MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU – SHENZHEN – HONG KONG EXPRESS RAIL LINK

(No. EP-349/2009/N)

Commissioning Test Report

Part I - Fixed Plant Noise at Kwai Chung Ventilation Building (KCV)
Part II - Fixed Plant Noise at Pat Heung (PHV), Nam Cheong (NCV) and Mongkok West (MKV) Ventilation Buildings
Part III - Fixed Plant Noise at Mai Po (MPV), Ngau Tam Mei (NTV) and Shing Mun (SMV) Ventilation Buildings; ERS Plant Building – North (SPN) and ERS Plant Building - South (SPS)
Part IV - Fixed Plant Noise at West Kowloon Station (WEK) and Public Transport Interchange (PTI)
Part V - Fixed Plant Noise at Shek Kong Stabling Sidings (SSS)
Part VI - Train Noise

Verified by :

(Eric Ching)

Position : Independent Environmental Checker

Date : 12 Sep 2018

MTR Corporation Limited

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Part VI - Train Noise

Certified by :
(Raymond Wong)

Position : Environmental Team Leader

Date : 12 September 2018

Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL)

Commissioning Test Report for the Fixed Plant Noise at Kwai Chung Ventilation Building (KCV)

MTR Corporation

May 2018

1 Introduction

The Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) Project (hereinafter known as "XRL") covers a 26km long underground rail line on dedicated tracks that run between the terminus in West Kowloon and the boundary at Huanggang, where connects with the XRL Mainland section. XRL Project also includes the construction of ventilation buildings, emergency access points, stabling sidings and maintenance facilities and an emergency rescue siding (ERS) (formerly known as rescue emergency station).

The Environmental Impact Assessment (EIA) Report (Register No.: AEIA-143/2009) was approved on 28 September 2009 by the Director of Environmental Protection (DEP) under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, an environmental permit (EP) was granted on 16 October 2009 (EP No: EP-349/2009) for the construction and operation of the Project. Variations of environmental permit (VEP) were subsequently applied and the latest Environmental Permit (EP No: EP-349/2009/M) (hereinafter known as "the EP") was issued by Director of Environmental Protection (DEP) on 25 June 2018.

This report is prepared with reference to EP Condition 2.36, "*The Permit Holder shall, no later than two weeks before the commencement of the operation of the Project, deposit with the Director a Commissioning Test Report to confirm the compliance of the operational air-borne and ground-borne noise levels in accordance with the EIA Report and the application for variation of an environmental permit No. VEP-377/2012 and its attached documents".*

MTR Corporation has prepared the Commissioning Test Report for Fixed Plant Noise for the noise measurement to show the compliance of noise criteria in accordance with the EIA Report and the EP; also the noise measurement for investigation of any tonal, impulsive and intermittent characteristics from the fixed plant noise sources. This report presents the noise measurement methodology, calculated Sound Power Levels from noise measurements, results of noise measurement for the fixed plant noise sources installed at Kwai Chung Ventilation Building (KCV) and confirming any characteristics of tonality, impulsiveness and intermittency. For the fixed plant noise verification at the other ventilation buildings and West Kowloon Terminal (WKT) areas, separate reports would be submitted.

2 Noise Criteria

2.1 Fixed Plant Noise Criteria in EIA

With reference to the IND-TM under the Noise Control Ordinance (NCO), the relevant acceptable noise levels (ANL) where determined based on the area sensitivity rating (ASR). The fixed plant noise criteria for the representative noise sensitive receivers (NSRs) were determined in EIA as follow (whichever is lower):

- 5dB(A) below the appropriate ANL set out in the IND-TM (the ANL-5dB(A) criterion); or

- The prevailing background noise levels where the prevailing background noise level is 5dB(A) below the appropriate ANL (i.e. ANL-5dB(A))

The noise criteria above were determined for planning purpose. While for operation, the fixed plant noise is controlled by a Noise Abatement Notices system governed by the NCO.

The fixed plant noise criteria for the NSR along the XRL alignment in KCV area, with the latest status of representative NSR, are presented in **Table 2.1** below. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied, where applicable, in accordance with IND-TM during the commissioning test.

Table 2.1 Summary of Fixed Plant Noise Criteria

NSR	Description	Area Sensitivity Rating (ASR) [(a)]	Noise Criteria, dB(A) [(a)]	
			Day and Evening Time	Night-time
Kwai Chung Ventilation Building (KCV) ***(Figure 2.1)***				
KC1	Kwai Oi House, Kwai Fong Estate	B	60	50

Note:

(a) ASR and noise criteria either follow that defined in the EIA Report or relevant application for variation of environmental permit (VEP-377/2012) where appropriate.

Fixed plant noise sources include: ventilation fans for building services, and plenum for tunnel ventilation, which are generally located inside plant rooms. Noise generated from indoor fixed plants would be emitted through louvres. The worst case scenario is when all eligible fixed plants at the same location operating concurrently under “normal scenario” for XRL operation during daytime and evening time periods; and night-time period, respectively. The worst case scenario was considered for compliance check against the fixed plant noise criteria and the noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs.

Table 2.2 below summarised the information of the fixed plant noise sources and the layout plan is shown in **Figure 2.2**

Table 2.2 Summary of Fixed Plant Noise Sources

Source Location	Direction Facing	Louvre ID
Kwai Chung Ventilation Building (KCV) ***(Figure 2.2)***		
Tunnel ventilation shaft	North	N1
FS control room/Corridor/Irrigation pump room	North	N2
UPS room	North	N3
LV switch room	North	N4
Air compression receiver room	North	N5
Smoke extraction fan	North	N6
Fresh air louvre	East	E1

Source Location	**Direction Facing**	**Louvre ID**
Kwai Chung Ventilation Building (KCV) ***(Figure 2.2)***		
Exhaust air louvre	East	E2
Staircase pressurization fan room	East	E3
Tunnel ventilation shaft	South	S1
P&D pump and tank room	South	S2
MCC room	South	S3
TECS control room	South	S4
Tunnel ventilation shaft	West	W1
Tunnel ventilation shaft	West	W2
Staircase pressurization fan room	West	W3
Smoke extraction make-up room	West	W4

3 Methodology

3.1 Noise Measurement for the Fixed Plants

Noise measurements to obtain the noise levels of the fixed plants were undertaken by Supreme Acoustics Research Limited, GAS Joint Venture and ATAL Building Services Engineering Ltd. The commissioning tests were carried out by qualified persons possessing at least 7 years of noise control experience and a corporate member of Hong Kong Institute of Acoustics or equivalent in accordance with S3.22 of the XRL EM&A Manual.

3.1.1 Methodology

Three measurement methods, namely Method 1 (at or near NSR), Method 2 (Far Field) and Method 3 (Near Field), have been developed based on NCO-TM, basic acoustic principles and *ISO 3746-2010: Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane*, respectively. Given the fixed plant noise sources are steady, all proposed methods could be adopted for all types of fixed plant source depending on the site environment/constraints that might affect the possibility to obtain valid results, considerations including but not limited to:

- Background noise with less influence to the measured noise levels
- Free of obstacles between measurement location and noise source
- Accessibility and Safety Concerns

Considering the reliability of data collection, i.e., results not influenced by the above-mentioned considerations, and the measurement efficiency on site, the selection of methodology was prioritized based on efficient measurement as Method 1 (at or near NSR) > Method 2 (Far Field) > Method 3 (Near Field). For Kwai Chung Ventilation Building (KCV), considering there are other building structures between the NSR and noise sources, also the heavily trafficked Kwai Chung Road was immediately in front of the NSR; obtaining valid results using Method 1 was considered unlikely. As such, only Method 2 and Method 3 were considered applicable. Method used for each louvre is presented in Appendix A3. Details of the measurement methodology are shown in **Appendix A1**.

Method 1 – Measuring Sound Pressure Level at NSR or Near NSR

- Measurement at NSR or near NSR at distance *D* away from the louvre, where D was at least two times the largest dimension b of the louvre and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the louvre and three measurements were taken when the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre was switched OFF
- The sound pressure level (SPL) at NSR or near NSR was determined by the following equation:

  Background corrected $L_p = L_p + BG$ - [20logD +8] (if applicable) + façade correction (if applicable)

  Where

  L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);

  BG is the background correction factor, in dB(A);

  D is separation between the center of louvre or surface of the plant and the microphone, in metres.

Method 2 – Measuring Sound Power Level by Far Field Method for Louvres or **for Plants**

- The microphone was positioned at the perpendicular distance *D* away from the center of the louvre or the surface of the plant, where D was at least two times the largest dimension b of the louvre or plant and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the center of the louvre/combined louvre area or the center the plant; and three measurements were taken when the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from the louvre or plant was switched OFF
- The sound power level (SWL) of the louvre or the plant was determined, based on basic acoustic principles, by the following equation:

$$L_w = L_p + 20\log D{,}center + 8 + BG$$

  Where

  L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);

  D,center is separation between the center of louvre or plant and the microphone, in metres;

  BG is the background correction factor, in dB(A).

Method 3 – Measuring Sound Power Level by Near Field Method for Louvres or **for Plants**

- A right parallelepiped hypothetical measurement box for each louvre or each surface of a plant was determined according to ISO 3746, with each side being spaced a distance *D* from the corresponding side of the louvre or plant
- Each of the 5 planes of the measurement box was subdivided into equal-sized rectangular grids, the length of each side of the grids should be less than or equal to 3 times of distance D, i.e. grid length $\leq 3D$
- The microphone was pointing toward the center of each grid, and a measurement was taken for each grid during the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre or plant was switched OFF
- The SWL of the louvre or the plant was determined by the following equation:

$$L_w = L_p + 10log(S) - K_{1A} - K_{2A}$$

Where
L_p is the averaged measured L_{eq} of all measurement points, in dB(A);
S is the total surface area over the measurement box (total 5 planes), in m^2;
K_{1A} is the background correction factor as described in *ISO 3746:2010*, in dB(A);
K_{2A} is the environmental correction for sound absorption and reflection as described in *ISO 3746:2010*, in dB(A).

Except for Method 3, which was adopted with reference to ISO 3746; the noise sources measured using Method 1 or Method 2 were considered steady if the difference between the maximum and minimum Leq is less than or equal to 1dB(A), ie, ≤1dB(A); average Leq was therefore considered. Otherwise, the maximum Leq would be adopted for SWL determination as a conservative approach.

3.1.2 Measurement Equipment

The sound level meters and calibrators used for noise measurements are listed in **Table 3.1**. The instruments complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in **Appendix A2a**.

Table 3.1 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	NTi XL2	5011
	NTi XL2	5617
	NTi XL2	6240
	Casella CEL-63X	5044655
Calibrator	BSWA TECH CA111	320248
	Casella CEL-120/1	5060836

Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

3.1.3 Measurement Schedule

The noise measurements were carried out during daytime, evening time and night-time periods, where the fixed plant items were operated steadily and continuously at their noisiest operating mode under normal scenario. The noise measurement schedule is shown in **Table 3.2**.

Table 3.2 Measurement Schedule

Location	Date	Time
KCV	25 - 26 April 2017	22:00 – 04:00
	22 September 2017	18:00 – 21:30
	6 October 2017	15:30 – 16:00

3.2 Noise Measurement to Confirm Any Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

3.2.1 Measurement Equipment

The sound level meters and calibrators used for noise measurements are listed in **Table 3.3**. The instruments complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in **Appendix A2b**.

Table 3.3 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	Larson Davis 831	0002594
Calibrator	B&K 4231	2084888

3.2.2 Measurement Parameters

With reference to the IND-TM, the noise measurement was conducted at the representative NSR for $L_{Aeq\ (30min)}$, in one-third octave band under the worst case scenario, ie, "normal scenario" during daytime and evening time periods; and night-time period, respectively.

The fixed plant noise sources will be operated steadily and continuously, and therefore no intermittency and impulsiveness are expected at the NSR. However, the characteristics of intermittency and impulsiveness will be recorded, if any, based on observation during measurement.

2 sets of background noise level, $L_{Aeq\ (5min)}$, and in one-third octave band, were measured at each measurement location when all fixed plant noise sources were not in operation.

3.2.3 Measurement Location

The noise measurement was carried out at the first layer of NSRs for the concerned area. For KCV, the representative NSR is Kwai Oi House, Kwai Fong Estate (KC1). The measurement location is shown in **Figure 2.1**.

3.2.4 Measurement Schedule

The noise measurements were carried out at the monitoring location for KCV, where the fixed plant items were operated steadily and continuously at their noisiest operating mode under normal scenario. The noise measurement schedule is shown in **Table 3.4**.

Table 3.4 Measurement Schedule

Location	Date
KCV	13 - 14 February 2018

4 Measurement Results

4.1 The Noise Levels of Fixed Plant Noise Sources

The noise levels measured under the worst case scenario are determined and presented in **Table 4.1**. Details of the measurement results are shown in **Appendix A3**.

Table 4.1 Summary of Sound Power Levels for Fixed Plants

Works Area	Direction Facing/ Elevation	Calculated SWL L_{Aeq}, dB(A)
KCV	North N1	95
	North N2	78
	North N3	72
	North N4	89
	North N5	81
	North N6 [(a)]	99
	East E1	71
	East E2	67
	East E3 [(a)]	89
	South S1	94
	South S2	77
	South S3	87
	South S4 [(a)]	100
	West W1	91
	West W2	89
	West W3 [(a)]	85
	West W4 [(a)]	110

Note:

(a) The plant would be operated during day and evening time only under normal scenario.

A compliance check against the fixed plant noise criteria at NSR was conducted. The cumulative noise levels from noise sources were assessed to ensure the compliance with the noise criterion. **Table 4.2** shows the results, details of the calculation are also given in **Appendix A3**.

Table 4.2 Cumulative Fixed Plant Noise at NSR

NSR	Source Location	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
KC1	Ventilation Shaft for N/B [(a)] and Building Service	46	33	60	50	Y	Y
KC1	Ventilation Shaft for S/B [(a)] and Building Service	46	33	60	50	Y	Y

Note:

(a) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

4.2 The Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

Noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs were conducted under the normal scenarios during daytime and evening, and during night-time, respectively and summarised in **Table 4.3** below. In each scenario, two sets of noise measurements, $L_{Aeq(30min)}$, in one-third octave band, were carried out to confirm that the difference in the measured noise levels with and without operation of fixed plant noise sources were less than 3.0 dB(A). That means the fixed plant noise sources from the ventilation building are not considered as significant noise sources at the NSR. Noise measurements at NSR KC1 (Kwai Oi House, Kwai Fong Estate) were dominated by road traffic noise; characteristics of tonality, impulsiveness and intermittency due to the fixed plant noise sources from KCV was not noticeable during the measurement. Detailed results of noise measurements are shown in **Appendix A4**.

Table 4.3 Noise measurement Results at NSR

NSR	Scenario	Measured Noise Level $L_{Aeq(30min)}$, dB(A), (measurement time)	Averaged Background Level $L_{Aeq(5min)}$, dB(A), (measurement time)	Difference between Measured Noise Level and Background Level, dB(A), (< 3 or >= 3)
KC1	Day and Evening Time	63.8 (22:01 – 22:31) 63.7 (22:31 – 23:01)	63.5 (21:12 –:28)	< 3
	Night-time	63.1 (23:39 – 00.09) 62.5 (00:10 – 00:40)	61.2 (00:46 –01:02)	< 3

As the differences between measured noise levels and background levels are all less than 3.0 dB(A), it was unable to obtain reliable corrected noise levels at the NSRs and corrections for tonality, impulsiveness or intermittency were therefore not applicable.

5 Conclusions

To fulfil the XRL EP condition 2.36, the fixed plant noise verification were undertaken and the measurement results indicated all the fixed plant noise levels in KCV are in compliance with the fixed plant noise criteria.

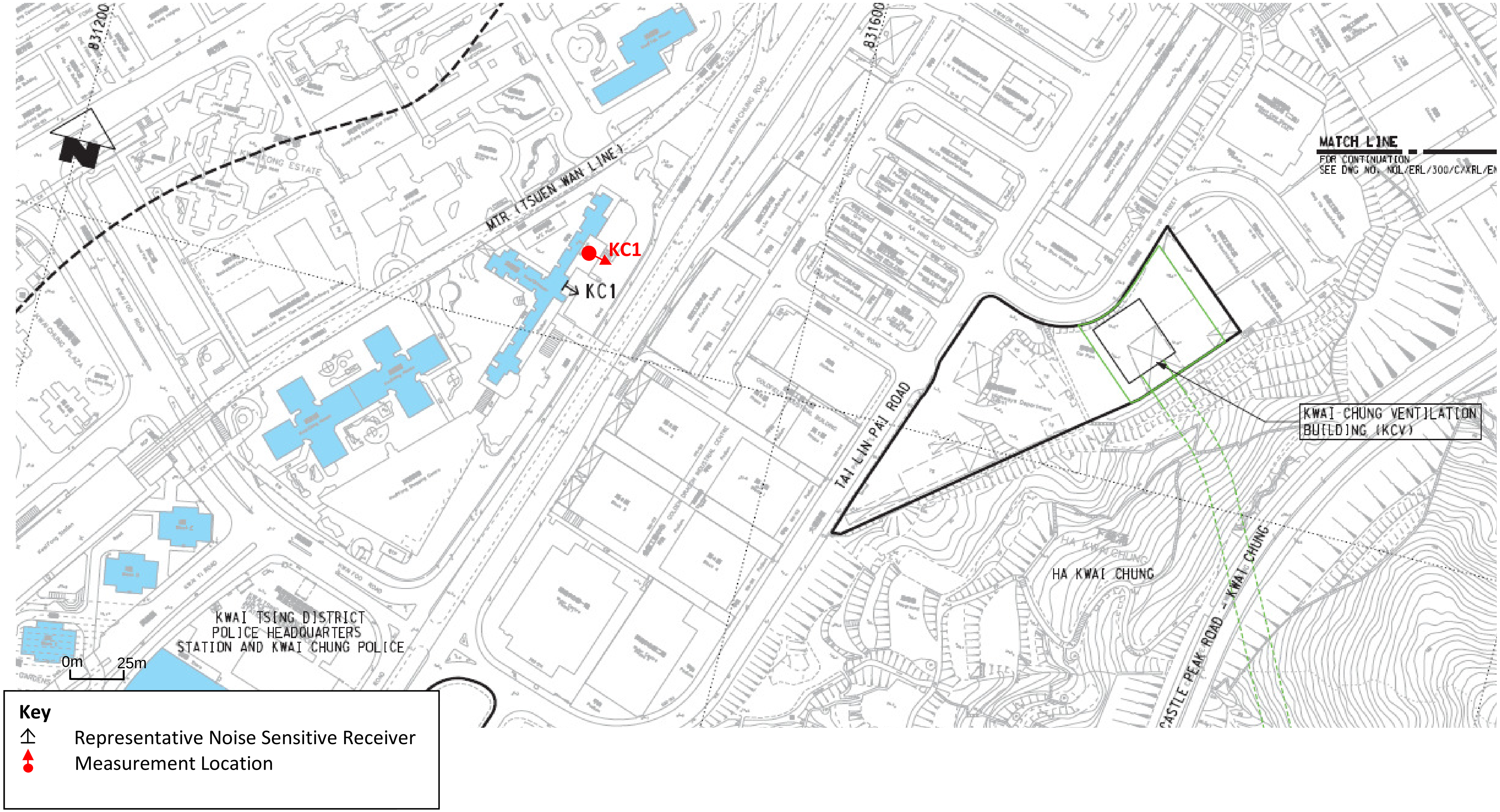


Figure 2.1 – Representative Noise Sensitive Receiver (NSR) and Noise Measurement Location for KCV

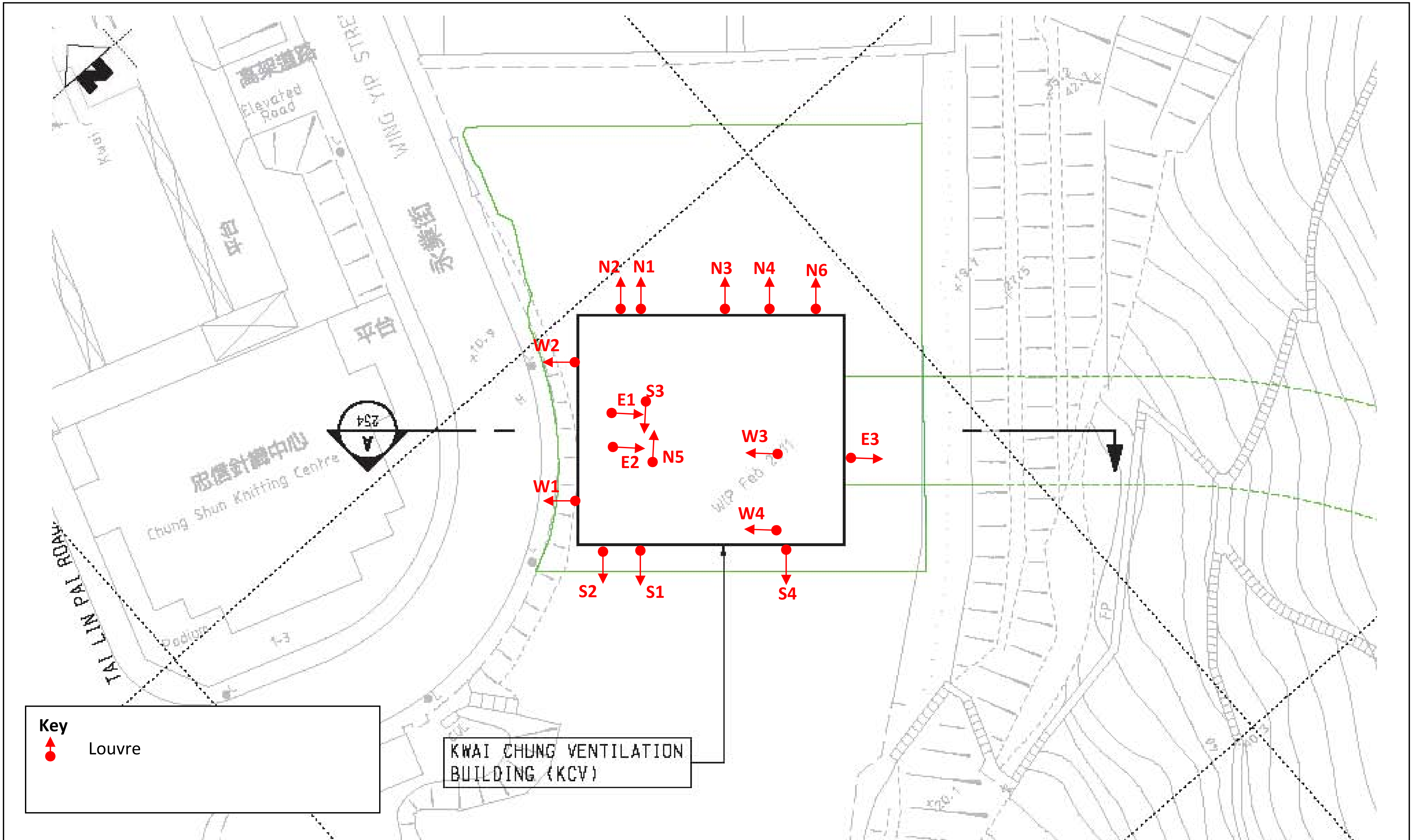


Figure 2.2 – Site layout and Fixed Plant Sources at KCV

Appendix A1 –Measurement Methodology

XRL Fixed Plant Noise Test Plan

BY : MTR XRL Env Team

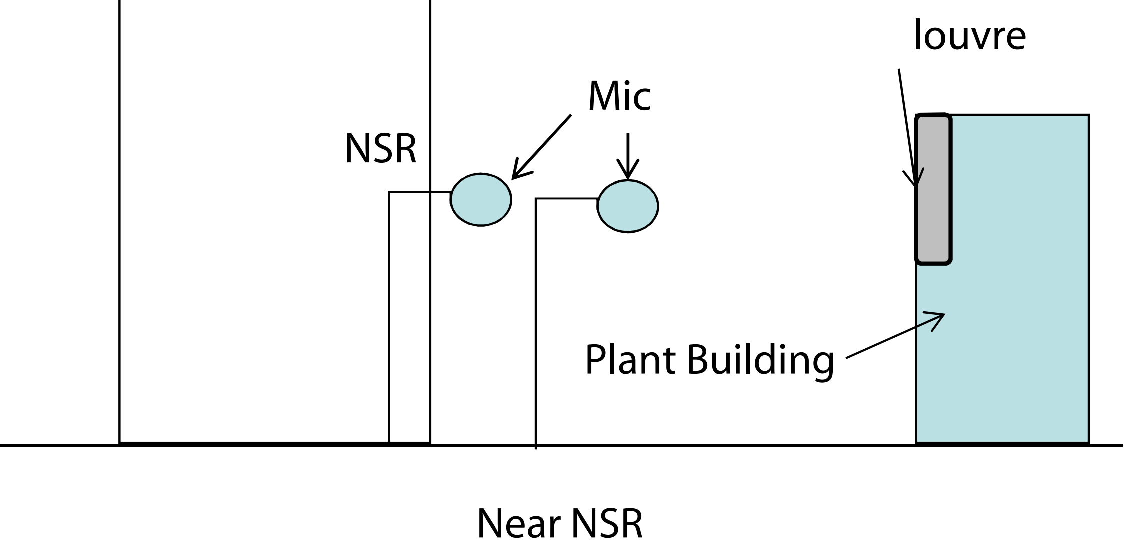
Summary of Testing Methodology

Method	Standard	No of repeated measurement	No of measurement point	Measurement distance, D	To Verify
Method 1 (NSR Method)	NCO - TM	3 sets of Leq 1min	Depend on number of NSRs nearby	At the most affected NSR or near NSR	ANL-5 or Background Prevailing
Method 2 (Far Field Method)	Basic Acoustic Principle	3 sets of Leq 1min	1 (for louvre/plant with uniform plane source)	D ≧2b and roundup to integer	ANL-5 or Background Prevailing
Method 3 (Near Field Method)	Developed based on ISO3746:2010	1 set of Leq 10s [(a)] /1min	Depend on the size of the louvre/plant and the measurement distance should follow guideline in ISO3746	At least 1m from the louvre opening/plant (unless otherwise specified)	ANL-5 or Background Prevailing

Note :
(a) If fixed plant items are operated at their noisiest operating modes and are steady during measurement, 10-second will be adopted for the duration of measurement.

Method 1 – Sound Pressure Level at NSR or Near NSR for louvre or Plant

"b" is the long side of the louvre
"D" is the separation between louvre and microphone



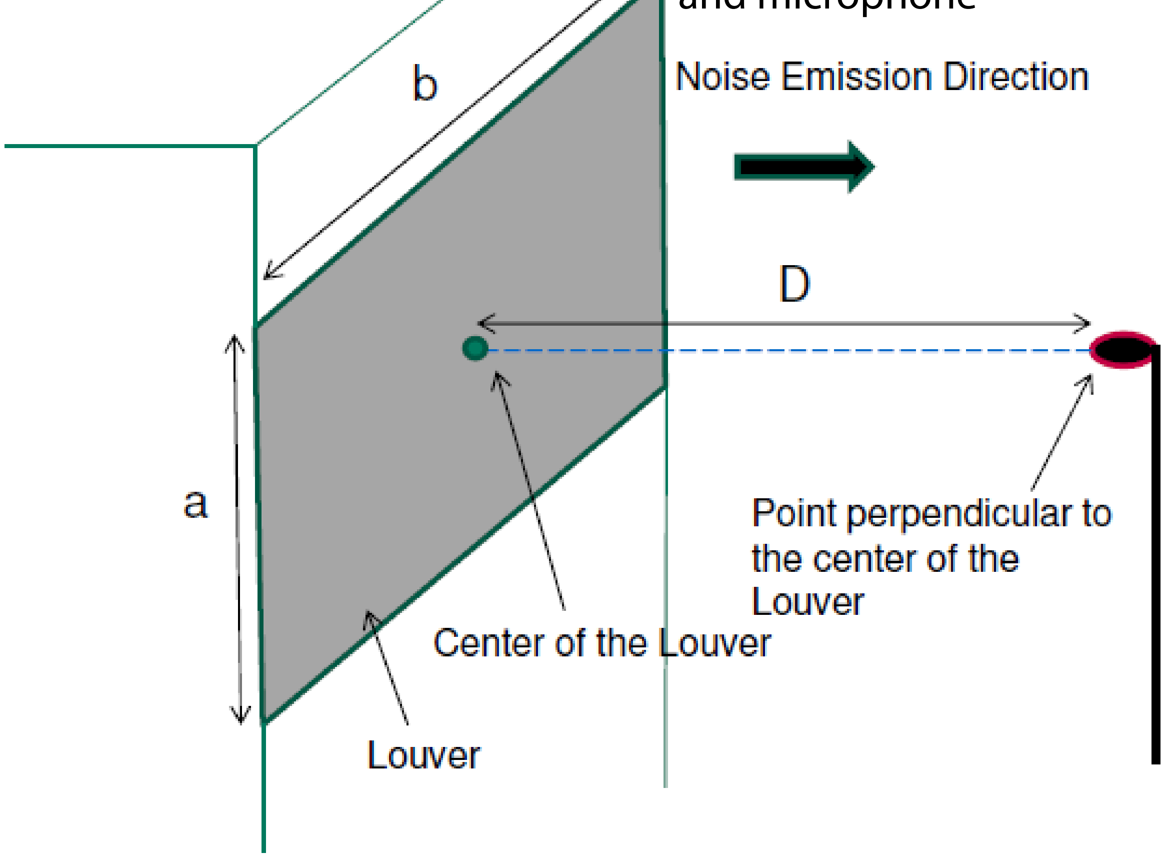
- Based on NCO - TM
- The locations of measurement points are depended on the site situation
- 3.0 dB façade correction should be considered if the location of measurement point is not at assessment point as defined in NCO-TM
- "D" must be greater than 2b and roundup to integer
- Detail calculation of the SPL should refer to the NCO-TM.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

Background corrected SPL = Mean $L_{Aeq1min}$ + BG - [20log (D) +8] (if applicable) + façade correction (if applicable)

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for louvre

"a" is the short side of the louvre
"b" is the long side of the louvre
"D" is the separation between louvre and microphone



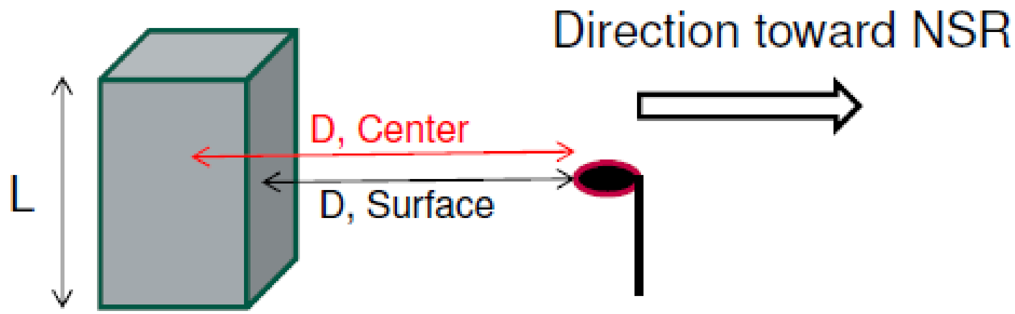
- Based on basic acoustic principle
- "D" must be greater than 2b and roundup to integer, i.e.: D≧2b
- The microphone must point to the center of the louvre.
- At least 3 sets of LAeq, 1min should be obtained
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 +BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for Plant

"L" is the longest side of the plant item
"D, Center" is the separation between center of the plant item and microphone
"D, Surface" is the separation between surface of the plant item and microphone

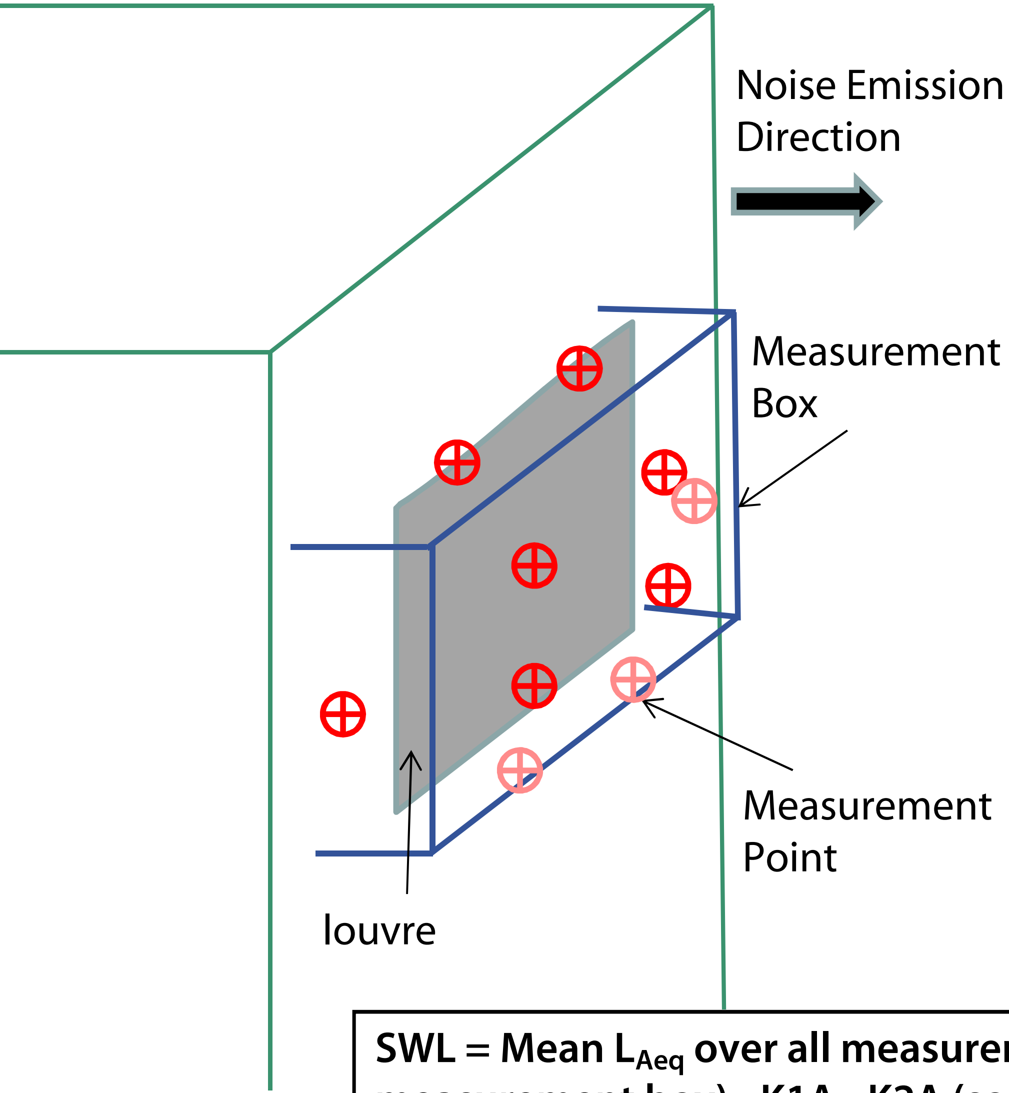


- "D, Surface" must be greater than twice of L (2L) and roundup to integer
- The microphone must be pointing to the center of the plant
- At least 3 sets of LAeq, 1min should be obtained at each measurement point.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 + BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 3 – Near Field Sound Power Testing Method for louvre

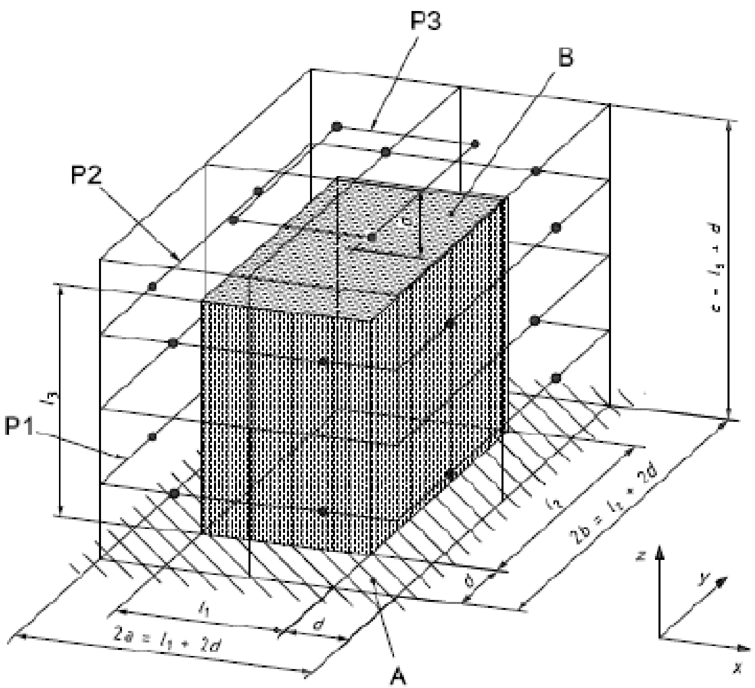


- Based on the principle of ISO3746 – 2010
- First step is to determine a hypothetical measurement surface /box with not less than 1m separation from the louvre.
- Second, determine the location of measurement point in accordance with the latest edition of ISO3746.
- Background noise level (BGL) should be taken at each measurement point for determination of background correction (K1A)
- At least 1 set of Leq, 10s/1min should be obtained at each measurement point
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Details calculation of the SWL should refer to the latest edition of ISO3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 3 – Near Field Sound Power Testing Method for Plant



Key

- Based on ISO 3746
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalised (See figure on the left for example).
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Detail calculation of the SWL should refer to the latest edition of ISO 3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

End

Appendix A2 – Calibration Certificates

Appendix A2a – Calibration Certificates (Noise Measurement for the Fixed Plants)

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**
  consisting of
  MA220 Serial Number: 6240
  Capsule Serial Number: 9498

- Certificate Issued: **10 January 2017**
- Certificate Number: **42745-6240-M2230**
- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

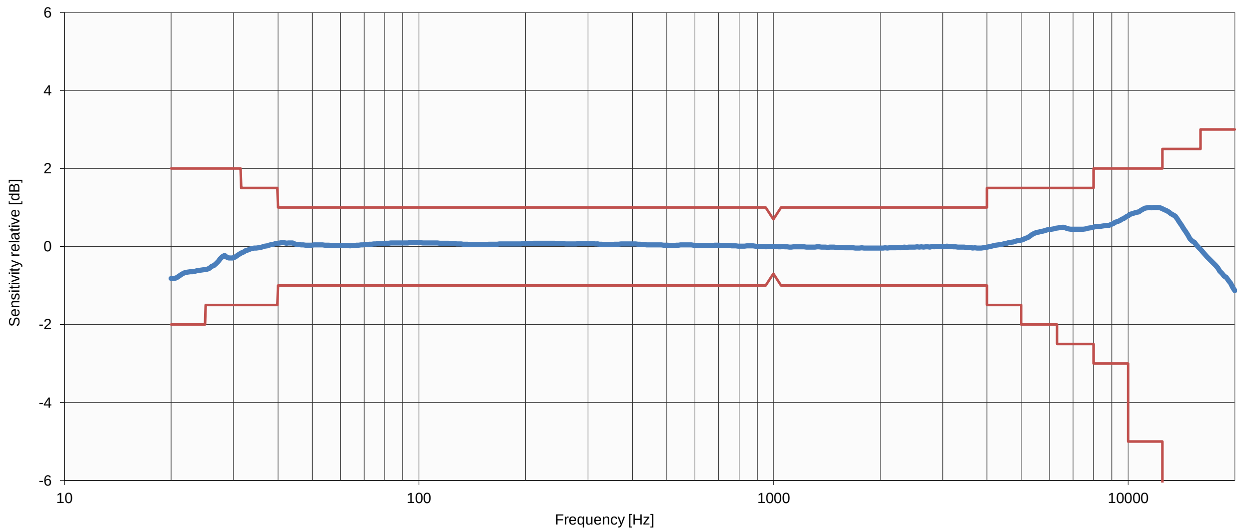
Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date:	10 January 2017			
Calibration of:	M2230	Measurement Microphone		
		MA220	Serial Number:	6240
		Capsule	Serial Number:	9498

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**43.3 mV/Pa**	±2.85%

• Test Conditions:	Temperature:	27.2 °C	±0.5 °C
	Relative Humidity:	39.5 %	±2%
	Air Pressure:	95.94 kPa	±0.25 kPa

- Calibration Equipment Used:

  - Norsonic Sound Calibrator, Type 1251, S/No. 30930
    Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
    Calibrated by Metas, Switzerland

  - NTi Audio FX100, S/No. 11094
    Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
    Calibrated by NTi Audio meeting product specifications

  - MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
    Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
    Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**
  consisting of
  MA220 Serial Number: 5011
  Capsule Serial Number: 7698

- Certificate Issued: **24 March 2017**

- Certificate Number: **42818-5011-M2230**

- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

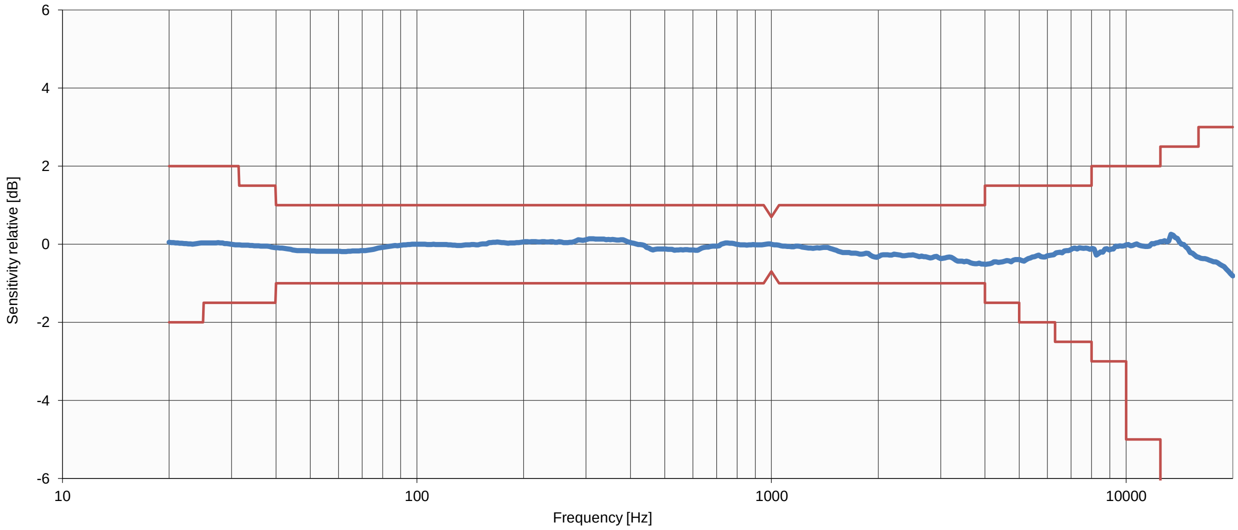
Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date:	24 March 2017			
Calibration of:	M2230	Measurement Microphone		
		MA220	Serial Number:	5011
		Capsule	Serial Number:	7698

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**46.5 mV/Pa**	±2.85%

- Test Conditions:

Test Conditions:	Temperature:	21.1 °C	±0.5 °C
	Relative Humidity:	47.2 %	±2%
	Air Pressure:	97.4 kPa	±0.25 kPa

- Calibration Equipment Used:

- Norsonic Sound Calibrator, Type 1251, S/No. 30930
  Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
  Calibrated by Metas, Switzerland

- NTi Audio FX100, S/No. 11094
  Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
  Calibrated by NTi Audio meeting product specifications

- MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
  Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
  Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**
  consisting of
  MA220 Serial Number: 5617
  Capsule Serial Number: 8507

- Certificate Issued: **24 March 2017**

- Certificate Number: **42818-5617-M2230**

- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

Signature:

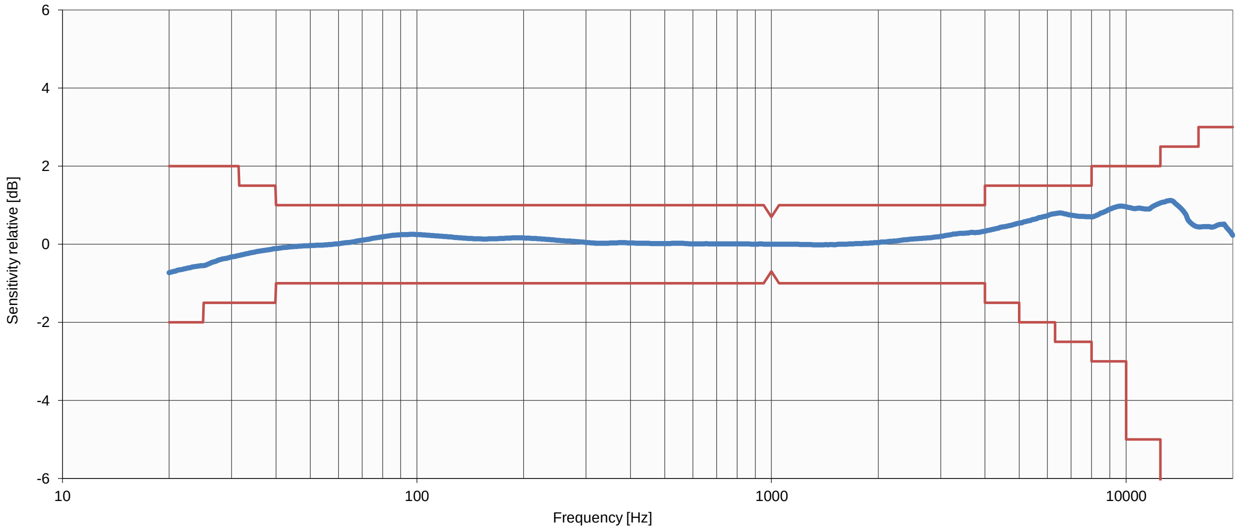
Stamp:

NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date:	24 March 2017			
Calibration of:	M2230	Measurement Microphone		
		MA220	Serial Number:	5617
		Capsule	Serial Number:	8507

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**48.1 mV/Pa**	±2.85%

- Test Conditions:

Test Conditions:	Temperature:	24.6 °C	±0.5 °C
	Relative Humidity:	43.6 %	±2%
	Air Pressure:	97.65 kPa	±0.25 kPa

- Calibration Equipment Used:

  - Norsonic Sound Calibrator, Type 1251, S/No. 30930
    Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
    Calibrated by Metas, Switzerland

  - NTi Audio FX100, S/No. 11094
    Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
    Calibrated by NTi Audio meeting product specifications

  - MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
    Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
    Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Calibration Chart

BSWA TECH

BSWA-IV-C021-03-0048A

Sound Calibrator model	CA111
Serial Number	320248
Appearance	OK
Power Supply	1.5V LR6 (AA battery) x2
Sound Pressure Level	93.93 / 114.02 dB
Frequency	1000.5 / 1000.5 Hz
THD (@1000Hz)	0.39 / 0.95 %

Copying and using select parts, or tampering with this document without the permission of BSWA is forbidden!

BSWA Technology Ltd.

www.bswa-tech.com

This equipment was calibrated at the following ambient conditions:

Temperature:	23 ℃
Humidity:	35 %RH
Pressure:	1025 hPa

This equipment is qualified!

Calibrated

2016-11-15

Date

QC
05

Appendix A2b – Calibration Certificates (Noise Measurement to Confirm Any Characteristics of Tonality, Impulsiveness and Intermittency at NSRs)

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. **706817**

Customer : Supreme Acoustics Research Limited.
Address : Rm3915, Hong Kong Plaza, 188 Connaught Road West, Hong Kong
Order No. : Q72718 **Date of receipt :** 13-Jul-17

Item Tested

Description : Sound Level Meter
Manufacturer : Larson Davis **I.D. :** SLM No.1
Model : 831 **Serial No. :** 0002594

Test Conditions

Date of Test : 25-Jul-17 **Supply Voltage :** --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure: Z01, IEC 61672.

Test Results

All results were within the IEC 61672 Type 1 or manufacturer's specification.
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C170120	SCL-HKSAR
S240	Sound Level Calibrator	703741	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Elva Chong

Approved by : Alan Chu

Date: 25-Jul-17

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

Calibration Certificate

Results :

1. **Self-generated noise:** 20.3 dBA (Mfr's Spec ≤ 19 dBA)

2. **Acoustical signal test**

UUT Setting			Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting		
20-140	A	F	94.0	94.0
		S		94.0
	C	F		94.0
	Z	F		94.0
	A	F	114.0	114.1
		S		114.1
	C	F		114.1
	Z	F		114.1

IEC 61672 Class 2 Spec. : ± 1.4 dB
Uncertainty : ± 0.1 dB

3 **Electrical signal tests of frequency weightings** (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Class 2 Spec.
31.5 Hz	-39.6	- 39.4 dB, ± 3.5 dB
63 Hz	-26.3	- 26.2 dB, ± 2.5 dB
125 Hz	-16.3	- 16.1 dB, ± 2.0 dB
250 Hz	-8.8	- 8.6 dB, ± 1.9 dB
500 Hz	-3.3	- 3.2 dB, ± 1.9 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.4 dB
2 kHz	+1.4	+ 1.2 dB, ± 2.6 dB
4 kHz	+1.9	+ 1.0 dB, ± 3.6 dB
8 kHz	+1.8	- 1.1 dB, ± 5.6 dB
16 kHz	-1.3	- 6.6 dB, + 6.0 dB ~ ∞ dB

Uncertainty : ± 0.1 dB

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Class 2 Spec.
A	94.0	94.0 (Ref.)	- -	± 0.4 dB
C	94.0	94.0	0.0	

4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Class 2 Spec.
Fast	94.0	94.0 (Ref.)	- -	± 0.3 dB
Slow	94.0	94.0	0.0	

Uncertainty : ± 0.1 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 024 hPa.
4. Power Supply Check: OK
5. Preamplifier model : PRM831 , S/N : 019083
6. Microphone model: 377B02 , S/N : 126167
7. T he UUT was adjusted with the laboratory's sound calibrator at the reference sound pressure level before the calibration.

---------- END ----------

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 707077

Customer : Supreme Acoustics Research Limited.
Address : Rm3915, Hong Kong Plaza, 188 Connaught Road West, Hong Kong
Order No. : Q72409 **Date of receipt :** 20-Jul-17

Item Tested

Description : Sound Level Calibrator
Manufacturer : B&K
Model : Type 4231
I.D. : No.003
Serial No. : 2084888

Test Conditions

Date of Test : 24-Jul-17
Ambient Temperature : (23 ± 3)°C
Supply Voltage : --
Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure : F21, Z02, IEC 60942.

Test Results

All results were within the IEC 60942 Class 1 specification.
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S014	Spectrum Analyzer	707126	NIM-PRC & SCL-HKSAR
S240	Sound Level Calibrator	703741	NIM-PRC & SCL-HKSAR
S041	Universal Counter	607883	SCL-HKSAR
S206	Sound Level Meter	605757	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Elva Chong

Approved by : Alan Chu

Date: 24-Jul-17

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

EO

Calibration Certificate

Results :

1. Generated Sound Pressure Level

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94	94.1	± 0.4 dB
114	114.2	

Uncertainty : ± 0.1 dB

2. **Short-term Level Fluctuation** : 0.0 dB
IEC 60942 Class 1 Spec. : ± 0.1 dB
Uncertainty : ± 0.01 dB

3. Frequency

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	0.999 9	± 1 %

Uncertainty : ± 3.6 x 10^{-6}

4. **Total Distortion** : < 0.6 %
IEC 60942 Class 1 Spec. : < 3 %
Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 023 hPa.

---------- END ----------

Appendix A3 – Fixed Plant Noise Summary

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Height	Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
KC1	Kwai Oi House, Kwai Fong Estate	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	10.03	12.30	3	3	499.2	67.8	53.6	14.2	67.8	95	309	10	30	46	60	0
			FS control room/Corridor /Irrigation pump room	N2	L	Y	2.00	0.80	2	4	n/a	60.3	57.1	3.2	57.5	78	309	10	13			
			UPS room	N3	L	Y	0.80	1.00	2	2	n/a	60.5	57.1	3.4	57.8	72	309	10	7			
			LV switch room	N4	L	Y	5.00	1.00	2	10	n/a	62.2	57.1	5.1	60.6	89	309	10	24			
			Air compression receiver room	N5	L	Y	1.20	0.80	2	3	n/a	63.9	55.5	8.4	63.2	81	284	10	17			
			Smoke extraction fan	N6	L	Y	4.60	3.60	3	1	61.4	81.6	60.4	21.2	81.6	99	309	10	34			
			Fresh air louvre	E1	L	Y	3.50	3.60	3	0.5	29.8	59.7	57.8	1.9	56.7	71	284	10	7			
			Exhaust air louvre	E2	L	Y	2.80	2.20	3	0.5	19.2	57.5	57.8	-0.3	54.5	67	284	10	3			
			Staircase pressurization fan room	E3	L	Y	2.40	3.00	2	6	n/a	65.2	53.2	12	65.2	89	307	10	24			
			Tunnel ventilation shaft	S1	L	N (i)	11.45	12.30	3	3	533.8	66.4	56.2	10.2	66.4	94	284	-				
			P&D pump and tank room	S2	L	Y	1.00	1.00	2	2	n/a	65.4	61.2	4.2	63.3	77	284	10	13			
			MCC room	S3	L	Y	1.50	1.00	2	3	n/a	69.6	55.5	14.1	69.6	87	284	10	23			
			TECS control room	S4	L	Y	2.00	1.00	2	4	n/a	80.4	60.6	19.8	80.4	100	284	10	36			
			Tunnel ventilation shaft	W1	L	N (i)	7.08	4.70	3	3	282.6	66.1	54.1	12	66.1	91	284	-				
			Tunnel ventilation shaft	W2	L	Y	7.08	2.60	3	3	242.5	65.2	52.3	12.9	65.2	89	299	10	24			
			Staircase pressurization fan room	W3	L	Y	2.40	2.00	2	5	n/a	64.2	58.3	5.9	62.9	85	299	10	20			
			Smoke extraction make-up room	W4	L	Y	2.40	3.00	2	6	n/a	86.4	58.3	28.1	86.4	110	299	10	45			
KC1	Kwai Oi House, Kwai Fong Estate	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	10.03	12.30	3	3	499.2	67.8	53.6	14.2	67.8	95	309	-		46	60	0
			FS control room/Corridor /Irrigation pump room	N2	L	Y	2.00	0.80	2	4	n/a	60.3	57.1	3.2	57.5	78	309	10	13			
			UPS room	N3	L	Y	0.80	1.00	2	2	n/a	60.5	57.1	3.4	57.8	72	309	10	7			
			LV switch room	N4	L	Y	5.00	1.00	2	10	n/a	62.2	57.1	5.1	60.6	89	309	10	24			
			Air compression receiver room	N5	L	Y	1.20	0.80	2	3	n/a	63.9	55.5	8.4	63.2	81	284	10	17			
			Smoke extraction fan	N6	L	Y	4.60	3.60	3	1	61.4	81.6	60.4	21.2	81.6	99	309	10	34			
			Fresh air louvre	E1	L	Y	3.50	3.60	3	0.5	29.8	59.7	57.8	1.9	56.7	71	284	10	7			
			Exhaust air louvre	E2	L	Y	2.80	2.20	3	0.5	19.2	57.5	57.8	-0.3	54.5	67	284	10	3			
			Staircase pressurization fan room	E3	L	Y	2.40	3.00	2	6	n/a	65.2	53.2	12.0	65.2	89	307	10	24			
			Tunnel ventilation shaft	S1	L	Y	11.45	12.30	3	3	533.8	66.4	56.2	10.2	66.4	94	284	10	30			
			P&D pump and tank room	S2	L	Y	1.00	1.00	2	2	n/a	65.4	61.2	4.2	63.3	77	284	10	13			
			MCC room	S3	L	Y	1.50	1.00	2	3	n/a	69.6	55.5	14.1	69.6	87	284	10	23			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
			TECS control room	S4	L	Y	2.00	1.00	2	4	n/a	80.4	60.6	19.8	80.4	100	284	10	36			
			Tunnel ventilation shaft	W1	L	Y	7.08	4.70	3	3	282.6	66.1	54.1	12.0	66.1	91	284	10	27			
			Tunnel ventilation shaft	W2	L	N (i)	7.08	2.60	3	3	242.5	65.2	52.3	12.9	65.2	89	299	-				
			Staircase pressurization fan room	W3	L	Y	2.40	2.00	2	5	n/a	64.2	58.3	5.9	62.9	85	299	10	20			
			Smoke extraction make-up room	W4	L	Y	2.40	3.00	2	6	n/a	86.4	58.3	28.1	86.4	110	299	10	45			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
KC1	Kwai Oi House, Kwai Fong Estate	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	10.03	12.30	3	3	499.2	67.8	53.6	14.2	67.8	95	309	10	30	33	50	0
			FS control room/Corridor /Irrigation pump room	N2	L	Y	2.00	0.80	2	4	n/a	60.3	57.1	3.2	57.5	78	309	10	13			
			UPS room	N3	L	Y	0.80	1.00	2	2	n/a	60.5	57.1	3.4	57.8	72	309	10	7			
			LV switch room	N4	L	Y	5.00	1.00	2	10	n/a	62.2	57.1	5.1	60.6	89	309	10	24			
			Air compression receiver room	N5	L	Y	1.20	0.80	2	3	n/a	63.9	55.5	8.4	63.2	81	284	10	17			
			Smoke extraction fan	N6	L	N (ii)	4.60	3.60	3	1	61.4	81.6	60.4	21.2	81.6	99	309	-				
			Fresh air louvre	E1	L	Y	3.50	3.60	3	0.5	29.8	59.7	57.8	1.9	56.7	71	284	10	7			
			Exhaust air louvre	E2	L	Y	2.80	2.20	3	0.5	19.2	57.5	57.8	-0.3	54.5	67	284	10	3			
			Staircase pressurization fan room	E3	L	N (ii)	2.40	3.00	2	6	n/a	65.2	53.2	12	65.2	89	307	-				
			Tunnel ventilation shaft	S1	L	N (i)	11.45	12.30	3	3	533.8	66.4	56.2	10.2	66.4	94	284	-				
			P&D pump and tank room	S2	L	Y	1.00	1.00	2	2	n/a	65.4	61.2	4.2	63.3	77	284	10	13			
			MCC room	S3	L	Y	1.50	1.00	2	3	n/a	69.6	55.5	14.1	69.6	87	284	10	23			
			TECS control room	S4	L	N (ii)	2.00	1.00	2	4	n/a	80.4	60.6	19.8	80.4	100	284	-				
			Tunnel ventilation shaft	W1	L	N (i)	7.08	4.70	3	3	282.6	66.1	54.1	12	66.1	91	284	-				
			Tunnel ventilation shaft	W2	L	Y	7.08	2.60	3	3	242.5	65.2	52.3	12.9	65.2	89	299	10	24			
			Staircase pressurization fan room	W3	L	N (ii)	2.40	2.00	2	5	n/a	64.2	58.3	5.9	62.9	85	299	-				
			Smoke extraction make-up room	W4	L	N (ii)	2.40	3.00	2	6	n/a	86.4	58.3	28.1	86.4	110	299	-				
KC1	Kwai Oi House, Kwai Fong Estate	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	10.03	12.30	3	3	499.2	67.8	53.6	14.2	67.8	95	309	-		33	50	0
			FS control room/Corridor /Irrigation pump room	N2	L	Y	2.00	0.80	2	4	n/a	60.3	57.1	3.2	57.5	78	309	10	13			
			UPS room	N3	L	Y	0.80	1.00	2	2	n/a	60.5	57.1	3.4	57.8	72	309	10	7			
			LV switch room	N4	L	Y	5.00	1.00	2	10	n/a	62.2	57.1	5.1	60.6	89	309	10	24			
			Air compression receiver room	N5	L	Y	1.20	0.80	2	3	n/a	63.9	55.5	8.4	63.2	81	284	10	17			
			Smoke extraction fan	N6	L	N (ii)	4.60	3.60	3	1	61.4	81.6	60.4	21.2	81.6	99	309	-				
			Fresh air louvre	E1	L	Y	3.50	3.60	3	0.5	29.8	59.7	57.8	1.9	56.7	71	284	10	7			
			Exhaust air louvre	E2	L	Y	2.80	2.20	3	0.5	19.2	57.5	57.8	-0.3	54.5	67	284	10	3			
			Staircase pressurization fan room	E3	L	N (ii)	2.40	3.00	2	6	n/a	65.2	53.2	12.0	65.2	89	307	-				
			Tunnel ventilation shaft	S1	L	Y	11.45	12.30	3	3	533.8	66.4	56.2	10.2	66.4	94	284	10	30			
			P&D pump and tank room	S2	L	Y	1.00	1.00	2	2	n/a	65.4	61.2	4.2	63.3	77	284	10	13			
			MCC room	S3	L	Y	1.50	1.00	2	3	n/a	69.6	55.5	14.1	69.6	87	284	10	23			
			TECS control room	S4	L	N (ii)	2.00	1.00	2	4	n/a	80.4	60.6	19.8	80.4	100	284	-				

NSR	Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
						Width	Height														
		Tunnel ventilation shaft	W1	L	Y	7.08	4.70	3	3	282.6	66.1	54.1	12.0	66.1	91	284	10	27			
		Tunnel ventilation shaft	W2	L	N (i)	7.08	2.60	3	3	242.5	65.2	52.3	12.9	65.2	89	299	-				
		Staircase pressurization fan room	W3	L	N (ii)	2.40	2.00	2	5	n/a	64.2	58.3	5.9	62.9	85	299	-				
		Smoke extraction make-up room	W4	L	N (ii)	2.40	3.00	2	6	n/a	86.4	58.3	28.1	86.4	110	299	-				

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

KCV - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
Tunnel ventilation shaft	N1	Normal	3	Point 1	65.8
	N1	Normal	3	Point 2	65.7
	N1	Normal	3	Point 3	67.3
	N1	Normal	3	Point 4	68.3
	N1	Normal	3	Point 5	68.9
	N1	Normal	3	Point 6	68.6
	N1	Normal	3	Point 7	68.3
	N1	Normal	3	Point 8	67
	N1	Normal	3	Point 9	68.3
	N1	Normal	3	Point 10	68.4
	N1	Normal	3	Point 11	68.4
	N1	Normal	3	Point 12	68.4
	N1	Normal	3	Point 13	68.4
	N1	Normal	3	Point 14	67.5
	N1	Normal	3	Point 15	67
	N1	Normal	3	Point 16	67.5
	N1	Normal		AVERAGE	67.8
FS control room/Corridor /Irrigation pump room	N2	Normal	2	measurement 1	60.3
	N2	Normal	2	measurement 2	60.3
	N2	Normal	2	measurement 3	60.2
	N2				60.3
UPS room	N3	Normal	2	measurement 1	60.6
	N3	Normal	2	measurement 2	60.6
	N3	Normal	2	measurement 3	60.3
	N3				60.5
LV switch room	N4	Normal	2	measurement 1	62.4
	N4	Normal	2	measurement 2	62.1
	N4	Normal	2	measurement 3	62.1
	N4				62.2
Air compression receiver room	N5	Normal	2	measurement 1	63.8
	N5	Normal	2	measurement 2	63.9
	N5	Normal	2	measurement 3	64.0
	N5				63.9
Smoke extraction fan	N6	Normal	3	Point 1	82.4
	N6	Normal	3	Point 2	81.7
	N6	Normal	3	Point 3	77.8
	N6	Normal	3	Point 4	80.4
	N6	Normal	3	Point 5	82.7
	N6	Normal	3	Point 6	84.1
	N6	Normal	3	Point 7	87
	N6	Normal	3	Point 8	85.1
	N6	Normal	3	Point 9	79.6
	N6	Normal	3	Point 10	80.6
	N6	Normal	3	Point 11	80.3
	N6	Normal	3	Point 12	77.7
	N6	Normal	3	Point 13	76.3
	N6	Normal	3	Point 14	74.8
	N6	Normal	3	Point 15	77.1
	N6	Normal	3	Point 16	77.4
	N6	Normal		AVERAGE	81.6
Fresh air louvre	E1	Normal	3	Point 1	59.8
	E1	Normal	3	Point 2	59.7
	E1	Normal	3	Point 3	59.5
	E1	Normal		AVERAGE	59.7
Exhaust air louvre	E2	Normal	3	Point 1	58.1
	E2	Normal	3	Point 2	57.6
	E2	Normal	3	Point 3	56.7
	E2	Normal		AVERAGE	57.5
Staircase pressurization fan room	E3	Normal	2	measurement 1	65.2
	E3	Normal	2	measurement 2	65.2
	E3	Normal	2	measurement 3	65.1
	E3				65.2
Tunnel ventilation shaft	S1	Normal	3	Point 1	68.2
	S1	Normal	3	Point 2	67.5
	S1	Normal	3	Point 3	66.1
	S1	Normal	3	Point 4	66.7
	S1	Normal	3	Point 5	66.4
	S1	Normal	3	Point 6	65.2
	S1	Normal	3	Point 7	65.4
	S1	Normal	3	Point 8	66.6
	S1	Normal	3	Point 9	65.5
	S1	Normal	3	Point 10	67.1
	S1	Normal	3	Point 11	67
	S1	Normal	3	Point 12	63.5
	S1	Normal		AVERAGE	66.4
P&D pump and tank room	S2	Normal	2	measurement 1	65.5
	S2	Normal	2	measurement 2	65.4
	S2	Normal	2	measurement 3	65.2
	S2				65.4
MCC room	S3	Normal	2	measurement 1	69.6
	S3	Normal	2	measurement 2	69.8
	S3	Normal	2	measurement 3	69.5
	S3				69.6
TECS control room	S4	Normal	2	measurement 1	80.4
	S4	Normal	2	measurement 2	80.4
	S4	Normal	2	measurement 3	80.4
	S4				80.4
Tunnel ventilation shaft	W1	Normal	3	Point 1	66.3
	W1	Normal	3	Point 2	67.2
	W1	Normal	3	Point 3	66
	W1	Normal	3	Point 4	64.1
	W1	Normal	3	Point 5	64
	W1	Normal	3	Point 6	65.4
	W1	Normal	3	Point 7	66.6
	W1	Normal	3	Point 8	66.7
	W1	Normal	3	Point 9	67.4
	W1	Normal	3	Point 10	67
	W1	Normal	3	Point 11	66.2
	W1	Normal	3	Point 12	64.6
	W1	Normal		AVERAGE	66.1
Tunnel ventilation shaft	W2	Normal	3	Point 1	62.6
	W2	Normal	3	Point 2	65.4
	W2	Normal	3	Point 3	66.1
	W2	Normal	3	Point 4	66.5
	W2	Normal	3	Point 5	66.3
	W2	Normal	3	Point 6	66.1
	W2	Normal	3	Point 7	64.5
	W2	Normal	3	Point 8	62
	W2	Normal		AVERAGE	65.2
Staircase pressurization fan room	W3	Normal	2	measurement 1	64.2
	W3	Normal	2	measurement 2	64.1
	W3	Normal	2	measurement 3	64.2
	W3				64.2
Smoke extraction make-up room	W4	Normal	2	measurement 1	86.5
	W4	Normal	2	measurement 2	86.4
	W4	Normal	2	measurement 3	86.4
	W4				86.4

Appendix A4 – Measurement Results at NSRs

Appendix A4 - Measurement Results at NSRs

NSR	Scenario	Measurement Type	Start Time	End Time	L_{aeq}, dB(A)
KC1	1	Background Noise Levels	13/02/2018 21:12	13/02/2018 21:17	63.3
			13/02/2018 21:23	13/02/2018 21:28	63.6
		Measured Noise Levels	13/02/2018 22:01	13/02/2018 22:31	63.8
			13/02/2018 22:31	13/02/2018 23:01	63.7
	2	Background Noise Levels	14/02/2018 00:46	14/02/2018 00:51	61.6
			14/02/2018 00:57	14/02/2018 01:02	60.8
		Measured Noise Levels	13/02/2018 23:39	14/02/2018 00:09	63.1
			14/02/2018 00:10	14/02/2018 00:40	62.5

Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL)

Commissioning Test Report for the Fixed Plant Noise at Pat Heung (PHV), Nam Cheong (NCV) and Mongkok West (MKV) Ventilation Buildings

MTR Corporation

May 2018

1 Introduction

The Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) Project (hereinafter known as "XRL") covers a 26km long underground rail line on dedicated tracks that run between the terminus in West Kowloon and the boundary at Huanggang, where connects with the XRL Mainland section. XRL Project also includes the construction of ventilation buildings, emergency access points, stabling sidings and maintenance facilities and an emergency rescue siding (ERS) (formerly known as rescue emergency station).

The Environmental Impact Assessment (EIA) Report (Register No.: AEIA-143/2009) was approved on 28 September 2009 by the Director of Environmental Protection (DEP) under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, an environmental permit (EP) was granted on 16 October 2009 (EP No: EP-349/2009) for the construction and operation of the Project. Variations of environmental permit (VEP) were subsequently applied and the latest Environmental Permit (EP No: EP-349/2009/M) (hereinafter known as "the EP") was issued by Director of Environmental Protection (DEP) on 25 June 2018.

This report is prepared with reference to EP Condition 2.36, "*The Permit Holder shall, no later than two weeks before the commencement of the operation of the Project, deposit with the Director a Commissioning Test Report to confirm the compliance of the operational air-borne and ground-borne noise levels in accordance with the EIA Report and the application for variation of an environmental permit No. VEP-377/2012 and its attached documents*".

MTR Corporation has prepared the Commissioning Test Report for Fixed Plant Noise for the noise measurement to show the compliance of noise criteria in accordance with the EIA Report and the EP; also the noise measurement for investigation of any tonal, impulsive and intermittent characteristics from the fixed plant noise sources. This report presents the noise measurement methodology, calculated Sound Power Levels from noise measurements, results of noise measurement for the fixed plant noise sources installed at Pat Heung (PHV), Nam Cheong (NCV) and Mongkok West (MKV) Ventilation Buildings and confirming any characteristics of tonality, impulsiveness and intermittency. For the fixed plant noise verification at the other ventilation buildings and West Kowloon Terminal (WKT) areas, separate reports would be submitted.

2 Noise Criteria

2.1 Fixed Plant Noise Criteria in EIA

With reference to the IND-TM under the Noise Control Ordinance (NCO), the relevant acceptable noise levels (ANL) where determined based on the area sensitivity rating (ASR). The fixed plant noise criteria for the representative noise sensitive receivers (NSRs) were determined in EIA as follow (whichever is lower):

- 5dB(A) below the appropriate ANL set out in the IND-TM (the ANL-5dB(A) criterion); or
- The prevailing background noise levels where the prevailing background noise level is 5dB(A) below the appropriate ANL (i.e. ANL-5dB(A))

The noise criteria above were determined for planning purpose. While for operation, the fixed plant noise is controlled by a Noise Abatement Notices system governed by the NCO.

The fixed plant noise criteria for the NSRs along the XRL alignment in PHV, NCV and MKV area, with the latest status of representative NSRs, are presented in **Table 2.1** below. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied, where applicable, in accordance with IND-TM during the commissioning test.

Table 2.1 Summary of Fixed Plant Noise Criteria

NSR	Description	Area Sensitivity Rating (ASR) [(a)]	Noise Criteria, dB(A) [(a)]	
			Day and Evening Time	Night-time
Pat Heung Ventilation Building (PHV) ***(Figure 2.1)***				
PH1	Sheung Tsuen Village House	A	49	43
PH1a	Sheung Tsuen Village House	A	49	43
PH1b	Sheung Tsuen Village House	A	49	43
PH4	Sheung Tsuen Village House	A	49	43
PH4a	Sheung Tsuen Village House	A	49	43
Nam Cheong Ventilation Building (NCV) ***(Figure 2.2)***				
NC10	St. Margaret's Coeducational English Secondary & Primary School	B	60	50
NC11	Tack Ching Girls' Secondary School	B	60	50
NC11e	Planned development (Site 6) Block 1	B	60	50
NC11f	Planned development (Site 6) Block 1	B	60	50
NC11g	Planned development (Site 6) Block 2	B	60	50
NC11h	Planned development (Site 6) Block 2	B	60	50
NC16	Tower 3 Aqua Marine	C	65	55
Mongkok West Ventilation Building (MKV) ***(Figure 2.3)***				
MK1	Yau Ma Tei Catholic Primary School (Hoi	B	60	-[(b)]

NSR	Description	Area Sensitivity Rating (ASR) [(a)]	Noise Criteria, dB(A) [(a)]	
			Day and Evening Time	Night-time
	Wang Road)			
MK3	Charming Garden Block 11	B	60	50

Note:

(a) ASR and noise criteria either follow that defined in the EIA Report or relevant application for variation of environmental permit (VEP-377/2012) where appropriate.

(b) There would be no noise sensitive use at MK1 during night-time period.

Fixed plant noise sources include: ventilation fans for building services, and plenum for tunnel ventilation, which are generally located inside plant rooms. Noise generated from indoor fixed plants would be emitted through louvres. The worst case scenario is when all eligible fixed plants at the same location operating concurrently under “normal scenario” for XRL operation during daytime and evening time periods; and night-time period, respectively. The worst case scenario was considered for compliance check against the fixed plant noise criteria and the noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs.

Table 2.2 below summarised the information of the fixed plant noise sources and the layout plan is shown in **Figures 2.1** to **2.3a**.

Table 2.2 Summary of Fixed Plant Noise Sources

Source Location	Direction Facing	Louvre ID
Pat Heung Ventilation Building (PHV) ***(Figure 2.1)***		
Tunnel ventilation shaft	North	N1
FS control room	North	N2
P&D pump and tank room	North	N3
Air duct riser	North	N4
Pressurization fan room	North	N5
Tunnel ventilation shaft	East	E1
Tunnel ventilation shaft	East	E2
Pressurization fan room	East	E3
Smoke extract make-up fan room	East	E4
Tunnel ventilation shaft	South	S1
UPS room	South	S2
SER	South	S3
MCC room	South	S4
Smoke extraction fan room	South	S5
ABBCS room	West	W1
Smoke extraction fan room	West	W2
Nam Cheong Ventilation Building (NCV) ***(Figure 2.2)***		
Tunnel ventilation shaft	North	N1
FS Control Room	North	N2

Source Location	Direction Facing	Louvre ID
E&M Service Area 8	North	N3
Tunnel ventilation shaft	East	E1
E&M Service Area 10	South	S1
E&M Service Area 10	South	S2
E&M Service Area 9	South	S3
Dog house	West	S4
LV Switch Room	West	W1
Mongkok West Ventilation Building (MKV) ***(Figures 2.3 and 2.3a)***		
Tunnel ventilation shaft	North	N1
Tunnel ventilation shaft	North	N2
EVS	North	N3
Harmonic Filter Room	East	E1
Harmonic Filter Room	East	E2
25kV Switch Room	East	E3
SVS	East	E4
Staircase Pressurization Fan Room 2	South	S1
Staircase Pressurization Fan Room 1	South	S2
Battery and Charge Room	South	S3
Harmonic Filter Room	South	S4
Fire Pump room (Electrical)	West	W1
FHP	North	FHP-N1

3 Methodology

3.1 Noise Measurement for the Fixed Plants

Noise measurements to obtain the noise levels of the fixed plants were undertaken by Supreme Acoustics Research Limited, GAS Joint Venture and ATAL Building Services Engineering Ltd. The commissioning tests were carried out by qualified persons possessing at least 7 years of noise control experience and a corporate member of Hong Kong Institute of Acoustics or equivalent in accordance with S3.22 of the XRL EM&A Manual.

3.1.1 Methodology

Three measurement methods, namely Method 1 (at or near NSR), Method 2 (Far Field) and Method 3 (Near Field), have been developed based on NCO-TM, basic acoustic principles and *ISO 3746-2010: Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane*, respectively. Given the fixed plant noise sources are steady, all proposed methods could be adopted for all types of fixed plant source depending on the site environment/constraints that might affect the possibility to obtain valid results, considerations including but not limited to:

- Background noise with less influence to the measured noise levels
- Free of obstacles between measurement location and noise source
- Accessibility and Safety Concerns

Considering the reliability of data collection, i.e. results not influenced by the above-mentioned considerations, and the measurement efficiency on site, the selection of methodology was prioritized based on efficient measurement as Method 1 (at or near NSR) > Method 2 (Far Field) > Method 3 (Near Field). However, various considerations which may affect the validity of results using Method 1 were taken in account, such as the distances between fixed plants and NSRs at PHV and NCV, some of the NSRs at PHV and NCV are too far away, some of the NSRs at PHV and NCV could not meet at least two times of the largest dimension from louvre etc. For MKV, considering there are other building structures between the NSR and noise sources, also the heavily trafficked Hoi Wang Road was immediately in front of the NSRs; obtaining valid results using Method 1 was considered unlikely. As such, only Method 2 and Method 3 were considered applicable. Method used for each louvre is presented in Appendix A3. Details of the measurement methodology are shown in **Appendix A1**.

Method 1 – Measuring Sound Pressure Level at NSR or Near NSR

- Measurement at NSR or near NSR at distance *D* away from the louvre, where D was at least two times the largest dimension b of the louvre and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the louvre and three measurements were taken when the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre was switched OFF
- The sound pressure level (SPL) at NSR or near NSR was determined by the following equation:

  Background corrected $L_p = L_p + BG - [20\log D + 8]$ *(if applicable) + façade correction (if applicable)*

  Where

  L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);

  BG is the background correction factor, in dB(A);

  D is separation between the center of louvre or surface of the plant and the microphone, in metres.

Method 2 – Measuring Sound Power Level by Far Field Method for Louvres or **for Plants**

- The microphone was positioned at the perpendicular distance *D* away from the center of the louvre or the surface of the plant, where D was at least two times the largest dimension b of the louvre or plant and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the center of the louvre/combined louvre area or the center the plant; and three measurements were taken when the noise source from the louvre was switched ON

- Background noise level was taken when the noise source from the louvre or plant was switched OFF
- The sound power level (SWL) of the louvre or the plant was determined, based on basic acoustic principles, by the following equation:

$$L_w = L_p + 20logD,center +8 + BG$$

Where
L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);
D,center is separation between the center of louvre or plant and the microphone, in metres;
BG is the background correction factor, in dB(A).

Method 3 – Measuring Sound Power Level by Near Field Method for Louvres or **for Plants**

- A right parallelepiped hypothetical measurement box for each louvre or each surface of a plant was determined according to ISO 3746, with each side being spaced a distance *D* from the corresponding side of the louvre or plant
- Each of the 5 planes of the measurement box was subdivided into equal-sized rectangular grids, the length of each side of the grids should be less than or equal to 3 times of distance D, i.e. grid length ≤*3D*
- The microphone was pointing toward the center of each grid, and a measurement was taken for each grid during the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre or plant was switched OFF
- The SWL of the louvre or the plant was determined by the following equation:

$$L_w = L_p + 10log(S) - K_{1A} - K_{2A}$$

Where
L_p is the averaged measured L_{eq} of all measurement points, in dB(A);
S is the total surface area over the measurement box (total 5 planes), in m^2;
K_{1A} is the background correction factor as described in *ISO 3746:2010*, in dB(A);
K_{2A} is the environmental correction for sound absorption and reflection as described in *ISO 3746:2010*, in dB(A).

Except for Method 3, which was adopted with reference to ISO 3746; the noise sources measured using Method 1 or Method 2 were considered steady if the difference between the maximum and minimum Leq is less than or equal to 1dB(A), ie, ≤1dB(A); average Leq was therefore considered. Otherwise, the maximum Leq would be adopted for SWL determination as a conservative approach.

3.1.2 Measurement Equipment

The sound level meters and calibrators used for noise measurements are listed in **Table 3.1**. The instruments complied with International Electrotechnical Commission Publications

651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in **Appendix A2**.

Table 3.1 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	NTi XL2	5011
	NTi XL2	5617
	NTi XL2	6240
	Casella CEL-63X	5044655
Calibrator	BSWA TECH CA111	320248
	Casella CEL-120/1	5060836

Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

3.1.3 Measurement Schedule

The noise measurements were carried out during daytime, evening time and night-time periods, where the fixed plant items were operated steadily and continuously at their noisiest operating mode under normal scenario. The noise measurement schedule is shown in **Table 3.2**.

Table 3.2 Measurement Schedule

Location	Date	Time
PHV	10 – 11 August 2017	22:00 – 05:00
	8 September 2017	10:30 – 15:00
	13 September 2017	10:30 – 12:00
NCV	19 – 20 July 2017	22:00 – 04:00
	20 – 21 October 2017	23:00 – 04:00
	9 November 2017	23:30 – 04:00
MKV	9 – 10 May 2017	22:00 – 02:00
	25 – 26 July 2017	22:00 – 02:00
	21 November 2017	23:00 – 04:00
	4 December 2017	10:00 – 12:00

3.2 Noise Measurement to Confirm Any Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

3.2.1 Measurement Equipment

The sound level meters and calibrators used for noise measurements are listed in **Table 3.3**. The instruments complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in **Appendix A2**.

Table 3.3 Noise Measurement Equipment

Equipment	Model	Serial Number

Sound Level Meter	Casella CEL-63X	5044655
Calibrator	Casella CEL-120/1	5060836

3.2.2 Measurement Parameters

With reference to the IND-TM, the noise measurement was conducted at the representative NSR for $L_{Aeq\,(30min)}$, in one-third octave band under the worst case scenario, ie, "normal scenario" during daytime and evening time periods; and night-time period, respectively.

The fixed plant noise sources will be operated steadily and continuously, and therefore no intermittency and impulsiveness are expected at the NSR. However, the characteristics of intermittency and impulsiveness will be recorded, if any, based on observation during measurement.

2 sets of background noise level, $L_{Aeq\,(5min)}$, and in one-third octave band, were measured at each measurement location when all fixed plant noise sources were not in operation.

3.2.3 Measurement Location

The noise measurement was carried out at the first layer of NSRs for the concerned areas. The measurement locations are summarised in Table 3.4 and shown in **Figures 2.1 to 2.3**.

Table 3.4 Measurement Schedule

Location	NSR	Description
PHV	PH1a	Sheung Tsuen Village House
	PH1b	Sheung Tsuen Village House
	PH4	Sheung Tsuen Village House
NCV	NC11	Tack Ching Girls' Secondary School
	NC11f [a]	Planned development (Site 6), Block 1
	NC11g [a]	Planned development (Site 6), Block 2
MKV	MK1	Yau Ma Tei Catholic Primary School (Hoi Wan Road)

Note:

(a) The actual measurement location was selected based on the latest building layout.

3.2.4 Measurement Schedule

The noise measurements were carried out at the monitoring location for PHV, NCV and MKV, where the fixed plant items were operated steadily and continuously at their noisiest operating mode under normal scenario. The noise measurement schedule is shown in **Table 3.5**.

Table 3.5 Measurement Schedule

Location	Date
PHV	2-3 May 2018
NCV	15-16 May 2018
MKV	10-11 May 2018

4 Measurement Results

4.1 The Noise Levels of Fixed Plant Noise Sources

The noise levels measured under the worst case scenario are determined and presented in **Table 4.1**. Details of the measurement results are shown in **Appendix A3**.

Table 4.1 Summary of Sound Power Levels for Fixed Plants

Works Area	Direction Facing/ Elevation	Calculated SWL L_{Aeq}, dB(A)
PHV	North N1	78
	North N2	61
	North N3	72
	North N4	74
	North N5 [(a)]	74
	East E1	79
	East E2	78
	East E3 [(a)]	77
	East E4 [(a)]	83
	South S1	80
	South S2 [(a)]	80
	South S3	64
	South S4	62
	South S5 [(a)]	81
	West W1	66
	West W2 [(a)]	85
NCV	North N1	81
	North N2	67
	North N3	78
	East E1	82
	South S1	72
	South S2	72
	South S3 [(a)]	69
	South S4	82
	West W1	74
MKV	North N1	86
	North N2	87
	North N3	80
	East E1	78
	East E2 [(a)]	72
	East E3	73
	East E4	79
	South S1 [(a)]	74
	South S2 [(a)]	75
	South S3	85
	South S4	72
	West W1	90
	North FHP-N1	84

Note:
(a) The plant would be operated during day and evening time only under normal scenario.

A compliance check against the fixed plant noise criteria at NSR was conducted. The cumulative noise levels from noise sources were assessed to ensure the compliance with the noise criterion. **Table 4.2** shows the results, details of the calculation are also given in **Appendix A3**.

Table 4.2 Cumulative Fixed Plant Noise at NSR

NSR	Source Location	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
PH1	Ventilation Shaft for N/B [(a)] and Building Service	44	29	49	43	Y	Y
PH1	Ventilation Shaft for S/B [(a)] and Building Service	45	38	49	43	Y	Y
PH1a	Ventilation Shaft for N/B [(a)] and Building Service	46	31	49	43	Y	Y
PH1a	Ventilation Shaft for S/B [(a)] and Building Service	47	40	49	43	Y	Y
PH1b	Ventilation Shaft for N/B [(a)] and Building Service	42	33	49	43	Y	Y
PH1b	Ventilation Shaft for S/B [(a)] and Building Service	43	39	49	43	Y	Y
PH4	Ventilation Shaft for N/B [(a)] and Building Service	42	36	49	43	Y	Y
PH4	Ventilation Shaft for S/B [(a)] and Building Service	42	32	49	43	Y	Y
PH4a	Ventilation Shaft for N/B [(a)] and Building Service	38	35	49	43	Y	Y
PH4a	Ventilation Shaft for S/B [(a)] and Building Service	36	31	49	43	Y	Y
NC10	Ventilation Shaft for N/B [(a)] and Building Service	36	36	60	50	Y	Y
NC10	Ventilation Shaft	35	35	60	50	Y	Y

NSR	Source Location	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
	for S/B [(a)] and Building Service						
NC11	Ventilation Shaft for N/B [(a)] and Building Service	37	33	60	50	Y	Y
NC11	Ventilation Shaft for S/B [(a)] and Building Service	38	36	60	50	Y	Y
NC11e	Ventilation Shaft for N/B [(a)] and Building Service	46	43	60	50	Y	Y
NC11e	Ventilation Shaft for S/B [(a)] and Building Service	46	42	60	50	Y	Y
NC11f	Ventilation Shaft for N/B [(a)] and Building Service	46	45	60	50	Y	Y
NC11f	Ventilation Shaft for S/B [(a)] and Building Service	45	43	60	50	Y	Y
NC11g	Ventilation Shaft for N/B [(a)] and Building Service	48	47	60	50	Y	Y
NC11g	Ventilation Shaft for S/B [(a)] and Building Service	39	38	60	50	Y	Y
NC11h	Ventilation Shaft for N/B [(a)] and Building Service	47	47	60	50	Y	Y
NC11h	Ventilation Shaft for S/B [(a)] and Building Service	39	38	60	50	Y	Y
NC16	Ventilation Shaft for N/B [(a)] and Building Service	32	28	65	55	Y	Y
NC16	Ventilation Shaft for S/B [(a)] and Building Service	33	31	65	55	Y	Y
MK1	Ventilation Shaft for N/B [(a)] and Building Service	39	-[(b)]	60	-	Y	-
MK1	Ventilation Shaft for S/B [(a)] and Building Service	40	-[(b)]	60	-	Y	-

NSR	Source Location	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
MK3	Ventilation Shaft for N/B [(a)] and Building Service	37	35	60	50	Y	Y
MK3	Ventilation Shaft for S/B [(a)] and Building Service	37	36	60	50	Y	Y

Note:

(a) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(b) There would be no noise sensitive use at MK1 during night-time period.

4.2 The Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

Noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs were conducted under the normal scenarios during daytime and evening, and during night-time, respectively and summarised in **Table 4.3** below. In each scenario, two sets of noise measurements, $L_{Aeq(30min)}$, in one-third octave band, were carried out to confirm that the difference in the measured noise levels with and without operation of fixed plant noise sources were less than 3.0 dB(A). That means the fixed plant noise sources from the ventilation building are not considered as significant noise sources at the NSR. Noise measurements at PHV, NCV and MKV were dominated by the community noise and road traffic noise along Sham Mong Road and Hoi Wang Road, respectively; characteristics of tonality, impulsiveness and intermittency due to the fixed plant noise sources from the ventilation buildings was not noticeable during the measurement. Detailed results of noise measurements are shown in **Appendix A4**.

Table 4.3 Noise measurement Results at NSR

NSR	Scenario	Measured Noise Level $L_{Aeq(30min)}$, dB(A), (measurement time)	Averaged Background Level $L_{Aeq(5min)}$, dB(A), (measurement time)	Difference between Measured Noise Level and Background Level, dB(A), (< 3.0 or >= 3.0)
PH1a	Day and Evening Time	51.7 (22:19 – 22:49) 50.4 (22:50 – 23:20)	52.8 (21:56 -22:06)	< 3.0
	Night-time	49.9 (23:28 – 23:58) 49.1 (23:58 – 00:28)	48.8 (00:47 – 00:57)	< 3.0
PH1b	Day and Evening Time	46.6 (22:23 – 22:53) 46.4 (22:53 – 23:23)	45.9 (22:00 – 22:10)	< 3.0
	Night-time	46.7 (23:38 – 00:08) 47.1 (00:08 – 00:38)	46.5 (00:44 – 00:55)	< 3.0
PH4	Day and Evening	45.9 (22:20 – 22:50) 45.1 (22:51 – 23:21)	46.5 (21:56 – 22:09)	< 3.0

NSR	Scenario	Measured Noise Level $L_{Aeq(30min)}$, dB(A), (measurement time)	Averaged Background Level $L_{Aeq(5min)}$, dB(A), (measurement time)	Difference between Measured Noise Level and Background Level, dB(A), (< 3.0 or >= 3.0)
	Time			
	Night-time	44.7 (23:26 – 23:56) 44.9 (00:02 – 00:32)	42.8 (00:48 – 01:00)	< 3.0
NC11	Day and Evening Time	65.9 (22:30 – 23:00) 65.3 (23:02 – 23:32)	65.5 (21:40 – 21:59)	< 3.0
	Night-time	66.4 (23:38 – 00:08) 66.3 (00:09 – 00:39)	64.2 (00:44 – 00:55)	< 3.0
NC11f	Day and Evening Time	60.3 (22:23 - 22:53) 59.6 (22:55 - 23:25)	59.9 (22:01 - 22:12)	< 3.0
	Night-time	58.9 (23:31 - 00:01) 58.8 (00:02 - 00:32)	57.4 (00:38 - 00:49)	< 3.0
NC11g	Day and Evening Time	60.5 (22:22 – 22:52) 59.5 (22:53 – 23:23)	60.3 (21:51 – 22:12)	< 3.0
	Night-time	59.0 (23:31 – 00:01) 58.7 (00:01 – 00:31)	57.3 (00:39 – 00:49)	< 3.0
MK1	Day and Evening Time	64.3 (21:54 – 22:24) 63.3 (22:25 – 22:55)	63.8 (21:24 – 21:40)	< 3.0
	Night-time	58.5 (00:47 – 01:17) 57.2 (01:20 – 01:50)	60.8 (00:00 – 00:14)	< 3.0

As the differences between measured noise levels and background levels are all less than 3.0 dB(A), it was unable to obtain reliable corrected noise levels at the NSRs and corrections for tonality, impulsiveness or intermittency were therefore not applicable.

5 Conclusions

To fulfil the XRL EP condition 2.36, the fixed plant noise verification were undertaken and the measurement results indicated all the fixed plant noise levels in PHV, NCV and MKV are in compliance with the fixed plant noise criteria.

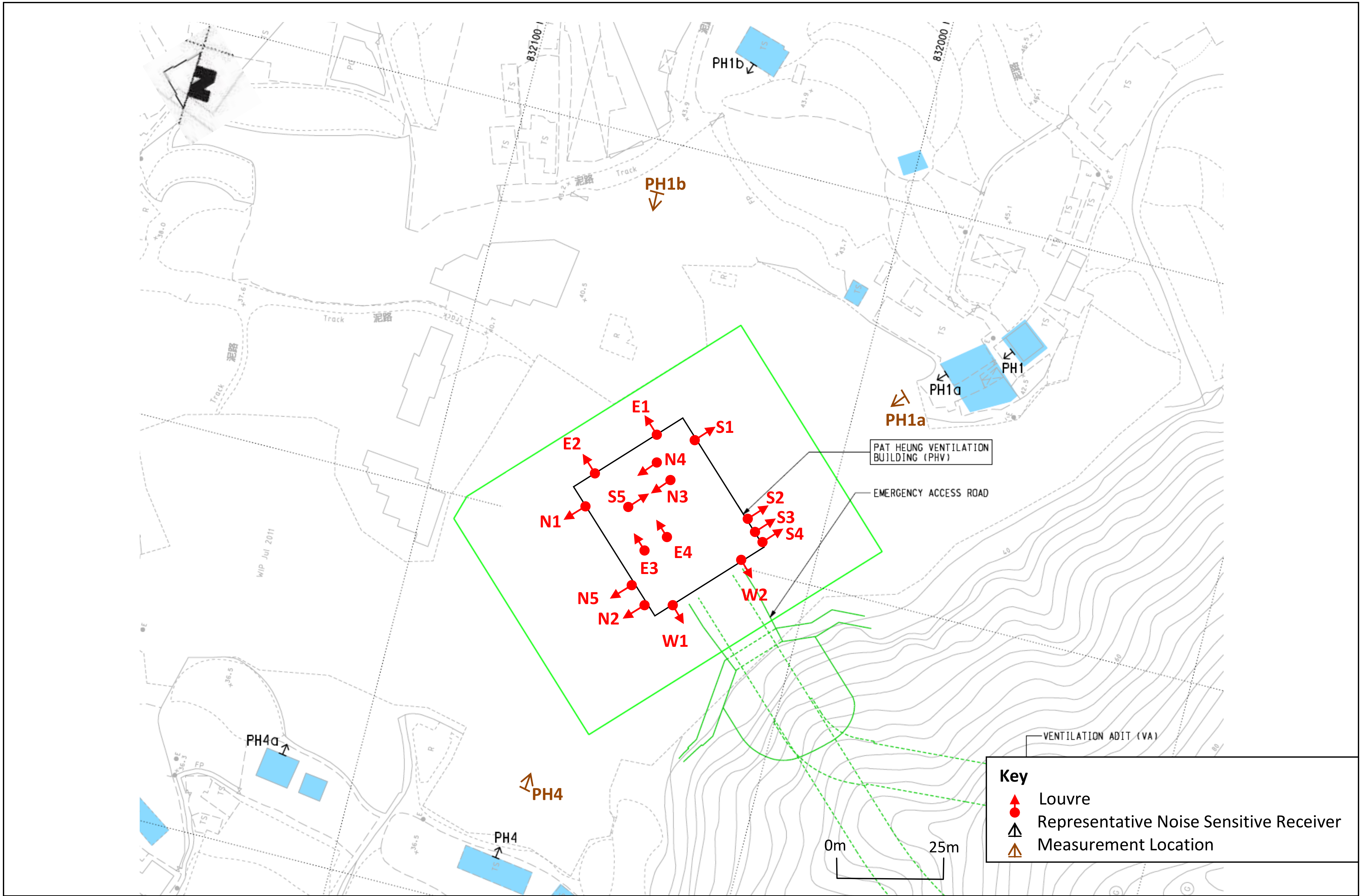


Figure 2.1 – Site layout, Noise Sensitive Receiver (NSR) and Fixed Plant Sources at PHV

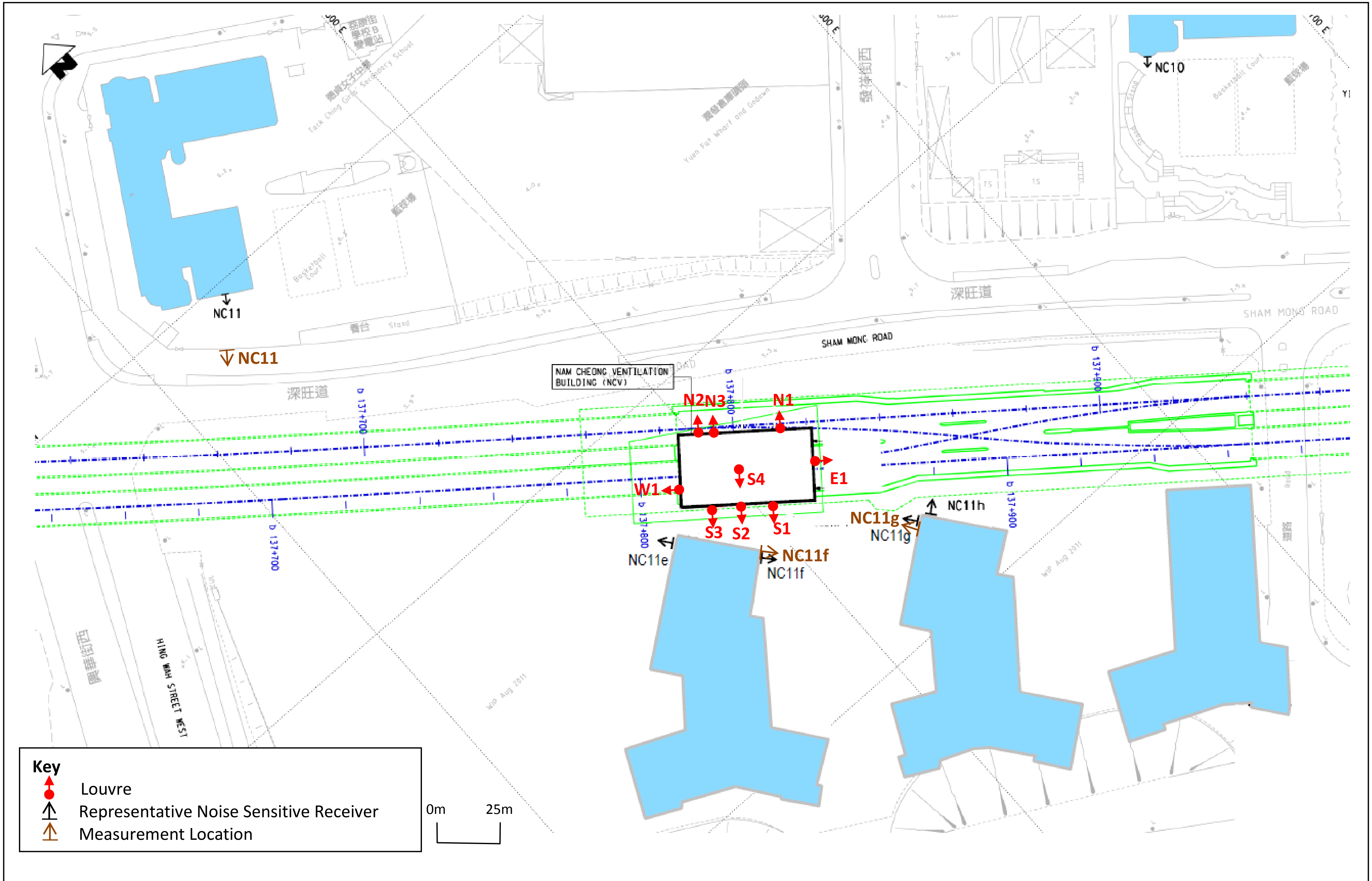


Figure 2.2 – Site layout, Noise Sensitive Receiver (NSR) and Fixed Plant Sources at NCV

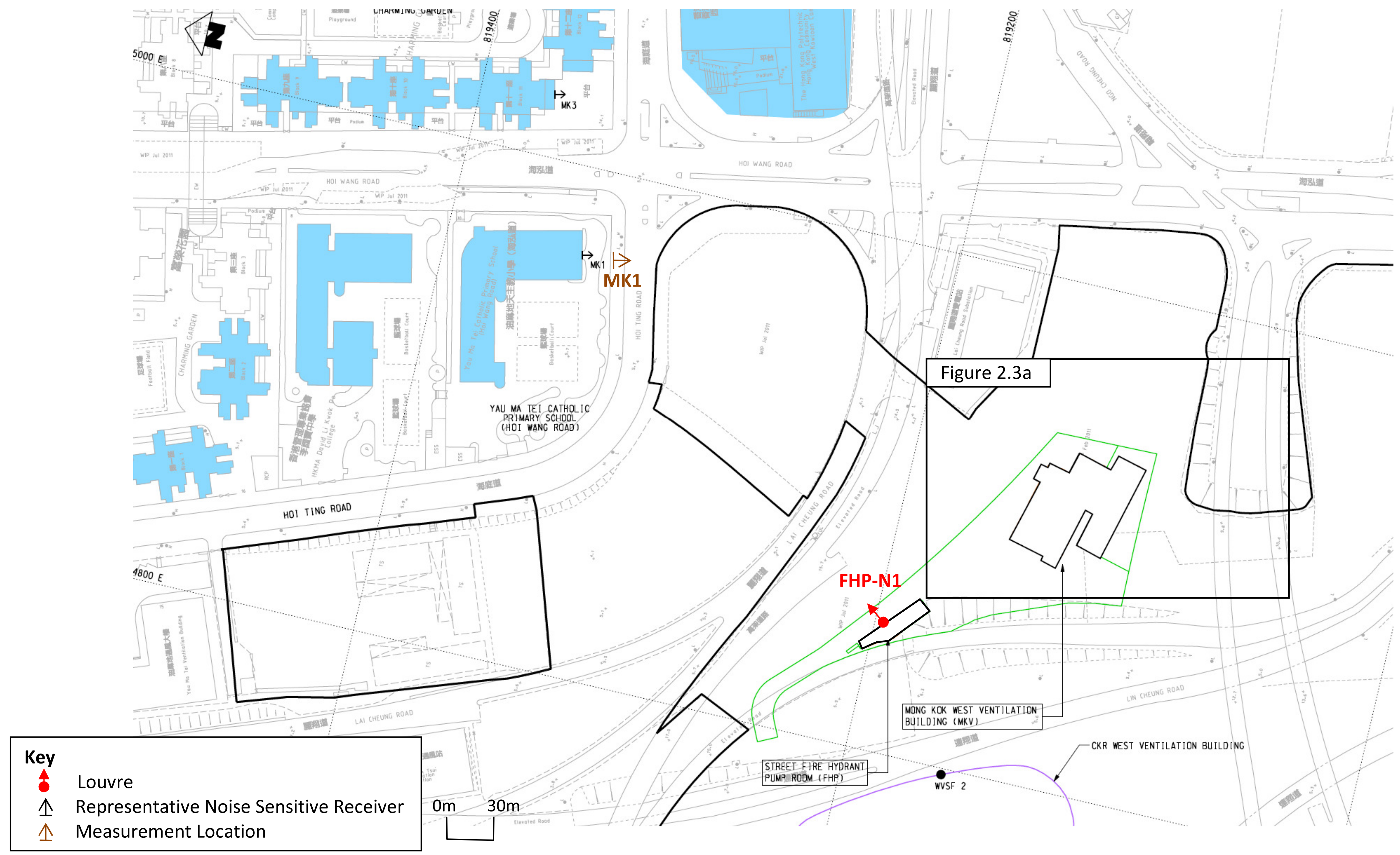


Figure 2.3 – Site layout, Noise Sensitive Receiver (NSR) and Fixed Plant Sources at MKV

Figure 2.3a – Site layout, Noise Sensitive Receiver (NSR) and Fixed Plant Sources at MKV

Appendix A1 –Measurement Methodology

XRL Fixed Plant Noise Test Plan

BY : MTR XRL Env Team

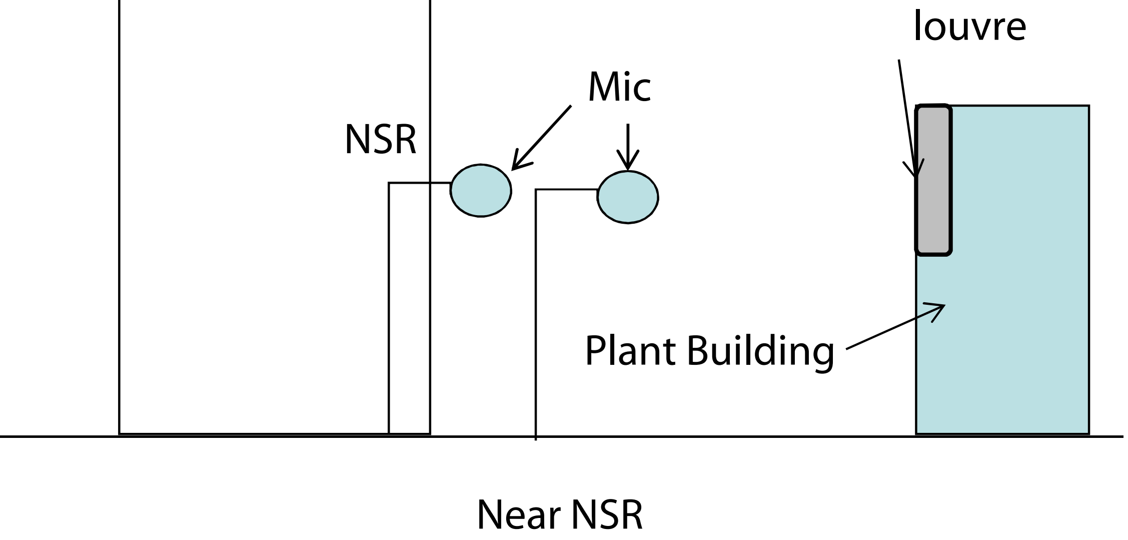
Summary of Testing Methodology

Method	Standard	No of repeated measurement	No of measurement point	Measurement distance, D	To Verify
Method 1 (NSR Method)	NCO - TM	3 sets of Leq 1min	Depend on number of NSRs nearby	At the most affected NSR or near NSR	ANL-5 or Background Prevailing
Method 2 (Far Field Method)	Basic Acoustic Principle	3 sets of Leq 1min	1 (for louvre/plant with uniform plane source)	D ≧2b and roundup to integer	ANL-5 or Background Prevailing
Method 3 (Near Field Method)	Developed based on ISO3746:2010	1 set of Leq 10s [a] /1min	Depend on the size of the louvre/plant and the measurement distance should follow guideline in ISO3746	At least 1m from the louvre opening/plant (unless otherwise specified)	ANL-5 or Background Prevailing

Note :
(a) If fixed plant items are operated at their noisiest operating modes and are steady during measurement, 10-second will be adopted for the duration of measurement.

Method 1 – Sound Pressure Level at NSR or Near NSR for louvre or Plant

“b” is the long side of the louvre
“D” is the separation between louvre and microphone

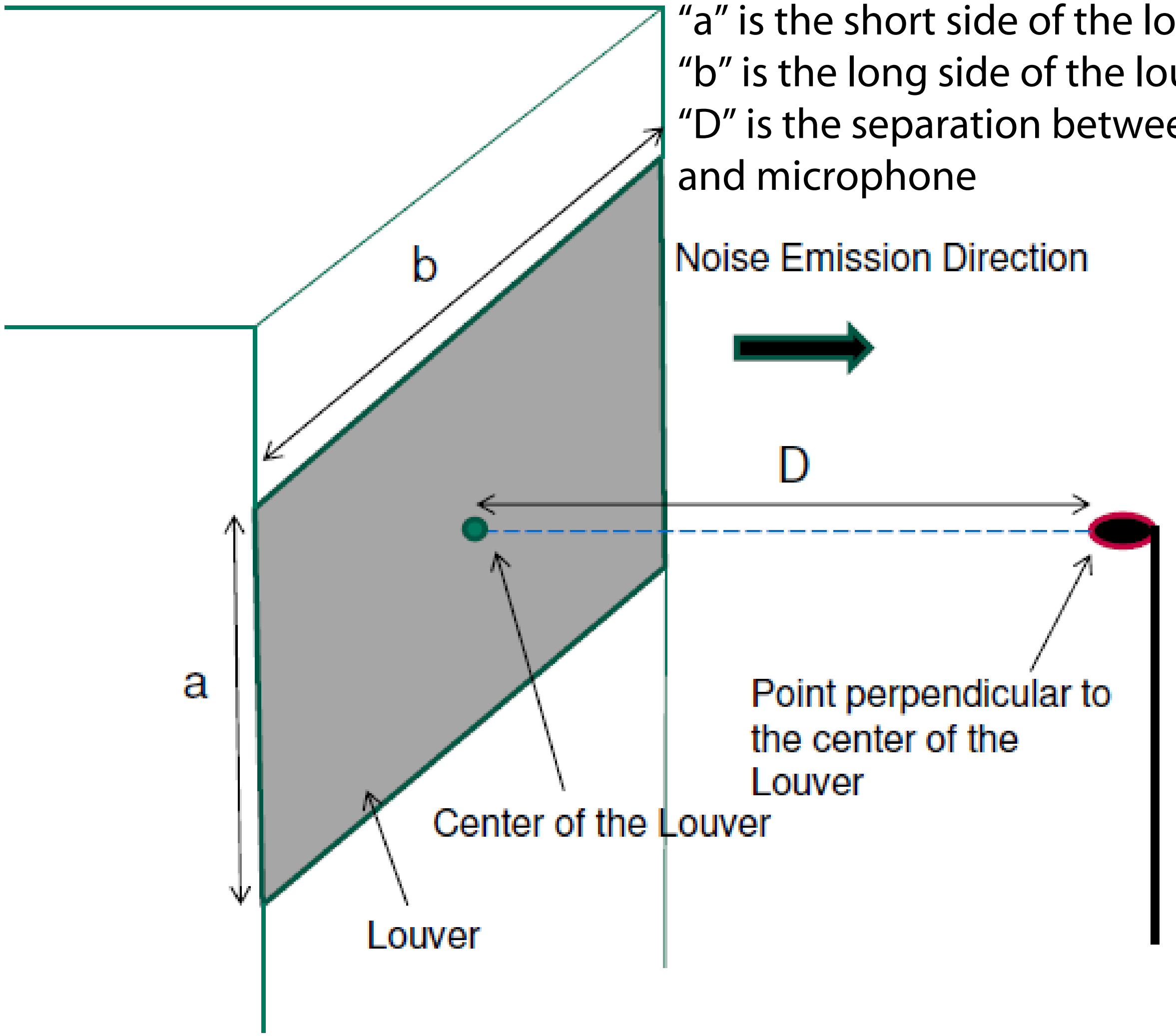


- Based on NCO - TM
- The locations of measurement points are depended on the site situation
- 3.0 dB façade correction should be considered if the location of measurement point is not at assessment point as defined in NCO-TM
- “D” must be greater than 2b and roundup to integer
- Detail calculation of the SPL should refer to the NCO-TM.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

Background corrected SPL = Mean $L_{Aeq1min}$ + BG - [20log (D) +8] (if applicable) + façade correction (if applicable)

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for louvre



"a" is the short side of the louvre
"b" is the long side of the louvre
"D" is the separation between louvre and microphone

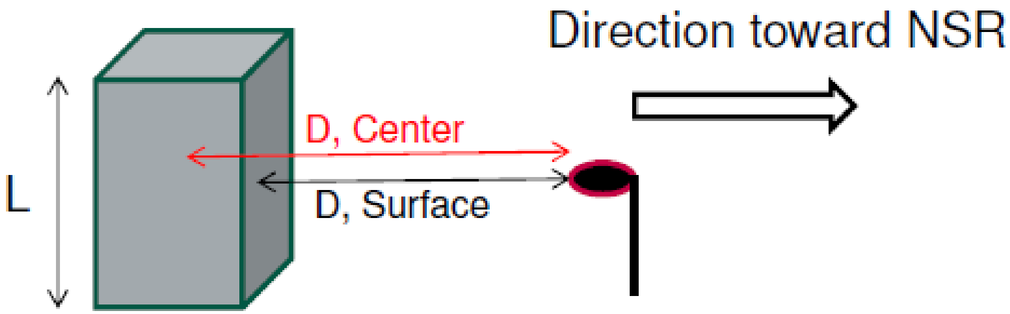
- Based on basic acoustic principle
- "D" must be greater than 2b and roundup to integer, i.e.: D≧2b
- The microphone must point to the center of the louvre.
- At least 3 sets of LAeq, 1min should be obtained
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 +BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for Plant

"L" is the longest side of the plant item
"D, Center" is the separation between center of the plant item and microphone
"D, Surface" is the separation between surface of the plant item and microphone

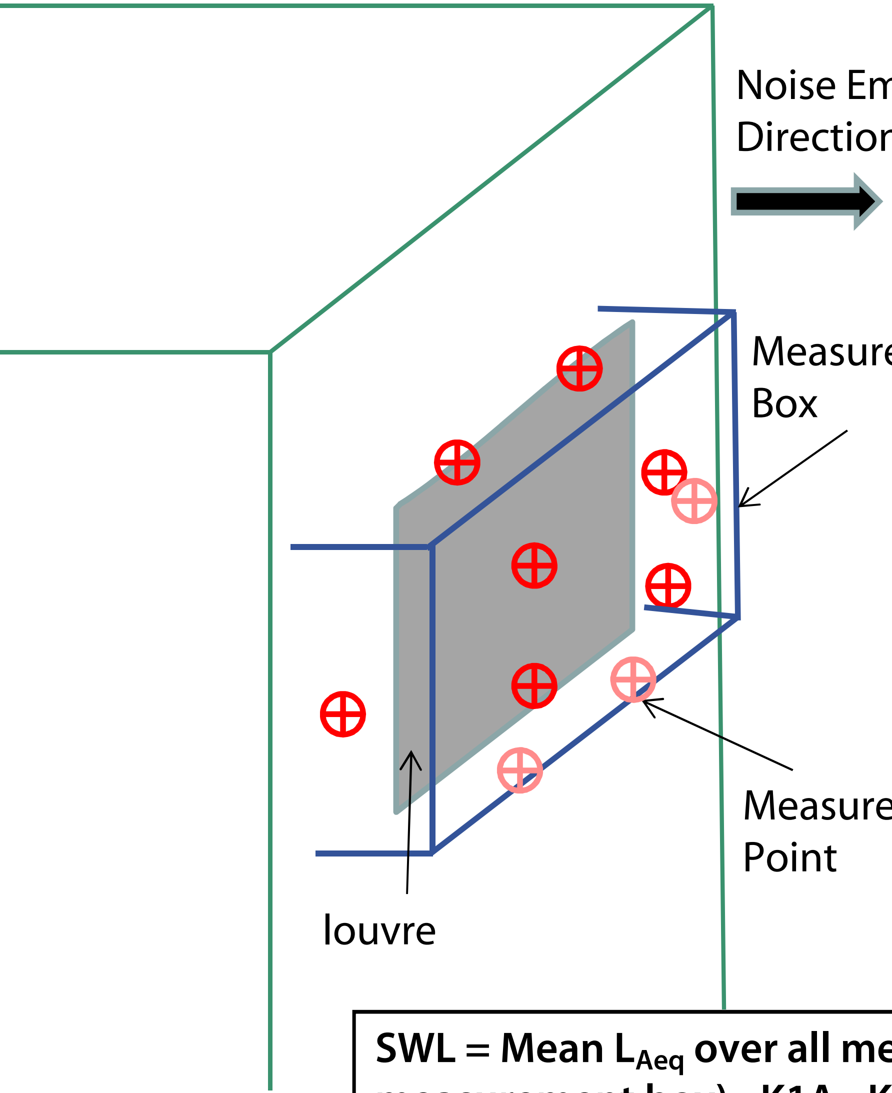


- "D, Surface" must be greater than twice of L (2L) and roundup to integer
- The microphone must be pointing to the center of the plant
- At least 3 sets of LAeq, 1min should be obtained at each measurement point.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 + BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 3 – Near Field Sound Power Testing Method for louvre

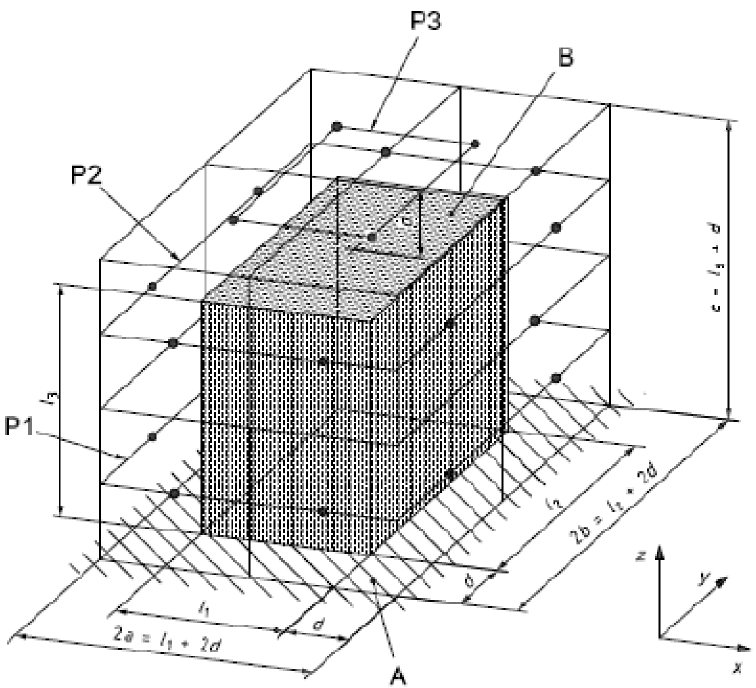


- Based on the principle of ISO3746 – 2010
- First step is to determine a hypothetical measurement surface /box with not less than 1m separation from the louvre.
- Second, determine the location of measurement point in accordance with the latest edition of ISO3746.
- Background noise level (BGL) should be taken at each measurement point for determination of background correction (K1A)
- At least 1 set of Leq, 10s/1min should be obtained at each measurement point
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Details calculation of the SWL should refer to the latest edition of ISO3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 3 – Near Field Sound Power Testing Method for Plant



- Based on ISO 3746
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalised (See figure on the left for example).
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Detail calculation of the SWL should refer to the latest edition of ISO 3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

End

Appendix A2 – Calibration Certificates

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. **704083**

Customer : 宏業承造有限公司

Address : 沙田火炭坳背灣街61-63號盈力工業大廈203室

Order No. : Q71682

Date of receipt : 8-May-17

Item Tested

Description : Sound Level Meter

Manufacturer : CASELLA

Model : CEL-63X

I.D. : CBSM0103

Serial No. : 5044655

Test Conditions

Date of Test : 11-May-17

Ambient Temperature : (23 ± 3)°C

Supply Voltage : --

Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure : Z01, IEC 61672, IEC 61260.

Test Results

All results were within the IEC 61672 Type 1 or IEC 61260 Class 1 specification.

The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C170120	SCL-HKSAR
S240	Sound Level Calibrator	701036	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Kin Wong

Approved by : Alan Chu

Date: 11-May-17

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

E

Hong Kong Calibration Ltd
香港校正有限公司

Calibration Certificate

Certificate No. 704083

Results :

1. **Self-generated noise:** 0.2 dBA (Mfr's Spec (Electrical) ≤ 17.5 dBA)

2. **Acoustical signal test**

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Octave Filter		
0-140	A	F	OFF	94.0	93.8
		S	OFF		93.8
	C	F	OFF		94.0
	Z	F	OFF		93.8
	A	F	1/1		93.8
	A	F	1/3		93.8
	A	F	OFF	114.0	113.8
		S	OFF		113.8
	C	F	OFF		113.8
	Z	F	OFF		113.8
	A	F	1/1		113.9
	A	F	1/3		113.8

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.3 dB

3 **Electrical signal tests of frequency weightings** (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.4	- 39.4 dB, ± 2 dB
63 Hz	-26.2	- 26.2 dB, ± 1.5 dB
125 Hz	-16.1	- 16.1 dB, ± 1.5 dB
250 Hz	-8.7	- 8.6 dB, ± 1 dB
500 Hz	-3.2	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.3	+ 1.2 dB, ± 1.6 dB
4 kHz	+0.9	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.4	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-9.5	- 6.6 dB, + 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

Calibration Certificate

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
A	94.0	93.8 (Ref.)	- -	± 0.4 dB
C	94.0	94.0	+0.2	
Z	94.0	93.8	0.0	

4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
Fast	94.0	93.8 (Ref.)	- -	± 0.3 dB
Slow	94.0	93.8	0.0	
Time-averaging	94.0	93.8	0.0	

Uncertainty : ± 0.1 dB

5. Filter Characteristics

5.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
125 Hz	-61.5	< - 61
250 Hz	-43.7	< - 42
500 Hz	-21.2	< - 17.5
707 Hz	-3.7	- 2 ~ - 5
1 kHz (Ref)	- -	--
1.414 kHz	-3.8	- 2 ~ - 5
2 kHz	-24.2	< - 17.5
4 kHz	-66.0	< - 42
8 kHz	-62.1	< - 61

Uncertainty : ± 0.25 dB

Calibration Certificate

5.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
326 Hz	-61.3	< - 61
530 Hz	-46.3	< - 42
772 Hz	-22.1	< - 17.5
891 Hz	-3.6	+ 0.3 ~ - 5.0
1 kHz (Ref)	- -	--
1.122 kHz	-3.6	+ 0.3 ~ - 5.0
1.296 kHz	-23.3	< - 17.5
1.887 kHz	-50.7	< - 42
3.070 kHz	-72.5	< - 61

Uncertainty : ± 0.25 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1029 hPa
4. Preamplifier model : CEL-495 , S/N : 002374.
5. Firmware Version: 129-08
6. Power Supply Check: OK
7. The UUT was adjusted with the laboratory's sound calibrator at the reference sound pressure level before the calibration.

------------ END ------------

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. **704084**

Customer : 宏業承造有限公司

Address : 沙田火炭坳背灣街61-63號盈力工業大廈203室

Order No. : Q71682

Date of receipt : 8-May-17

Item Tested

Description : Sound Level Calibrator

Manufacturer : Casella

Model : CEL-120/1

I.D. : CBSM0103

Serial No. : 5060836

Test Conditions

Date of Test : 11-May-17

Ambient Temperature : (23 ± 3)°C

Supply Voltage : --

Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure: IEC 60942, F21, Z02.

Test Results

All results were within the IEC 60942 Class 1 specification.

The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S014	Spectrum Analyzer	605758	NIM-PRC & SCL-HKSAR
S240	Sound Level Calibrator	701036	NIM-PRC & SCL-HKSAR
S041	Universal Counter	607883	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant. The test results apply to the above Unit-Under-Test only

Calibrated by : Kin Wong

Approved by : Alan Chu

Date: 11-May-17

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

E

Calibration Certificate

Results :

1. Generated Sound Pressure Level

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94	94.2	± 0.4 dB
114	114.2	

Uncertainty : ± 0.2 dB

2. **Short-term Level Fluctuation** : 0.0 dB
   IEC 60942 Class 1 Spec. : ± 0.1 dB
   Uncertainty : ± 0.01 dB

3. Frequency

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	1.000	± 1 %

Uncertainty : ± 3.6 x 10^{-6}

4. **Total Distortion** : < 0.2 %
   IEC 60942 Class 1 Spec. : < 3 %
   Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1029 hPa.

----------- END -----------

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Customer : ATAL Engineering Ltd
Address : 13/F., Island Place Tower, 510 King's Road, North Point, H. K.
Order No. : Q81893 **Date of receipt :** 16-May-18

Item Tested

Description : Sound Level Meter
Manufacturer : CASELLA **I.D.** : --
Model : CEL-63X **Serial No.** : 5044655

Test Conditions

Date of Test : 18-May-18 **Supply Voltage** : --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure : Z01, IEC 61672, IEC 61260.

Test Results

All results were within the IEC 61672 Type 1 or IEC 61260 Class 1 specification. (where applicable)
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C170120	SCL-HKSAR
S240	Sound Level Calibrator	803357	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Elva Chong **Approved by :** Kin Wong

Date: 18-May-18

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

Results :

1. Self-generated noise: 23.2 dBA

2. Acoustical signal test

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Octave Filter		
0-140	A	F	OFF	94.0	93.3
		S	OFF		93.3
	C	F	OFF		93.3
	Z	F	OFF		93.3
	A	F	1/1		93.3
	A	F	1/3		93.3
	A	F	OFF	114.0	113.4
		S	OFF		113.4
	C	F	OFF		113.4
	Z	F	OFF		113.4
	A	F	1/1		113.4
	A	F	1/3		113.4

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.3 dB

3 Electrical signal tests of frequency weightings (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.5	- 39.4 dB, ± 2 dB
63 Hz	-26.3	- 26.2 dB, ± 1.5 dB
125 Hz	-16.3	- 16.1 dB, ± 1.5 dB
250 Hz	-8.8	- 8.6 dB, ± 1 dB
500 Hz	-3.3	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.2	+ 1.2 dB, ± 1.6 dB
4 kHz	+0.8	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.5	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-9.5	- 6.6 dB, + 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

Calibration Certificate

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
A	94.0	94.0 (Ref.)	- -	± 0.4 dB
C	94.0	94.0	0.0	
Z	94.0	94.0	0.0	

4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
Fast	94.0	94.0 (Ref.)	- -	± 0.3 dB
Slow	94.0	94.0	0.0	
Time-averaging	94.0	94.0	0.0	

Uncertainty : ± 0.1 dB

5. Filter Characteristics

5.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
125 Hz	-61.4	< - 61
250 Hz	-43.7	< - 42
500 Hz	-21.2	< - 17.5
707 Hz	-3.7	- 2 ~ - 5
1 kHz (Ref)	- -	--
1.414 kHz	-3.8	- 2 ~ - 5
2 kHz	-24.2	< - 17.5
4 kHz	-65.4	< - 42
8 kHz	-61.9	< - 61

Uncertainty : ± 0.25 dB

5.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
326 Hz	-61.3	<- 61
530 Hz	-46.3	<- 42
772 Hz	-22.1	<- 17.5
891 Hz	-3.6	+ 0.3 ~ - 5.0
1 kHz (Ref)	- -	--
1.122 kHz	-3.7	+ 0.3 ~ - 5.0
1.296 kHz	-23.3	<- 17.5
1.887 kHz	-50.7	<- 42
3.070 kHz	-72.4	<- 61

Uncertainty : ± 0.25 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 006 hPa
4. Preamplifier model : CEL-495 , S/N : 002374
5. Firmware Version: 129-08
6. Power Supply Check: OK
7. The UUT was adjusted with the supplied sound calibrator at the reference sound pressure level before the calibration.

---------- END ----------

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Customer : ATAL Engineering Ltd
Address : 13/F., Island Place Tower, 510 King's Road, North Point, H. K.
Order No. : Q81893 **Date of receipt :** 16-May-18

Item Tested

Description : Sound Level Calibrator
Manufacturer : Casella **I.D. :** --
Model : CEL-120/1 **Serial No. :** 5060836

Test Conditions

Date of Test : 18-May-18 **Supply Voltage :** --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure: IEC 60942, F21, Z02.

Test Results

All results were within the IEC 60942 Class 1 specification.
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S014	Spectrum Analyzer	707126	NIM-PRC & SCL-HKSAR
S240	Sound Level Calibrator	803357	NIM-PRC & SCL-HKSAR
S041	Universal Counter	802061	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : ______________
Elva Chong

Approved by : ______________
Kin Wong

Date: 18-May-18

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

E

Calibration Certificate

Results :

1. Generated Sound Pressure Level

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94.0	94.3	± 0.4 dB
114.0	114.3	

Uncertainty : ± 0.2 dB

2. **Short-term Level Fluctuation** : 0.0 dB
IEC 60942 Class 1 Spec. : ± 0.1 dB
Uncertainty : ± 0.01 dB

3. Frequency

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	1.000	± 1 %

Uncertainty : ± 3.6 x 10^{-6}

4. **Total Distortion** : < 0.2 %
IEC 60942 Class 1 Spec. : < 4 %
Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 006 hPa.

---------- END ----------

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**

consisting of		
MA220	Serial Number:	6240
Capsule	Serial Number:	9498

- Certificate Issued: **10 January 2017**
- Certificate Number: **42745-6240-M2230**
- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

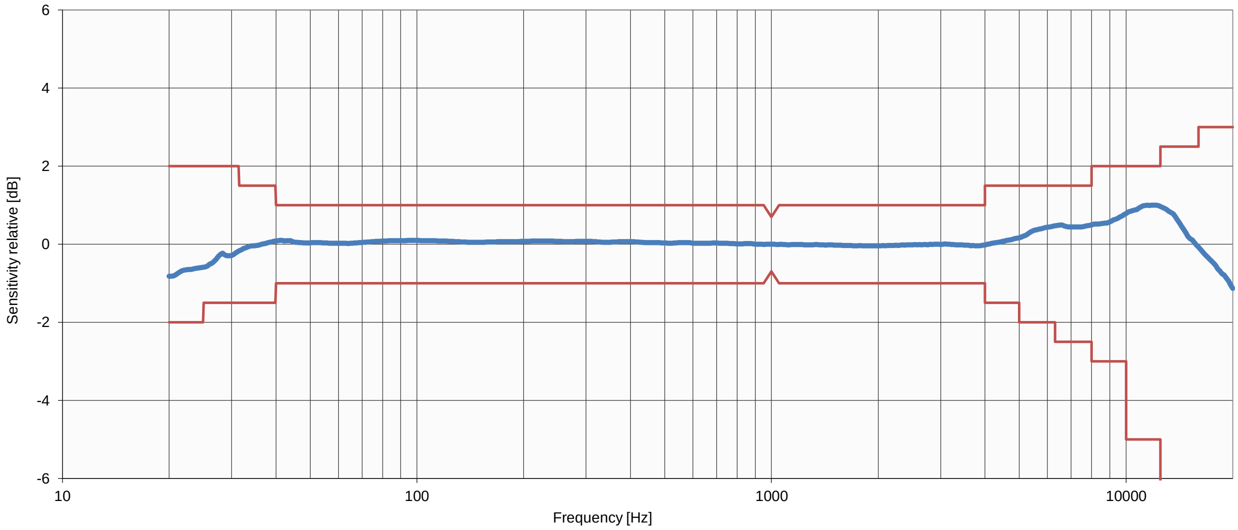
Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date:	10 January 2017		
Calibration of:	M2230 Measurement Microphone		
	MA220	Serial Number:	6240
	Capsule	Serial Number:	9498

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**43.3 mV/Pa**	±2.85%

- Test Conditions:

Test Conditions:	Temperature:	27.2 °C	±0.5 °C
	Relative Humidity:	39.5 %	±2%
	Air Pressure:	95.94 kPa	±0.25 kPa

- Calibration Equipment Used:

- Norsonic Sound Calibrator, Type 1251, S/No. 30930
  Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
  Calibrated by Metas, Switzerland

- NTi Audio FX100, S/No. 11094
  Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
  Calibrated by NTi Audio meeting product specifications

- MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
  Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
  Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**

consisting of		
MA220	Serial Number:	5011
Capsule	Serial Number:	7698

- Certificate Issued: **24 March 2017**
- Certificate Number: **42818-5011-M2230**
- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

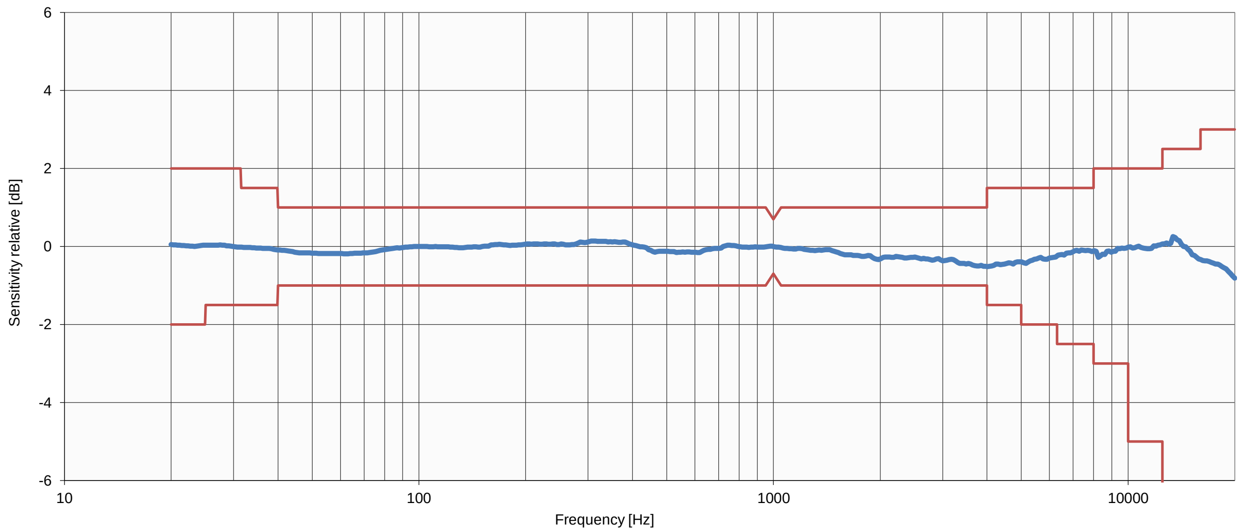
Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date:	24 March 2017			
Calibration of:	M2230	Measurement Microphone		
		MA220	Serial Number:	5011
		Capsule	Serial Number:	7698

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**46.5 mV/Pa**	±2.85%

- Test Conditions:

Temperature:	21.1 °C	±0.5 °C
Relative Humidity:	47.2 %	±2%
Air Pressure:	97.4 kPa	±0.25 kPa

- Calibration Equipment Used:

  - Norsonic Sound Calibrator, Type 1251, S/No. 30930
    Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
    Calibrated by Metas, Switzerland

  - NTi Audio FX100, S/No. 11094
    Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
    Calibrated by NTi Audio meeting product specifications

  - MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
    Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
    Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**
  consisting of
  MA220 Serial Number: 5617
  Capsule Serial Number: 8507

- Certificate Issued: **24 March 2017**

- Certificate Number: **42818-5617-M2230**

- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

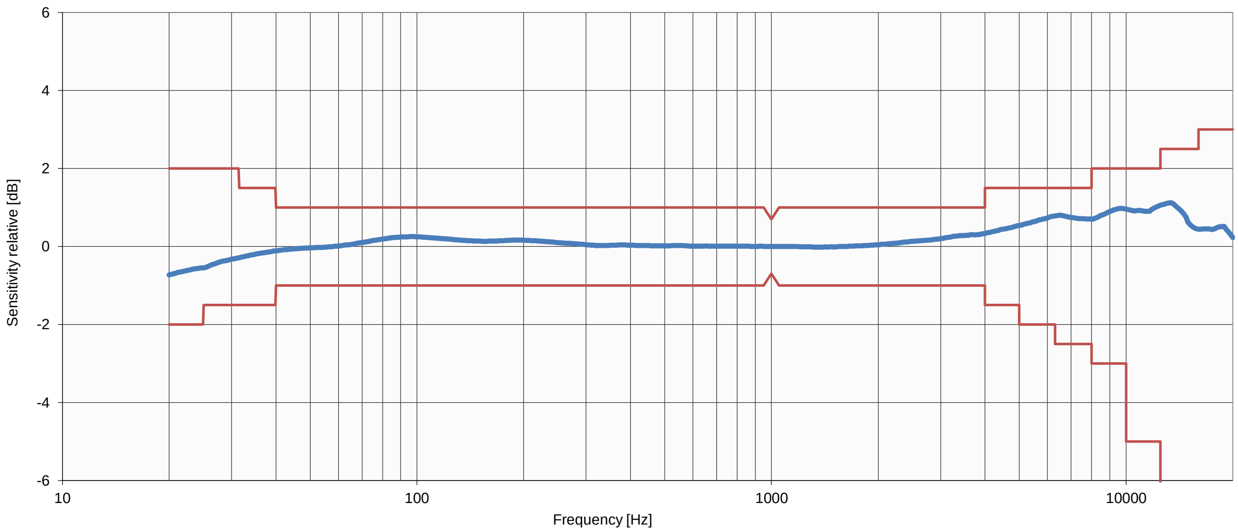
Date: 24 March 2017

Calibration of: M2230 Measurement Microphone

	MA220	Serial Number:	5617
	Capsule	Serial Number:	8507

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**48.1 mV/Pa**	±2.85%

- Test Conditions:

Temperature:	24.6	°C	±0.5 °C
Relative Humidity:	43.6	%	±2%
Air Pressure:	97.65	kPa	±0.25 kPa

- Calibration Equipment Used:

- Norsonic Sound Calibrator, Type 1251, S/No. 30930
  Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
  Calibrated by Metas, Switzerland

- NTi Audio FX100, S/No. 11094
  Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
  Calibrated by NTi Audio meeting product specifications

- MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
  Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
  Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Calibration Chart

BSWA TECH

BSWA-IV-C021-03-0048A

Sound Calibrator model	CA111
Serial Number	120317
Appearance	OK
Power Supply	1.5V LR6 (AA battery) x2
Sound Pressure Level	93.92 / 114.04 dB
Frequency	1000.5 / 1000.5 Hz
THD (@1000Hz)	0.23 / 0.80 %

BSWA Technology Ltd.

www.bswa-tech.com

This equipment was calibrated at the following ambient conditions:

Temperature:	23 ℃
Humidity:	35 %RH
Pressure:	1025 hPa

This equipment is qualified!

Calibrated

QC 05

2016-11-15

Date

Appendix A3 – Fixed Plant Noise Summary

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
PH1	Sheung Tsuen Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	113	10	22	44	49	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	113	10	5			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	86	10	18			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	86	10	20			
			Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	113	10	18			
			Tunnel ventilation shaft	E1	L	N (i)	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	86	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	106	10	22			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	106	10	21			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	100	10	28			
			Tunnel ventilation shaft	S1	L	N (i)	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	81	-	-			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	81	0	37			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	81	0	21			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	81	0	19			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	100	0	36			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	105	0	21			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	86	0	41			
PH1a	Sheung Tsuen Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	95	10	23	46	49	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	95	10	6			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	69	10	20			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	69	10	22			
			Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	95	10	19			
			Tunnel ventilation shaft	E1	L	N (i)	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	69	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	88	10	24			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	88	10	23			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	82	10	30			
			Tunnel ventilation shaft	S1	L	N (i)	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	63	-	-			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	63	0	39			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	63	0	23			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	63	0	21			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	82	0	38			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	86	0	22			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	74	0	43			
			Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	116	10	22			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
PH1b	Sheung Tsuen Village House	Ventilation Shaft for N/B (i) and Building Service	FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	120	10	4	42	49	0
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	97	10	17			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	97	10	19			
			Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	120	10	17			
			Tunnel ventilation shaft	E1	L	N (i)	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	92	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	108	0	32			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	118	0	31			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	118	0	37			
			Tunnel ventilation shaft	S1	L	N (i)	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	92	-	-			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	102	0	35			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	104	0	19			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	105	0	17			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	108	0	35			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	122	10	9			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	122	10	28			
PH4	Sheung Tsuen Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	86	0	34	42	49	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	80	0	18			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	110	0	26			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	110	0	28			
			Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	80	0	31			
			Tunnel ventilation shaft	E1	L	N (i)	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	114	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	98	10	23			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	82	10	24			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	82	10	30			
			Tunnel ventilation shaft	S1	L	N (i)	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	113	-	-			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	96	10	25			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	96	10	9			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	96	10	7			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	108	10	25			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	90	0	22			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	102	0	40			
			Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	99	0	33			
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	99	0	16			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	120	0	25			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	120	0	27			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
PH4a	Sheung Tsuen Village House	Ventilation Shaft for N/B (i) and Building Service	Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	100	0	29	38	49	0
			Tunnel ventilation shaft	E1	L	N (i)	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	123	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	103	10	23			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	102	10	22			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	103	10	28			
			Tunnel ventilation shaft	S1	L	N (i)	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	131	-	-			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	131	10	23			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	131	10	7			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	131	10	5			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	102	10	26			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	101	10	11			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	125	10	28			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
PH1	Sheung Tsuen Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	113	-	-	45	49	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	113	10	5			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	86	10	18			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	86	10	20			
			Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	113	10	18			
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	86	10	25			
			Tunnel ventilation shaft	E2	L	N (i)	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	106	-	-			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	106	10	21			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	100	10	28			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	81	0	37			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	81	0	37			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	81	0	21			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	81	0	19			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	100	0	36			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	105	0	21			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	86	0	41			
PH1a	Sheung Tsuen Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	95	-	-	47	49	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	95	10	6			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	69	10	20			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	69	10	22			
			Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	95	10	19			
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	69	10	27			
			Tunnel ventilation shaft	E2	L	N (i)	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	88	-	0			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	88	10	23			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	82	10	30			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	63	0	39			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	63	0	39			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	63	0	23			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	63	0	21			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	82	0	38			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	86	0	22			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	74	0	43			
			Tunnel ventilation shaft	N1	L	N (i)	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	116	-	-			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
PH1b	Sheung Tsuen Village House	Ventilation Shaft for S/B (i) and Building Service	FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	120	10	4	43	49	0
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	97	10	17			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	97	10	19			
			Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	120	10	17			
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	92	0	35			
			Tunnel ventilation shaft	E2	L	N (i)	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	108	-	-			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	118	0	31			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	118	0	37			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	92	0	36			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	102	0	35			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	104	0	19			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	105	0	17			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	108	0	35			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	122	10	9			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	122	10	28			
PH4	Sheung Tsuen Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	86	-	-	42	49	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	80	0	18			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	110	0	26			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	110	0	28			
			Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	80	0	31			
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	114	10	23			
			Tunnel ventilation shaft	E2	L	N (i)	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	98	-	-			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	82	10	24			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	82	10	30			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	113	10	24			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	96	10	25			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	96	10	9			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	96	10	7			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	108	10	25			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	90	0	22			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	102	0	40			
			Tunnel ventilation shaft	N1	L	N (i)	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	99	-	-			
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	99	0	16			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	120	0	25			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	120	0	27			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
PH4a	Sheung Tsuen Village House	Ventilation Shaft for S/B (i) and Building Service	Pressurization fan room	N5	L	Y	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	100	0	29	36	49	0
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	123	10	22			
			Tunnel ventilation shaft	E2	L	N (i)	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	103	-	-			
			Pressurization fan room	E3	L	Y	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	102	10	22			
			Smoke extract make-up fan room	E4	L	Y	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	103	10	28			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	131	10	23			
			UPS room	S2	L	Y	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	131	10	23			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	131	10	7			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	131	10	5			
			Smoke extraction fan room	S5	L	Y	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	102	10	26			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	101	10	11			
			Smoke extraction fan room	W2	L	Y	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	125	10	28			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method [iii]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [iii]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [v]	Calculated SWL L_{Aeq} [dB(A)] [vi]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
PH1	Sheung Tsuen Village House	Ventilation Shaft for N/B [i] and Building Service	Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	113	10	22	29	43	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	113	10	5			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	86	10	18			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	86	10	20			
			Pressurization fan room	N5	L	N [ii]	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	113	-	-			
			Tunnel ventilation shaft	E1	L	N [i]	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	86	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	106	10	22			
			Pressurization fan room	E3	L	N [ii]	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	106	-	-			
			Smoke extract make-up fan room	E4	L	N [ii]	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	100	-	-			
			Tunnel ventilation shaft	S1	L	N [i]	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	81	-	-			
			UPS room	S2	L	N [ii]	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	81	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	81	0	21			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	81	0	19			
			Smoke extraction fan room	S5	L	N [ii]	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	100	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	105	0	21			
			Smoke extraction fan room	W2	L	N [ii]	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	86	-	-			
PH1a	Sheung Tsuen Village House	Ventilation Shaft for N/B [i] and Building Service	Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	95	10	23	31	43	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	95	10	6			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	69	10	20			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	69	10	22			
			Pressurization fan room	N5	L	N [ii]	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	95	-	-			
			Tunnel ventilation shaft	E1	L	N [i]	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	69	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	88	10	24			
			Pressurization fan room	E3	L	N [ii]	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	88	-	-			
			Smoke extract make-up fan room	E4	L	N [ii]	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	82	-	-			
			Tunnel ventilation shaft	S1	L	N [i]	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	63	-	-			
			UPS room	S2	L	N [ii]	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	63	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	63	0	23			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	63	0	21			
			Smoke extraction fan room	S5	L	N [ii]	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	82	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	86	0	22			
			Smoke extraction fan room	W2	L	N [ii]	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	74	-	-			
			Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	116	10	22			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Height	Method [(iii)]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [(iii)]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [(v)]	Calculated SWL L_{Aeq} [dB(A)] [(vi)]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
PH1b	Sheung Tsuen Village House	Ventilation Shaft for N/B [(i)] and Building Service	FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	120	10	4	33	43	0
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	97	10	17			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	97	10	19			
			Pressurization fan room	N5	L	N [(ii)]	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	120	-	-			
			Tunnel ventilation shaft	E1	L	N [(i)]	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	92	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	108	0	32			
			Pressurization fan room	E3	L	N [(ii)]	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	118	-	-			
			Smoke extract make-up fan room	E4	L	N [(ii)]	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	118	-	-			
			Tunnel ventilation shaft	S1	L	N [(i)]	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	92	-	0			
			UPS room	S2	L	N [(ii)]	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	102	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	104	0	19			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	105	0	17			
			Smoke extraction fan room	S5	L	N [(ii)]	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	108	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	122	10	9			
			Smoke extraction fan room	W2	L	N [(ii)]	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	122	-	-			
PH4	Sheung Tsuen Village House	Ventilation Shaft for N/B [(i)] and Building Service	Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	86	0	34	36	43	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	80	0	18			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	110	0	26			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	110	0	28			
			Pressurization fan room	N5	L	N [(ii)]	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	80	-	-			
			Tunnel ventilation shaft	E1	L	N [(i)]	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	114	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	98	10	23			
			Pressurization fan room	E3	L	N [(ii)]	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	82	-	-			
			Smoke extract make-up fan room	E4	L	N [(ii)]	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	82	-	-			
			Tunnel ventilation shaft	S1	L	N [(i)]	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	113	-	-			
			UPS room	S2	L	N [(ii)]	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	96	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	96	10	9			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	96	10	7			
			Smoke extraction fan room	S5	L	N [(ii)]	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	108	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	90	0	22			
			Smoke extraction fan room	W2	L	N [(ii)]	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	102	-	-			
			Tunnel ventilation shaft	N1	L	Y	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	99	0	33			
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	99	0	16			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	120	0	25			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	120	0	27			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
PH4a	Sheung Tsuen Village House	Ventilation Shaft for N/B (i) and Building Service	Pressurization fan room	N5	L	N (ii)	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	100	-	-	35	43	0
			Tunnel ventilation shaft	E1	L	N (i)	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	123	-	-			
			Tunnel ventilation shaft	E2	L	Y	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	103	10	23			
			Pressurization fan room	E3	L	N (ii)	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	102	-	-			
			Smoke extract make-up fan room	E4	L	N (ii)	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	103	-	-			
			Tunnel ventilation shaft	S1	L	N (i)	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	131	-	-			
			UPS room	S2	L	N (ii)	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	131	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	131	10	7			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	131	10	5			
			Smoke extraction fan room	S5	L	N (ii)	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	102	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	101	10	11			
			Smoke extraction fan room	W2	L	N (ii)	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	125	-	-			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
PH1	Sheung Tsuen Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	113	-	-	38	43	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	113	10	5			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	86	10	18			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	86	10	20			
			Pressurization fan room	N5	L	N (ii)	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	113	-	-			
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	86	10	25			
			Tunnel ventilation shaft	E2	L	N (i)	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	106	-	-			
			Pressurization fan room	E3	L	N (ii)	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	106	-	-			
			Smoke extract make-up fan room	E4	L	N (ii)	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	100	-	-			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	81	0	37			
			UPS room	S2	L	N (ii)	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	81	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	81	0	21			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	81	0	19			
			Smoke extraction fan room	S5	L	N (ii)	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	100	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	105	0	21			
			Smoke extraction fan room	W2	L	N (ii)	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	86	-	-			
PH1a	Sheung Tsuen Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	95	-	-	40	43	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	95	10	6			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	69	10	20			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	69	10	22			
			Pressurization fan room	N5	L	N (ii)	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	95	-	-			
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	69	10	27			
			Tunnel ventilation shaft	E2	L	N (i)	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	88	-	-			
			Pressurization fan room	E3	L	N (ii)	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	88	-	-			
			Smoke extract make-up fan room	E4	L	N (ii)	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	82	-	-			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	63	0	39			
			UPS room	S2	L	N (ii)	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	63	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	63	0	23			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	63	0	21			
			Smoke extraction fan room	S5	L	N (ii)	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	82	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	86	0	22			
			Smoke extraction fan room	W2	L	N (ii)	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	74	-	-			
			Tunnel ventilation shaft	N1	L	N (i)	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	116	-	-			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method [iii]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [iii]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [v]	Calculated SWL L_{Aeq} [dB(A)] [vi]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
PH1b	Sheung Tsuen Village House	Ventilation Shaft for S/B [i] and Building Service	FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	120	10	4	39	43	0
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	97	10	17			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	97	10	19			
			Pressurization fan room	N5	L	N [ii]	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	120	-	-			
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	92	0	35			
			Tunnel ventilation shaft	E2	L	N [i]	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	108	-	-			
			Pressurization fan room	E3	L	N [ii]	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	118	-	-			
			Smoke extract make-up fan room	E4	L	N [ii]	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	118	-	-			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	92	0	36			
			UPS room	S2	L	N [ii]	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	102	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	104	0	19			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	105	0	17			
			Smoke extraction fan room	S5	L	N [ii]	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	108	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	122	10	9			
			Smoke extraction fan room	W2	L	N [ii]	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	122	-	-			
PH4	Sheung Tsuen Village House	Ventilation Shaft for S/B [i] and Building Service	Tunnel ventilation shaft	N1	L	N [i]	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	86	-	-	32	43	0
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	80	0	18			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	110	0	26			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	110	0	28			
			Pressurization fan room	N5	L	N [ii]	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	80	-	-			
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	114	10	23			
			Tunnel ventilation shaft	E2	L	N [i]	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	98	-	-			
			Pressurization fan room	E3	L	N [ii]	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	82	-	-			
			Smoke extract make-up fan room	E4	L	N [ii]	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	82	-	-			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	113	10	24			
			UPS room	S2	L	N [ii]	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	96	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	96	10	9			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	96	10	7			
			Smoke extraction fan room	S5	L	N [ii]	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	108	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	90	0	22			
			Smoke extraction fan room	W2	L	N [ii]	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	102	-	-			
			Tunnel ventilation shaft	N1	L	N [i]	15.53	5.05	3	3	433.3	53.9	49.5	4.4	51.9	78	99	-	-			
			FS control room	N2	L	Y	0.50	0.50	2	1	n/a	55	50.4	4.6	53.2	61	99	0	16			
			P&D pump and tank room	N3	L	Y	2.20	1.70	2	5	n/a	52.9	49.7	3.2	50.1	72	120	0	25			
			Air duct riser	N4	L	Y	5.70	2.50	3	1	59.1	57.7	51.7	6	56.4	74	120	0	27			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
PH4a	Sheung Tsuen Village House	Ventilation Shaft for S/B (i) and Building Service	Pressurization fan room	N5	L	N (ii)	2.20	2.70	2	6	n/a	51.2	43.8	7.4	50.3	74	100	-	-	31	43	0
			Tunnel ventilation shaft	E1	L	Y	8.28	5.05	3	3	309.7	55.1	48.4	6.7	54.1	79	123	10	22			
			Tunnel ventilation shaft	E2	L	N (i)	8.28	5.05	3	3	309.7	54.8	50.5	4.3	52.8	78	103	-	-			
			Pressurization fan room	E3	L	N (ii)	2.30	2.10	2	5	n/a	55	43.8	11.2	55	77	102	-	-			
			Smoke extract make-up fan room	E4	L	N (ii)	1.80	2.40	2	5	n/a	60.8	43.8	17	60.8	83	103	-	-			
			Tunnel ventilation shaft	S1	L	Y	15.15	5.05	3	3	426.9	55.7	50.5	5.2	54.1	80	131	10	23			
			UPS room	S2	L	N (ii)	2.5	1.1	2	5	n/a	59.0	50.0	9	58.4	80	131	-	-			
			SER	S3	L	Y	0.70	0.70	2	2	n/a	51.1	45.3	5.8	49.8	64	131	10	7			
			MCC room	S4	L	Y	0.50	0.50	2	1	n/a	55.3	50.2	5.1	53.7	62	131	10	5			
			Smoke extraction fan room	S5	L	N (ii)	5.80	1.90	3	1	53.8	64.1	45.3	18.8	64.1	81	102	-	-			
			ABBCS room	W1	L	Y	1.10	1.00	2	3	n/a	51.1	47.1	4	48.9	66	101	10	11			
			Smoke extraction fan room	W2	L	N (ii)	7.00	1.90	3	1	60.9	66.9	47.5	19.4	66.9	85	125	-	-			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
NC10	St. Margaret's Coeducational English Secondary & Primary School	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	141	-	-	36	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	141	0	19			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	141	0	30			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	137	0	34			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	151	10	13			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	151	10	13			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	151	10	10			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	170	10	22			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	164	10	15			
NC11	Tack Ching Girls' Secondary School	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	141	-	-	37	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	136	0	19			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	136	0	30			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	163	10	23			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	135	10	14			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	135	10	14			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	135	10	11			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	133	0	35			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	128	0	27			
NC11e	Planned development (site 6), Block 1 (vi)	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	30	-	-	46	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	30	10	22			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	30	10	33			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	32	10	37			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	20	10	31			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	13	10	35			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	9	10	35			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	16	10	43			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	11	10	38			
NC11f	Planned development (site 6), Block 1 (vi)	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	29	-	-	46	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	29	10	23			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	29	10	34			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	21	10	41			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	13	10	35			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	8	10	39			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	11	10	33			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	25	10	39			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Height	Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	20	10	33			
NC11g	Planned development (site 6), Block 2	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	50	-	-	48	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	50	10	18			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	50	10	29			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	33	0	47			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	45	0	34			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	55	0	32			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	62	0	28			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	66	10	31			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	71	10	22			
NC11h	Planned development (site 6), Block 2	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	50	-	-	47	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	55	10	17			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	55	10	28			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	34	0	46			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	47	0	34			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	55	0	32			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	62	0	28			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	77	10	29			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	72	10	22			
NC16	Tower 3 Aqua Marine	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	239	-	-	32	65	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	239	0	14			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	239	0	25			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	261	10	19			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	230	10	10			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	230	10	10			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	230	10	7			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	225	0	30			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	225	0	22			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vi) A canopy with acoustic lining will be provided at the southern façade of NCV for screening the fixed plant noise from the southern louvres to Block 1.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
NC10	St. Margaret's Coeducational English Secondary & Primary School	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	141	0	33	35	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	141	0	19			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	141	0	30			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	137	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	151	10	13			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	151	10	13			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	151	10	10			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	170	10	22			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	164	10	15			
NC11	Tack Ching Girls' Secondary School	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	141	0	33	38	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	136	0	19			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	136	0	30			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	163	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	135	10	14			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	135	10	14			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	135	10	11			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	133	0	35			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	128	0	27			
NC11e	Planned development (site 6), Block 1 (vi)	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	30	10	36	46	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	30	10	22			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	30	10	33			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	32	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	20	10	31			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	13	10	35			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	9	10	35			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	16	10	43			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	11	10	38			
NC11f	Planned development (site 6), Block 1 (vi)	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	29	10	37	45	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	29	10	23			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	29	10	34			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	21	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	13	10	35			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	8	10	39			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	11	10	33			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	25	10	39			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	20	10	33			
NC11g	Planned development (site 6), Block 2	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	50	10	32	39	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	50	10	18			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	50	10	29			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	33	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	45	0	34			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	55	0	32			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	62	0	28			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	66	10	31			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	71	10	22			
NC11h	Planned development (site 6), Block 2	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	50	10	32	39	60	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	55	10	17			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	55	10	28			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	34	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	47	0	34			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	55	0	32			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	62	0	28			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	77	10	29			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	72	10	22			
NC16	Tower 3 Aqua Marine	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	239	0	28	33	65	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	239	0	14			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	239	0	25			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	261	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	230	10	10			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	230	10	10			
			E&M Service Area 9	S3	L	Y	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	230	10	7			
			Dog house	S4	L	Y	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	225	0	30			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	225	0	22			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vi) A canopy with acoustic lining will be provided at the southern façade of NCV for screening the fixed plant noise from the southern louvres to Block 1.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method [iii]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [iv]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [v]	Calculated SWL L_{Aeq} [dB(A)] [vi]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
NC10	St. Margaret's Coeducational English Secondary & Primary School	Ventilation Shaft for N/B [i] and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	141	-	-	36	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	141	0	19			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	141	0	30			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	137	0	34			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	151	10	13			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	151	10	13			
			E&M Service Area 9	S3	L	N [ii]	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	151	-	-			
			Dog house	S4	L	N [ii]	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	170	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	164	10	15			
NC11	Tack Ching Girls' Secondary School	Ventilation Shaft for N/B [i] and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	141	-	-	33	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	136	0	19			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	136	0	30			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	163	10	23			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	135	10	14			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	135	10	14			
			E&M Service Area 9	S3	L	N [ii]	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	135	-	-			
			Dog house	S4	L	N [ii]	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	133	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	128	0	27			
NC11e	Planned development (site 6), Block 1 [vii]	Ventilation Shaft for N/B [i] and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	30	-	-	43	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	30	10	22			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	30	10	33			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	32	10	37			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	20	10	31			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	13	10	35			
			E&M Service Area 9	S3	L	N [ii]	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	9	-	0			
			Dog house	S4	L	N [ii]	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	16	-	0			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	11	10	38			
NC11f	Planned development (site 6), Block 1 [vii]	Ventilation Shaft for N/B [i] and Building Service	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	29	-	-	45	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	29	10	23			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	29	10	34			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	21	10	41			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	13	10	35			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	8	10	39			
			E&M Service Area 9	S3	L	N [ii]	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	11	-	-			
			Dog house	S4	L	N [ii]	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	25	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	20	10	33			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method [(iii)]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [(iv)]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [(v)]	Calculated SWL L_{Aeq} [dB(A)] [(vi)]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
NC11g	**Planned development (site 6), Block 2**	**Ventilation Shaft for N/B [(i)] and Building Service**	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	50	-	-	47	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	50	10	18			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	50	10	29			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	33	0	47			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	45	0	34			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	55	0	32			
			E&M Service Area 9	S3	L	N [(ii)]	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	62	-	-			
			Dog house	S4	L	N [(ii)]	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	66	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	71	10	22			
NC11h	**Planned development (site 6), Block 2**	**Ventilation Shaft for N/B [(i)] and Building Service**	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	50	-	-	47	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	55	10	17			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	55	10	28			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	34	0	46			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	47	0	34			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	55	0	32			
			E&M Service Area 9	S3	L	N [(ii)]	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	62	-	-			
			Dog house	S4	L	N [(ii)]	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	77	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	72	10	22			
NC16	**Tower 3 Aqua Marine**	**Ventilation Shaft for N/B [(i)] and Building Service**	Tunnel ventilation shaft	N1	L	N	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	239	-	-	28	55	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	239	0	14			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	239	0	25			
			Tunnel ventilation shaft	E1	L	Y	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	261	10	19			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	230	10	10			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	230	10	10			
			E&M Service Area 9	S3	L	N [(ii)]	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	230	-	-			
			Dog house	S4	L	N [(ii)]	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	225	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	225	0	22			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vii) A canopy with acoustic lining will be provided at the southern façade of NCV for screening the fixed plant noise from the southern louvres to Block 1.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
NC10	St. Margaret's Coeducational English Secondary & Primary School	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	141	0	33	35	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	141	0	19			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	141	0	30			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	137	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	151	10	13			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	151	10	13			
			E&M Service Area 9	S3	L	N (ii)	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	151	-	-			
			Dog house	S4	L	N (ii)	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	170	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	164	10	15			
NC11	Tack Ching Girls' Secondary School	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	141	0	33	36	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	136	0	19			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	136	0	30			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	163	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	135	10	14			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	135	10	14			
			E&M Service Area 9	S3	L	N (ii)	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	135	-	-			
			Dog house	S4	L	N (ii)	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	133	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	128	0	27			
NC11e	Planned development (site 6), Block 1 (vii)	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	30	10	36	42	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	30	10	22			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	30	10	33			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	32	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	20	10	31			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	13	10	35			
			E&M Service Area 9	S3	L	N (ii)	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	9	-	-			
			Dog house	S4	L	N (ii)	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	16	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	11	10	38			
NC11f	Planned development (site 6), Block 1 (vii)	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	29	10	37	43	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	29	10	23			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	29	10	34			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	21	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	13	10	35			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	8	10	39			
			E&M Service Area 9	S3	L	N (ii)	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	11	-	-			
			Dog house	S4	L	N (ii)	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	25	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	20	10	33			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
NC11g	**Planned development (site 6), Block 2**	**Ventilation Shaft for S/B (i) and Building Service**	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	50	10	32	38	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	50	10	18			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	50	10	29			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	33	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	45	0	34			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	55	0	32			
			E&M Service Area 9	S3	L	N (ii)	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	62	-	-			
			Dog house	S4	L	N (ii)	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	66	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	71	10	22			
NC11h	**Planned development (site 6), Block 2**	**Ventilation Shaft for S/B (i) and Building Service**	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	50	10	32	38	50	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	55	10	17			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	55	10	28			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	34	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	47	0	34			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	55	0	32			
			E&M Service Area 9	S3	L	N (ii)	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	62	-	-			
			Dog house	S4	L	N (ii)	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	77	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	72	10	22			
NC16	**Tower 3 Aqua Marine**	**Ventilation Shaft for S/B (i) and Building Service**	Tunnel ventilation shaft	N1	L	Y	18.30	5.65	3	3	498.8	57.2	54	3.2	54.4	81	239	0	28	31	55	0
			FS Control Room	N2	L	Y	2.44	0.55	3	1	25.3	54.8	49.6	5.2	53.2	67	239	0	14			
			E&M Service Area 8	N3	L	Y	3.16	5.61	3	1	64.8	61.2	55.8	5.4	59.7	78	239	0	25			
			Tunnel ventilation shaft	E1	L	N	17.45	6.18	3	1	214.4	60.7	55.9	4.8	59	82	261	-	-			
			E&M Service Area 10	S1	L	Y	1.56	1.86	3	1	28.6	59.5	55.8	3.7	57.1	72	230	10	10			
			E&M Service Area 10	S2	L	Y	7.86	1.86	3	1	65.5	57.2	56.9	0.3	54.2	72	230	10	10			
			E&M Service Area 9	S3	L	N (ii)	5.90	1.40	3	1	49.5	55.3	55.1	0.2	52.3	69	230	-	-			
			Dog house	S4	L	N (ii)	0.8	0.8	2	2	N/A	67.8	56.5	11.3	67.8	82	225	-	-			
			LV Switch Room	W1	L	Y	0.80	0.80	3	1	19.0	61.7	54	7.7	60.9	74	225	0	22			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vii) A canopy with acoustic lining will be provided at the southern façade of NCV for screening the fixed plant noise from the southern louvres to Block 1.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
MK1	Yau Ma Tei Catholic Primary School (Hoi Wang Road)	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	10.00	8.00	3	3	404.0	60.8	53.7	7.1	59.9	86	202	0	35	39	60	0
			Tunnel ventilation shaft	N2	L	N (i)	10.00	8.00	3	3	404.0	62.5	56	6.5	61.4	87	202	-	-			
			EVS	N3	L	Y	1.70	6.96	3	2	129.1	61.5	58.6	2.9	58.5	80	202	0	29			
			Harmonic Filter Room	E1	L	Y	1.24	1.24	2	3	N/A	62.3	56.9	5.4	60.8	78	222	0	26			
			Harmonic Filter Room	E2	L	Y	9.90	1.70	3	1	75.2	56.3	55.6	0.7	53.3	72	207	0	21			
			25kV Switch Room	E3	L	Y	0.75	0.75	2	2	N/A	61.1	56.9	4.2	59	73	217	0	21			
			SVS	E4	L	Y	1.70	8.70	3	2	146.0	59.6	55.6	4	57.4	79	207	0	28			
			Staircase Pressuraization Fan Room 2	S1	L	Y	5.90	1.20	3	1	47.5	58.2	52.7	5.5	56.8	74	207	10	13			
			Staircase Pressuraization Fan Room 1	S2	L	Y	5.90	1.20	3	1	47.5	59.2	52.7	6.5	58.1	75	207	10	14			
			Battery and Charge Room	S3	L	Y	1.0	1.0	3	1	21.0	71.3	57.8	13.5	71.3	85	237	10	23			
			Harmonic Filter Room	S4	L	Y	2.10	0.90	3	1	25.9	58.7	52.7	6	57.4	72	237	10	10			
			Fire Pump room (Electrical)	W1	L	Y	1.00	1.00	3	1	21.0	77.1	61.4	15.7	77.1	90	227	10	28			
			FHP	FHP-N1	L	Y	0.80	0.80	2	2	N/A	69.6	53.8	15.8	69.6	84	189	0	33			
MK3	Charming Garden Block 11	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	10.00	8.00	3	3	404.0	60.8	53.7	7.1	59.9	86	268	0	32	37	60	0
			Tunnel ventilation shaft	N2	L	N (i)	10.00	8.00	3	3	404.0	62.5	56	6.5	61.4	87	268	-	-			
			EVS	N3	L	Y	1.70	6.96	3	2	129.1	61.5	58.6	2.9	58.5	80	268	0	26			
			Harmonic Filter Room	E1	L	Y	1.24	1.24	2	3	N/A	62.3	56.9	5.4	60.8	78	265	0	25			
			Harmonic Filter Room	E2	L	Y	9.90	1.70	3	1	75.2	56.3	55.6	0.7	53.3	72	252	0	19			
			25kV Switch Room	E3	L	Y	0.75	0.75	2	2	N/A	61.1	56.9	4.2	59	73	260	0	20			
			SVS	E4	L	Y	1.70	8.70	3	2	146.0	59.6	55.6	4	57.4	79	252	0	26			
			Staircase Pressuraization Fan Room 2	S1	L	Y	5.90	1.20	3	1	47.5	58.2	52.7	5.5	56.8	74	252	10	11			
			Staircase Pressuraization Fan Room 1	S2	L	Y	5.90	1.20	3	1	47.5	59.2	52.7	6.5	58.1	75	252	10	12			
			Battery and Charge Room	S3	L	Y	1.0	1.0	3	1	21.0	71.3	57.8	13.5	71.3	85	282	10	21			
			Harmonic Filter Room	S4	L	Y	2.10	0.90	3	1	25.9	58.7	52.7	6	57.4	72	282	10	8			
			Fire Pump room (Electrical)	W1	L	Y	1.00	1.00	3	1	21.0	77.1	61.4	15.7	77.1	90	275	10	26			
			FHP	FHP-N1	L	Y	0.80	0.80	2	2	N/A	69.6	53.8	15.8	69.6	84	249	0	31			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
MK1	Yau Ma Tei Catholic Primary School (Hoi Wang Road)	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	10.00	8.00	3	3	404.0	60.8	53.7	7.1	59.9	86	202	-	-	40	60	0
			Tunnel ventilation shaft	N2	L	Y	10.00	8.00	3	3	404.0	62.5	56	6.5	61.4	87	202	0	36			
			EVS	N3	L	Y	1.70	6.96	3	2	129.1	61.5	58.6	2.9	58.5	80	202	0	29			
			Harmonic Filter Room	E1	L	Y	1.24	1.24	2	3	N/A	62.3	56.9	5.4	60.8	78	222	0	26			
			Harmonic Filter Room	E2	L	Y	9.90	1.70	3	1	75.2	56.3	55.6	0.7	53.3	72	207	0	21			
			25kV Switch Room	E3	L	Y	0.75	0.75	2	2	N/A	61.1	56.9	4.2	59	73	217	0	21			
			SVS	E4	L	Y	1.70	8.70	3	2	146.0	59.6	55.6	4	57.4	79	207	0	28			
			Staircase Pressuraization Fan Room 2	S1	L	Y	5.90	1.20	3	1	47.5	58.2	52.7	5.5	56.8	74	207	10	13			
			Staircase Pressuraization Fan Room 1	S2	L	Y	5.90	1.20	3	1	47.5	59.2	52.7	6.5	58.1	75	207	10	14			
			Battery and Charge Room	S3	L	Y	1.0	1.0	3	1	21.0	71.3	57.8	13.5	71.3	85	237	10	23			
			Harmonic Filter Room	S4	L	Y	2.10	0.90	3	1	25.9	58.7	52.7	6	57.4	72	237	10	10			
			Fire Pump room (Electrical)	W1	L	Y	1.00	1.00	3	1	21.0	77.1	61.4	15.7	77.1	90	227	10	28			
			FHP	FHP-N1	L	Y	0.80	0.80	2	2	N/A	69.6	53.8	15.8	69.6	84	189	0	33			
MK3	Charming Garden Block 11	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	10.00	8.00	3	3	404.0	60.8	53.7	7.1	59.9	86	268	-	-	37	60	0
			Tunnel ventilation shaft	N2	L	Y	10.00	8.00	3	3	404.0	62.5	56	6.5	61.4	87	268	0	33			
			EVS	N3	L	Y	1.70	6.96	3	2	129.1	61.5	58.6	2.9	58.5	80	268	0	26			
			Harmonic Filter Room	E1	L	Y	1.24	1.24	2	3	N/A	62.3	56.9	5.4	60.8	78	265	0	25			
			Harmonic Filter Room	E2	L	Y	9.90	1.70	3	1	75.2	56.3	55.6	0.7	53.3	72	252	0	19			
			25kV Switch Room	E3	L	Y	0.75	0.75	2	2	N/A	61.1	56.9	4.2	59	73	260	0	20			
			SVS	E4	L	Y	1.70	8.70	3	2	146.0	59.6	55.6	4	57.4	79	252	0	26			
			Staircase Pressuraization Fan Room 2	S1	L	Y	5.90	1.20	3	1	47.5	58.2	52.7	5.5	56.8	74	252	10	11			
			Staircase Pressuraization Fan Room 1	S2	L	Y	5.90	1.20	3	1	47.5	59.2	52.7	6.5	58.1	75	252	10	12			
			Battery and Charge Room	S3	L	Y	1.0	1.0	3	1	21.0	71.3	57.8	13.5	71.3	85	282	10	21			
			Harmonic Filter Room	S4	L	Y	2.10	0.90	3	1	25.9	58.7	52.7	6	57.4	72	282	10	8			
			Fire Pump room (Electrical)	W1	L	Y	1.00	1.00	3	1	21.0	77.1	61.4	15.7	77.1	90	275	10	26			
			FHP	FHP-N1	L	Y	0.80	0.80	2	2	N/A	69.6	53.8	15.8	69.6	84	249	0	31			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
MK3	Charming Garden Block 11	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	10.00	8.00	3	3	404.0	60.8	53.7	7.1	59.9	86	268	0	32	35	50	0
			Tunnel ventilation shaft	N2	L	N (i)	10.00	8.00	3	3	404.0	62.5	56	6.5	61.4	87	268	-	-			
			EVS	N3	L	Y	1.70	6.96	3	2	129.1	58.6	49.7	8.9	58	79	268	0	25			
			Harmonic Filter Room	E1	L	Y	1.24	1.24	2	3	N/A	62.3	56.9	5.4	60.8	78	265	0	25			
			Harmonic Filter Room	E2	L	N (ii)	9.90	1.70	3	1	75.2	56.3	55.6	0.7	53.3	72	252	-	0			
			25kV Switch Room	E3	L	Y	0.75	0.75	2	2	N/A	61.1	56.9	4.2	59	73	260	0	20			
			SVS	E4	L	Y	1.70	8.70	3	2	146.0	59.6	55.6	4	57.4	79	252	0	26			
			Staircase Pressuraization Fan Room 2	S1	L	N (ii)	5.90	1.20	3	1	47.5	58.2	52.7	5.5	56.8	74	252	-	-			
			Staircase Pressuraization Fan Room 1	S2	L	N (ii)	5.90	1.20	3	1	47.5	59.2	52.7	6.5	58.1	75	252	-	-			
			Battery and Charge Room	S3	L	Y	1.0	1.0	3	1	21.0	71.3	57.8	13.5	71.3	85	282	10	21			
			Harmonic Filter Room	S4	L	Y	2.10	0.90	3	1	25.9	58.7	52.7	6	57.4	72	282	10	8			
			Fire Pump room (Electrical)	W1	L	Y	1.00	1.00	3	1	21.0	77.1	61.4	15.7	77.1	90	275	10	26			
			FHP	FHP-N1	L	Y	0.80	0.80	2	2	N/A	69.6	53.8	15.8	69.6	84	249	-	-			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night Time Criteria [dB(A)]	Exceedance [dB(A)]
MK3	**Charming Garden Block 11**	**Ventilation Shaft for S/B (i) and Building Service**	Tunnel ventilation shaft	N1	L	N (i)	10.00	8.00	3	3	404.0	60.8	53.7	7.1	59.9	86	268	-	-	36	50	0
			Tunnel ventilation shaft	N2	L	Y	10.00	8.00	3	3	404.0	62.5	56	6.5	61.4	87	268	0	33			
			EVS	N3	L	Y	1.70	6.96	3	2	129.1	58.6	49.7	8.9	58	79	268	0	25			
			Harmonic Filter Room	E1	L	Y	1.24	1.24	2	3	N/A	62.3	56.9	5.4	60.8	78	265	0	25			
			Harmonic Filter Room	E2	L	N (ii)	9.90	1.70	3	1	75.2	56.3	55.6	0.7	53.3	72	252	-	0			
			25kV Switch Room	E3	L	Y	0.75	0.75	2	2	N/A	61.1	56.9	4.2	59	73	260	0	20			
			SVS	E4	L	Y	1.70	8.70	3	2	146.0	59.6	55.6	4	57.4	79	252	0	26			
			Staircase Pressuraization Fan Room 2	S1	L	N (ii)	5.90	1.20	3	1	47.5	58.2	52.7	5.5	56.8	74	252	-	-			
			Staircase Pressuraization Fan Room 1	S2	L	N (ii)	5.90	1.20	3	1	47.5	59.2	52.7	6.5	58.1	75	252	-	-			
			Battery and Charge Room	S3	L	Y	1.0	1.0	3	1	21.0	71.3	57.8	13.5	71.3	85	282	10	21			
			Harmonic Filter Room	S4	L	Y	2.10	0.90	3	1	25.9	58.7	52.7	6	57.4	72	282	10	8			
			Fire Pump room (Electrical)	W1	L	Y	1.00	1.00	3	1	21.0	77.1	61.4	15.7	77.1	90	275	10	26			
			FHP	FHP-N1	L	Y	0.80	0.80	2	2	N/A	69.6	53.8	15.8	69.6	84	249	-	-			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

PHV - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
Tunnel ventilation shaft	N1	Normal	3	Point 1	53.6
	N1	Normal	3	Point 2	56.9
	N1	Normal	3	Point 3	56.9
	N1	Normal	3	Point 4	55.9
	N1	Normal	3	Point 5	52.8
	N1	Normal	3	Point 6	51
	N1	Normal	3	Point 7	51.9
	N1	Normal	3	Point 8	52.4
	N1	Normal	3	Point 9	52.5
	N1	Normal	3	Point 10	54.8
	N1	Normal	3	Point 11	55.9
	N1	Normal	3	Point 12	54.1
	N1	Normal	3	Point 13	51.6
	N1	Normal	3	Point 14	51.1
	N1	Normal	3	Point 15	51.8
	N1	Normal	3	Point 16	52
	N1	Normal		AVERAGE	53.9
FS control room	N2	Normal	2	measurement 1	55.6
	N2	Normal	2	measurement 2	54.7
	N2	Normal	2	measurement 3	54.7
	N2			AVERAGE	55.0
P&D pump and tank room	N3	Normal	2	measurement 1	52.9
	N3	Normal	2	measurement 2	52.8
	N3	Normal	2	measurement 3	53.1
	N3			AVERAGE	52.9
Air duct riser	N4	Normal	3	Point 1	58.2
	N4	Normal	3	Point 2	58.5
	N4	Normal	3	Point 3	58.4
	N4	Normal	3	Point 4	60.2
	N4	Normal	3	Point 5	58.4
	N4	Normal	3	Point 6	58.9
	N4	Normal	3	Point 7	56.7
	N4	Normal	3	Point 8	55.1
	N4	Normal	3	Point 9	55.5
	N4	Normal	3	Point 10	56.5
	N4	Normal	3	Point 11	56.6
	N4	Normal	3	Point 12	56.0
	N4	Normal	3	Point 13	57.5
	N4	Normal	3	Point 14	57.9
	N4	Normal	3	Point 15	58.0
	N4	Normal	3	Point 16	58.1
	N4			AVERAGE	57.7
Pressurization fan room	N5	Normal	2	measurement 1	51.2
	N5	Normal	2	measurement 2	51.2
	N5	Normal	2	measurement 3	51.2
	N5			AVERAGE	51.2
Tunnel ventilation shaft	E1	Normal	3	Point 1	53.7
	E1	Normal	3	Point 2	58.2
	E1	Normal	3	Point 3	58.3
	E1	Normal	3	Point 4	50.8
	E1	Normal	3	Point 5	52.1
	E1	Normal	3	Point 6	52.9
	E1	Normal	3	Point 7	55.4
	E1	Normal	3	Point 8	56.5
	E1	Normal	3	Point 9	56.8
	E1	Normal	3	Point 10	52
	E1	Normal	3	Point 11	52.5
	E1	Normal	3	Point 12	53
	E1			AVERAGE	55.1
Tunnel ventilation shaft	E2	Normal	3	Point 1	56.8
	E2	Normal	3	Point 2	57.4
	E2	Normal	3	Point 3	55.4
	E2	Normal	3	Point 4	54
	E2	Normal	3	Point 5	51.7
	E2	Normal	3	Point 6	51.8
	E2	Normal	3	Point 7	55.4
	E2	Normal	3	Point 8	52.7
	E2	Normal	3	Point 9	56.6
	E2	Normal	3	Point 10	53.1
	E2	Normal	3	Point 11	53.5
	E2	Normal	3	Point 12	53.9
	E2			AVERAGE	54.8
Pressurization fan room	E3	Normal	2	measurement 1	54.7
	E3	Normal	2	measurement 2	55.5
	E3	Normal	2	measurement 3	54.9

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
	E3			AVERAGE	55.0
Smoke extract make-up fan room	E4	Normal	2	measurement 1	60.7
	E4	Normal	2	measurement 2	60.9
	E4	Normal	2	measurement 3	60.9
	E4			AVERAGE	60.8
Tunnel ventilation shaft	S1	Normal	3	Point 1	53.9
	S1	Normal	3	Point 2	57.9
	S1	Normal	3	Point 3	59.4
	S1	Normal	3	Point 4	57.7
	S1	Normal	3	Point 5	54.1
	S1	Normal	3	Point 6	52.6
	S1	Normal	3	Point 7	53.7
	S1	Normal	3	Point 8	52.8
	S1	Normal	3	Point 9	54.5
	S1	Normal	3	Point 10	54.7
	S1	Normal	3	Point 11	54.7
	S1	Normal	3	Point 12	55.8
	S1	Normal	3	Point 13	56.7
	S1	Normal	3	Point 14	56
	S1	Normal	3	Point 15	56
	S1	Normal	3	Point 16	53.4
	S1			AVERAGE	55.7
UPS room	S2	Normal	2	measurement 1	59.0
	S2	Normal	2	measurement 2	59.0
	S2	Normal	2	measurement 3	58.9
	S2			AVERAGE	59.0
SER	S3	Normal	2	measurement 1	49.6
	S3	Normal	2	measurement 2	50.2
	S3	Normal	2	measurement 3	51.1
	S3			MAX	51.1
MCC room	S4	Normal	2	measurement 1	55.6
	S4	Normal	2	measurement 2	55.2
	S4	Normal	2	measurement 3	55.0
	S4			AVERAGE	55.3
Smoke extraction fan room	S5	Normal	3	Point 1	67
	S5	Normal	3	Point 2	64.4
	S5	Normal	3	Point 3	60.7
	S5	Normal	3	Point 4	66.1
	S5	Normal	3	Point 5	64.2
	S5	Normal	3	Point 6	61.2
	S5	Normal	3	Point 7	65.6
	S5	Normal	3	Point 8	63.5
	S5	Normal	3	Point 9	60.2
	S5	Normal	3	Point 10	61.2
	S5	Normal	3	Point 11	60.7
	S5	Normal	3	Point 12	60.3
	S5	Normal	3	Point 13	63.7
	S5	Normal	3	Point 14	64.3
	S5	Normal	3	Point 15	66.5
	S5	Normal	3	Point 16	65.7
	S5			AVERAGE	64.1
ABBCS room	W1	Normal	2	measurement 1	51.4
	W1	Normal	2	measurement 2	51.2
	W1	Normal	2	measurement 3	50.8
	W1			AVERAGE	51.1
Smoke extraction fan room	W2	Normal	3	Point 1	64.9
	W2	Normal	3	Point 2	64.8
	W2	Normal	3	Point 3	68.3
	W2	Normal	3	Point 4	66.4
	W2	Normal	3	Point 5	69.3
	W2	Normal	3	Point 6	69.9
	W2	Normal	3	Point 7	63.7
	W2	Normal	3	Point 8	66.6
	W2	Normal	3	Point 9	68.2
	W2	Normal	3	Point 10	63.0
	W2	Normal	3	Point 11	62.7
	W2	Normal	3	Point 12	64.1
	W2	Normal	3	Point 13	65.1
	W2	Normal	3	Point 14	67.6
	W2	Normal	3	Point 15	68.5
	W2	Normal	3	Point 16	68.0
	W2			AVERAGE	66.9

PHV - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
Tunnel ventilation shaft	N1	Normal	3	Point 1	53.6
	N1	Normal	3	Point 2	56.9
	N1	Normal	3	Point 3	56.9
	N1	Normal	3	Point 4	55.9
	N1	Normal	3	Point 5	52.8
	N1	Normal	3	Point 6	51
	N1	Normal	3	Point 7	51.9
	N1	Normal	3	Point 8	52.4
	N1	Normal	3	Point 9	52.5
	N1	Normal	3	Point 10	54.8
	N1	Normal	3	Point 11	55.9
	N1	Normal	3	Point 12	54.1
	N1	Normal	3	Point 13	51.6
	N1	Normal	3	Point 14	51.1
	N1	Normal	3	Point 15	51.8
	N1	Normal	3	Point 16	52
	N1	Normal		AVERAGE	53.9
FS control room	N2	Normal	2	measurement 1	55.6
	N2	Normal	2	measurement 2	54.7
	N2	Normal	2	measurement 3	54.7
	N2			AVERAGE	55.0
P&D pump and tank room	N3	Normal	2	measurement 1	52.9
	N3	Normal	2	measurement 2	52.8
	N3	Normal	2	measurement 3	53.1
	N3			AVERAGE	52.9
Air duct riser	N4	Normal	3	Point 1	58.2
	N4	Normal	3	Point 2	58.5
	N4	Normal	3	Point 3	58.4
	N4	Normal	3	Point 4	60.2
	N4	Normal	3	Point 5	58.4
	N4	Normal	3	Point 6	58.9
	N4	Normal	3	Point 7	56.7
	N4	Normal	3	Point 8	55.1
	N4	Normal	3	Point 9	55.5
	N4	Normal	3	Point 10	56.5
	N4	Normal	3	Point 11	56.6
	N4	Normal	3	Point 12	56.0
	N4	Normal	3	Point 13	57.5
	N4	Normal	3	Point 14	57.9
	N4	Normal	3	Point 15	58.0
	N4	Normal	3	Point 16	58.1
	N4			AVERAGE	57.7
Pressurization fan room	N5	Normal	2	measurement 1	51.2
	N5	Normal	2	measurement 2	51.2
	N5	Normal	2	measurement 3	51.2
	N5			AVERAGE	51.2
Tunnel ventilation shaft	E1	Normal	3	Point 1	53.7
	E1	Normal	3	Point 2	58.2
	E1	Normal	3	Point 3	58.3
	E1	Normal	3	Point 4	50.8
	E1	Normal	3	Point 5	52.1
	E1	Normal	3	Point 6	52.9
	E1	Normal	3	Point 7	55.4
	E1	Normal	3	Point 8	56.5
	E1	Normal	3	Point 9	56.8
	E1	Normal	3	Point 10	52
	E1	Normal	3	Point 11	52.5
	E1	Normal	3	Point 12	53
	E1			AVERAGE	55.1
Tunnel ventilation shaft	E2	Normal	3	Point 1	56.8
	E2	Normal	3	Point 2	57.4
	E2	Normal	3	Point 3	55.4
	E2	Normal	3	Point 4	54
	E2	Normal	3	Point 5	51.7
	E2	Normal	3	Point 6	51.8
	E2	Normal	3	Point 7	55.4
	E2	Normal	3	Point 8	52.7
	E2	Normal	3	Point 9	56.6
	E2	Normal	3	Point 10	53.1
	E2	Normal	3	Point 11	53.5
	E2	Normal	3	Point 12	53.9
	E2			AVERAGE	54.8
Pressurization fan room	E3	Normal	2	measurement 1	54.7
	E3	Normal	2	measurement 2	55.5
	E3	Normal	2	measurement 3	54.9

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
	E3			AVERAGE	55.0
Smoke extract make-up fan room	E4	Normal	2	measurement 1	60.7
	E4	Normal	2	measurement 2	60.9
	E4	Normal	2	measurement 3	60.9
	E4			AVERAGE	60.8
Tunnel ventilation shaft	S1	Normal	3	Point 1	53.9
	S1	Normal	3	Point 2	57.9
	S1	Normal	3	Point 3	59.4
	S1	Normal	3	Point 4	57.7
	S1	Normal	3	Point 5	54.1
	S1	Normal	3	Point 6	52.6
	S1	Normal	3	Point 7	53.7
	S1	Normal	3	Point 8	52.8
	S1	Normal	3	Point 9	54.5
	S1	Normal	3	Point 10	54.7
	S1	Normal	3	Point 11	54.7
	S1	Normal	3	Point 12	55.8
	S1	Normal	3	Point 13	56.7
	S1	Normal	3	Point 14	56
	S1	Normal	3	Point 15	56
	S1	Normal	3	Point 16	53.4
	S1			AVERAGE	55.7
UPS room	S2	Normal	2	measurement 1	59.0
	S2	Normal	2	measurement 2	59.0
	S2	Normal	2	measurement 3	58.9
	S2			AVERAGE	59.0
SER	S3	Normal	2	measurement 1	49.6
	S3	Normal	2	measurement 2	50.2
	S3	Normal	2	measurement 3	51.1
	S3			AVERAGE	50.3
MCC room	S4	Normal	2	measurement 1	55.6
	S4	Normal	2	measurement 2	55.2
	S4	Normal	2	measurement 3	55.0
	S4			AVERAGE	55.3
Smoke extraction fan room	S5	Normal	3	Point 1	67
	S5	Normal	3	Point 2	64.4
	S5	Normal	3	Point 3	60.7
	S5	Normal	3	Point 4	66.1
	S5	Normal	3	Point 5	64.2
	S5	Normal	3	Point 6	61.2
	S5	Normal	3	Point 7	65.6
	S5	Normal	3	Point 8	63.5
	S5	Normal	3	Point 9	60.2
	S5	Normal	3	Point 10	61.2
	S5	Normal	3	Point 11	60.7
	S5	Normal	3	Point 12	60.3
	S5	Normal	3	Point 13	63.7
	S5	Normal	3	Point 14	64.3
	S5	Normal	3	Point 15	66.5
	S5	Normal	3	Point 16	65.7
	S5			AVERAGE	64.1
ABBCS room	W1	Normal	2	measurement 1	51.4
	W1	Normal	2	measurement 2	51.2
	W1	Normal	2	measurement 3	50.8
	W1			AVERAGE	51.1
Smoke extraction fan room	W2	Normal	3	Point 1	64.9
	W2	Normal	3	Point 2	64.8
	W2	Normal	3	Point 3	68.3
	W2	Normal	3	Point 4	66.4
	W2	Normal	3	Point 5	69.3
	W2	Normal	3	Point 6	69.9
	W2	Normal	3	Point 7	63.7
	W2	Normal	3	Point 8	66.6
	W2	Normal	3	Point 9	68.2
	W2	Normal	3	Point 10	63.0
	W2	Normal	3	Point 11	62.7
	W2	Normal	3	Point 12	64.1
	W2	Normal	3	Point 13	65.1
	W2	Normal	3	Point 14	67.6
	W2	Normal	3	Point 15	68.5
	W2	Normal	3	Point 16	68.0
	W2			AVERAGE	66.9

NCV - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
Tunnel ventilation shaft	N1	Normal	3	Point 1	59.5
	N1	Normal	3	Point 2	60.7
	N1	Normal	3	Point 3	60.8
	N1	Normal	3	Point 4	60.7
	N1	Normal	3	Point 5	60.6
	N1	Normal	3	Point 6	61.1
	N1	Normal	3	Point 7	60.8
	N1	Normal	3	Point 8	59.1
	N1	Normal	3	Point 9	61.7
	N1	Normal	3	Point 10	62.2
	N1	Normal	3	Point 11	61.6
	N1	Normal	3	Point 12	61.7
	N1	Normal	3	Point 13	61.1
	N1	Normal	3	Point 14	60.4
	N1	Normal	3	Point 15	60.1
	N1	Normal	3	Point 16	58.6
	N1	Normal	3	Point 17	59.4
	N1	Normal	3	Point 18	61.5
	N1	Normal	3	Point 19	61.8
	N1	Normal	3	Point 20	60.9
	N1	Normal	3	Point 21	63.1
	N1	Normal	3	Point 22	62.8
	N1	Normal	3	Point 23	62.7
	N1	Normal	3	Point 24	63.9
	N1	Normal	3	Point 25	61.3
	N1	Normal	3	Point 26	60.6
	N1	Normal	3	Point 27	60.2
	N1	Normal	3	Point 28	60.2
	N1	Normal	3	Point 29	59.7
	N1	Normal	3	Point 30	59.8
	N1	Normal	3	Point 31	59.1
	N1	Normal	3	Point 32	58.4
	N1	Normal	3	Point 33	57.3
	N1	Normal	3	Point 34	58.8
	N1	Normal	3	Point 35	58.6
	N1	Normal	3	Point 36	58.5
	N1	Normal	3	Point 37	60.4
	N1	Normal	3	Point 38	59.6
	N1	Normal	3	Point 39	60.8
	N1	Normal	3	Point 40	60.7
	N1	Normal	3	Point 41	56.4
	N1			AVERAGE	60.7
FS Control Room	N2	Normal	3	Point 1	54.3
	N2	Normal	3	Point 2	54.6
	N2	Normal	3	Point 3	55.1
	N2	Normal	3	Point 4	54.6
	N2	Normal	3	Point 5	55.1
	N2	Normal	3	Point 6	54.9
	N2	Normal	3	Point 7	54.0
	N2	Normal	3	Point 8	55.9
	N2			AVERAGE	54.8
E&M Service Area 8	N3	Normal	3	Point 1	60.6
	N3	Normal	3	Point 2	64.7
	N3	Normal	3	Point 3	56.7
	N3	Normal	3	Point 4	62.9
	N3	Normal	3	Point 5	61.4
	N3	Normal	3	Point 6	61.5
	N3	Normal	3	Point 7	59.5
	N3	Normal	3	Point 8	63.8
	N3	Normal	3	Point 9	61.2
	N3	Normal	3	Point 10	57.1
	N3	Normal	3	Point 11	57.9
	N3	Normal	3	Point 12	61.4
	N3	Normal	3	Point 13	62.5
	N3	Normal	3	Point 14	60.3
	N3	Normal	3	Point 15	60.5
	N3	Normal	3	Point 16	58.9
	N3			AVERAGE	61.2
Tunnel ventilation shaft	E1	Normal	3	Point 1	58.8
	E1	Normal	3	Point 2	58.4
	E1	Normal	3	Point 3	57.8
	E1	Normal	3	Point 4	57.2
	E1	Normal	3	Point 5	55.7
	E1	Normal	3	Point 6	56.6
	E1	Normal	3	Point 7	56.3

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
	E1	Normal	3	Point 8	57.4
	E1	Normal	3	Point 9	57.5
	E1	Normal	3	Point 10	59
	E1	Normal	3	Point 11	58
	E1	Normal	3	Point 12	57.1
	E1	Normal	3	Point 13	55.5
	E1	Normal	3	Point 14	55.7
	E1	Normal	3	Point 15	56.1
	E1	Normal	3	Point 16	56.4
	E1			AVERAGE	57.2
Tunnel ventilation shaft	S1	Normal	3	Point 1	57.6
	S1	Normal	3	Point 2	58.2
	S1	Normal	3	Point 3	57.5
	S1	Normal	3	Point 4	59.2
	S1	Normal	3	Point 5	59.4
	S1	Normal	3	Point 6	58.5
	S1	Normal	3	Point 7	57.3
	S1	Normal	3	Point 8	60.8
	S1	Normal	3	Point 9	60.8
	S1	Normal	3	Point 10	58.4
	S1	Normal	3	Point 11	62.2
	S1	Normal	3	Point 12	61.1
	S1			AVERAGE	59.5
E&M Service Area 10	S2	Normal	3	Point 1	55.8
	S2	Normal	3	Point 2	55.0
	S2	Normal	3	Point 3	56.2
	S2	Normal	3	Point 4	58.4
	S2	Normal	3	Point 5	57.9
	S2	Normal	3	Point 6	57.8
	S2	Normal	3	Point 7	56.7
	S2	Normal	3	Point 8	57.8
	S2	Normal	3	Point 9	57.7
	S2	Normal	3	Point 10	58.4
	S2	Normal	3	Point 11	56.5
	S2	Normal	3	Point 12	57.4
	S2	Normal	3	Point 13	58.6
	S2	Normal	3	Point 14	57.1
	S2	Normal	3	Point 15	57.3
	S2	Normal	3	Point 16	56.3
	S2			AVERAGE	57.3
E&M Service Area 9	S3	Normal	3	Point 1	54.9
	S3	Normal	3	Point 2	56.2
	S3	Normal	3	Point 3	54.9
	S3	Normal	3	Point 4	55.0
	S3	Normal	3	Point 5	56.7
	S3	Normal	3	Point 6	55.9
	S3	Normal	3	Point 7	55.6
	S3	Normal	3	Point 8	54.8
	S3	Normal	3	Point 9	54.6
	S3	Normal	3	Point 10	55.3
	S3	Normal	3	Point 11	55.6
	S3	Normal	3	Point 12	55.6
	S3	Normal	3	Point 13	55.3
	S3	Normal	3	Point 14	54.3
	S3	Normal	3	Point 15	55.3
	S3	Normal	3	Point 16	53.8
	S3			AVERAGE	55.3
Dog house	S4	Normal	2	measurement 1	67.8
	S4	Normal	2	measurement 2	67.8
	S4	Normal	2	measurement 3	67.8
	S4			AVERAGE	67.8
LV Switch Room	W1	Normal	3	Point 1	61
	W1	Normal	3	Point 2	62.9
	W1	Normal	3	Point 3	61.5
	W1	Normal	3	Point 4	62.1
	W1	Normal	3	Point 5	60.7
	W1			AVERAGE	61.7

MKV - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
Tunnel ventilation shaft	N1	Normal	3	Point 1	59.7
	N1	Normal	3	Point 2	63.7
	N1	Normal	3	Point 3	63.7
	N1	Normal	3	Point 4	58
	N1	Normal	3	Point 5	59
	N1	Normal	3	Point 6	60.8
	N1	Normal	3	Point 7	60.6
	N1	Normal	3	Point 8	59
	N1	Normal	3	Point 9	60.3
	N1	Normal	3	Point 10	59.8
	N1	Normal	3	Point 11	59.5
	N1	Normal	3	Point 12	61
	N1			AVERAGE	60.8
Tunnel ventilation shaft	N2	Normal	3	Point 1	62.9
	N2	Normal	3	Point 2	63.6
	N2	Normal	3	Point 3	63.8
	N2	Normal	3	Point 4	63.6
	N2	Normal	3	Point 5	61.8
	N2	Normal	3	Point 6	62.0
	N2	Normal	3	Point 7	61.9
	N2	Normal	3	Point 8	61.1
	N2	Normal	3	Point 9	61.6
	N2	Normal	3	Point 10	62.4
	N2	Normal	3	Point 11	62.2
	N2	Normal	3	Point 12	62.1
	N2			AVERAGE	62.5
EVS	N3	Normal	3	Point 1	59.5
	N3	Normal	3	Point 2	60.1
	N3	Normal	3	Point 3	61.3
	N3	Normal	3	Point 4	60.3
	N3	Normal	3	Point 5	63.2
	N3	Normal	3	Point 6	63.2
	N3	Normal	3	Point 7	61.8
	N3	Normal	3	Point 8	61.5
	N3			AVERAGE	61.6
Harmonic Filter Room	E1	Normal	2	measurement 1	62.3
	E1	Normal	2	measurement 2	62.3
	E1	Normal	2	measurement 3	62.3
	E1			AVERAGE	62.3
Harmonic Filter Room	E2	Normal	3	Point 1	54.5
	E2	Normal	3	Point 2	54.6
	E2	Normal	3	Point 3	56.7
	E2	Normal	3	Point 4	57.1
	E2	Normal	3	Point 5	58.8
	E2	Normal	3	Point 6	56.5
	E2	Normal	3	Point 7	54.5
	E2	Normal	3	Point 8	55.4
	E2	Normal	3	Point 9	57.4
	E2	Normal	3	Point 10	56.1
	E2	Normal	3	Point 11	56.0
	E2	Normal	3	Point 12	56.9
	E2	Normal	3	Point 13	55.2
	E2	Normal	3	Point 14	55.4
	E2	Normal	3	Point 15	55.1
	E2	Normal	3	Point 16	56.2
	E2	Normal	3	Point 17	51.7
	E2	Normal	3	Point 18	58.7
	E2	Normal	3	Point 19	57.1
	E2	Normal	3	Point 20	56.6
	E2			AVERAGE	56.3
25kV Switch Room	E3	Normal	2	measurement 1	60.9
	E3	Normal	2	measurement 2	61
	E3	Normal	2	measurement 3	61.3
	E3			AVERAGE	61.1
SVS	E4	Normal	3	Point 1	59.4
	E4	Normal	3	Point 2	60.3
	E4	Normal	3	Point 3	60.6
	E4	Normal	3	Point 4	60.7
	E4	Normal	3	Point 5	61.5
	E4	Normal	3	Point 6	61
	E4	Normal	3	Point 7	59.6
	E4	Normal	3	Point 8	57
	E4	Normal	3	Point 9	57.6

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
	E4	Normal	3	Point 10	57.6
	E4	Normal	3	Point 11	57.2
	E4			AVERAGE	59.6
Staircase Pressurization Fan Room 2	S1	Normal	3	Point 1	55.7
	S1	Normal	3	Point 2	56.2
	S1	Normal	3	Point 3	61.3
	S1	Normal	3	Point 4	57.7
	S1	Normal	3	Point 5	57.9
	S1	Normal	3	Point 6	58.8
	S1	Normal	3	Point 7	58.6
	S1	Normal	3	Point 8	57.9
	S1	Normal	3	Point 9	59.5
	S1	Normal	3	Point 10	60.2
	S1	Normal	3	Point 11	58.1
	S1	Normal	3	Point 12	59
	S1	Normal	3	Point 13	55.4
	S1	Normal	3	Point 14	56.3
	S1	Normal	3	Point 15	56.6
	S1	Normal	3	Point 16	57
	S1			AVERAGE	58.2
Staircase Pressurization Fan Room 1	S2	Normal	3	Point 1	60.5
	S2	Normal	3	Point 2	59.5
	S2	Normal	3	Point 3	55.8
	S2	Normal	3	Point 4	56.9
	S2	Normal	3	Point 5	57.5
	S2	Normal	3	Point 6	59.8
	S2	Normal	3	Point 7	61.1
	S2	Normal	3	Point 8	59.6
	S2	Normal	3	Point 9	59.2
	S2	Normal	3	Point 10	59.5
	S2	Normal	3	Point 11	59.9
	S2	Normal	3	Point 12	57.4
	S2	Normal	3	Point 13	58.4
	S2	Normal	3	Point 14	57.9
	S2	Normal	3	Point 15	61.1
	S2	Normal	3	Point 16	59.9
	S2			AVERAGE	59.2
Battery and Charge Room	S3	Normal	3	Point 1	70.2
	S3	Normal	3	Point 2	73.7
	S3	Normal	3	Point 3	71.5
	S3	Normal	3	Point 4	70.1
	S3	Normal	3	Point 5	69.7
	S3			AVERAGE	71.3
TECS control room	S4	Normal	3	Point 1	59.5
	S4	Normal	3	Point 2	55.8
	S4	Normal	3	Point 3	57.5
	S4	Normal	3	Point 4	59.6
	S4	Normal	3	Point 5	57.4
	S4	Normal	3	Point 6	58.4
	S4	Normal	3	Point 7	57.9
	S4	Normal	3	Point 8	61.1
	S4			AVERAGE	58.7
Fire Pump room (Electrical)	W1	Normal	3	Point 1	78
	W1	Normal	3	Point 2	77.6
	W1	Normal	3	Point 3	77.4
	W1	Normal	3	Point 4	76
	W1	Normal	3	Point 5	75.9
	W1			AVERAGE	77.1
FHP	FHP-N1	Normal	2	measurement 1	69.9
	FHP-N1	Normal	2	measurement 2	69.4
	FHP-N1	Normal	2	measurement 3	69.6
	FHP-N1			AVERAGE	69.6

Appendix A4 – Measurement Results at NSRs

Appendix A4 - Results at NSRs

NSR	Scenario	Measurement Type	Start Time	End Time	L_{Aeq}, dB(A)
PH1a	Day and Evening Time	Background Noise Levels	21:56	22:01	52.6
			22:01	22:06	53.0
		Measured Noise Levels	22:19	22:49	51.7
			22:50	23:20	50.4
	Night-time	Background Noise Levels	00:47	00:52	49.3
			00:52	00:57	48.2
		Measured Noise Levels	23:28	23:58	49.9
			23:58	00:28	49.1
PH1b	Day and Evening Time	Background Noise Levels	22:00	22:05	46.1
			22:05	22:10	45.7
		Measured Noise Levels	22:23	22:53	46.6
			22:53	23:23	46.4
	Night-time	Background Noise Levels*	00:44	00:49	45.2
			00:50	00:55	47.8
		Measured Noise Levels	23:38	00:08	46.7
			00:08	00:38	47.1
PH4	Day and Evening Time	Background Noise Levels	21:56	22:02	46.7
			22:03	22:09	46.2
		Measured Noise Levels	22:20	22:50	45.9
			22:51	23:21	45.1
	Night-time	Background Noise Levels	00:48	00:53	42.5
			00:54	01:00	43.0
		Measured Noise Levels	23:26	23:56	44.7
			00:02	00:32	44.9
NC11	Day and Evening Time	Background Noise Levels	21:40	21:45	65.7
			21:54	21:59	65.3
		Measured Noise Levels	22:30	23:00	65.9
			23:02	23:32	65.3
	Night-time	Background Noise Levels	00:44	00:49	63.9
			00:50	00:55	64.4
		Measured Noise Levels	23:38	00:08	66.4
			00:09	00:39	66.3
NC11f	Day and Evening Time	Background Noise Levels	22:01	22:06	60.0
			22:07	22:12	59.8
		Measured Noise Levels	22:23	22:53	60.3
			22:55	23:25	59.6
	Night-time	Background Noise Levels	00:38	00:43	57.4
			00:44	00:49	57.4
		Measured Noise Levels	23:31	00:01	58.9
			00:02	00:32	58.8
NC11g	Day and Evening Time	Background Noise Levels	21:51	21:56	60.4
			22:07	22:12	60.1
		Measured Noise Levels	22:22	22:52	60.5
			22:53	23:23	59.5
	Night-time	Background Noise Levels	00:39	00:44	56.7
			00:44	00:49	57.9
		Measured Noise Levels	23:31	00:01	59.0
			00:01	00:31	58.7
MK1	Day and Evening Time	Background Noise Levels	21:24	21:29	63.9
			21:35	21:40	63.6
		Measured Noise Levels	21:54	22:24	64.3
			22:25	22:55	63.3
	Night-time	Background Noise Levels	00:00	00:05	62.2
			00:09	00:14	59.4
		Measured Noise Levels	00:47	01:17	58.5
			01:20	01:50	57.2

Note:

On-site observations indicated there was no noticeable noise during 00:44 – 00:49 and community noise emitted from NSR PH1b during 00:50 – 00:55, therefore there were differences in noise levels between the two periods.

Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL)

Commissioning Test Report for the Fixed Plant Noise at Mai Po (MPV), Ngau Tam Mei (NTV) and Shing Mun (SMV) Ventilation Buildings; ERS Plant Building – North (SPN) and ERS Plant Building – South (SPS)

MTR Corporation

July 2018

1 Introduction

The Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) Project (hereinafter known as "XRL") covers a 26km long underground rail line on dedicated tracks that run between the terminus in West Kowloon and the boundary at Huanggang, where connects with the XRL Mainland section. XRL Project also includes the construction of ventilation buildings, emergency access points, stabling sidings and maintenance facilities and an emergency rescue siding (ERS) (formerly known as rescue emergency station).

The Environmental Impact Assessment (EIA) Report (Register No.: AEIA-143/2009) was approved on 28 September 2009 by the Director of Environmental Protection (DEP) under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, an environmental permit (EP) was granted on 16 October 2009 (EP No: EP-349/2009) for the construction and operation of the Project. Variations of environmental permit (VEP) were subsequently applied and the latest Environmental Permit (EP No: EP-349/2009/M) (hereinafter known as "the EP") was issued by Director of Environmental Protection (DEP) on 25 June 2018.

This report is prepared with reference to EP Condition 2.36, "*The Permit Holder shall, no later than two weeks before the commencement of the operation of the Project, deposit with the Director a Commissioning Test Report to confirm the compliance of the operational air-borne and ground-borne noise levels in accordance with the EIA Report and the application for variation of an environmental permit No. VEP-377/2012 and its attached documents*".

MTR Corporation has prepared the Commissioning Test Report for Fixed Plant Noise for the noise measurement to show the compliance of noise criteria in accordance with the EIA Report and the EP; also the noise measurement for investigation of any tonal, impulsive and intermittent characteristics from the fixed plant noise sources. This report presents the noise measurement methodology, calculated Sound Power Levels from noise measurements, results of noise measurement for the fixed plant noise sources installed at Mai Po (MPV), Ngau Tam Mei (NTV) and Shing Mun (SMV) Ventilation Buildings; ERS Plant Building – North (SPN) and ERS Plant Building – South (SPS); and confirming any characteristics of tonality, impulsiveness and intermittency. For the fixed plant noise verification at the other ventilation buildings and West Kowloon Terminal (WKT) areas, separate reports would be submitted.

2 Noise Criteria

2.1 Fixed Plant Noise Criteria in EIA

With reference to the IND-TM under the Noise Control Ordinance (NCO), the relevant acceptable noise levels (ANL) where determined based on the area sensitivity rating (ASR).

The fixed plant noise criteria for the representative noise sensitive receivers (NSRs) were determined in EIA as follow (whichever is lower):

- 5dB(A) below the appropriate ANL set out in the IND-TM (the ANL-5dB(A) criterion); or
- The prevailing background noise levels where the prevailing background noise level is 5dB(A) below the appropriate ANL (i.e. ANL-5dB(A))

The noise criteria above were determined for planning purpose. While for operation, the fixed plant noise is controlled by a Noise Abatement Notices system governed by the NCO.

The fixed plant noise criteria for the NSRs along the XRL alignment in MPV, NTV, SMV, SPN and SPS area, with the latest status of representative NSRs, are presented in **Table 2.1** below. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied, where applicable, in accordance with IND-TM during the commissioning test.

Table 2.1 Summary of Fixed Plant Noise Criteria

NSR	**Description**	**Area Sensitivity Rating (ASR)** [a]	**Noise Criteria, dB(A)** [a]	
			Day and Evening Time	**Night-time**
Mai Po Ventilation Building (MPV) ***(Figure 2.1)***				
MP1	House 5 Phase A Royal Palms	B	60	50
MP5	Proposed Comprehensive Development at Wo Shang Wai	A	51	45
MP6	Planned village house at Village Zone	B	60	50
Ngau Tam Mei Ventilation Building (NTV) ***(Figure 2.2)***				
NT1	Yau Tam Mei Village House	A	55	44
NT1a [b]	Yau Tam Mei Village House	A	55	44
NT4	Yau Tam Mei Village House	A	55	44
NT4a [b]	Yau Tam Mei Village House	A	55	44
NT4b [b]	Yau Tam Mei Village House	A	55	44
Shing Mun Ventilation Building (SMV) ***(Figure 2.3)***				
SM1	Sau Shan House, Cheung Shan Estate	B	60	50
SM4	Shui Hong Nursing Home	B	60	50
ERS Plant Building - North (SPN) ***(Figure 2.4)***				

NSR	Description	Area Sensitivity Rating (ASR) [(a)]	Noise Criteria, dB(A) [(a)]	
			Day and Evening Time	Night-time
SS6	No.32 Leung Uk Tsuen	B	52	45
SS7	Leung Uk Tsuen Village House	B	49	47
SS10	DD110 LOT462, Wang Toi Shan	B	49	47
SS12	265 Kam Tai Road	B	49	47
SS15	Abandoned village house in Shek Kong	B	49	47
ERS Plant Building - South (SPS) ***(Figure 2.5)***				
SS2	Nam Hing Lei Village House	B	49	39
SS4	Leung Uk Tsuen Village House	B	49	40
SS5	51A Leung Uk Tsuen	B	52	45
SS11a	Lueng Uk Tsuen Squats	B	52	50
SS14	Planned village house at Village Zone	B	49	47
SS20 [(b)]	Village house in Shek Kong	B	49	40

Note:

(a) ASR and noise criteria either follow that defined in the EIA Report or relevant application for variation of environmental permit (VEP-377/2012) where appropriate.

(b) These are representative NSRs additional to those identified in the EIA Report which the ASR and noise criteria are defined in Environmental Review Report for the application for variation of environmental permit (VEP-377-2012).

Fixed plant noise sources include: ventilation fans for building services, and plenum for tunnel ventilation, which are generally located inside plant rooms. Noise generated from indoor fixed plants would be emitted through louvres. The worst case scenario is when all eligible fixed plants at the same location operating concurrently under “normal scenario” for XRL operation during daytime and evening time periods; and night-time period, respectively. The worst case scenario was considered for compliance check against the fixed plant noise criteria and the noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs.

Table 2.2 below summarised the information of the fixed plant noise sources and the layout plan is shown in **Figures 2.1** to **2.5a**.

Table 2.2 Summary of Fixed Plant Noise Sources

Source Location	Direction Facing	Louvre ID
Mai Po Ventilation Building (MPV) ***(Figure 2.1)***		

Source Location	Direction Facing	Louvre ID
ECS duct	North	N1
FS control room	North	N2
LV switch room	North	N3
Tunnel ventilation shaft	East	E1
Tunnel ventilation shaft	South	S1
Tunnel ventilation shaft	South	S2
Tunnel ventilation shaft	West	W1
Air Release Louvre	West	W2
Ngau Tam Mei Ventilation Building (NTV) ***(Figure 2.2)***		
Tunnel ventilation shaft	North	N1
Tunnel ventilation shaft	North	N2
CTER	North	N3
ECS duct	North	N4
Tunnel ventilation shaft	East	E1
Tunnel ventilation shaft	East	E2
Tunnel ventilation shaft	South	S1
Tunnel ventilation shaft	South	S2
LV switch room	South	S3
LV switch room	South	S4
LV switch room	South	S5
Exhaust Air Duct	South	S6
UPS Room Fresh Air Intake	West	W1
Shing Mun Ventilation Building (SMV) ***(Figure 2.3)***		
Tunnel ventilation shaft	North	N1
FS inlet	North	N2
MCC room	North	N3
Exhaust air louvre	North	N4
Staircase pressurization fan room	North	N5
UPS room	East	E1
LV switch room	East	E2
Fresh air louvre	East	E3
Staircase pressurization fan room 1	East	E4
Staircase pressurization fan room 2	East	E5
Tunnel ventilation shaft	South	S1
Sprinkler & FS pump room	South	S2
Air compressor receiver room	South	S3
Tunnel ECS control room	South	S4
Staircase pressurization fan room	South	S5
Tunnel ventilation shaft	West	W1
Tunnel ventilation shaft	West	W2
SPS air release louvre	West	W3
Track section cabin room	West	W4
ERS Plant Building - North (SPN) ***(Figures 2.4 and 2.4a)***		
Tunnel Ventilation Shaft	North	N1
Tunnel Ventilation Shaft	North	N2

Source Location	Direction Facing	Louvre ID
Dog House	North	N3
Tunnel Ventilation Shaft	East	E1
T.ECS Control Room	East	E2
Dog House	East	E3
Tunnel Ventilation Shaft	South	S1
Tunnel Ventilation Shaft	South	S2
Tunnel Ventilation Shaft	West	W1
ABBCS Room	West	W2
ERS Plant Building - South (SPS) ***(Figures 2.5 and 2.5a)***		
Tunnel Ventilation Shaft	North	N1
Tunnel Ventilation Shaft	North	N2
Dog House	North	N3
Tunnel Ventilation Shaft	East	E1
Air Compressor Receiver Room	East	E2
T.ECS Control Room	East	E3
Dog House	East	E4
Dog House	East	E5
Tunnel Ventilation Shaft	South	S1
Tunnel Ventilation Shaft	South	S2
Dog House	South	S3
Tunnel Ventilation Shaft	West	W1
Building Service Control Room	West	W2
MCC Room	West	W3
Dog House	West	W4

3 Methodology

3.1 Noise Measurement for the Fixed Plants

Noise measurements to obtain the noise levels of the fixed plants were undertaken by Supreme Acoustics Research Limited, GAS Joint Venture and ATAL Building Services Engineering Ltd. The commissioning tests were carried out by qualified persons possessing at least 7 years of noise control experience and a corporate member of Hong Kong Institute of Acoustics or equivalent in accordance with S3.22 of the XRL EM&A Manual.

3.1.1 Methodology

Three measurement methods, namely Method 1 (at or near NSR), Method 2 (Far Field) and Method 3 (Near Field), have been developed based on NCO-TM, basic acoustic principles and *ISO 3746-2010: Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane*, respectively. Given the fixed plant noise sources are steady, all proposed methods could be adopted for all types of fixed plant source depending on the site environment/constraints that might affect the possibility to obtain valid results, considerations including but not limited to:

- Background noise with less influence to the measured noise levels
- Free of obstacles between measurement location and noise source
- Accessibility and Safety Concerns

Considering the reliability of data collection, i.e. results not influenced by the above-mentioned considerations, and the measurement efficiency on site, the selection of methodology was prioritized based on efficient measurement as Method 1 (at or near NSR) > Method 2 (Far Field) > Method 3 (Near Field). However, various considerations which may affect the validity of results using Method 1 were taken in account, such as the distances between fixed plants and NSRs at MPV and SPN/SPS are too far away (at least 66m for MPV, 120m for SPN and 159m for SPS) and some of these NSRs are screened by noise barriers (e.g. MP1, SS4, SS11a, SS15, SS20), under Proposed Comprehensive Development at Wo Shang Wai, Yuen Long (EP No: EP-311/2008/E) and under the Project at Shek Kong Stabling Sidings respectively (refer to **Figures 2.1, 2.4 and 2.5**); where the background noise at NSRs would mask the fixed plant noises from MPV and SPN/SPS. NSRs at NTV has no appropriate accessible location which meets the minimum distance requirement, etc. For SMV, considering there are heavy traffic and bus stops along Cheung Pei Shan Estate Road West immediately in front of the NSRs; obtaining valid results using Method 1 was considered unlikely. As such, only Method 2 and Method 3 were considered applicable. Method used for each louvre is presented in **Appendix A3**. Details of the measurement methodology are shown in **Appendix A1**.

Method 1 – Measuring Sound Pressure Level at NSR or Near NSR

- Measurement at NSR or near NSR at distance D away from the louvre, where D was at least two times the largest dimension b of the louvre and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the louvre and three measurements were taken when the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre was switched OFF
- The sound pressure level (SPL) at NSR or near NSR was determined by the following equation:

$$\text{Background corrected } L_p = L_p + BG - [20\log D + 8] \text{ (if applicable)} + \text{façade correction (if applicable)}$$

Where

L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);

BG is the background correction factor, in dB(A);

D is separation between the center of louvre or surface of the plant and the microphone, in metres.

Method 2 – Measuring Sound Power Level by Far Field Method for Louvres or **for Plants**

- The microphone was positioned at the perpendicular distance *D* away from the center of the louvre or the surface of the plant, where D was at least two times the largest dimension b of the louvre or plant and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the center of the louvre/combined louvre area or the center the plant; and three measurements were taken when the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from the louvre or plant was switched OFF
- The sound power level (SWL) of the louvre or the plant was determined, based on basic acoustic principles, by the following equation:

$$L_w = L_p + 20logD,center + 8 + BG$$

Where

L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);

D,center is separation between the center of louvre or plant and the microphone, in metres;

BG is the background correction factor, in dB(A).

Method 3 – Measuring Sound Power Level by Near Field Method for Louvres or **for Plants**

- A right parallelepiped hypothetical measurement box for each louvre or each surface of a plant was determined according to ISO 3746:2010, with each side being spaced a distance *D* from the corresponding side of the louvre or plant
- Each of the 5 planes of the measurement box was subdivided into equal-sized rectangular grids, the length of each side of the grids should be less than or equal to 3 times of distance D, i.e. grid length $\leq 3D$
- The microphone was pointing toward the center of each grid, and a measurement was taken for each grid during the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre or plant was switched OFF
- The SWL of the louvre or the plant was determined by the following equation:

$$L_w = L_p + 10log(S) - K_{1A} - K_{2A}$$

Where

L_p is the averaged measured L_{eq} of all measurement points, in dB(A);

S is the total surface area over the measurement box (total 5 planes), in m^2;

K_{1A} is the background correction factor as described in *ISO 3746:2010*, in dB(A);

K_{2A} is the environmental correction for sound absorption and reflection as described in *ISO 3746:2010*, in dB(A).

Except for Method 3, which was adopted with reference to ISO 3746:2010; the noise sources measured using Method 1 or Method 2 were considered steady if the difference between the maximum and minimum Leq is less than or equal to 1dB(A), ie, ≤1dB(A); average Leq was therefore considered. Otherwise, the maximum Leq would be adopted for SWL determination as a conservative approach.

3.1.2 Measurement Equipment

The sound level meters and calibrators used for noise measurements are listed in **Table 3.1**. The instruments complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in **Appendix A2**.

Table 3.1 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	NTi XL2	5011
	NTi XL2	5617
	NTi XL2	6240
	Casella CEL-63X	5044655
Calibrator	BSWA TECH CA111	320248
	Casella CEL-120/1	5060836

Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

3.1.3 Measurement Schedule

The noise measurements were carried out during daytime, evening time and night-time periods, where the fixed plant items were operated steadily and continuously at their noisiest operating mode under normal scenario. The noise measurement schedule is shown in **Table 3.2**.

Table 3.2 Measurement Schedule

Location	Date	Time
MPV	9-10, 11-12 Oct 2017	22:00 – 06:00
	13 Oct 2017	10:00 – 12:00
	22 Nov 2017	00:00 – 06:00
NTV	30 Aug 2017	18:00 – 22:00
	11 Oct 2017	11:00 – 16:00
	12, 14 Dec 2017	14:00 – 20:00
SMV	27-28 Apr 2017	22:00 – 05: 00
	15 Nov 2017	14:00 – 17:00
SPN	20–21 Apr 2017	00:00 – 03:00
	1 Dec 2017	10:30 – 12:00
SPS	20–21 Apr 2017	00:00 – 03:00
	1 Dec 2017	14:00 – 16:00
	10 Jan 2018	16:00 – 18:00

3.2 Noise Measurement to Confirm Any Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

3.2.1 Measurement Equipment

The sound level meters and calibrators used for noise measurements are listed in **Table 3.3**. The instruments complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in **Appendix A2**.

Table 3.3 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	Casella CEL-63X	5044655
	Bruel & Kjaer 2250-L	2701830
	Bruel & Kjaer 2250	2704790
	NTi XL2	5011
	NTi XL2	5617
	NTi XL2	6240
Calibrator	Casella CEL-120/1	5060836
	BSWA TECH CA111	320248

3.2.2 Measurement Parameters

With reference to the IND-TM, the noise measurement was conducted at the representative NSR for $L_{Aeq\ (30min)}$, in one-third octave band under the worst case scenario, ie, "normal scenario" during daytime and evening time periods; and night-time period, respectively.

The fixed plant noise sources will be operated steadily and continuously, and therefore no intermittency and impulsiveness are expected at the NSR. However, the characteristics of intermittency and impulsiveness will be recorded, if any, based on observation during measurement.

2 sets of background noise level, $L_{Aeq\ (5min)}$, and in one-third octave band, were measured at each measurement location when all fixed plant noise sources were not in operation.

3.2.3 Measurement Location

The noise measurement was carried out at the first layer of NSRs for the concerned areas. The measurement locations are summarised in Table 3.4 and shown in **Figures 2.1** to **2.5**.

Table 3.4 Measurement Locations

Location	NSR	Description
MPV	MP1	House 5 Phase A Royal Palms
	MP5	Proposed Comprehensive Development at Wo Shang Wai
	MP6	Planned village house at Village Zone
NTV	NT1a	Yau Tam Mei Village House
	NT4a	Yau Tam Mei Village House

Location	NSR	Description
SMV	SM1	Sau Shan House, Cheung Shan Estate
	SM4	Shui Hong Nursing House
SPN	SS7	Leung Uk Tsuen Village House
	SS10	DD110 LOT 452, Wang Toi Shan
	SS15[a]	Abandoned village house in Shek Kong
SPS	SS11a[a]	Leung Uk Tsuen Squats
	SS20[a]	Village house in Shek Kong

Note:
(a) Certain direction of the ventilation shaft is totally or partially screened by the proposed noise barriers at Shek Kong Stabling Sidings (SSS).

3.2.4 Measurement Schedule

The noise measurements were carried out at the monitoring location for MPV, NTV, SMV, SPN and SPS, where the fixed plant items were operated steadily and continuously at their noisiest operating mode under normal scenario. The noise measurement schedule is shown in **Table 3.5**. Sample measurement photos of MPV, NTV, SMV, SPN and SPS are shown in **Appendix A3**.

Table 3.5 Measurement Schedule

Location	Date
MPV	25 – 26 Apr 2018
NTV	17 – 18 May 2018
SMV	8 – 9 Jun 2018
SPN	24 – 25 May 2018
SPS	24 – 25 May 2018

4 Measurement Results

4.1 The Noise Levels of Fixed Plant Noise Sources

The noise levels measured under the worst case scenario are determined and presented in **Table 4.1**. Details of the measurement results are shown in **Appendix A3**.

Table 4.1 Summary of Sound Power Levels for Fixed Plants

Works Area	Direction Facing/ Elevation	Calculated SWL L_{Aeq}, dB(A)
MPV	North N1 [a]	67
	North N2	69
	North N3	72
	East E1	74
	South S1	74
	South S2	75
	West W1	70
	West W2 [a]	69
NTV	North N1	72

Works Area	Direction Facing/ Elevation	Calculated SWL L_{Aeq}, dB(A)
	North N2	69
	North N3	61
	North N4 [(a)]	73
	East E1	77
	East E2	72
	South S1	78
	South S2	78
	South S3 [(a)]	71
	South S4 [(a)]	71
	South S5 [(a)]	76
	South S6 [(a)]	88
	West W1 [(a)]	82
SMV	North N1	80
	North N2	63
	North N3	77
	North N4	61
	North N5 [(a)]	74
	East E1 [(a)]	89
	East E2	81
	East E3	62
	East E4 [(a)]	74
	East E5 [(a)]	67
	South S1	89
	South S2	84
	South S3	86
	South S4	86
	South S5 [(a)]	68
	West W1	76
	West W2	76
	West W3 [(a)]	97
	West W4	78
SPN	North N1	84
	North N2	84
	North N3	66
	East E1	85
	East E2	64
	East E3	68
	South S1	90
	South S2	89
	West W1	87
	West W2	72
SPS	North N1	88
	North N2	90
	North N3	71

Works Area	Direction Facing/ Elevation	Calculated SWL L_{Aeq}, dB(A)
	East E1	84
	East E2	90
	East E3	89
	East E4	78
	East E5	76
	South S1	82
	South S2	84
	South S3	82
	West W1	84
	West W2	76
	West W3	80
	West W4	74

Note:

(a) The plant would be operated during day and evening time only under normal scenario.

A compliance check against the fixed plant noise criteria at NSR was conducted. The cumulative noise levels from noise sources were assessed to ensure the compliance with the noise criterion. **Table 4.2** shows the results, details of the calculation are also given in **Appendix A3**.

Table 4.2 Cumulative Fixed Plant Noise at NSR

NSR	Source Location	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
MP1	Ventilation Shaft and Building Service	29	28	60	50	Y	Y
MP5	Ventilation Shaft and Building Service	34	33	51	45	Y	Y
MP6	Ventilation Shaft and Building Service	35	35	60	50	Y	Y
NT1	Ventilation Shaft for N/B [(a)] and Building Service	42	36	55	44	Y	Y
	Ventilation Shaft for S/B [(a)] and Building Service	43	40	55	44	Y	Y
NT1a	Ventilation Shaft for N/B [(a)] and Building Service	43	40	55	44	Y	Y
	Ventilation Shaft	44	42	55	44	Y	Y

NSR	Source Location	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
	for S/B [a] and Building Service						
NT4	Ventilation Shaft for N/B [a] and Building Service	44	42	55	44	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	42	36	55	44	Y	Y
NT4a	Ventilation Shaft for N/B [a] and Building Service	44	42	55	44	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	42	37	55	44	Y	Y
NT4b	Ventilation Shaft for N/B [a] and Building Service	40	36	55	44	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	41	38	55	44	Y	Y
SM1	Ventilation Shaft for N/B [a] and Building Service	56	49	60	50	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	56	49	60	50	Y	Y
SM4	Ventilation Shaft for N/B [a] and Building Service	59	47	60	50	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	59	45	60	50	Y	Y
SS6	Ventilation Shaft for N/B [a] and Building Service	39	39	52	45	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	41	41	52	45	Y	Y
SS7	Ventilation Shaft for N/B [a] and Building Service	39	39	49	47	Y	Y
	Ventilation Shaft for S/B [a] and	41	41	49	47	Y	Y

NSR	Source Location	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
	Building Service						
SS10	Ventilation Shaft for N/B [a] and Building Service	36	36	49	47	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	35	35	49	47	Y	Y
SS12	Ventilation Shaft for N/B [a] and Building Service	36	36	49	47	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	33	33	49	47	Y	Y
SS15[b]	Ventilation Shaft for N/B [a] and Building Service	39	39	49	47	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	42	42	49	47	Y	Y
SS2	Ventilation Shaft for N/B [a] and Building Service	32	32	49	39	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	31	31	49	39	Y	Y
SS4[b]	Ventilation Shaft for N/B [a] and Building Service	35	35	49	40	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	35	35	49	40	Y	Y
SS5	Ventilation Shaft for N/B [a] and Building Service	43	43	52	45	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	43	43	52	45	Y	Y
SS11a[b]	Ventilation Shaft for N/B [a] and Building Service	42	42	52	50	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	40	40	52	50	Y	Y

NSR	Source Location	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
SS14	Ventilation Shaft for N/B [a] and Building Service	40	40	49	47	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	40	40	49	47	Y	Y
SS20[b]	Ventilation Shaft for N/B [a] and Building Service	36	36	49	40	Y	Y
	Ventilation Shaft for S/B [a] and Building Service	36	36	49	40	Y	Y

Note:

(a) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario for NTV, SMV, SPN and SPS. Tunnel ventilation would be operated for both northbound (N/B) and southbound (S/B) direction under normal scenario for MPV.

(b) Certain direction of the ventilation shaft is totally or partially screened by the proposed noise barriers at SSS.

4.2 The Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

Noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs were conducted under the normal scenarios during daytime and evening, and during night-time, respectively and summarised in **Table 4.3** below. In each scenario, two sets of noise measurements, $L_{Aeq(30min)}$, in one-third octave band, were carried out to confirm that the difference in the measured noise levels with and without operation of fixed plant noise sources were less than 3.0 dB(A). That means the fixed plant noise sources from the ventilation buildings and the plant buildings are not considered as significant noise sources at the NSR. Noise measurements at NTV and some NSRs at SPN/SPS (e.g. SS11a, SS15 and SS20) were dominated by community noise; MPV, SMV and some NSRs at SPN/SPS (e.g. SS7, SS10) were dominated by the road traffic noise along Castle Peak Road – Mai Po and San Tin Highway, Cheung Pei Shan Estate Road West and Kam Tin Road, respectively; characteristics of tonality, impulsiveness and intermittency due to the fixed plant noise sources from the ventilation buildings was not noticeable during the measurement. Detailed results of noise measurements are shown in **Appendix A4**.

Table 4.3 Noise measurement Results at NSR

NSR	Scenario	Measured Noise Level $L_{Aeq(30min)}$, dB(A), (measurement time) (b)	Averaged Background Level $L_{Aeq(5min)}$, dB(A), (measurement time) (a)	Difference between Measured Noise Level and Background Level, dB(A), (< 3.0 or >= 3.0)
MP1	Day and Evening Time	49.0 (22:45 – 23:15) 48.4 (00:25 – 00:55)	48.9 (22:00 – 22:20)	< 3.0
	Night-time	49.0 (01:00 – 01:30) 49.7 (01:30 – 02:00)	49.6 (02:10 – 02:20)	< 3.0
MP5	Day and Evening Time	48.1 (22:45 – 23:15) 48.9 (00:25 – 00:55)	46.7 (22:00 – 22:20)	< 3.0
	Night-time	49.8 (01:00 – 01:30) 48.4 (01:30 – 02:00)	47.8 (02:05 – 02:20)	< 3.0
MP6	Day and Evening Time	48.7 (22:45 – 23:15) 46.4 (00:25 – 00:55)	48.5 (22:00 – 22:20)	< 3.0
	Night-time	48.4 (01:00 – 01:30) 47.6 (01:30 – 02:00)	47.1 (02:05 – 02:15)	< 3.0
NT1a	Day and Evening Time	52.0 (23:25 – 23:55) 52.8 (23:56 – 00:26)	52.2 (23:08 – 23:18)	< 3.0
	Night-time	46.9 (00:28 – 00:58) 45.7 (01:03 – 01:33)	44.0 (01:54 – 02:14)	< 3.0
NT4a	Day and Evening Time	50.8 (23:24 – 23:54) 52.5 (23:55 – 00:25)	52.1 (23:13 – 23:23)	< 3.0
	Night-time	52.8 (00:32 – 01:02) 53.2 (01:03 – 01:33)	52.6 (01:40 – 01:50)	< 3.0
SM1	Day and Evening Time	64.2 (22:39 – 23:09) 64.3 (23:10 – 23:40)	65.1 (22:12 – 22:27)	< 3.0
	Night-time	61.3 (23:42 – 00:12) 60.9 (00:13 – 00:43)	59.7 (00:49 – 00:59)	< 3.0
SM4	Day and Evening Time	60.6 (22:30 – 23:00) 59.4 (23:00 – 23:30)	60.4 (21:45 – 21:55)	< 3.0
	Night-time	56.6 (23:34 – 00:04) 56.7 (00:04 – 00:34)	55.6 (00:39 – 00:49)	< 3.0
SS7	Day and Evening Time	50.7 (23:43 – 00:13) 48.5 (00:13 – 00:43)	50.2 (23:30 – 23:40)	< 3.0
	Night-time	47.9 (00:50 – 01:20) 47.2 (01:20 – 01:50)	46.9 (02:25 – 02:40)	< 3.0
SS10	Day and	58.9 (23:42 – 00:12)	57.2 (23:18 – 23:28)	< 3.0

NSR	Scenario	Measured Noise Level $L_{Aeq(30min)}$, dB(A), (measurement time) (b)	Averaged Background Level $L_{Aeq(5min)}$, dB(A), (measurement time) (a)	Difference between Measured Noise Level and Background Level, dB(A), (< 3.0 or >= 3.0)
	Evening Time	56.8 (00:12 – 00:42)		
	Night-time	55.5 (00:46 – 01:16) 55.8 (01:16 – 01:46)	54.4 (02:24 – 02:34)	< 3.0
SS15	Day and Evening Time	47.7 (23:43 – 00:13) 47.6 (00:13 – 00:43)	49.0 (22:33 – 22:43)	< 3.0
	Night-time	48.4 (00:50 – 01:20) 48.4 (01:20 – 01:50)	48.8 (02:25 – 02:35)	< 3.0
SS11a	Day and Evening Time	48.3 (23:52 – 00:22) 48.3 (00:22 – 00:52)	46.9 (23:15 – 23:33)	< 3.0
	Night-time	47.6 (00:55 – 01:25) 45.5 (01:25 – 01:55)	46.7 (02:43 – 02:53)	< 3.0
SS20	Day and Evening Time	57.1 (23:42 – 00:12) 57.3 (00:14 – 00:44)	57.5 (23:04 – 23:15)	< 3.0
	Night-time	57.1 (00:46 – 01:16) 57.1 (01:17 – 01:47)	57.5 (02:24 – 02:35)	< 3.0

Note:

(a) The noise levels at NSRs were dominated either by community noise or road traffic noise; the fixed plants from the ventilation buildings and the plant buildings were not considered as significant noise sources at the NSR.

(b) The scenarios were arranged for the purpose of testing and commissioning only. The scenario under "day and evening time" would not happen after 2300 during the operation phase.

As the differences between measured noise levels and background levels are all less than 3.0 dB(A), it was unable to obtain reliable corrected noise levels at the NSRs and corrections for tonality, impulsiveness or intermittency were therefore not applicable.

5 Conclusions

To fulfil the XRL EP condition 2.36, the fixed plant noise verification were undertaken and the measurement results indicated all the fixed plant noise levels in MPV, NTV, SMV, SPN and SPS are in compliance with the fixed plant noise criteria.

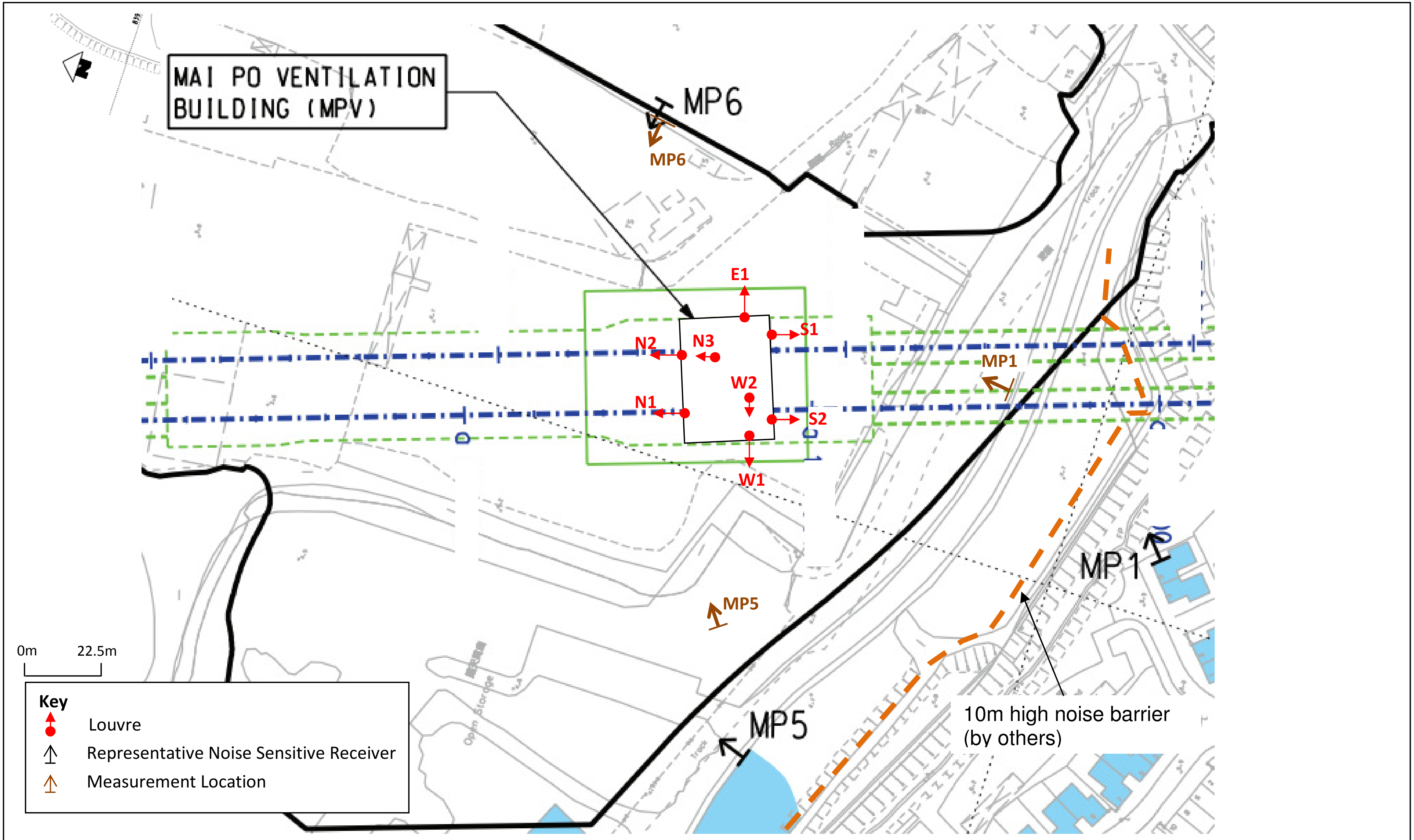


Figure 2.1 – Representative Noise Sensitive Receiver (NSR), Noise Measurement Location and Fixed Plant Sources at MPV

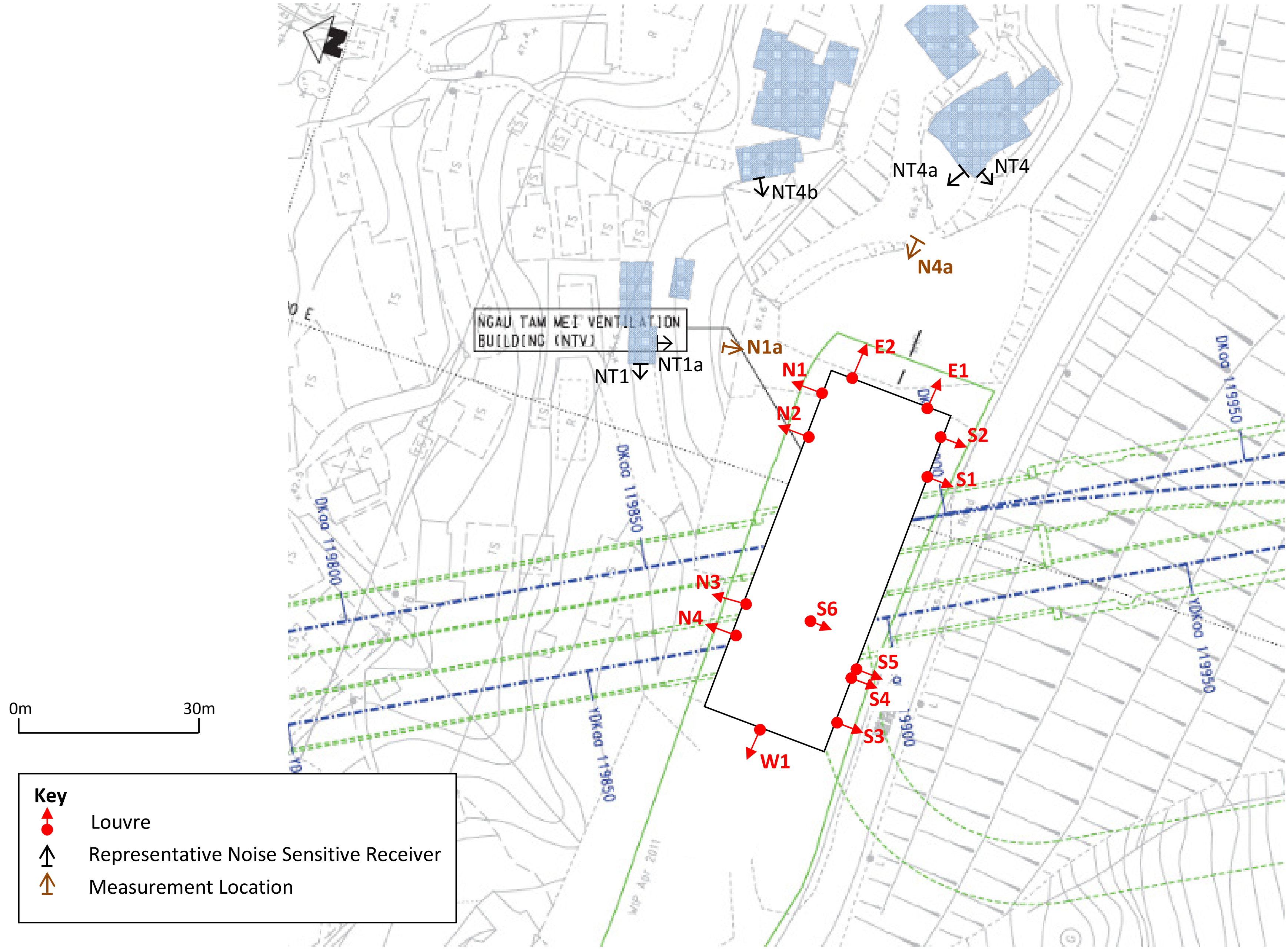


Figure 2.2 – Representative Noise Sensitive Receiver (NSR), Noise Measurement Location and Fixed Plant Sources at NTV

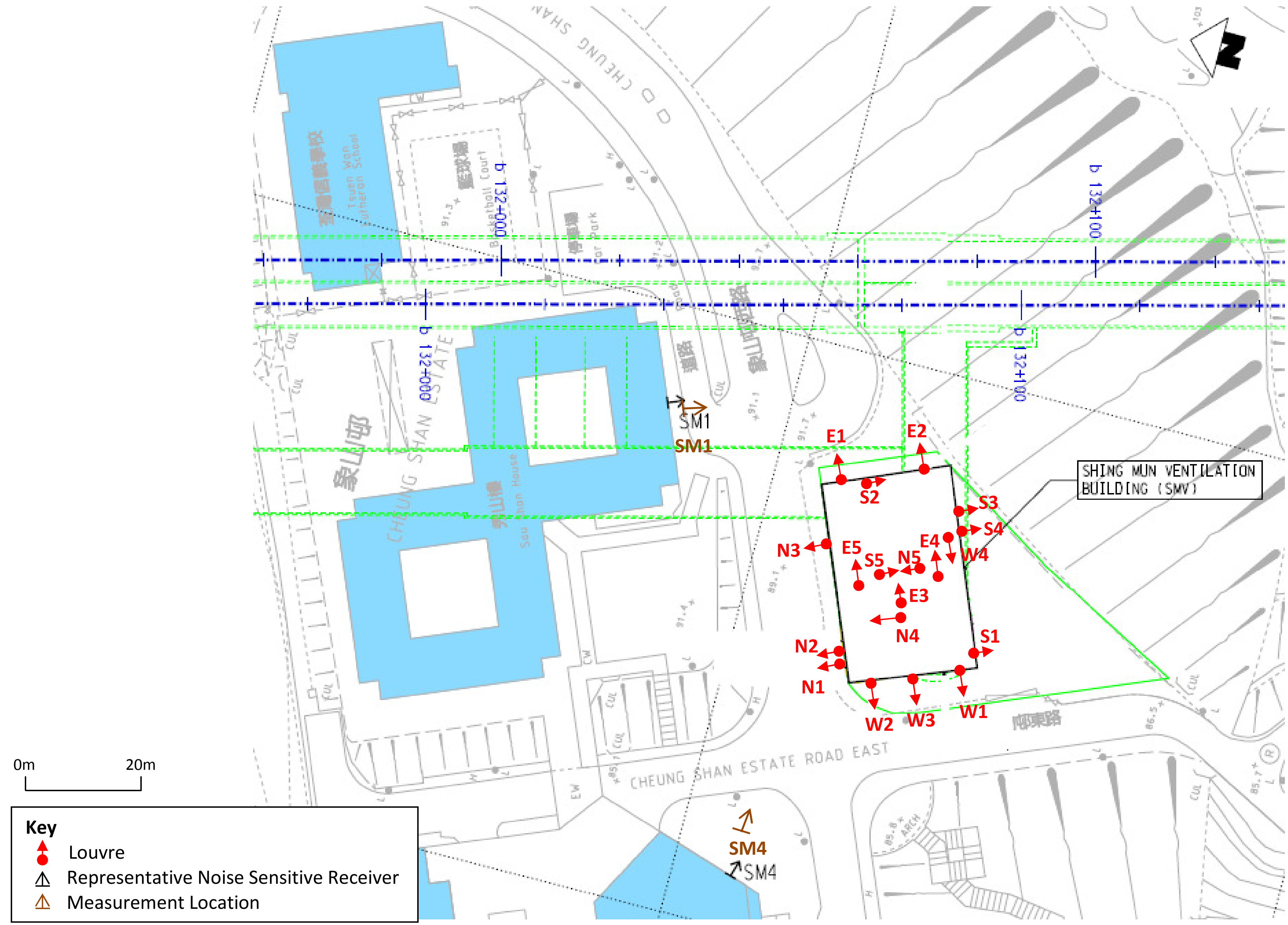


Figure 2.3 – Site layout, Noise Sensitive Receiver (NSR) and Fixed Plant Sources at SMV

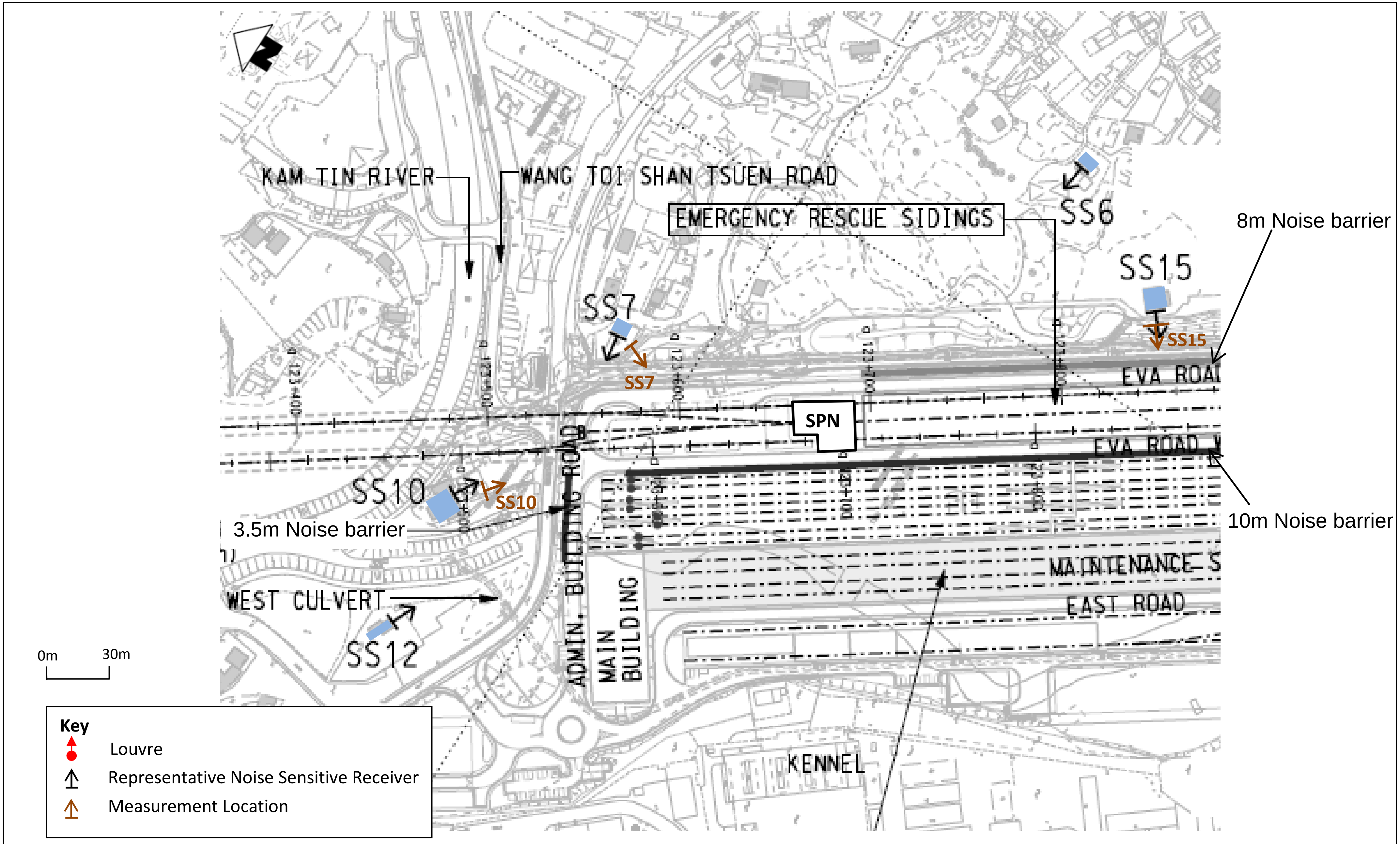


Figure 2.4 – Representative Noise Sensitive Receiver (NSR), Noise Measurement Location and Fixed Plant Sources at SPN

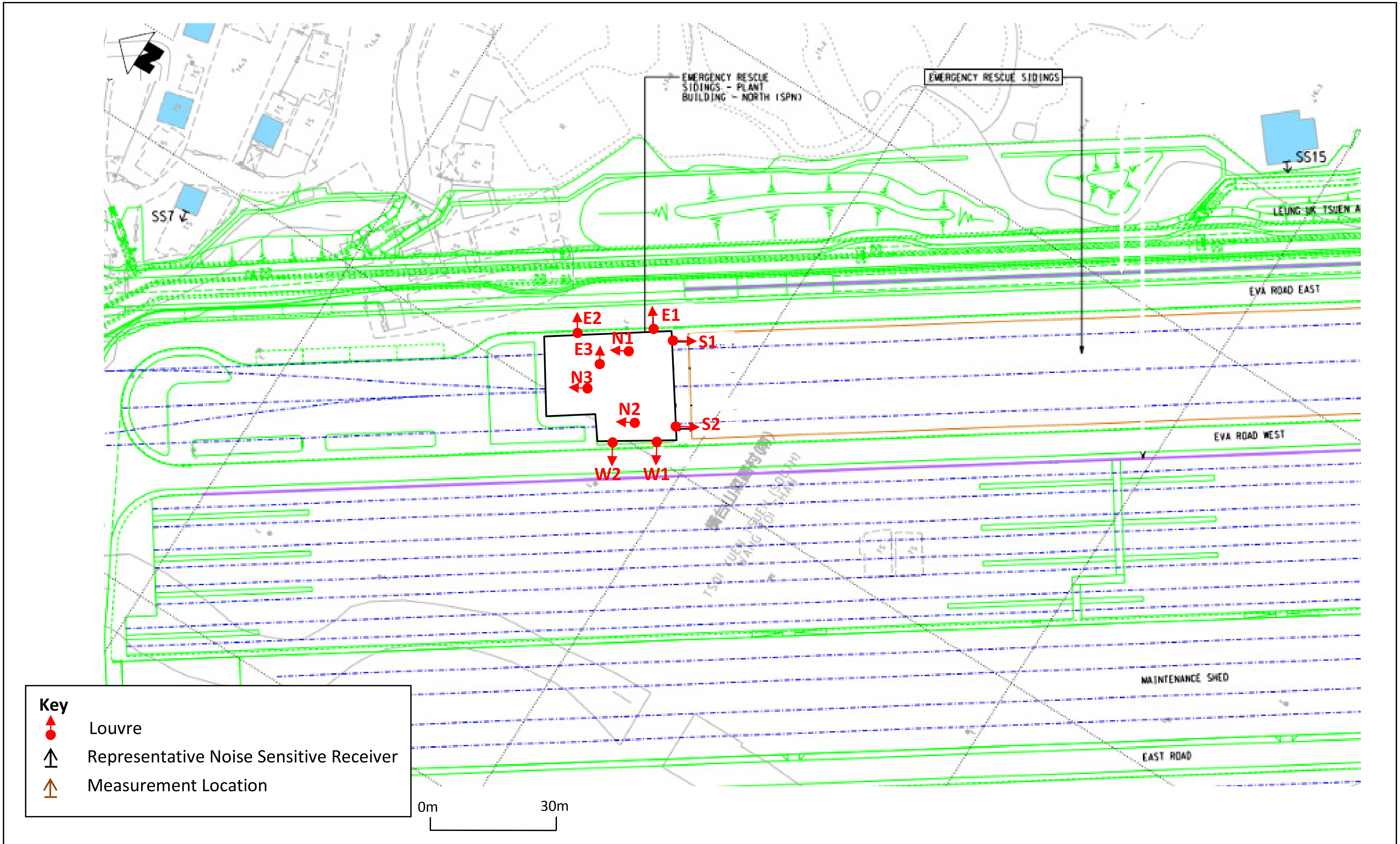


Figure 2.4a – Representative Noise Sensitive Receiver (NSR), Noise Measurement Location and Fixed Plant Sources at SPN

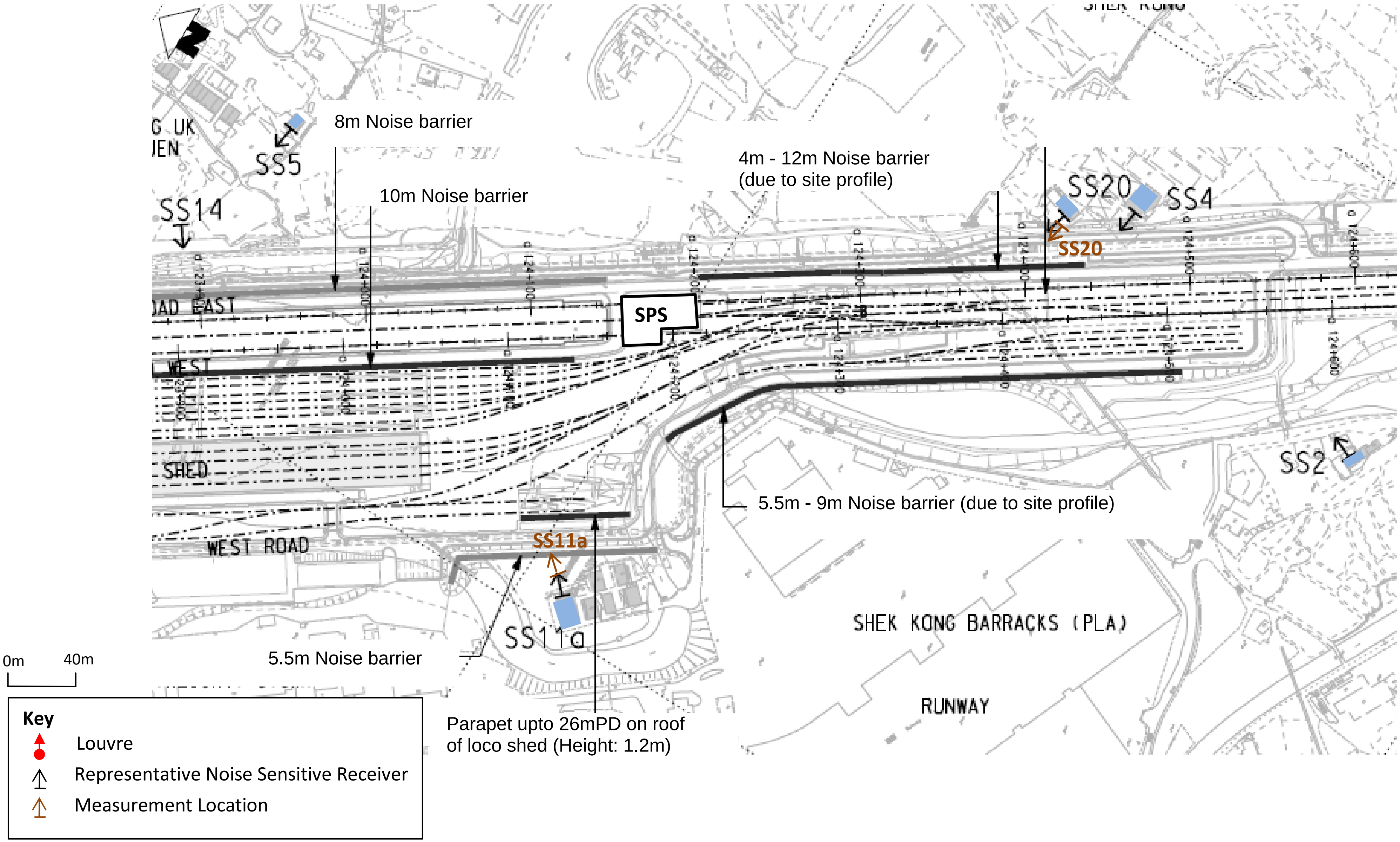


Figure 2.5 – Representative Noise Sensitive Receiver (NSR), Noise Measurement Location and Fixed Plant Sources at SPS

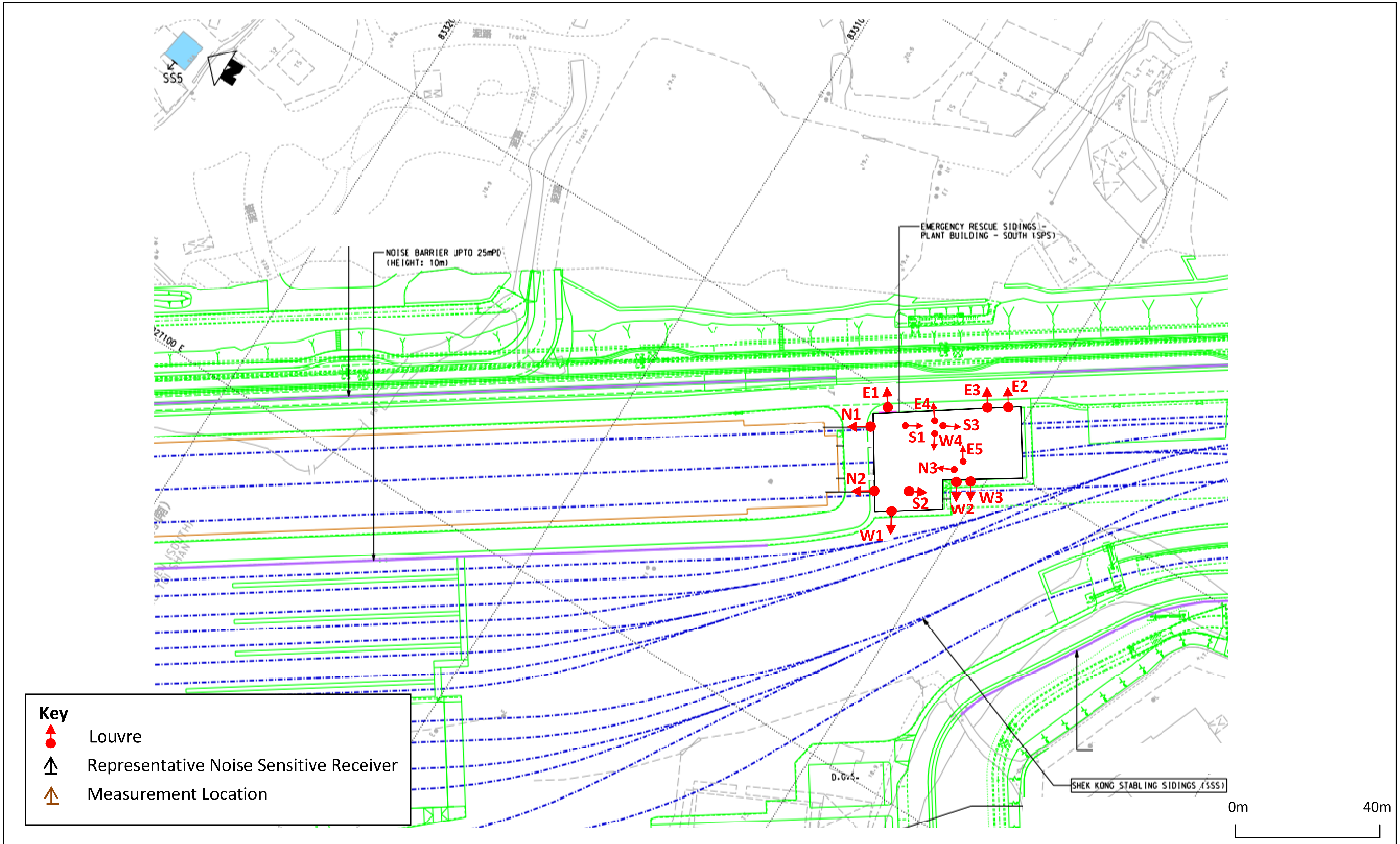


Figure 2.5a – Representative Noise Sensitive Receiver (NSR), Noise Measurement Location and Fixed Plant Sources at SPS

Appendix A1 –Measurement Methodology

XRL Fixed Plant Noise Test Plan

BY : MTR XRL Env Team

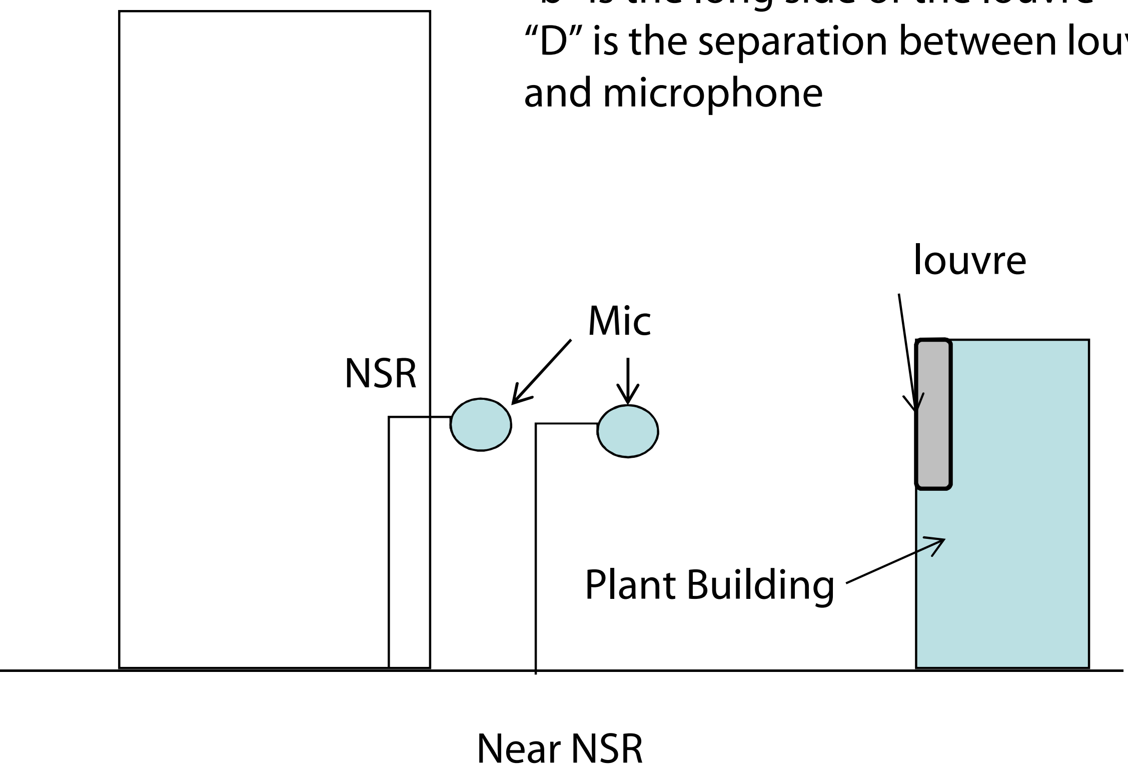
Summary of Testing Methodology

Method	Standard	No of repeated measurement	No of measurement point	Measurement distance, D	To Verify
Method 1 (NSR Method)	NCO - TM	3 sets of Leq 1min	Depend on number of NSRs nearby	At the most affected NSR or near NSR	ANL-5 or Background Prevailing
Method 2 (Far Field Method)	Basic Acoustic Principle	3 sets of Leq 1min	1 (for louvre/plant with uniform plane source)	D ≧2b and roundup to integer	ANL-5 or Background Prevailing
Method 3 (Near Field Method)	Developed based on ISO3746:2010	1 set of Leq 10s [(a)] /1min	Depend on the size of the louvre/plant and the measurement distance should follow guideline in ISO3746	At least 1m from the louvre opening/plant (unless otherwise specified)	ANL-5 or Background Prevailing

Note :
(a) If fixed plant items are operated at their noisiest operating modes and are steady during measurement, 10-second will be adopted for the duration of measurement.

Method 1 – Sound Pressure Level at NSR or Near NSR for louvre or Plant

“b” is the long side of the louvre
“D” is the separation between louvre and microphone

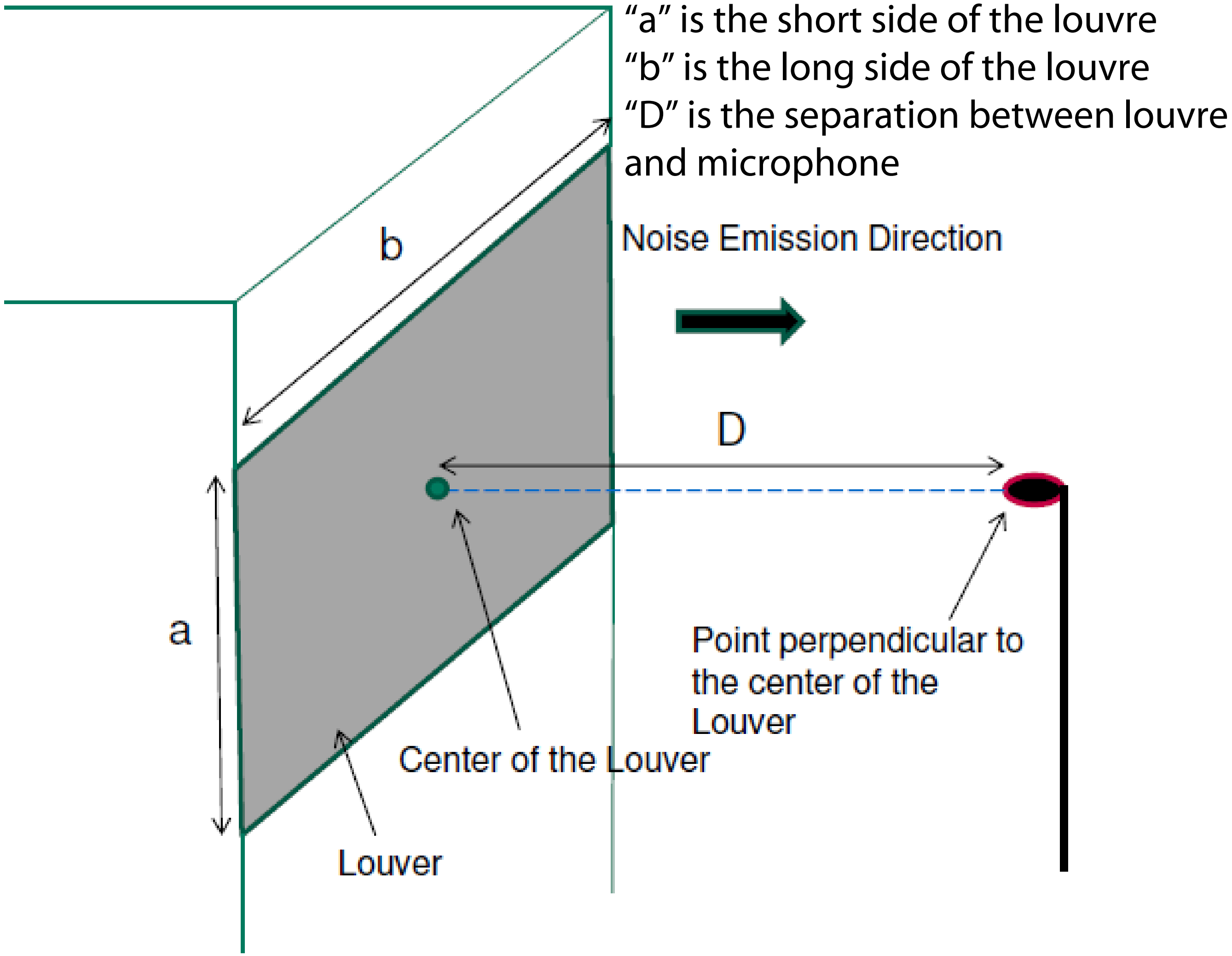


- Based on NCO - TM
- The locations of measurement points are depended on the site situation
- 3.0 dB façade correction should be considered if the location of measurement point is not at assessment point as defined in NCO-TM
- “D” must be greater than 2b and roundup to integer
- Detail calculation of the SPL should refer to the NCO-TM.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

Background corrected SPL = Mean $L_{Aeq1min}$ + BG - [20log (D) +8] (if applicable) + façade correction (if applicable)

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for louvre



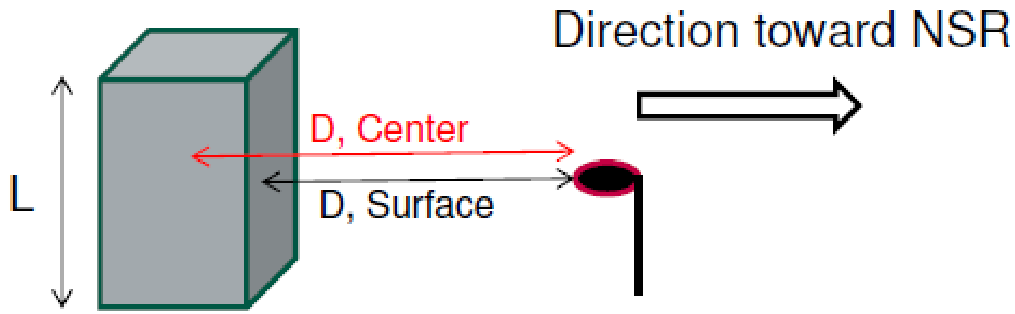
- Based on basic acoustic principle
- “D” must be greater than 2b and roundup to integer, i.e.: D≧2b
- The microphone must point to the center of the louvre.
- At least 3 sets of LAeq, 1min should be obtained
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 +BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for Plant

"L" is the longest side of the plant item
"D, Center" is the separation between center of the plant item and microphone
"D, Surface" is the separation between surface of the plant item and microphone

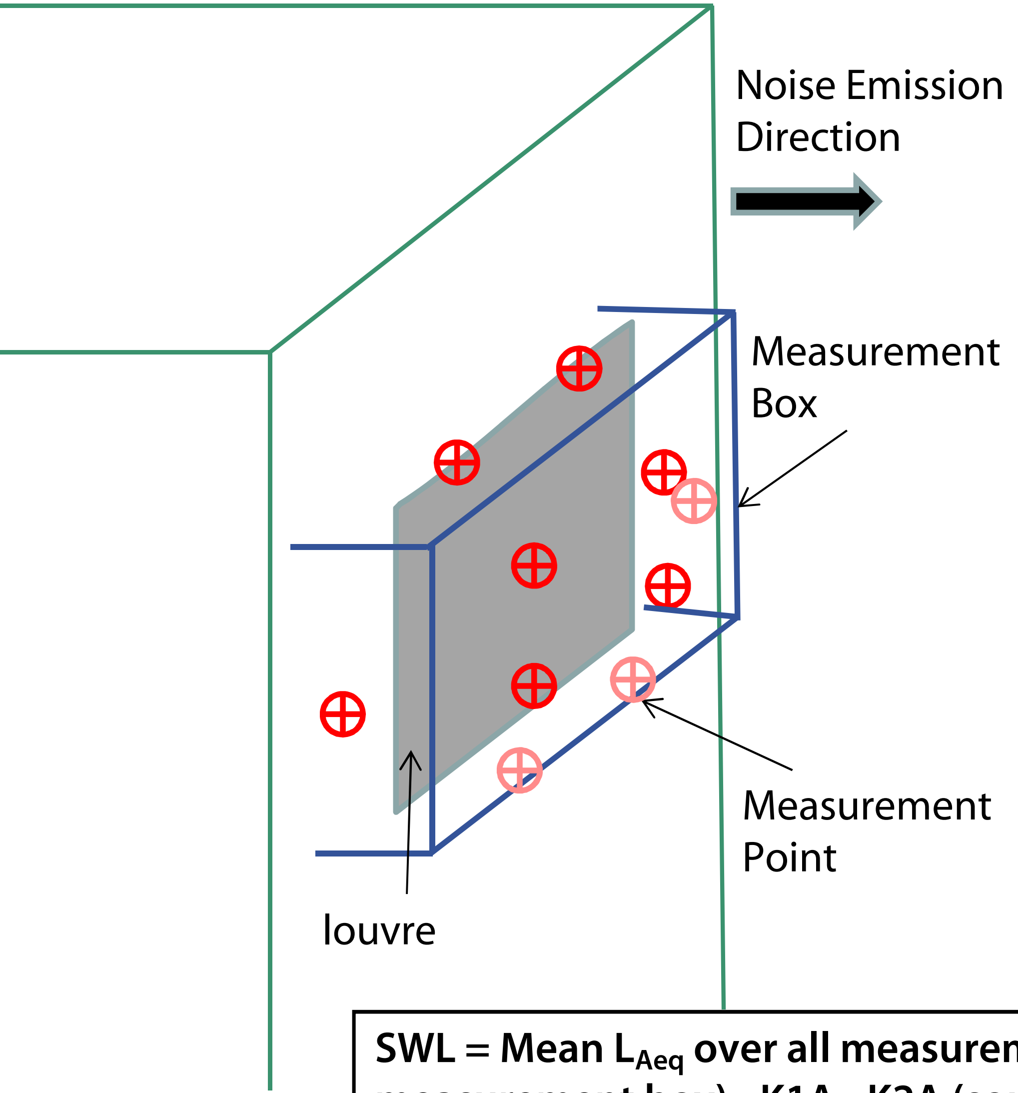


- "D, Surface" must be greater than twice of L (2L) and roundup to integer
- The microphone must be pointing to the center of the plant
- At least 3 sets of LAeq, 1min should be obtained at each measurement point.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 + BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 3 – Near Field Sound Power Testing Method for louvre

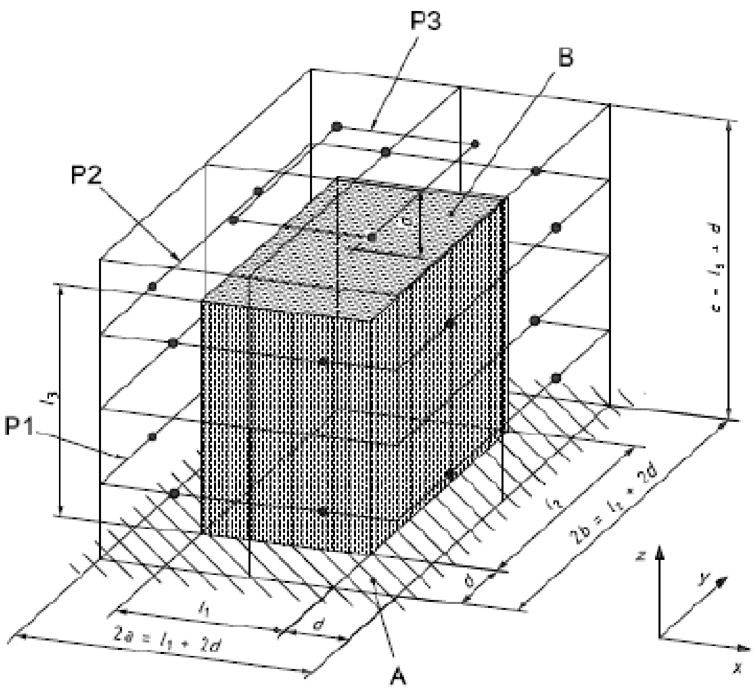


- Based on the principle of ISO3746 – 2010
- First step is to determine a hypothetical measurement surface /box with not less than 1m separation from the louvre.
- Second, determine the location of measurement point in accordance with the latest edition of ISO3746.
- Background noise level (BGL) should be taken at each measurement point for determination of background correction (K1A)
- At least 1 set of Leq, 10s/1min should be obtained at each measurement point
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Details calculation of the SWL should refer to the latest edition of ISO3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 3 – Near Field Sound Power Testing Method for Plant



- Based on ISO 3746
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalised (See figure on the left for example).
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Detail calculation of the SWL should refer to the latest edition of ISO 3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

End

Appendix A2 – Calibration Certificates

Calibration Certificate

Certificate No. **704083**

Customer : 宏業承造有限公司
Address : 沙田火炭坳背灣街61-63號盈力工業大廈203室
Order No. : Q71682
Date of receipt : 8-May-17

Item Tested

Description : Sound Level Meter
Manufacturer : CASELLA
Model : CEL-63X
I.D. : CBSM0103
Serial No. : 5044655

Test Conditions

Date of Test : 11-May-17
Ambient Temperature : (23 ± 3)°C
Supply Voltage : --
Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure : Z01, IEC 61672, IEC 61260.

Test Results

All results were within the IEC 61672 Type 1 or IEC 61260 Class 1 specification.
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C170120	SCL-HKSAR
S240	Sound Level Calibrator	701036	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Kin Wong

Approved by : Alan Chu

Date: 11-May-17

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

E

Calibration Certificate

Results :

1. **Self-generated noise:** 0.2 dBA (Mfr's Spec (Electrical) ≤ 17.5 dBA)

2. **Acoustical signal test**

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Octave Filter		
0-140	A	F	OFF	94.0	93.8
		S	OFF		93.8
	C	F	OFF		94.0
	Z	F	OFF		93.8
	A	F	1/1		93.8
	A	F	1/3		93.8
	A	F	OFF	114.0	113.8
		S	OFF		113.8
	C	F	OFF		113.8
	Z	F	OFF		113.8
	A	F	1/1		113.9
	A	F	1/3		113.8

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.3 dB

3 **Electrical signal tests of frequency weightings** (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.4	- 39.4 dB, ± 2 dB
63 Hz	-26.2	- 26.2 dB, ± 1.5 dB
125 Hz	-16.1	- 16.1 dB, ± 1.5 dB
250 Hz	-8.7	- 8.6 dB, ± 1 dB
500 Hz	-3.2	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.3	+ 1.2 dB, ± 1.6 dB
4 kHz	+0.9	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.4	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-9.5	- 6.6 dB, + 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

Calibration Certificate

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
A	94.0	93.8 (Ref.)	- -	± 0.4 dB
C	94.0	94.0	+0.2	
Z	94.0	93.8	0.0	

4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
Fast	94.0	93.8 (Ref.)	- -	± 0.3 dB
Slow	94.0	93.8	0.0	
Time-averaging	94.0	93.8	0.0	

Uncertainty : ± 0.1 dB

5. Filter Characteristics

5.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
125 Hz	-61.5	< - 61
250 Hz	-43.7	< - 42
500 Hz	-21.2	< - 17.5
707 Hz	-3.7	- 2 ~ - 5
1 kHz (Ref)	- -	--
1.414 kHz	-3.8	- 2 ~ - 5
2 kHz	-24.2	< - 17.5
4 kHz	-66.0	< - 42
8 kHz	-62.1	< - 61

Uncertainty : ± 0.25 dB

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. **704083**

5.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
326 Hz	-61.3	< - 61
530 Hz	-46.3	< - 42
772 Hz	-22.1	< - 17.5
891 Hz	-3.6	+ 0.3 ~ - 5.0
1 kHz (Ref)	- -	--
1.122 kHz	-3.6	+ 0.3 ~ - 5.0
1.296 kHz	-23.3	< - 17.5
1.887 kHz	-50.7	< - 42
3.070 kHz	-72.5	< - 61

Uncertainty : ± 0.25 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1029 hPa
4. Preamplifier model : CEL-495 , S/N : 002374.
5. Firmware Version: 129-08
6. Power Supply Check: OK
7. The UUT was adjusted with the laboratory's sound calibrator at the reference sound pressure level before the calibration.

----------- END -----------

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Customer : 宏業承造有限公司
Address : 沙田火炭坳背灣街61-63號盈力工業大廈203室
Order No. : Q71682 **Date of receipt :** 8-May-17

Item Tested

Description : Sound Level Calibrator
Manufacturer : Casella **I.D.** : CBSM0103
Model : CEL-120/1 **Serial No.** : 5060836

Test Conditions

Date of Test : 11-May-17 **Supply Voltage** : --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure: IEC 60942, F21, Z02.

Test Results

All results were within the IEC 60942 Class 1 specification.
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S014	Spectrum Analyzer	605758	NIM-PRC & SCL-HKSAR
S240	Sound Level Calibrator	701036	NIM-PRC & SCL-HKSAR
S041	Universal Counter	607883	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Kin Wong **Approved by :** Alan Chu

Date: 11-May-17

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

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香港校正有限公司

Calibration Certificate

Results :

1. Generated Sound Pressure Level

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94	94.2	± 0.4 dB
114	114.2	

Uncertainty : ± 0.2 dB

2. Short-term Level Fluctuation : 0.0 dB
IEC 60942 Class 1 Spec. : ± 0.1 dB
Uncertainty : ± 0.01 dB

3. Frequency

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	1.000	± 1 %

Uncertainty : ± 3.6×10^{-6}

4. Total Distortion : < 0.2 %
IEC 60942 Class 1 Spec. : < 3 %
Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1029 hPa.

----------- END -----------

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. **804865**

Customer : ATAL Engineering Ltd
Address : 13/F., Island Place Tower, 510 King's Road, North Point, H. K.
Order No. : Q81893
Date of receipt : 16-May-18

Item Tested

Description : Sound Level Meter
Manufacturer : CASELLA
Model : CEL-63X
I.D. : --
Serial No. : 5044655

Test Conditions

Date of Test : 18-May-18
Ambient Temperature : (23 ± 3)°C
Supply Voltage : --
Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure : Z01, IEC 61672, IEC 61260.

Test Results

All results were within the IEC 61672 Type 1 or IEC 61260 Class 1 specification. (where applicable)
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C170120	SCL-HKSAR
S240	Sound Level Calibrator	803357	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Elva Chong

Approved by : Kin Wong

Date: 18-May-18

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

Calibration Certificate

Results :

1. **Self-generated noise:** 23.2 dBA

2. **Acoustical signal test**

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Octave Filter		
0-140	A	F	OFF	94.0	93.3
		S	OFF		93.3
	C	F	OFF		93.3
	Z	F	OFF		93.3
	A	F	1/1		93.3
	A	F	1/3		93.3
	A	F	OFF	114.0	113.4
		S	OFF		113.4
	C	F	OFF		113.4
	Z	F	OFF		113.4
	A	F	1/1		113.4
	A	F	1/3		113.4

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.3 dB

3 **Electrical signal tests of frequency weightings** (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.5	- 39.4 dB, ± 2 dB
63 Hz	-26.3	- 26.2 dB, ± 1.5 dB
125 Hz	-16.3	- 16.1 dB, ± 1.5 dB
250 Hz	-8.8	- 8.6 dB, ± 1 dB
500 Hz	-3.3	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.2	+ 1.2 dB, ± 1.6 dB
4 kHz	+0.8	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.5	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-9.5	- 6.6 dB, + 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

Calibration Certificate

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
A	94.0	94.0 (Ref.)	- -	± 0.4 dB
C	94.0	94.0	0.0	
Z	94.0	94.0	0.0	

4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
Fast	94.0	94.0 (Ref.)	- -	± 0.3 dB
Slow	94.0	94.0	0.0	
Time-averaging	94.0	94.0	0.0	

Uncertainty : ± 0.1 dB

5. Filter Characteristics

5.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
125 Hz	-61.4	<- 61
250 Hz	-43.7	<- 42
500 Hz	-21.2	<- 17.5
707 Hz	-3.7	- 2 ~ - 5
1 kHz (Ref)	- -	--
1.414 kHz	-3.8	- 2 ~ - 5
2 kHz	-24.2	<- 17.5
4 kHz	-65.4	<- 42
8 kHz	-61.9	<- 61

Uncertainty : ± 0.25 dB

Calibration Certificate

5.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
326 Hz	-61.3	< - 61
530 Hz	-46.3	< - 42
772 Hz	-22.1	< - 17.5
891 Hz	-3.6	+ 0.3 ~ - 5.0
1 kHz (Ref)	- -	--
1.122 kHz	-3.7	+ 0.3 ~ - 5.0
1.296 kHz	-23.3	< - 17.5
1.887 kHz	-50.7	< - 42
3.070 kHz	-72.4	< - 61

Uncertainty : ± 0.25 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 006 hPa
4. Preamplifier model : CEL-495 , S/N : 002374
5. Firmware Version: 129-08
6. Power Supply Check: OK
7. The UUT was adjusted with the supplied sound calibrator at the reference sound pressure level before the calibration.

---------- END ----------

Hong Kong Calibration Ltd.
香 港 校 正 有 限 公 司

Calibration Certificate

Certificate No. **804866**

Customer : ATAL Engineering Ltd
Address : 13/F., Island Place Tower, 510 King's Road, North Point, H. K.
Order No. : Q81893 **Date of receipt :** 16-May-18

Item Tested

Description : Sound Level Calibrator
Manufacturer : Casella **I.D. :** --
Model : CEL-120/1 **Serial No. :** 5060836

Test Conditions

Date of Test : 18-May-18 **Supply Voltage :** --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure: IEC 60942, F21, Z02.

Test Results

All results were within the IEC 60942 Class 1 specification.
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S014	Spectrum Analyzer	707126	NIM-PRC & SCL-HKSAR
S240	Sound Level Calibrator	803357	NIM-PRC & SCL-HKSAR
S041	Universal Counter	802061	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Elva Chong

Approved by : Kin Wong

Date: 18-May-18

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

E

Calibration Certificate

Results :

1. Generated Sound Pressure Level

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94.0	94.3	± 0.4 dB
114.0	114.3	

Uncertainty : ± 0.2 dB

2. **Short-term Level Fluctuation** : 0.0 dB
IEC 60942 Class 1 Spec. : ± 0.1 dB
Uncertainty : ± 0.01 dB

3. Frequency

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	1.000	± 1 %

Uncertainty : ± 3.6 x 10^{-6}

4. **Total Distortion** : < 0.2 %
IEC 60942 Class 1 Spec. : < 4 %
Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 006 hPa.

---------- END ----------

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**
  consisting of
  MA220 Serial Number: 6240
  Capsule Serial Number: 9498

- Certificate Issued: **10 January 2017**
- Certificate Number: **42745-6240-M2230**
- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

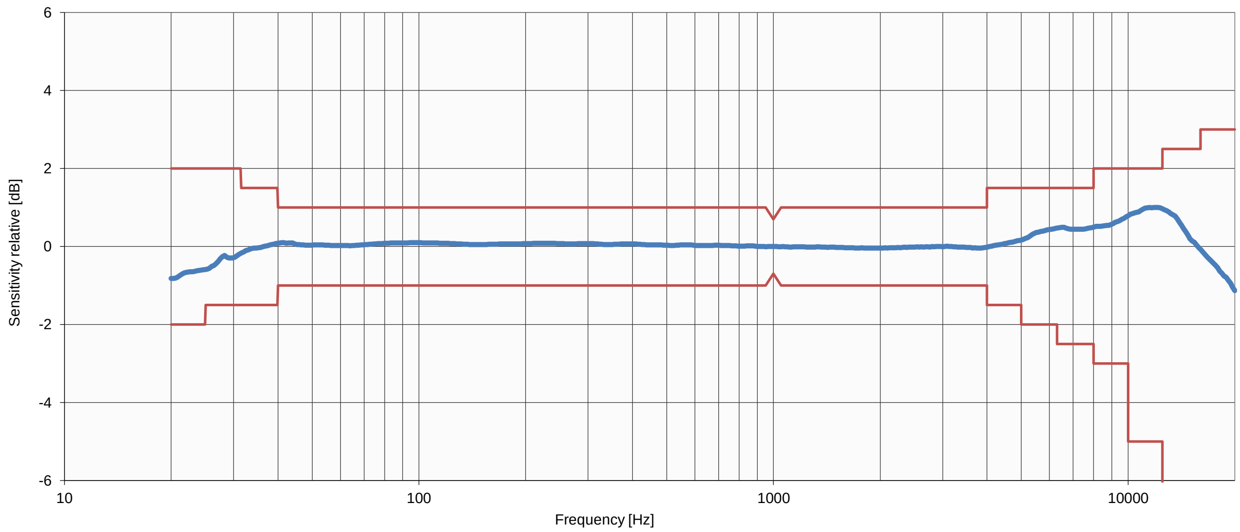
Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date:	10 January 2017			
Calibration of:	M2230	Measurement Microphone		
		MA220	Serial Number:	6240
		Capsule	Serial Number:	9498

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**43.3 mV/Pa**	±2.85%

- Test Conditions:

Test Conditions:	Temperature:	27.2 °C	±0.5 °C
	Relative Humidity:	39.5 %	±2%
	Air Pressure:	95.94 kPa	±0.25 kPa

- Calibration Equipment Used:

- Norsonic Sound Calibrator, Type 1251, S/No. 30930
  Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
  Calibrated by Metas, Switzerland

- NTi Audio FX100, S/No. 11094
  Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
  Calibrated by NTi Audio meeting product specifications

- MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
  Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
  Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**
  consisting of
  MA220 Serial Number: 5011
  Capsule Serial Number: 7698

- Certificate Issued: **24 March 2017**

- Certificate Number: **42818-5011-M2230**

- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

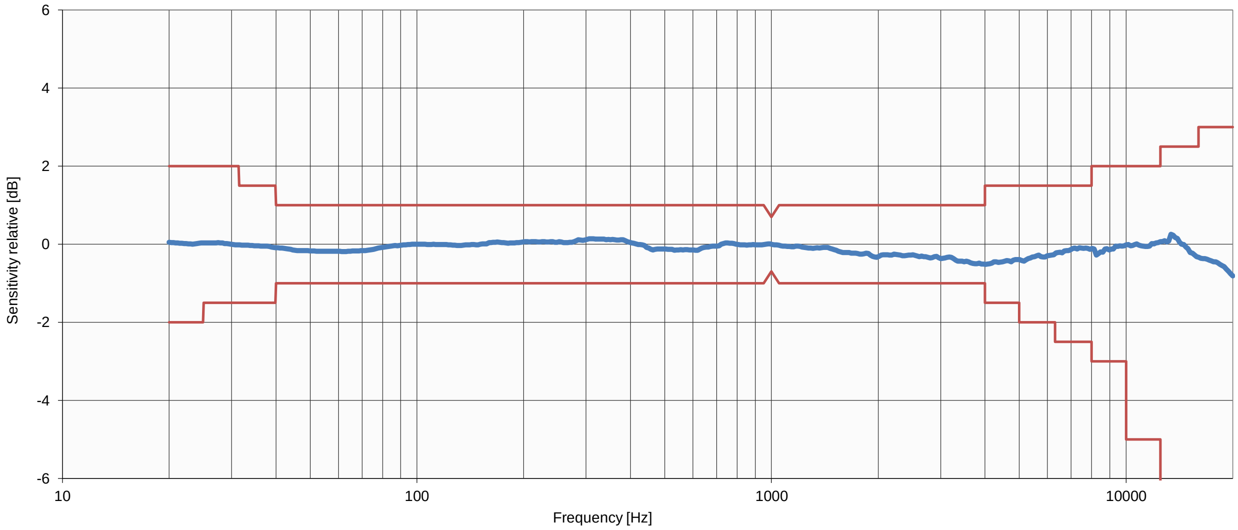
Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date:	24 March 2017			
Calibration of:	M2230	Measurement Microphone		
		MA220	Serial Number:	5011
		Capsule	Serial Number:	7698

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**46.5 mV/Pa**	±2.85%

- Test Conditions:

	Temperature:	21.1 °C	±0.5 °C
	Relative Humidity:	47.2 %	±2%
	Air Pressure:	97.4 kPa	±0.25 kPa

- Calibration Equipment Used:

- Norsonic Sound Calibrator, Type 1251, S/No. 30930
  Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
  Calibrated by Metas, Switzerland

- NTi Audio FX100, S/No. 11094
  Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
  Calibrated by NTi Audio meeting product specifications

- MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
  Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
  Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**
  consisting of
  MA220 Serial Number: 5617
  Capsule Serial Number: 8507

- Certificate Issued: **24 March 2017**

- Certificate Number: **42818-5617-M2230**

- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

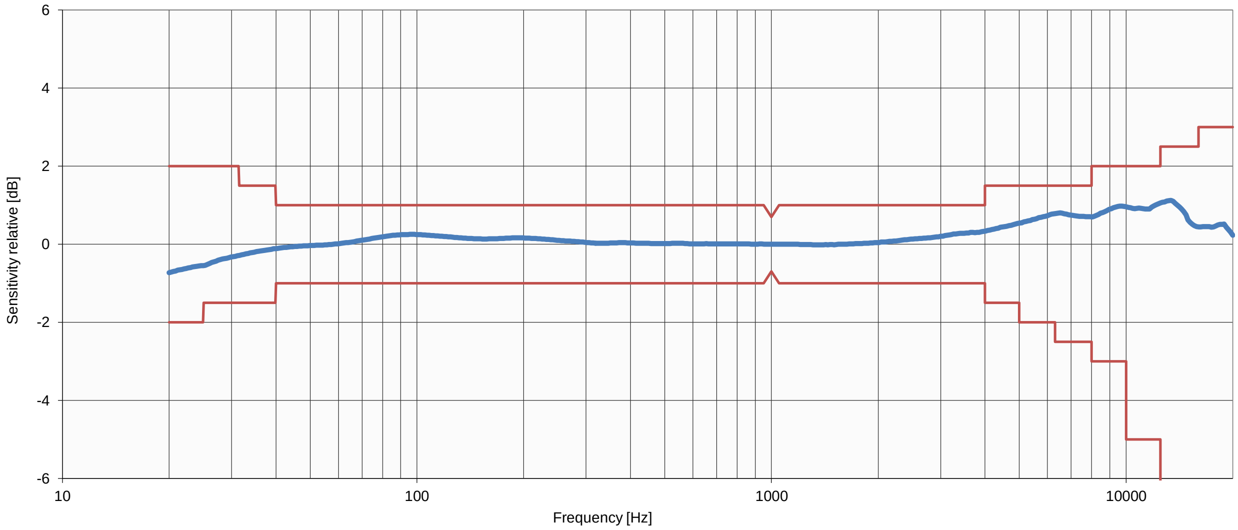
Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date:	24 March 2017			
Calibration of:	M2230	Measurement Microphone		
		MA220	Serial Number:	5617
		Capsule	Serial Number:	8507

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**48.1 mV/Pa**	±2.85%

- Test Conditions:

Temperature:	24.6 °C	±0.5 °C
Relative Humidity:	43.6 %	±2%
Air Pressure:	97.65 kPa	±0.25 kPa

- Calibration Equipment Used:

  - Norsonic Sound Calibrator, Type 1251, S/No. 30930
    Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
    Calibrated by Metas, Switzerland

  - NTi Audio FX100, S/No. 11094
    Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
    Calibrated by NTi Audio meeting product specifications

  - MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
    Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
    Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

Calibration Chart

BSWA TECH

BSWA-IV-C021-03-0048A

Sound Calibrator model	CA111
Serial Number	510317
Appearance	OK
Power Supply	1.5V LR6 (AA battery) x2
Sound Pressure Level	93.92 / 114.04 dB
Frequency	1000.5 / 1000.5 Hz
THD (@1000Hz)	0.23 / 0.80 %

BSWA Technology Ltd.

www.bswa-tech.com

This equipment was calibrated at the following ambient conditions:

Temperature:	23 ℃
Humidity:	35 %RH
Pressure:	1025 hPa

This equipment is qualified!

Calibrated

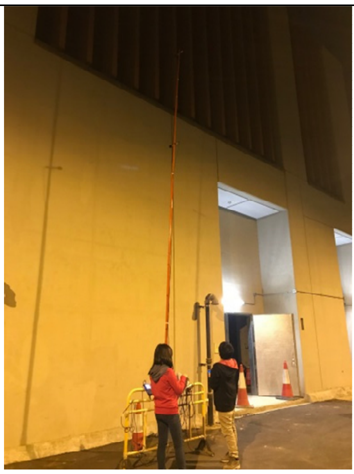
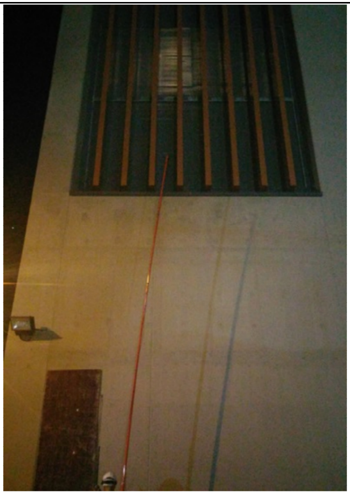
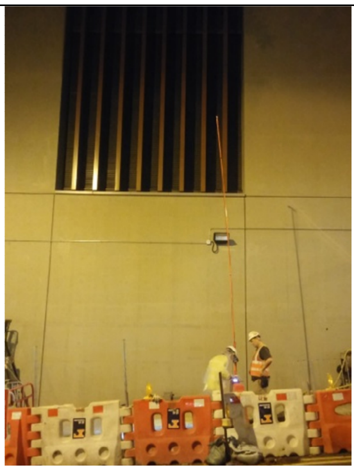
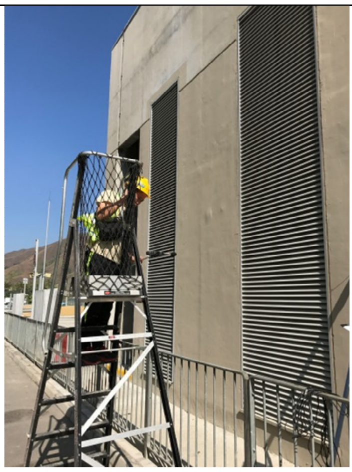
QC 05

2016-11-15

Date

Appendix A3 – Fixed Plant Noise Summary

Measurement Photos

 MPV	 NTV
 SMV	 SPN
 SPS	

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
MP1	House 5 Phase A Royal Palms	Ventilation Shaft and Building Service	ECS duct	N1	L	Y	1.20	1.00	2	3	n/a	49.9	42.4	7.5	49	67	141	5	14	29	60	0
			FS control room	N2	L	Y	0.80	0.80	2	2	n/a	54.8	44.4	10.4	54.8	69	150	5	15			
			LV switch room	N3	L	Y	7.00	3.00	3	1	73.0	54.9	49.9	5	53.2	72	150	5	18			
			Tunnel ventilation shaft	E1	L	Y	12.68	5.93	3	1	161.5	54.4	51.1	3.3	51.7	74	136	10	16			
			Tunnel ventilation shaft	S1	L	Y	8.28	5.93	3	1	117.8	55.1	49.7	5.4	53.6	74	130	5	22			
			Tunnel ventilation shaft	S2	L	Y	9.48	5.93	3	1	129.7	54.8	46.9	7.9	54	75	121	5	23			
			Tunnel ventilation shaft	W1	L	Y	13.00	5.93	3	1	164.7	50.2	46.3	3.9	47.9	70	123	0	23			
			Air Release Louvre	W2	L	Y	1.20	0.60	3	1	19.9	57.6	52.8	4.8	55.9	69	123	0	22			
MP5	Proposed Comprehensive Development at Wo Shang Wai	Ventilation Shaft and Building Service	ECS duct	N1	L	Y	1.20	1.00	2	3	n/a	49.9	42.4	7.5	49	67	101	10	12	34	51	0
			FS control room	N2	L	Y	0.80	0.80	2	2	n/a	54.8	44.4	10.4	54.8	69	116	10	13			
			LV switch room	N3	L	Y	7.00	3.00	3	1	73.0	54.9	49.9	5	53.2	72	150	5	18			
			Tunnel ventilation shaft	E1	L	Y	12.68	5.93	3	1	161.5	54.4	51.1	3.3	51.7	74	125	10	17			
			Tunnel ventilation shaft	S1	L	Y	8.28	5.93	3	1	117.8	55.1	49.7	5.4	53.6	74	119	0	27			
			Tunnel ventilation shaft	S2	L	Y	9.48	5.93	3	1	129.7	54.8	46.9	7.9	54	75	97	0	30			
			Tunnel ventilation shaft	W1	L	Y	13.00	5.93	3	1	164.7	50.2	46.3	3.9	47.9	70	88	0	26			
			Air Release Louvre	W2	L	Y	1.20	0.60	3	1	19.9	57.6	52.8	4.8	55.9	69	97	0	24			
MP6	Planned village house at Village Zone	Ventilation Shaft and Building Service	ECS duct	N1	L	Y	1.20	1.00	2	3	n/a	49.9	42.4	7.5	49	67	88	0	23	35	60	0
			FS control room	N2	L	Y	0.80	0.80	2	2	n/a	54.8	44.4	10.4	54.8	69	73	0	27			
			LV switch room	N3	L	Y	7.00	3.00	3	1	73.0	54.9	49.9	5	53.2	72	150	5	18			
			Tunnel ventilation shaft	E1	L	Y	12.68	5.93	3	1	161.5	54.4	51.1	3.3	51.7	74	68	0	32			
			Tunnel ventilation shaft	S1	L	Y	8.28	5.93	3	1	117.8	55.1	49.7	5.4	53.6	74	75	5	26			
			Tunnel ventilation shaft	S2	L	Y	9.48	5.93	3	1	129.7	54.8	46.9	7.9	54	75	95	5	25			
			Tunnel ventilation shaft	W1	L	Y	13.00	5.93	3	1	164.7	50.2	46.3	3.9	47.9	70	99	10	15			
			Air Release Louvre	W2	L	Y	1.20	0.60	3	1	19.9	57.6	52.8	4.8	55.9	69	86	10	15			

Remarks:

(i) Tunnel ventilation would be operated for both northbound (N/B) and southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
MP1	House 5 Phase A Royal Palms	Ventilation Shaft and Building Service	ECS duct	N1	L	N (ii)	1.20	1.00	2	3	n/a	49.9	42.4	7.5	49	67	141	-	-	28	50	0
			FS control room	N2	L	Y	0.80	0.80	2	2	n/a	54.8	44.4	10.4	54.8	69	150	5	15			
			LV switch room	N3	L	Y	7.00	3.00	3	1	73.0	54.9	49.9	5	53.2	72	150	5	18			
			Tunnel ventilation shaft	E1	L	Y	12.68	5.93	3	1	161.5	54.4	51.1	3.3	51.7	74	136	10	16			
			Tunnel ventilation shaft	S1	L	Y	8.28	5.93	3	1	117.8	55.1	49.7	5.4	53.6	74	130	5	22			
			Tunnel ventilation shaft	S2	L	Y	9.48	5.93	3	1	129.7	54.8	46.9	7.9	54	75	121	5	23			
			Tunnel ventilation shaft	W1	L	Y	13.00	5.93	3	1	164.7	50.2	46.3	3.9	47.9	70	123	0	23			
			Air Release Louvre	W2	L	N (ii)	1.20	0.60	3	1	19.9	57.6	52.8	4.8	55.9	69	123	-	-			
MP5	Proposed Comprehensive Development at Wo Shang Wai	Ventilation Shaft and Building Service	ECS duct	N1	L	N (ii)	1.20	1.00	2	3	n/a	49.9	42.4	7.5	49	67	101	-	-	33	45	0
			FS control room	N2	L	Y	0.80	0.80	2	2	n/a	54.8	44.4	10.4	54.8	69	116	10	13			
			LV switch room	N3	L	Y	7.00	3.00	3	1	73.0	54.9	49.9	5	53.2	72	150	5	18			
			Tunnel ventilation shaft	E1	L	Y	12.68	5.93	3	1	161.5	54.4	51.1	3.3	51.7	74	125	10	17			
			Tunnel ventilation shaft	S1	L	Y	8.28	5.93	3	1	117.8	55.1	49.7	5.4	53.6	74	119	0	27			
			Tunnel ventilation shaft	S2	L	Y	9.48	5.93	3	1	129.7	54.8	46.9	7.9	54	75	97	0	30			
			Tunnel ventilation shaft	W1	L	Y	13.00	5.93	3	1	164.7	50.2	46.3	3.9	47.9	70	88	0	26			
			Air Release Louvre	W2	L	N (ii)	1.20	0.60	3	1	19.9	57.6	52.8	4.8	55.9	69	97	-	-			
MP6	Planned village house at Village Zone	Ventilation Shaft and Building Service	ECS duct	N1	L	N (ii)	1.20	1.00	2	3	n/a	49.9	42.4	7.5	49	67	88	-	-	35	50	0
			FS control room	N2	L	Y	0.80	0.80	2	2	n/a	54.8	44.4	10.4	54.8	69	73	0	27			
			LV switch room	N3	L	Y	7.00	3.00	3	1	73.0	54.9	49.9	5	53.2	72	150	5	18			
			Tunnel ventilation shaft	E1	L	Y	12.68	5.93	3	1	161.5	54.4	51.1	3.3	51.7	74	68	0	32			
			Tunnel ventilation shaft	S1	L	Y	8.28	5.93	3	1	117.8	55.1	49.7	5.4	53.6	74	75	5	26			
			Tunnel ventilation shaft	S2	L	Y	9.48	5.93	3	1	129.7	54.8	46.9	7.9	54	75	95	5	25			
			Tunnel ventilation shaft	W1	L	Y	13.00	5.93	3	1	164.7	50.2	46.3	3.9	47.9	70	99	10	15			
			Air Release Louvre	W2	L	N (ii)	1.20	0.60	3	1	19.9	57.6	52.8	4.8	55.9	69	86	-	-			

Remarks:

(i) Not used

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in**Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method [(ii)]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [(iv)]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [(v)]	Calculated SWL L_{Aeq} [dB(A)] [(vi)]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
NT1	Yau Tam Mei Village House	Ventilation Shaft for N/B [(i)] and Building Service	Tunnel ventilation shaft	N1	L	N [(i)]	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	30	-	-	42	55	0
			Tunnel ventilation shaft	N2	L	N [(i)]	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	30	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	43	0	23			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	45	0	35			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	45	5	34			
			Tunnel ventilation shaft	E2	L	N [(i)]	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	33	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	10	29			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	50	10	29			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	67	10	19			
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	62	10	20			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	62	10	25			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	50	10	39			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	62	10	31			
NT1a	Yau Tam Mei Village House	Ventilation Shaft for N/B [(i)] and Building Service	Tunnel ventilation shaft	N1	L	N [(i)]	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	29	-	-	43	55	0.0
			Tunnel ventilation shaft	N2	L	N [(i)]	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	29	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	45	0	23			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	48	0	34			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	43	0	39			
			Tunnel ventilation shaft	E2	L	N [(i)]	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	32	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	49	10	29			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	49	10	29			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	70	10	19			
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	63	10	20			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	63	10	25			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	50	10	39			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	65	10	31			
NT4	Yau Tam Mei Village House	Ventilation Shaft for N/B [(i)] and Building Service	Tunnel ventilation shaft	N1	L	N [(i)]	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	44	-	-	44	55	0
			Tunnel ventilation shaft	N2	L	N [(i)]	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	50	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	80	5	13			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	86	5	24			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	40	0	40			
			Tunnel ventilation shaft	E2	L	N [(i)]	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	40	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	5	34			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	43	5	35			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	92	5	22			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	85	5	22			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	85	5	27			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	80	5	40			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	97	10	27			
NT4a	Yau Tam Mei Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	42	-	-	44	55	0
			Tunnel ventilation shaft	N2	L	N (i)	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	50	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	80	5	13			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	85	5	24			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	39	0	40			
			Tunnel ventilation shaft	E2	L	N (i)	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	39	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	5	34			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	43	5	35			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	92	5	22			
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	85	5	22			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	85	5	27			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	80	5	40			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	96	10	27			
NT4b	Yau Tam Mei Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	36	-	-	40	55	0
			Tunnel ventilation shaft	N2	L	N (i)	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	43	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	70	0	19			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	75	0	30			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	44	5	34			
			Tunnel ventilation shaft	E2	L	N (i)	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	35	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	55	10	28			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	50	10	29			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	90	10	17			
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	81	10	18			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	81	10	23			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	70	10	36			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	90	10	28			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
NT1	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	30	0	37	43	55	0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	30	0	34			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	43	0	23			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	45	0	35			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	45	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	33	5	32			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	50	-	-			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	67	10	19			
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	62	10	20			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	62	10	25			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	50	10	39			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	62	10	31			
NT1a	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	29	0	38	44	55	0.0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	29	0	35			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	45	0	23			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	48	0	34			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	43	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	32	0	37			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	49	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	49	-	-			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	70	10	19			
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	63	10	20			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	63	10	25			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	50	10	39			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	65	10	31			
NT4	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	44	5	29	42	55	0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	50	5	25			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	80	5	13			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	86	5	24			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	40	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	40	0	35			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	43	-	-			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	92	5	22			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	85	5	22			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	85	5	27			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	80	5	40			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	97	10	27			
NT4a	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	42	5	30	42	55	0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	50	5	25			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	80	5	13			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	85	5	24			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	39	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	39	0	35			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	43	-	-			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	92	5	22			
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	85	5	22			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	85	5	27			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	80	5	40			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	96	10	27			
NT4b	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	36	0	36	41	55	0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	43	0	31			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	70	0	19			
			ECS duct	N4	L	Y	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	75	0	30			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	44	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	35	5	31			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	55	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	50	-	-			
			LV switch room	S3	L	Y	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	90	10	17			
			LV switch room	S4	L	Y	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	81	10	18			
			LV switch room	S5	L	Y	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	81	10	23			
			Exhaust Air Duct	S6	L	Y	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	70	10	36			
			UPS Room Fresh Air Intake	W1	L	Y	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	90	10	28			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
NT1	Yau Tam Mei Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	30	-	-	36	44	0
			Tunnel ventilation shaft	N2	L	N (i)	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	30	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	43	0	23			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	45	-	-			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	45	5	34			
			Tunnel ventilation shaft	E2	L	N (i)	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	33	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	10	29			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	50	10	29			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	67	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	62	-	-			
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	62	-	-			
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	50	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	62	-	-			
NT1a	Yau Tam Mei Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	29	-	-	40	44	0.0
			Tunnel ventilation shaft	N2	L	N (i)	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	29	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	45	0	23			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	48	-	-			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	43	0	39			
			Tunnel ventilation shaft	E2	L	N (i)	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	32	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	49	10	29			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	49	10	29			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	70	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	63	-	-			
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	63	-	-			
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	50	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	65	-	-			
NT4	Yau Tam Mei Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	44	-	-	42	44	0
			Tunnel ventilation shaft	N2	L	N (i)	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	50	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	80	5	13			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	86	-	-			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	40	0	40			
			Tunnel ventilation shaft	E2	L	N (i)	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	40	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	5	34			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	43	5	35			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	92	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	85	-	-			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	85	-	-			
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	80	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	97	-	-			
NT4a	Yau Tam Mei Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	42	-	-	42	44	0
			Tunnel ventilation shaft	N2	L	N (i)	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	50	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	80	5	13			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	85	-	-			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	39	0	40			
			Tunnel ventilation shaft	E2	L	N (i)	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	39	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	5	34			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	43	5	35			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	92	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	85	-	-			
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	85	-	-			
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	80	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	96	-	-			
NT4b	Yau Tam Mei Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	36	-	-	36	44	0
			Tunnel ventilation shaft	N2	L	N (i)	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	43	-	-			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	70	0	19			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	75	-	-			
			Tunnel ventilation shaft	E1	L	Y	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	44	5	34			
			Tunnel ventilation shaft	E2	L	N (i)	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	35	-	-			
			Tunnel ventilation shaft	S1	L	Y	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	55	10	28			
			Tunnel ventilation shaft	S2	L	Y	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	50	10	29			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	90	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	81	-	-			
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	81	-	-			
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	70	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	90	-	-			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (iii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
NT1	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	30	0	37	40	44	0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	30	0	34			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	43	0	23			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	45	-	-			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	45	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	33	5	32			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	50	-	-			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	67	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	62	-	-			
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	62	-	-			
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	50	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	62	-	-			
NT1a	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	29	0	38	42	44	0.0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	29	0	35			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	45	0	23			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	48	-	-			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	43	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	32	0	37			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	49	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	49	-	-			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	70	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	63	-	-			
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	63	-	-			
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	50	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	65	-	-			
NT4	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	44	5	29	36	44	0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	50	5	25			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	80	5	13			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	86	-	-			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	40	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	40	0	35			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	43	-	-			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	92	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	85	-	-			
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	85	-	-			

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	80	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	97	-	-			
NT4a	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	42	5	30	37	44	0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	50	5	25			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	80	5	13			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	85	-	-			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	39	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	39	0	35			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	50	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	43	-	-			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	92	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	85	-	-			
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	85	-	-			
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	80	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	96	-	-			
NT4b	Yau Tam Mei Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	Y	3.88	9.00	3	2	185.9	51	46.6	4.4	49	72	36	0	36	38	44	0
			Tunnel ventilation shaft	N2	L	Y	12.50	2.20	3	2	193.1	49.6	46.6	3	46.6	69	43	0	31			
			CTER	N3	L	Y	0.80	1.60	3	0.5	9.1	54.2	53.2	1	51.2	61	70	0	19			
			ECS duct	N4	L	N (ii)	2.60	2.20	3	1	36.9	58.5	53.2	5.3	57	73	75	-	-			
			Tunnel ventilation shaft	E1	L	N (i)	5.08	9.00	3	2	206.3	54.1	45.9	8.2	53.4	77	44	-	-			
			Tunnel ventilation shaft	E2	L	Y	5.08	9.00	3	2	206.3	51.5	48.5	3	48.5	72	35	5	31			
			Tunnel ventilation shaft	S1	L	N (i)	12.51	2.20	3	2	193.2	55.5	44.6	10.9	55.5	78	55	-	-			
			Tunnel ventilation shaft	S2	L	N (i)	3.88	9.00	3	2	185.9	55.9	46.9	9	55.3	78	50	-	-			
			LV switch room	S3	L	N (ii)	3.30	2.20	3	1	41.3	54.6	39.4	15.2	54.6	71	90	-	-			
			LV switch room	S4	L	N (ii)	2.10	3.80	3	1	43.6	54.6	39.4	15.2	54.6	71	81	-	-			
			LV switch room	S5	L	N (ii)	1.20	3.80	3	1	36.6	60.2	39.4	20.8	60.2	76	81	-	-			
			Exhaust Air Duct	S6	L	N (ii)	2.40	0.73	2	5	n/a	66.2	44.9	21.3	66.2	88	70	-	-			
			UPS Room Fresh Air Intake	W1	L	N (ii)	3.00	2.00	2	6	n/a	59.3	51.8	7.5	58.4	82	90	-	-			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
SM1	Sau Shan House, Cheung Shan Estate	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	9.09	12.25	2	25	n/a	46.2	42.1	4.1	44.1	80	48	0	41	56	60	0
			FS inlet	N2	L	Y	1.00	0.70	3	1	19.5	52.6	54.5	-1.9	49.6	63	48	0	24			
			MCC room	N3	L	Y	2.80	1.00	3	1	30.0	62.6	48.4	14.2	62.6	77	30	0	42			
			Exhaust air louvre	N4	L	Y	1.00	4.60	3	1	39.0	48.4	49.1	-0.7	45.4	61	50	0	22			
			Staircase pressurization fan room	N5	L	Y	1.00	3.00	3	1	31.0	61.7	58.8	2.9	58.7	74	42	0	37			
			UPS room	E1	L	Y	2.80	2.00	3	1	36.8	72.9	48	24.9	72.9	89	29	0	55			
			LV switch room	E2	L	Y	2.70	1.20	3	1	30.8	66.3	51.2	15.1	66.3	81	38	0	44			
			Fresh air louvre	E3	L	Y	2.60	2.60	3	1	39.6	49.1	49.1	0	46.1	62	42	0	25			
			Staircase pressurization fan room 1	E4	L	Y	2.90	3.20	3	0.5	24.5	62.6	58.8	3.8	60.3	74	47	0	36			
			Staircase pressurization fan room 2	E5	L	Y	2.90	3.20	3	1	45.7	53.9	52.5	1.4	50.9	67	38	0	30			
			Tunnel ventilation shaft	S1	L	Y	9.09	11.40	2	23	n/a	55.7	51	4.7	53.9	89	62	-	-			
			Sprinkler & FS pump room	S2	L	Y	1.20	1.20	2	3	n/a	66.8	48.2	18.6	66.8	84	30	10	39			
			Air compressor receiver room	S3	L	Y	2.20	1.20	3	1	28.2	71	51.2	19.8	71	86	48	10	37			
			Tunnel ECS control room	S4	L	Y	3.40	1.20	3	1	34.5	70.8	51.8	19	70.8	86	48	10	37			
			Staircase pressurization fan room	S5	L	Y	1.00	2.20	3	1	27.0	55.9	52.5	3.4	53.2	68	48	10	19			
			Tunnel ventilation shaft	W1	L	Y	5.88	6.20	2	13	n/a	48.6	45.2	3.4	45.9	76	64	-	-			
			Tunnel ventilation shaft	W2	L	N (i)	5.88	6.20	2	13	n/a	47.6	43.2	4.4	45.6	76	57	10	26			
			SPS air release louvre	W3	L	Y	1.50	1.20	2	3	n/a	79.4	56.4	23	79.4	97	60	10	46			
			Track section cabin room	W4	L	Y	2.00	0.80	3	1	24.8	63.7	51.8	11.9	63.7	78	48	10	29			
SM4	Shui Hong Nursing	Ventilation Shaft for N/B (i) and Building	Tunnel ventilation shaft	N1	L	N (i)	9.09	12.25	2	25	n/a	46.2	42.1	4.1	44.1	80	39	0	43	59	60	0
			FS inlet	N2	L	Y	1.00	0.70	3	1	19.5	52.6	54.5	-1.9	49.6	63	39	0	26			
			MCC room	N3	L	Y	2.80	1.00	3	1	30.0	62.6	48.4	14.2	62.6	77	50	0	38			
			Exhaust air louvre	N4	L	Y	1.00	4.60	3	1	39.0	48.4	49.1	-0.7	45.4	61	42	0	24			
			Staircase pressurization fan room	N5	L	Y	1.00	3.00	3	1	31.0	61.7	58.8	2.9	58.7	74	48	0	35			
			UPS room	E1	L	Y	2.80	2.00	3	1	36.8	72.9	48	24.9	72.9	89	63	10	38			
			LV switch room	E2	L	Y	2.70	1.20	3	1	30.8	66.3	51.2	15.1	66.3	81	70	10	29			
			Fresh air louvre	E3	L	Y	2.60	2.60	3	1	39.6	49.1	49.1	0	46.1	62	48	10	13			
			Staircase pressurization fan room 1	E4	L	Y	2.90	3.20	3	0.5	24.5	62.6	58.8	3.8	60.3	74	52	10	25			
			Staircase pressurization fan room 2	E5	L	Y	2.90	3.20	3	1	45.7	53.9	52.5	1.4	50.9	67	46	10	19			
			Tunnel ventilation shaft	S1	L	Y	9.09	11.40	2	23	n/a	55.7	51	4.7	53.9	89	55	-	-			

NSR	Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method [(ii)]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [(iii)]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [(iv)]	Calculated SWL L_{Aeq} [dB(A)] [(v)]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
						Width	Height														
Home	**Service**	Sprinkler & FS pump room	S2	L	Y	1.20	1.20	2	3	n/a	66.8	48.2	18.6	66.8	84	62	10	33			
		Air compressor receiver room	S3	L	Y	2.20	1.20	3	1	28.2	71	51.2	19.8	71	86	60	10	35			
		Tunnel ECS control room	S4	L	Y	3.40	1.20	3	1	34.5	70.8	51.8	19	70.8	86	60	10	35			
		Staircase pressurization fan room	S5	L	Y	1.00	2.20	3	1	27.0	55.9	52.5	3.4	53.2	68	60	10	17			
		Tunnel ventilation shaft	W1	L	Y	5.88	6.20	2	13	n/a	48.6	45.2	3.4	45.9	76	48	-	-			
		Tunnel ventilation shaft	W2	L	N [(i)]	5.88	6.20	2	13	n/a	47.6	43.2	4.4	45.6	76	39	0	39			
		SPS air release louvre	W3	L	Y	1.50	1.20	2	3	n/a	79.4	56.4	23	79.4	97	45	0	59			
		Track section cabin room	W4	L	Y	2.00	0.80	3	1	24.8	63.7	51.8	11.9	63.7	78	48	10	29			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
SM1	Sau Shan House, Cheung Shan Estate	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	9.09	12.25	2	25	n/a	46.2	42.1	4.1	44.1	80	48	-	-	56	60	0
			FS inlet	N2	L	Y	1.00	0.70	3	1	19.5	52.6	54.5	-1.9	49.6	63	48	0	24			
			MCC room	N3	L	Y	2.80	1.00	3	1	30.0	62.6	48.4	14.2	62.6	77	30	0	42			
			Exhaust air louvre	N4	L	Y	1.00	4.60	3	1	39.0	48.4	49.1	-0.7	45.4	61	50	0	22			
			Staircase pressurization fan room	N5	L	Y	1.00	3.00	3	1	31.0	61.7	58.8	2.9	58.7	74	42	0	37			
			UPS room	E1	L	Y	2.80	2.00	3	1	36.8	72.9	48	24.9	72.9	89	29	0	55			
			LV switch room	E2	L	Y	2.70	1.20	3	1	30.8	66.3	51.2	15.1	66.3	81	38	0	44			
			Fresh air louvre	E3	L	Y	2.60	2.60	3	1	39.6	49.1	49.1	0	46.1	62	42	0	25			
			Staircase pressurization fan room 1	E4	L	Y	2.90	3.20	3	0.5	24.5	62.6	58.8	3.8	60.3	74	47	0	36			
			Staircase pressurization fan room 2	E5	L	Y	2.90	3.20	3	1	45.7	53.9	52.5	1.4	50.9	67	38	0	30			
			Tunnel ventilation shaft	S1	L	Y	9.09	11.40	2	23	n/a	55.7	51	4.7	53.9	89	62	10	38			
			Sprinkler & FS pump room	S2	L	Y	1.20	1.20	2	3	n/a	66.8	48.2	18.6	66.8	84	30	10	39			
			Air compressor receiver room	S3	L	Y	2.20	1.20	3	1	28.2	71	51.2	19.8	71	86	48	10	37			
			Tunnel ECS control room	S4	L	Y	3.40	1.20	3	1	34.5	70.8	51.8	19	70.8	86	48	10	37			
			Staircase pressurization fan room	S5	L	Y	1.00	2.20	3	1	27.0	55.9	52.5	3.4	53.2	68	48	10	19			
			Tunnel ventilation shaft	W1	L	Y	5.88	6.20	2	13	n/a	48.6	45.2	3.4	45.9	76	64	10	25			
			Tunnel ventilation shaft	W2	L	N (i)	5.88	6.20	2	13	n/a	47.6	43.2	4.4	45.6	76	57	-	-			
			SPS air release louvre	W3	L	Y	1.50	1.20	2	3	n/a	79.4	56.4	23	79.4	97	60	10	46			
			Track section cabin room	W4	L	Y	2.00	0.80	3	1	24.8	63.7	51.8	11.9	63.7	78	48	10	29			
SM4	Shui Hong Nursing Home	Ventilation Shaft for S/B (i) and Building	Tunnel ventilation shaft	N1	L	N (i)	9.09	12.25	2	25	n/a	46.2	42.1	4.1	44.1	80	39	-	-	59	60	0
			FS inlet	N2	L	Y	1.00	0.70	3	1	19.5	52.6	54.5	-1.9	49.6	63	39	0	26			
			MCC room	N3	L	Y	2.80	1.00	3	1	30.0	62.6	48.4	14.2	62.6	77	50	0	38			
			Exhaust air louvre	N4	L	Y	1.00	4.60	3	1	39.0	48.4	49.1	-0.7	45.4	61	42	0	24			
			Staircase pressurization fan room	N5	L	Y	1.00	3.00	3	1	31.0	61.7	58.8	2.9	58.7	74	48	0	35			
			UPS room	E1	L	Y	2.80	2.00	3	1	36.8	72.9	48	24.9	72.9	89	63	10	38			
			LV switch room	E2	L	Y	2.70	1.20	3	1	30.8	66.3	51.2	15.1	66.3	81	70	10	29			
			Fresh air louvre	E3	L	Y	2.60	2.60	3	1	39.6	49.1	49.1	0	46.1	62	48	10	13			
			Staircase pressurization fan room 1	E4	L	Y	2.90	3.20	3	0.5	24.5	62.6	58.8	3.8	60.3	74	52	10	25			
			Staircase pressurization fan room 2	E5	L	Y	2.90	3.20	3	1	45.7	53.9	52.5	1.4	50.9	67	46	10	19			
			Tunnel ventilation shaft	S1	L	Y	9.09	11.40	2	23	n/a	55.7	51	4.7	53.9	89	55	10	39			

NSR	Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
						Width	Height														
Home	**Service**	Sprinkler & FS pump room	S2	L	Y	1.20	1.20	2	3	n/a	66.8	48.2	18.6	66.8	84	62	10	33			
		Air compressor receiver room	S3	L	Y	2.20	1.20	3	1	28.2	71	51.2	19.8	71	86	60	10	35			
		Tunnel ECS control room	S4	L	Y	3.40	1.20	3	1	34.5	70.8	51.8	19	70.8	86	60	10	35			
		Staircase pressurization fan room	S5	L	Y	1.00	2.20	3	1	27.0	55.9	52.5	3.4	53.2	68	60	10	17			
		Tunnel ventilation shaft	W1	L	Y	5.88	6.20	2	13	n/a	48.6	45.2	3.4	45.9	76	48	0	37			
		Tunnel ventilation shaft	W2	L	N (i)	5.88	6.20	2	13	n/a	47.6	43.2	4.4	45.6	76	39	-	-			
		SPS air release louvre	W3	L	Y	1.50	1.20	2	3	n/a	79.4	56.4	23	79.4	97	45	0	59			
		Track section cabin room	W4	L	Y	2.00	0.80	3	1	24.8	63.7	51.8	11.9	63.7	78	48	10	29			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
SM1	Sau Shan House, Cheung Shan Estate	Ventilation Shaft for N/B (i) and Building Service	Tunnel ventilation shaft	N1	L	N (i)	9.09	12.25	2	25	n/a	46.2	42.1	4.1	44.1	80	48	0	41	49	50	0.0
			FS inlet	N2	L	Y	1.00	0.70	3	1	19.5	52.6	54.5	-1.9	49.6	63	48	0	24			
			MCC room	N3	L	Y	2.80	1.00	3	1	30.0	62.6	48.4	14.2	62.6	77	30	0	42			
			Exhaust air louvre	N4	L	Y	1.00	4.60	3	1	39.0	48.4	49.1	-0.7	45.4	61	50	0	22			
			Staircase pressurization fan room	N5	L	N (ii)	1.00	3.00	3	1	31.0	61.7	58.8	2.9	58.7	74	42	-	-			
			UPS room	E1	L	N (ii)	2.80	2.00	3	1	36.8	72.9	48	24.9	72.9	89	29	-	0			
			LV switch room	E2	L	Y	2.70	1.20	3	1	30.8	66.3	51.2	15.1	66.3	81	38	0	44			
			Fresh air louvre	E3	L	Y	2.60	2.60	3	1	39.6	49.1	49.1	0	46.1	62	42	0	25			
			Staircase pressurization fan room 1	E4	L	N (ii)	2.90	3.20	3	0.5	24.5	62.6	58.8	3.8	60.3	74	47	-	-			
			Staircase pressurization fan room 2	E5	L	N (ii)	2.90	3.20	3	1	45.7	53.9	52.5	1.4	50.9	67	38	-	-			
			Tunnel ventilation shaft	S1	L	Y	9.09	11.40	2	23	n/a	55.7	51	4.7	53.9	89	62	-	-			
			Sprinkler & FS pump room	S2	L	Y	1.20	1.20	2	3	n/a	66.8	48.2	18.6	66.8	84	30	10	39			
			Air compressor receiver room	S3	L	Y	2.20	1.20	3	1	28.2	71	51.2	19.8	71	86	48	10	37			
			Tunnel ECS control room	S4	L	Y	3.40	1.20	3	1	34.5	70.8	51.8	19	70.8	86	48	10	37			
			Staircase pressurization fan room	S5	L	N (ii)	1.00	2.20	3	1	27.0	55.9	52.5	3.4	53.2	68	48	-	-			
			Tunnel ventilation shaft	W1	L	Y	5.88	6.20	2	13	n/a	48.6	45.2	3.4	45.9	76	64	-	-			
			Tunnel ventilation shaft	W2	L	N (i)	5.88	6.20	2	13	n/a	47.6	43.2	4.4	45.6	76	57	10	26			
			SPS air release louvre	W3	L	N (ii)	1.50	1.20	2	3	n/a	79.4	56.4	23	79.4	97	60	-	-			
			Track section cabin room	W4	L	Y	2.00	0.80	3	1	24.8	63.7	51.8	11.9	63.7	78	48	10	29			
SM4	Shui Hong Nursing	Ventilation Shaft for N/B (i) and Building	Tunnel ventilation shaft	N1	L	N (i)	9.09	12.25	2	25	n/a	46.2	42.1	4.1	44.1	80	39	0	43	47	50	0.0
			FS inlet	N2	L	Y	1.00	0.70	3	1	19.5	52.6	54.5	-1.9	49.6	63	39	0	26			
			MCC room	N3	L	Y	2.80	1.00	3	1	30.0	62.6	48.4	14.2	62.6	77	50	0	38			
			Exhaust air louvre	N4	L	Y	1.00	4.60	3	1	39.0	48.4	49.1	-0.7	45.4	61	42	0	24			
			Staircase pressurization fan room	N5	L	N (ii)	1.00	3.00	3	1	31.0	61.7	58.8	2.9	58.7	74	48	-	-			
			UPS room	E1	L	N (ii)	2.80	2.00	3	1	36.8	72.9	48	24.9	72.9	89	63	-	-			
			LV switch room	E2	L	Y	2.70	1.20	3	1	30.8	66.3	51.2	15.1	66.3	81	70	10	29			
			Fresh air louvre	E3	L	Y	2.60	2.60	3	1	39.6	49.1	49.1	0	46.1	62	48	10	13			
			Staircase pressurization fan room 1	E4	L	N (ii)	2.90	3.20	3	0.5	24.5	62.6	58.8	3.8	60.3	74	52	-	-			
			Staircase pressurization fan room 2	E5	L	N (ii)	2.90	3.20	3	1	45.7	53.9	52.5	1.4	50.9	67	46	-	-			
			Tunnel ventilation shaft	S1	L	Y	9.09	11.40	2	23	n/a	55.7	51	4.7	53.9	89	55	-	-			

NSR	Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method [(iii)]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [(iv)]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [(v)]	Calculated SWL L_{Aeq} [dB(A)] [(vi)]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
						Width	Height														
Home	**Service**	Sprinkler & FS pump room	S2	L	Y	1.20	1.20	2	3	n/a	66.8	48.2	18.6	66.8	84	62	10	33			
		Air compressor receiver room	S3	L	Y	2.20	1.20	3	1	28.2	71	51.2	19.8	71	86	60	10	35			
		Tunnel ECS control room	S4	L	Y	3.40	1.20	3	1	34.5	70.8	51.8	19	70.8	86	60	10	35			
		Staircase pressurization fan room	S5	L	N [(ii)]	1.00	2.20	3	1	27.0	55.9	52.5	3.4	53.2	68	60	-	-			
		Tunnel ventilation shaft	W1	L	Y	5.88	6.20	2	13	n/a	48.6	45.2	3.4	45.9	76	64	-	-			
		Tunnel ventilation shaft	W2	L	N [(i)]	5.88	6.20	2	13	n/a	47.6	43.2	4.4	45.6	76	39	0	39			
		SPS air release louvre	W3	L	N [(ii)]	1.50	1.20	2	3	n/a	79.4	56.4	23	79.4	97	45	-	-			
		Track section cabin room	W4	L	Y	2.00	0.80	3	1	24.8	63.7	51.8	11.9	63.7	78	60	0	37			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iv)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
			Tunnel ventilation shaft	N1	L	N (i)	9.09	12.25	2	25	n/a	46.2	42.1	4.1	44.1	80	48	-	-			
			FS inlet	N2	L	Y	1.00	0.70	3	1	19.5	52.6	54.5	-1.9	49.6	63	48	0	24			
			MCC room	N3	L	Y	2.80	1.00	3	1	30.0	62.6	48.4	14.2	62.6	77	30	0	42			
			Exhaust air louvre	N4	L	Y	1.00	4.60	3	1	39.0	48.4	49.1	-0.7	45.4	61	50	0	22			
			Staircase pressurization fan room	N5	L	N (ii)	1.00	3.00	3	1	31.0	61.7	58.8	2.9	58.7	74	42	-	-			
			UPS room	E1	L	N (ii)	2.80	2.00	3	1	36.8	72.9	48	24.9	72.9	89	29	-	-			
			LV switch room	E2	L	Y	2.70	1.20	3	1	30.8	66.3	51.2	15.1	66.3	81	38	0	44			
			Fresh air louvre	E3	L	Y	2.60	2.60	3	1	39.6	49.1	49.1	0	46.1	62	42	0	25			
			Staircase pressurization fan room 1	E4	L	N (ii)	2.90	3.20	3	0.5	24.5	62.6	58.8	3.8	60.3	74	47	-	-			
			Staircase pressurization fan room 2	E5	L	N (ii)	2.90	3.20	3	1	45.7	53.9	52.5	1.4	50.9	67	38	-	-			
SM1	Sau Shan House, Cheung Shan Estate	Ventilation Shaft for S/B (i) and Building Service	Tunnel ventilation shaft	S1	L	Y	9.09	11.40	2	23	n/a	55.7	51	4.7	53.9	89	62	10	38	49	50	0.0
			Sprinkler & FS pump room	S2	L	Y	1.20	1.20	2	3	n/a	66.8	48.2	18.6	66.8	84	30	10	39			
			Air compressor receiver room	S3	L	Y	2.20	1.20	3	1	28.2	71	51.2	19.8	71	86	48	10	37			
			Tunnel ECS control room	S4	L	Y	3.40	1.20	3	1	34.5	70.8	51.8	19	70.8	86	48	10	37			
			Staircase pressurization fan room	S5	L	N (ii)	1.00	2.20	3	1	27.0	55.9	52.5	3.4	53.2	68	48	-	-			
			Tunnel ventilation shaft	W1	L	Y	5.88	6.20	2	13	n/a	48.6	45.2	3.4	45.9	76	64	10	25			
			Tunnel ventilation shaft	W2	L	N (i)	5.88	6.20	2	13	n/a	47.6	43.2	4.4	45.6	76	57	-	-			
			SPS air release louvre	W3	L	N (ii)	1.50	1.20	2	3	n/a	79.4	56.4	23	79.4	97	60	-	-			
			Track section cabin room	W4	L	Y	2.00	0.80	3	1	24.8	63.7	51.8	11.9	63.7	78	48	0	39			
			Tunnel ventilation shaft	N1	L	N (i)	9.09	12.25	2	25	n/a	46.2	42.1	4.1	44.1	80	39	-	-			
			FS inlet	N2	L	Y	1.00	0.70	3	1	19.5	52.6	54.5	-1.9	49.6	63	39	0	26			
			MCC room	N3	L	Y	2.80	1.00	3	1	30.0	62.6	48.4	14.2	62.6	77	50	0	38			
			Exhaust air louvre	N4	L	Y	1.00	4.60	3	1	39.0	48.4	49.1	-0.7	45.4	61	42	0	24			
			Staircase pressurization fan room	N5	L	N (ii)	1.00	3.00	3	1	31.0	61.7	58.8	2.9	58.7	74	48	-	-			
			UPS room	E1	L	N (ii)	2.80	2.00	3	1	36.8	72.9	48	24.9	72.9	89	63	-	-			
			LV switch room	E2	L	Y	2.70	1.20	3	1	30.8	66.3	51.2	15.1	66.3	81	70	10	29			
			Fresh air louvre	E3	L	Y	2.60	2.60	3	1	39.6	49.1	49.1	0	46.1	62	48	10	13			
			Staircase pressurization fan room 1	E4	L	N (ii)	2.90	3.20	3	0.5	24.5	62.6	58.8	3.8	60.3	74	52	-	-			
			Staircase pressurization fan room 2	E5	L	N (ii)	2.90	3.20	3	1	45.7	53.9	52.5	1.4	50.9	67	46	-	-			
SM4	Shui Hong Nursing Home	Ventilation Shaft for S/B (i) and Building	Tunnel ventilation shaft	S1	L	Y	9.09	11.40	2	23	n/a	55.7	51	4.7	53.9	89	55	10	39	45	50	0.0

NSR	Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method [iii]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [iv]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [v]	Calculated SWL L_{Aeq} [dB(A)] [vi]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
						Width	Height														
Home	Service	Sprinkler & FS pump room	S2	L	Y	1.20	1.20	2	3	n/a	66.8	48.2	18.6	66.8	84	62	10	33			
		Air compressor receiver room	S3	L	Y	2.20	1.20	3	1	28.2	71	51.2	19.8	71	86	60	10	35			
		Tunnel ECS control room	S4	L	Y	3.40	1.20	3	1	34.5	70.8	51.8	19	70.8	86	60	10	35			
		Staircase pressurization fan room	S5	L	N [ii]	1.00	2.20	3	1	27.0	55.9	52.5	3.4	53.2	68	60	-	-			
		Tunnel ventilation shaft	W1	L	Y	5.88	6.20	2	13	n/a	48.6	45.2	3.4	45.9	76	64	0	35			
		Tunnel ventilation shaft	W2	L	N [i]	5.88	6.20	2	13	n/a	47.6	43.2	4.4	45.6	76	39	-	-			
		SPS air release louvre	W3	L	N [ii]	1.50	1.20	2	3	n/a	79.4	56.4	23	79.4	97	45	-	-			
		Track section cabin room	W4	L	Y	2.00	0.80	3	1	24.8	63.7	51.8	11.9	63.7	78	60	0	37			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) The plant would be operated during day and evening time only under normal scenario.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in**Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method [(ii)]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [(iii)]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [(iv)]	Calculated SWL L_{Aeq} [dB(A)] [(v)]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)] [(vi)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS6	No. 32 Leung Uk Tsuen	Ventilation Shaft for N/B [(i)] and Building Service	Tunnel Ventilation Shaft	N1	L	N [(i)]	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	176	-	-	39	52	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	189	10	23			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	180	10	6			
			Tunnel Ventilation Shaft	E1	L	N [(i)]	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	170	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	176	0	14			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	176	0	18			
			Tunnel Ventilation Shaft	S1	L	N [(i)]	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	169	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	181	0	39			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	190	10	26			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	190	10	11			
SS7	Leung Uk Tsuen Village House	Ventilation Shaft for N/B [(i)] and Building Service	Tunnel Ventilation Shaft	N1	L	N [(i)]	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	120	-	-	39	49	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	127	0	37			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	115	0	20			
			Tunnel Ventilation Shaft	E1	L	N [(i)]	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	121	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	116	0	18			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	116	0	22			
			Tunnel Ventilation Shaft	S1	L	N [(i)]	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	127	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	133	10	32			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	132	10	30			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	127	10	15			
SS10	DD110 LOT 482, Wang Toi Shan	Ventilation Shaft for N/B [(i)] and Building Service	Tunnel Ventilation Shaft	N1	L	N [(i)]	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	205	-	-	36	49	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	203	0	33			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	200	0	15			
			Tunnel Ventilation Shaft	E1	L	N [(i)]	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	208	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	198	5	8			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	203	5	12			
			Tunnel Ventilation Shaft	S1	L	N [(i)]	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	213	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	212	10	27			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	204	5	31			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	194	5	16			

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method [ii]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [iii]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [iv]	Calculated SWL L_{Aeq} [dB(A)] [v]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] [vi]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
SS12	255 Kam Tai Road	Ventilation Shaft for N/B [i] and Building Service	Tunnel Ventilation Shaft	N1	L	N[i]	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	258	-	-	36	49	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	253	0	31			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	255	0	13			
			Tunnel Ventilation Shaft	E1	L	N[i]	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	263	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	258	10	1			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	255	10	5			
			Tunnel Ventilation Shaft	S1	L	N[i]	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	255	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	259	10	26			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	252	0	34			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	247	0	19			
SS15[vi]	Abandoned village house in Shek Kong	Ventilation Shaft for N/B [i] and Building Service	Tunnel Ventilation Shaft	N1	L	N[i]	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	172	-	-	39	49	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	177	10	24			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	177	10	6			
			Tunnel Ventilation Shaft	E1	L	N[i]	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	165	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	170	5	9			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	167	5	14			
			Tunnel Ventilation Shaft	S1	L	N[i]	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	164	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	169	0	39			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	174	10	27			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	176	10	12			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vi) A negative correction of 10dB(A) and 5dB(A) has been adopted to the direction facing of the ventilation shaft totally and partially screened by the proposed noise barriers at SSS respectively.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vi)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS6	No. 32 Leung Uk Tsuen	Ventilation Shaft for S/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	176	10	24	41	52	0
			Tunnel Ventilation Shaft	N2	L	N(i)	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	189	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	180	10	6			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	170	0	35			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	176	0	14			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	176	0	18			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	169	0	40			
			Tunnel Ventilation Shaft	S2	L	N(i)	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	181	-	-			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	190	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	190	10	11			
SS7	Leung Uk Tsuen Village House	Ventilation Shaft for S/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	120	0	37	41	49	0
			Tunnel Ventilation Shaft	N2	L	N(i)	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	127	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	115	0	20			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	121	0	38			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	116	0	18			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	116	0	22			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	127	10	33			
			Tunnel Ventilation Shaft	S2	L	N(i)	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	133	-	-			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	132	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	127	10	15			
SS10	DD110 LOT 482, Wang Toi Shan	Ventilation Shaft for S/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	205	0	33	35	49	0
			Tunnel Ventilation Shaft	N2	L	N(i)	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	203	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	200	0	15			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	208	5	29			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	198	5	8			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	203	5	12			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	213	10	28			
			Tunnel Ventilation Shaft	S2	L	N(i)	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	212	-	-			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	204	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	194	5	16			

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vi)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
SS12	255 Kam Tai Road	Ventilation Shaft for S/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	258	0	31	33	49	0
			Tunnel Ventilation Shaft	N2	L	N(i)	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	253	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	255	0	13			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	263	10	22			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	258	10	1			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	255	10	5			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	255	10	27			
			Tunnel Ventilation Shaft	S2	L	N(i)	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	259	-	-			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	252	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	247	0	19			
SS15(vi)	Abandoned village house in Shek Kong	Ventilation Shaft for S/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	172	10	24	42	49	0
			Tunnel Ventilation Shaft	N2	L	N(i)	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	177	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	177	10	6			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	165	5	31			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	170	5	9			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	167	5	14			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	164	0	41			
			Tunnel Ventilation Shaft	S2	L	N(i)	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	169	-	-			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	174	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	176	10	12			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vi) A negative correction of 10dB(A) and 5dB(A) has been adopted to the direction facing of the ventilation shaft totally and partially screened by the proposed noise barriers at SSS respectively.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (iii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vii)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS6	No. 32 Leung Uk Tsuen	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	176	-	-	39	45	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	189	10	23			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	180	10	6			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	170	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	176	0	14			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	176	0	18			
			Tunnel Ventilaion Shaft	S1	L	N(i)	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	169	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	181	0	39			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	190	10	26			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	190	10	11			
SS7	Leung Uk Tsuen Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	120	-	-	39	47	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	127	0	37			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	115	0	20			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	121	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	116	0	18			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	116	0	22			
			Tunnel Ventilation Shaft	S1	L	N(i)	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	127	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	133	10	32			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	132	10	30			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	127	10	15			
SS10	DD110 LOT 482, Wang Toi Shan	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	205	-	-	36	47	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	203	0	33			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	200	0	15			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	208	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	198	5	8			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	203	5	12			
			Tunnel Ventilation Shaft	S1	L	N(i)	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	213	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	212	10	27			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	204	5	31			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	194	5	16			

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)] (vii)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS12	255 Kam Tai Road	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	258	-	-	36	47	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	253	0	31			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	255	0	13			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	263	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	258	10	1			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	255	10	5			
			Tunnel Ventilation Shaft	S1	L	N(i)	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	255	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	259	10	26			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	252	0	34			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	247	0	19			
SS15(vii)	Abandoned village house in Shek Kong	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	172	-	-	39	47	0
			Tunnel Ventilation Shaft	N2	L	Y	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	177	10	24			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	177	10	6			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	165	-	-			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	170	5	9			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	167	5	14			
			Tunnel Ventilation Shaft	S1	L	N(i)	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	164	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	169	0	39			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	174	10	27			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	176	10	12			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Not used.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vii) A negative correction of 10dB(A) and 5dB(A) has been adopted to the direction facing of the ventilation shaft totally and partially screened by the proposed noise barriers at SSS respectively.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method [(iii)]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [(iii)]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [(v)]	Calculated SWL L_{Aeq} [dB(A)] [(vi)]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] [(vii)]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
			Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	176	10	24			
			Tunnel Ventilation Shaft	N2	L	N[(i)]	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	189	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	180	10	6			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	170	0	35			
SS6	No. 32 Leung Uk Tsuen	Ventilation Shaft for S/B [(i)] and Building Service	T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	176	0	14	41	45	0
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	176	0	18			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	169	0	40			
			Tunnel Ventilation Shaft	S2	L	N[(i)]	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	181	-	-			
			Tunnel Ventilation Shaft	W1	L	N[(i)]	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	190	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	190	10	11			
			Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	120	0	37			
			Tunnel Ventilation Shaft	N2	L	N[(i)]	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	127	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	115	0	20			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	121	0	38			
SS7	Leung Uk Tsuen Village House	Ventilation Shaft for S/B [(i)] and Building Service	T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	116	0	18	41	47	0
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	116	0	22			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	127	10	33			
			Tunnel Ventilation Shaft	S2	L	N[(i)]	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	133	-	-			
			Tunnel Ventilation Shaft	W1	L	N[(i)]	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	132	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	127	10	15			
			Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	205	0	33			
			Tunnel Ventilation Shaft	N2	L	N[(i)]	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	203	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	200	0	15			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	208	5	29			
SS10	DD110 LOT 482, Wang Toi Shan	Ventilation Shaft for S/B [(i)] and Building Service	T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	198	5	8	35	47	0
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	203	5	12			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	213	10	28			
			Tunnel Ventilation Shaft	S2	L	N[(i)]	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	212	-	-			
			Tunnel Ventilation Shaft	W1	L	N[(i)]	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	204	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	194	5	16			

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)] (vii)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS12	255 Kam Tai Road	Ventilation Shaft for S/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	258	0	31	33	47	0
			Tunnel Ventilation Shaft	N2	L	N(i)	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	253	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	255	0	13			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	263	10	22			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	258	10	1			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	255	10	5			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	255	10	27			
			Tunnel Ventilation Shaft	S2	L	N(i)	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	259	-	-			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	252	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	247	0	19			
SS15(vii)	Abandoned village house in Shek Kong	Ventilation Shaft for S/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	Y	5.88	2.85	2	12	N/A	54.8	45.1	9.7	54.3	84	172	10	24	42	47	0
			Tunnel Ventilation Shaft	N2	L	N(i)	5.86	2.85	2	12	N/A	55.3	48.5	6.8	54.3	84	177	-	-			
			Dog House	N3	L	Y	4.80	1.20	3	0.5	20.8	56	53	3	53	66	177	10	6			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	56	48.6	7.4	55.1	85	165	5	31			
			T.ECS Control Room	E2	L	Y	0.80	2.50	3	0.5	11.6	56.1	54.7	1.4	53.1	64	170	5	9			
			Dog House	E3	L	Y	2.80	1.20	3	1	31.4	56.0	55.6	0.4	53	68	167	5	14			
			Tunnel Ventilation Shaft	S1	L	Y	9.35	6.50	2	19	N/A	56.3	43.8	12.5	56.3	90	164	0	41			
			Tunnel Ventilation Shaft	S2	L	N(i)	9.35	6.50	2	19	N/A	55.8	42.8	13	55.8	89	169	-	-			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	3	3	283.7	62.9	45	17.9	62.9	87	174	-	-			
			ABBCS Room	W2	L	Y	1.00	4.00	3	0.5	17.0	59.7	50	9.7	59.2	72	176	10	12			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Not used.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in**Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vii) A negative correction of 10dB(A) and 5dB(A) has been adopted to the direction facing of the ventilation shaft totally and partially screened by the proposed noise barriers at SSS respectively.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vi)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
SS2	No. 32 Leung Uk Tsuen	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	448	-	-	32	49	0
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	443	10	22			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	443	10	3			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	443	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	443	10	22			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	430	10	21			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	430	10	10			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	425	10	8			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	439	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	435	0	26			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	425	0	24			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	437	0	26			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	435	0	18			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	435	0	22			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	437	0	16			
SS4(vi)	Leung Uk Tsuen Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	314	-	-	35	49	0
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	315	10	25			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	300	10	6			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	307	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	297	5	31			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	297	5	30			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	295	5	19			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	300	5	16			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	305	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	308	5	24			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	295	5	23			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	312	10	19			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	312	10	11			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	312	10	15			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	312	10	9			
			Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	227	-	-			
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	236	0	38			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	240	0	18			

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vi)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS5	51A Leung Uk Tsuen	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	228	-	-	43	52	0
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	235	0	38			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	233	0	37			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	230	0	26			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	233	0	24			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	235	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	244	10	21			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	230	10	20			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	243	10	21			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	248	10	13			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	248	10	17			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	230	10	12			
SS11a(vi)	Leung Uk Tsuen Squats	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	176	-	-	42	52	0
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	160	0	41			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	160	0	22			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	186	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	186	10	30			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	186	10	29			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	180	10	18			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	180	10	16			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	180	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	163	10	25			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	180	10	22			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	159	5	30			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	165	5	22			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	165	5	26			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	180	5	19			
	Planned village	Ventilation Shaft for	Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	272	-	-			
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	276	0	36			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	290	0	17			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	274	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	300	0	35			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	300	0	34			

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (ii)	Measurement Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vi)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
SS14	house at Village Zone	N/B (i) and Building Service	Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	281	0	24	40	49	0
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	286	0	22			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	281	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	285	10	20			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	286	10	18			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	285	10	20			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	290	10	12			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	292	10	16			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	286	10	10			
SS20(vi)	Village house at Shek Kong	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	271	-	-	36	49	0
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	274	10	26			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	280	10	7			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	264	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	250	5	32			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	250	5	31			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	258	5	20			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	258	5	18			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	263	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	286	5	25			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	258	5	24			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	270	10	20			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	283	10	12			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	283	10	16			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	258	10	11			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vi) A negative correction of 10dB(A) and 5dB(A) has been adopted to the direction facing of the ventilation shaft totally and partially screened by the proposed noise barriers at SSS respectively.

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method [ii]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [iii]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [iv]	Calculated SWL L_{Aeq} [dB(A)] [v]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] [vi]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
SS2	No. 32 Leung Uk Tsuen	Ventilation Shaft for S/B [i] and Building Service	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	448	10	20	31	49	0
			Tunnel Ventilation Shaft	N2	L	N[i]	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	443	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	443	10	3			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	443	10	16			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	443	10	22			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	430	10	21			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	430	10	10			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	425	10	8			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	439	0	24			
			Tunnel Ventilation Shaft	S2	L	N[i]	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	435	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	425	0	24			
			Tunnel Ventilation Shaft	W1	L	N[i]	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	437	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	435	0	18			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	435	0	22			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	437	0	16			
SS4[vi]	Leung Uk Tsuen Village House	Ventilation Shaft for S/B [i] and Building Service	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	314	10	23	35	49	0
			Tunnel Ventilation Shaft	N2	L	N[i]	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	315	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	300	10	6			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	307	5	24			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	297	5	31			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	297	5	30			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	295	5	19			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	300	5	16			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	305	5	22			
			Tunnel Ventilation Shaft	S2	L	N[i]	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	308	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	295	5	23			
			Tunnel Ventilation Shaft	W1	L	N[i]	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	312	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	312	10	11			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	312	10	15			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	312	10	9			
			Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	227	0	36			
			Tunnel Ventilation Shaft	N2	L	N[i]	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	236	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	240	0	18			

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Height	Method (ii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (iv)	Calculated SWL L_{Aeq} [dB(A)] (v)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vi)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
SS5	51A Leung Uk Tsuen	Ventilation Shaft for S/B (i) and Building Service	Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	228	0	32	43	52	0
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	235	0	38			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	233	0	37			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	230	0	26			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	233	0	24			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	235	10	20			
			Tunnel Ventilation Shaft	S2	L	N(i)	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	244	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	230	10	20			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	243	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	248	10	13			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	248	10	17			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	230	10	12			
SS11a(vi)	Leung Uk Tsuen Squats	Ventilation Shaft for S/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	176	0	38	40	52	0
			Tunnel Ventilation Shaft	N2	L	N(i)	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	160	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	160	0	22			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	186	10	24			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	186	10	30			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	186	10	29			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	180	10	18			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	180	10	16			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	180	10	22			
			Tunnel Ventilation Shaft	S2	L	N(i)	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	163	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	180	10	22			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	159	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	165	5	22			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	165	5	26			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	180	5	19			
	Planned village	Ventilation Shaft for	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	272	0	34			
			Tunnel Ventilation Shaft	N2	L	N(i)	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	276	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	290	0	17			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	274	0	30			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	300	0	35			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	300	0	34			

Day and Evening Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method [ii]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [iii]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [iv]	Calculated SWL L_{Aeq} [dB(A)] [v]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)] [vi]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Day and Evening Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS14	**house at Village Zone**	**S/B [i] and Building Service**	Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	281	0	24	40	49	0
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	286	0	22			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	281	10	18			
			Tunnel Ventilation Shaft	S2	L	N[i]	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	285	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	286	10	18			
			Tunnel Ventilation Shaft	W1	L	N[i]	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	285	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	290	10	12			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	292	10	16			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	286	10	10			
SS20[vi]	**Village house at Shek Kong**	**Ventilation Shaft for S/B [i] and Building Service**	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	271	10	24	36	49	0
			Tunnel Ventilation Shaft	N2	L	N[i]	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	274	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	280	10	7			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	264	5	26			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	250	5	32			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	250	5	31			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	258	5	20			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	258	5	18			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	263	5	24			
			Tunnel Ventilation Shaft	S2	L	N[i]	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	286	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	258	5	24			
			Tunnel Ventilation Shaft	W1	L	N[i]	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	270	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	283	10	12			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	283	10	16			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	258	10	11			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iii) Results are averaged from the measured noise levels.

(iv) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(v) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vi) A negative correction of 10dB(A) and 5dB(A) has been adopted to the direction facing of the ventilation shaft totally and partially screened by the proposed noise barriers at SSS respectively.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)] (vii)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
SS2	No. 32 Leung Uk Tsuen	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	448	-	-	32	39	0
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	443	10	22			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	443	10	3			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	443	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	443	10	22			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	430	10	21			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	430	10	10			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	425	10	8			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	439	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	435	0	26			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	425	0	24			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	437	0	26			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	435	0	18			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	435	0	22			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	437	0	16			
SS4 (vii)	Leung Uk Tsuen Village House	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	314	-	-	35	40	0
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	315	10	25			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	300	10	6			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	307	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	297	5	31			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	297	5	30			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	295	5	19			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	300	5	16			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	305	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	308	5	24			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	295	5	23			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	312	10	19			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	312	10	11			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	312	10	15			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	312	10	9			
			Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	227	-	-			
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	236	0	38			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	240	0	18			

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vii)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS5	51A Leung Uk Tsuen	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	228	-	-	43	45	0
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	235	0	38			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	233	0	37			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	230	0	26			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	233	0	24			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	235	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	244	10	21			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	230	10	20			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	243	10	21			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	248	10	13			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	248	10	17			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	230	10	12			
SS11a(vii)	Leung Uk Tsuen Squats	Ventilation Shaft for N/B (i) and Building Service	Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	176	-	-	42	50	0
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	160	0	41			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	160	0	22			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	186	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	186	10	30			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	186	10	29			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	180	10	18			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	180	10	16			
			Tunnel Ventilation Shaft	S1	L	N(i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	180	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	163	10	25			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	180	10	22			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	159	5	30			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	165	5	22			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	165	5	26			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	180	5	19			
	Planned village	Ventilation Shaft for	Tunnel Ventilation Shaft	N1	L	N(i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	272	-	-			
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	276	0	36			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	290	0	17			
			Tunnel Ventilation Shaft	E1	L	N(i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	274	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	300	0	35			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	300	0	34			

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vii)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS14	**house at Village Zone**	**N/B (i) and Building Service**	Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	281	0	24	40	47	0
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	286	0	22			
			Tunnel Ventilation Shaft	S1	L	N (i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	281	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	285	10	20			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	286	10	18			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	285	10	20			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	290	10	12			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	292	10	16			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	286	10	10			
SS20 (vii)	**Village house at Shek Kong**	**Ventilation Shaft for N/B (i) and Building Service**	Tunnel Ventilation Shaft	N1	L	N (i)	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	271	-	-	36	40	0
			Tunnel Ventilation Shaft	N2	L	Y	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	274	10	26			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	280	10	7			
			Tunnel Ventilation Shaft	E1	L	N (i)	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	264	-	-			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	250	5	32			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	250	5	31			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	258	5	20			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	258	5	18			
			Tunnel Ventilation Shaft	S1	L	N (i)	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	263	-	-			
			Tunnel Ventilation Shaft	S2	L	Y	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	286	5	25			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	258	5	24			
			Tunnel Ventilation Shaft	W1	L	Y	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	270	10	20			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	283	10	12			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	283	10	16			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	258	10	11			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Not used.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in**Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vii) A negative correction of 10dB(A) and 5dB(A) has been adopted to the direction facing of the ventilation shaft totally and partially screened by the proposed noise barriers at SSS respectively.

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method [iii]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [iii]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [v]	Calculated SWL L_{Aeq} [dB(A)] [vi]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, *LoS* [dB(A)] [vii]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
SS2	No. 32 Leung Uk Tsuen	Ventilation Shaft for S/B [i] and Building Service	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	448	10	20	31	39	0
			Tunnel Ventilation Shaft	N2	L	N[i]	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	443	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	443	10	3			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	443	10	16			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	443	10	22			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	430	10	21			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	430	10	10			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	425	10	8			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	439	0	24			
			Tunnel Ventilation Shaft	S2	L	N[i]	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	435	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	425	0	24			
			Tunnel Ventilation Shaft	W1	L	N[i]	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	437	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	435	0	18			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	435	0	22			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	437	0	16			
SS4[vii]	Leung Uk Tsuen Village House	Ventilation Shaft for S/B [i] and Building Service	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	314	10	23	35	40	0
			Tunnel Ventilation Shaft	N2	L	N[i]	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	315	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	300	10	6			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	307	5	24			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	297	5	31			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	297	5	30			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	295	5	19			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	300	5	16			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	305	5	22			
			Tunnel Ventilation Shaft	S2	L	N[i]	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	308	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	295	5	23			
			Tunnel Ventilation Shaft	W1	L	N[i]	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	312	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	312	10	11			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	312	10	15			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	312	10	9			
			Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	227	0	36			
			Tunnel Ventilation Shaft	N2	L	N[i]	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	236	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	240	0	18			

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m)		Method [iii]	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] [iii]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] [v]	Calculated SWL L_{Aeq} [dB(A)] [vi]	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] [vii]	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
							Width	Height														
SS5	51A Leung Uk Tsuen	Ventilation Shaft for S/B [i] and Building Service	Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	228	0	32	43	45	0
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	235	0	38			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	233	0	37			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	230	0	26			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	233	0	24			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	235	10	20			
			Tunnel Ventilation Shaft	S2	L	N[i]	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	244	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	230	10	20			
			Tunnel Ventilation Shaft	W1	L	N[i]	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	243	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	248	10	13			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	248	10	17			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	230	10	12			
SS11a[vii]	Leung Uk Tsuen Squats	Ventilation Shaft for S/B [i] and Building Service	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	176	0	38	40	50	0
			Tunnel Ventilation Shaft	N2	L	N[i]	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	160	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	160	0	22			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	186	10	24			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	186	10	30			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	186	10	29			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	180	10	18			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	180	10	16			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	180	10	22			
			Tunnel Ventilation Shaft	S2	L	N[i]	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	163	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	180	10	22			
			Tunnel Ventilation Shaft	W1	L	N[i]	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	159	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	165	5	22			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	165	5	26			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	180	5	19			
	Planned village	Ventilation Shaft for	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	272	0	34			
			Tunnel Ventilation Shaft	N2	L	N[i]	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	276	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	290	0	17			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	274	0	30			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	300	0	35			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	300	0	34			

Night Time Fixed Plant Noise at NSR

NSR		Noise Source	Description	Louvre ID	Plant or Louvre? (P/L)	In operation? (Y/N)	Louvre Size (m) Width	Louvre Size (m) Height	Method (iii)	Measure-ment Distance, D_M (m)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)] (iii)	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured $L_{Aeq,mea}$ [dB(A)] (v)	Calculated SWL L_{Aeq} [dB(A)] (vi)	Distance from Noise Source to NSR, D_N [m]	Correction for line of sight, LoS [dB(A)] (vii)	Corrected SPL at NSR [dB(A)]	Cumulative SPL at NSR [dB(A)]	Night-Time Criteria [dB(A)]	Exceedance [dB(A)]
SS14	**house at Village Zone**	**S/B (i) and Building Service**	Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	281	0	24	40	47	0
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	286	0	22			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	281	10	18			
			Tunnel Ventilation Shaft	S2	L	N(i)	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	285	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	286	10	18			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	285	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	290	10	12			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	292	10	16			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	286	10	10			
SS20(vii)	**Village house at Shek Kong**	**Ventilation Shaft for S/B (i) and Building Service**	Tunnel Ventilation Shaft	N1	L	Y	9.35	6.50	2	19	N/A	55.2	46.8	8.4	54.5	88	271	10	24	36	40	0
			Tunnel Ventilation Shaft	N2	L	N(i)	9.37	6.50	2	19	N/A	57.1	48.2	8.9	56.5	90	274	-	-			
			Dog House	N3	L	Y	1.70	1.70	2	4	N/A	53.9	50.3	3.6	51.4	71	280	10	7			
			Tunnel Ventilation Shaft	E1	L	Y	5.28	6.50	2	13	N/A	55.8	51.8	4	53.6	84	264	5	26			
			Air Compressor Receiver Room	E2	L	Y	0.80	2.98	3	1	29.5	75.1	60.7	14.4	75.1	90	250	5	32			
			T.ECS Control Room	E3	L	Y	1.60	0.85	2	4	N/A	69.9	60.7	9.2	69.3	89	250	5	31			
			Dog House	E4	L	Y	1.30	1.20	2	4	N/A	59	50.3	8.7	58.4	78	258	5	20			
			Dog House	E5	L	Y	1.70	1.70	2	4	N/A	56.9	50.3	6.6	55.8	76	258	5	18			
			Tunnel Ventilation Shaft	S1	L	Y	5.88	2.85	2	12	N/A	54.3	49.7	4.6	52.5	82	263	5	24			
			Tunnel Ventilation Shaft	S2	L	N(i)	5.28	6.50	2	13	N/A	56	51.8	4.2	53.9	84	286	-	-			
			Dog House	S3	L	Y	1.30	1.20	2	4	N/A	62.1	50.3	11.8	62.1	82	258	5	24			
			Tunnel Ventilation Shaft	W1	L	N(i)	5.28	6.50	2	50	N/A	43.3	37.6	5.7	41.9	84	270	-	-			
			Building Service Control Room	W2	L	Y	0.80	2.98	3	1	29.5	61.4	50.9	10.5	61.4	76	283	10	12			
			MCC Room	W3	L	Y	0.80	2.98	3	1	29.5	65	50.9	14.1	65	80	283	10	16			
			Dog House	W4	L	Y	1.30	1.20	2	3	N/A	57.4	50.3	7.1	56.5	74	258	10	11			

Remarks:

(i) Tunnel ventilation would only be operated for either northbound (N/B) or southbound (S/B) direction under normal scenario.

(ii) Not used.

(iii) Method 2 Far field method for Louvres or Plants

Method 3 Near field method for Louvres or Plants

(iv) Results are averaged from the measured noise levels.

(v) If the difference between the background and the measured noise level is less than 3.0 dB, background noise correction factor should be capped to 3.0 dB.

(vi) The calculation of SWL is in accordance with the methodology described in **Section 3.1.1** and **Appendix A1** of the Report. For Method 3, K2A was not claimed in the calculation.

(vii) A negative correction of 10dB(A) and 5dB(A) has been adopted to the direction facing of the ventilation shaft totally and partially screened by the proposed noise barriers at SSS respectively.

MPV - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
ECS duct	N1	Normal	2	measurement 1	49.7
	N1	Normal	2	measurement 2	50.4
	N1	Normal	2	measurement 3	49.7
	N1	Normal		AVERAGE	49.9
FS control room	N2	Normal	2	measurement 1	54.7
	N2	Normal	2	measurement 2	55.0
	N2	Normal	2	measurement 3	54.8
	N2	Normal		AVERAGE	54.8
LV switch room	N3	Normal	3	Point 1	54.1
	N3	Normal	3	Point 2	55.5
	N3	Normal	3	Point 3	56.0
	N3	Normal	3	Point 4	54.9
	N3	Normal	3	Point 5	54.6
	N3	Normal	3	Point 6	54.2
	N3	Normal	3	Point 7	54.1
	N3	Normal	3	Point 8	54.8
	N3	Normal	3	Point 9	56.2
	N3	Normal	3	Point 10	55.5
	N3	Normal	3	Point 11	55.0
	N3	Normal	3	Point 12	54.0
	N3	Normal	3	Point 13	53.0
	N3	Normal	3	Point 14	55.0
	N3	Normal	3	Point 15	55.2
	N3	Normal	3	Point 16	55.2
	N3	Normal		AVERAGE	54.9
Tunnel ventilation shaft	E1	Normal	3	Point 1	53.4
	E1	Normal	3	Point 2	52.9
	E1	Normal	3	Point 3	52.8
	E1	Normal	3	Point 4	53.1
	E1	Normal	3	Point 5	54.2
	E1	Normal	3	Point 6	57.2
	E1	Normal	3	Point 7	57.3
	E1	Normal	3	Point 8	56.6
	E1	Normal	3	Point 9	56.1
	E1	Normal	3	Point 10	54.9
	E1	Normal	3	Point 11	54.5
	E1	Normal	3	Point 12	56.3
	E1	Normal	3	Point 13	52.0
	E1	Normal	3	Point 14	53.1
	E1	Normal	3	Point 15	55.2
	E1	Normal	3	Point 16	55.5
	E1	Normal	3	Point 17	54.7
	E1	Normal	3	Point 18	55.1
	E1	Normal	3	Point 19	51.5
	E1	Normal	3	Point 20	52.2
	E1	Normal	3	Point 21	53.7
	E1	Normal	3	Point 22	54.5
	E1	Normal	3	Point 23	54.6
	E1	Normal	3	Point 24	52.4
	E1	Normal	3	Point 25	53.8
	E1	Normal	3	Point 26	54.2
	E1	Normal	3	Point 27	54.4
	E1	Normal	3	Point 28	54.1
	E1	Normal	3	Point 29	53.6
	E1	Normal	3	Point 30	50.9
	E1	Normal	3	Point 31	51.2
	E1	Normal		AVERAGE	54.4
Tunnel ventilation shaft	S1	Normal	3	Point 1	56.5
	S1	Normal	3	Point 2	57.2
	S1	Normal	3	Point 3	55
	S1	Normal	3	Point 4	55
	S1	Normal	3	Point 5	56.7
	S1	Normal	3	Point 6	57.1
	S1	Normal	3	Point 7	58.5
	S1	Normal	3	Point 8	56
	S1	Normal	3	Point 9	57
	S1	Normal	3	Point 10	55.6
	S1	Normal	3	Point 11	55.8
	S1	Normal	3	Point 12	55.1
	S1	Normal	3	Point 13	55.2
	S1	Normal	3	Point 14	52.8
	S1	Normal	3	Point 15	54.2
	S1	Normal	3	Point 16	55.6
	S1	Normal	3	Point 17	54.9
	S1	Normal	3	Point 18	53.6
	S1	Normal	3	Point 19	52.9
	S1	Normal	3	Point 20	51.9
	S1	Normal	3	Point 21	52.9
	S1	Normal	3	Point 22	53
	S1	Normal	3	Point 23	53.2
	S1	Normal	3	Point 24	52.2
	S1	Normal	3	Point 25	52.3
	S1	Normal	3	Point 26	51.4
	S1	Normal		AVERAGE	55.1
Tunnel ventilation shaft	S2	Normal	3	Point 1	56
	S2	Normal	3	Point 2	55
	S2	Normal	3	Point 3	55.2
	S2	Normal	3	Point 4	55.9
	S2	Normal	3	Point 5	56
	S2	Normal	3	Point 6	56.2
	S2	Normal	3	Point 7	56.2
	S2	Normal	3	Point 8	54.8
	S2	Normal	3	Point 9	54.9
	S2	Normal	3	Point 10	55.6
	S2	Normal	3	Point 11	55.1
	S2	Normal	3	Point 12	56.3
	S2	Normal	3	Point 13	55
	S2	Normal	3	Point 14	55.8
	S2	Normal	3	Point 15	53.9
	S2	Normal	3	Point 16	55.2
	S2	Normal	3	Point 17	55.6
	S2	Normal	3	Point 18	55.1
	S2	Normal	3	Point 19	55.8
	S2	Normal	3	Point 20	51.7
	S2	Normal	3	Point 21	53.7
	S2	Normal	3	Point 22	51
	S2	Normal	3	Point 23	53.4
	S2	Normal	3	Point 24	52.1
	S2	Normal	3	Point 25	52.5
	S2	Normal	3	Point 26	51.2
	S2	Normal		AVERAGE	54.8
Tunnel ventilation shaft	W1	Normal	3	Point 1	52.3
	W1	Normal	3	Point 2	51.8
	W1	Normal	3	Point 3	51.5
	W1	Normal	3	Point 4	50.6
	W1	Normal	3	Point 5	49.6
	W1	Normal	3	Point 6	50.5
	W1	Normal	3	Point 7	49.3
	W1	Normal	3	Point 8	50.5
	W1	Normal	3	Point 9	51.5
	W1	Normal	3	Point 10	52.4
	W1	Normal	3	Point 11	52.5
	W1	Normal	3	Point 12	50.9
	W1	Normal	3	Point 13	50.5
	W1	Normal	3	Point 14	50.4
	W1	Normal	3	Point 15	51.5
	W1	Normal	3	Point 16	51.2
	W1	Normal	3	Point 17	51.5
	W1	Normal	3	Point 18	50.8
	W1	Normal	3	Point 19	51.4
	W1	Normal	3	Point 20	48.2
	W1	Normal	3	Point 21	50.1
	W1	Normal	3	Point 22	49.6
	W1	Normal	3	Point 23	50.2
	W1	Normal	3	Point 24	47.6
	W1	Normal	3	Point 25	47.2
	W1	Normal	3	Point 26	46
	W1	Normal	3	Point 27	46.6
	W1	Normal	3	Point 28	47.2
	W1	Normal	3	Point 29	47.3
	W1	Normal	3	Point 30	48.7
	W1	Normal	3	Point 31	46.4
	W1	Normal		AVERAGE	50.2
Air Release Louvre	W2	Normal	3	Point 1	57.6
	W2	Normal	3	Point 2	57.4
	W2	Normal	3	Point 3	57.9
	W2	Normal	3	Point 4	57.2
	W2	Normal	3	Point 5	57.9
	W2	Normal	3	Point 6	57
	W2	Normal	3	Point 7	58.1
	W2	Normal	3	Point 8	57.7
	W2	Normal		AVERAGE	57.6

NTV - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
Tunnel ventilation shaft	N1	Normal	3	Point 1	50.8
	N1	Normal	3	Point 2	50.8
	N1	Normal	3	Point 3	51.1
	N1	Normal	3	Point 4	51.1
	N1	Normal	3	Point 5	51.2
	N1	Normal	3	Point 6	51.1
	N1	Normal	3	Point 7	51
	N1	Normal	3	Point 8	50.7
	N1	Normal	3	Point 9	51.1
	N1	Normal	3	Point 10	51.6
	N1	Normal	3	Point 11	51.5
	N1	Normal	3	Point 12	51.6
	N1	Normal	3	Point 13	51.2
	N1	Normal	3	Point 14	51
	N1	Normal	3	Point 15	50.3
	N1	Normal	3	Point 16	50
	N1	Normal		AVERAGE	51.0
Tunnel ventilation shaft	N2	Normal	3	Point 1	49.9
	N2	Normal	3	Point 2	49.6
	N2	Normal	3	Point 3	50
	N2	Normal	3	Point 4	50
	N2	Normal	3	Point 5	49.9
	N2	Normal	3	Point 6	49.7
	N2	Normal	3	Point 7	50.1
	N2	Normal	3	Point 8	49.8
	N2	Normal	3	Point 9	49.6
	N2	Normal	3	Point 10	49.7
	N2	Normal	3	Point 11	49.9
	N2	Normal	3	Point 12	49.7
	N2	Normal	3	Point 13	49.6
	N2	Normal	3	Point 14	49.7
	N2	Normal	3	Point 15	48.3
	N2	Normal	3	Point 16	48.1
	N2	Normal		AVERAGE	49.6
CTER	N3	Normal	3	Point 1	53.9
	N3	Normal	3	Point 2	52.7
	N3	Normal	3	Point 3	56.5
	N3	Normal	3	Point 4	53.5
	N3	Normal	3	Point 5	53.2
	N3	Normal		AVERAGE	54.2
ECS duct	N4	Normal	3	Point 1	58.2
	N4	Normal	3	Point 2	58.7
	N4	Normal	3	Point 3	57.9
	N4	Normal	3	Point 4	58.8
	N4	Normal	3	Point 5	57.9
	N4	Normal	3	Point 6	58.1
	N4	Normal	3	Point 7	58.4
	N4	Normal	3	Point 8	56.8
	N4	Normal	3	Point 9	59.6
	N4	Normal	3	Point 10	58.7
	N4	Normal	3	Point 11	58.6
	N4	Normal	3	Point 12	59.9
	N4	Normal		AVERAGE	58.5
Tunnel ventilation shaft	E1	Normal	3	Point 1	52.5
	E1	Normal	3	Point 2	52.7
	E1	Normal	3	Point 3	53.8
	E1	Normal	3	Point 4	53.3
	E1	Normal	3	Point 5	53.6
	E1	Normal	3	Point 6	53.7
	E1	Normal	3	Point 7	49.9
	E1	Normal	3	Point 8	53.6
	E1	Normal	3	Point 9	55.8
	E1	Normal	3	Point 10	53.9
	E1	Normal	3	Point 11	54.8
	E1	Normal	3	Point 12	54.7
	E1	Normal	3	Point 13	55.6
	E1	Normal	3	Point 14	55.4
	E1	Normal	3	Point 15	55.0
	E1	Normal	3	Point 16	54.4
	E1	Normal		AVERAGE	54.1
Tunnel ventilation shaft	E2	Normal	3	Point 1	52.5
	E2	Normal	3	Point 2	53.6
	E2	Normal	3	Point 3	53.7
	E2	Normal	3	Point 4	53.7
	E2	Normal	3	Point 5	53.3
	E2	Normal	3	Point 6	50.9
	E2	Normal	3	Point 7	50.7
	E2	Normal	3	Point 8	50.9
	E2	Normal	3	Point 9	50.1
	E2	Normal	3	Point 10	50.3
	E2	Normal	3	Point 11	47.9
	E2	Normal	3	Point 12	48.6
	E2	Normal	3	Point 13	50.6
	E2	Normal	3	Point 14	50.8
	E2	Normal	3	Point 15	50.7
	E2	Normal	3	Point 16	50.7
	E2	Normal		AVERAGE	51.5
Tunnel ventilation shaft	S1	Normal	3	Point 1	54.1
	S1	Normal	3	Point 2	53.6
	S1	Normal	3	Point 3	55.1
	S1	Normal	3	Point 4	54.7
	S1	Normal	3	Point 5	54.2
	S1	Normal	3	Point 6	52.3
	S1	Normal	3	Point 7	57.9
	S1	Normal	3	Point 8	54.8
	S1	Normal	3	Point 9	56.6
	S1	Normal	3	Point 10	57
	S1	Normal	3	Point 11	57.8
	S1	Normal	3	Point 12	54.4
	S1	Normal	3	Point 13	54.5
	S1	Normal	3	Point 14	54.3
	S1	Normal	3	Point 15	56
	S1	Normal	3	Point 16	56
	S1	Normal		AVERAGE	55.5
Tunnel ventilation shaft	S2	Normal	3	Point 1	54.2
	S2	Normal	3	Point 2	54.8
	S2	Normal	3	Point 3	55.0
	S2	Normal	3	Point 4	55.6
	S2	Normal	3	Point 5	55.4
	S2	Normal	3	Point 6	55.4
	S2	Normal	3	Point 7	56.6
	S2	Normal	3	Point 8	55.4
	S2	Normal	3	Point 9	56.0
	S2	Normal	3	Point 10	54.1
	S2	Normal	3	Point 11	59.4
	S2	Normal	3	Point 12	57.4
	S2	Normal	3	Point 13	55.0
	S2	Normal	3	Point 14	55.9
	S2	Normal	3	Point 15	55.2
	S2	Normal	3	Point 16	55.0
	S2	Normal		AVERAGE	55.9
LV switch room	S3	Normal	3	Point 1	54.3
	S3	Normal	3	Point 2	55.0
	S3	Normal	3	Point 3	55.1
	S3	Normal	3	Point 4	56.2
	S3	Normal	3	Point 5	52.4
	S3	Normal	3	Point 6	53.1
	S3	Normal	3	Point 7	53.8
	S3	Normal	3	Point 8	55.5
	S3	Normal	3	Point 9	54.2
	S3	Normal	3	Point 10	55.4
	S3	Normal	3	Point 11	54.2
	S3	Normal	3	Point 12	54.6
	S3	Normal		AVERAGE	54.6
LV switch room	S4	Normal	3	Point 1	54.2
	S4	Normal	3	Point 2	55.0
	S4	Normal	3	Point 3	55.1
	S4	Normal	3	Point 4	56.2
	S4	Normal	3	Point 5	52.4
	S4	Normal	3	Point 6	53.1
	S4	Normal	3	Point 7	53.8
	S4	Normal	3	Point 8	55.4
	S4	Normal	3	Point 9	54.1
	S4	Normal	3	Point 10	55.4
	S4	Normal	3	Point 11	54.1
	S4	Normal	3	Point 12	54.6
	S4	Normal		AVERAGE	54.6
LV switch room	S5	Normal	3	Point 1	58.6
	S5	Normal	3	Point 2	61.9
	S5	Normal	3	Point 3	57.7
	S5	Normal	3	Point 4	60.9
	S5	Normal	3	Point 5	59.5
	S5	Normal	3	Point 6	60.6
	S5	Normal	3	Point 7	59.5
	S5	Normal	3	Point 8	60.7
	S5	Normal	3	Point 9	60.4
	S5	Normal	3	Point 10	59.5
	S5	Normal	3	Point 11	59.7
	S5	Normal	3	Point 12	61.4
	S5	Normal		AVERAGE	60.2
Exhaust Air Duct	S6	Normal	2	measurement 1	66.1
	S6	Normal	2	measurement 2	66.2
	S6	Normal	2	measurement 3	66.3
	S6	Normal		AVERAGE	66.2
UPS Room Fresh Air Intake	W1	Normal	2	measurement 1	59.5
	W1	Normal	2	measurement 2	59.2
	W1	Normal	2	measurement 3	59.2
	W1	Normal		AVERAGE	59.3

SMV - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
Tunnel ventilation shaft	N1	Normal	2	measurement 1	46.2
	N1	Normal	2	measurement 2	46.3
	N1	Normal	2	measurement 3	46.2
	N1	Normal		AVERAGE	46.2
FS inlet	N2	Normal	3	Point 1	54.7
	N2	Normal	3	Point 2	53
	N2	Normal	3	Point 3	53.6
	N2	Normal	3	Point 4	50.5
	N2	Normal	3	Point 5	48.8
	N2	Normal		AVERAGE	52.6
MCC room	N3	Normal	3	Point 1	61.4
	N3	Normal	3	Point 2	63.1
	N3	Normal	3	Point 3	62
	N3	Normal	3	Point 4	62.1
	N3	Normal	3	Point 5	63.8
	N3	Normal	3	Point 6	63.3
	N3	Normal	3	Point 7	62.3
	N3	Normal	3	Point 8	62.5
	N3	Normal		AVERAGE	62.6
Exhause air louvre	N4	Normal	3	Point 1	50.5
	N4	Normal	3	Point 2	46.3
	N4	Normal	3	Point 3	48
	N4	Normal	3	Point 4	48.1
	N4	Normal	3	Point 5	46.8
	N4	Normal	3	Point 6	47.3
	N4	Normal	3	Point 7	47.4
	N4	Normal	3	Point 8	48.4
	N4	Normal	3	Point 9	48.7
	N4	Normal	3	Point 10	48.8
	N4	Normal	3	Point 11	49.8
	N4	Normal	3	AVERAGE	48.4
L30	N5	Normal	3	Point 1	61.1
	N5	Normal	3	Point 2	61.9
	N5	Normal	3	Point 3	62.5
	N5	Normal	3	Point 4	62.2
	N5	Normal	3	Point 5	61.4
	N5	Normal	3	Point 6	61.5
	N5	Normal	3	Point 7	61.3
	N5	Normal	3	Point 8	61.6
	N5				61.7
UPS room	E1	Normal	3	Point 1	68.6
	E1	Normal	3	Point 2	70.5
	E1	Normal	3	Point 3	74
	E1	Normal	3	Point 4	74.7
	E1	Normal	3	Point 5	70.9
	E1	Normal	3	Point 6	68.4
	E1	Normal	3	Point 7	68.7
	E1	Normal	3	Point 8	72.6
	E1	Normal	3	Point 9	77.4
	E1	Normal	3	Point 10	74.9
	E1	Normal	3	Point 11	73.1
	E1	Normal	3	Point 12	69.7
	E1	Normal		AVERAGE	72.9
LV switch room	E2	Normal	3	Point 1	67.3
	E2	Normal	3	Point 2	64.8
	E2	Normal	3	Point 3	63.8
	E2	Normal	3	Point 4	65.9
	E2	Normal	3	Point 5	70.2
	E2	Normal	3	Point 6	66.6
	E2	Normal	3	Point 7	65.9
	E2	Normal	3	Point 8	68.8
	E2	Normal	3	Point 9	66
	E2	Normal	3	Point 10	62.7
	E2	Normal	3	Point 11	61.7
	E2	Normal	3	Point 12	64.6
	E2	Normal		AVERAGE	66.3
Fresh air louvre	E3	Normal	3	Point 1	49.9
	E3	Normal	3	Point 2	49.2
	E3	Normal	3	Point 3	48.7
	E3	Normal	3	Point 4	48.8
	E3	Normal	3	Point 5	48.6
	E3	Normal	3	Point 6	51.7
	E3	Normal	3	Point 7	47.2
	E3	Normal	3	Point 8	47.4
	E3	Normal	3	Point 9	46.6
	E3	Normal	3	Point 10	48.1
	E3	Normal	3	Point 11	47.2
	E3	Normal	3	Point 12	51.7
	E3	Normal		AVERAGE	49.1
Staircase pressurization fan room 1	E4	Normal	3	Point 1	61.9
	E4	Normal	3	Point 2	61.9
	E4	Normal	3	Point 3	60.7
	E4	Normal	3	Point 4	63
	E4	Normal	3	Point 5	63.3
	E4	Normal	3	Point 6	61.5
	E4	Normal	3	Point 7	61.7
	E4	Normal	3	Point 8	64.6
	E4	Normal	3	Point 9	64.7
	E4	Normal	3	Point 10	61.2
	E4	Normal	3	Point 11	62.2
	E4	Normal	3	Point 12	61.7
	E4	Normal		AVERAGE	62.6
Staircase pressurization fan room 2	E5	Normal	3	Point 1	53.8
	E5	Normal	3	Point 2	53.4
	E5	Normal	3	Point 3	52.3
	E5	Normal	3	Point 4	54.4
	E5	Normal	3	Point 5	58
	E5	Normal	3	Point 6	52.3
	E5	Normal	3	Point 7	54.1
	E5	Normal	3	Point 8	54.4
	E5	Normal	3	Point 9	52.9
	E5	Normal	3	Point 10	52
	E5	Normal	3	Point 11	52.1
	E5	Normal	3	Point 12	52.8
	E5	Normal		AVERAGE	53.9
Tunnel ventilation shaft	S1	Normal	2	measurement 1	55.2
	S1		2	measurement 2	56
	S1		2	measurement 3	55.9
	S1	Normal		AVERAGE	55.7
Sprinkler & FS pump room	S2	Normal	2	measurement 1	66.8
	S2	Normal	2	measurement 2	66.9
	S2	Normal	2	measurement 3	66.8
	S2	Normal		AVERAGE	66.8
Air compressor receiver room	S3	Normal	3	Point 1	67.7
	S3	Normal	3	Point 2	70
	S3	Normal	3	Point 3	73.1
	S3	Normal	3	Point 4	73
	S3	Normal	3	Point 5	70.1
	S3	Normal	3	Point 6	66.3
	S3	Normal	3	Point 7	66
	S3	Normal	3	Point 8	68.8
	S3	Normal	3	Point 9	71.5
	S3	Normal	3	Point 10	76
	S3	Normal	3	Point 11	69.4
	S3	Normal	3	Point 12	67.7
	S3	Normal		AVERAGE	71.0
Air compressor receiver room	S4	Normal	3	Point 1	67.9
	S4	Normal	3	Point 2	73.5
	S4	Normal	3	Point 3	72.5
	S4	Normal	3	Point 4	73.6
	S4	Normal	3	Point 5	69.2
	S4	Normal	3	Point 6	63.4
	S4	Normal	3	Point 7	63.5
	S4	Normal	3	Point 8	68.5
	S4	Normal	3	Point 9	73.5
	S4	Normal	3	Point 10	72.9
	S4	Normal	3	Point 11	69
	S4	Normal	3	Point 12	66.5
	S4	Normal		AVERAGE	70.8
Staircase pressurization fan room	S5	Normal	3	Point 1	55.8
	S5	Normal	3	Point 2	55.0
	S5	Normal	3	Point 3	55.9
	S5	Normal	3	Point 4	55.0
	S5	Normal	3	Point 5	55.4
	S5	Normal	3	Point 6	56.8
	S5	Normal	3	Point 7	55.5
	S5	Normal	3	Point 8	57.4
	S5	Normal		AVERAGE	55.9
Tunnel ventilation shaft	W1	Normal	2	measurement 1	48.7
	W1		2	measurement 2	48.8
	W1		2	measurement 3	48.4
	W1	Normal		AVERAGE	48.6
Tunnel ventilation shaft	W2	Normal	2	measurement 1	47.4
	W2	Normal	2	measurement 2	47.9
	W2	Normal	2	measurement 3	47.4
	W2	Normal		AVERAGE	47.6
SPS air release louvre	W3	Normal	2	measurement 1	79.3
	W3	Normal	2	measurement 2	79.5
	W3	Normal	2	measurement 3	79.5
	W3	Normal		AVERAGE	79.4
Track section cabin room	W4	Normal	3	Point 1	64.9
	W4	Normal	3	Point 2	64.4
	W4	Normal	3	Point 3	60.2
	W4	Normal	3	Point 4	64.6
	W4	Normal	3	Point 5	64.1
	W4	Normal	3	Point 6	64.3
	W4	Normal	3	Point 7	62.3
	W4	Normal	3	Point 8	62.6
	W4	Normal		AVERAGE	63.7

SPN - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
Tunnel Ventilation Shaft	N1	Normal	2	Measurement 1	54.8
	N1	Normal	2	Measurement 2	54.9
	N1	Normal	2	Measurement 3	54.8
	N1	Normal		AVERAGE	54.8
Tunnel Ventilation Shaft	N2	Normal	2	Measurement 1	54.9
	N2	Normal	2	Measurement 2	55.3
	N2	Normal	2	Measurement 3	55.7
	N2	Normal		AVERAGE	55.3
Dog House	N3	Normal	3	Point 1	56.2
	N3	Normal	3	Point 2	56.8
	N3	Normal	3	Point 3	55.8
	N3	Normal	3	Point 4	55.0
	N3	Normal	3	Point 5	56.1
	N3	Normal	3	Point 6	56.7
	N3	Normal	3	Point 7	56.3
	N3	Normal	3	Point 8	55.9
	N3	Normal	3	Point 9	56.0
	N3	Normal	3	Point 10	56.2
	N3	Normal	3	Point 11	56.3
	N3	Normal	3	Point 12	55.7
	N3	Normal	3	Point 13	54.6
	N3	Normal	3	Point 14	55.4
	N3	Normal	3	Point 15	56.1
	N3	Normal	3	Point 16	56.0
	N3	Normal		AVERAGE	56.0
Tunnel Ventilation Shaft	E1	Normal	2	Measurement 1	55.9
	E1	Normal	2	Measurement 2	55.9
	E1	Normal	2	Measurement 3	56.1
	E1	Normal		AVERAGE	56.0
T.ECS Control Room	E2	Normal	3	Point 1	54.7
	E2	Normal	3	Point 2	54.6
	E2	Normal	3	Point 3	56.7
	E2	Normal	3	Point 4	57.1
	E2	Normal	3	Point 5	56.5
	E2	Normal	3	Point 6	55.2
	E2	Normal	3	Point 7	55.4
	E2	Normal	3	Point 8	57.4
	E2	Normal		AVERAGE	56.1
Dog House	E3	Normal	3	Point 1	55.5
	E3	Normal	3	Point 2	56.1
	E3	Normal	3	Point 3	55.2
	E3	Normal	3	Point 4	56
	E3	Normal	3	Point 5	56.1
	E3	Normal	3	Point 6	55.2
	E3	Normal	3	Point 7	56.6
	E3	Normal	3	Point 8	56.4
	E3	Normal	3	Point 9	55.6
	E3	Normal	3	Point 10	54.8
	E3	Normal	3	Point 11	57.1
	E3	Normal	3	Point 12	56.3
	E3	Normal		AVERAGE	56.0
Tunnel Ventilation Shaft	S1	Normal	2	Measurement 1	56.2
	S1	Normal	2	Measurement 2	56.3
	S1	Normal	2	Measurement 3	56.3
	S1	Normal		AVERAGE	56.3
Tunnel Ventilation Shaft	S2	Normal	2	Measurement 1	55.8
	S2	Normal	2	Measurement 2	55.7
	S2	Normal	2	Measurement 3	55.8
	S2	Normal		AVERAGE	55.8
Tunnel Ventilation Shaft	W1	Normal	3	Point 1	62.8
	W1	Normal	3	Point 2	63
	W1	Normal	3	Point 3	62.6
	W1	Normal	3	Point 4	62.2
	W1	Normal	3	Point 5	63.2
	W1	Normal	3	Point 6	63.5
	W1	Normal	3	Point 7	63.6
	W1	Normal	3	Point 8	62.4
	W1	Normal	3	Point 9	63.5
	W1	Normal	3	Point 10	62.6
	W1	Normal	3	Point 11	62.3
	W1	Normal	3	Point 12	63.3
	W1	Normal		AVERAGE	62.9
ABBCS Room	W2	Normal	3	Point 1	60
	W2	Normal	3	Point 2	60
	W2	Normal	3	Point 3	60.8
	W2	Normal	3	Point 4	59.5
	W2	Normal	3	Point 5	58.1
	W2	Normal	3	Point 6	59.9
	W2	Normal	3	Point 7	59.6
	W2	Normal	3	Point 8	59.4
	W2	Normal		AVERAGE	59.7

SPS - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method	Location / measurement	LAeq [dB]
Tunnel Ventilation Shaft	N1	Normal	2	measurement 1	55.4
	N1	Normal	2	measurement 2	54.9
	N1	Normal	2	measurement 3	55.4
	N1	Normal		AVERAGE	55.2
Tunnel Ventilation Shaft	N2	Normal	2	measurement 1	57.0
	N2	Normal	2	measurement 2	57.1
	N2	Normal	2	measurement 3	57.2
	N2	Normal		AVERAGE	57.1
Dog House	N3	Normal	2	measurement 1	54.1
	N3	Normal	2	measurement 2	53.7
	N3	Normal	2	measurement 3	53.8
	N3	Normal		AVERAGE	53.9
Tunnel Ventilation Shaft	E1	Normal	2	measurement 1	55.8
	E1	Normal	2	measurement 2	55.7
	E1	Normal	2	measurement 3	56
	E1	Normal		AVERAGE	55.8
Air Compressor Receiver Room					
	E2	Normal	3	Point 1	77.1
	E2	Normal	3	Point 2	76.5
	E2	Normal	3	Point 3	75.4
	E2	Normal	3	Point 4	76.6
	E2	Normal	3	Point 5	73.3
	E2	Normal	3	Point 6	74.2
	E2	Normal	3	Point 7	74.2
	E2	Normal	3	Point 8	70.5
	E2	Normal		AVERAGE	75.1
T.ECS Control Room	E3	Normal	2	measurement 1	70.1
	E3	Normal	2	measurement 2	69.8
	E3	Normal	2	measurement 3	69.7
	E3	Normal		AVERAGE	69.9
Dog House	E4	Normal	2	measurement 1	59.0
	E4	Normal	2	measurement 2	57.9
	E4	Normal	2	measurement 3	57.3
	E4	Normal		AVERAGE	59.0
Dog House	E5	Normal	2	measurement 1	56.9
	E5	Normal	2	measurement 2	55.2
	E5	Normal	2	measurement 3	55.0
	E5	Normal		AVERAGE	56.9
Tunnel Ventilation Shaft	S1	Normal	2	measurement 1	54.3
	S1	Normal	2	measurement 2	54.4
	S1	Normal	2	measurement 3	54.3
	S1	Normal		AVERAGE	54.3
Tunnel Ventilation Shaft	S2	Normal	2	measurement 1	56.0
	S2	Normal	2	measurement 2	55.9
	S2	Normal	2	measurement 3	56.0
	S2	Normal		AVERAGE	56.0
Dog House	S3	Normal	2	measurement 1	62.1
	S3	Normal	2	measurement 2	61.6
	S3	Normal	2	measurement 3	60.9
	S3	Normal		AVERAGE	62.1
Tunnel ventilation shaft	W1	Normal	2	measurement 1	43.1
	W1	Normal	2	measurement 2	43.2
	W1	Normal	2	measurement 3	43.6
	W1	Normal		AVERAGE	43.3
Building Service Control Room					
	W2	Normal	3	Point 1	66.1
	W2	Normal	3	Point 2	63.4
	W2	Normal	3	Point 3	62
	W2	Normal	3	Point 4	61
	W2	Normal	3	Point 5	56.9
	W2	Normal	3	Point 6	57.4
	W2	Normal	3	Point 7	57.2
	W2	Normal	3	Point 8	56.2
	W2	Normal		AVERAGE	61.4
MCC Room	W3	Normal	3	Point 1	67.6
	W3	Normal	3	Point 2	66.9
	W3	Normal	3	Point 3	66.9
	W3	Normal	3	Point 4	67.0
	W3	Normal	3	Point 5	61.0
	W3	Normal	3	Point 6	61.5
	W3	Normal	3	Point 7	60.6
	W3	Normal	3	Point 8	60.4
	W3	Normal		AVERAGE	65.0
Dog House	W4	Normal	2	measurement 1	57.4
	W4	Normal	2	measurement 2	57.0
	W4	Normal	2	measurement 3	56.2
	W4	Normal		AVERAGE	57.4

Appendix A4 – Measurement Results at NSRs

Appendix A4 - Measurement Results at NSRs

NSR	Scenario	Measurement Type	Start Time*	End Time*	L_{Aeq}, dB(A)
MP1	Day and Evening Time	Background Noise Levels	22:00	22:05	49.0
			22:15	22:20	48.8
		Measured Noise Levels	22:45	23:15	49.0
			00:25	00:55	48.4
	Night-time	Background Noise Levels	02:10	02:15	49.0
			02:15	02:20	50.1
		Measured Noise Levels	01:00	01:30	49.0
			01:30	02:00	49.7
MP5	Day and Evening Time	Background Noise Levels	22:00	22:05	46.6
			22:15	22:20	46.8
		Measured Noise Levels	22:45	23:15	48.1
			00:25	00:55	48.9
	Night-time	Background Noise Levels	02:05	02:10	46.8
			02:15	02:20	48.8
		Measured Noise Levels	01:00	01:30	49.8
			01:30	02:00	48.4
MP6	Day and Evening Time	Background Noise Levels	22:00	22:05	48.4
			22:15	22:20	48.6
		Measured Noise Levels	22:45	23:15	48.7
			00:25	00:55	46.4
	Night-time	Background Noise Levels	02:05	02:10	47.9
			02:10	02:15	46.3
		Measured Noise Levels	01:00	01:30	48.4
			01:30	02:00	47.6
NT1a	Day and Evening Time	Background Noise Levels	23:08	23:13	52.6
			23:13	23:18	51.8
		Measured Noise Levels	23:25	23:55	52.0
			23:56	00:26	52.8
	Night-time	Background Noise Levels	01:54	01:59	44.0
			02:09	02:14	44.0
		Measured Noise Levels	00:28	00:58	46.9
			01:03	01:33	45.7
NT4a	Day and Evening Time	Background Noise Levels	23:13	23:18	51.7
			23:18	23:23	52.4
		Measured Noise Levels	23:24	23:54	50.8
			23:55	00:25	52.5
	Night-time	Background Noise Levels	01:40	01:45	52.5
			01:45	01:50	52.7
		Measured Noise Levels	00:32	01:02	52.8
			01:03	01:33	53.2
SM1	Day and Evening Time	Background Noise Levels	22:12	22:17	65.1
			22:22	22:27	65.0
		Measured Noise Levels	22:39	23:09	64.2
			23:10	23:40	64.3
	Night-time	Background Noise Levels	00:49	00:54	61.2
			00:54	00:59	58.2
		Measured Noise Levels	23:42	00:12	61.3
			00:13	00:43	60.9
SM4	Day and Evening Time	Background Noise Levels	21:45	21:50	60.6
			21:50	21:55	60.1
		Measured Noise Levels	22:30	23:00	60.6
			23:00	23:30	59.4
	Night-time	Background Noise Levels	00:39	00:44	56.2
			00:44	00:49	55.0
		Measured Noise Levels	23:34	00:04	56.6
			00:04	00:34	56.7

NSR	Scenario	Measurement Type	Start Time*	End Time*	L_{Aeq}, dB(A)
SS7	Day and Evening Time	Background Noise Levels	23:30	23:35	50.2
			23:35	23:40	50.2
		Measured Noise Levels	23:43	00:13	50.7
			00:13	00:43	48.5
	Night-time	Background Noise Levels	02:25	02:30	47.3
			02:35	02:40	46.5
		Measured Noise Levels	00:50	01:20	47.9
			01:20	01:50	47.2
SS10	Day and Evening Time	Background Noise Levels	23:18	23:23	56.4
			23:23	23:28	58.0
		Measured Noise Levels	23:42	00:12	58.9
			00:12	00:42	56.8
	Night-time	Background Noise Levels	02:24	02:29	55.7
			02:29	02:34	53.0
		Measured Noise Levels	00:46	01:16	55.5
			01:16	01:46	55.8
SS15	Day and Evening Time	Background Noise Levels	22:33	22:38	49.0
			22:38	22:43	48.9
		Measured Noise Levels	23:43	00:13	47.7
			00:13	00:43	47.6
	Night-time	Background Noise Levels	02:25	02:30	48.7
			02:30	02:35	48.9
		Measured Noise Levels	00:50	01:20	48.4
			01:20	01:50	48.4
SS11a	Day and Evening Time	Background Noise Levels	23:15	23:20	46.1
			23:28	23:33	47.7
		Measured Noise Levels	23:52	00:22	48.3
			00:22	00:52	48.3
	Night-time	Background Noise Levels	02:43	02:48	46.8
			02:48	02:53	46.5
		Measured Noise Levels	00:55	01:25	47.6
			01:25	01:55	45.5
SS20	Day and Evening Time	Background Noise Levels	23:04	23:09	57.7
			23:10	23:15	57.2
		Measured Noise Levels	23:42	00:12	57.1
			00:14	00:44	57.3
	Night-time	Background Noise Levels	02:24	02:29	57.6
			02:30	02:35	57.3
		Measured Noise Levels	00:46	01:16	57.1
			01:17	01:47	57.1

Note:
The scenarios were arranged for the purpose of testing and commissioning only. The scenario under "day and evening time" would not happen after 2300 during the operation phase.

MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU – SHENZHEN – HONG KONG EXPRESS RAIL LINK

(No. EP-349/2009/M)

Commissioning Test Report for the Fixed Plant Noise at West Kowloon Station (WEK) and Public Transport Interchange (PTI)

Verified by : ______________________

(Eric Ching)

Position : Independent Environmental Checker

Date : 15 Aug. 18

MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU –
SHENZHEN – HONG KONG EXPRESS RAIL LINK
(No. EP-349/2009/M)

Commissioning Test Report for the Fixed Plant Noise at West Kowloon Station (WEK) and Public Transport Interchange (PTI)

Certified by : ____________________

(Raymond Wong)

Position : Environmental Team Leader

Date : 15 August 2018

Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL)

Commissioning Test Report for the Fixed Plant Noise at West Kowloon Station (WEK) and Public Transport Interchange (PTI)

MTR Corporation

August 2018

1 Introduction

The Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) Project (hereinafter known as "XRL") covers a 26km long underground rail line on dedicated tracks that run between the terminus in West Kowloon and the boundary at Huanggang, where connects with the XRL Mainland section. XRL Project also includes the construction of ventilation buildings, emergency access points, stabling sidings and maintenance facilities and an emergency rescue siding (ERS) (formerly known as rescue emergency station).

The Environmental Impact Assessment (EIA) Report (Register No.: AEIA-143/2009) was approved on 28 September 2009 by the Director of Environmental Protection (DEP) under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, an environmental permit (EP) was granted on 16 October 2009 (EP No: EP-349/2009) for the construction and operation of the Project. Variations of environmental permit (VEP) were subsequently applied and the latest Environmental Permit (EP No: EP-349/2009/M) (hereinafter known as "the EP") was issued by Director of Environmental Protection (DEP) on 25 June 2018.

This report is prepared with reference to EP Condition 2.36, "*The Permit Holder shall, no later than two weeks before the commencement of the operation of the Project, deposit with the Director a Commissioning Test Report to confirm the compliance of the operational air-borne and ground-borne noise levels in accordance with the EIA Report and the application for variation of an environmental permit No. VEP-377/2012 and its attached documents".*

A Commissioning Test Report for Fixed Plant Noise at West Kowloon Station (WEK) (formerly named as West Kowloon Terminus) and Public Transport Interchange (PTI) has been prepared to confirm the compliance of noise criteria in accordance with the fixed plant noise levels in accordance with the application for variation of an environmental permit No. VEP-407/2013 and its attached documents. This report presents the noise measurement methodology, results of noise measurement for the fixed plant noise sources installed at WEK and PTI, calculated Sound Power Levels from noise measurements having due regard to the characteristics of tonality, impulsiveness and intermittency.

2 Noise Criteria

2.1 Fixed Plant Noise Criteria in EIA

With reference to the IND-TM under the Noise Control Ordinance (NCO), the relevant acceptable noise levels (ANL) where determined based on the area sensitivity rating (ASR). The fixed plant noise criteria for the representative noise sensitive receivers (NSRs) were determined in EIA as follow (whichever is lower):

- 5dB(A) below the appropriate ANL set out in the IND-TM (the ANL-5dB(A) criterion); or
- The prevailing background noise levels where the prevailing background noise level is 5dB(A) below the appropriate ANL (i.e. ANL-5dB(A))

The noise criteria above were determined for planning purpose, while during operations; the fixed plant noise is controlled by a Noise Abatement Notices system governed by the NCO.

According to the fixed plant noise assessment in the Environmental Review Report (ERR)[1] for supporting the application for variation of an environmental permit No. VEP-407/2013, there would be two operation scenarios which are Day 1 Scenario (before occupation of West Kowloon Cultural District (WKCD)) and Day 2 Scenario (upon occupation of WKCD). Under Day 2 Scenario, the building structures with fixed plant noise sources of WEK located at WKCD would be fully integrated with the future WKCD development such that they would be encapsulated by future WKCD's building blocks. In such case, the noise sources as well as their locations would be different from Day 1 Scenario, and as the detailed design of WKCD has not been confirmed yet during the commissioning test, it is impossible to conduct assessment for the uncertain Day 2 Scenario. Therefore, this commissioning test has been conducted to confirm the noise compliance for Day 1 Scenario only. To ensure the compliance of fixed plant noise criteria for Day 2 Scenario upon occupation of the WKCD building(s) that would encapsulate VS 6, VS 7, PVS 6 and VS6-4, MTR will maintain continuous dialogue with the West Kowloon Cultural District Authority regarding the future noise sensitive development in WKCD. Relevant information of Day 2 Scenario to show compliance would be submitted, when the detailed design of WKCD development is confirmed and finalized. The fixed plant noise sources and the representative NSRs for Day 1 Scenario are shown in **Figure 2.1**.

The fixed plant noise criteria for the representative NSR in West Kowloon area under Day 1 Scenario are presented in **Table 2.1** below. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied to the results of noise measurement, where applicable, in accordance with IND-TM.

Table 2.1 Summary of Fixed Plant Noise Criteria (Day 1 Scenario)

[1] Environmental Review Report – Design Changes in Mong Kok West Ventilation Building, West Kowloon Terminus and Its Associated Building Elements, June 2013.

NSR ID	**Description**	**Area Sensitivity Rating (ASR)** [a]	**Noise Criteria, $L_{eq,30min}$ dB(A)** [a]	
			Day and Evening Time	**Night-time**
West Kowloon Station (WEK) and its associated building elements ***(Figure 2.1)***				
WK3	Man King Building, 46 - 48 Man Wui Street (South façade)	B	60	50
WK3a	Man King Building, 46 - 48 Man Wui Street (West façade)	B	60	50
WK4	Tower 6, Sorrento (East façade)	B	60	50
WK7a	Tsim Sha Tsui Fire Station	C	65	55
WK8a	Tower 6, The Waterfront	B	60	50
WK11a	Tower 3, The Austin (formerly named as Planned Development)	B	60	50
WK12a	Tower 5, Grand Austin (formerly named as Planned Development)	B	60	50
WK14	Moon Tower, The Arch	B	60	50
WK14a	Star Tower, The Arch	B	60	50
WK18	Hindu Temple	C	65	55

Note:

(a) ASR and noise criteria follow that defined in the relevant application for variation of environmental permit (VEP-407/2013) and its attached documents.

Major fixed plant noise sources at WEK and PTI include PTI ventilation, station ventilation, other electrical mechanical equipment, and tunnel ventilation, which are generally located inside plant rooms, except for fans in PTI. They would be operating concurrently under "normal scenario" for XRL operation during both daytime and evening time, and night-time period, as the worst case scenario. The worst case scenario was considered for compliance check against the fixed plant noise criteria and the noise measurement was conducted to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs.

Table 2.2 below summarised the information of the fixed plant noise sources and the layout plans are shown in **Figure 2.2A – 2.2E**.

Table 2.2 Summary of Fixed Plant Noise Sources in WEK and PTI

Location	**Noise Source**	**Louvre ID**
West Kowloon Station (WEK) and Public Transport Interchange (PTI) ***(Figures 2.2A – 2.2E)***		
West Kowloon Plant Building (WKP)	WKP (formerly named as TVS 3)	WKP-U1-E6PN-03A Section 1
		WKP-U1-E6PN-03A Section 2

Location	Noise Source	Louvre ID
		WKP-U1-E6PN-06A
		WKP-U1-E6PN-04A
		WKP-U1-E6VS-02
		WKP-U1-E6PN-09
	EAA (formerly named as VS 3 North)	WKT-VS3N-1
West Kowloon Station (WEK)	VS 3	WKT-VS3-1
		WKT-VS3-2
		WKT-VS3-3
		WKT-VS3-4
		WKT-VS3-5
		WKT-VS3-6A
		WKT-VS3-6B
		WKT-VS3-7
		WKT-VS3-8
	VS 2 East	WKT-VS2E-1
		WKT-VS2E-2
		WKT-VS2E-3
	VS 4	WKT-VS4-1
		WKT-VS4-3
		WKT-VS4-4
	VS 5	WKT-VS5-1
		WKT-VS5-2
		WKT-VS5-4
	VS 2 West	WKT-VS2W-1
		WKT-VS2W-2A
		WKT-VS2W-2B
		WKT-VS2W-2C
		WKT-VS2W-3
	VS 1	WKT-VS1-1
		WKT-VS1-2
		WKT-VS1-3
		WKT-VS1-4
West Kowloon Cultural District (WKCD)	VS 6	WKT-VS6-1
		WKT-VS6-2A
		WKT-VS6-2B
		WKT-VS6-3A
		WKT-VS6-3B
		WKT-VS6-4
		WKT-VS6-5A
		WKT-VS6-5B
		WKT-VS6-6A
		WKT-VS6-6B
		WKT-VS6-7A
		WKT-VS6-7B
	PVS 6	WKT-PVS6-1

Location	Noise Source	Louvre ID
		WKT-PVS6-2
		WKT-PVS6-3A
		WKT-PVS6-3B
		WKT-PVS6-4
	VS6-4 (formerly named as TVS 1)	WKT-G-G15VS-01A
		WKT-G-G15VS-01B
		WKT-G-G15VS-01C
		WKT-G-G15VS-03A Section 1
		WKT-G-G15VS-03A Section 2
	VS 7	WKT-G-D14VS-03A
		WKT-G-D14VS-04A
		WKT-VS7-1A
		WKT-VS7-1B
		WKT-VS7-2
		WKT-VS7-3
Public Transport Interchange (PTI)	PTI Ventilation Shaft	L-01
		L-02
		L-03
		L-03a
		L-06
		L-07
		L-08
		L-08a
		L-10
		L-11
		L-12
		L-13
		L-14
		L-15a
		L-15b
		L-21
		L-22
		L-23
		L-24
		L-28
		L-29
		L-30
		L-31

3 Methodology

3.1 Noise Measurement for the Fixed Plants

Noise measurements to obtain the noise levels of the fixed plants were undertaken by Supreme Acoustics Research Limited, GAS Joint Venture, Gammon-Leighton Joint Venture and Wilson Acoustics Ltd. The commissioning tests were carried out by qualified persons possessing at least 7 years of noise control experience and a corporate member of Hong Kong Institute of Acoustics or equivalent in accordance with S3.22 of the XRL EM&A Manual.

3.1.1 Methodology

Three measurement methods, namely Method 1 (at or near NSR), Method 2 (Far Field) and Method 3 (Near Field), have been developed based on NCO-TM, basic acoustic principles and *ISO 3746-2010: Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane*, respectively. Given the fixed plant noise sources are steady, all proposed methods could be adopted for all types of fixed plant source depending on the site environment/constraints that might affect the possibility to obtain valid results, considerations including but not limited to:

- Background noise with less influence to the measured noise levels
- Free of obstacles between measurement location and noise source
- Accessibility and Safety Concerns

For WEK and PTI, considering the background noise dominated by the road traffic noise from Jordan Road, Lin Cheung Road, Road D1A, Austin Road West, and Canton Road were immediately in front of the NSRs; obtaining valid results using Method 1 was considered unlikely. As such, only Method 2 and Method 3 were considered applicable. Method used for each louvre is presented in Appendix A3. Details of the measurement methodology are shown in **Appendix A1**.

Method 1 – Measuring Sound Pressure Level at NSR or Near NSR

- Measurement at NSR or near NSR at distance *D* away from the louvre, where D was at least two times the largest dimension b of the louvre and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the louvre and three measurements were taken when the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre was switched OFF
- The sound pressure level (SPL) at NSR or near NSR was determined by the following equation:

  $$\textit{Background corrected } L_p = L_p + BG - [20\log D + 8] \textit{ (if applicable)} + \textit{façade correction (if applicable)}$$

  Where
  L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);
  BG is the background correction factor, in dB(A);
  D is separation between the center of louvre or surface of the plant and the microphone, in metres.

Method 2 – Measuring Sound Power Level by Far Field Method for Louvres or for Plants

- The microphone was positioned at the perpendicular distance *D* away from the center of the louvre or the surface of the plant, where D was at least two times the largest dimension b of the louvre or plant and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the center of the louvre/combined louvre area or the center the plant; and three measurements were taken when the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from the louvre or plant was switched OFF
- The sound power level (SWL) of the louvre or the plant was determined, based on basic acoustic principles, by the following equation:

$$L_w = L_p + 20logD,center +8 + BG$$

Where

L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);

D,center is separation between the center of louvre or plant and the microphone, in metres;

BG is the background correction factor, in dB(A).

Method 3 – Measuring Sound Power Level by Near Field Method for Louvres or **for Plants**

- A right parallelepiped hypothetical measurement box for each louvre or each surface of a plant was determined according to ISO 3746, with each side being spaced a distance *D* from the corresponding side of the louvre or plant
- Each of the 5 planes of the measurement box was subdivided into equal-sized rectangular grids, the length of each side of the grids should be less than or equal to 3 times of distance D, i.e. grid length $\leq 3D$
- The microphone was pointing toward the center of each grid, and a measurement was taken for each grid during the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre or plant was switched OFF
- The SWL of the louvre or the plant was determined by the following equation:

$$L_w = L_p + 10log(S) - K_{1A} - K_{2A}$$

Where

L_p is the averaged measured L_{eq} of all measurement points, in dB(A);

S is the total surface area over the measurement box (total 5 planes), in m^2;

K_{1A} is the background correction factor as described in *ISO 3746:2010*, in dB(A);

K_{2A} is the environmental correction for sound absorption and reflection as described in *ISO 3746:2010*, in dB(A).

Except for Method 3, which was adopted with reference to ISO 3746; the noise sources measured using Method 1 or Method 2 were considered steady if the difference between the maximum and minimum Leq is less than or equal to 1dB(A), ie, ≤1dB(A); average Leq was therefore considered. Otherwise, the maximum Leq would be adopted for SWL determination as a conservative approach.

3.1.2 Measurement Equipment

The sound level meters and calibrators used for noise measurements are listed in **Table 3.1**. The instruments complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in **Appendix A2a**.

Table 3.1 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	Rion NL-52	00564841
	Rion NL-31	00593586
	SVAN 955	15234
	SVAN 958	20890
	SVAN 958	59120
	SVAN 958	59121
	SVAN 959	11228
Calibrator	Rion NC-74	34984065
	SV30A	29088

Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

3.1.3 Measurement Schedule

The noise measurements were carried out during daytime, evening time and night-time periods, where the fixed plant items were operated steadily and continuously at their noisiest operating mode under normal scenario. The noise measurement schedule is shown in **Table 3.2**.

Table 3.2 Measurement Schedule

Location	Date	Daytime and Evening Time / Night-time
PTI	10 – 11 May 2018	Night-time
	20 May 2018	Daytime and Evening Time
	30 May 2018	Daytime and Evening Time
	30 – 31 May 2018	Night-time
WEK	29 – 30 May 2018	Night-time
	31 May – 1 June 2018	Night-time
	5 – 6 June 2018	Night-time
	14-15 June 2018	Night-time
	21-22 June 2018	Night-time

Location	Date	Daytime and Evening Time / Night-time
	23-24 June 2018	Night-time
	25-26 June 2018	Night-time
	26-27 June 2018	Night-time
	27-28 June 2018	Night-time
	30 June-1 July 2018	Night-time
	1-2 July 2018	Night-time
	6-7 July 2018	Night-time
	9-10 July 2018	Night-time
	18-19 July 2018	Night-time
	25-26 July 2018	Night-time

3.2 Noise Measurement to Confirm Any Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

3.2.1 Measurement Equipment

The sound level meters and calibrators used for noise measurements are listed in **Table 3.3**. The instruments complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in **Appendix A2b**.

Table 3.3 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	B&K 2250	2551242
	B&K 2250	2551244
	B&K 2250	2718890
	B&K 2250-L	2741137
	B&K 2250-L	2701819
	B&K 2250-L	2701830
	B&K 2250-L	2718884
	NTI Audio M2230	6240
Calibrator	B&K 4231	1858983
	B&K 4231	2725557

3.2.2 Measurement Parameters

With reference to the IND-TM, the noise measurement was conducted at the representative NSRs for $L_{Aeq\ (30min)}$, in one-third octave band under the worst case scenario, i.e., “normal scenario” during night-time period at which with minimal influence from traffic noise.

The fixed plant noise sources will be operated steadily and continuously, and therefore no intermittency and impulsiveness are expected at the NSRs. However, the characteristics of intermittency and impulsiveness will be recorded, if any, based on observation during measurement.

2 sets of background noise level, $L_{Aeq\ (5min)}$, and in one-third octave band, were measured at each measurement location when all fixed plant noise sources were not in operation.

3.2.3 Measurement Location and Date

Based on the representative NSRs as listed in **Table 2.1** for WEK and PTI, some of the representative NSRs were selected for noise measurement. The selected representative NSRs include WK3a, WK4, WK7a, WK8a, WK11, WK12a, WK14 and WK14a. WK18 is a planned NSR and thus no measurement was conducted at this planned NSR for checking of any characteristics of tonality, impulsiveness and intermittency. The measurement location is shown in **Figure 2.1**.

The noise measurement was carried out at the selected existing representative NSRs (**Table 4.3** refers) on 6 and 7 Jul 2018 during which the fixed plant items were operated steadily and continuously at their noisiest operating mode under normal scenario.

4 Measurement Results

4.1 The Noise Levels of Fixed Plant Noise Sources

The noise levels measured under the worst case scenario are determined and presented in **Table 4.1**. Details of the measurement results are shown in **Appendix A3**.

Table 4.1 Summary of Sound Power Levels for Fixed Plants

Location	Noise Sources	Louvre ID	Calculated SWL L_{Aeq}, dB(A)
WKP	WKP(formerly named as TVS 3)	WKP-U1-E6PN-03A Section 1	82
		WKP-U1-E6PN-03A Section 2	80
		WKP-U1-E6PN-06A	69
		WKP-U1-E6PN-04A	83
		WKP-U1-E6VS-02	66
		WKP-U1-E6PN-09	74
	EAA (formerly named as VS 3 North)	WKT-VS3N-1	80
WEK	VS 3	WKT-VS3-1	67
		WKT-VS3-2	67
		WKT-VS3-3	72
		WKT-VS3-4	72
		WKT-VS3-5	69
		WKT-VS3-6A	66
		WKT-VS3-6B	67
		WKT-VS3-7	65
		WKT-VS3-8	66

Location	Noise Sources	Louvre ID	Calculated SWL L_{Aeq}, dB(A)
	VS 2 East	WKT-VS2E-1	72
		WKT-VS2E-2	69
		WKT-VS2E-3	69
	VS 4	WKT-VS4-1	79
		WKT-VS4-3	73
		WKT-VS4-4	74
	VS 5	WKT-VS5-1	70
		WKT-VS5-2	92
		WKT-VS5-4	79
	VS 2 West	WKT-VS2W-1	75
		WKT-VS2W-2A	68
		WKT-VS2W-2B	70
		WKT-VS2W-2C	70
		WKT-VS2W-3	76
	VS 1	WKT-VS1-1	67
		WKT-VS1-2	72
		WKT-VS1-3	72
		WKT-VS1-4	75
WKCD	VS 6	WKT-VS6-1	77
		WKT-VS6-2A	60
		WKT-VS6-2B	62
		WKT-VS6-3A	62
		WKT-VS6-3B	66
		WKT-VS6-4	75
		WKT-VS6-5A	76
		WKT-VS6-5B	76
		WKT-VS6-6A	65
		WKT-VS6-6B	70
		WKT-VS6-7A	69
		WKT-VS6-7B	63
	PVS 6	WKT-PVS6-1	63
		WKT-PVS6-2	68
		WKT-PVS6-3A	69
		WKT-PVS6-3B	73
		WKT-PVS6-4	72
	VS6-4 (formerly named as TVS 1)	WKT-G-G15VS-01A	75
		WKT-G-G15VS-01B	76
		WKT-G-G15VS-01C	74
		WKT-G-G15VS-03A Section 1	72
		WKT-G-G15VS-03A Section 2	73
	VS 7	WKT-G-D14VS-03A	81
		WKT-G-D14VS-04A	78
		WKT-VS7-1A	77

Location	Noise Sources	Louvre ID	Calculated SWL L_{Aeq}, dB(A)
		WKT-VS7-1B	74
		WKT-VS7-2	69
		WKT-VS7-3	80
PTI	PTI Ventilation Shaft	L-01	83
		L-02	79
		L-03	81
		L-03a	80
		L-06	75
		L-07	69
		L-08	72
		L-08a	69
		L-10	86
		L-11	84
		L-12	84
		L-13	90
		L-14	88
		L-15a	86
		L-15b	82
		L-21	75
		L-22	76
		L-23	78
		L-24	78
		L-28	72
		L-29	79
		L-30	75
		L-31	83

A compliance check against the fixed plant noise criteria at NSRs was conducted. The cumulative noise levels from noise sources were assessed to ensure the compliance with the noise criteria. **Table 4.2** show the results, details of the calculation are also given in **Appendix A3**.

Table 4.2 Cumulative Fixed Plant Noise Levels at Representative NSRs under Day 1 Operation

NSR ID	Description	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
WK3	Man King Building, 46-48 Man Wui Street (South facade)	46	46	60	50	Y	Y

NSR ID	Description	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
WK3a	Man King Building, 46-48 Man Wui Street (West facade)	48	48	60	50	Y	Y
WK4	Tower 6, Sorrento (East facade)	47	47	60	50	Y	Y
WK7a	Tsim Sha Tsui Fire Station	41	41	65	55	Y	Y
WK8a	Tower 6, The Waterfront	46	46	60	50	Y	Y
WK11a	Tower 3, The Austin	45	45	60	50	Y	Y
WK12a	Tower 5, Grand Austin	47	47	60	50	Y	Y
WK14	Moon Tower, The Arch	41	41	60	50	Y	Y
WK14a	Star Tower, The Arch	41	41	60	50	Y	Y
WK18	Hindu Temple	55	N/A[a]	65	55	Y	Y

Note:
(a) No sensitive use at WK18 during night-time period.

4.2 The Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

Noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs were conducted under the normal scenarios during night-time period. Measurement results are summarised in **Table 4.3** below. Two sets of noise measurements, $L_{Aeq(30min)}$, in one-third octave band, were carried out to confirm that the difference in the measured noise levels with and without operation of fixed plant noise sources were less than 3.0 dB(A). That means fixed plant noise sources are not considered as significant noise sources at the NSRs.

Noise measurements at the selected representative NSRs were dominated by road traffic noise; characteristics of tonality, impulsiveness and intermittency due to the fixed plant noise sources from fixed plant noise sources in West Kowloon was not noticeable during the measurement. Detailed results of noise measurements are shown in **Appendix A4**.

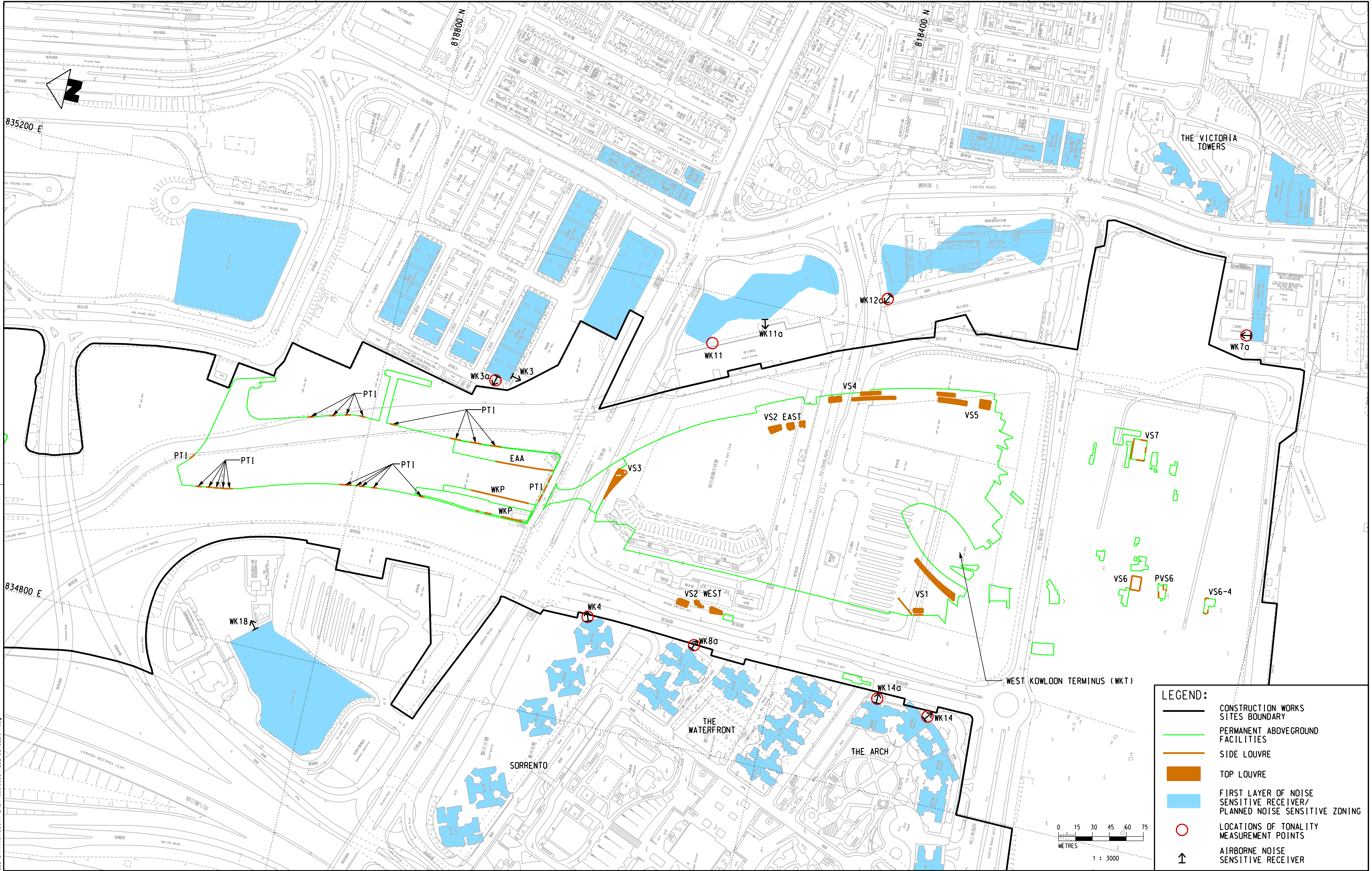
Table 4.3 Noise measurement Results at NSR Under Scenario 1

NSR	Time Period	Measured Noise Level $L_{Aeq(30min)}$, dB(A), (measurement time)	Averaged Background Level $L_{Aeq(5min)}$, dB(A), (measurement time)	Difference between Measured Noise Level and Background Level, dB(A), (< 3 or >= 3)
WK3a	Night-time	54.9 (23:46-00:16) 54.3 (00:22-00:52)	55.1 (01:13-1:34)	< 3
WK4	Night-time	60.4 (00:02-00:32) 60.2 (12:32-01:02)	59.5 (01:17-01:27)	< 3
WK7a	Night-time	56.2 (23:52-00:22) 56.0 (00:23-00:53)	54.4 (01:20-01:41)	< 3
WK8a	Night-time	58.4 (23:52-'00:22) 56.9 (00:22-00:52)	57.3 (01:24-01:34)	< 3
WK11	Night-time	58.5 (23:54-00:24) 58.0 (00:24-00:54)	56.7 (01:16-01:36)	< 3
WK12a	Night-time	52.4 (23:53-00:23) 51.4 (00:23-00:53)	50.0 (01:13-01:33)	< 3
WK14	Night-time	56.0 (23:51-00:22) 54.3 (00:22-00:52)	54.5 (01:12-01:33)	< 3
WK14a	Night-time	56.4 (00:00-00:30) 56.0 (00:30-01:00)	56.1 (01:13-01:33)	< 3

As the differences between measured noise levels and background levels are all less than 3.0 dB(A), it was unable to obtain reliable corrected noise levels at the NSRs and corrections for tonality, impulsiveness or intermittency were therefore not applicable.

5 Conclusions

To fulfil the XRL EP condition 2.36, the fixed plant noise verification were undertaken and the measurement results indicated all the fixed plant noise levels in WEK and PTI are in compliance with the fixed plant noise criteria.



REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	12/JUL/2018

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ENS_M52_104A.dgn

TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

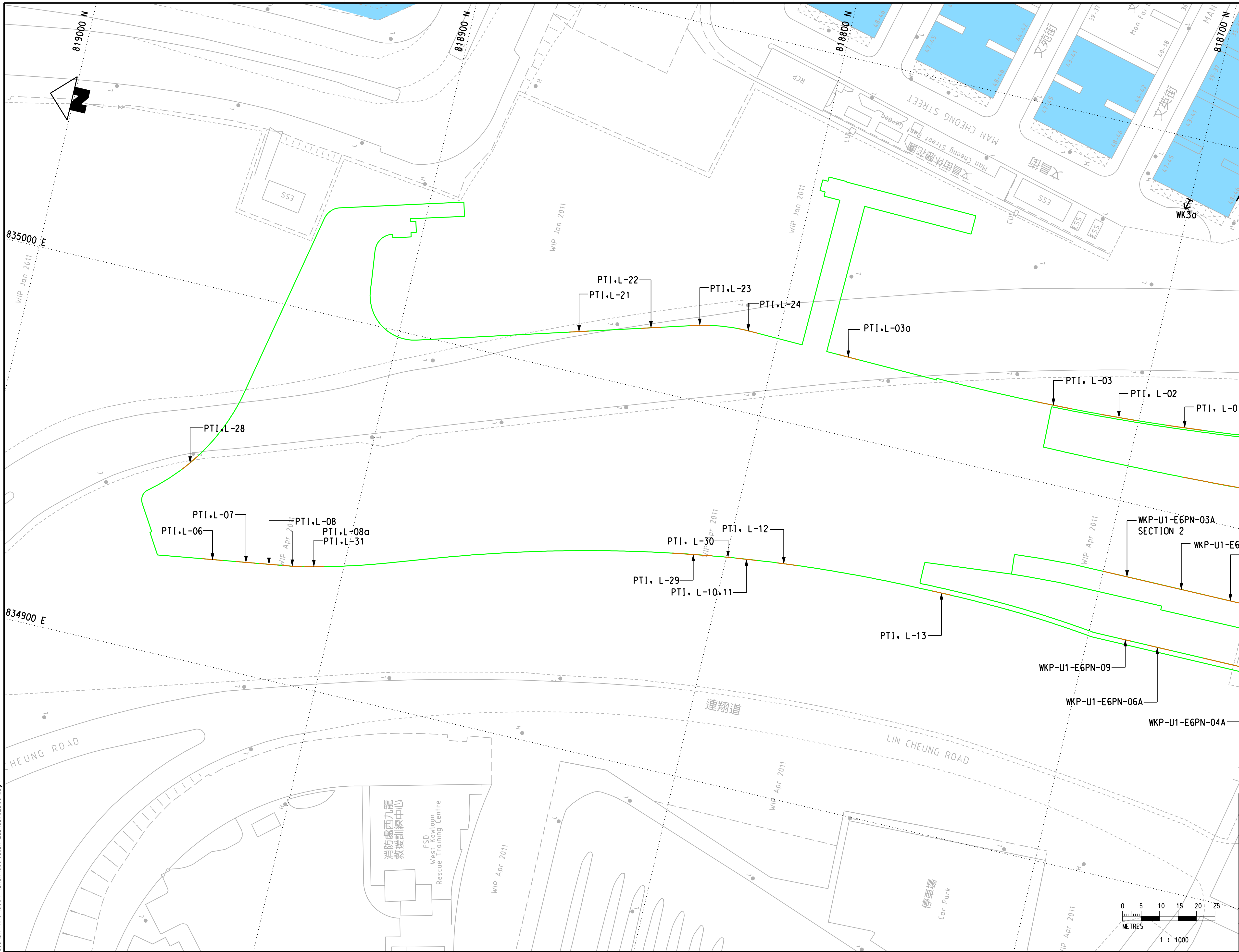
LOCATIONS OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS AND TONALITY MEASUREMENT POINTS (WEK&PTI)

SCALE 1 : 3000 (A3)

FIGURE NO. Figure 2.1

REV. A

PLOT DRV: V:\ustnset\MTR\PLOTDRIVER\WINDOWS\A3 COLOUR.plt
MODELNAME: Default PRINTED BY: WenH 2018/8/2 17:06:34
FILENAME: P:\projects\60250393\DRAWING\000\K\ENS\R\C8016_C_XRL_ENS_M52_104A.dgn



LEGEND:

- PERMANENT ABOVEGROUND FACILITIES
- SIDE LOUVRE
- TOP LOUVRE
- FIRST LAYER OF NOISE SENSITIVE RECEIVER/ PLANNED NOISE SENSITIVE ZONING
- AIRBORNE NOISE SENSITIVE RECEIVER

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	12/JUL/2018

DO NOT SCALE DRAWINGS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.

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EXPRESS RAIL LINK

ORIGINATOR

AECOM

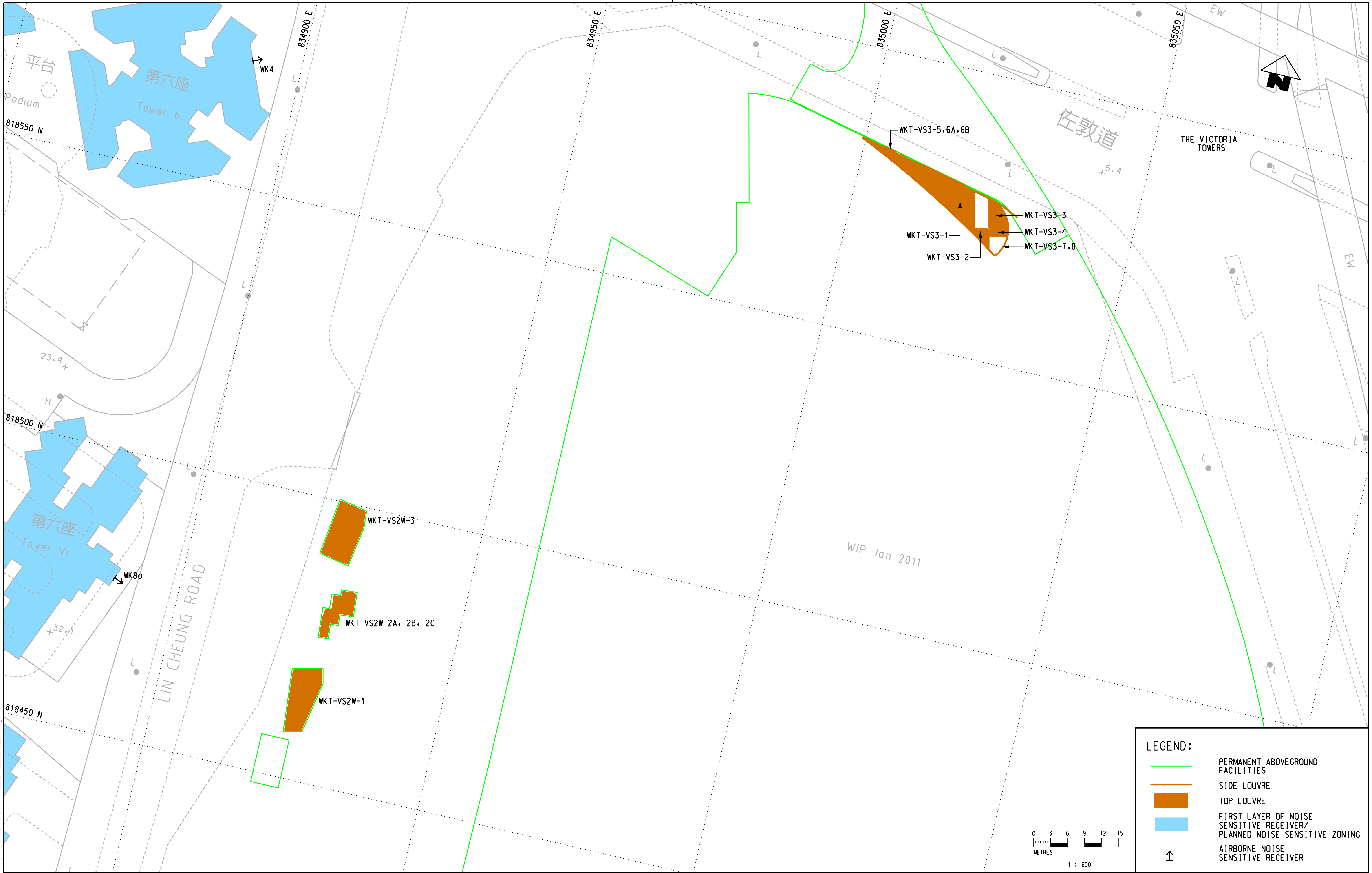
CADD REF. C8016_C_XRL_ENS_M52_105A.dgn

TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF FIXED PLANT NOISE SOURCES
(SHEET 1 OF 5)

SCALE 1 : 3000 (A3) | FIGURE NO. Figure 2.2A | REV. A

PLOT DRV: V:\ustnset\MTR\PLOTDRIVER\WINDOWS\A3 COLOUR.plt 12:2b05
MODELNAME: Default PRINTED BY: LVP 2018/7/31
FILENAME: P:\projects\60450393\DRAWING\000\XK\ENSR\C8016_C_XRL_ENS_M52_105A.dgn



DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	12/JUL/2018

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EXPRESS RAIL LINK

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AECOM

CADD REF. C8016_C_XRL_ENS_M52_106A.dgn

TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATIONS OF FIXED PLANT NOISE SOURCES

(SHEET 2 OF 5)

SCALE 1 : 600 (A3)

FIGURE NO. Figure 2.2B

REV. A

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

PLOT DRV: V:\ustnset\MTR\PLOTDRVER\WINDOWS\A3 COLOUR.plt 2018/7/18 14:50:13
MODELNAME: Default PRINTED BY: LVP
FILENAME: P:\projects\60150393\DRAWING\000\K\ENSR\C8016_C_XRL_ENS_M52_106A.dgn

DRAWN	ZRH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	12/JUL/2018

DO NOT SCALE DRAWINGS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

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CADD REF. C8016_C_XRL_ENS_M52_107A.dgn

TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATIONS OF FIXED PLANT NOISE SOURCES

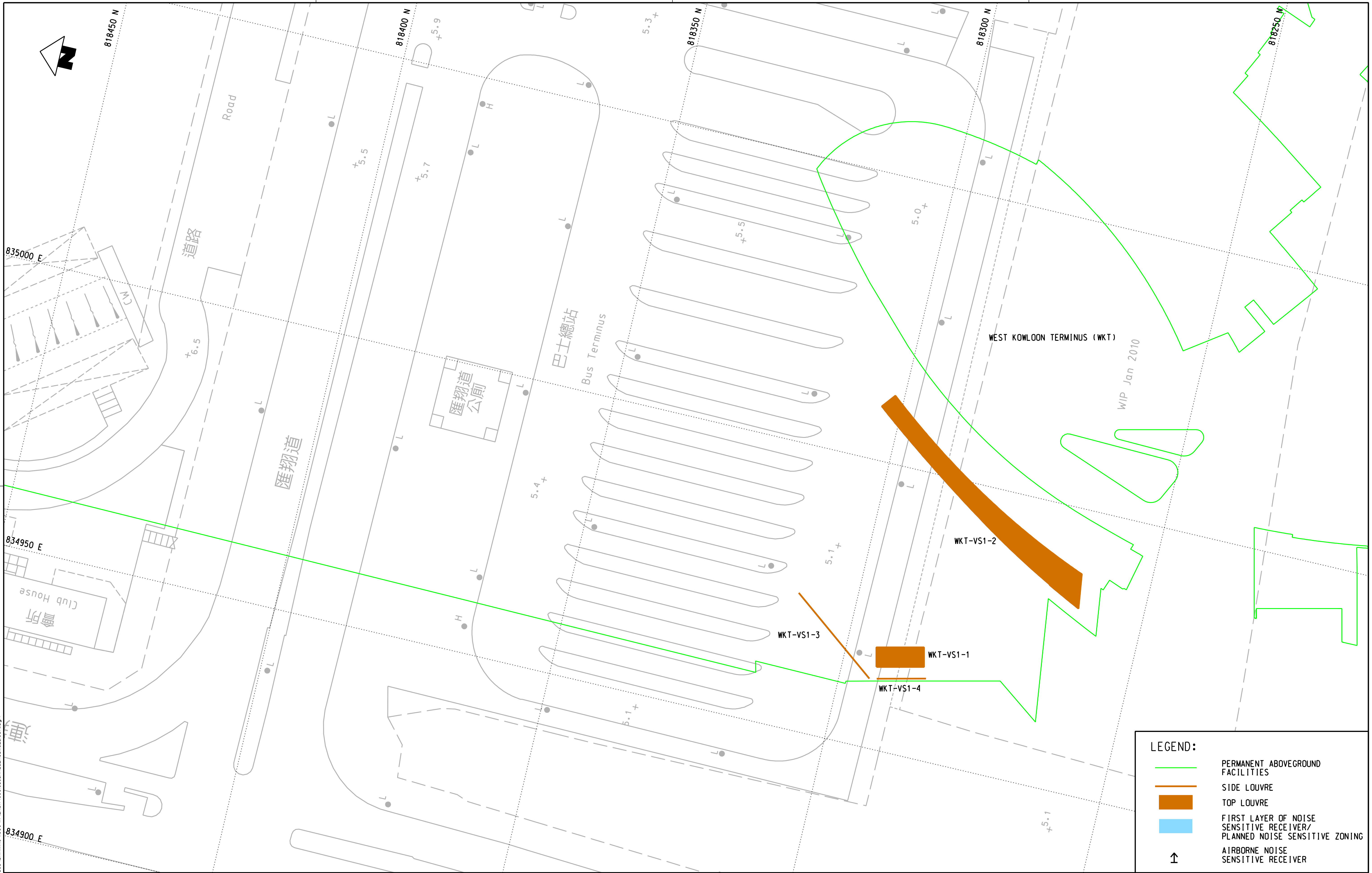
(SHEET 3 OF 5)

SCALE 1 : 600 (A3)

FIGURE NO. Figure 2.2C

REV. A

PLOT DRV: V:\ustnset\MTR\PLOTDRIVER\WINDOWS\A3 COLOUR.plt
MODELNAME: Default PRINTED BY: WenH 2018/8/2 17:10:36
FILENAME: P:\projects\60450393\DRAWING\000\K\ENSR\C8016_C_XRL_ENS_M52_107A.dgn



REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	ZRH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	12/JUL/2018

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ENS_M52_108A.dgn

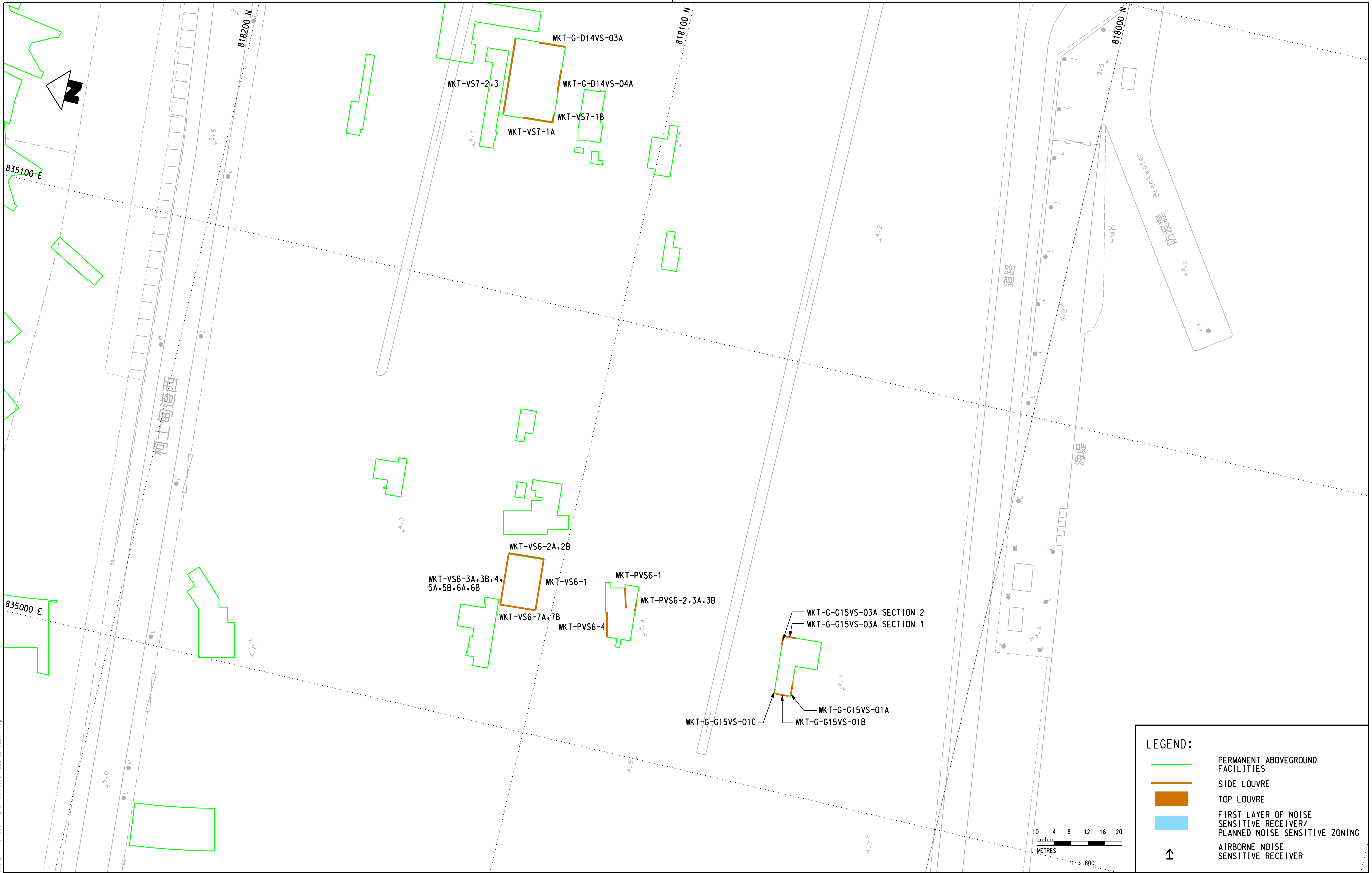
TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF FIXED PLANT NOISE SOURCES
(SHEET 4 OF 5)

SCALE 1 : 600 (A3)

FIGURE NO. Figure 2.2D

REV. A



DRAWN	ZRH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	12/JUL/2018

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ENS_M52_109A.dgn

TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATIONS OF FIXED PLANT NOISE SOURCES

(SHEET 5 OF 5)

SCALE 1 : 800 (A3)

FIGURE NO. Figure 2.2E

REV. A

PLOT DRV: V:\ustnset\MTR\PLOTDRIVER\WINDOWS\A3 COLOUR.plt 2018/8/10 15:27:24
MODELNAME: Default PRINTED BY: LVP
FILENAME: P:\projects\60150393\DRAWING\000\KK\ENSR\C8016_C_XRL_ENS_M52_109A.dgn

Appendix A1 –Measurement Methodology

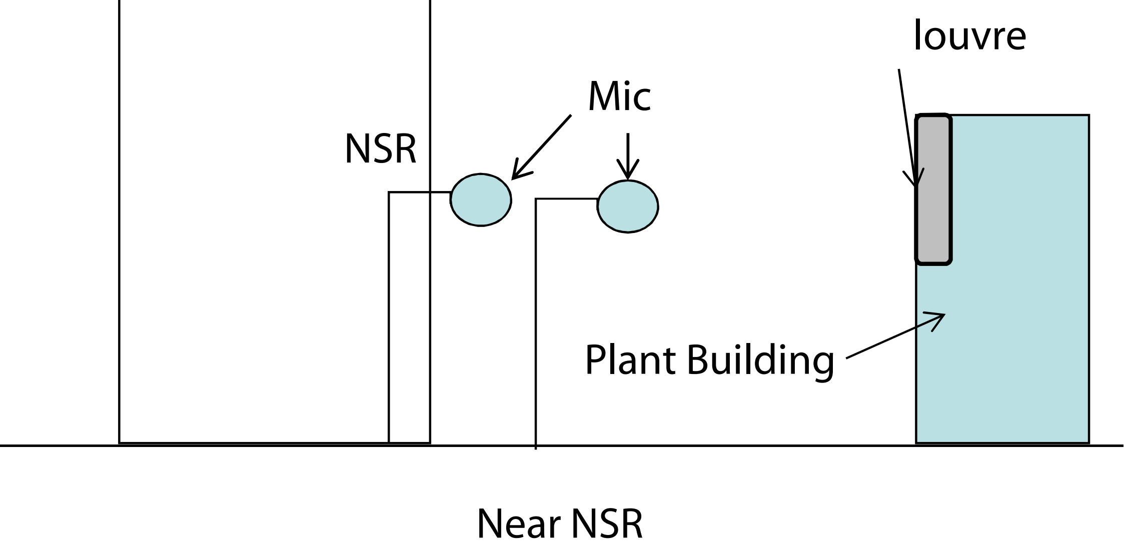
Summary of Testing Methodology

Method	Standard	No of repeated measurement	No of measurement point	Measurement distance, D	To Verify
Method 1 (NSR Method)	NCO - TM	3 sets of Leq 1min	Depend on number of NSRs nearby	At the most affected NSR or near NSR	ANL-5 or Background Prevailing
Method 2 (Far Field Method)	Basic Acoustic Principle	3 sets of Leq 1min	1 (for louvre/plant with uniform plane source)	D ≧2b and roundup to integer	ANL-5 or Background Prevailing
Method 3 (Near Field Method)	Developed based on ISO3746:2010	1 set of Leq 10s [(a)] /1min	Depend on the size of the louvre/plant and the measurement distance should follow guideline in ISO3746	At least 1m from the louvre opening/plant (unless otherwise specified)	ANL-5 or Background Prevailing

Note :
(a) If fixed plant items are operated at their noisiest operating modes and are steady during measurement, 10-second will be adopted for the duration of measurement.

Method 1 – Sound Pressure Level at NSR or Near NSR for louvre or Plant

"b" is the long side of the louvre
"D" is the separation between louvre and microphone



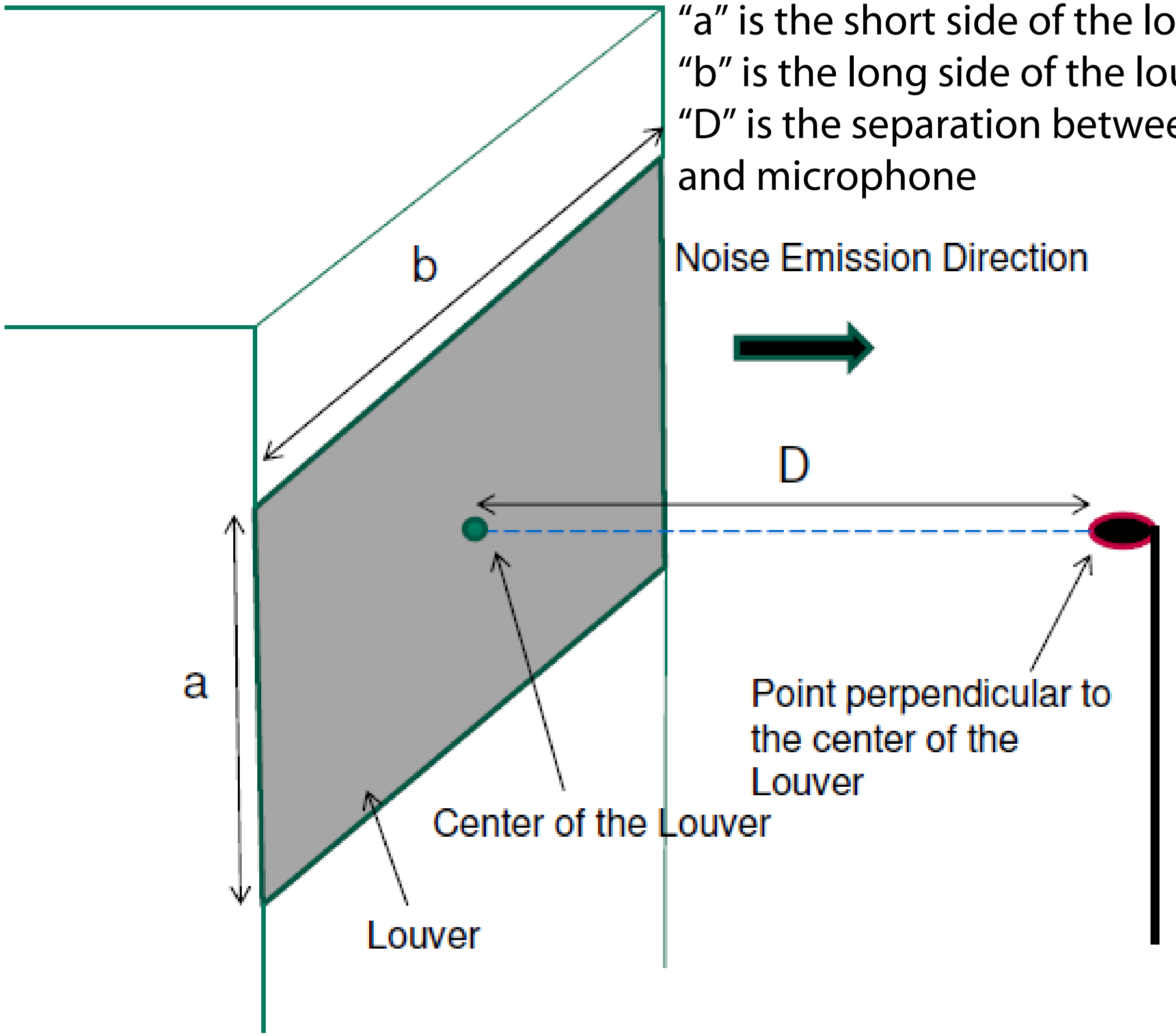
- Based on NCO - TM
- The locations of measurement points are depended on the site situation
- 3.0 dB façade correction should be considered if the location of measurement point is not at assessment point as defined in NCO-TM
- "D" must be greater than 2b and roundup to integer
- Detail calculation of the SPL should refer to the NCO-TM.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

Background corrected SPL = Mean $L_{Aeq1min}$ + BG - [20log (D) +8] (if applicable) + façade correction (if applicable)

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for louvre

"a" is the short side of the louvre
"b" is the long side of the louvre
"D" is the separation between louvre and microphone



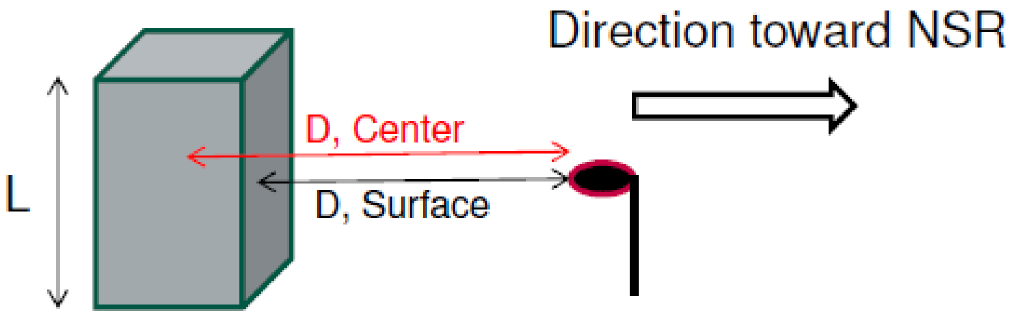
- Based on basic acoustic principle
- "D" must be greater than 2b and roundup to integer, i.e.: D≧2b
- The microphone must point to the center of the louvre.
- At least 3 sets of LAeq, 1min should be obtained
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 +BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for Plant

"L" is the longest side of the plant item
"D, Center" is the separation between center of the plant item and microphone
"D, Surface" is the separation between surface of the plant item and microphone

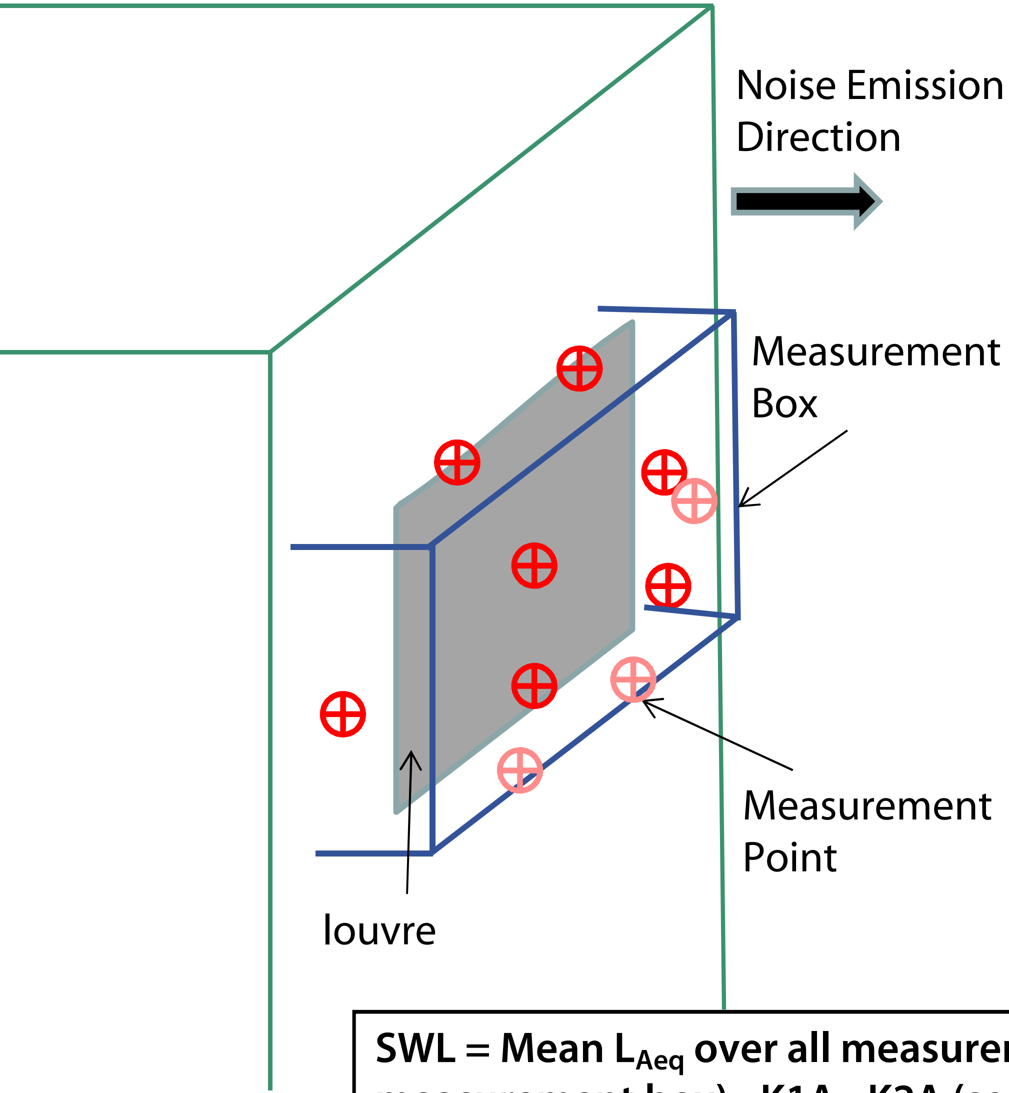


- "D, Surface" must be greater than twice of L (2L) and roundup to integer
- The microphone must be pointing to the center of the plant
- At least 3 sets of LAeq, 1min should be obtained at each measurement point.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 + BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 3 – Near Field Sound Power Testing Method for louvre

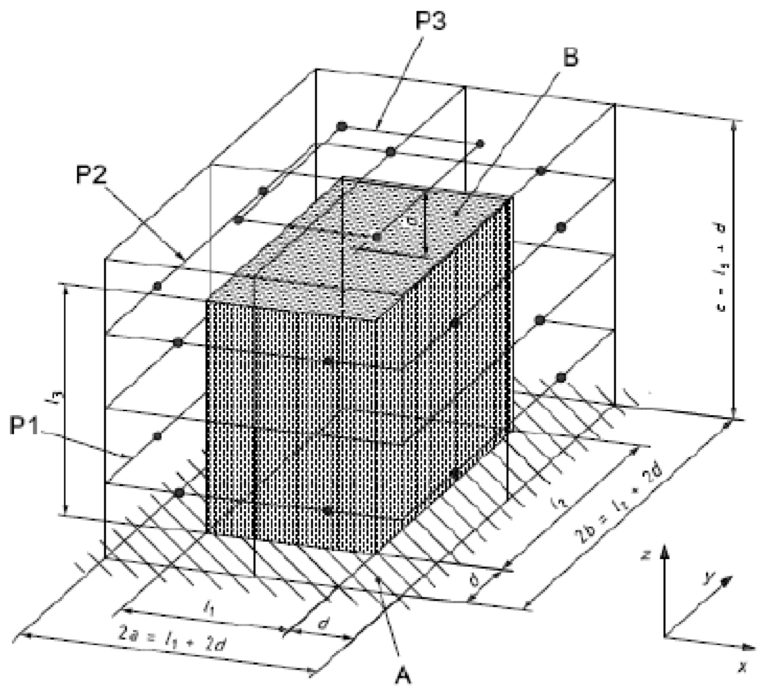


- Based on the principle of ISO3746 – 2010
- First step is to determine a hypothetical measurement surface /box with not less than 1m separation from the louvre.
- Second, determine the location of measurement point in accordance with the latest edition of ISO3746.
- Background noise level (BGL) should be taken at each measurement point for determination of background correction (K1A)
- At least 1 set of Leq, 10s/1min should be obtained at each measurement point
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Details calculation of the SWL should refer to the latest edition of ISO3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 3 – Near Field Sound Power Testing Method for Plant



- Based on ISO 3746
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalised (See figure on the left for example).
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Detail calculation of the SWL should refer to the latest edition of ISO 3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Appendix A2 – Calibration Certificates

Appendix A2a – Calibration Certificates (Noise Measurement for the Fixed Plants)

MAX

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	6-Feb-2018	**Certificate Number**	MLCN180200S

Customer Information

Company Name	Wilson Acoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T.

Equipment-under-Test (EUT)

Description	Sound Level Meter
Manufacturer	Svantek
Model Number	SVAN 955
Serial Number	15234
Equipment Number	--

Calibration Particular

Date of Calibration	6-Feb-2018		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-2018		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo	6-Feb-2018

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.
*

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MaxLab Calibration Centre Limited
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Unit B2, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk

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Certificate No. MLCN180200S

Calibration Data

Parameter	Frequency Weighting	Range (dB)	Time Weighting	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
SPL	A (1 kHz Input)	25 - 130	F	94 dB	94.0 dB	0.0 dB	0.2 dB
			S	94 dB	94.0 dB	0.0 dB	0.2 dB
			I	94 dB	94.0 dB	0.0 dB	0.2 dB
	C (1 kHz Input)	25 - 130	F	94 dB	94.0 dB	0.0 dB	0.2 dB
			S	94 dB	94.0 dB	0.0 dB	0.2 dB
			I	94 dB	94.0 dB	0.0 dB	0.2 dB
	Z (1 kHz Input)	25 - 130	F	94 dB	94.0 dB	0.0 dB	0.2 dB
			S	94 dB	94.0 dB	0.0 dB	0.2 dB
			I	94 dB	94.0 dB	0.0 dB	0.2 dB
	A (1 kHz Input)	25 - 130	F	114 dB	114.0 dB	0.0 dB	0.2 dB
			S	114 dB	114.0 dB	0.0 dB	0.2 dB
			I	114 dB	114.0 dB	0.0 dB	0.2 dB
	C (1 kHz Input)	25 - 130	F	114 dB	114.0 dB	0.0 dB	0.2 dB
			S	114 dB	114.0 dB	0.0 dB	0.2 dB
			I	114 dB	114.0 dB	0.0 dB	0.2 dB
	Z (1 kHz Input)	25 - 130	F	114 dB	114.0 dB	0.0 dB	0.2 dB
			S	114 dB	114.0 dB	0.0 dB	0.2 dB
			I	114 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Patrick
Date : 6-Feb-2018

Checked By : K.O. Lo
Date : 6-Feb-2018

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Calibration Certificate

Certificate Information

Date of Issue	23-Jun-2017	**Certificate Number**	MLCN171137S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	20890
Equipment Number	--

Calibration Particular

Date of Calibration	23-Jun-2017		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-2018		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 23-Jun-2017

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.
* The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited.

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MAXLAB

Certificate No.MLCN171137S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	A / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	A / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB

- END -

Calibrated By : Patrick
Date : 23-Jun-2017

Checked By : K.O. Lo
Date : 23-Jun-2017

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MaxLab Calibration Centre Limited
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Unit B2, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk

SVANTEK ISO9001 certified

FACTORY CALIBRATION DATA OF THE SVAN 958 *No. 59120*

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: LIN; Input signal =114.0dB, f_{sin}=1kHz

	Range 105dB		Range 130dB	
	Indication [dB]	**Error [dB]**	**Indication [dB]**	**Error [dB]**
Channel 1	113.99	-0.01	114.02	0.02
Channel 2	113.98	-0.02	114.03	0.03
Channel 3	113.98	-0.02	114.03	0.03
Channel 4	113.98	-0.02	114.02	0.02

2. CALIBRATION* (acoustical)

LEVEL METER; Range: 130 dB; Reference frequency: 1000Hz;

Filter	LIN		A		C	
	Indication [dB]	**Error [dB]**	**Indication [dB]**	**Error [dB]**	**Indication [dB]**	**Error [dB]**
Channel 1	114.0	0.0	114.0	0.0	114.0	0.0
Channel 2	114.0	0.0	114.0	0.0	114.0	0.0
Channel 3	114.0	0.0	114.0	0.0	114.0	0.0
Channel 4	114.0	0.0	114.0	0.0	114.0	0.0

Calibration measured with the microphone SVANTEK type SV22 No. 4013604. Calibration factor: -0.4dB

3. LINEARITY TEST* (electrical)

LEVEL METER; Range: 105 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	24.0	30.0	40.0	60.0	80.0	100.0	114.0
Channel 1	**Error [dB]**	0.24	0.11	0.04	-0.0i	0.00	0.01	0.01
Channel 2	**Error [dB]**	0.28	0.10	0.04	-0.01	0.00	0.01	0.01
Channel 3	**Error [dB]**	0.20	0.10	0.04	-0.01	0.00	0.01	0.01
Channel 4	**Error [dB]**	0.21	0.09	0.04	-0.01	0.00	0.01	0.01

LEVEL METER; Range: 130 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	45.0	50.0	60.0	80.0	100.0	120.0	135.0
Channel 1	**Error [dB]**	0.09	0.07	0.03	0.00	0.01	0.00	0.01
Channel 2	**Error [dB]**	0.10	0.06	0.03	0.00	0.01	0.00	0.01
Channel 3	**Error [dB]**	0.03	0.05	0.02	0.01	0.01	0.01	0.02
Channel 4	**Error [dB]**	0.00	0.04	0.02	0.00	0.01	0.00	0.01

1/3 OCTAVE (1kHz); Range: 130 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	35.0	40.0	60.0	80.0	100.0	120.0	135.0
Channel 1	**Error [dB]**	0.39	0.15	0.03	0.01	0.01	0.00	0.01
Channel 2	**Error [dB]**	0.37	0.14	0.03	0.01	0.01	-0.00	0.02
Channel 3	**Error [dB]**	0.23	0.05	0.03	0.00	0.01	0.00	0.01
Channel 4	**Error [dB]**	0.23	0.03	0.02	0.01	0.01	0.01	0.02

4. TONEBURST RESPONSE* (electrical)

LEVEL METER; Characteristic: A; f_{sin}= 4000 Hz; Burst duration: 2s;

Range: **105dB**; Equivalent input steady level = 112dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.9	97.9	94.0	91.0	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
		2	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.8	97.9	94.0	90.9	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		3	Indication [dB]	112.0	111.9	111.0	109.4	107.1	103.7	100.8	97.9	93.9	90.9	87.9	84.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		4	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.9	97.9	94.0	91.0	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	1	Indication [dB]	109.9	108.0	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	Indication [dB]	109.9	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	Indication [dB]	109.9	107.9	104.5	101.7	98.8	94.9	91.9	88.9	84.9	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	Indication [dB]	109.9	108.0	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		2	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	81.9	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		3	Indication [dB]	111.8	108.9	105.0	102.0	98.9	95.0	92.0	88.9	84.9	81.9	78.9	75.8
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		4	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1

Range: **105dB**; Equivalent input steady level = 52dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	Indication [dB]	52.0	51.9	51.0	49.4	47.2	43.7	40.8	37.9
			Error [dB]	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	0.0
		2	Indication [dB]	52.0	51.9	51.0	49.4	47.1	43.7	40.8	37.9
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
		3	Indication [dB]	51.9	51.9	51.0	49.3	47.1	43.6	40.8	37.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0
		4	Indication [dB]	52.0	51.9	51.0	49.4	47.2	43.7	40.8	37.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	0.0	-0.1	-0.0
	Slow	1	Indication [dB]	49.9	47.9	44.6	41.8	38.9	35.0	32.0	29.0
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
		2	Indication [dB]	49.9	47.9	44.6	41.8	38.9	34.9	31.9	29.1
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.1
		3	Indication [dB]	49.9	47.9	44.5	41.7	38.8	34.9	31.9	29.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.1
		4	Indication [dB]	49.9	47.9	44.6	41.8	38.9	35.0	32.1	29.0
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	0.0	0.1	0.0
SEL	-	1	Indication [dB]	51.8	49.0	45.0	42.0	39.0	35.1	32.1	29.2
			Error [dB]	-0.2	-0.0	0.0	0.0	0.0	0.1	0.1	0.2
		2	Indication [dB]	51.8	49.0	45.0	42.0	39.0	35.0	32.0	29.2
			Error [dB]	-0.2	-0.0	0.0	0.0	0.0	0.1	0.1	0.2
		3	Indication [dB]	51.8	48.9	45.0	41.9	38.9	35.0	32.0	29.1
			Error [dB]	-0.2	-0.0	0.0	0.0	0.0	0.1	0.1	0.1
		4	Indication [dB]	51.8	49.0	45.0	42.0	39.0	35.1	32.1	29.1
			Error [dB]	-0.2	0.0	0.0	-0.0	0.0	0.1	0.1	0.1

Range: **105dB**; Equivalent input steady level = 34dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	**Indication [dB]**	34.1	34.0
			Error [dB]	0.0	0.0
		2	**Indication [dB]**	34.1	33.9
			Error [dB]	0.0	-0.0
		3	**Indication [dB]**	34.0	33.9
			Error [dB]	0.0	0.0
		4	**Indication [dB]**	34.0	33.9
			Error [dB]	-0.0	-0.1
	Slow	1	**Indication [dB]**	32.0	30.1
			Error [dB]	-0.1	0.1
		2	**Indication [dB]**	32.0	30.0
			Error [dB]	-0.1	0.1
		3	**Indication [dB]**	31.9	29.9
			Error [dB]	-0.1	0.1
		4	**Indication [dB]**	31.9	30.0
			Error [dB]	-0.1	0.0
SEL	-	1	**Indication [dB]**	33.9	31.2
			Error [dB]	-0.1	0.1
		2	**Indication [dB]**	33.9	31.1
			Error [dB]	-0.1	0.1
		3	**Indication [dB]**	33.8	31.1
			Error [dB]	-0.2	0.1
		4	**Indication [dB]**	33.8	31.1
			Error [dB]	-0.2	0.0

Range: **130dB**; Equivalent input steady level = 134dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	**Indication [dB]**	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		3	**Indication [dB]**	134.0	133.9	133.0	131.4	129.1	125.7	122.8	119.9	115.9	112.9	109.9	106.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		4	**Indication [dB]**	134.0	133.9	133.0	131.4	129.2	125.7	122.9	119.9	116.0	113.0	109.9	106.9
			Error [dB]	-0.0	0.0	0.0	0.0	129.2	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
	Slow	1	**Indication [dB]**	131.9	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	**Indication [dB]**	131.9	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	**Indication [dB]**	131.9	129.9	126.5	123.8	120.8	116.9	113.9	110.9	106.9	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	**Indication [dB]**	131.9	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	**Indication [dB]**	133.8	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	104.0	100.9	97.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		2	**Indication [dB]**	133.8	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	103.9	100.9	97.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		3	**Indication [dB]**	133.8	130.9	127.0	124.0	121.0	117.0	114.0	110.9	107.0	103.9	100.9	97.8
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		4	**Indication [dB]**	133.8	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	104.0	100.9	97.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1

Range: **130dB**; Equivalent input steady level = 74dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	**Indication [dB]**	74.0	73.9	73.0	71.4	69.2	65.7	62.8	59.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.0
		2	**Indication [dB]**	74.0	73.9	73.0	71.4	69.2	65.7	62.8	59.9
			Error [dB]	0.0	0.0	73.0	0.0	-0.0	-0.0	-0.0	0.0
		3	**Indication [dB]**	73.9	73.9	73.0	71.3	69.1	65.6	62.8	59.9
			Error [dB]	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0
		4	**Indication [dB]**	74.0	73.9	73.0	71.4	69.2	65.7	62.8	59.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
	Slow	1	**Indication [dB]**	71.9	69.9	66.6	63.8	60.9	57.0	54.0	51.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
		2	**Indication [dB]**	71.9	69.9	66.5	63.8	60.9	56.9	54.0	51.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.0
		3	**Indication [dB]**	71.9	69.9	66.5	63.7	60.8	56.9	54.0	51.0
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.1
		4	**Indication [dB]**	71.9	69.9	66.6	63.8	60.9	57.0	54.0	51.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	0.1
SEL	-	1	**Indication [dB]**	73.8	71.0	67.0	64.0	61.0	57.0	54.1	51.1
			Error [dB]	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1
		2	**Indication [dB]**	73.8	71.0	67.0	64.0	61.0	57.0	54.0	51.1
			Error [dB]	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1
		3	**Indication [dB]**	73.8	70.9	67.0	63.9	61.0	57.0	54.0	51.0
			Error [dB]	-0.2	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0
		4	**Indication [dB]**	73.8	71.0	67.0	64.0	61.0	57.0	54.0	51.1
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	0.1

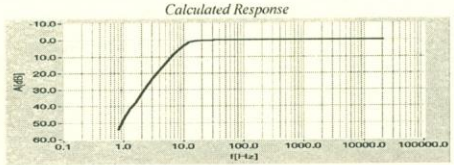
Range: **130dB**; Equivalent input steady level = 54dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	**Indication [dB]**	54.1	53.9
			Error [dB]	0.0	-0.0
		2	**Indication [dB]**	54.0	53.9
			Error [dB]	-0.0	-0.0
		3	**Indication [dB]**	54.0	53.9
			Error [dB]	0.1	0.1
		4	**Indication [dB]**	54.0	54.0
			Error [dB]	0.0	0.1
	Slow	1	**Indication [dB]**	52.0	50.0
			Error [dB]	-0.1	0.1
		2	**Indication [dB]**	51.9	50.0
			Error [dB]	-0.1	0.1
		3	**Indication [dB]**	51.9	49.9
			Error [dB]	-0.0	0.1
		4	**Indication [dB]**	51.9	50.0
			Error [dB]	-0.1	0.1
SEL	-	1	**Indication [dB]**	53.9	51.1
			Error [dB]	-0.1	0.1
		2	**Indication [dB]**	53.9	51.1
			Error [dB]	-0.2	0.1
		3	**Indication [dB]**	53.8	51.0
			Error [dB]	-0.1	0.1
		4	**Indication [dB]**	53.9	51.1
			Error [dB]	-0.1	0.1

6. FREQUENCY RESPONSE (electrical)

LEVEL METER; Filter: Z; Range: 130 dB; Input signal =135 dB;

Calculated Response



Measured Response with Preamplifier SV12 (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
10	3.2	3.2	3.2	3.2	250	0.0	0.0	-0.0	0.0
12.5	1.4	1.4	1.4	1.4	500	0.0	0.0	-0.0	0.0
16	0.5	0.5	0.5	0.5	1000	0.0	0.0	-0.0	0.0
20	0.1	0.1	0.1	0.1	2000	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	4000	0.0	0.0	0.0	0.0
31.5	-0.0	-0.0	-0.0	-0.0	8000	0.0	0.0	0.0	0.0
63	-0.0	-0.0	-0.0	-0.0	16000	0.0	0.0	0.0	-0.0
125	0.0	0.0	-0.0	0.0	20000	-0.0	0.0	0.0	-0.1

All frequencies are nominal center values for the 1/3 octave bands

7. INTERNAL NOISE LEVEL* (electrical)

LEVEL METER; Range: 105 dB, Back-light – off; Calibration factor: 0dB

	Filter	Z	A	C
Channel 1	Level [dB]	14.7	13.3	12.6
Channel 2	Level [dB]	17.4	13.0	12.3
Channel 3	Level [dB]	17.8	11.7	11.1
Channel 4	Level [dB]	14.9	11.8	12.4

* measured with preamplifier SVANTEK type SV12 No. 1771.

VIBRATION LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: HP10; Input signal =140.0dB (10.0 m/s^2), f_{sin}=79,6Hz

	Range 145dB		Range 170dB	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	139.98	-0.02	140.03	0.03
Channel 2	139.99	-0.01	140.04	0.04
Channel 3	139.98	-0.02	140.04	0.04
Channel 4	139.98	-0.02	140.03	0.03

2. CALIBRATION (vibrational)

LEVEL METER; Range: 145dB; Input signal: 120dB;

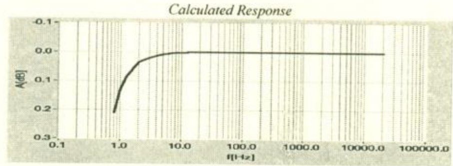
Filter	HP1		HP10		Wd		Wm		Wh	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.2	0.1	110.7	0.1
Channel 2	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.2	0.1	110.7	0.1
Channel 3	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.1	0.1	110.7	0.1
Channel 4	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.2	0.1	110.7	0.1

Calibration measured with the accelerometer DYTRAN type 3185D No. 2975. Calibration factor: -0.3dB

3. FREQUENCY RESPONSE (electrical)

1/3 OCTAVE; Filter: HP; Range: 170 dB; input=175 dB;

Calculated Response



Measured Response (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2 [dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
0.8	0.21	0.21	0.20	0.21	5	0.01	0.01	0.01	0.02	500	0.00	0.00	0.00	0.00
1	0.12	0.12	0.12	0.12	6.3	0.01	0.01	0.01	0.01	1000	0.00	0.00	0.00	0.00
1.25	0.09	0.09	0.09	0.09	8	0.01	0.01	0.01	0.01	2000	0.00	0.00	0.00	0.00
1.6	0.04	0.04	0.04	0.05	16	0.00	0.00	0.00	0.00	4000	0.01	0.02	0.02	0.01
2	0.04	0.04	0.03	0.04	31.5	-0.01	0.00	-0.01	0.00	8000	0.04	0.04	0.05	0.02
2.5	0.02	0.02	0.02	0.03	63	0.00	0.00	0.00	0.00	16000	0.02	0.02	0.04	-0.04
3.15	0.03	0.03	0.03	0.03	125	0.00	0.00	0.00	0.00	20000	-0.01	0.00	0.02	-0.07
4	0.03	0.03	0.03	0.03	250	0.00	0.00	-0.01	0.00					

All frequencies are nominal center values for the 1/3 octave bands

4. INTERNAL NOISE LEVEL (electrical)

LEVEL METER func.; Range: 145 dB; Back-light – off

	Filter	HP1	HP10	Wd	Wm	Wh
Channel 1	**Indication [dB]**	54.4	52.1	42.2	39.0	36.5
Channel 2	**Indication [dB]**	55.0	52.5	42.5	39.0	36.5
Channel 3	**Indication [dB]**	53.2	50.2	42.7	38.8	36.8
Channel 4	**Indication [dB]**	54.9	52.7	42.9	39.4	37.1

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
22 °C	31 %	1004 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	100	Signal generator
2.	SVANTEK	SVAN 912A	15900	Sound & Vibration Analyser
3.	KEITHLEY	2000	0910165	Digital multimeter
4.	SVANTEK	SV30A	24563	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	747	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.

2. Tracebility of the calibration is guarantied by the above mentioned ISO9001 procedures.

3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.

4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Paweł Bednarczyk P.Be........................ Test date: 2016-09-20

SVANTEK ISO9001 certified

FACTORY CALIBRATION DATA OF THE SVAN 958 *No. 59121*

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: LIN; Input signal =114.0dB, f_{sin}=1kHz

	Range 105dB		Range 130dB	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	113.98	-0.02	114.02	0.02
Channel 2	113.97	-0.03	114.02	0.02
Channel 3	113.97	-0.03	114.02	0.02
Channel 4	113.97	-0.03	114.02	0.02

2. CALIBRATION* (acoustical)

LEVEL METER; Range: 130 dB; Reference frequency: 1000Hz;

Filter	LIN		A		C	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	114.0	0.0	114.0	0.0	114.0	0.0
Channel 2	114.0	0.0	114.0	0.0	114.0	0.0
Channel 3	114.0	0.0	114.0	0.0	114.0	0.0
Channel 4	114.0	0.0	114.0	0.0	114.0	0.0

Calibration measured with the microphone SVANTEK type SV22 No. 4013604. Calibration factor: -0.4dB

3. LINEARITY TEST* (electrical)

LEVEL METER; Range: 105 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	24.0	30.0	40.0	60.0	80.0	100.0	114.0
Channel 1	Error [dB]	0.32	0.13	0.04	-0.01	0.00	0.01	0.01
Channel 2	Error [dB]	0.29	0.11	0.04	-0.01	0.00	0.01	0.01
Channel 3	Error [dB]	0.25	0.09	0.04	-0.01	0.00	0.01	0.01
Channel 4	Error [dB]	0.35	0.11	0.03	-0.01	-0.00	0.01	0.01

LEVEL METER; Range: 130 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	45.0	50.0	60.0	80.0	100.0	120.0	135.0
Channel 1	Error [dB]	0.07	0.09	0.04	0.01	0.01	0.00	0.01
Channel 2	Error [dB]	0.09	0.10	0.04	0.01	0.01	0.00	0.01
Channel 3	Error [dB]	0.00	0.01	0.00	0.01	0.01	0.00	0.01
Channel 4	Error [dB]	-0.02	0.00	0.01	0.01	0.01	0.00	0.01

1/3 OCTAVE (1kHz); Range: 130 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	35.0	40.0	60.0	80.0	100.0	120.0	135.0
Channel 1	Error [dB]	0.32	0.11	0.03	0.00	0.00	-0.01	0.00
Channel 2	Error [dB]	0.34	0.11	0.03	0.00	0.01	0.00	0.01
Channel 3	Error [dB]	0.30	0.07	0.03	0.00	0.01	0.00	0.01
Channel 4	Error [dB]	0.28	0.08	0.04	0.00	0.01	-0.01	-0.00

4. TONEBURST RESPONSE* (electrical)

LEVEL METER; Characteristic: A; f_{sin}= 4000 Hz; Burst duration: 2s;

Range: **105dB**; Equivalent input steady level = 112dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	**Indication [dB]**	111.9	111.9	111.0	109.3	107.1	103.6	100.8	97.9	93.9	90.9	87.8	84.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	111.9	111.8	110.9	109.3	107.1	103.6	100.8	97.8	93.9	90.9	87.8	84.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		3	**Indication [dB]**	112.0	111.9	111.0	109.4	107.2	103.7	100.8	97.9	94.0	90.9	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		4	**Indication [dB]**	111.9	111.9	111.0	109.3	107.1	103.6	100.8	97.9	93.9	90.9	87.8	84.8
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	1	**Indication [dB]**	109.9	107.9	104.5	101.7	98.8	94.9	91.9	88.9	84.9	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	**Indication [dB]**	109.9	107.9	104.5	101.7	98.8	94.9	91.9	88.9	84.9	-	-	-
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	**Indication [dB]**	110.0	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	**Indication [dB]**	109.9	107.9	104.5	101.7	98.8	94.9	91.9	88.9	84.9	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	**Indication [dB]**	111.9	108.9	104.9	101.9	98.9	94.9	91.9	88.9	84.9	81.9	78.8	75.8
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	111.9	108.9	104.9	101.9	98.9	94.9	91.9	88.9	84.9	81.9	78.8	75.8
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		3	**Indication [dB]**	112.0	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	81.9	78.9	75.9
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		4	**Indication [dB]**	111.9	108.9	105.0	101.9	98.9	94.9	91.9	88.9	84.9	81.9	78.8	75.8
			Error [dB]	0.0	-0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1

Range: **105dB**; Equivalent input steady level = 52dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	**Indication [dB]**	51.9	51.8	50.9	49.3	47.1	43.6	40.8	37.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	0.0
		2	**Indication [dB]**	51.9	51.8	50.9	49.3	47.1	43.6	40.7	37.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0
		3	**Indication [dB]**	52.0	51.9	51.0	49.4	47.1	43.7	40.8	37.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0
		4	**Indication [dB]**	51.9	51.8	50.9	49.3	47.1	43.6	40.8	37.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	0.0
	Slow	1	**Indication [dB]**	49.9	47.9	44.5	41.7	38.8	34.9	31.9	28.9
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	0.0	-0.0	0.0
		2	**Indication [dB]**	49.9	47.9	44.5	41.7	38.8	34.9	31.9	28.9
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	0.0	-0.0	-0.0
		3	**Indication [dB]**	50.0	47.9	44.6	41.8	38.8	35.0	31.9	29.0
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	0.0	-0.0	0.0
		4	**Indication [dB]**	49.9	47.9	44.5	41.7	38.8	34.9	31.9	29.2
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	0.3
SEL	-	1	**Indication [dB]**	51.9	48.9	44.9	41.9	38.9	35.0	32.0	29.1
			Error [dB]	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
		2	**Indication [dB]**	51.9	48.9	44.9	41.9	38.9	35.0	32.0	29.0
			Error [dB]	0.0	-0.0	0.0	0.0	0.0	0.1	0.1	0.1
		3	**Indication [dB]**	52.0	49.0	45.0	42.0	39.0	35.0	32.0	29.1
			Error [dB]	0.0	-0.0	0.0	0.0	0.0	0.1	0.1	0.2
		4	**Indication [dB]**	51.9	48.9	44.9	41.9	38.9	35.0	32.0	29.1
			Error [dB]	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2

Range: **105dB**; Equivalent input steady level = 34dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	**Indication [dB]**	34.0	33.9
			Error [dB]	0.0	-0.0
		2	**Indication [dB]**	34.0	33.9
			Error [dB]	-0.0	0.0
		3	**Indication [dB]**	34.0	33.9
			Error [dB]	0.0	0.0
		4	**Indication [dB]**	34.0	33.9
			Error [dB]	0.0	0.0
	Slow	1	**Indication [dB]**	32.0	30.0
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	32.0	30.0
			Error [dB]	0.0	0.1
		3	**Indication [dB]**	32.0	29.9
			Error [dB]	0.0	0.1
		4	**Indication [dB]**	31.9	30.1
			Error [dB]	0.0	0.3
SEL	-	1	**Indication [dB]**	34.0	31.1
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	34.0	31.1
			Error [dB]	0.0	0.1
		3	**Indication [dB]**	34.0	31.1
			Error [dB]	0.0	0.1
		4	**Indication [dB]**	34.0	31.0
			Error [dB]	0.0	0.1

Range: **130dB**; Equivalent input steady level = 134dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	**Indication [dB]**	133.9	133.8	132.9	131.3	129.1	125.6	122.8	119.8	115.9	112.9	109.8	106.8
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	133.9	133.8	132.9	131.3	129.1	125.6	122.8	119.8	115.9	112.9	109.8	106.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		3	**Indication [dB]**	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		4	**Indication [dB]**	133.9	133.9	133.0	131.3	129.1	125.6	122.8	119.9	115.9	112.9	109.8	106.8
			Error [dB]	0.0	0.0	0.0	0.0	129.1	-0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	1	**Indication [dB]**	131.9	129.9	126.5	123.7	120.8	116.9	113.9	110.9	106.9	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	**Indication [dB]**	131.9	129.9	126.5	123.7	120.8	116.9	113.9	110.9	106.9	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	**Indication [dB]**	132.0	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	**Indication [dB]**	131.9	129.9	126.5	123.7	120.8	116.9	113.9	110.9	106.9	-	-	-
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	**Indication [dB]**	133.9	130.9	126.9	123.9	120.9	116.9	113.9	110.9	106.9	103.9	100.8	97.8
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	133.9	130.9	126.9	123.9	120.9	116.9	113.9	110.9	106.9	103.9	100.8	97.8
			Error [dB]	0.0	-0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		3	**Indication [dB]**	134.0	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	103.9	100.9	97.9
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		4	**Indication [dB]**	133.9	130.9	127.0	123.9	120.9	116.9	113.9	110.9	106.9	103.9	100.8	97.8
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1

Range: **130dB**; Equivalent input steady level = 74dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	**Indication [dB]**	73.9	73.8	72.9	71.3	69.1	65.6	62.8	59.8
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
		2	**Indication [dB]**	73.9	73.8	72.9	71.3	69.1	65.6	62.8	59.8
			Error [dB]	-0.0	0.0	72.9	0.0	-0.0	-0.0	-0.0	0.0
		3	**Indication [dB]**	74.0	73.9	73.0	71.4	69.1	65.7	62.8	59.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0
		4	**Indication [dB]**	73.9	73.9	72.9	71.3	69.1	65.6	62.8	59.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
	Slow	1	**Indication [dB]**	71.9	69.9	66.5	63.7	60.8	56.9	54.0	50.9
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0
		2	**Indication [dB]**	71.9	69.9	66.5	63.7	60.8	56.9	53.9	51.0
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.1
		3	**Indication [dB]**	72.0	69.9	66.5	63.8	60.9	56.9	54.0	50.9
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
		4	**Indication [dB]**	71.9	69.9	66.5	63.7	60.8	56.9	53.9	50.9
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
SEL	-	1	**Indication [dB]**	73.9	70.9	66.9	63.9	60.9	56.9	54.0	51.0
			Error [dB]	-0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	0.1
		2	**Indication [dB]**	73.9	70.9	66.9	63.9	60.9	56.9	54.0	51.0
			Error [dB]	0.0	-0.0	0.0	-0.0	-0.0	0.0	0.0	0.1
		3	**Indication [dB]**	74.0	71.0	67.0	64.0	61.0	57.0	54.0	51.0
			Error [dB]	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.1
		4	**Indication [dB]**	73.9	70.9	66.9	63.9	60.9	56.9	54.0	51.0
			Error [dB]	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.1

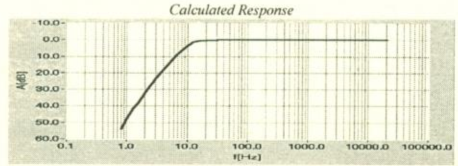
Range: **130dB**; Equivalent input steady level = 54dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	**Indication [dB]**	54.0	53.9
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	54.0	53.8
			Error [dB]	0.1	-0.0
		3	**Indication [dB]**	54.0	53.9
			Error [dB]	0.0	-0.0
		4	**Indication [dB]**	53.9	53.9
			Error [dB]	-0.0	0.0
	Slow	1	**Indication [dB]**	52.0	49.9
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	52.0	49.9
			Error [dB]	0.0	0.1
		3	**Indication [dB]**	52.0	50.0
			Error [dB]	0.0	0.1
		4	**Indication [dB]**	51.9	50.0
			Error [dB]	-0.0	0.1
SEL	-	1	**Indication [dB]**	54.0	51.0
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	54.0	51.0
			Error [dB]	0.0	0.0
		3	**Indication [dB]**	54.0	51.0
			Error [dB]	0.0	0.0
		4	**Indication [dB]**	54.0	51.0
			Error [dB]	-0.0	0.0

6. FREQUENCY RESPONSE (electrical)

LEVEL METER; Filter: Z; Range: 130 dB; Input signal =135 dB;

Calculated Response



Measured Response with Preamplifier SV12 (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
10	3.2	3.2	3.2	3.2	250	0.0	-0.0	-0.0	0.0
12.5	1.4	1.4	1.4	1.4	500	0.0	-0.0	0.0	0.0
16	0.5	0.5	0.5	0.5	1000	0.0	0.0	0.0	0.0
20	0.1	0.1	0.1	0.1	2000	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	4000	0.0	0.0	0.0	0.0
31.5	-0.0	-0.0	-0.0	-0.0	8000	0.0	0.0	0.0	0.0
63	-0.0	-0.0	-0.0	-0.0	16000	0.0	0.0	0.0	0.0
125	0.0	-0.0	-0.0	-0.0	20000	0.0	0.0	0.1	0.0

All frequencies are nominal center values for the 1/3 octave bands

7. INTERNAL NOISE LEVEL* (electrical)

LEVEL METER; Range: 105 dB; Back-light – off; Calibration factor: 0dB

	Filter	Z	A	C
Channel 1	**Level [dB]**	14.2	11.6	11.8
Channel 2	**Level [dB]**	13.2	10.7	10.8
Channel 3	**Level [dB]**	13.9	11.2	11.8
Channel 4	**Level [dB]**	14.0	11.4	11.3

* measured with preamplifier SVANTEK type SV12 No. 1771.

VIBRATION LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: HP10; Input signal =140.0dB (10.0 m/s^2), f_{sin}=79,6Hz

	Range 145dB		Range 170dB	
	Indication [dB]	**Error [dB]**	**Indication [dB]**	**Error [dB]**
Channel 1	139.99	-0.01	140.03	0.03
Channel 2	139.98	-0.02	140.02	0.02
Channel 3	139.98	-0.02	140.03	0.03
Channel 4	139.98	-0.02	140.02	0.02

2. CALIBRATION (vibrational)

LEVEL METER; Range: 145dB; Input signal: 120dB;

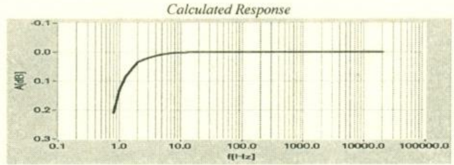
Filter	HP1		HP10		Wd		Wm		Wh	
	Indication [dB]	**Error [dB]**	**Indication [dB]**	**Error [dB]**	**Indication [dB]**	**Error [dB]**	**Indication [dB]**	**Error [dB]**	**Indication [dB]**	**Error [dB]**
Channel 1	119.8	-0.2	119.8	-0.2	106.0	-0.2	102.2	0.1	110.7	0.1
Channel 2	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.1	0.1	110.7	0.1
Channel 3	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.1	0.1	110.6	0.1
Channel 4	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.1	0.1	110.7	0.1

Calibration measured with the accelerometer DYTRAN type 3185D No. 2975 Calibration factor: -0.3dB

3. FREQUENCY RESPONSE (electrical)

1/3 OCTAVE; Filter: HP; Range: 170 dB; input=175 dB;

Calculated Response



Measured Response (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2 [dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
0.8	0.18	0.19	0.18	0.18	5	0.01	0.01	0.01	0.01	500	-0.01	-0.01	-0.01	-0.01
1	0.13	0.13	0.13	0.13	6.3	-0.00	-0.00	-0.00	-0.00	1000	-0.01	-0.00	-0.01	-0.00
1.25	0.08	0.08	0.07	0.08	8	-0.00	-0.00	-0.00	-0.00	2000	-0.01	-0.00	-0.01	-0.00
1.6	0.06	0.07	0.06	0.06	16	-0.01	-0.00	-0.01	-0.00	4000	-0.00	0.01	-0.00	0.01
2	0.04	0.05	0.04	0.05	31.5	-0.01	-0.01	-0.01	-0.01	8000	0.03	0.04	0.03	0.03
2.5	0.01	0.02	0.01	0.02	63	-0.01	-0.00	-0.01	-0.00	16000	0.01	0.02	0.03	0.02
3.15	-0.00	-0.00	-0.00	-0.00	125	-0.01	-0.01	-0.01	-0.01	20000	0.01	0.02	0.04	0.03
4	-0.00	0.01	-0.00	0.01	250	-0.01	-0.01	-0.01	-0.01					

All frequencies are nominal center values for the 1/3 octave bands

4. INTERNAL NOISE LEVEL (electrical)

LEVEL METER func.; Range: 145 dB; Back-light – off

	Filter	HP1	HP10	Wd	Wm	Wh
Channel 1	**Indication [dB]**	53.7	51.0	42.4	39.4	36.2
Channel 2	**Indication [dB]**	54.8	52.5	42.5	38.5	36.3
Channel 3	**Indication [dB]**	53.0	50.3	42.7	39.4	36.9
Channel 4	**Indication [dB]**	54.8	52.6	42.7	39.1	36.7

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
22 °C	31 %	1004 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	100	Signal generator
2.	SVANTEK	SVAN 912A	15900	Sound &Vibration Analyser
3.	KEITHLEY	2000	0910165	Digital multimeter
4.	SVANTEK	SV30A	24563	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	747	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.

2. Tracebility of the calibration is guarantied by the above mentioned ISO9001 procedures.

3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.

4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Paweł Bednarczyk P.B. .... Test date: 2016-09-20

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CALIBRATION CERTIFICATE

Certificate Information			
Date of Issue	7-May-2018	**Certificate Number**	MLCN180789S

Customer Information	
Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)	
Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 959
Serial Number	11228
Equipment Number	--

Calibration Particular			
Date of Calibration	7-May-2018		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-2018		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date		
	K.O. Lo	7-May-2018

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.
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Certificate No. MLCN180789S

Calibration Data

Weighting / Time	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
A / FAST (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
C / FAST (1 kHz Input)	LOW	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / FAST (1 kHz Input)	LOW	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
		113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
A / SLOW (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
C / SLOW (1 kHz Input)	LOW	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / SLOW (1 kHz Input)	LOW	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
A / IMPULSE (1 kHz Input)	LOW	93.9 dB	94.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
C / IMPULSE (1 kHz Input)	LOW	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB
Z / IMPULSE (1 kHz Input)	LOW	94.0 dB	94.0 dB	0.0 dB	0.2 dB	± 0.7 dB
	HIGH	113.9 dB	114.0 dB	-0.1 dB	0.2 dB	± 0.7 dB

- END -

Calibrated By : Dan
Date : 7-May-2018

Checked By : K.O. Lo
Date : 7-May-2018

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Cert F6: Acoustic Calibrator – SV 30A (SN: 29088)

MAX

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CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	5-Mar-2018	**Certificate Number**	MLCN180297S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	29088
Equipment Number	--

Calibration Particular

Date of Calibration	5-Mar-2018		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-18 1351(MLTE049) / MLEC17/06/02 / 6-Jun-18		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 5-Mar-2018

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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* The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited.

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Certificate No. MLCN180297S

Calibration Data

EUT Setting	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
94 dB	93.7 dB	0.3 dB	0.15 dB	± 0.3 dB
114 dB	113.7 dB	0.3 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Patrick
Date : 5-Mar-18

Checked By : K.O. Lo
Date : 5-Mar-18

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MaxLab Calibration Centre Limited
香港新界葵涌華星街16-18號保盈工業大廈9樓B2室
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輝創工程有限公司
Sun Creation Engineering Limited
Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C181756
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC18-0613)

Date of Receipt / 收件日期 : 20 March 2018

Description / 儀器名稱	:	Sound Calibrator
Manufacturer / 製造商	:	Rion
Model No. / 型號	:	NC-74
Serial No. / 編號	:	34984065
Supplied By / 委託者	:	Gammon Construction Limited 28/F., Devon House, Taikoo Place, 979 King's Road, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C

Relative Humidity / 相對濕度 : (50 ± 25)%

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 5 April 2018

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By : K C Lee
測試 Engineer

Certified By : H C Chan
核證 Engineer

Date of Issue : 10 April 2018
簽發日期

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 — 校正及檢測實驗所
c/o 香港新界屯門興安里一號四樓
Tel/電話: (852) 2927 2606 Fax/傳真: (852) 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

輝創工程有限公司
Sun Creation Engineering Limited
Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C181756
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C173864
CL281	Multifunction Acoustic Calibrator	PA160023
TST150A	Measuring Amplifier	C181288

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.3	± 0.2

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000	1 kHz ± 1 %	± 1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C181757
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC18-0613) Date of Receipt / 收件日期 : 20 March 2018

Description / 儀器名稱	:	Sound Level Meter
Manufacturer / 製造商	:	Rion
Model No. / 型號	:	NL-31
Serial No. / 編號	:	00593586
Supplied By / 委託者	:	Gammon Construction Limited 28/F., Devon House, Taikoo Place, 979 King's Road, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 5 April 2018

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By 測試 : K C Lee
Engineer

Certified By 核證 : H C Chan
Engineer

Date of Issue 簽發日期 : 10 April 2018

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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Certificate of Calibration
校正證書

Certificate No. : C181757
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration was performed before the test.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C180024
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L_A	A	Fast	94.00	1	93.6	± 1.1

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 120	L_A	A	Fast	94.00	1	93.6 (Ref.)
				104.00		103.6
				114.00		113.6

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L_A	A	Fast	94.00	1	93.6	Ref.
			Slow			93.6	± 0.3

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Certificate of Calibration
校正證書

Certificate No. : C181757
證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L_A	A	Fast	94.00	63 Hz	67.2	-26.2 ± 1.5
					125 Hz	77.3	-16.1 ± 1.5
					250 Hz	84.8	-8.6 ± 1.4
					500 Hz	90.3	-3.2 ± 1.4
					1 kHz	93.6	Ref.
					2 kHz	94.9	+1.2 ± 1.6
					4 kHz	94.7	+1.0 ± 1.6
					8 kHz	92.6	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.7	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L_C	C	Fast	94.00	63 Hz	92.7	-0.8 ± 1.5
					125 Hz	93.4	-0.2 ± 1.5
					250 Hz	93.6	0.0 ± 1.4
					500 Hz	93.6	0.0 ± 1.4
					1 kHz	93.6	Ref.
					2 kHz	93.5	-0.2 ± 1.6
					4 kHz	92.9	-0.8 ± 1.6
					8 kHz	90.7	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.9	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : UC-53A & S/N : 316111

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 Hz - 125 Hz	± 0.35 dB
	250 Hz - 500 Hz	± 0.30 dB
	1 kHz	± 0.20 dB
	2 kHz - 4 kHz	± 0.35 dB
	8 kHz	± 0.45 dB
	12.5 kHz	± 0.70 dB
104 dB	1 kHz	± 0.10 dB (Ref. 94 dB)
114 dB	1 kHz	± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 — 校正及檢測實驗所
c/o 香港新界屯門興安里一號四樓
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輝創工程有限公司
Sun Creation Engineering Limited
Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C181756
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC18-0613) Date of Receipt / 收件日期 : 20 March 2018

Description / 儀器名稱	:	Sound Calibrator
Manufacturer / 製造商	:	Rion
Model No. / 型號	:	NC-74
Serial No. / 編號	:	34984065
Supplied By / 委託者	:	Gammon Construction Limited 28/F., Devon House, Taikoo Place, 979 King's Road, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 5 April 2018

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By 測試 : K C Lee
Engineer

Certified By 核證 : H C Chan
Engineer

Date of Issue 簽發日期 : 10 April 2018

Sun Creation Engineering Limited – Calibration & Testing Laboratory
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Certificate of Calibration
校正證書

Certificate No. : C181756
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C173864
CL281	Multifunction Acoustic Calibrator	PA160023
TST150A	Measuring Amplifier	C181288

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.3	± 0.2

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000	1 kHz ± 1 %	± 1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C172620
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-1051) Date of Receipt / 收件日期 : 10 May 2017

Description / 儀器名稱	:	Sound Level Meter
Manufacturer / 製造商	:	Rion
Model No. / 型號	:	NL-52
Serial No. / 編號	:	00564841
Supplied By / 委託者	:	Gammon E&M Limited (E&M Svc) 28/F., Devon House, Taikoo Place, 979 King's Road, Quarry Bay, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C   Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 16 May 2017

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Fluke Everett Service Center, USA
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany

Tested By 測試 : H T Wong
Technical Officer

Certified By 核證 : K C Lee
Engineer

Date of Issue 簽發日期 : 17 May 2017

Sun Creation Engineering Limited – Calibration & Testing Laboratory
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Certificate of Calibration
校正證書

Certificate No. : C172620
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration was performed before the test.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C170048
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L_A	A	Fast	94.00	1	94.0	± 1.1

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L_A	A	Fast	94.00	1	94.0 (Ref.)
				104.00		104.1
				114.00		114.1

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L_A	A	Fast	94.00	1	94.0	Ref.
			Slow			94.0	± 0.3

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Certificate of Calibration
校正證書

Certificate No. : C172620
證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L_A	A	Fast	94.00	63 Hz	67.7	-26.2 ± 1.5
					125 Hz	77.8	-16.1 ± 1.5
					250 Hz	85.3	-8.6 ± 1.4
					500 Hz	90.8	-3.2 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.6
					4 kHz	95.0	+1.0 ± 1.6
					8 kHz	93.0	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.6	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L_C	C	Fast	94.00	63 Hz	93.1	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.5
					250 Hz	94.0	0.0 ± 1.4
					500 Hz	94.0	0.0 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	93.9	-0.2 ± 1.6
					4 kHz	93.2	-0.8 ± 1.6
					8 kHz	91.1	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.6	-6.2 (+3.0 ; -6.0)

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Certificate of Calibration
校正證書

Certificate No. : C172620
證書編號

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 09479

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	12.5 kHz	: ± 0.70 dB
104 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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Appendix A2b – Calibration Certificates (Noise Measurement to Confirm Any Characteristics of Tonality, Impulsiveness and Intermittency at NSRs)

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港黃竹坑道37號利達中心12樓
12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

ilac-MRA HKAS HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 16CA0914 02-01

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250	4189	ZC0032
Serial/Equipment No.:	2551242	2985292	23235
Adaptors used:	-	-	-

Item submitted by

Customer Name: MTR Corporation
Address of Customer: 8/F, Fo Tan Railway House, Fo Tan, N.T. Hong Kong
Request No.: -
Date of receipt: 14-Sep-2016

Date of test: 19-Sep-2016

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	18-Jun-2017	CIGISMEC
Signal generator	DS 360	33873	18-Apr-2017	CEPREI
Signal generator	DS 360	61227	18-Apr-2017	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 55 ± 10 %
Air pressure: 1000 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: ~~Huang Jian Min~~/Feng Jun Qi Date: 19-Sep-2016 Company Chop: SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Form No CARP152-1/Issue 1/Rev C/01/02/2007

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
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Fax: (852) 2555 7533

ilac-MRA HKAS HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 16CA0914 02-01

1, **Electrical Tests**

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, **Acoustic tests**

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, **Response to associated sound calibrator**

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip
Date: 19-Sep-2016

Checked by: Lam Tze Wai
Date: 19-Sep-2016

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Form No CARP152-2/Issue 1/Rev C/01/02/2007

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E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 16CA1025 02-03

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250	4189	ZC0032
Serial/Equipment No.:	2551244	2550229	5051
Adaptors used:	-	-	-

Item submitted by

Customer Name: MTR Corporation
Address of Customer: 8/F, Fo Tan Railway House, Fo Tan, N.T. Hong Kong
Request No.: -
Date of receipt: 25-Oct-2016

Date of test: 26-Oct-2016

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	18-Jun-2017	CIGISMEC
Signal generator	DS 360	33873	18-Apr-2017	CEPREI
Signal generator	DS 360	61227	18-Apr-2017	CEPREI

Ambient conditions

Temperature: 22 ± 1 °C
Relative humidity: 55 ± 10 %
Air pressure: 1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responseses of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi Date: 27-Oct-2016 Company Chop: SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

\- End -

Calibrated by: Fung Chi Yip
Date: 26-Oct-2016

Checked by: Lam Tze Wai
Date: 27-Oct-2016

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

ilac-MRA HKAS HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0902 02-02

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250	4950	ZC0032
Serial/Equipment No.:	2718890	2827088	24967
Adaptors used:	-	-	-

Item submitted by

Customer Name: Anewr Consulting Limited
Address of Customer: Unit 517, 5/F Tower A, Regent Centre, 63 Wo Yip Hop Road, Kwai Chung
Request No.: -
Date of receipt: 02-Sep-2017

Date of test: 09-Sep-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	08-Sep-2018	CIGISMEC
Signal generator	DS 360	33873	25-Apr-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1010 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of $\pm$20%.
3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 09-Sep-2017 **Company Chop:**

SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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ilac-MRA HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA0902 02-02

1, **Electrical Tests**

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, **Acoustic tests**

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, **Response to associated sound calibrator**

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Lai Sheng Jie
Date: 09-Sep-2017

Checked by: Fung Chi Yip
Date: 09-Sep-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Form No.CARP152-2/Issue 1/Rev.C/01/02/2007

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港黃竹坑道37號利達中心12樓
12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 16CA1025 02-01

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250-L	4189	ZC0032
Serial/Equipment No.:	2741137	2680937	14982
Adaptors used:	-	-	-

Item submitted by

Customer Name: MTR Corporation
Address of Customer: 8/F., Fo Tan Railway House, Fo Tan, N.T., Hong Kong
Request No.: -
Date of receipt: 25-Oct-2016

Date of test: 26-Oct-2016

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	18-Jun-2017	CIGISMEC
Signal generator	DS 360	33873	18-Apr-2017	CEPREI
Signal generator	DS 360	61227	18-Apr-2017	CEPREI

Ambient conditions

Temperature: 22 ± 1 °C
Relative humidity: 55 ± 10 %
Air pressure: 1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi Date: 27-Oct-2016 Company Chop: SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
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CERTIFICATE OF CALIBRATION

(Continuation Page)

1, **Electrical Tests**

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, **Acoustic tests**

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, **Response to associated sound calibrator**

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip
Date: 26-Oct-2016

Checked by: Lam Tze Wai
Date: 27-Oct-2016

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C173769
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-1522) Date of Receipt / 收件日期 : 30 June 2017

Description / 儀器名稱 : Sound Level Meter
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 2250-L
Serial No. / 編號 : 2701830
Supplied By / 委託者 : ANewR Consulting Limited
Unit 517, 5/F., Tower A, Regent Centre,
63 Wo Yi Hop Road, Kwai Chung, N.T. Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 11 July 2017

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By
測試 : K C Lee
Engineer

Certified By
核證 : H C Chan
Engineer

Date of Issue
簽發日期 : 12 July 2017

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C173769
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration using laboratory acoustic calibrator was performed before the test 6.1.1.2 to 6.3.2.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C170048
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.1

6.1.1.2 After Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	± 1.1

6.1.2 Linearity

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.0 (Ref.)
		104.00		104.0
		114.00		114.0

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C173769
證書編號

6.2 Time Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	Ref.
	LAS (SPL)			94.0	± 0.3

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LAF (SPL)	94.00	63 Hz	67.8	-26.2 ± 1.5
			125 Hz	77.8	-16.1 ± 1.5
			250 Hz	85.3	-8.6 ± 1.4
			500 Hz	90.8	-3.2 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	95.2	+1.2 ± 1.6
			4 kHz	94.9	+1.0 ± 1.6
			8 kHz	92.5	-1.1(+2.1 ; -3.1)
			12.5 kHz	89.5	-4.3(+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LCF (SPL)	94.00	63 Hz	93.2	-0.8 ± 1.5
			125 Hz	93.8	-0.2 ± 1.5
			250 Hz	94.0	0.0 ± 1.4
			500 Hz	94.0	0.0 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	93.8	-0.2 ± 1.6
			4 kHz	93.1	-0.8 ± 1.6
			8 kHz	90.7	-3.0 (+2.1 ; -3.1)
			12.5 kHz	87.5	-6.2 (+3.0 ; -6.0)

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C173769
證書編號

Remarks : - UUT Microphone Model No. : 4950 & S/N : 2678779

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 Hz - 125 Hz	± 0.35 dB
	250 Hz - 500 Hz	± 0.30 dB
	1 kHz	± 0.20 dB
	2 kHz - 4 kHz	± 0.35 dB
	8 kHz	± 0.45 dB
	12.5 kHz	± 0.70 dB
104 dB	1 kHz	± 0.10 dB (Ref. 94 dB)
114 dB	1 kHz	± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
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Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0615 01-01

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250-L	4950	ZC0032
Serial/Equipment No.:	2718884	2698644	13482
Adaptors used:	-	-	-

Item submitted by

Customer Name: Anewr Consulting Limited
Address of Customer: Unit 517, 5/F Tower A, Regent Centre, 63 Wo Yip Hop Road, Kwai Chung
Request No.: -
Date of receipt: 15-Jun-2017

Date of test: 26-Jun-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	17-Jun-2018	CIGISMEC
Signal generator	DS 360	33873	25-Apr-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI

Ambient conditions

Temperature: 23 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1010 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of $\pm$20%.
3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang ~~Jian Min~~/Feng Jun Qi Date: 27-Jun-2017 Company Chop: SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港黃竹坑道37號利達中心12樓
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Fax: (852) 2555 7533

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA0615 01-01

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Lai Sheng Jie
Date: 26-Jun-2017

Checked by: Fung Chi Yip
Date: 27-Jun-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
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Tel: (852) 2873 6860
Fax: (852) 2555 7533

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0114 02-02

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250-L	4950	ZC0032
Serial/Equipment No.:	2701819	2678777	12538
Adaptors used:	-	-	-

Item submitted by

Customer Name: Anewr Consulting Limited
Address of Customer: Unit 517, 5/F Tower A, Regent Centre, 63 Wo Yip Hop Road, Kwai Chung
Request No.: -
Date of receipt: 14-Jan-2017

Date of test: 18-Jan-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	18-Jun-2017	CIGISMEC
Signal generator	DS 360	33873	18-Apr-2017	CEPREI
Signal generator	DS 360	61227	18-Apr-2017	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 60 ± 10 %
Air pressure: 1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of $\underline{+}$20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsesss of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 19-Jan-2017 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

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CERTIFICATE OF CALIBRATION

(Continuation Page)

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip
Date: 18-Jan-2017

Checked by: Lam Tze Wai
Date: 19-Jan-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Manufacturer Calibration Certificate

The following instrument has been tested and calibrated to the manufacturer specifications.
The calibration is traceable in accordance with ISO/IEC 17025 covering all instrument functions.

- Device Type: **M2230 Measurement Microphone**
  consisting of
  MA220 Serial Number: 6240
  Capsule Serial Number: 9498

- Certificate Issued: **10 January 2017**
- Certificate Number: **42745-6240-M2230**
- Results: **PASSED**
  (for detailed report see next page)

Tested by: M.Frick

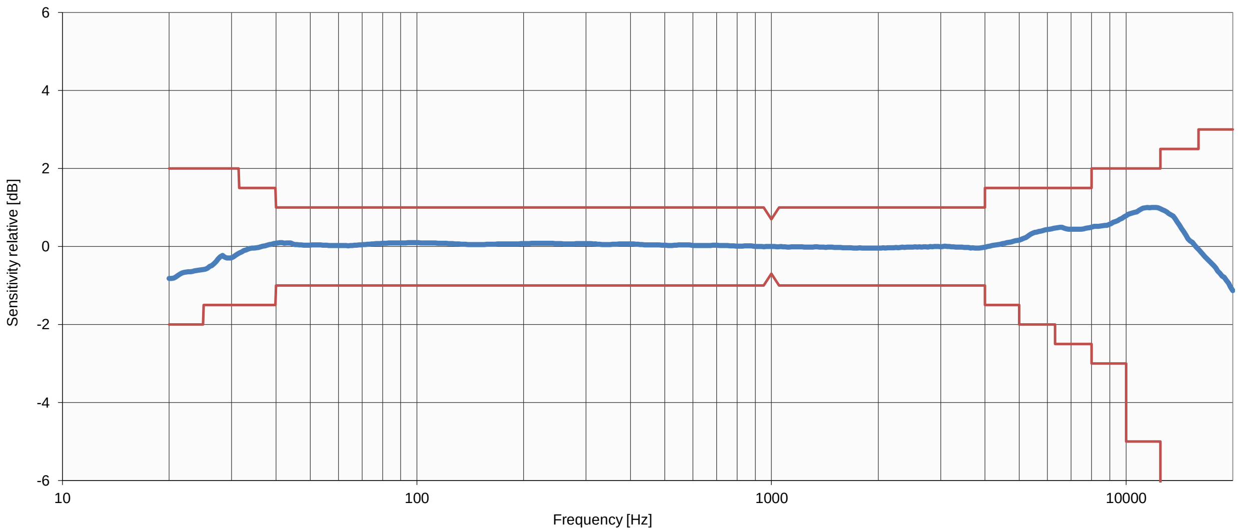
Signature:

Stamp: NTi Audio AG
Im alten Riet 102
LI - 9494 Schaan
www.nti-audio.com

Date:	10 January 2017			
Calibration of:	M2230	Measurement Microphone		
		MA220	Serial Number:	6240
		Capsule	Serial Number:	9498

- Detailed Calibration Test Results:

Frequency response: **Class 1 acc. IEC 61672**



	actual	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL	**43.3 mV/Pa**	±2.85%

- Test Conditions:

Temperature:	27.2 °C	±0.5 °C
Relative Humidity:	39.5 %	±2%
Air Pressure:	95.94 kPa	±0.25 kPa

- Calibration Equipment Used:

- Norsonic Sound Calibrator, Type 1251, S/No. 30930
  Last Calibration: 05.12.2016, Next Calibration: 05.12.2018
  Calibrated by Metas, Switzerland

- NTi Audio FX100, S/No. 11094
  Last Calibration: 16.08.2016, Next Calibration: 16.08.2017
  Calibrated by NTi Audio meeting product specifications

- MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
  Last Calibration: 30.11.2015, Next Calibration: 30.11.2017
  Calibrated by MTG, Germany

1 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with the regulations of the GUM.

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CERTIFICATE OF CALIBRATION

Certificate No.: 18CA0524 04-04

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	B & K
Type/Model No.:	4231
Serial/Equipment No.:	1858983
Adaptors used:	-

Item submitted by

Curstomer:	MTR Corporation Ltd.
Address of Customer:	-
Request No.:	-
Date of receipt:	24-May-2018

Date of test: 25-May-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	20-Apr-2019	SCL
Preamplifier	B&K 2673	2743150	27-Apr-2019	CEPREI
Measuring amplifier	B&K 2610	2346941	08-May-2019	CEPREI
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Digital multi-meter	34401A	US36087050	23-Apr-2019	CEPREI
Audio analyzer	8903B	GB41300350	23-Apr-2019	CEPREI
Universal counter	53132A	MY40003662	24-Apr-2019	CEPREI

Ambient conditions

Temperature:	21 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Jun Qi **Date:** 28-May-2018 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Form No CARP156-1/Issue 1/Rev.D/01/03/2007

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CERTIFICATE OF CALIBRATION

(Continuation Page)

1, **Measured Sound Pressure Level**

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	93.86	0.10

2, **Sound Pressure Level Stability - Short Term Fluctuations**

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.010 dB**

Estimated expanded uncertainty 0.005 dB

3, **Actual Output Frequency**

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency =999.84 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, **Total Noise and Distortion**

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.5 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

\- End -

Calibrated by: Fung Chi Yip **Checked by:** Shek Kwong Tat

Date: 25-May-2018 **Date:** 28-May-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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CERTIFICATE OF CALIBRATION

Certificate No.: 18CA0524 04-03

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	B & K
Type/Model No.:	4231
Serial/Equipment No.:	2725557
Adaptors used:	-

Item submitted by

Curstomer:	MTR Corporation Ltd.
Address of Customer:	-
Request No.:	-
Date of receipt:	24-May-2018

Date of test: 25-May-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	20-Apr-2019	SCL
Preamplifier	B&K 2673	2743150	27-Apr-2019	CEPREI
Measuring amplifier	B&K 2610	2346941	08-May-2019	CEPREI
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Digital multi-meter	34401A	US36087050	23-Apr-2019	CEPREI
Audio analyzer	8903B	GB41300350	23-Apr-2019	CEPREI
Universal counter	53132A	MY40003662	24-Apr-2019	CEPREI

Ambient conditions

Temperature:	21 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Jun Qi **Date:** 28-May-2018 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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(Continuation Page)

Certificate No.: 18CA0524 04-03

1, **Measured Sound Pressure Level**

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	93.94	0.10

2, **Sound Pressure Level Stability - Short Term Fluctuations**

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.015 dB**

Estimated expanded uncertainty 0.005 dB

3, **Actual Output Frequency**

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency =1000.0 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, **Total Noise and Distortion**

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.5 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Checked by:** Shek Kwong Tat

Date: 25-May-2018 **Date:** 28-May-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Appendix A3 – Fixed Plant Noise Summary

Appendix A3 Result Summary Table

Source ID	Louvre ID	Plant / Louvre	Method[1]	Louvre Size		Measurement Distance(m)	Measurement Box Area (S)	Measured Noise Level L_{Aeq} [dB(A)]	Average Background LAeq [dB(A)]	Difference LAeq [dB(A)] [2]	Background Corrected Measured LAeq [dB(A)]	Area Corr.	Calculated SWL
				Width (mm)	Height (mm)								
	WKP-U1-E6PN-03A Section 1	Louvre	3	28200	4600	3	631.3	56.2	52.5	3.7	53.8	28.0	82
	WKP-U1-E6PN-03A Section 2	Louvre	3	21950	6500	3	592.1	55.0	52.5	2.5	52.0	27.7	80
WKP	WKP-U1-E6PN-06A	Louvre	3	5600	10920	0.25	78.4	52.9	51.6	1.3	49.9	18.9	69
	WKP-U1-E6PN-04A	Louvre	3	18900	9285	1	300.2	60.6	57.3	3.3	57.9	24.8	83
	WKP-E6PVS-02	Louvre	3	3000	5400	0.5	36.0	53.7	54.5	-0.8	50.7	15.6	66
	WKP-U1-E6PN-09	Louvre	3	1600	5000	0.5	24.2	63.0	61.4	1.6	60.0	13.8	74
EAA	WKT-VS3N-1	Louvre	3	51365	4430	1	462.7	56.0	52.7	3.3	53.3	26.7	80
	WKT-VS3-1	Louvre	3	3000	1500	1	34.5	55.0	54.4	0.6	52.0	15.4	67
	WKT-VS3-2	Louvre	3	1000	3000	1	31.0	55.0	55.5	-0.5	52.0	14.9	67
	WKT-VS3-3	Louvre	3	4570	3400	1	59.4	57.0	53.7	3.3	54.3	17.7	72
	WKT-VS3-4	Louvre	3	5540	23780	1	261.0	51.0	50.2	0.8	48.0	24.2	72
VS3	WKT-VS3-5	Louvre	3	24350	2500	1	125.6	51.0	49.7	1.3	48.0	21.0	69
	WKT-VS3-6A	Louvre	3	2360	2500	1	37.3	53.0	51.5	1.5	50.0	15.7	66
	WKT-VS3-6B	Louvre	3	2784	2500	1	40.1	54.0	51.4	2.6	51.0	16.0	67
	WKT-VS3-7	Louvre	3	685	2500	1	26.5	54.0	51.6	2.4	51.0	14.2	65
	WKT-VS3-8	Louvre	3	3330	2500	1	43.6	53.0	51.7	1.3	50.0	16.4	66
	WKT-VS2E-1	Louvre	3	12000	6000	1	156.0	53.0	52.9	0.1	50.0	21.9	72
VS2E	WKT-VS2E-2	Louvre	3	6244	5965	1	98.1	52.0	51.7	0.3	49.0	19.9	69
	WKT-VS2E-3	Louvre	3	5139	6028	1	87.6	53.0	50.8	2.2	50.0	19.4	69
	WKT-VS4-1	Louvre	3	28535	2185	1	134.2	60.0	56.7	3.3	57.3	21.3	79
VS4	WKT-VS4-3	Louvre	3	11020	4505	1	123.7	55.0	54.4	0.6	52.0	20.9	73
	WKT-VS4-4	Louvre	3	38730	2485	1	190.2	54.0	59.1	-5.1	51.0	22.8	74
	WKT-VS5-1	Louvre	3	17988	2617	1	99.5	53.0	52.9	0.1	50.0	20.0	70
VS5	WKT-VS5-2	Louvre	3	25373	3880	1	227.5	69.0	55.8	13.2	68.8	23.6	92
	WKT-VS5-4	Louvre	3	9383	4500	1	115.0	61.0	59.8	1.2	58.0	20.6	79
	WKT-VS2W-1	Louvre	3	10600	4892	1	98.6	58.0	55.6	2.4	55.0	19.9	75
	WKT-VS2W-2A	Louvre	3	4700	1200	1	41.2	55.0	54.7	0.3	52.0	16.1	68
VS2W	WKT-VS2W-2B	Louvre	3	4700	1200	1	41.2	57.0	55.4	1.6	54.0	16.1	70
	WKT-VS2W-2C	Louvre	3	3800	2200	1	44.4	57.0	54.3	2.7	54.0	16.5	70
	WKT-VS2W-3	Louvre	3	9602	4358	1	109.7	59.0	56.6	2.4	56.0	20.4	76
	WKT-VS1-1	Louvre	3	8550	3707	1	90.8	50.0	48.5	1.5	47.0	19.6	67
VS1	WKT-VS1-2	Louvre	3	4400	34100	1	316.0	50.0	49.5	0.5	47.0	25.0	72
	WKT-VS1-3	Louvre	3	10500	7925	1	168.9	53.0	50.3	2.7	50.0	22.3	72
	WKT-VS1-4	Louvre	3	19183	7925	1	228.1	54.0	54.0	0.0	51.0	23.6	75
	WKT-VS6-1	Louvre	3	5500	11100	2	241.9	56.0	52.2	3.8	53.7	23.8	77
	WKT-VS6-2A	Louvre	3	1100	2100		27.1	49.0	47.3	1.7	46.0	14.3	60
	WKT-VS6-2B	Louvre	3	1100	3800		35.8	49.0	47.9	1.1	46.0	15.5	62
	WKT-VS6-3A	Louvre	3	3370	3575		51.8	48.0	49.0	-1.0	45.0	17.1	62
	WKT-VS6-3B	Louvre	3	3370	2775		45.9	52.0	52.0	0.0	49.0	16.6	66
VS6	WKT-VS6-4	Louvre	3	1800	8360		58.1	59.0	53.5	5.5	57.6	17.6	75
	WKT-VS6-5A	Louvre	3	3350	1615	1	37.3	61.0	51.4	9.6	60.5	15.7	76
	WKT-VS6-5B	Louvre	3	2000	5495		53.0	60.0	54.4	5.6	58.6	17.2	76
	WKT-VS6-6A	Louvre	3	400	1250		12.3	57.0	55.9	1.1	54.0	10.9	65
	WKT-VS6-6B	Louvre	3	400	1250		12.3	60.0	52.7	7.3	59.1	10.9	70
	WKT-VS6-7A	Louvre	3	8050	8725		149.3	50.0	48.9	1.1	47.0	21.7	69
	WKT-VS6-7B	Louvre	3	5300	1850		33.8	51.0	48.9	2.1	48.0	15.3	63

Appendix A3 Result Summary Table

Source ID	Louvre ID	Plant / Louvre	Method(1)	Louvre Size		Measurement Distance(m)	Measurement Box Area (S)	Measured Noise Level L_{Aeq} [dB(A)]	Average Background LAeq [dB(A)]	Difference LAeq [dB(A)] (2)	Background Corrected Measured LAeq [dB(A)]	Area Corr.	Calculated SWL
				Width (mm)	Height (mm)								
PVS6	WKT-PVS6-1	Louvre	3	500	1000	1	18.5	53.0	51.7	1.3	50.0	12.7	63
	WKT-PVS6-2	Louvre	3	350	1200		18.6	57.0	51.2	5.8	55.7	12.7	68
	WKT-PVS6-3A	Louvre	3	400	1970		22.3	58.0	54.0	4.0	55.8	13.5	69
	WKT-PVS6-3B	Louvre	3	1600	6550		55.1	58.0	54.3	3.7	55.6	17.4	73
	WKT-PVS6-4	Louvre	3	5350	2650		41.5	57.0	49.0	8.0	56.3	16.2	72
VS6-4	WKT-G-G15VS-01A	Louvre	3	2725	7450	2	149.7	56.3	52.9	3.4	53.6	21.8	75
	WKT-G-G15VS-01B	Louvre	3	2940	7450	2	153.0	56.1	51.5	4.6	54.3	21.8	76
	WKT-G-G15VS-01C	Louvre	3	600	7450	2	116.9	55.1	50.6	4.5	53.2	20.7	74
	WKT-G-G15VS-03A Section 1	Louvre	3	3075	10000	1	95.1	55.5	52.5	3.0	52.5	19.8	72
	WKT-G-G15VS-03A Section 2	Louvre	3	2250	10000	1	83.5	55.2	50.0	5.2	53.6	19.2	73
VS7	WKT-G-D14VS-03A	Louvre	3	6150	15600	3	464.9	56.8	53.5	3.3	54.1	26.7	81
	WKT-G-D14VS-04A	Louvre	3	5350	17700	1	198.9	56.6	51.9	4.7	54.8	23.0	78
	WKT-VS7-1A	Louvre	3	6800	15045	2	325.1	54.0	50.1	3.9	51.7	25.1	77
	WKT-VS7-1B	Louvre	3	2500	15045	2	226.0	53.0	50.7	2.3	50.0	23.5	74
	WKT-VS7-2	Louvre	3	2350	15425	1	119.3	51.0	50.1	0.9	48.0	20.8	69
	WKT-VS7-3	Louvre	3	10000	18250		307.5	58.0	54.7	3.3	55.3	24.9	80
PTI	L-01	Louvre	3	8000	2250	2	148.0	60.8	56.0	4.8	59.1	21.7	83
				8000	2250	2	148.0	59.0	56.0	3.0	56.0	21.7	
	L-02	Louvre	3	8000	2250	2	148.0	59.6	55.4	4.2	57.6	21.7	79
	L-03	Louvre	3	8000	2250	2	148.0	60.7	55.4	5.3	59.3	21.7	81
	L-03a	Louvre	3	9000	2000	2	154.0	59.9	56.0	3.9	57.7	21.9	80
	L-06	Louvre	2	1000	1000	2	N/A	62.7	57.6	5.1	61.1	N/A	75
	L-07	Louvre	2	1000	1000	2	N/A	57.7	53.9	3.8	55.4	N/A	69
	L-08	Louvre	2	1000	1000	2	N/A	59.2	53.9	5.3	57.7	N/A	72
	L-08a	Louvre	2	1000	1000	2	N/A	57.4	53.9	3.5	54.8	N/A	69
	L-10	Louvre	3	6000	2250	2	127.5	65.9	58.8	7.1	65.0	21.1	86
	L-11	Louvre	3	6000	2250	2	127.5	64.5	58.8	5.7	63.1	21.1	84
	L-12	Louvre	3	6000	2250	2	127.5	64.4	58.8	5.6	63.0	21.1	84
	L-13	Louvre	3	6000	2250	2	127.5	62.8	56.8	6.0	61.5	21.1	90
				6000	2250	2	127.5	62.4	56.8	5.6	61.0	21.1	
				6000	2250	2	127.5	64.5	56.8	7.7	63.7	21.1	
				6000	2250	2	127.5	62.3	56.8	5.5	60.9	21.1	
				6000	2250	2	127.5	61.3	56.8	4.5	59.4	21.1	
	L-14	Louvre	3	7350	2250	2	141.3	66.6	56.8	9.8	66.1	21.5	88
	L-15a	Louvre	3	6600	2250	2	133.7	65.7	56.8	8.9	65.1	21.3	86
	L-15b	Louvre	3	6600	2250	2	133.7	62.3	56.8	5.5	60.9	21.3	82
	L-21	Louvre	3	8500	2000	2	149.0	56.5	53.4	3.1	53.6	21.7	75
	L-22	Louvre	3	8500	2000	2	149.0	56.9	53.4	3.5	54.3	21.7	76
	L-23	Louvre	3	8500	2000	2	149.0	59.2	56.0	3.2	56.4	21.7	78
	L-24	Louvre	3	8500	2000	2	149.0	59.4	56.0	3.4	56.7	21.7	78
	L-28	Louvre	3	7000	2000	2	134.0	54.2	51.2	3.0	51.2	21.3	72
	L-29	Louvre	3	7000	2000	2	134.0	60.7	57.7	3.0	57.7	21.3	79
	L-30	Louvre	3	7000	2000	2	134.0	57.1	54.0	3.1	54.2	21.3	75
	L-31	Louvre	3	7000	2000	2	134.0	63.3	57.7	5.6	61.9	21.3	83

(1) 2: Far-field measurement; 3: Near-field measurement.

(2) For near field measurement, if the difference between measures noise level (MNL) and the average background noise level is 3dB(A) or less then 3dB(A), a -3dB(A) will be applie to the MNL as the background corrected measured noise level. If the difference is greater than 3dB(A), the formula 10*LOG10(10^(MNL/10)-10^(BGN/10)) will be applied. For far field measurement, the SWL is calculated by the following equation: SWL = SPL + 20log D + 8 + K1A, where D is the separation between the louvre and the microphone, in meter; K1A is the background noise correction factor as described in ISO 3746:2010

(3) P2 louvre, which was identified in the ERR for "Design Changes in Mon Kok West Ventilation Buildings, West Kowloon Terminus and Its Associated Building Elements" in 2013, does not connected to any mechanical plant and therefore it was not included in the assessment.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK3	46-48 Man King Building (South facade)	WKP	WKP-U1-E6PN-03ASection 1	108	82	0	36		
			WKP-U1-E6PN-03ASection 2	106	80	0	35		
			WKP-U1-E6PN-06A	122	69	10	12		
			WKP-U1-E6PN-04A	125	83	10	26		
			WKP-E6PVS-02	106	66	0	21		
			WKP-U1-E6PN-09	122	74	10	17		
		EAA	WKT-VS3N-1	77	80	10	27		
		VS 3	WKT-VS3-1	127	67	0	20		
			WKT-VS3-2	128	67	0	20		
			WKT-VS3-3	124	72	0	25		
			WKT-VS3-4	126	72	0	25		
			WKT-VS3-5	129	69	0	22		
			WKT-VS3-6A	129	66	0	19		
			WKT-VS3-6B	129	67	0	20		
			WKT-VS3-7	124	65	0	18		
			WKT-VS3-8	124	66	0	19		
		VS 2 EAST	WKT-VS2E-1	233	72	0	20		
			WKT-VS2E-2	246	69	0	16		
			WKT-VS2E-3	256	69	0	16		
		VS 4(3)	WKT-VS4-3	283	73	0	19		
		VS 2 WEST	WKT-VS2W-1	247	75	0	22		
			WKT-VS2W-2A	247	68	0	15		
			WKT-VS2W-2B	247	70	0	17		
			WKT-VS2W-2C	257	70	0	17		
			WKT-VS2W-3	271	76	0	22		
		PTI	L-01	63	83	0	42		
			L-02	68	79	0	37		
			L-03	76	81	5	33		
			L-03a	117	80	5	29		
			L-06	297	75	10	11		
			L-07	289	69	10	5		
			L-08	283	72	10	8		
			L-08a	277	69	10	5		
			L-10	167	86	10	27		
			L-11	167	84	10	25		
			L-12	159	84	10	25		
			L-13	134	90	10	32		
			L-14	108	88	10	32		
			L-15a	100	86	10	31		
			L-15b	93	82	10	28		
			L-21	185	75	5	20		
			L-22	166	76	5	22		
			L-23	153	78	5	24		
			L-24	140	78	5	25		
			L-28	295	72	10	8		
			L-29	178	79	10	19		
			L-30	171	75	10	15		
			L-31	272	83	10	19	**46**	**60**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2) (3), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK3	46-48 Man King Building (South facade)	WKP	WKP-U1-E6PN-03ASection 1	108	82	0	36		
			WKP-U1-E6PN-03ASection 2	106	80	0	35		
			WKP-U1-E6PN-06A	122	69	10	12		
			WKP-U1-E6PN-04A	125	83	10	26		
			WKP-E6PVS-02	106	66	0	21		
			WKP-U1-E6PN-09	122	74	10	17		
		EAA	WKT-VS3N-1	77	80	10	27		
		VS 3	WKT-VS3-1	127	67	0	20		
			WKT-VS3-2	128	67	0	20		
			WKT-VS3-3	124	72	0	25		
			WKT-VS3-4	126	72	0	25		
			WKT-VS3-5	129	69	0	22		
			WKT-VS3-6A	129	66	0	19		
			WKT-VS3-6B	129	67	0	20		
			WKT-VS3-7	124	65	0	18		
			WKT-VS3-8	124	66	0	19		
		VS 2 EAST	WKT-VS2E-1	233	72	0	20		
			WKT-VS2E-2	246	69	0	16		
			WKT-VS2E-3	256	69	0	16		
		VS 4(3)	WKT-VS4-3	283	73	0	19		
		VS 2 WEST	WKT-VS2W-1	247	75	0	22		
			WKT-VS2W-2A	247	68	0	15		
			WKT-VS2W-2B	247	70	0	17		
			WKT-VS2W-2C	257	70	0	17		
			WKT-VS2W-3	271	76	0	22		
		PTI	L-01	63	83	0	42		
			L-02	68	79	0	37		
			L-03	76	81	5	33		
			L-03a	117	80	5	29		
			L-06	297	75	10	11		
			L-07	289	69	10	5		
			L-08	283	72	10	8		
			L-08a	277	69	10	5		
			L-10	167	86	10	27		
			L-11	167	84	10	25		
			L-12	159	84	10	25		
			L-13	134	90	10	32		
			L-14	108	88	10	32		
			L-15a	100	86	10	31		
			L-15b	93	82	10	28		
			L-21	185	75	5	20		
			L-22	166	76	5	22		
			L-23	153	78	5	24		
			L-24	140	78	5	25		
			L-28	295	72	10	8		
			L-29	178	79	10	19		
			L-30	171	75	10	15		
			L-31	272	83	10	19	**46**	**50**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louvre.
3) WKT-VS4-1 and WKT-VS4-4 are located at more than 300m from NSR WK3, and therefore they are not included in the assessment.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK3a	46-48 Man King Building (West facade)	WKP	WKP-U1-E6PN-03ASection 1	107	82	0	36		
			WKP-U1-E6PN-03ASection 2	100	80	0	35		
			WKP-U1-E6PN-06A	118	69	10	13		
			WKP-U1-E6PN-04A	124	83	10	26		
			WKP-E6PVS-02	102	66	0	21		
			WKP-U1-E6PN-09	116	74	10	18		
		EAA	WKT-VS3N-1	78	80	10	27		
		VS 3	WKT-VS3-1	139	67	0	19		
			WKT-VS3-2	141	67	0	19		
			WKT-VS3-3	136	72	0	24		
			WKT-VS3-4	139	72	0	24		
			WKT-VS3-5	140	69	0	21		
			WKT-VS3-6A	140	66	0	18		
			WKT-VS3-6B	140	67	0	19		
			WKT-VS3-7	137	65	0	17		
			WKT-VS3-8	137	66	0	18		
		VS 2 EAST	WKT-VS2E-1	251	72	0	19		
			WKT-VS2E-2	264	69	0	16		
			WKT-VS2E-3	274	69	0	15		
		VS 2 WEST	WKT-VS2W-1	257	75	0	22		
			WKT-VS2W-2A	257	68	0	15		
			WKT-VS2W-2B	257	70	0	17		
			WKT-VS2W-2C	267	70	0	16		
			WKT-VS2W-3	282	76	0	22		
		PTI	L-01	58	83	0	43		
			L-02	58	79	0	39		
			L-03	62	81	0	40		
			L-03a	98	80	0	35		
			L-06	278	75	10	11		
			L-07	270	69	10	5		
			L-08	265	72	10	9		
			L-08a	259	69	10	6		
			L-10	150	86	10	27		
			L-11	150	84	10	25		
			L-12	143	84	10	26		
			L-13	122	90	10	33		
			L-14	111	88	10	32		
			L-15a	104	86	10	31		
			L-15b	99	82	10	27		
			L-21	166	75	0	26		
			L-22	147	76	0	28		
			L-23	134	78	0	30		
			L-24	122	78	0	31		
			L-28	277	72	10	8		
			L-29	161	79	10	20		
			L-30	154	75	10	16		
			L-31	253	83	10	20	**48**	**60**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK3a	46-48 Man King Building (West facade)	WKP	WKP-U1-E6PN-03ASection 1	107	82	0	36		
			WKP-U1-E6PN-03ASection 2	100	80	0	35		
			WKP-U1-E6PN-06A	118	69	10	13		
			WKP-U1-E6PN-04A	124	83	10	26		
			WKP-E6PVS-02	102	66	0	21		
			WKP-U1-E6PN-09	116	74	10	18		
		EAA	WKT-VS3N-1	78	80	10	27		
		VS 3	WKT-VS3-1	139	67	0	19		
			WKT-VS3-2	141	67	0	19		
			WKT-VS3-3	136	72	0	24		
			WKT-VS3-4	139	72	0	24		
			WKT-VS3-5	140	69	0	21		
			WKT-VS3-6A	140	66	0	18		
			WKT-VS3-6B	140	67	0	19		
			WKT-VS3-7	137	65	0	17		
			WKT-VS3-8	137	66	0	18		
		VS 2 EAST	WKT-VS2E-1	251	72	0	19		
			WKT-VS2E-2	264	69	0	16		
			WKT-VS2E-3	274	69	0	15		
		VS 2 WEST	WKT-VS2W-1	257	75	0	22		
			WKT-VS2W-2A	257	68	0	15		
			WKT-VS2W-2B	257	70	0	17		
			WKT-VS2W-2C	267	70	0	16		
			WKT-VS2W-3	282	76	0	22		
		PTI	L-01	58	83	0	43		
			L-02	58	79	0	39		
			L-03	62	81	0	40		
			L-03a	98	80	0	35		
			L-06	278	75	10	11		
			L-07	270	69	10	5		
			L-08	265	72	10	9		
			L-08a	259	69	10	6		
			L-10	150	86	10	27		
			L-11	150	84	10	25		
			L-12	143	84	10	26		
			L-13	122	90	10	33		
			L-14	111	88	10	32		
			L-15a	104	86	10	31		
			L-15b	99	82	10	27		
			L-21	166	75	0	26		
			L-22	147	76	0	28		
			L-23	134	78	0	30		
			L-24	122	78	0	31		
			L-28	277	72	10	8		
			L-29	161	79	10	20		
			L-30	154	75	10	16		
			L-31	253	83	10	20	**48**	**50**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louvre.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK4	Tower 6, Sorrento (East façade)	WKP	WKP-U1-E6PN-03ASection 1	122	82	10	25		
			WKP-U1-E6PN-03ASection 2	144	80	10	22		
			WKP-U1-E6PN-06A	127	69	0	22		
			WKP-U1-E6PN-04A	108	83	0	37		
			WKP-E6PVS-02	135	66	10	8		
			WKP-U1-E6PN-09	135	74	0	26		
		EAA	WKT-VS3N-1	147	80	0	32		
		VS 3	WKT-VS3-1	119	67	0	20		
			WKT-VS3-2	129	67	0	20		
			WKT-VS3-3	131	72	0	25		
			WKT-VS3-4	131	72	0	25		
			WKT-VS3-5	110	69	10	13		
			WKT-VS3-6A	110	66	10	10		
			WKT-VS3-6B	110	67	10	11		
			WKT-VS3-7	133	65	10	8		
			WKT-VS3-8	133	66	10	9		
		VS 2 EAST	WKT-VS2E-1	235	72	0	20		
			WKT-VS2E-2	246	69	0	16		
			WKT-VS2E-3	255	69	0	16		
		VS 4(3)	WKT-VS4-3	291	73	0	19		
		VS 2 WEST	WKT-VS2W-1	85	75	0	31		
			WKT-VS2W-2A	85	68	5	19		
			WKT-VS2W-2B	85	70	5	21		
			WKT-VS2W-2C	99	70	5	20		
			WKT-VS2W-3	113	76	5	25		
		VS 1(3)	WKT-VS1-1	293	67	0	13		
			WKT-VS1-3	281	72	5	13		
			WKT-VS1-4	293	75	5	16		
		PTI(3)	L-01	171	83	10	23		
			L-02	183	79	10	19		
			L-03	195	81	10	20		
			L-03a	242	80	10	17		
			L-06	363	75	0	0		
			L-07	354	69	0	0		
			L-08	348	72	0	0		
			L-08a	342	69	0	0		
			L-10	230	86	0	34		
			L-11	230	84	0	32		
			L-12	220	84	0	32		
			L-13	181	90	0	40		
			L-14	113	88	0	42		
			L-15a	120	86	0	39		
			L-15b	127	82	0	35		
			L-22	287	76	10	12		
			L-23	277	78	10	14		
			L-24	266	78	10	14		
			L-29	244	79	0	26		
			L-30	235	75	0	23	**47**	**60**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK4	Tower 6, Sorrento (East façade)	WKP	WKP-U1-E6PN-03ASection 1	122	82	10	25		
			WKP-U1-E6PN-03ASection 2	144	80	10	22		
			WKP-U1-E6PN-06A	127	69	0	22		
			WKP-U1-E6PN-04A	108	83	0	37		
			WKP-E6PVS-02	135	66	10	8		
			WKP-U1-E6PN-09	135	74	0	26		
		EAA	WKT-VS3N-1	147	80	0	32		
		VS 3	WKT-VS3-1	119	67	0	20		
			WKT-VS3-2	129	67	0	20		
			WKT-VS3-3	131	72	0	25		
			WKT-VS3-4	131	72	0	25		
			WKT-VS3-5	110	69	10	13		
			WKT-VS3-6A	110	66	10	10		
			WKT-VS3-6B	110	67	10	11		
			WKT-VS3-7	133	65	10	8		
			WKT-VS3-8	133	66	10	9		
		VS 2 EAST	WKT-VS2E-1	235	72	0	20		
			WKT-VS2E-2	246	69	0	16		
			WKT-VS2E-3	255	69	0	16		
		VS 4(3)	WKT-VS4-3	291	73	0	19		
		VS 2 WEST	WKT-VS2W-1	85	75	0	31		
			WKT-VS2W-2A	85	68	5	19		
			WKT-VS2W-2B	85	70	5	21		
			WKT-VS2W-2C	99	70	5	20		
			WKT-VS2W-3	113	76	5	25		
		VS 1(3)	WKT-VS1-1	293	67	0	13		
			WKT-VS1-3	281	72	5	13		
			WKT-VS1-4	293	75	5	16		
		PTI(3)	L-01	171	83	10	23		
			L-02	183	79	10	19		
			L-03	195	81	10	20		
			L-03a	242	80	10	17		
			L-06	363	75	0	0		
			L-07	354	69	0	0		
			L-08	348	72	0	0		
			L-08a	342	69	0	0		
			L-10	230	86	0	34		
			L-11	230	84	0	32		
			L-12	220	84	0	32		
			L-13	181	90	0	40		
			L-14	113	88	0	42		
			L-15a	120	86	0	39		
			L-15b	127	82	0	35		
			L-22	287	76	10	12		
			L-23	277	78	10	14		
			L-24	266	78	10	14		
			L-29	244	79	0	26		
			L-30	235	75	0	23	**47**	**50**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louvre.
3) WKT-VS4-1 WKT-VS4-4, WKT-VS1-2 and PTI L-31 are located at more than 300m from NSR WK4, and therefore they are not included in the assessment.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK 7a	Tsim Sha Tsui Fire Station	VS 5	WKT-VS5-1	270	70	10	6		
			WKT-VS5-2	266	92	0	39		
			WKT-VS5-4	238	79	0	26		
		VS 6	WKT-VS6-1	239	77	0	24		
			WKT-VS6-2A	234	60	0	8		
			WKT-VS6-2B	234	62	0	10		
			WKT-VS6-3A	241	62	10	0		
			WKT-VS6-3B	241	66	10	3		
			WKT-VS6-4	241	75	10	12		
			WKT-VS6-5A	241	76	10	13		
			WKT-VS6-5B	241	76	10	13		
			WKT-VS6-6A	241	65	10	2		
			WKT-VS6-6B	241	70	10	7		
			WKT-VS6-7A	246	69	10	6		
			WKT-VS6-7B	246	63	10	0		
		PVS6	WKT-PVS6-1	235	63	10	1		
			WKT-PVS6-2	236	68	0	16		
			WKT-PVS6-3A	236	69	0	17		
			WKT-PVS6-3B	236	73	0	21		
			WKT-PVS6-4	242	72	10	9		
		VS6-4	WKT-G-G15VS-01A	247	75	10	12		
			WKT-G-G15VS-01B	249	76	10	13		
			WKT-G-G15VS-01C	248	74	5	16		
			WKT-G-G15VS-03ASection 1	235	72	0	20		
			WKT-G-G15VS-03A Section 2	236	73	0	21		
		VS 7	WKT-G-D14VS-03A	130	81	0	34		
			WKT-G-D14VS-04A	135	78	0	30		
			WKT-VS7-1A	145	77	10	19		
			WKT-VS7-1B	142	74	0	26		
			WKT-VS7-2	142	69	10	11		
			WKT-VS7-3	142	80	10	22	**41**	**65**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK 7a	Tsim Sha Tsui Fire Station	VS 5	WKT-VS5-1	270	70	10	6		
			WKT-VS5-2	266	92	0	39		
			WKT-VS5-4	238	79	0	26		
		VS 6	WKT-VS6-1	239	77	0	24		
			WKT-VS6-2A	234	60	0	8		
			WKT-VS6-2B	234	62	0	10		
			WKT-VS6-3A	241	62	10	0		
			WKT-VS6-3B	241	66	10	3		
			WKT-VS6-4	241	75	10	12		
			WKT-VS6-5A	241	76	10	13		
			WKT-VS6-5B	241	76	10	13		
			WKT-VS6-6A	241	65	10	2		
			WKT-VS6-6B	241	70	10	7		
			WKT-VS6-7A	246	69	10	6		
			WKT-VS6-7B	246	63	10	0		
		PVS6	WKT-PVS6-1	235	63	10	1		
			WKT-PVS6-2	236	68	0	16		
			WKT-PVS6-3A	236	69	0	17		
			WKT-PVS6-3B	236	73	0	21		
			WKT-PVS6-4	242	72	10	9		
		VS6-4	WKT-G-G15VS-01A	247	75	10	12		
			WKT-G-G15VS-01B	249	76	10	13		
			WKT-G-G15VS-01C	248	74	5	16		
			WKT-G-G15VS-03ASection 1	235	72	0	20		
			WKT-G-G15VS-03A Section 2	236	73	0	21		
		VS 7	WKT-G-D14VS-03A	130	81	0	34		
			WKT-G-D14VS-04A	135	78	0	30		
			WKT-VS7-1A	145	77	10	19		
			WKT-VS7-1B	142	74	0	26		
			WKT-VS7-2	142	69	10	11		
			WKT-VS7-3	142	80	10	22	**41**	**55**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louvre.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK8a	Tower 6, The Waterfront	WKP	WKP-U1-E6PN-03ASection 1	205	82	10	21		
			WKP-U1-E6PN-03ASection 2	232	80	10	18		
			WKP-U1-E6PN-06A	216	69	0	17		
			WKP-U1-E6PN-04A	195	83	0	32		
			WKP-E6PVS-02	220	66	10	4		
			WKP-U1-E6PN-09	225	74	0	22		
		EAA	WKT-VS3N-1	223	80	0	28		
		VS 3	WKT-VS3-1	159	67	0	18		
			WKT-VS3-2	163	67	0	18		
			WKT-VS3-3	166	72	0	23		
			WKT-VS3-4	165	72	0	23		
			WKT-VS3-5	155	69	10	10		
			WKT-VS3-6A	155	66	10	7		
			WKT-VS3-6B	155	67	10	8		
			WKT-VS3-7	168	65	10	6		
			WKT-VS3-8	168	66	10	7		
		VS 2 EAST	WKT-VS2E-1	204	72	0	21		
			WKT-VS2E-2	211	69	0	18		
			WKT-VS2E-3	217	69	0	17		
		VS 4	WKT-VS4-1	272	79	0	25		
			WKT-VS4-3	250	73	0	20		
			WKT-VS4-4	270	74	0	20		
		VS 2 WEST	WKT-VS2W-1	39	75	0	38		
			WKT-VS2W-2A	39	68	0	31		
			WKT-VS2W-2B	39	70	0	33		
			WKT-VS2W-2C	36	70	0	34		
			WKT-VS2W-3	35	76	0	40		
		VS 1	WKT-VS1-1	201	67	0	16		
			WKT-VS1-2	221	72	0	20		
			WKT-VS1-3	189	72	0	21		
			WKT-VS1-4	200	75	0	24		
		PTI	L-01	249	83	10	20		
			L-02	263	79	10	16		
			L-03	279	81	10	17		
			L-13	275	90	0	36		
			L-14	188	88	0	37		
			L-15a	192	86	0	35		
			L-15b	195	82	0	31	**46**	**60**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK8a	Tower 6, The Waterfront	WKP	WKP-U1-E6PN-03ASection 1	205	82	10	21		
			WKP-U1-E6PN-03ASection 2	232	80	10	18		
			WKP-U1-E6PN-06A	216	69	0	17		
			WKP-U1-E6PN-04A	195	83	0	32		
			WKP-E6PVS-02	220	66	10	4		
			WKP-U1-E6PN-09	225	74	0	22		
		EAA	WKT-VS3N-1	223	80	0	28		
		VS 3	WKT-VS3-1	159	67	0	18		
			WKT-VS3-2	163	67	0	18		
			WKT-VS3-3	166	72	0	23		
			WKT-VS3-4	165	72	0	23		
			WKT-VS3-5	155	69	10	10		
			WKT-VS3-6A	155	66	10	7		
			WKT-VS3-6B	155	67	10	8		
			WKT-VS3-7	168	65	10	6		
			WKT-VS3-8	168	66	10	7		
		VS 2 EAST	WKT-VS2E-1	204	72	0	21		
			WKT-VS2E-2	211	69	0	18		
			WKT-VS2E-3	217	69	0	17		
		VS 4	WKT-VS4-1	272	79	0	25		
			WKT-VS4-3	250	73	0	20		
			WKT-VS4-4	270	74	0	20		
		VS 2 WEST	WKT-VS2W-1	39	75	0	38		
			WKT-VS2W-2A	39	68	0	31		
			WKT-VS2W-2B	39	70	0	33		
			WKT-VS2W-2C	36	70	0	34		
			WKT-VS2W-3	35	76	0	40		
		VS 1	WKT-VS1-1	201	67	0	16		
			WKT-VS1-2	221	72	0	20		
			WKT-VS1-3	189	72	0	21		
			WKT-VS1-4	200	75	0	24		
		PTI	L-01	249	83	10	20		
			L-02	263	79	10	16		
			L-03	279	81	10	17		
			L-13	275	90	0	36		
			L-14	188	88	0	37		
			L-15a	192	86	0	35		
			L-15b	195	82	0	31	**46**	**50**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louvre.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK11a	Tower 3, The Austin (formerly named as Planned Development)	WKP	WKP-U1-E6PN-03ASection 1	272	82	0	28		
			WKP-U1-E6PN-03ASection 2	292	80	0	26		
			WKP-U1-E6PN-06A	297	69	10	5		
			WKP-U1-E6PN-04A	282	83	10	19		
			WKP-E6PVS-02	283	66	0	12		
		EAA	WKT-VS3N-1	252	80	10	17		
		VS 3	WKT-VS3-1	195	67	0	16		
			WKT-VS3-2	183	67	0	17		
			WKT-VS3-3	184	72	0	22		
			WKT-VS3-4	181	72	0	22		
			WKT-VS3-5	206	69	10	8		
			WKT-VS3-6A	206	66	10	5		
			WKT-VS3-6B	206	67	10	6		
			WKT-VS3-7	181	65	0	15		
			WKT-VS3-8	181	66	0	16		
		VS 2 EAST	WKT-VS2E-1	93	72	0	28		
			WKT-VS2E-2	93	69	0	25		
			WKT-VS2E-3	94	69	0	24		
		VS 4	WKT-VS4-1	112	79	0	33		
			WKT-VS4-3	91	73	0	29		
			WKT-VS4-4	117	74	0	28		
		VS 5	WKT-VS5-1	172	70	0	20		
			WKT-VS5-2	179	92	0	42		
			WKT-VS5-4	207	79	0	28		
		VS 2 WEST	WKT-VS2W-1	257	75	0	22		
			WKT-VS2W-2A	257	68	0	15		
			WKT-VS2W-2B	257	70	0	17		
			WKT-VS2W-2C	255	70	0	17		
			WKT-VS2W-3	258	76	0	23		
		VS 1	WKT-VS1-1	288	67	0	13		
			WKT-VS1-2	273	72	0	18		
			WKT-VS1-3	279	72	10	8		
			WKT-VS1-4	291	75	10	11		
		PTI	L-01	262	83	0	30		
			L-02	277	79	0	25		
			L-03	292	81	0	27		
			L-14	251	88	0	35		
			L-15a	242	86	0	33		
			L-15b	234	82	0	30	**45**	**60**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK11a	Tower 3, The Austin (formerly named as Planned Development)	WKP	WKP-U1-E6PN-03ASection 1	272	82	0	28		
			WKP-U1-E6PN-03ASection 2	292	80	0	26		
			WKP-U1-E6PN-06A	297	69	10	5		
			WKP-U1-E6PN-04A	282	83	10	19		
			WKP-E6PVS-02	283	66	0	12		
		EAA	WKT-VS3N-1	252	80	10	17		
		VS 3	WKT-VS3-1	195	67	0	16		
			WKT-VS3-2	183	67	0	17		
			WKT-VS3-3	184	72	0	22		
			WKT-VS3-4	181	72	0	22		
			WKT-VS3-5	206	69	10	8		
			WKT-VS3-6A	206	66	10	5		
			WKT-VS3-6B	206	67	10	6		
			WKT-VS3-7	181	65	0	15		
			WKT-VS3-8	181	66	0	16		
		VS 2 EAST	WKT-VS2E-1	93	72	0	28		
			WKT-VS2E-2	93	69	0	25		
			WKT-VS2E-3	94	69	0	24		
		VS 4	WKT-VS4-1	112	79	0	33		
			WKT-VS4-3	91	73	0	29		
			WKT-VS4-4	117	74	0	28		
		VS 5	WKT-VS5-1	172	70	0	20		
			WKT-VS5-2	179	92	0	42		
			WKT-VS5-4	207	79	0	28		
		VS 2 WEST	WKT-VS2W-1	257	75	0	22		
			WKT-VS2W-2A	257	68	0	15		
			WKT-VS2W-2B	257	70	0	17		
			WKT-VS2W-2C	255	70	0	17		
			WKT-VS2W-3	258	76	0	23		
		VS 1	WKT-VS1-1	288	67	0	13		
			WKT-VS1-2	273	72	0	18		
			WKT-VS1-3	279	72	10	8		
			WKT-VS1-4	291	75	10	11		
		PTI	L-01	262	83	0	30		
			L-02	277	79	0	25		
			L-03	292	81	0	27		
			L-14	251	88	0	35		
			L-15a	242	86	0	33		
			L-15b	234	82	0	30	**45**	**50**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louvre.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK12a	Tower 5, Grand Austin (formerly named as Planned Development)	VS 3	WKT-VS3-1	292	67	0	13		
			WKT-VS3-2	281	67	0	13		
			WKT-VS3-3	282	72	0	18		
			WKT-VS3-4	279	72	0	18		
			WKT-VS3-7	280	65	0	11		
			WKT-VS3-8	280	66	0	12		
		VS 2 EAST	WKT-VS2E-1	152	72	0	23		
			WKT-VS2E-2	141	69	0	21		
			WKT-VS2E-3	134	69	0	21		
		VS 4	WKT-VS4-1	85	79	0	35		
			WKT-VS4-3	100	73	0	28		
			WKT-VS4-4	88	74	0	30		
		VS 5	WKT-VS5-1	99	70	0	25		
			WKT-VS5-2	107	92	0	46		
			WKT-VS5-4	126	79	0	32		
		VS 1	WKT-VS1-1	277	67	0	13		
			WKT-VS1-2	253	72	0	19		
			WKT-VS1-3	272	72	10	8		
			WKT-VS1-4	281	75	10	11		
		VS 7	WKT-G-D14VS-03A	259	81	0	28		
			WKT-G-D14VS-04A	265	78	10	15		
			WKT-VS7-1A	265	77	10	14		
			WKT-VS7-1B	268	74	10	10		
			WKT-VS7-2	254	69	0	16		
			WKT-VS7-3	254	80	0	27	**47**	**60**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK12a	Tower 5, Grand Austin (formerly named as Planned Development)	VS 3	WKT-VS3-1	292	67	0	13		
			WKT-VS3-2	281	67	0	13		
			WKT-VS3-3	282	72	0	18		
			WKT-VS3-4	279	72	0	18		
			WKT-VS3-7	280	65	0	11		
			WKT-VS3-8	280	66	0	12		
		VS 2 EAST	WKT-VS2E-1	152	72	0	23		
			WKT-VS2E-2	141	69	0	21		
			WKT-VS2E-3	134	69	0	21		
		VS 4	WKT-VS4-1	85	79	0	35		
			WKT-VS4-3	100	73	0	28		
			WKT-VS4-4	88	74	0	30		
		VS 5	WKT-VS5-1	99	70	0	25		
			WKT-VS5-2	107	92	0	46		
			WKT-VS5-4	126	79	0	32		
		VS 1	WKT-VS1-1	277	67	0	13		
			WKT-VS1-2	253	72	0	19		
			WKT-VS1-3	272	72	10	8		
			WKT-VS1-4	281	75	10	11		
		VS 7	WKT-G-D14VS-03A	259	81	0	28		
			WKT-G-D14VS-04A	265	78	10	15		
			WKT-VS7-1A	265	77	10	14		
			WKT-VS7-1B	268	74	10	10		
			WKT-VS7-2	254	69	0	16		
			WKT-VS7-3	254	80	0	27	**47**	**50**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louvre.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK14	Moon Tower, The Arch	VS 2 EAST	WKT-VS2E-1	288	72	0	18		
			WKT-VS2E-2	284	69	0	15		
			WKT-VS2E-3	281	69	0	15		
		VS 4	WKT-VS4-1	290	79	0	25		
			WKT-VS4-3	292	73	0	19		
			WKT-VS4-4	285	74	0	20		
		VS 5	WKT-VS5-1	285	70	0	16		
			WKT-VS5-2	279	92	0	38		
			WKT-VS5-4	282	79	0	25		
		VS 2 WEST	WKT-VS2W-1	239	75	10	12		
			WKT-VS2W-2A	239	68	10	5		
			WKT-VS2W-2B	239	70	10	7		
			WKT-VS2W-2C	226	70	10	8		
			WKT-VS2W-3	210	76	10	15		
		VS 1	WKT-VS1-1	94	67	0	23		
			WKT-VS1-2	119	72	0	25		
			WKT-VS1-3	99	72	0	27		
			WKT-VS1-4	90	75	0	31		
		VS 6	WKT-VS6-1	221	77	10	15		
			WKT-VS6-2A	222	60	10	0		
			WKT-VS6-2B	222	62	10	0		
			WKT-VS6-3A	215	62	0	10		
			WKT-VS6-3B	215	66	0	14		
			WKT-VS6-4	215	75	0	23		
			WKT-VS6-5A	215	76	0	24		
			WKT-VS6-5B	215	76	0	24		
			WKT-VS6-6A	215	65	0	13		
			WKT-VS6-6B	215	70	0	18		
			WKT-VS6-7A	214	69	0	17		
			WKT-VS6-7B	214	63	0	11		
		PVS6	WKT-PVS6-1	237	63	0	10		
			WKT-PVS6-2	238	68	10	5		
			WKT-PVS6-3A	238	69	10	6		
			WKT-PVS6-3B	238	73	10	10		
			WKT-PVS6-4	230	72	0	20		
		VS6-4	WKT-G-G15VS-01A	264	75	10	12		
			WKT-G-G15VS-01B	261	76	0	23		
			WKT-G-G15VS-01C	260	74	0	21		
			WKT-G-G15VS-03ASection 1	268	72	10	8		
			WKT-G-G15VS-03A Section 2	267	73	0	19		
		VS 7	WKT-VS7-1A	294	77	0	23		
			WKT-VS7-1B	297	74	10	10		
			WKT-VS7-2	298	69	0	15		
			WKT-VS7-3	298	80	0	26	**41**	**60**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK14	Moon Tower, The Arch	VS 2 EAST	WKT-VS2E-1	288	72	0	18		
			WKT-VS2E-2	284	69	0	15		
			WKT-VS2E-3	281	69	0	15		
		VS 4	WKT-VS4-1	290	79	0	25		
			WKT-VS4-3	292	73	0	19		
			WKT-VS4-4	285	74	0	20		
		VS 5	WKT-VS5-1	285	70	0	16		
			WKT-VS5-2	279	92	0	38		
			WKT-VS5-4	282	79	0	25		
		VS 2 WEST	WKT-VS2W-1	239	75	10	12		
			WKT-VS2W-2A	239	68	10	5		
			WKT-VS2W-2B	239	70	10	7		
			WKT-VS2W-2C	226	70	10	8		
			WKT-VS2W-3	210	76	10	15		
		VS 1	WKT-VS1-1	94	67	0	23		
			WKT-VS1-2	119	72	0	25		
			WKT-VS1-3	99	72	0	27		
			WKT-VS1-4	90	75	0	31		
		VS 6	WKT-VS6-1	221	77	10	15		
			WKT-VS6-2A	222	60	10	0		
			WKT-VS6-2B	222	62	10	0		
			WKT-VS6-3A	215	62	0	10		
			WKT-VS6-3B	215	66	0	14		
			WKT-VS6-4	215	75	0	23		
			WKT-VS6-5A	215	76	0	24		
			WKT-VS6-5B	215	76	0	24		
			WKT-VS6-6A	215	65	0	13		
			WKT-VS6-6B	215	70	0	18		
			WKT-VS6-7A	214	69	0	17		
			WKT-VS6-7B	214	63	0	11		
		PVS6	WKT-PVS6-1	237	63	0	10		
			WKT-PVS6-2	238	68	10	5		
			WKT-PVS6-3A	238	69	10	6		
			WKT-PVS6-3B	238	73	10	10		
			WKT-PVS6-4	230	72	0	20		
		VS6-4	WKT-G-G15VS-01A	264	75	10	12		
			WKT-G-G15VS-01B	261	76	0	23		
			WKT-G-G15VS-01C	260	74	0	21		
			WKT-G-G15VS-03ASection 1	268	72	10	8		
			WKT-G-G15VS-03A Section 2	267	73	0	19		
		VS7	WKT-VS7-1A	294	77	0	23		
			WKT-VS7-1B	297	74	10	10		
			WKT-VS7-2	298	69	0	15		
			WKT-VS7-3	298	80	0	26	**41**	**50**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louvre.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m[1]	SWL, dB(A)	Correction for line of sight[2], dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK14a	Star Tower, The Arch	VS 3	WKT-VS3-2	299	67	0	12		
		VS 2 EAST	WKT-VS2E-1	255	72	0	19		
			WKT-VS2E-2	253	69	0	16		
			WKT-VS2E-3	251	69	0	16		
		VS 4	WKT-VS4-1	270	79	0	25		
			WKT-VS4-3	267	73	0	19		
			WKT-VS4-4	265	74	0	21		
		VS 5	WKT-VS5-1	276	70	0	16		
			WKT-VS5-2	271	92	0	38		
			WKT-VS5-4	279	79	0	25		
		VS 2 WEST	WKT-VS2W-1	192	75	0	24		
			WKT-VS2W-2A	192	68	0	17		
			WKT-VS2W-2B	192	70	0	19		
			WKT-VS2W-2C	179	70	0	20		
			WKT-VS2W-3	163	76	0	27		
		VS 1	WKT-VS1-1	86	67	0	23		
			WKT-VS1-2	116	72	0	26		
			WKT-VS1-3	85	72	0	28		
			WKT-VS1-4	82	75	0	32		
		VS 6	WKT-VS6-1	254	77	0	24		
			WKT-VS6-2A	254	60	10	0		
			WKT-VS6-2B	254	62	10	0		
			WKT-VS6-3A	247	62	0	9		
			WKT-VS6-3B	247	66	0	13		
			WKT-VS6-4	247	75	0	22		
			WKT-VS6-5A	247	76	0	23		
			WKT-VS6-5B	247	76	0	23		
			WKT-VS6-6A	247	65	0	12		
			WKT-VS6-6B	247	70	0	17		
			WKT-VS6-7A	247	69	0	16		
			WKT-VS6-7B	247	63	0	10		
		PVS6	WKT-PVS6-1	271	63	0	9		
			WKT-PVS6-2	273	68	10	4		
			WKT-PVS6-3A	273	69	10	5		
			WKT-PVS6-3B	273	73	10	9		
			WKT-PVS6-4	265	72	0	19		
		VS6-4	WKT-G-G15VS-01B	300	76	0	21		
			WKT-G-G15VS-01C	298	74	0	20	**41**	**60**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m[1]	SWL, dB(A)	Correction for line of sight[2], dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK14a	Star Tower, The Arch	VS 3	WKT-VS3-2	299	67	0	12		
		VS 2 EAST	WKT-VS2E-1	255	72	0	19		
			WKT-VS2E-2	253	69	0	16		
			WKT-VS2E-3	251	69	0	16		
		VS 4	WKT-VS4-1	270	79	0	25		
			WKT-VS4-3	267	73	0	19		
			WKT-VS4-4	265	74	0	21		
		VS 5	WKT-VS5-1	276	70	0	16		
			WKT-VS5-2	271	92	0	38		
			WKT-VS5-4	279	79	0	25		
		VS 2 WEST	WKT-VS2W-1	192	75	0	24		
			WKT-VS2W-2A	192	68	0	17		
			WKT-VS2W-2B	192	70	0	19		
			WKT-VS2W-2C	179	70	0	20		
			WKT-VS2W-3	163	76	0	27		
		VS 1	WKT-VS1-1	86	67	0	23		
			WKT-VS1-2	116	72	0	26		
			WKT-VS1-3	85	72	0	28		
			WKT-VS1-4	82	75	0	32		
		VS 6	WKT-VS6-1	254	77	0	24		
			WKT-VS6-2A	254	60	10	0		
			WKT-VS6-2B	254	62	10	0		
			WKT-VS6-3A	247	62	0	9		
			WKT-VS6-3B	247	66	0	13		
			WKT-VS6-4	247	75	0	22		
			WKT-VS6-5A	247	76	0	23		
			WKT-VS6-5B	247	76	0	23		
			WKT-VS6-6A	247	65	0	12		
			WKT-VS6-6B	247	70	0	17		
			WKT-VS6-7A	247	69	0	16		
			WKT-VS6-7B	247	63	0	10		
		PVS6	WKT-PVS6-1	271	63	0	9		
			WKT-PVS6-2	273	68	10	4		
			WKT-PVS6-3A	273	69	10	5		
			WKT-PVS6-3B	273	73	10	9		
			WKT-PVS6-4	265	72	0	19		
		VS6-4	WKT-G-G15VS-01B	300	76	0	21		
			WKT-G-G15VS-01C	298	74	0	20	**41**	**50**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to the louvre.

Appendix A3
Fixed Plant Noise Impact Assessment

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Daytime Noise Criteria, dB(A)
Daytime and Evening Time									
WK18	Hindu Temple(3)	MKV(4)	East E1	288	78	10	14		
			East E2	296	72	10	8		
			East E3	293	73	10	9		
			East E4	300	79	10	0		
			South S1	291	74	0	20		
			South S2	292	75	0	21		
			South S3	272	85	0	31		
			South S4	272	72	0	18		
			West W1	279	90	0	36		
		CKR(4)	WVSF 3	246	104	0	51		
			WVSF 4	299	104	0	49		
			WVSF 5	290	104	0	50		
		WKP	WKP-U1-E6PN-03ASection 1	255	82	10	19		
			WKP-U1-E6PN-03ASection 2	233	80	10	18		
			WKP-U1-E6PN-06A	230	69	0	17		
			WKP-U1-E6PN-04A	248	83	0	30		
			WKP-E6PVS-02	242	66	10	3		
			WKP-U1-E6PN-09	223	74	0	22		
		EAA	WKT-VS3N-1	273	80	0	26		
		PTI	L-01	267	83	10	19		
			L-02	254	79	10	16		
			L-03	243	81	10	18		
			L-03a	216	80	10	18		
			L-06	132	75	0	28		
			L-07	128	69	0	22		
			L-08	126	72	0	25		
			L-08a	124	69	0	22		
			L-10	156	86	0	37		
			L-11	156	84	0	35		
			L-12	162	84	0	35		
			L-13	187	90	0	39		
			L-14	278	88	10	24		
			L-15a	286	86	10	22		
			L-15b	293	82	10	18		
			L-21	191	75	0	24		
			L-22	198	76	10	15		
			L-23	204	78	10	17		
			L-24	208	78	10	17		
			L-28	158	72	0	23		
			L-29	148	79	0	31		
			L-30	153	75	0	26		
			L-31	122	83	0	36	**55**	**60**

NSR No.	Description	ID	Louvre ID (contractor)	Distance, m(1)	SWL, dB(A)	Correction for line of sight(2), dB(A)	SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
Night-time									
WK18	Hindu Temple(3)	MKV(4)	East E2	296	72	10	8		
			East E3	293	73	10	9		
			South S3	272	85	0	31		
			South S4	272	72	0	18		
			West W1	279	90	0	36		
		CKR(4)	WVSF 3	246	104	0	51		
			WVSF 4	299	104	0	49		
			WVSF 5	290	104	0	50		
		WKP	WKP-U1-E6PN-03ASection 1	255	82	10	19		
			WKP-U1-E6PN-03ASection 2	233	80	10	18		
			WKP-U1-E6PN-06A	230	69	0	17		
			WKP-U1-E6PN-04A	248	83	0	30		
			WKP-E6PVS-02	242	66	10	3		
			WKP-U1-E6PN-09	223	74	0	22		
		EAA	WKT-VS3N-1	273	80	0	26		
		PTI	L-01	267	83	10	19		
			L-02	254	79	10	16		
			L-03	243	81	10	18		
			L-03a	216	80	10	18		
			L-06	132	75	0	28		
			L-07	128	69	0	22		
			L-08	126	72	0	25		
			L-08a	124	69	0	22		
			L-10	156	86	0	37		
			L-11	156	84	0	35		
			L-12	162	84	0	35		
			L-13	187	90	0	39		
			L-14	278	88	10	24		
			L-15a	286	86	10	22		
			L-15b	293	82	10	18		
			L-21	191	75	0	24		
			L-22	198	76	10	15		
			L-23	204	78	10	17		
			L-24	208	78	10	17		
			L-28	158	72	0	23		
			L-29	148	79	0	31		
			L-30	153	75	0	26		
			L-31	122	83	0	36	**N/A**	**55**

Remark:
1) Fixed plant noise sources at a distance of over 300m from a noise sensitive receiver are considered to have an insignificant noise impact and are therefore not assessed.
2) A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings and negative correction of 5 dB(A) for NSR do not have direct line of sight to th
3) No sensitive uses at WK18 during night-time period.
4) SWL of noise sources at CKR are taken from "Environmental Review Report – Design Changes in Mong Kok West Ventilation Building, West Kowloon Terminus and Its Associated Building Elements, June 2013", while SWL of noise sources at MKV are taken from "Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) - Commissioning Test Report for the Fixed Plant Noise at Pat Heung (PHV), Nam Cheong (NCV) and Mongkok West (MKV) Ventilation Buildings, May 2018".

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[1]	Location/ Measurement	L_{Aeq} (dB)
WKP	WKP-U1-E6PN-03A Section 1	Normal	3	point 1	56.3
	WKP-U1-E6PN-03A Section 1	Normal	3	point 2	57.3
	WKP-U1-E6PN-03A Section 1	Normal	3	point 3	57.1
	WKP-U1-E6PN-03A Section 1	Normal	3	point 4	57.4
	WKP-U1-E6PN-03A Section 1	Normal	3	point 5	54.4
	WKP-U1-E6PN-03A Section 1	Normal	3	point 6	54.1
	WKP-U1-E6PN-03A Section 1	Normal	3	point 7	55.4
	WKP-U1-E6PN-03A Section 1	Normal	3	point 8	56.6
	WKP-U1-E6PN-03A Section 1	Normal	3	point 9	55.5
	WKP-U1-E6PN-03A Section 1	Normal	3	point 10	56.4
	WKP-U1-E6PN-03A Section 1	Normal	3	point 11	56.6
	WKP-U1-E6PN-03A Section 1	Normal	3	point 12	56.8
	WKP-U1-E6PN-03A Section 1	Normal	3	point 13	56.8
	WKP-U1-E6PN-03A Section 1	Normal	3	point 14	55.5
	WKP-U1-E6PN-03A Section 1	Normal	3	point 15	56.8
	WKP-U1-E6PN-03A Section 1	Normal	3	point 16	54.3
	WKP-U1-E6PN-03A Section 1	Normal	3	point 17	56.5
	WKP-U1-E6PN-03A Section 1	Normal	3	point 18	56.7
	WKP-U1-E6PN-03A Section 1	Normal	3	point 19	55.3
	WKP-U1-E6PN-03A Section 1	Normal	3	point 20	56.6
				AVERAGE	**56.2**
	WKP-U1-E6PN-03A Section 2	Normal	3	point 1	54.3
	WKP-U1-E6PN-03A Section 2	Normal	3	point 2	55.6
	WKP-U1-E6PN-03A Section 2	Normal	3	point 3	55.2
	WKP-U1-E6PN-03A Section 2	Normal	3	point 4	54.9
	WKP-U1-E6PN-03A Section 2	Normal	3	point 5	54.8
	WKP-U1-E6PN-03A Section 2	Normal	3	point 6	54.6
	WKP-U1-E6PN-03A Section 2	Normal	3	point 7	53.6
	WKP-U1-E6PN-03A Section 2	Normal	3	point 8	52.6
	WKP-U1-E6PN-03A Section 2	Normal	3	point 9	52.8
	WKP-U1-E6PN-03A Section 2	Normal	3	point 10	54.8
	WKP-U1-E6PN-03A Section 2	Normal	3	point 11	54.8
	WKP-U1-E6PN-03A Section 2	Normal	3	point 12	55.0
	WKP-U1-E6PN-03A Section 2	Normal	3	point 13	55.0
	WKP-U1-E6PN-03A Section 2	Normal	3	point 14	55.0
	WKP-U1-E6PN-03A Section 2	Normal	3	point 15	54.9
	WKP-U1-E6PN-03A Section 2	Normal	3	point 16	54.8
	WKP-U1-E6PN-03A Section 2	Normal	3	point 17	57.1
	WKP-U1-E6PN-03A Section 2	Normal	3	point 18	55.2
	WKP-U1-E6PN-03A Section 2	Normal	3	point 19	56.2
	WKP-U1-E6PN-03A Section 2	Normal	3	point 20	56.3
				AVERAGE	**55.0**
	WKP-U1-E6PN-06A	Normal	3	point 1	52.8
	WKP-U1-E6PN-06A	Normal	3	point 2	52.2
	WKP-U1-E6PN-06A	Normal	3	point 3	52.1
	WKP-U1-E6PN-06A	Normal	3	point 4	51.8
	WKP-U1-E6PN-06A	Normal	3	point 5	53.2
	WKP-U1-E6PN-06A	Normal	3	point 6	52.5
	WKP-U1-E6PN-06A	Normal	3	point 7	53.5
	WKP-U1-E6PN-06A	Normal	3	point 8	53.0
	WKP-U1-E6PN-06A	Normal	3	point 9	54.1
				AVERAGE	**52.9**
	WKP-U1-E6PN-04A	Normal	3	point 1	59.2
	WKP-U1-E6PN-04A	Normal	3	point 2	61.3
	WKP-U1-E6PN-04A	Normal	3	point 3	61.1
	WKP-U1-E6PN-04A	Normal	3	point 4	58.7
	WKP-U1-E6PN-04A	Normal	3	point 5	58.7
	WKP-U1-E6PN-04A	Normal	3	point 6	59.1
	WKP-U1-E6PN-04A	Normal	3	point 7	59.8
	WKP-U1-E6PN-04A	Normal	3	point 8	60.6
	WKP-U1-E6PN-04A	Normal	3	point 9	59.1
	WKP-U1-E6PN-04A	Normal	3	point 10	60.0
	WKP-U1-E6PN-04A	Normal	3	point 11	61.2
	WKP-U1-E6PN-04A	Normal	3	point 12	61.0
	WKP-U1-E6PN-04A	Normal	3	point 13	60.7
	WKP-U1-E6PN-04A	Normal	3	point 14	61.7
	WKP-U1-E6PN-04A	Normal	3	point 15	60.7
	WKP-U1-E6PN-04A	Normal	3	point 16	60.3
	WKP-U1-E6PN-04A	Normal	3	point 17	62.1
	WKP-U1-E6PN-04A	Normal	3	point 18	63.3
	WKP-U1-E6PN-04A	Normal	3	point 19	63.2
	WKP-U1-E6PN-04A	Normal	3	point 20	63.6
	WKP-U1-E6PN-04A	Normal	3	point 21	62.4
	WKP-U1-E6PN-04A	Normal	3	point 22	60.7
	WKP-U1-E6PN-04A	Normal	3	point 23	58.3
	WKP-U1-E6PN-04A	Normal	3	point 24	59.8
	WKP-U1-E6PN-04A	Normal	3	point 25	61.2
	WKP-U1-E6PN-04A	Normal	3	point 26	59.8
	WKP-U1-E6PN-04A	Normal	3	point 27	58.5
	WKP-U1-E6PN-04A	Normal	3	point 28	59.2
	WKP-U1-E6PN-04A	Normal	3	point 29	59.6
	WKP-U1-E6PN-04A	Normal	3	point 30	58.7
	WKP-U1-E6PN-04A	Normal	3	point 31	59.1
	WKP-U1-E6PN-04A	Normal	3	point 32	59.9
	WKP-U1-E6PN-04A	Normal	3	point 33	61.0
	WKP-U1-E6PN-04A	Normal	3	point 34	58.9
	WKP-U1-E6PN-04A	Normal	3	point 35	61.2
	WKP-U1-E6PN-04A	Normal	3	point 36	60.2
	WKP-U1-E6PN-04A	Normal	3	point 37	61.0
	WKP-U1-E6PN-04A	Normal	3	point 38	60.6
	WKP-U1-E6PN-04A	Normal	3	point 39	59.9
	WKP-U1-E6PN-04A	Normal	3	point 40	60.8
	WKP-U1-E6PN-04A	Normal	3	point 41	61.2
	WKP-U1-E6PN-04A	Normal	3	point 42	60.5
	WKP-U1-E6PN-04A	Normal	3	point 43	61.2
	WKP-U1-E6PN-04A	Normal	3	point 44	60.0
	WKP-U1-E6PN-04A	Normal	3	point 45	59.9
	WKP-U1-E6PN-04A	Normal	3	point 46	61.1
	WKP-U1-E6PN-04A	Normal	3	point 47	60.4
	WKP-U1-E6PN-04A	Normal	3	point 48	60.4
	WKP-U1-E6PN-04A	Normal	3	point 49	61.0

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(1)	Location/ Measurement	L_{Aeq} (dB)
	WKP-U1-E6PN-04A	Normal	3	point 50	59.9
				AVERAGE	**60.6**
	WKP-E6PVS-02	Normal	3	point 1	54.5
	WKP-E6PVS-02	Normal	3	point 2	53.5
	WKP-E6PVS-02	Normal	3	point 3	52.3
	WKP-E6PVS-02	Normal	3	point 4	53.2
	WKP-E6PVS-02	Normal	3	point 5	52.5
	WKP-E6PVS-02	Normal	3	point 6	53.6
	WKP-E6PVS-02	Normal	3	point 7	54.1
	WKP-E6PVS-02	Normal	3	point 8	54.7
	WKP-E6PVS-02	Normal	3	point 9	51.9
	WKP-E6PVS-02	Normal	3	point 10	51.9
	WKP-E6PVS-02	Normal	3	point 11	52.8
	WKP-E6PVS-02	Normal	3	point 12	51.9
	WKP-E6PVS-02	Normal	3	point 13	55.2
	WKP-E6PVS-02	Normal	3	point 14	54.2
	WKP-E6PVS-02	Normal	3	point 15	53.0
	WKP-E6PVS-02	Normal	3	point 16	54.0
	WKP-E6PVS-02	Normal	3	point 17	55.4
	WKP-E6PVS-02	Normal	3	point 18	55.7
	WKP-E6PVS-02	Normal	3	point 19	55.4
	WKP-E6PVS-02	Normal	3	point 20	54.0
	WKP-E6PVS-02	Normal	3	point 21	53.1
	WKP-E6PVS-02	Normal	3	point 22	54.8
	WKP-E6PVS-02	Normal	3	point 23	53.5
	WKP-E6PVS-02	Normal	3	point 24	53.4
	WKP-E6PVS-02	Normal	3	point 25	52.8
	WKP-E6PVS-02	Normal	3	point 26	53.8
	WKP-E6PVS-02	Normal	3	point 27	54.0
	WKP-E6PVS-02	Normal	3	point 28	54.0
	WKP-E6PVS-02	Normal	3	point 29	53.5
	WKP-E6PVS-02	Normal	3	point 30	53.4
	WKP-E6PVS-02	Normal	3	point 31	52.7
	WKP-E6PVS-02	Normal	3	point 32	53.4
				AVERAGE	**53.7**
	WKP-U1-E6PN-09	Normal	3	point 1	61.4
	WKP-U1-E6PN-09	Normal	3	point 2	60.6
	WKP-U1-E6PN-09	Normal	3	point 3	62.9
	WKP-U1-E6PN-09	Normal	3	point 4	59.6
	WKP-U1-E6PN-09	Normal	3	point 5	64.5
	WKP-U1-E6PN-09	Normal	3	point 6	63.1
	WKP-U1-E6PN-09	Normal	3	point 7	65.0
	WKP-U1-E6PN-09	Normal	3	point 8	60.3
	WKP-U1-E6PN-09	Normal	3	point 9	65.3
	WKP-U1-E6PN-09	Normal	3	point 10	61.3
	WKP-U1-E6PN-09	Normal	3	point 11	62.6
	WKP-U1-E6PN-09	Normal	3	point 12	65.5
	WKP-U1-E6PN-09	Normal	3	point 13	64.2
	WKP-U1-E6PN-09	Normal	3	point 14	63.7
	WKP-U1-E6PN-09	Normal	3	point 15	60.1
	WKP-U1-E6PN-09	Normal	3	point 16	64.7
	WKP-U1-E6PN-09	Normal	3	point 17	61.1
	WKP-U1-E6PN-09	Normal	3	point 18	59.3
	WKP-U1-E6PN-09	Normal	3	point 19	63.9
	WKP-U1-E6PN-09	Normal	3	point 20	61.2
	WKP-U1-E6PN-09	Normal	3	point 21	62.5
	WKP-U1-E6PN-09	Normal	3	point 22	64.9
	WKP-U1-E6PN-09	Normal	3	point 23	62.8
	WKP-U1-E6PN-09	Normal	3	point 24	62.3
	WKP-U1-E6PN-09	Normal	3	point 25	62.3
				AVERAGE	**63.0**
EAA	WKT-VS3N-1	Normal	3	point 1	54.8
	WKT-VS3N-1	Normal	3	point 2	53.8
	WKT-VS3N-1	Normal	3	point 3	53.8
	WKT-VS3N-1	Normal	3	point 4	55.3
	WKT-VS3N-1	Normal	3	point 5	54.0
	WKT-VS3N-1	Normal	3	point 6	54.4
	WKT-VS3N-1	Normal	3	point 7	57.6
	WKT-VS3N-1	Normal	3	point 8	56.5
	WKT-VS3N-1	Normal	3	point 9	56.6
	WKT-VS3N-1	Normal	3	point 10	57.6
	WKT-VS3N-1	Normal	3	point 11	57.2
	WKT-VS3N-1	Normal	3	point 12	55.1
	WKT-VS3N-1	Normal	3	point 13	54.6
	WKT-VS3N-1	Normal	3	point 14	56.7
	WKT-VS3N-1	Normal	3	point 15	56.7
	WKT-VS3N-1	Normal	3	point 16	55.3
	WKT-VS3N-1	Normal	3	point 17	56.4
	WKT-VS3N-1	Normal	3	point 18	56.5
	WKT-VS3N-1	Normal	3	point 19	53.6
	WKT-VS3N-1	Normal	3	point 20	54.3
	WKT-VS3N-1	Normal	3	point 21	53.3
	WKT-VS3N-1	Normal	3	point 22	54.8
	WKT-VS3N-1	Normal	3	point 23	53.0
	WKT-VS3N-1	Normal	3	point 24	56.9
	WKT-VS3N-1	Normal	3	point 25	53.7
	WKT-VS3N-1	Normal	3	point 26	54.6
	WKT-VS3N-1	Normal	3	point 27	52.8
	WKT-VS3N-1	Normal	3	point 28	53.8
	WKT-VS3N-1	Normal	3	point 29	55.3
	WKT-VS3N-1	Normal	3	point 30	53.8
	WKT-VS3N-1	Normal	3	point 31	56.3
	WKT-VS3N-1	Normal	3	point 32	56.1
	WKT-VS3N-1	Normal	3	point 33	56.0
	WKT-VS3N-1	Normal	3	point 34	56.5
	WKT-VS3N-1	Normal	3	point 35	56.0
	WKT-VS3N-1	Normal	3	point 36	56.1
	WKT-VS3N-1	Normal	3	point 37	56.9
	WKT-VS3N-1	Normal	3	point 38	57.8
	WKT-VS3N-1	Normal	3	point 39	58.4
	WKT-VS3N-1	Normal	3	point 40	59.0

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[1]	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS3N-1	Normal	3	point 41	58.3
	WKT-VS3N-1	Normal	3	point 42	55.3
	WKT-VS3N-1	Normal	3	point 43	54.8
	WKT-VS3N-1	Normal	3	point 44	54.4
	WKT-VS3N-1	Normal	3	point 45	55.9
	WKT-VS3N-1	Normal	3	point 46	53.2
	WKT-VS3N-1	Normal	3	point 47	53.8
	WKT-VS3N-1	Normal	3	point 48	56.0
	WKT-VS3N-1	Normal	3	point 49	55.2
	WKT-VS3N-1	Normal	3	point 50	54.8
	WKT-VS3N-1	Normal	3	point 51	54.3
	WKT-VS3N-1	Normal	3	point 52	55.8
	WKT-VS3N-1	Normal	3	point 53	55.8
	WKT-VS3N-1	Normal	3	point 54	54.2
	WKT-VS3N-1	Normal	3	point 55	54.9
	WKT-VS3N-1	Normal	3	point 56	52.9
	WKT-VS3N-1	Normal	3	point 57	55.2
	WKT-VS3N-1	Normal	3	point 58	55.2
	WKT-VS3N-1	Normal	3	point 59	55.5
	WKT-VS3N-1	Normal	3	point 60	53.7
	WKT-VS3N-1	Normal	3	point 61	53.3
	WKT-VS3N-1	Normal	3	point 62	55.6
	WKT-VS3N-1	Normal	3	point 63	53.8
	WKT-VS3N-1	Normal	3	point 64	53.8
	WKT-VS3N-1	Normal	3	point 65	55.4
	WKT-VS3N-1	Normal	3	point 66	54.6
	WKT-VS3N-1	Normal	3	point 67	55.6
	WKT-VS3N-1	Normal	3	point 68	57.3
	WKT-VS3N-1	Normal	3	point 69	57.5
	WKT-VS3N-1	Normal	3	point 70	56.4
	WKT-VS3N-1	Normal	3	point 71	56.6
	WKT-VS3N-1	Normal	3	point 72	56.7
	WKT-VS3N-1	Normal	3	point 73	56.2
	WKT-VS3N-1	Normal	3	point 74	55.0
	WKT-VS3N-1	Normal	3	point 75	56.0
	WKT-VS3N-1	Normal	3	point 76	54.9
	WKT-VS3N-1	Normal	3	point 77	54.5
	WKT-VS3N-1	Normal	3	point 78	53.1
	WKT-VS3N-1	Normal	3	point 79	53.1
	WKT-VS3N-1	Normal	3	point 80	53.3
	WKT-VS3N-1	Normal	3	point 81	53.0
	WKT-VS3N-1	Normal	3	point 82	53.3
	WKT-VS3N-1	Normal	3	point 83	53.3
	WKT-VS3N-1	Normal	3	point 84	52.3
	WKT-VS3N-1	Normal	3	point 85	53.0
	WKT-VS3N-1	Normal	3	point 86	55.2
	WKT-VS3N-1	Normal	3	point 87	52.4
	WKT-VS3N-1	Normal	3	point 88	54.8
	WKT-VS3N-1	Normal	3	point 89	57.0
	WKT-VS3N-1	Normal	3	point 90	56.1
	WKT-VS3N-1	Normal	3	point 91	57.2
	WKT-VS3N-1	Normal	3	point 92	58.4
	WKT-VS3N-1	Normal	3	point 93	57.2
	WKT-VS3N-1	Normal	3	point 94	57.9
	WKT-VS3N-1	Normal	3	point 95	58.0
	WKT-VS3N-1	Normal	3	point 96	55.4
				AVERAGE	**56**
VS 3	WKT-VS3-1	Normal	3	point 1	53.3
	WKT-VS3-1	Normal	3	point 2	52.2
	WKT-VS3-1	Normal	3	point 3	56.6
	WKT-VS3-1	Normal	3	point 4	55.8
	WKT-VS3-1	Normal	3	point 5	54.7
	WKT-VS3-1	Normal	3	point 6	53.3
	WKT-VS3-1	Normal	3	point 7	54.7
	WKT-VS3-1	Normal	3	point 8	55.8
	WKT-VS3-1	Normal	3	point 9	53.5
	WKT-VS3-1	Normal	3	point 10	53.1
				AVERAGE	**55**
	WKT-VS3-2	Normal	3	point 1	55.1
	WKT-VS3-2	Normal	3	point 2	53.4
	WKT-VS3-2	Normal	3	point 3	54.9
	WKT-VS3-2	Normal	3	point 4	56.1
	WKT-VS3-2	Normal	3	point 5	57.1
	WKT-VS3-2	Normal	3	point 6	55.6
	WKT-VS3-2	Normal	3	point 7	54.0
	WKT-VS3-2	Normal	3	point 8	54.8
				AVERAGE	**55**
	WKT-VS3-3	Normal	3	point 1	57.6
	WKT-VS3-3	Normal	3	point 2	59.1
	WKT-VS3-3	Normal	3	point 3	56.8
	WKT-VS3-3	Normal	3	point 4	56.9
	WKT-VS3-3	Normal	3	point 5	56.7
	WKT-VS3-3	Normal	3	point 6	57.6
	WKT-VS3-3	Normal	3	point 7	56.9
	WKT-VS3-3	Normal	3	point 8	56.6
	WKT-VS3-3	Normal	3	point 9	56.0
	WKT-VS3-3	Normal	3	point 10	56.9
	WKT-VS3-3	Normal	3	point 11	57.2
	WKT-VS3-3	Normal	3	point 12	56.1
	WKT-VS3-3	Normal	3	point 13	56.2
	WKT-VS3-3	Normal	3	point 14	55.2
	WKT-VS3-3	Normal	3	point 15	56.1
	WKT-VS3-3	Normal	3	point 16	59.1
				AVERAGE	**57**
	WKT-VS3-4	Normal	3	point 1	51.8
	WKT-VS3-4	Normal	3	point 2	51.7
	WKT-VS3-4	Normal	3	point 3	49.1
	WKT-VS3-4	Normal	3	point 4	51.2
	WKT-VS3-4	Normal	3	point 5	51.8
	WKT-VS3-4	Normal	3	point 6	51.7
	WKT-VS3-4	Normal	3	point 7	52.0

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[1]	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS3-4	Normal	3	point 8	51.6
	WKT-VS3-4	Normal	3	point 9	51.2
	WKT-VS3-4	Normal	3	point 10	50.5
	WKT-VS3-4	Normal	3	point 11	49.5
	WKT-VS3-4	Normal	3	point 12	48.7
	WKT-VS3-4	Normal	3	point 13	52.0
	WKT-VS3-4	Normal	3	point 14	51.3
	WKT-VS3-4	Normal	3	point 15	51.1
	WKT-VS3-4	Normal	3	point 16	49.9
	WKT-VS3-4	Normal	3	point 17	50.2
	WKT-VS3-4	Normal	3	point 18	51.5
	WKT-VS3-4	Normal	3	point 19	51.7
	WKT-VS3-4	Normal	3	point 20	50.8
	WKT-VS3-4	Normal	3	point 21	49.9
	WKT-VS3-4	Normal	3	point 22	51.4
	WKT-VS3-4	Normal	3	point 23	52.5
	WKT-VS3-4	Normal	3	point 24	48.8
	WKT-VS3-4	Normal	3	point 25	51.5
	WKT-VS3-4	Normal	3	point 26	50.9
	WKT-VS3-4	Normal	3	point 27	51.8
	WKT-VS3-4	Normal	3	point 28	52.7
	WKT-VS3-4	Normal	3	point 29	49.2
	WKT-VS3-4	Normal	3	point 30	51.7
	WKT-VS3-4	Normal	3	point 31	51.1
	WKT-VS3-4	Normal	3	point 32	52.7
	WKT-VS3-4	Normal	3	point 33	51.9
	WKT-VS3-4	Normal	3	point 34	49.1
	WKT-VS3-4	Normal	3	point 35	50.0
	WKT-VS3-4	Normal	3	point 36	50.0
	WKT-VS3-4	Normal	3	point 37	49.4
	WKT-VS3-4	Normal	3	point 38	50.5
	WKT-VS3-4	Normal	3	point 39	49.4
	WKT-VS3-4	Normal	3	point 40	48.5
	WKT-VS3-4	Normal	3	point 41	50.3
	WKT-VS3-4	Normal	3	point 42	49.4
	WKT-VS3-4	Normal	3	point 43	53.2
	WKT-VS3-4	Normal	3	point 44	48.9
	WKT-VS3-4	Normal	3	point 45	50.3
	WKT-VS3-4	Normal	3	point 46	49.0
	WKT-VS3-4	Normal	3	point 47	49.3
	WKT-VS3-4	Normal	3	point 48	51.9
	WKT-VS3-4	Normal	3	point 49	51.7
	WKT-VS3-4	Normal	3	point 50	52.4
	WKT-VS3-4	Normal	3	point 51	50.7
				AVERAGE	**51**
	WKT-VS3-5	Normal	3	point 1	53.3
	WKT-VS3-5	Normal	3	point 2	52.9
	WKT-VS3-5	Normal	3	point 3	50.9
	WKT-VS3-5	Normal	3	point 4	51.9
	WKT-VS3-5	Normal	3	point 5	52.7
	WKT-VS3-5	Normal	3	point 6	52.1
	WKT-VS3-5	Normal	3	point 7	50.1
	WKT-VS3-5	Normal	3	point 8	51.8
	WKT-VS3-5	Normal	3	point 9	52.3
	WKT-VS3-5	Normal	3	point 10	53.2
	WKT-VS3-5	Normal	3	point 11	50.2
	WKT-VS3-5	Normal	3	point 12	50.3
	WKT-VS3-5	Normal	3	point 13	50.8
	WKT-VS3-5	Normal	3	point 14	49.9
	WKT-VS3-5	Normal	3	point 15	50.1
	WKT-VS3-5	Normal	3	point 16	50.6
	WKT-VS3-5	Normal	3	point 17	52.5
	WKT-VS3-5	Normal	3	point 18	51.5
	WKT-VS3-5	Normal	3	point 19	52.2
	WKT-VS3-5	Normal	3	point 20	51.4
	WKT-VS3-5	Normal	3	point 21	51.7
	WKT-VS3-5	Normal	3	point 22	51.4
	WKT-VS3-5	Normal	3	point 23	51.9
	WKT-VS3-5	Normal	3	point 24	51.5
	WKT-VS3-5	Normal	3	point 25	50.6
	WKT-VS3-5	Normal	3	point 26	50.9
	WKT-VS3-5	Normal	3	point 27	50.1
	WKT-VS3-5	Normal	3	point 28	51.0
	WKT-VS3-5	Normal	3	point 29	50.5
	WKT-VS3-5	Normal	3	point 30	51.7
	WKT-VS3-5	Normal	3	point 31	50.9
				AVERAGE	**51**
	WKT-VS3-6A	Normal	3	point 1	52.4
	WKT-VS3-6A	Normal	3	point 2	52.6
	WKT-VS3-6A	Normal	3	point 3	55.3
	WKT-VS3-6A	Normal	3	point 4	53.7
	WKT-VS3-6A	Normal	3	point 5	55.3
	WKT-VS3-6A	Normal	3	point 6	54.2
	WKT-VS3-6A	Normal	3	point 7	52.4
	WKT-VS3-6A	Normal	3	point 8	54.0
	WKT-VS3-6A	Normal	3	point 9	53.5
	WKT-VS3-6A	Normal	3	point 10	52.5
	WKT-VS3-6A	Normal	3	point 11	50.8
	WKT-VS3-6A	Normal	3	point 12	51.1
				AVERAGE	**53**
	WKT-VS3-6B	Normal	3	point 1	54.7
	WKT-VS3-6B	Normal	3	point 2	54.1
	WKT-VS3-6B	Normal	3	point 3	55.0
	WKT-VS3-6B	Normal	3	point 4	54.9
	WKT-VS3-6B	Normal	3	point 5	53.4
	WKT-VS3-6B	Normal	3	point 6	53.9
	WKT-VS3-6B	Normal	3	point 7	53.3
	WKT-VS3-6B	Normal	3	point 8	54.8
	WKT-VS3-6B	Normal	3	point 9	54.4
	WKT-VS3-6B	Normal	3	point 10	52.3
	WKT-VS3-6B	Normal	3	point 11	52.2

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[1]	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS3-6B	Normal	3	point 12	53.9
				AVERAGE	**54**
	WKT-VS3-7	Normal	3	point 1	56.3
	WKT-VS3-7	Normal	3	point 2	55.0
	WKT-VS3-7	Normal	3	point 3	54.9
	WKT-VS3-7	Normal	3	point 4	52.5
	WKT-VS3-7	Normal	3	point 5	54.9
	WKT-VS3-7	Normal	3	point 6	54.5
	WKT-VS3-7	Normal	3	point 7	53.4
	WKT-VS3-7	Normal	3	point 8	52.7
				AVERAGE	**54**
	WKT-VS3-8	Normal	3	point 1	54.2
	WKT-VS3-8	Normal	3	point 2	52.4
	WKT-VS3-8	Normal	3	point 3	54.5
	WKT-VS3-8	Normal	3	point 4	51.9
	WKT-VS3-8	Normal	3	point 5	52.0
	WKT-VS3-8	Normal	3	point 6	52.9
	WKT-VS3-8	Normal	3	point 7	50.5
	WKT-VS3-8	Normal	3	point 8	52.3
	WKT-VS3-8	Normal	3	point 9	54.1
	WKT-VS3-8	Normal	3	point 10	54.7
	WKT-VS3-8	Normal	3	point 11	51.5
	WKT-VS3-8	Normal	3	point 12	52.6
				AVERAGE	**53**
VS 2 EAST	WKT-VS2E-1	Normal	3	point 1	54.8
	WKT-VS2E-1	Normal	3	point 2	55.5
	WKT-VS2E-1	Normal	3	point 3	54.5
	WKT-VS2E-1	Normal	3	point 4	55.5
	WKT-VS2E-1	Normal	3	point 5	54.9
	WKT-VS2E-1	Normal	3	point 6	52.2
	WKT-VS2E-1	Normal	3	point 7	53.5
	WKT-VS2E-1	Normal	3	point 8	52.2
	WKT-VS2E-1	Normal	3	point 9	52.6
	WKT-VS2E-1	Normal	3	point 10	51.6
	WKT-VS2E-1	Normal	3	point 11	52.2
	WKT-VS2E-1	Normal	3	point 12	51.6
	WKT-VS2E-1	Normal	3	point 13	51.7
	WKT-VS2E-1	Normal	3	point 14	50.7
	WKT-VS2E-1	Normal	3	point 15	50.9
	WKT-VS2E-1	Normal	3	point 16	50.6
	WKT-VS2E-1	Normal	3	point 17	51.3
	WKT-VS2E-1	Normal	3	point 18	51.3
	WKT-VS2E-1	Normal	3	point 19	51.1
	WKT-VS2E-1	Normal	3	point 20	53.3
	WKT-VS2E-1	Normal	3	point 21	51.9
	WKT-VS2E-1	Normal	3	point 22	52.3
	WKT-VS2E-1	Normal	3	point 23	52.5
	WKT-VS2E-1	Normal	3	point 24	52.2
	WKT-VS2E-1	Normal	3	point 25	50.6
	WKT-VS2E-1	Normal	3	point 26	51.4
	WKT-VS2E-1	Normal	3	point 27	51.2
	WKT-VS2E-1	Normal	3	point 28	52.7
	WKT-VS2E-1	Normal	3	point 29	51.3
	WKT-VS2E-1	Normal	3	point 30	52.5
	WKT-VS2E-1	Normal	3	point 31	52.1
				AVERAGE	**53**
	WKT-VS2E-2	Normal	3	point 1	53.7
	WKT-VS2E-2	Normal	3	point 2	54.8
	WKT-VS2E-2	Normal	3	point 3	54.6
	WKT-VS2E-2	Normal	3	point 4	53.0
	WKT-VS2E-2	Normal	3	point 5	53.3
	WKT-VS2E-2	Normal	3	point 6	53.2
	WKT-VS2E-2	Normal	3	point 7	51.6
	WKT-VS2E-2	Normal	3	point 8	51.6
	WKT-VS2E-2	Normal	3	point 9	51.1
	WKT-VS2E-2	Normal	3	point 10	51.3
	WKT-VS2E-2	Normal	3	point 11	51.6
	WKT-VS2E-2	Normal	3	point 12	51.4
	WKT-VS2E-2	Normal	3	point 13	50.4
	WKT-VS2E-2	Normal	3	point 14	52.1
	WKT-VS2E-2	Normal	3	point 15	51.1
	WKT-VS2E-2	Normal	3	point 16	50.9
	WKT-VS2E-2	Normal	3	point 17	51.5
	WKT-VS2E-2	Normal	3	point 18	52.0
	WKT-VS2E-2	Normal	3	point 19	52.4
	WKT-VS2E-2	Normal	3	point 20	52.1
	WKT-VS2E-2	Normal	3	point 21	52.7
				AVERAGE	**52**
	WKT-VS2E-3	Normal	3	point 1	52.6
	WKT-VS2E-3	Normal	3	point 2	53.4
	WKT-VS2E-3	Normal	3	point 3	53.3
	WKT-VS2E-3	Normal	3	point 4	53.7
	WKT-VS2E-3	Normal	3	point 5	53.5
	WKT-VS2E-3	Normal	3	point 6	51.7
	WKT-VS2E-3	Normal	3	point 7	53.8
	WKT-VS2E-3	Normal	3	point 8	51.3
	WKT-VS2E-3	Normal	3	point 9	53.8
	WKT-VS2E-3	Normal	3	point 10	52.3
	WKT-VS2E-3	Normal	3	point 11	53.3
	WKT-VS2E-3	Normal	3	point 12	52.1
	WKT-VS2E-3	Normal	3	point 13	53.7
	WKT-VS2E-3	Normal	3	point 14	53.0
	WKT-VS2E-3	Normal	3	point 15	52.6
	WKT-VS2E-3	Normal	3	point 16	52.5
	WKT-VS2E-3	Normal	3	point 17	53.1
	WKT-VS2E-3	Normal	3	point 18	53.7
	WKT-VS2E-3	Normal	3	point 19	52.7
	WKT-VS2E-3	Normal	3	point 20	51.4
	WKT-VS2E-3	Normal	3	point 21	51.3
				AVERAGE	**53**
VS 4	WKT-VS4-1	Normal	3	point 1	59.5

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[(1)]	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS4-1	Normal	3	point 2	59.4
	WKT-VS4-1	Normal	3	point 3	59.2
	WKT-VS4-1	Normal	3	point 4	60.6
	WKT-VS4-1	Normal	3	point 5	60.3
	WKT-VS4-1	Normal	3	point 6	59.4
	WKT-VS4-1	Normal	3	point 7	60.5
	WKT-VS4-1	Normal	3	point 8	61.0
	WKT-VS4-1	Normal	3	point 9	59.6
	WKT-VS4-1	Normal	3	point 10	60.4
	WKT-VS4-1	Normal	3	point 11	60.4
	WKT-VS4-1	Normal	3	point 12	58.9
	WKT-VS4-1	Normal	3	point 13	60.6
	WKT-VS4-1	Normal	3	point 14	60.7
	WKT-VS4-1	Normal	3	point 15	58.7
	WKT-VS4-1	Normal	3	point 16	60.5
	WKT-VS4-1	Normal	3	point 17	60.9
	WKT-VS4-1	Normal	3	point 18	58.6
	WKT-VS4-1	Normal	3	point 19	60.3
	WKT-VS4-1	Normal	3	point 20	60.9
	WKT-VS4-1	Normal	3	point 21	58.6
	WKT-VS4-1	Normal	3	point 22	61.2
	WKT-VS4-1	Normal	3	point 23	61.6
	WKT-VS4-1	Normal	3	point 24	59.3
	WKT-VS4-1	Normal	3	point 25	61.1
	WKT-VS4-1	Normal	3	point 26	61.5
	WKT-VS4-1	Normal	3	point 27	59.9
	WKT-VS4-1	Normal	3	point 28	61.3
	WKT-VS4-1	Normal	3	point 29	61.4
	WKT-VS4-1	Normal	3	point 30	61.8
	WKT-VS4-1	Normal	3	point 31	61.6
				AVERAGE	**60**
	WKT-VS4-3	Normal	3	point 1	56.5
	WKT-VS4-3	Normal	3	point 2	57.0
	WKT-VS4-3	Normal	3	point 3	54.5
	WKT-VS4-3	Normal	3	point 4	55.0
	WKT-VS4-3	Normal	3	point 5	55.3
	WKT-VS4-3	Normal	3	point 6	55.6
	WKT-VS4-3	Normal	3	point 7	55.2
	WKT-VS4-3	Normal	3	point 8	55.0
	WKT-VS4-3	Normal	3	point 9	56.3
	WKT-VS4-3	Normal	3	point 10	56.1
	WKT-VS4-3	Normal	3	point 11	53.1
	WKT-VS4-3	Normal	3	point 12	52.5
	WKT-VS4-3	Normal	3	point 13	54.8
	WKT-VS4-3	Normal	3	point 14	51.1
	WKT-VS4-3	Normal	3	point 15	54.5
	WKT-VS4-3	Normal	3	point 16	55.1
	WKT-VS4-3	Normal	3	point 17	53.0
	WKT-VS4-3	Normal	3	point 18	54.4
	WKT-VS4-3	Normal	3	point 19	54.2
	WKT-VS4-3	Normal	3	point 20	54.8
	WKT-VS4-3	Normal	3	point 21	54.9
	WKT-VS4-3	Normal	3	point 22	56.4
	WKT-VS4-3	Normal	3	point 23	53.2
	WKT-VS4-3	Normal	3	point 24	54.3
	WKT-VS4-3	Normal	3	point 25	56.6
	WKT-VS4-3	Normal	3	point 26	55.1
	WKT-VS4-3	Normal	3	point 27	54.5
	WKT-VS4-3	Normal	3	point 28	52.3
	WKT-VS4-3	Normal	3	point 29	54.4
	WKT-VS4-3	Normal	3	point 30	55.3
	WKT-VS4-3	Normal	3	point 31	55.9
				AVERAGE	**55**
	WKT-VS4-4	Normal	3	point 1	54.5
	WKT-VS4-4	Normal	3	point 2	54.3
	WKT-VS4-4	Normal	3	point 3	53.9
	WKT-VS4-4	Normal	3	point 4	54.5
	WKT-VS4-4	Normal	3	point 5	54.8
	WKT-VS4-4	Normal	3	point 6	52.7
	WKT-VS4-4	Normal	3	point 7	53.8
	WKT-VS4-4	Normal	3	point 8	54.9
	WKT-VS4-4	Normal	3	point 9	52.3
	WKT-VS4-4	Normal	3	point 10	53.1
	WKT-VS4-4	Normal	3	point 11	54.9
	WKT-VS4-4	Normal	3	point 12	53.2
	WKT-VS4-4	Normal	3	point 13	53.4
	WKT-VS4-4	Normal	3	point 14	53.2
	WKT-VS4-4	Normal	3	point 15	53.2
	WKT-VS4-4	Normal	3	point 16	54.6
	WKT-VS4-4	Normal	3	point 17	54.6
	WKT-VS4-4	Normal	3	point 18	53.4
	WKT-VS4-4	Normal	3	point 19	54.2
	WKT-VS4-4	Normal	3	point 20	54.5
	WKT-VS4-4	Normal	3	point 21	51.9
	WKT-VS4-4	Normal	3	point 22	53.5
	WKT-VS4-4	Normal	3	point 23	54.2
	WKT-VS4-4	Normal	3	point 24	53.8
	WKT-VS4-4	Normal	3	point 25	53.5
	WKT-VS4-4	Normal	3	point 26	54.3
	WKT-VS4-4	Normal	3	point 27	54.0
	WKT-VS4-4	Normal	3	point 28	52.6
	WKT-VS4-4	Normal	3	point 29	54.1
	WKT-VS4-4	Normal	3	point 30	54.7
	WKT-VS4-4	Normal	3	point 31	53.3
	WKT-VS4-4	Normal	3	point 32	52.5
	WKT-VS4-4	Normal	3	point 33	52.3
	WKT-VS4-4	Normal	3	point 34	54.3
	WKT-VS4-4	Normal	3	point 35	52.1
	WKT-VS4-4	Normal	3	point 36	52.4
	WKT-VS4-4	Normal	3	point 37	52.4
	WKT-VS4-4	Normal	3	point 38	52.2

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[1]	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS4-4	Normal	3	point 39	54.1
	WKT-VS4-4	Normal	3	point 40	54.5
	WKT-VS4-4	Normal	3	point 41	53.2
	WKT-VS4-4	Normal	3	point 42	51.4
	WKT-VS4-4	Normal	3	point 43	52.4
	WKT-VS4-4	Normal	3	point 44	53.0
	WKT-VS4-4	Normal	3	point 45	53.6
	WKT-VS4-4	Normal	3	point 46	52.8
				AVERAGE	**54**
VS 5	WKT-VS5-1	Normal	3	point 1	51.9
	WKT-VS5-1	Normal	3	point 2	52.6
	WKT-VS5-1	Normal	3	point 3	51.5
	WKT-VS5-1	Normal	3	point 4	51.6
	WKT-VS5-1	Normal	3	point 5	53.9
	WKT-VS5-1	Normal	3	point 6	53.1
	WKT-VS5-1	Normal	3	point 7	52.0
	WKT-VS5-1	Normal	3	point 8	53.4
	WKT-VS5-1	Normal	3	point 9	52.4
	WKT-VS5-1	Normal	3	point 10	53.6
	WKT-VS5-1	Normal	3	point 11	53.1
	WKT-VS5-1	Normal	3	point 12	55.5
	WKT-VS5-1	Normal	3	point 13	56.1
	WKT-VS5-1	Normal	3	point 14	53.3
	WKT-VS5-1	Normal	3	point 15	53.1
	WKT-VS5-1	Normal	3	point 16	52.8
	WKT-VS5-1	Normal	3	point 17	53.1
				AVERAGE	**53**
	WKT-VS5-2	Normal	3	point 1	65.3
	WKT-VS5-2	Normal	3	point 2	66.5
	WKT-VS5-2	Normal	3	point 3	66.4
	WKT-VS5-2	Normal	3	point 4	66.4
	WKT-VS5-2	Normal	3	point 5	68.1
	WKT-VS5-2	Normal	3	point 6	68.6
	WKT-VS5-2	Normal	3	point 7	69.5
	WKT-VS5-2	Normal	3	point 8	70.1
	WKT-VS5-2	Normal	3	point 9	69.5
	WKT-VS5-2	Normal	3	point 10	68.5
	WKT-VS5-2	Normal	3	point 11	64.7
	WKT-VS5-2	Normal	3	point 12	64.5
	WKT-VS5-2	Normal	3	point 13	65.8
	WKT-VS5-2	Normal	3	point 14	69.0
	WKT-VS5-2	Normal	3	point 15	69.6
	WKT-VS5-2	Normal	3	point 16	68.7
	WKT-VS5-2	Normal	3	point 17	69.4
	WKT-VS5-2	Normal	3	point 18	68.2
	WKT-VS5-2	Normal	3	point 19	69.0
	WKT-VS5-2	Normal	3	point 20	68.2
	WKT-VS5-2	Normal	3	point 21	68.0
	WKT-VS5-2	Normal	3	point 22	65.5
	WKT-VS5-2	Normal	3	point 23	65.2
	WKT-VS5-2	Normal	3	point 24	65.5
	WKT-VS5-2	Normal	3	point 25	69.2
	WKT-VS5-2	Normal	3	point 26	70.1
	WKT-VS5-2	Normal	3	point 27	70.0
	WKT-VS5-2	Normal	3	point 28	69.9
	WKT-VS5-2	Normal	3	point 29	70.7
	WKT-VS5-2	Normal	3	point 30	70.5
	WKT-VS5-2	Normal	3	point 31	72.0
	WKT-VS5-2	Normal	3	point 32	73.0
	WKT-VS5-2	Normal	3	point 33	67.9
	WKT-VS5-2	Normal	3	point 34	71.3
	WKT-VS5-2	Normal	3	point 35	67.7
	WKT-VS5-2	Normal	3	point 36	69.7
	WKT-VS5-2	Normal	3	point 37	70.3
	WKT-VS5-2	Normal	3	point 38	70.4
	WKT-VS5-2	Normal	3	point 39	70.3
	WKT-VS5-2	Normal	3	point 40	71.0
	WKT-VS5-2	Normal	3	point 41	70.5
	WKT-VS5-2	Normal	3	point 42	71.7
	WKT-VS5-2	Normal	3	point 43	72.5
	WKT-VS5-2	Normal	3	point 44	69.9
				AVERAGE	**69**
	WKT-VS5-4	Normal	3	point 1	58.9
	WKT-VS5-4	Normal	3	point 2	61.0
	WKT-VS5-4	Normal	3	point 3	58.8
	WKT-VS5-4	Normal	3	point 4	57.5
	WKT-VS5-4	Normal	3	point 5	57.0
	WKT-VS5-4	Normal	3	point 6	56.5
	WKT-VS5-4	Normal	3	point 7	59.8
	WKT-VS5-4	Normal	3	point 8	51.7
	WKT-VS5-4	Normal	3	point 9	60.3
	WKT-VS5-4	Normal	3	point 10	59.8
	WKT-VS5-4	Normal	3	point 11	58.9
	WKT-VS5-4	Normal	3	point 12	57.5
	WKT-VS5-4	Normal	3	point 13	64.0
	WKT-VS5-4	Normal	3	point 14	65.2
	WKT-VS5-4	Normal	3	point 15	61.1
	WKT-VS5-4	Normal	3	point 16	59.7
	WKT-VS5-4	Normal	3	point 17	63.1
	WKT-VS5-4	Normal	3	point 18	65.2
	WKT-VS5-4	Normal	3	point 19	60.3
	WKT-VS5-4	Normal	3	point 20	59.3
				AVERAGE	**61**
VS 2 WEST	WKT-VS2W-1	Normal	3	point 1	58.9
	WKT-VS2W-1	Normal	3	point 2	59.5
	WKT-VS2W-1	Normal	3	point 3	58.7
	WKT-VS2W-1	Normal	3	point 4	59.6
	WKT-VS2W-1	Normal	3	point 5	58.9
	WKT-VS2W-1	Normal	3	point 6	59.3
	WKT-VS2W-1	Normal	3	point 7	59.2
	WKT-VS2W-1	Normal	3	point 8	58.8

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(1)	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS2W-1	Normal	3	point 9	60.1
	WKT-VS2W-1	Normal	3	point 10	59.5
	WKT-VS2W-1	Normal	3	point 11	55.3
	WKT-VS2W-1	Normal	3	point 12	56.0
	WKT-VS2W-1	Normal	3	point 13	56.3
	WKT-VS2W-1	Normal	3	point 14	56.9
	WKT-VS2W-1	Normal	3	point 15	56.2
	WKT-VS2W-1	Normal	3	point 16	56.9
	WKT-VS2W-1	Normal	3	point 17	56.5
	WKT-VS2W-1	Normal	3	point 18	58.5
	WKT-VS2W-1	Normal	3	point 19	58.0
				AVERAGE	**58**
	WKT-VS2W-2A	Normal	3	point 1	56.2
	WKT-VS2W-2A	Normal	3	point 2	56.2
	WKT-VS2W-2A	Normal	3	point 3	55.3
	WKT-VS2W-2A	Normal	3	point 4	55.6
	WKT-VS2W-2A	Normal	3	point 5	56.0
	WKT-VS2W-2A	Normal	3	point 6	56.6
	WKT-VS2W-2A	Normal	3	point 7	56.0
	WKT-VS2W-2A	Normal	3	point 8	55.7
	WKT-VS2W-2A	Normal	3	point 9	54.8
	WKT-VS2W-2A	Normal	3	point 10	54.3
	WKT-VS2W-2A	Normal	3	point 11	54.8
	WKT-VS2W-2A	Normal	3	point 12	55.0
	WKT-VS2W-2A	Normal	3	point 13	56.2
	WKT-VS2W-2A	Normal	3	point 14	55.3
	WKT-VS2W-2A	Normal	3	point 15	53.8
	WKT-VS2W-2A	Normal	3	point 16	53.9
				AVERAGE	**55**
	WKT-VS2W-2B	Normal	3	point 1	57.5
	WKT-VS2W-2B	Normal	3	point 2	57.1
	WKT-VS2W-2B	Normal	3	point 3	56.4
	WKT-VS2W-2B	Normal	3	point 4	56.1
	WKT-VS2W-2B	Normal	3	point 5	57.1
	WKT-VS2W-2B	Normal	3	point 6	56.2
	WKT-VS2W-2B	Normal	3	point 7	59.8
	WKT-VS2W-2B	Normal	3	point 8	58.2
	WKT-VS2W-2B	Normal	3	point 9	55.9
	WKT-VS2W-2B	Normal	3	point 10	57.6
	WKT-VS2W-2B	Normal	3	point 11	55.8
	WKT-VS2W-2B	Normal	3	point 12	55.9
	WKT-VS2W-2B	Normal	3	point 13	56.3
	WKT-VS2W-2B	Normal	3	point 14	56.3
	WKT-VS2W-2B	Normal	3	point 15	55.3
	WKT-VS2W-2B	Normal	3	point 16	55.8
				AVERAGE	**57**
	WKT-VS2W-2C	Normal	3	point 1	56.8
	WKT-VS2W-2C	Normal	3	point 2	57.3
	WKT-VS2W-2C	Normal	3	point 3	57.9
	WKT-VS2W-2C	Normal	3	point 4	58.6
	WKT-VS2W-2C	Normal	3	point 5	55.9
	WKT-VS2W-2C	Normal	3	point 6	57.0
	WKT-VS2W-2C	Normal	3	point 7	56.8
	WKT-VS2W-2C	Normal	3	point 8	57.1
	WKT-VS2W-2C	Normal	3	point 9	57.5
	WKT-VS2W-2C	Normal	3	point 10	56.9
	WKT-VS2W-2C	Normal	3	point 11	56.9
	WKT-VS2W-2C	Normal	3	point 12	57.0
				AVERAGE	**57**
	WKT-VS2W-3	Normal	3	point 1	57.1
	WKT-VS2W-3	Normal	3	point 2	56.9
	WKT-VS2W-3	Normal	3	point 3	57.0
	WKT-VS2W-3	Normal	3	point 4	57.4
	WKT-VS2W-3	Normal	3	point 5	58.7
	WKT-VS2W-3	Normal	3	point 6	58.4
	WKT-VS2W-3	Normal	3	point 7	58.9
	WKT-VS2W-3	Normal	3	point 8	56.9
	WKT-VS2W-3	Normal	3	point 9	58.1
	WKT-VS2W-3	Normal	3	point 10	58.0
	WKT-VS2W-3	Normal	3	point 11	55.8
	WKT-VS2W-3	Normal	3	point 12	58.2
	WKT-VS2W-3	Normal	3	point 13	57.1
	WKT-VS2W-3	Normal	3	point 14	57.2
	WKT-VS2W-3	Normal	3	point 15	58.6
	WKT-VS2W-3	Normal	3	point 16	61.6
	WKT-VS2W-3	Normal	3	point 17	60.9
	WKT-VS2W-3	Normal	3	point 18	60.4
	WKT-VS2W-3	Normal	3	point 19	60.5
	WKT-VS2W-3	Normal	3	point 20	61.8
	WKT-VS2W-3	Normal	3	point 21	62.4
	WKT-VS2W-3	Normal	3	point 22	60.6
	WKT-VS2W-3	Normal	3	point 23	59.5
	WKT-VS2W-3	Normal	3	point 24	60.7
	WKT-VS2W-3	Normal	3	point 25	61.3
	WKT-VS2W-3	Normal	3	point 26	60.3
				AVERAGE	**59**
VS 1	WKT-VS1-1	Normal	3	point 1	48.3
	WKT-VS1-1	Normal	3	point 2	48.3
	WKT-VS1-1	Normal	3	point 3	51.2
	WKT-VS1-1	Normal	3	point 4	49.3
	WKT-VS1-1	Normal	3	point 5	48.5
	WKT-VS1-1	Normal	3	point 6	49.4
	WKT-VS1-1	Normal	3	point 7	49.4
	WKT-VS1-1	Normal	3	point 8	49.5
	WKT-VS1-1	Normal	3	point 9	50.0
	WKT-VS1-1	Normal	3	point 10	50.5
	WKT-VS1-1	Normal	3	point 11	50.0
	WKT-VS1-1	Normal	3	point 12	50.5
	WKT-VS1-1	Normal	3	point 13	48.9
	WKT-VS1-1	Normal	3	point 14	49.3
	WKT-VS1-1	Normal	3	point 15	48.9

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(1)	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS1-1	Normal	3	point 16	49.3
	WKT-VS1-1	Normal	3	point 17	50.9
	WKT-VS1-1	Normal	3	point 18	50.1
	WKT-VS1-1	Normal	3	point 19	50.5
	WKT-VS1-1	Normal	3	point 20	50.2
				AVERAGE	**50**
	WKT-VS1-2	Normal	3	point 1	49.4
	WKT-VS1-2	Normal	3	point 2	50.3
	WKT-VS1-2	Normal	3	point 3	50.5
	WKT-VS1-2	Normal	3	point 4	50.2
	WKT-VS1-2	Normal	3	point 5	49.4
	WKT-VS1-2	Normal	3	point 6	49.3
	WKT-VS1-2	Normal	3	point 7	49.0
	WKT-VS1-2	Normal	3	point 8	49.1
	WKT-VS1-2	Normal	3	point 9	48.7
	WKT-VS1-2	Normal	3	point 10	49.8
	WKT-VS1-2	Normal	3	point 11	49.4
	WKT-VS1-2	Normal	3	point 12	48.9
	WKT-VS1-2	Normal	3	point 13	49.8
	WKT-VS1-2	Normal	3	point 14	50.2
	WKT-VS1-2	Normal	3	point 15	50.2
	WKT-VS1-2	Normal	3	point 16	50.4
	WKT-VS1-2	Normal	3	point 17	50.8
	WKT-VS1-2	Normal	3	point 18	50.7
	WKT-VS1-2	Normal	3	point 19	50.7
	WKT-VS1-2	Normal	3	point 20	50.3
	WKT-VS1-2	Normal	3	point 21	49.8
	WKT-VS1-2	Normal	3	point 22	50.1
	WKT-VS1-2	Normal	3	point 23	50.3
	WKT-VS1-2	Normal	3	point 24	50.7
	WKT-VS1-2	Normal	3	point 25	50.8
	WKT-VS1-2	Normal	3	point 26	51.0
	WKT-VS1-2	Normal	3	point 27	51.0
	WKT-VS1-2	Normal	3	point 28	50.1
	WKT-VS1-2	Normal	3	point 29	49.7
	WKT-VS1-2	Normal	3	point 30	50.2
	WKT-VS1-2	Normal	3	point 31	50.8
	WKT-VS1-2	Normal	3	point 32	50.9
	WKT-VS1-2	Normal	3	point 33	49.8
	WKT-VS1-2	Normal	3	point 34	49.9
	WKT-VS1-2	Normal	3	point 35	49.2
	WKT-VS1-2	Normal	3	point 36	49.6
	WKT-VS1-2	Normal	3	point 37	49.5
	WKT-VS1-2	Normal	3	point 38	49.8
	WKT-VS1-2	Normal	3	point 39	49.8
	WKT-VS1-2	Normal	3	point 40	49.1
	WKT-VS1-2	Normal	3	point 41	50.0
	WKT-VS1-2	Normal	3	point 42	51.0
	WKT-VS1-2	Normal	3	point 43	49.9
	WKT-VS1-2	Normal	3	point 44	50.1
	WKT-VS1-2	Normal	3	point 45	49.1
	WKT-VS1-2	Normal	3	point 46	48.6
	WKT-VS1-2	Normal	3	point 47	48.3
	WKT-VS1-2	Normal	3	point 48	49.9
	WKT-VS1-2	Normal	3	point 49	48.7
	WKT-VS1-2	Normal	3	point 50	49.2
	WKT-VS1-2	Normal	3	point 51	49.8
	WKT-VS1-2	Normal	3	point 52	49.7
	WKT-VS1-2	Normal	3	point 53	48.4
	WKT-VS1-2	Normal	3	point 54	49.9
	WKT-VS1-2	Normal	3	point 55	50.6
	WKT-VS1-2	Normal	3	point 56	50.0
	WKT-VS1-2	Normal	3	point 57	49.7
	WKT-VS1-2	Normal	3	point 58	48.8
	WKT-VS1-2	Normal	3	point 59	48.9
	WKT-VS1-2	Normal	3	point 60	50.4
	WKT-VS1-2	Normal	3	point 61	49.7
	WKT-VS1-2	Normal	3	point 62	48.2
	WKT-VS1-2	Normal	3	point 63	48.7
	WKT-VS1-2	Normal	3	point 64	47.8
	WKT-VS1-2	Normal	3	point 65	47.6
	WKT-VS1-2	Normal	3	point 66	48.9
	WKT-VS1-2	Normal	3	point 67	49.4
	WKT-VS1-2	Normal	3	point 68	48.2
	WKT-VS1-2	Normal	3	point 69	48.9
	WKT-VS1-2	Normal	3	point 70	48.4
	WKT-VS1-2	Normal	3	point 71	48.5
				AVERAGE	**50**
	WKT-VS1-3	Normal	3	point 1	50.6
	WKT-VS1-3	Normal	3	point 2	52.2
	WKT-VS1-3	Normal	3	point 3	51.3
	WKT-VS1-3	Normal	3	point 4	52.1
	WKT-VS1-3	Normal	3	point 5	49.3
	WKT-VS1-3	Normal	3	point 6	53.2
	WKT-VS1-3	Normal	3	point 7	53.2
	WKT-VS1-3	Normal	3	point 8	52.5
	WKT-VS1-3	Normal	3	point 9	53.3
	WKT-VS1-3	Normal	3	point 10	51.0
	WKT-VS1-3	Normal	3	point 11	50.0
	WKT-VS1-3	Normal	3	point 12	49.9
	WKT-VS1-3	Normal	3	point 13	51.7
	WKT-VS1-3	Normal	3	point 14	51.1
	WKT-VS1-3	Normal	3	point 15	53.8
	WKT-VS1-3	Normal	3	point 16	54.1
	WKT-VS1-3	Normal	3	point 17	52.3
	WKT-VS1-3	Normal	3	point 18	50.7
	WKT-VS1-3	Normal	3	point 19	50.0
	WKT-VS1-3	Normal	3	point 20	52.4
	WKT-VS1-3	Normal	3	point 21	52.9
	WKT-VS1-3	Normal	3	point 22	54.1
	WKT-VS1-3	Normal	3	point 23	55.3

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[1]	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS1-3	Normal	3	point 24	52.6
	WKT-VS1-3	Normal	3	point 25	53.0
	WKT-VS1-3	Normal	3	point 26	54.1
	WKT-VS1-3	Normal	3	point 27	53.9
	WKT-VS1-3	Normal	3	point 28	54.3
	WKT-VS1-3	Normal	3	point 29	52.3
	WKT-VS1-3	Normal	3	point 30	52.6
	WKT-VS1-3	Normal	3	point 31	55.5
	WKT-VS1-3	Normal	3	point 32	55.3
	WKT-VS1-3	Normal	3	point 33	53.8
	WKT-VS1-3	Normal	3	point 34	55.2
	WKT-VS1-3	Normal	3	point 35	53.8
	WKT-VS1-3	Normal	3	point 36	54.6
	WKT-VS1-3	Normal	3	point 37	54.8
	WKT-VS1-3	Normal	3	point 38	51.7
				AVERAGE	**53**
	WKT-VS1-4	Normal	3	point 1	57.1
	WKT-VS1-4	Normal	3	point 2	56.8
	WKT-VS1-4	Normal	3	point 3	56.9
	WKT-VS1-4	Normal	3	point 4	52.9
	WKT-VS1-4	Normal	3	point 5	54.6
	WKT-VS1-4	Normal	3	point 6	53.2
	WKT-VS1-4	Normal	3	point 7	53.3
	WKT-VS1-4	Normal	3	point 8	53.1
	WKT-VS1-4	Normal	3	point 9	53.4
	WKT-VS1-4	Normal	3	point 10	53.2
	WKT-VS1-4	Normal	3	point 11	52.2
	WKT-VS1-4	Normal	3	point 12	50.6
	WKT-VS1-4	Normal	3	point 13	58.1
	WKT-VS1-4	Normal	3	point 14	57.1
	WKT-VS1-4	Normal	3	point 15	51.6
	WKT-VS1-4	Normal	3	point 16	52.0
	WKT-VS1-4	Normal	3	point 17	54.2
	WKT-VS1-4	Normal	3	point 18	54.6
	WKT-VS1-4	Normal	3	point 19	51.8
	WKT-VS1-4	Normal	3	point 20	53.2
	WKT-VS1-4	Normal	3	point 21	53.8
	WKT-VS1-4	Normal	3	point 22	53.1
	WKT-VS1-4	Normal	3	point 23	53.3
	WKT-VS1-4	Normal	3	point 24	52.7
	WKT-VS1-4	Normal	3	point 25	53.2
	WKT-VS1-4	Normal	3	point 26	53.8
	WKT-VS1-4	Normal	3	point 27	53.6
	WKT-VS1-4	Normal	3	point 28	53.6
	WKT-VS1-4	Normal	3	point 29	53.9
	WKT-VS1-4	Normal	3	point 30	55.3
	WKT-VS1-4	Normal	3	point 31	52.1
	WKT-VS1-4	Normal	3	point 32	52.2
	WKT-VS1-4	Normal	3	point 33	53.6
	WKT-VS1-4	Normal	3	point 34	52.4
	WKT-VS1-4	Normal	3	point 35	52.3
	WKT-VS1-4	Normal	3	point 36	52.4
	WKT-VS1-4	Normal	3	point 37	51.6
	WKT-VS1-4	Normal	3	point 38	53.0
				AVERAGE	**54**
VS 6	WKT-VS6-1	Normal	3	point 1	57.0
	WKT-VS6-1	Normal	3	point 2	55.5
	WKT-VS6-1	Normal	3	point 3	56.6
	WKT-VS6-1	Normal	3	point 4	58.1
	WKT-VS6-1	Normal	3	point 5	57.6
	WKT-VS6-1	Normal	3	point 6	58.5
	WKT-VS6-1	Normal	3	point 7	55.6
	WKT-VS6-1	Normal	3	point 8	54.7
	WKT-VS6-1	Normal	3	point 9	54.0
	WKT-VS6-1	Normal	3	point 10	54.8
	WKT-VS6-1	Normal	3	point 11	53.8
	WKT-VS6-1	Normal	3	point 12	55.4
	WKT-VS6-1	Normal	3	point 13	56.2
	WKT-VS6-1	Normal	3	point 14	54.6
	WKT-VS6-1	Normal	3	point 15	54.2
	WKT-VS6-1	Normal	3	point 16	55.2
				AVERAGE	**56**
	WKT-VS6-2A	Normal	3	point 1	47.9
	WKT-VS6-2A	Normal	3	point 2	48.6
	WKT-VS6-2A	Normal	3	point 3	49.9
	WKT-VS6-2A	Normal	3	point 4	48.3
	WKT-VS6-2A	Normal	3	point 5	49.4
	WKT-VS6-2A	Normal	3	point 6	49.4
	WKT-VS6-2A	Normal	3	point 7	48.3
	WKT-VS6-2A	Normal	3	point 8	48.5
	WKT-VS6-2A	Normal	3	point 9	48.5
	WKT-VS6-2A	Normal	3	point 10	49.1
	WKT-VS6-2A	Normal	3	point 11	48.9
	WKT-VS6-2A	Normal	3	point 12	48.1
				AVERAGE	**49**
	WKT-VS6-2B	Normal	3	point 1	49.0
	WKT-VS6-2B	Normal	3	point 2	49.4
	WKT-VS6-2B	Normal	3	point 3	47.8
	WKT-VS6-2B	Normal	3	point 4	48.2
	WKT-VS6-2B	Normal	3	point 5	49.3
	WKT-VS6-2B	Normal	3	point 6	49.9
	WKT-VS6-2B	Normal	3	point 7	49.1
	WKT-VS6-2B	Normal	3	point 8	48.6
	WKT-VS6-2B	Normal	3	point 9	48.3
	WKT-VS6-2B	Normal	3	point 10	48.3
	WKT-VS6-2B	Normal	3	point 11	49.0
	WKT-VS6-2B	Normal	3	point 12	48.0
				AVERAGE	**49**
	WKT-VS6-3A	Normal	3	point 1	48.6
	WKT-VS6-3A	Normal	3	point 2	48.0
	WKT-VS6-3A	Normal	3	point 3	49.1

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(1)	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS6-3A	Normal	3	point 4	48.1
	WKT-VS6-3A	Normal	3	point 5	47.8
	WKT-VS6-3A	Normal	3	point 6	48.7
	WKT-VS6-3A	Normal	3	point 7	49.5
	WKT-VS6-3A	Normal	3	point 8	49.1
	WKT-VS6-3A	Normal	3	point 9	48.6
	WKT-VS6-3A	Normal	3	point 10	47.8
	WKT-VS6-3A	Normal	3	point 11	47.8
	WKT-VS6-3A	Normal	3	point 12	48.0
				AVERAGE	**48**
	WKT-VS6-3B	Normal	3	point 1	53.3
	WKT-VS6-3B	Normal	3	point 2	53.2
	WKT-VS6-3B	Normal	3	point 3	52.2
	WKT-VS6-3B	Normal	3	point 4	52.7
	WKT-VS6-3B	Normal	3	point 5	51.5
	WKT-VS6-3B	Normal	3	point 6	52.2
	WKT-VS6-3B	Normal	3	point 7	51.9
	WKT-VS6-3B	Normal	3	point 8	52.8
	WKT-VS6-3B	Normal	3	point 9	52.0
	WKT-VS6-3B	Normal	3	point 10	52.3
	WKT-VS6-3B	Normal	3	point 11	51.3
	WKT-VS6-3B	Normal	3	point 12	51.7
				AVERAGE	**52**
	WKT-VS6-4	Normal	3	point 1	62.1
	WKT-VS6-4	Normal	3	point 2	65.1
	WKT-VS6-4	Normal	3	point 3	61.3
	WKT-VS6-4	Normal	3	point 4	60.0
	WKT-VS6-4	Normal	3	point 5	57.3
	WKT-VS6-4	Normal	3	point 6	63.0
	WKT-VS6-4	Normal	3	point 7	56.4
	WKT-VS6-4	Normal	3	point 8	57.4
	WKT-VS6-4	Normal	3	point 9	59.6
	WKT-VS6-4	Normal	3	point 10	63.3
	WKT-VS6-4	Normal	3	point 11	54.0
	WKT-VS6-4	Normal	3	point 12	52.8
	WKT-VS6-4	Normal	3	point 13	54.5
	WKT-VS6-4	Normal	3	point 14	54.8
	WKT-VS6-4	Normal	3	point 15	51.8
	WKT-VS6-4	Normal	3	point 16	51.4
	WKT-VS6-4	Normal	3	point 17	57.8
	WKT-VS6-4	Normal	3	point 18	52.4
				AVERAGE	**59**
	WKT-VS6-5A	Normal	3	point 1	58.3
	WKT-VS6-5A	Normal	3	point 2	61.0
	WKT-VS6-5A	Normal	3	point 3	56.4
	WKT-VS6-5A	Normal	3	point 4	60.8
	WKT-VS6-5A	Normal	3	point 5	57.8
	WKT-VS6-5A	Normal	3	point 6	63.1
	WKT-VS6-5A	Normal	3	point 7	60.4
	WKT-VS6-5A	Normal	3	point 8	63.7
	WKT-VS6-5A	Normal	3	point 9	59.8
	WKT-VS6-5A	Normal	3	point 10	60.8
	WKT-VS6-5A	Normal	3	point 11	61.8
	WKT-VS6-5A	Normal	3	point 12	58.6
				AVERAGE	**61**
	WKT-VS6-5B	Normal	3	point 1	61.4
	WKT-VS6-5B	Normal	3	point 2	52.5
	WKT-VS6-5B	Normal	3	point 3	62.5
	WKT-VS6-5B	Normal	3	point 4	62.0
	WKT-VS6-5B	Normal	3	point 5	56.9
	WKT-VS6-5B	Normal	3	point 6	61.5
	WKT-VS6-5B	Normal	3	point 7	52.6
	WKT-VS6-5B	Normal	3	point 8	53.9
	WKT-VS6-5B	Normal	3	point 9	54.5
	WKT-VS6-5B	Normal	3	point 10	54.2
	WKT-VS6-5B	Normal	3	point 11	63.4
	WKT-VS6-5B	Normal	3	point 12	61.6
	WKT-VS6-5B	Normal	3	point 13	60.4
	WKT-VS6-5B	Normal	3	point 14	62.3
	WKT-VS6-5B	Normal	3	point 15	58.7
	WKT-VS6-5B	Normal	3	point 16	56.6
				AVERAGE	**60**
	WKT-VS6-6A	Normal	3	point 1	59.6
	WKT-VS6-6A	Normal	3	point 2	54.5
	WKT-VS6-6A	Normal	3	point 3	54.9
	WKT-VS6-6A	Normal	3	point 4	54.8
				AVERAGE	**57**
	WKT-VS6-6B	Normal	3	point 1	64.9
	WKT-VS6-6B	Normal	3	point 2	58.9
	WKT-VS6-6B	Normal	3	point 3	53.8
	WKT-VS6-6B	Normal	3	point 4	53.9
				AVERAGE	**60**
	WKT-VS6-7A	Normal	3	point 1	50.0
	WKT-VS6-7A	Normal	3	point 2	51.2
	WKT-VS6-7A	Normal	3	point 3	52.4
	WKT-VS6-7A	Normal	3	point 4	49.7
	WKT-VS6-7A	Normal	3	point 5	47.8
	WKT-VS6-7A	Normal	3	point 6	51.6
	WKT-VS6-7A	Normal	3	point 7	51.6
	WKT-VS6-7A	Normal	3	point 8	51.5
	WKT-VS6-7A	Normal	3	point 9	50.1
	WKT-VS6-7A	Normal	3	point 10	50.9
	WKT-VS6-7A	Normal	3	point 11	49.7
	WKT-VS6-7A	Normal	3	point 12	50.5
	WKT-VS6-7A	Normal	3	point 13	49.8
	WKT-VS6-7A	Normal	3	point 14	51.4
	WKT-VS6-7A	Normal	3	point 15	50.2
	WKT-VS6-7A	Normal	3	point 16	50.9
	WKT-VS6-7A	Normal	3	point 17	49.5
	WKT-VS6-7A	Normal	3	point 18	52.4
	WKT-VS6-7A	Normal	3	point 19	52.5

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(1)	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS6-7A	Normal	3	point 20	50.0
	WKT-VS6-7A	Normal	3	point 21	48.9
	WKT-VS6-7A	Normal	3	point 22	50.3
	WKT-VS6-7A	Normal	3	point 23	49.7
	WKT-VS6-7A	Normal	3	point 24	50.0
	WKT-VS6-7A	Normal	3	point 25	49.5
	WKT-VS6-7A	Normal	3	point 26	49.0
	WKT-VS6-7A	Normal	3	point 27	50.3
	WKT-VS6-7A	Normal	3	point 28	49.5
	WKT-VS6-7A	Normal	3	point 29	50.0
	WKT-VS6-7A	Normal	3	point 30	49.7
	WKT-VS6-7A	Normal	3	point 31	49.8
	WKT-VS6-7A	Normal	3	point 32	49.9
				AVERAGE	**50**
	WKT-VS6-7B	Normal	3	point 1	51.1
	WKT-VS6-7B	Normal	3	point 2	52.9
	WKT-VS6-7B	Normal	3	point 3	51.8
	WKT-VS6-7B	Normal	3	point 4	50.5
	WKT-VS6-7B	Normal	3	point 5	51.6
	WKT-VS6-7B	Normal	3	point 6	51.6
	WKT-VS6-7B	Normal	3	point 7	50.7
	WKT-VS6-7B	Normal	3	point 8	49.6
				AVERAGE	**51**
PVS6	WKT-PVS6-1	Normal	3	point 1	53.1
	WKT-PVS6-1	Normal	3	point 2	52.3
	WKT-PVS6-1	Normal	3	point 3	53.3
	WKT-PVS6-1	Normal	3	point 4	52.6
	WKT-PVS6-1	Normal	3	point 5	52.4
				AVERAGE	**53**
	WKT-PVS6-2	Normal	3	point 1	55.8
	WKT-PVS6-2	Normal	3	point 2	56.8
	WKT-PVS6-2	Normal	3	point 3	57.0
	WKT-PVS6-2	Normal	3	point 4	58.9
	WKT-PVS6-2	Normal	3	point 5	58.2
	WKT-PVS6-2	Normal	3	point 6	58.4
	WKT-PVS6-2	Normal	3	point 7	54.4
	WKT-PVS6-2	Normal	3	point 8	55.9
				AVERAGE	**57**
	WKT-PVS6-3A	Normal	3	point 1	58.6
	WKT-PVS6-3A	Normal	3	point 2	57.5
	WKT-PVS6-3A	Normal	3	point 3	59.2
	WKT-PVS6-3A	Normal	3	point 4	57.2
	WKT-PVS6-3A	Normal	3	point 5	58.2
	WKT-PVS6-3A	Normal	3	point 6	57.0
	WKT-PVS6-3A	Normal	3	point 7	57.9
	WKT-PVS6-3A	Normal	3	point 8	58.0
				AVERAGE	**58**
	WKT-PVS6-3B	Normal	3	point 1	58.5
	WKT-PVS6-3B	Normal	3	point 2	58.3
	WKT-PVS6-3B	Normal	3	point 3	59.2
	WKT-PVS6-3B	Normal	3	point 4	59.7
	WKT-PVS6-3B	Normal	3	point 5	56.2
	WKT-PVS6-3B	Normal	3	point 6	57.0
	WKT-PVS6-3B	Normal	3	point 7	57.5
	WKT-PVS6-3B	Normal	3	point 8	56.7
	WKT-PVS6-3B	Normal	3	point 9	54.8
	WKT-PVS6-3B	Normal	3	point 10	56.0
	WKT-PVS6-3B	Normal	3	point 11	61.2
	WKT-PVS6-3B	Normal	3	point 12	61.6
	WKT-PVS6-3B	Normal	3	point 13	57.6
	WKT-PVS6-3B	Normal	3	point 14	58.3
	WKT-PVS6-3B	Normal	3	point 15	56.2
	WKT-PVS6-3B	Normal	3	point 16	56.8
				AVERAGE	**58**
	WKT-PVS6-4	Normal	3	point 1	56.2
	WKT-PVS6-4	Normal	3	point 2	57.6
	WKT-PVS6-4	Normal	3	point 3	56.1
	WKT-PVS6-4	Normal	3	point 4	54.9
	WKT-PVS6-4	Normal	3	point 5	57.0
	WKT-PVS6-4	Normal	3	point 6	59.1
	WKT-PVS6-4	Normal	3	point 7	56.3
	WKT-PVS6-4	Normal	3	point 8	53.4
				AVERAGE	**57**
VS6-4	WKT-G-G15VS-01A	Normal	3	point 1	57.4
	WKT-G-G15VS-01A	Normal	3	point 2	57.3
	WKT-G-G15VS-01A	Normal	3	point 3	57.2
	WKT-G-G15VS-01A	Normal	3	point 4	57.2
	WKT-G-G15VS-01A	Normal	3	point 5	57.1
	WKT-G-G15VS-01A	Normal	3	point 6	57.3
	WKT-G-G15VS-01A	Normal	3	point 7	55.0
	WKT-G-G15VS-01A	Normal	3	point 8	55.1
	WKT-G-G15VS-01A	Normal	3	point 9	54.8
	WKT-G-G15VS-01A	Normal	3	point 10	54.8
	WKT-G-G15VS-01A	Normal	3	point 11	54.9
	WKT-G-G15VS-01A	Normal	3	point 12	55.4
				AVERAGE	**56.3**
	WKT-G-G15VS-01B	Normal	3	point 1	57.4
	WKT-G-G15VS-01B	Normal	3	point 2	57.6
	WKT-G-G15VS-01B	Normal	3	point 3	57.6
	WKT-G-G15VS-01B	Normal	3	point 4	57.5
	WKT-G-G15VS-01B	Normal	3	point 5	55.1
	WKT-G-G15VS-01B	Normal	3	point 6	55.3
	WKT-G-G15VS-01B	Normal	3	point 7	55.3
	WKT-G-G15VS-01B	Normal	3	point 8	54.9
	WKT-G-G15VS-01B	Normal	3	point 9	54.9
	WKT-G-G15VS-01B	Normal	3	point 10	55.0
	WKT-G-G15VS-01B	Normal	3	point 11	54.9
	WKT-G-G15VS-01B	Normal	3	point 12	55.3
				AVERAGE	**56.1**
	WKT-G-G15VS-01C	Normal	3	point 1	54.9
	WKT-G-G15VS-01C	Normal	3	point 2	54.8

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(1)	Location/ Measurement	L_{Aeq} (dB)
	WKT-G-G15VS-01C	Normal	3	point 3	54.5
	WKT-G-G15VS-01C	Normal	3	point 4	54.9
	WKT-G-G15VS-01C	Normal	3	point 5	55.3
	WKT-G-G15VS-01C	Normal	3	point 6	55.7
	WKT-G-G15VS-01C	Normal	3	point 7	55.1
	WKT-G-G15VS-01C	Normal	3	point 8	55.5
				AVERAGE	**55.1**
	WKT-G-G15VS-03A Section 1	Normal	3	point 1	55.9
	WKT-G-G15VS-03A Section 1	Normal	3	point 2	55.3
	WKT-G-G15VS-03A Section 1	Normal	3	point 3	55.1
	WKT-G-G15VS-03A Section 1	Normal	3	point 4	54.6
	WKT-G-G15VS-03A Section 1	Normal	3	point 5	54.8
	WKT-G-G15VS-03A Section 1	Normal	3	point 6	55.6
	WKT-G-G15VS-03A Section 1	Normal	3	point 7	55.6
	WKT-G-G15VS-03A Section 1	Normal	3	point 8	55.1
	WKT-G-G15VS-03A Section 1	Normal	3	point 9	55.1
	WKT-G-G15VS-03A Section 1	Normal	3	point 10	55.8
	WKT-G-G15VS-03A Section 1	Normal	3	point 11	55.0
	WKT-G-G15VS-03A Section 1	Normal	3	point 12	55.0
	WKT-G-G15VS-03A Section 1	Normal	3	point 13	55.5
	WKT-G-G15VS-03A Section 1	Normal	3	point 14	55.3
	WKT-G-G15VS-03A Section 1	Normal	3	point 15	55.1
	WKT-G-G15VS-03A Section 1	Normal	3	point 16	54.1
	WKT-G-G15VS-03A Section 1	Normal	3	point 17	56.0
	WKT-G-G15VS-03A Section 1	Normal	3	point 18	56.1
	WKT-G-G15VS-03A Section 1	Normal	3	point 19	56.2
	WKT-G-G15VS-03A Section 1	Normal	3	point 20	55.9
	WKT-G-G15VS-03A Section 1	Normal	3	point 21	55.9
	WKT-G-G15VS-03A Section 1	Normal	3	point 22	55.8
	WKT-G-G15VS-03A Section 1	Normal	3	point 23	55.9
	WKT-G-G15VS-03A Section 1	Normal	3	point 24	55.7
	WKT-G-G15VS-03A Section 1	Normal	3	point 25	55.9
	WKT-G-G15VS-03A Section 1	Normal	3	point 26	55.9
				AVERAGE	**55.5**
	WKT-G-G15VS-03A Section 2	Normal	3	point 1	54.9
	WKT-G-G15VS-03A Section 2	Normal	3	point 2	55.5
	WKT-G-G15VS-03A Section 2	Normal	3	point 3	55.1
	WKT-G-G15VS-03A Section 2	Normal	3	point 4	55.2
	WKT-G-G15VS-03A Section 2	Normal	3	point 5	55.2
	WKT-G-G15VS-03A Section 2	Normal	3	point 6	56.0
	WKT-G-G15VS-03A Section 2	Normal	3	point 7	55.8
	WKT-G-G15VS-03A Section 2	Normal	3	point 8	55.1
	WKT-G-G15VS-03A Section 2	Normal	3	point 9	54.9
	WKT-G-G15VS-03A Section 2	Normal	3	point 10	55.1
	WKT-G-G15VS-03A Section 2	Normal	3	point 11	55.3
	WKT-G-G15VS-03A Section 2	Normal	3	point 12	54.8
	WKT-G-G15VS-03A Section 2	Normal	3	point 13	55.1
	WKT-G-G15VS-03A Section 2	Normal	3	point 14	55.0
	WKT-G-G15VS-03A Section 2	Normal	3	point 15	54.8
	WKT-G-G15VS-03A Section 2	Normal	3	point 16	54.6
	WKT-G-G15VS-03A Section 2	Normal	3	point 17	54.8
	WKT-G-G15VS-03A Section 2	Normal	3	point 18	55.5
	WKT-G-G15VS-03A Section 2	Normal	3	point 19	55.3
	WKT-G-G15VS-03A Section 2	Normal	3	point 20	55.4
	WKT-G-G15VS-03A Section 2	Normal	3	point 21	55.0
	WKT-G-G15VS-03A Section 2	Normal	3	point 22	55.0
	WKT-G-G15VS-03A Section 2	Normal	3	point 23	55.0
	WKT-G-G15VS-03A Section 2	Normal	3	point 24	55.1
	WKT-G-G15VS-03A Section 2	Normal	3	point 25	55.0
	WKT-G-G15VS-03A Section 2	Normal	3	point 26	55.2
				AVERAGE	**55.2**
VS 7	WKT-G-D14VS-03A	Normal	3	point 1	57.3
	WKT-G-D14VS-03A	Normal	3	point 2	56.7
	WKT-G-D14VS-03A	Normal	3	point 3	57.4
	WKT-G-D14VS-03A	Normal	3	point 4	57.0
	WKT-G-D14VS-03A	Normal	3	point 5	56.8
	WKT-G-D14VS-03A	Normal	3	point 6	56.8
	WKT-G-D14VS-03A	Normal	3	point 7	55.7
	WKT-G-D14VS-03A	Normal	3	point 8	56.8
	WKT-G-D14VS-03A	Normal	3	point 9	56.3
	WKT-G-D14VS-03A	Normal	3	point 10	56.9
	WKT-G-D14VS-03A	Normal	3	point 11	56.0
	WKT-G-D14VS-03A	Normal	3	point 12	55.9
	WKT-G-D14VS-03A	Normal	3	point 13	57.4
	WKT-G-D14VS-03A	Normal	3	point 14	58.5
	WKT-G-D14VS-03A	Normal	3	point 15	55.8
	WKT-G-D14VS-03A	Normal	3	point 16	58.2
	WKT-G-D14VS-03A	Normal	3	point 17	56.1
	WKT-G-D14VS-03A	Normal	3	point 18	56.1
	WKT-G-D14VS-03A	Normal	3	point 19	55.5
	WKT-G-D14VS-03A	Normal	3	point 20	55.6
				AVERAGE	**56.8**
	WKT-G-D14VS-04A	Normal	3	point 1	56.6
	WKT-G-D14VS-04A	Normal	3	point 2	56.9
	WKT-G-D14VS-04A	Normal	3	point 3	56.6
	WKT-G-D14VS-04A	Normal	3	point 4	56.6
	WKT-G-D14VS-04A	Normal	3	point 5	56.4
	WKT-G-D14VS-04A	Normal	3	point 6	56.6
	WKT-G-D14VS-04A	Normal	3	point 7	56.8
	WKT-G-D14VS-04A	Normal	3	point 8	56.1
	WKT-G-D14VS-04A	Normal	3	point 9	56.6
	WKT-G-D14VS-04A	Normal	3	point 10	56.2
	WKT-G-D14VS-04A	Normal	3	point 11	56.5
	WKT-G-D14VS-04A	Normal	3	point 12	56.8
	WKT-G-D14VS-04A	Normal	3	point 13	56.7
	WKT-G-D14VS-04A	Normal	3	point 14	56.8
	WKT-G-D14VS-04A	Normal	3	point 15	56.4
	WKT-G-D14VS-04A	Normal	3	point 16	56.7
	WKT-G-D14VS-04A	Normal	3	point 17	56.6
	WKT-G-D14VS-04A	Normal	3	point 18	56.9
	WKT-G-D14VS-04A	Normal	3	point 19	56.4

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(1)	Location/ Measurement	L_{Aeq} (dB)
	WKT-G-D14VS-04A	Normal	3	point 20	56.8
				AVERAGE	**56.6**
	WKT-VS7-1A	Normal	3	point 1	51.6
	WKT-VS7-1A	Normal	3	point 2	53.6
	WKT-VS7-1A	Normal	3	point 3	54.2
	WKT-VS7-1A	Normal	3	point 4	54.3
	WKT-VS7-1A	Normal	3	point 5	54.4
	WKT-VS7-1A	Normal	3	point 6	52.8
	WKT-VS7-1A	Normal	3	point 7	52.3
	WKT-VS7-1A	Normal	3	point 8	51.7
	WKT-VS7-1A	Normal	3	point 9	52.0
	WKT-VS7-1A	Normal	3	point 10	49.9
	WKT-VS7-1A	Normal	3	point 11	53.9
	WKT-VS7-1A	Normal	3	point 12	51.4
	WKT-VS7-1A	Normal	3	point 13	54.4
	WKT-VS7-1A	Normal	3	point 14	52.3
	WKT-VS7-1A	Normal	3	point 15	52.6
	WKT-VS7-1A	Normal	3	point 16	52.9
	WKT-VS7-1A	Normal	3	point 17	56.5
	WKT-VS7-1A	Normal	3	point 18	55.9
	WKT-VS7-1A	Normal	3	point 19	55.9
	WKT-VS7-1A	Normal	3	point 20	55.3
				AVERAGE	**54**
	WKT-VS7-1B	Normal	3	point 1	51.7
	WKT-VS7-1B	Normal	3	point 2	51.9
	WKT-VS7-1B	Normal	3	point 3	52.0
	WKT-VS7-1B	Normal	3	point 4	54.0
	WKT-VS7-1B	Normal	3	point 5	56.1
	WKT-VS7-1B	Normal	3	point 6	53.9
	WKT-VS7-1B	Normal	3	point 7	51.1
	WKT-VS7-1B	Normal	3	point 8	50.1
	WKT-VS7-1B	Normal	3	point 9	51.7
	WKT-VS7-1B	Normal	3	point 10	51.9
	WKT-VS7-1B	Normal	3	point 11	50.8
	WKT-VS7-1B	Normal	3	point 12	54.1
	WKT-VS7-1B	Normal	3	point 13	51.5
	WKT-VS7-1B	Normal	3	point 14	54.1
	WKT-VS7-1B	Normal	3	point 15	51.5
	WKT-VS7-1B	Normal	3	point 16	51.9
	WKT-VS7-1B	Normal	3	point 17	52.5
	WKT-VS7-1B	Normal	3	point 18	54.8
	WKT-VS7-1B	Normal	3	point 19	53.1
	WKT-VS7-1B	Normal	3	point 20	54.4
				AVERAGE	**53**
	WKT-VS7-2	Normal	3	point 1	51.2
	WKT-VS7-2	Normal	3	point 2	51.5
	WKT-VS7-2	Normal	3	point 3	52.3
	WKT-VS7-2	Normal	3	point 4	53.1
	WKT-VS7-2	Normal	3	point 5	51.2
	WKT-VS7-2	Normal	3	point 6	51.2
	WKT-VS7-2	Normal	3	point 7	49.8
	WKT-VS7-2	Normal	3	point 8	54.1
	WKT-VS7-2	Normal	3	point 9	53.1
	WKT-VS7-2	Normal	3	point 10	50.5
	WKT-VS7-2	Normal	3	point 11	49.5
	WKT-VS7-2	Normal	3	point 12	48.8
	WKT-VS7-2	Normal	3	point 13	50.0
	WKT-VS7-2	Normal	3	point 14	49.0
	WKT-VS7-2	Normal	3	point 15	48.8
	WKT-VS7-2	Normal	3	point 16	49.9
	WKT-VS7-2	Normal	3	point 17	49.8
	WKT-VS7-2	Normal	3	point 18	50.3
	WKT-VS7-2	Normal	3	point 19	52.7
	WKT-VS7-2	Normal	3	point 20	51.3
	WKT-VS7-2	Normal	3	point 21	50.3
	WKT-VS7-2	Normal	3	point 22	50.9
	WKT-VS7-2	Normal	3	point 23	52.0
	WKT-VS7-2	Normal	3	point 24	51.1
	WKT-VS7-2	Normal	3	point 25	51.5
	WKT-VS7-2	Normal	3	point 26	50.3
	WKT-VS7-2	Normal	3	point 27	51.9
	WKT-VS7-2	Normal	3	point 28	51.6
				AVERAGE	**51**
	WKT-VS7-3	Normal	3	point 1	53.8
	WKT-VS7-3	Normal	3	point 2	57.5
	WKT-VS7-3	Normal	3	point 3	57.6
	WKT-VS7-3	Normal	3	point 4	56.8
	WKT-VS7-3	Normal	3	point 5	56.0
	WKT-VS7-3	Normal	3	point 6	56.0
	WKT-VS7-3	Normal	3	point 7	57.9
	WKT-VS7-3	Normal	3	point 8	58.5
	WKT-VS7-3	Normal	3	point 9	57.6
	WKT-VS7-3	Normal	3	point 10	53.8
	WKT-VS7-3	Normal	3	point 11	55.8
	WKT-VS7-3	Normal	3	point 12	59.1
	WKT-VS7-3	Normal	3	point 13	59.0
	WKT-VS7-3	Normal	3	point 14	58.1
	WKT-VS7-3	Normal	3	point 15	57.2
	WKT-VS7-3	Normal	3	point 16	55.3
	WKT-VS7-3	Normal	3	point 17	55.0
	WKT-VS7-3	Normal	3	point 18	56.9
	WKT-VS7-3	Normal	3	point 19	60.1
	WKT-VS7-3	Normal	3	point 20	60.8
	WKT-VS7-3	Normal	3	point 21	59.0
	WKT-VS7-3	Normal	3	point 22	57.0
	WKT-VS7-3	Normal	3	point 23	56.5
	WKT-VS7-3	Normal	3	point 24	58.8
	WKT-VS7-3	Normal	3	point 25	62.1
	WKT-VS7-3	Normal	3	point 26	60.5
	WKT-VS7-3	Normal	3	point 27	56.1
	WKT-VS7-3	Normal	3	point 28	53.7

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[1]	Location/ Measurement	L_{Aeq} (dB)
	WKT-VS7-3	Normal	3	point 29	57.4
	WKT-VS7-3	Normal	3	point 30	58.8
	WKT-VS7-3	Normal	3	point 31	57.7
	WKT-VS7-3	Normal	3	point 32	59.1
	WKT-VS7-3	Normal	3	point 33	55.5
	WKT-VS7-3	Normal	3	point 34	57.6
	WKT-VS7-3	Normal	3	point 35	59.4
	WKT-VS7-3	Normal	3	point 36	59.8
	WKT-VS7-3	Normal	3	point 37	56.5
	WKT-VS7-3	Normal	3	point 38	58.7
	WKT-VS7-3	Normal	3	point 39	58.9
	WKT-VS7-3	Normal	3	point 40	57.5
	WKT-VS7-3	Normal	3	point 41	59.7
	WKT-VS7-3	Normal	3	point 42	59.5
	WKT-VS7-3	Normal	3	point 43	57.2
	WKT-VS7-3	Normal	3	point 44	53.8
	WKT-VS7-3	Normal	3	point 45	56.0
	WKT-VS7-3	Normal	3	point 46	55.0
	WKT-VS7-3	Normal	3	point 47	59.5
	WKT-VS7-3	Normal	3	point 48	60.1
	WKT-VS7-3	Normal	3	point 49	56.9
	WKT-VS7-3	Normal	3	point 50	55.7
				AVERAGE	**58**
PTI	L-01	Normal	3	point 1	61.0
	L-01	Normal	3	point 2	60.1
	L-01	Normal	3	point 3	60.4
	L-01	Normal	3	point 4	60.0
	L-01	Normal	3	point 5	60.4
	L-01	Normal	3	point 6	61.2
	L-01	Normal	3	point 7	60.7
	L-01	Normal	3	point 8	61.2
	L-01	Normal	3	point 9	60.7
	L-01	Normal	3	point 10	56.4
	L-01	Normal	3	point 11	61.5
	L-01	Normal	3	point 12	63.1
				AVERAGE	**60.8**
	L-01	Normal	3	point 1	60.9
	L-01	Normal	3	point 2	57.4
	L-01	Normal	3	point 3	61.2
	L-01	Normal	3	point 4	58.5
	L-01	Normal	3	point 5	57.7
	L-01	Normal	3	point 6	57.7
	L-01	Normal	3	point 7	58.9
	L-01	Normal	3	point 8	58.1
	L-01	Normal	3	point 9	57.9
	L-01	Normal	3	point 10	58.3
	L-01	Normal	3	point 11	59.5
	L-01	Normal	3	point 12	60.2
				AVERAGE	**59.0**
	L-02	Normal	3	point 1	58.9
	L-02	Normal	3	point 2	59.4
	L-02	Normal	3	point 3	59.4
	L-02	Normal	3	point 4	59.2
	L-02	Normal	3	point 5	59.6
	L-02	Normal	3	point 6	59.0
	L-02	Normal	3	point 7	59.8
	L-02	Normal	3	point 8	61.3
	L-02	Normal	3	point 9	59.5
	L-02	Normal	3	point 10	59.9
	L-02	Normal	3	point 11	59.6
	L-02	Normal	3	point 12	59.5
				AVERAGE	**59.6**
	L-03	Normal	3	point 1	60.6
	L-03	Normal	3	point 2	61.3
	L-03	Normal	3	point 3	61.3
	L-03	Normal	3	point 4	60.2
	L-03	Normal	3	point 5	61.0
	L-03	Normal	3	point 6	62.1
	L-03	Normal	3	point 7	59.3
	L-03	Normal	3	point 8	61.3
	L-03	Normal	3	point 9	58.7
	L-03	Normal	3	point 10	60.3
	L-03	Normal	3	point 11	61.2
	L-03	Normal	3	point 12	59.3
				AVERAGE	**60.7**
	L-03a	Normal	3	point 1	60.4
	L-03a	Normal	3	point 2	59.2
	L-03a	Normal	3	point 3	59.9
	L-03a	Normal	3	point 4	59.6
	L-03a	Normal	3	point 5	61.3
	L-03a	Normal	3	point 6	60.1
	L-03a	Normal	3	point 7	60.2
	L-03a	Normal	3	point 8	59.8
	L-03a	Normal	3	point 9	59.0
	L-03a	Normal	3	point 10	60.3
	L-03a	Normal	3	point 11	59.0
				AVERAGE	**59.9**
	L-06	Normal	2	measurement 1	62.3
	L-06	Normal	2	measurement 2	62.7
	L-06	Normal	2	measurement 3	62.5
	L-06	Normal	2	measurement 4	63.5
	L-06	Normal	2	measurement 5	63.3
	L-06	Normal	2	measurement 6	62.4
	L-06	Normal	2	measurement 7	62.6
	L-06	Normal	2	measurement 8	62.2
	L-06	Normal	2	measurement 9	62.7
	L-06	Normal	2	measurement 10	61.9
				AVERAGE	**62.7**
	L-07	Normal	2	measurement 1	55.4
	L-07	Normal	2	measurement 2	55.9
	L-07	Normal	2	measurement 3	56.5

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(1)	Location/ Measurement	L_{Aeq} (dB)
	L-07	Normal	2	measurement 4	57.3
	L-07	Normal	2	measurement 5	57.6
	L-07	Normal	2	measurement 6	58.0
	L-07	Normal	2	measurement 7	58.3
	L-07	Normal	2	measurement 8	58.8
	L-07	Normal	2	measurement 9	58.8
	L-07	Normal	2	measurement 10	58.5
				AVERAGE	**57.7**
	L-08	Normal	2	measurement 1	61.4
	L-08	Normal	2	measurement 2	61.5
	L-08	Normal	2	measurement 3	60.1
	L-08	Normal	2	measurement 4	60.4
	L-08	Normal	2	measurement 5	59.6
	L-08	Normal	2	measurement 6	58.0
	L-08	Normal	2	measurement 7	57.3
	L-08	Normal	2	measurement 8	56.8
	L-08	Normal	2	measurement 9	56.0
	L-08	Normal	2	measurement 10	55.3
				AVERAGE	**59.2**
	L-08a	Normal	2	measurement 1	55.3
	L-08a	Normal	2	measurement 2	55.4
	L-08a	Normal	2	measurement 3	55.9
	L-08a	Normal	2	measurement 4	56.5
	L-08a	Normal	2	measurement 5	57.3
	L-08a	Normal	2	measurement 6	57.6
	L-08a	Normal	2	measurement 7	58.0
	L-08a	Normal	2	measurement 8	58.3
	L-08a	Normal	2	measurement 9	58.8
	L-08a	Normal	2	measurement 10	58.8
				AVERAGE	**57.4**
	L-10	Normal	3	point 1	66.2
	L-10	Normal	3	point 2	66.9
	L-10	Normal	3	point 3	66.6
	L-10	Normal	3	point 4	64.8
	L-10	Normal	3	point 5	66.3
	L-10	Normal	3	point 6	67.0
	L-10	Normal	3	point 7	66.7
	L-10	Normal	3	point 8	64.3
	L-10	Normal	3	point 9	66.0
	L-10	Normal	3	point 10	66.0
	L-10	Normal	3	point 11	64.6
	L-10	Normal	3	point 12	64.4
				AVERAGE	**65.9**
	L-11	Normal	3	point 1	64.6
	L-11	Normal	3	point 2	66.7
	L-11	Normal	3	point 3	63.9
	L-11	Normal	3	point 4	64.4
	L-11	Normal	3	point 5	64.7
	L-11	Normal	3	point 6	63.0
	L-11	Normal	3	point 7	62.1
	L-11	Normal	3	point 8	62.7
	L-11	Normal	3	point 9	65.4
	L-11	Normal	3	point 10	64.3
	L-11	Normal	3	point 11	64.8
	L-11	Normal	3	point 12	65.0
				AVERAGE	**64.5**
	L-12	Normal	3	point 1	64.2
	L-12	Normal	3	point 2	63.7
	L-12	Normal	3	point 3	64.5
	L-12	Normal	3	point 4	64.8
	L-12	Normal	3	point 5	65.3
	L-12	Normal	3	point 6	64.7
	L-12	Normal	3	point 7	65.0
	L-12	Normal	3	point 8	64.8
	L-12	Normal	3	point 9	64.8
	L-12	Normal	3	point 10	63.6
	L-12	Normal	3	point 11	63.7
	L-12	Normal	3	point 12	63.6
				AVERAGE	**64.4**
	L-13	Normal	3	point 1	66.6
	L-13	Normal	3	point 2	64.2
	L-13	Normal	3	point 3	61.2
	L-13	Normal	3	point 4	61.7
	L-13	Normal	3	point 5	61.4
	L-13	Normal	3	point 6	61.1
	L-13	Normal	3	point 7	61.2
	L-13	Normal	3	point 8	62.5
	L-13	Normal	3	point 9	61.9
	L-13	Normal	3	point 10	62.5
	L-13	Normal	3	point 11	63.2
	L-13	Normal	3	point 12	61.8
				AVERAGE	**62.8**
	L-13	Normal	3	point 1	62.1
	L-13	Normal	3	point 2	62.2
	L-13	Normal	3	point 3	61.9
	L-13	Normal	3	point 4	62.3
	L-13	Normal	3	point 5	63.5
	L-13	Normal	3	point 6	61.7
	L-13	Normal	3	point 7	61.7
	L-13	Normal	3	point 8	63.9
	L-13	Normal	3	point 9	61.8
	L-13	Normal	3	point 10	62.3
	L-13	Normal	3	point 11	61.8
	L-13	Normal	3	point 12	63.1
				AVERAGE	**62.4**
	L-13	Normal	3	point 1	65.1
	L-13	Normal	3	point 2	63.8
	L-13	Normal	3	point 3	64.1
	L-13	Normal	3	point 4	64.5
	L-13	Normal	3	point 5	66.1
	L-13	Normal	3	point 6	66.0

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[1]	Location/ Measurement	L_{Aeq} (dB)
	L-13	Normal	3	point 7	63.2
	L-13	Normal	3	point 8	64.4
	L-13	Normal	3	point 9	63.7
	L-13	Normal	3	point 10	62.8
	L-13	Normal	3	point 11	64.0
	L-13	Normal	3	point 12	65.1
				AVERAGE	**64.5**
	L-13	Normal	3	point 1	61.6
	L-13	Normal	3	point 2	62.5
	L-13	Normal	3	point 3	62.2
	L-13	Normal	3	point 4	62.1
	L-13	Normal	3	point 5	62.2
	L-13	Normal	3	point 6	62.3
	L-13	Normal	3	point 7	61.7
	L-13	Normal	3	point 8	63.2
	L-13	Normal	3	point 9	63.0
	L-13	Normal	3	point 10	62.1
	L-13	Normal	3	point 11	62.7
	L-13	Normal	3	point 12	61.8
				AVERAGE	**62.3**
	L-13	Normal	3	point 1	60.6
	L-13	Normal	3	point 2	59.2
	L-13	Normal	3	point 3	62.3
	L-13	Normal	3	point 4	62.3
	L-13	Normal	3	point 5	61.3
	L-13	Normal	3	point 6	62.0
	L-13	Normal	3	point 7	61.3
	L-13	Normal	3	point 8	62.0
	L-13	Normal	3	point 9	62.7
	L-13	Normal	3	point 10	59.0
	L-13	Normal	3	point 11	61.7
	L-13	Normal	3	point 12	59.0
				AVERAGE	**61.3**
	L-14	Normal	3	point 1	66.5
	L-14	Normal	3	point 2	66.2
	L-14	Normal	3	point 3	65.1
	L-14	Normal	3	point 4	66.6
	L-14	Normal	3	point 5	66.7
	L-14	Normal	3	point 6	64.1
	L-14	Normal	3	point 7	67.3
	L-14	Normal	3	point 8	65.8
	L-14	Normal	3	point 9	66.4
	L-14	Normal	3	point 10	67.2
	L-14	Normal	3	point 11	68.6
	L-14	Normal	3	point 12	66.6
				AVERAGE	**66.6**
	L-15a	Normal	3	point 1	64.2
	L-15a	Normal	3	point 2	67.1
	L-15a	Normal	3	point 3	64.1
	L-15a	Normal	3	point 4	63.9
	L-15a	Normal	3	point 5	64.9
	L-15a	Normal	3	point 6	67.6
	L-15a	Normal	3	point 7	67.3
	L-15a	Normal	3	point 8	65.3
	L-15a	Normal	3	point 9	66.6
	L-15a	Normal	3	point 10	65.0
	L-15a	Normal	3	point 11	65.0
	L-15a	Normal	3	point 12	65.1
				AVERAGE	**65.7**
	L-15b	Normal	3	point 1	58.9
	L-15b	Normal	3	point 2	64.4
	L-15b	Normal	3	point 3	60.9
	L-15b	Normal	3	point 4	61.1
	L-15b	Normal	3	point 5	61.7
	L-15b	Normal	3	point 6	61.8
	L-15b	Normal	3	point 7	61.3
	L-15b	Normal	3	point 8	61.3
	L-15b	Normal	3	point 9	62.6
	L-15b	Normal	3	point 10	64.5
	L-15b	Normal	3	point 11	62.0
	L-15b	Normal	3	point 12	63.6
				AVERAGE	**62.3**
	L-21	Normal	3	point 1	56.4
	L-21	Normal	3	point 2	56.4
	L-21	Normal	3	point 3	56.4
	L-21	Normal	3	point 4	56.9
	L-21	Normal	3	point 5	56.3
	L-21	Normal	3	point 6	55.6
	L-21	Normal	3	point 7	56.8
	L-21	Normal	3	point 8	56.7
	L-21	Normal	3	point 9	56.2
	L-21	Normal	3	point 10	56.3
	L-21	Normal	3	point 11	56.9
				AVERAGE	**56.5**
	L-22	Normal	3	point 1	56.4
	L-22	Normal	3	point 2	56.0
	L-22	Normal	3	point 3	57.5
	L-22	Normal	3	point 4	56.6
	L-22	Normal	3	point 5	56.5
	L-22	Normal	3	point 6	57.5
	L-22	Normal	3	point 7	57.9
	L-22	Normal	3	point 8	56.9
	L-22	Normal	3	point 9	57.2
	L-22	Normal	3	point 10	56.4
	L-22	Normal	3	point 11	56.3
				AVERAGE	**56.9**
	L-23	Normal	3	point 1	58.8
	L-23	Normal	3	point 2	58.4
	L-23	Normal	3	point 3	59.2
	L-23	Normal	3	point 4	59.4
	L-23	Normal	3	point 5	59.2

Appendix A3 -

WEK - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method[1]	Location/ Measurement	L_{Aeq} (dB)
	L-23	Normal	3	point 6	59.1
	L-23	Normal	3	point 7	59.0
	L-23	Normal	3	point 8	59.6
	L-23	Normal	3	point 9	59.5
	L-23	Normal	3	point 10	59.7
	L-23	Normal	3	point 11	59.5
				AVERAGE	**59.2**
	L-24	Normal	3	point 1	59.0
	L-24	Normal	3	point 2	59.1
	L-24	Normal	3	point 3	59.6
	L-24	Normal	3	point 4	58.8
	L-24	Normal	3	point 5	59.4
	L-24	Normal	3	point 6	59.5
	L-24	Normal	3	point 7	59.5
	L-24	Normal	3	point 8	59.5
	L-24	Normal	3	point 9	59.9
	L-24	Normal	3	point 10	59.4
	L-24	Normal	3	point 11	59.0
				AVERAGE	**59.4**
	L-28	Normal	3	point 1	54.0
	L-28	Normal	3	point 2	54.8
	L-28	Normal	3	point 3	54.3
	L-28	Normal	3	point 4	54.9
	L-28	Normal	3	point 5	54.4
	L-28	Normal	3	point 6	54.1
	L-28	Normal	3	point 7	52.3
	L-28	Normal	3	point 8	54.4
				AVERAGE	**54.2**
	L-29	Normal	3	point 1	61.2
	L-29	Normal	3	point 2	60.2
	L-29	Normal	3	point 3	60.0
	L-29	Normal	3	point 4	60.8
	L-29	Normal	3	point 5	61.3
	L-29	Normal	3	point 6	60.4
	L-29	Normal	3	point 7	60.6
	L-29	Normal	3	point 8	61.1
				AVERAGE	**60.7**
	L-30	Normal	3	point 1	56.7
	L-30	Normal	3	point 2	56.7
	L-30	Normal	3	point 3	56.8
	L-30	Normal	3	point 4	57.4
	L-30	Normal	3	point 5	56.5
	L-30	Normal	3	point 6	57.7
	L-30	Normal	3	point 7	57.8
	L-30	Normal	3	point 8	56.8
				AVERAGE	**57.1**
	L-31	Normal	3	point 1	62.6
	L-31	Normal	3	point 2	62.7
	L-31	Normal	3	point 3	64.2
	L-31	Normal	3	point 4	64.1
	L-31	Normal	3	point 5	62.4
	L-31	Normal	3	point 6	62.5
	L-31	Normal	3	point 7	62.6
	L-31	Normal	3	point 8	64.7
				AVERAGE	**63.3**

(1): 2: Far-field measurement; 3: Near-field measurement.

Appendix A4 – Measurement Results at NSRs

Appendix A4 - Measurement Results at NSRs

NSR	Scenario	Measurement Type	Start Time	End Time	L_{Aeq}, dB(A)
WK3a - Rooftop of Man King Building	Night-time	Background Noise Levels	7-Jul-2018 01:13	7-Jul-2018 01:23	56.5
			7-Jul-2018 01:24	7-Jul-2018 01:34	53.8
		Measured Noise Levels	6-Jul-2018 23:46	7-Jul-2018 00:16	54.9
			7-Jul-2018 00:22	7-Jul-2018 00:52	54.3
WK4 - Refuge Floor (17/F), The Sorrento	Night-time	Background Noise Levels	7-Jul-2018 01:17	7-Jul-2018 01:22	59.4
			7-Jul-2018 01:22	7-Jul-2018 01:27	59.5
		Measured Noise Levels	7-Jul-2018 00:02	7-Jul-2018 00:32	60.4
			7-Jul-2018 00:32	7-Jul-2018 01:02	60.2
WK7a - Top Level, TST Fire Station	Night-time	Background Noise Levels	7-Jul-2018 01:20	7-Jul-2018 01:30	54.1
			7-Jul-2018 01:31	7-Jul-2018 01:41	54.7
		Measured Noise Levels	6-Jul-2018 23:52	7-Jul-2018 00:22	56.2
			7-Jul-2018 00:23	7-Jul-2018 00:53	56.0
WK8a - Podium, The Waterfront	Night-time	Background Noise Levels	7-Jul-2018 01:24	7-Jul-2018 01:29	56.8
			7-Jul-2018 01:29	7-Jul-2018 01:34	57.9
		Measured Noise Levels	6-Jul-2018 23:52	7-Jul-2018 00:22	58.4
			7-Jul-2018 00:22	7-Jul-2018 00:52	56.9
WK11 - Refuge Floor (Top Level), T5, The Austin	Night-time	Background Noise Levels	7-Jul-2018 01:16	7-Jul-2018 01:26	57.5
			7-Jul-2018 01:26	7-Jul-2018 01:36	55.8
		Measured Noise Levels	6-Jul-2018 23:54	7-Jul-2018 00:24	58.5
			7-Jul-2018 00:24	7-Jul-2018 00:54	58.0
WK12a - Refuge Floor (Top Level), T5, Grand Austin	Night-time	Background Noise Levels	7-Jul-2018 01:13	7-Jul-2018 01:23	49.9
			7-Jul-2018 01:23	7-Jul-2018 01:33	50.0
		Measured Noise Levels	6-Jul-2018 23:53	7-Jul-2018 00:23	52.4
			7-Jul-2018 00:23	7-Jul-2018 00:53	51.4
WK14 - Refuge Floor (29/F), Moon Tower, The Arch	Night-time	Background Noise Levels	7-Jul-2018 01:12	7-Jul-2018 01:22	55.3
			7-Jul-2018 01:23	7-Jul-2018 01:33	53.6
		Measured Noise Levels	6-Jul-2018 23:51	7-Jul-2018 00:21	56.0
			7-Jul-2018 00:22	7-Jul-2018 00:52	54.3
WK14a - Refuge Floor (19/F), Star Tower, The Arch	Night-time	Background Noise Levels	7-Jul-2018 01:13	7-Jul-2018 01:23	56.9
			7-Jul-2018 01:23	7-Jul-2018 01:33	55.3
		Measured Noise Levels	7-Jul-2018 00:00	7-Jul-2018 00:30	56.4
			7-Jul-2018 00:30	7-Jul-2018 01:00	56.0

Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL)

Commissioning Test Report for the Fixed Plant Noise at Shek Kong Stabling Sidings (SSS)

MTR Corporation

August 2018

1 Introduction

The Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL) Project (hereinafter known as "XRL") covers a 26km long underground rail line on dedicated tracks that run between the terminus in West Kowloon and the boundary at Huanggang, where connects with the XRL Mainland section. XRL Project also includes the construction of ventilation buildings, emergency access points, stabling sidings and maintenance facilities and an emergency rescue siding (ERS) (formerly known as rescue emergency station).

The Environmental Impact Assessment (EIA) Report (Register No.: AEIA-143/2009) was approved on 28 September 2009 by the Director of Environmental Protection (DEP) under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, an environmental permit (EP) was granted on 16 October 2009 (EP No: EP-349/2009) for the construction and operation of the Project. Variations of environmental permit (VEP) were subsequently applied and the latest Environmental Permit (EP No: EP-349/2009/M) (hereinafter known as "the EP") was issued by Director of Environmental Protection (DEP) on 25 June 2018.

This report is prepared with reference to EP Condition 2.36, "*The Permit Holder shall, no later than two weeks before the commencement of the operation of the Project, deposit with the Director a Commissioning Test Report to confirm the compliance of the operational air-borne and ground-borne noise levels in accordance with the EIA Report and the application for variation of an environmental permit No. VEP-377/2012 and its attached documents*".

A Commissioning Test Report for Fixed Plant Noise at Shek Kong Stabling Sidings has been prepared to confirm the compliance of noise criteria in accordance with the operational air-borne noise levels in accordance with the application for variation of an environmental permit No. VEP-377/2012 and its attached documents. This report presents the noise measurement methodology, results of noise measurement for the fixed plant noise sources installed at Shek Kong Stabling Sidings (SSS), calculated Sound Power Levels from noise measurements having due regard to the characteristics of tonality, impulsiveness and intermittency. Given that operation arrangement of tunnel ventilation fans at ERS Plant Building – South (SPS) / ERS Plant Building - North (SPN) still follows those discussed in approved XRL EIA Report (Note 2 of Table 5.10 of EIA Report refers), no cumulative fixed plant noise impact is anticipated as major fixed plant noise sources at SSS and SPS/SPN would not be operated at the same time. For the fixed plant noise verification at the ventilation buildings including SPS and SPN and West Kowloon Station (WEK), separate reports would be submitted.

2 Noise Criteria

2.1 Fixed Plant Noise Criteria in EIA

With reference to the IND-TM under the Noise Control Ordinance (NCO), the relevant acceptable noise levels (ANL) where determined based on the area sensitivity rating (ASR).

The fixed plant noise criteria for the representative noise sensitive receivers (NSRs) were determined in EIA as follow (whichever is lower):

- 5dB(A) below the appropriate ANL set out in the IND-TM (the ANL-5dB(A) criterion); or
- The prevailing background noise levels where the prevailing background noise level is 5dB(A) below the appropriate ANL (i.e. ANL-5dB(A))

The noise criteria above were determined for planning purpose, while during operations; the fixed plant noise is controlled by a Noise Abatement Notices system governed by the NCO.

The representative NSRs which are located within 300m assessment area were identified in the Environmental Review Report for the Proposed Design Changes at Shek Kong Stabling Sidings, September 2012 (ERR-SSS) for variation of environmental permit (VEP-377/2012). Description of the NSRs and the corresponding fixed plant noise criteria are presented in Table 2.1 below. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied to the results of noise measurement, where applicable, in accordance with IND-TM.

Table 2.1 Summary of Fixed Plant Noise Criteria

NSR	Description	Area Sensitivity Rating (ASR)[a]	Noise Criteria, $L_{eq,\,30min}$ dB(A) [a]	
			Day and Evening Time	Night-time
Shek Kong Stabling Sidings (SSS) (Figure 2.1)				
SS2	Nam Hing Lei Village House	B	49	39
SS4	Leung Uk Tsuen Village House	B	49	40
SS5	51A Leung Uk Tsuen	B	52	45
SS6	32 Leung Uk Tsuen	B	52	45
SS7	Leung Uk Tsuen Village House	B	49	47
SS10	DD110 LOT 482, Wang Toi Shan	B	49	47
SS11a	Leung Uk Tsuen Squats	B	52	50
SS12	265 Kam Tai Road	B	49	47
SS14	Planned village house at Village Zone	B	49	47
SS15	Abandoned village house in Shek Kong	B	49	47
SS20	Village house in Shek Kong	B	49	40

Note:
(a) ASR and noise criteria follow that defined in Table 3.12 of ERR-SSS.

Major fixed plant noise sources at SSS include gantry crane, air handling units (AHU), cooling towers, chillers, compressors, train wash plant, train idling and shunting. For both indoor and outdoor fixed plants, they would be operating concurrently under “normal scenario” for XRL operation during daytime and evening time periods; and night-time period, respectively under the worst case scenario. The worst case scenario was considered for compliance check against the fixed plant noise criteria and the noise measurement was conducted to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs.

Table 2.2 below summarised the information of the fixed plant noise sources and the layout plan is shown in Figures 2.2 and 2.3. All the fixed noise sources identified in the ERR-SSS have been covered in this Report.

Table 2.2 Summary of Fixed Plant Noise Sources

Noise Source	Location	Indoor / Outdoor
Shek Kong Stabling Sidings (SSS)		
Gantry crane	Ground level of P-way sidings	Outdoor
Train Wash Plant	Ground level of SSS	Outdoor
AHU (RMS-AHU-4001 to 4016)	Roof of Running Maintenance Shed	Outdoor
Ventilation louvres (SMB.GL.L.004, SMB.GL.L.005, SMB.U2.L.001B & SMB.U1.L.003B)	G/F, 1/F and 2/F of SSS Main Building	Outdoor
Chiller	Roof of SSS Main Building	Indoor[(a)]
Cooling Towers	Roof of SSS Main Building	Outdoor
Compressor	1/F of SSS Main Building	Indoor[(a)]
Train Idling	Running Maintenance Shed and Sidings	Indoor and Outdoor
Train Shunting at 25kph	Sidings	Outdoor

Note:
(a) Both chiller and compressor are fully enclosed inside the building and have insignificant noise contribution based on the on-site observations. Therefore, they are excluded in the noise measurement and the subsequent fixed plant noise calculation.

3 Methodology

3.1 Noise Measurement for the Fixed Plants

Noise measurements to obtain the noise levels of the fixed plants were undertaken by National Railway Product Quality Supervision and Inspection Center (鐵道部產品質量監督檢驗中心), GAS Joint Venture and ATAL Building Services Engineering Ltd. The commissioning tests were carried out by qualified persons possessing at least 7 years of noise control experience and a corporate member of Hong Kong Institute of Acoustics or equivalent in accordance with S3.22 of the XRL EM&A Manual.

3.1.1 Methodology

Three measurement methods for stationary fixed plant sources, namely Method 1 (at or near NSR), Method 2 (Far Field) and Method 3 (Near Field), have been developed based on NCO-TM, basic acoustic principles and *ISO 3746-2010: Acoustics – Determination of sound power levels and sound energy levels of noise sources using sound pressure – Survey method using* *an enveloping measurement surface over a reflecting plane*, respectively. Given the fixed plant noise sources are steady, all proposed methods could be adopted for all types of fixed plant source depending on the site environment/constraints that might affect the possibility to obtain valid results, considerations including but not limited to:

- Background noise with less influence to the measured noise levels
- Free of obstacles between measurement location and noise source
- Accessibility and Safety Concerns

For Shek Kong Stabling Sidings (SSS), considering there are building structures including noise barriers, SSS main building or maintenance shed between the NSR and noise sources such that there are no direct line of sight between most of the fixed plant and NSRs, also the fact that background noise environment (Table 4.3 refers) in this area (i.e. mainly due to heavily trafficked Kam Tin Road or natural ambient sound) is found to be higher than the noise criteria presented in Table 2.1, obtaining valid results using Method 1 was considered unlikely. As such, only Method 2 and Method 3 were considered applicable. Details of the measurement methodology are shown in Appendix A1.

Method 1 – Measuring Sound Pressure Level at NSR or Near NSR

- Measurement at NSR or near NSR at distance D away from the louvre, where D was at least two times the largest dimension b of the louvre and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the louvre and three measurements were taken when the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre was switched OFF
- The sound pressure level (SPL) at NSR or near NSR was determined by the following equation:

  Background corrected L_p = L_p + BG - [20logD +8] (if applicable) + façade correction (if applicable)

  Where

  L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);

  BG is the background correction factor, in dB(A);

  D is separation between the center of louvre or surface of the plant and the microphone, in metres.

Method 2 – Measuring Sound Power Level by Far Field Method for Louvres or for Plants

- The microphone was positioned at the perpendicular distance D away from the center of the louvre or the surface of the plant, where D was at least two times the largest dimension b of the louvre or plant and rounded up to integer, i.e.: $D \geqq 2b$
- The microphone was pointing toward the center of the louvre/combined louvre area or the center the plant; and three measurements were taken when the noise source from the louvre was switched ON

- Background noise level was taken when the noise source from the louvre or plant was switched OFF
- The sound power level (SWL) of the louvre or the plant was determined, based on basic acoustic principles, by the following equation:

$$L_w = L_p + 20logD,center +8 + BG$$

Where
L_p is the average $L_{eq,1min}$ of all measurements, in dB(A);
D,center is separation between the center of louvre or plant and the microphone, in metres;
BG is the background correction factor, in dB(A).

Method 3 – Measuring Sound Power Level by Near Field Method for Louvres or for Plants

- A right parallelepiped hypothetical measurement box for each louvre or each surface of a plant was determined according to ISO 3746:2010, with each side being spaced a distance *D* from the corresponding side of the louvre or plant
- Each of the 5 planes of the measurement box was subdivided into equal-sized rectangular grids, the length of each side of the grids should be less than or equal to 3 times of distance D, i.e. grid length $\leq 3D$
- The microphone was pointing toward the center of each grid, and a measurement was taken for each grid during the noise source from the louvre was switched ON
- Background noise level was taken when the noise source from louvre or plant was switched OFF
- The SWL of the louvre or the plant was determined by the following equation:

$$L_w = L_p + 10log(S) - K_{1A} - K_{2A}$$

Where
L_p is the averaged measured L_{eq} of all measurement points, in dB(A);
S is the total surface area over the measurement box (total 5 planes), in m^2;
K_{1A} is the background correction factor as described in *ISO 3746:2010*, in dB(A);
K_{2A} is the environmental correction for sound absorption and reflection as described in *ISO 3746:2010*, in dB(A).

Except for Method 3, which was adopted with reference to ISO 3746:2010; the noise sources measured using Method 1 or Method 2 were considered steady if the difference between the maximum and minimum L_{eq} is less than or equal to 1dB(A), i.e., $\leq$1dB(A); average L_{eq} was therefore considered. Otherwise, the maximum L_{eq} would be adopted for SWL determination as a conservative approach.

For the noise induced by train movement, noise measurement was conducted at a distance of 25m from the rail center and at a height of 3.5m above top of rail according to the specification of China Railway High-Speed (CRH) train. For train idling noise, noise measurement was conducted at a distance of 7.5m from the rail center and at a height of

1.2m above top of rail according to the specification of CRH train, which was discussed in the ERR-SSS for assessment.

3.1.2 Measurement Equipment

The sound level meters and calibrators used for noise measurements are listed in Table 3.1. The instruments complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in Appendix A2a.

Table 3.1 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	Lutron SL-4022	I.328198
	B&K 2250	2704790
	Casella CEL-63X	5044655
	LMS SCADAS Mobile 05	53102514
Calibrator	Casella CEL-120/1	5060836
	B&K 4231	1858983

Before and after each series of measurements, a calibration check was carried out on the sound level meter by the calibrator. The difference between the readings made before and after each series of measurements shall be less than or equal to 1.0 dB.

3.1.3 Measurement Schedule

The noise measurements were carried out during daytime, evening time and night-time periods, where the fixed plant items were operated steadily and continuously at their noisiest operating mode under normal scenario. The noise measurement schedule is shown in Table 3.2.

Table 3.2 Measurement Schedule

Noise Source	Date	Time
Gantry crane	21 Dec 2015, 3 Aug 2016	10:30 – 17:00
Train Wash Plant	20 Jun 2018	10:30 – 17:00
AHU (RMS-AHU-4001 to 4016)	20 Jul 2017	10:30 – 17:00
Cooling Towers	-(1)	-(1)
Ventilation louvres (SMB.GL.L.004, SMB.GL.L.005, SMB.U2.L.001B & SMB.U1.L.003B)	27 Jul 2017	23:00 – 01:00
	4 Aug 2017	10:30 – 17:00
Train Idling	3 Mar, 25 Jun and 12 Jul 2014	10:30 – 17:00
Train Shunting at 25kph	3 Mar, 25 Jun and 12 Jul 2014	10:30 – 17:00

Note:
(1) Commissioning test was conducted by the Manufacturer.

3.2 Noise Measurement to Confirm Any Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

3.2.1 Measurement Equipment

The sound level meters and calibrators used for noise measurements at NSRs are listed in Table 3.3. The instruments complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) or equivalent international standards. Calibration certificates are shown in Appendix A2b.

Table 3.3 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	B&K 2250-L	2718884
	Casella CEL-63X	5044655
	B&K 2250-L	2701830
	B&K 2250	2749852
	B&K 2250	2718890
	B&K 2250	2704790
Calibrator	B&K 4231	1858983

3.2.2 Measurement Parameters

With reference to the IND-TM, the noise measurement was conducted at the representative NSR for $L_{Aeq\ (30min)}$, in one-third octave band under the worst case scenario, ie, "normal scenario" during daytime and evening time periods; and night-time period, respectively.

The fixed plant noise sources will be operated steadily and continuously, and therefore no intermittency and impulsiveness are expected at the NSR. However, the characteristics of intermittency and impulsiveness will be recorded, if any, based on observation during measurement.

2 sets of background noise level, $L_{Aeq\ (5min)}$, were measured at each measurement location when all fixed plant noise sources were not in operation.

3.2.3 Measurement Scenarios

The noise measurement were conducted in 2 operation scenarios as identified in Table 3.6 of ERR-SSS[1].

Table 3.4 Operation Scenarios in SSS

Train Operation	Operation Scenarios in SSS
Night-time Train Movement/Operation	<u>After 0030 hours</u> • 2 short haul movements within SSS

[1] Environmental Review Report for the Proposed Design Changes at Shek Kong Stabling Sidings (September 2012) for supporting the variation of an environmental permit No. VEP-377/2012.

Train Operation	Operation Scenarios in SSS
activities at SSS (during a 30 minute period)	• 1 long haul train idling in the covered running maintenance shed • Continuous operation of AHU and compressors
Daytime and Evening Time Train movement/operation activities at SSS (during a 30 minute period)	• 6 short haul movements within SSS • 1 short haul train idling on stabling track • Loading of maintenance train (on gantry crane) • Train wash operating • Continuous operation of AHU and compressors

3.2.4 Measurement Location and Date

Based on the representative NSRs as listed in Table 2.1 for SSS, some of the representative NSRs have been selected for noise measurement. The selected representative NSRs include SS7 – Leung Uk Tsuen Village House, SS10 – DD110 LOT 482, Wang Toi Shan, SS11a - Leung Uk Tsuen Squats, SS12 - 265 Kam Tai Road, SS15 - Abandoned village house in Shek Kong and SS20 - Village house in Shek Kong. The measurement location is shown in Figures 2.2 and 2.3.

The noise measurement was carried out at the selected representative NSRs (Table 4.3 refers) on 20 – 21 Jun 2018, during which the fixed plant items were operated steadily and continuously at their noisiest operating mode under operation scenarios as listed in Table 3.4 above.

4 Measurement Results

4.1 The Noise Levels of Fixed Plant Noise Sources

The noise levels measured under the worst case scenario are determined and presented in Table 4.1. Details of the measurement results are shown in Appendix A3.

Table 4.1 Summary of Noise Levels for Fixed Plants

Location	Fixed Plant Noise Source	Calculated SWL L_{Aeq} / L_{max} / Sound Pressure Level, dB(A)
SSS	Short Haul Shunting	L_{max} 69 dB(A) (at 25m setback from track centre, 3.5m from rail top)
	Long Haul Shunting	L_{max} 69 dB(A) (at 25m setback from track centre, 3.5m from rail top)
	Short Haul Idling	SPL L_{eq} 70 dB(A) (at 7.5m setback from track centre, 1.2m from rail top)
	Gantry Crane	SWL 90.0 dB(A)
	Train Wash Plant	L_{eq} 61.8 dB(A) (at 6m from source under full wash scenario)

Location	Fixed Plant Noise Source	Calculated SWL L_{Aeq} / L_{max} / Sound Pressure Level, dB(A)
	Cooling Tower[1]	SWL 82 dB(A)
	RMS-AHU-4001[2]	SWL 76 dB(A)
	RMS-AHU-4002	SWL 75 dB(A)
	RMS-AHU-4003	SWL 75 dB(A)
	RMS-AHU-4004	SWL 72 dB(A)
	RMS-AHU-4005	SWL 72 dB(A)
	RMS-AHU-4006	SWL 72 dB(A)
	RMS-AHU-4007	SWL 74 dB(A)
	RMS-AHU-4008	SWL 72 dB(A)
	RMS-AHU-4009	SWL 76 dB(A)
	RMS-AHU-4010	SWL 74 dB(A)
	RMS-AHU-4011	SWL 72 dB(A)
	RMS-AHU-4012	SWL 72 dB(A)
	RMS-AHU-4013	SWL 77 dB(A)
	RMS-AHU-4014	SWL 76 dB(A)
	RMS-AHU-4015	SWL 77 dB(A)
	RMS-AHU-4016	SWL 76 dB(A)
	SMB.GL.L.004	SWL 77 dB(A)
	SMB.GL.L.005	SWL 74 dB(A)
	SMB.U1.L.003B	SWL 75 dB(A)
	SMB.U2.L.001B	SWL 70 dB(A)

Note:
(1) A total of 3 Cooling towers are on the roof level of SSS Main Building and will operate simultaneously during day and evening time, while only 1 cooling tower will operate during night-time.
(2) A total of 16 AHUs (total 8 groups) are on the roof of Running Maintenance Shed and only 8 AHUs (one of each group) will operate 24-hour. As a conservative approach, the maximum SWL of each group AHU is adopted in the noise calculation.

A compliance check against the fixed plant noise criteria at NSR was conducted. The cumulative noise levels from noise sources were assessed to ensure the compliance with the noise criterion. Table 4.2 shows the results, details of the calculation are also given in Appendix A3.

Table 4.2 Cumulative Fixed Plant Noise at NSR

NSR	Description	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
SS2	Nam Hing Lei Village House	36	35	49	39	Y	Y
SS4	Leung Uk Tsuen Village House	37	32	49	40	Y	Y

NSR	Description	Cumulative SPL, dB(A)		Noise Criteria, dB(A)		Compliance (Y/N)	
		Day and Evening Time	Night-time	Day and Evening Time	Night-time	Day and Evening Time	Night-time
SS5	51A Leung Uk Tsuen	43	35	52	45	Y	Y
SS6	32 Leung Uk Tsuen	43	34	52	45	Y	Y
SS7	Leung Uk Tsuen Village House	46	41	49	47	Y	Y
SS10	DD110 LOT 482, Wang Toi Shan	44	38	49	47	Y	Y
SS11a	Leung Uk Tsuen Squats	44	41	52	50	Y	Y
SS12	265 Kam Tai Road	45	39	49	47	Y	Y
SS14	Planned village house at Village Zone	46	37	49	47	Y	Y
SS15	Abandoned village house in Shek Kong	47	38	49	47	Y	Y
SS20	Village house in Shek Kong	40	36	49	40	Y	Y

4.2 The Characteristics of Tonality, Impulsiveness and Intermittency at NSRs

Noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the identified NSRs were conducted under the normal operation scenarios during daytime and evening, and during night-time, respectively as specified in Table 3.4. Measurement results are summarised in Table 4.3 below. In each operation scenario, two sets of noise measurements, $L_{Aeq(30min)}$ were carried out to confirm that the difference in the measured noise levels with and without operation of fixed plant noise sources were less than 3.0 dB(A). That means the fixed plant noise sources are not considered as significant noise sources at the NSRs.

Noise measurements at the selected representative NSRs were dominated by road traffic noise or natural ambient sound; characteristics of tonality, impulsiveness and intermittency from fixed plant noise sources in SSS was not noticeable during the measurement. Detailed results of noise measurements are shown in Appendix A4.

Table 4.3 Noise measurement Results at Representative NSRs

NSR[1]	Operation Scenario	Measured Noise Level $L_{Aeq(30min)}$, dB(A), (measurement time[2][3])	Averaged Background Level $L_{Aeq(5min)}$, dB(A), (measurement period[2][3])	Difference between Measured Noise Level and Background Level, (< 3 or >= 3 dB(A))
SS7	Daytime Train movement / operation activities at SSS	51.8 (22:58 – 23:28) 50.4 (23:28 – 23:58)	52.0 (22:20 –22:30)	< 3
	Night-time Train Movement / Operation activities at SSS	50.6 (00:24 – 00:54) 51.5 (00:54 – 01:24)	50.3 (01:30 –01:44)	< 3
SS10	Daytime Train movement / operation activities at SSS	68.5 (22:58 – 23:28) 66.9 (23:28 – 23:58)	68.9 (22:22 –22:37)	< 3
	Night-time Train Movement / Operation activities at SSS	65.9 (00:24 – 00:54) 66.2 (00:54 – 01:24)	66.5 (00:07 –00:17)	< 3
SS11a	Daytime Train movement / operation activities at SSS	52.7 (22:58 – 23:28) 53.2 (23:28 – 23:58)	51.4 (22:14 –22:52)	< 3
	Night-time Train Movement / Operation activities at SSS	52.2 (00:24 – 00:54) 51.2 (00:54 – 01:24)	51.9 (00:09 –00:23)	< 3
SS12	Daytime Train movement / operation activities at SSS	67.6 (22:58 – 23:28) 66.3 (23:28 – 23:58)	69.0 (22:34 –22:49)	< 3
	Night-time Train Movement / Operation activities at SSS	65.4 (00:24 – 00:54) 64.4 (00:54 – 01:24)	65.9 (00:10 –00:20)	< 3
SS15	Daytime Train movement / operation activities at SSS	57.4 (22:58 – 23:28) 57.3 (23:28 – 23:58)	57.3 (22:05 –22:16)	< 3
	Night-time Train Movement / Operation activities at SSS	57.8 (00:24 – 00:54) 57.9 (00:54 – 01:24)	57.5 (00:07 –00:18)	< 3
SS20	Daytime Train movement / operation activities at SSS	54.6 (22:58 – 23:28) 54.5 (23:28 – 23:58)	54.2 (22:35 –22:46)	< 3
	Night-time Train Movement / Operation activities at SSS	54.4 (00:24 – 00:54) 54.5 (00:54 – 01:24)	54.5 (00:07 –00:23)	< 3

Notes:

(1) Noise environment at SS7, SS10 and SS12 was dominated by heavily trafficked Kam Tin Road, while Background noise environment at SS11a, SS15 and SS20 was dominated by natural ambient sound.

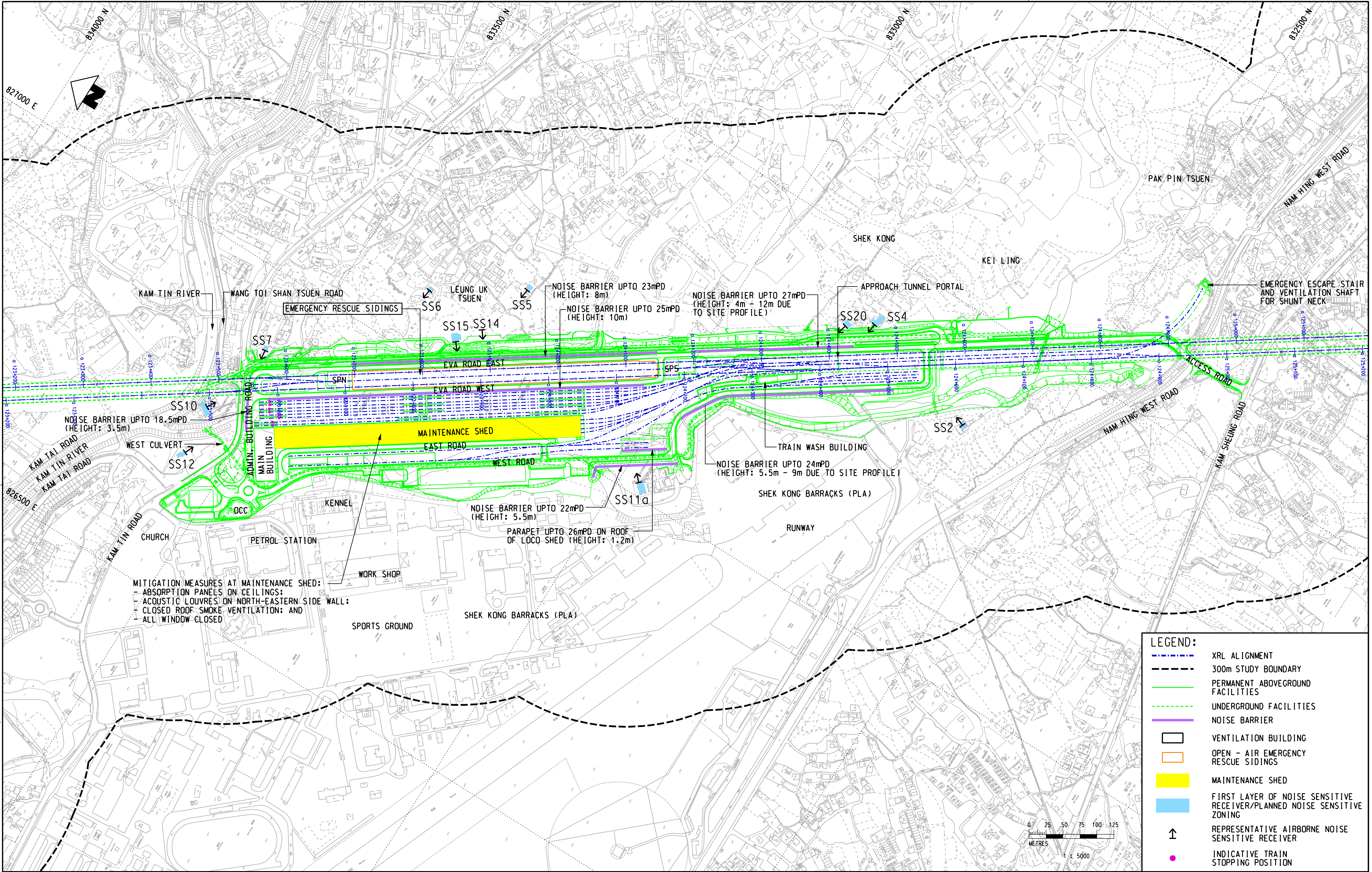
(2) The measurements were conducted between evening-time to night-time (i.e. 2200 – 0130), which is considered as a representative period due to relatively lower background noise level. The measurement results of both operation scenarios were therefore less affected by background noise.

(3) Fixed plant noise was inaudible at all NSRs. In addition, based on site observations, the measured noise levels were dominated by the background noise including traffic noise or natural ambient sound. Due to fluctuation of background noise, it is possible the "Averaged Background Noise Level" presented in Table 4.3 is higher than the "Measured Noise Level".

As the differences between measured noise levels and background levels are all less than 3.0 dB(A), it was unable to obtain reliable corrected noise levels at the NSRs and corrections for tonality, impulsiveness or intermittency were therefore not applicable.

5 Conclusions

To fulfil the XRL EP condition 2.36, the fixed plant noise verification were undertaken and the measurement results indicated all the fixed plant noise levels in SSS are in compliance with the fixed plant noise criteria.



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DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	05/JUL./2018

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ENS_M52_101A.dgn

TITLE

C8016

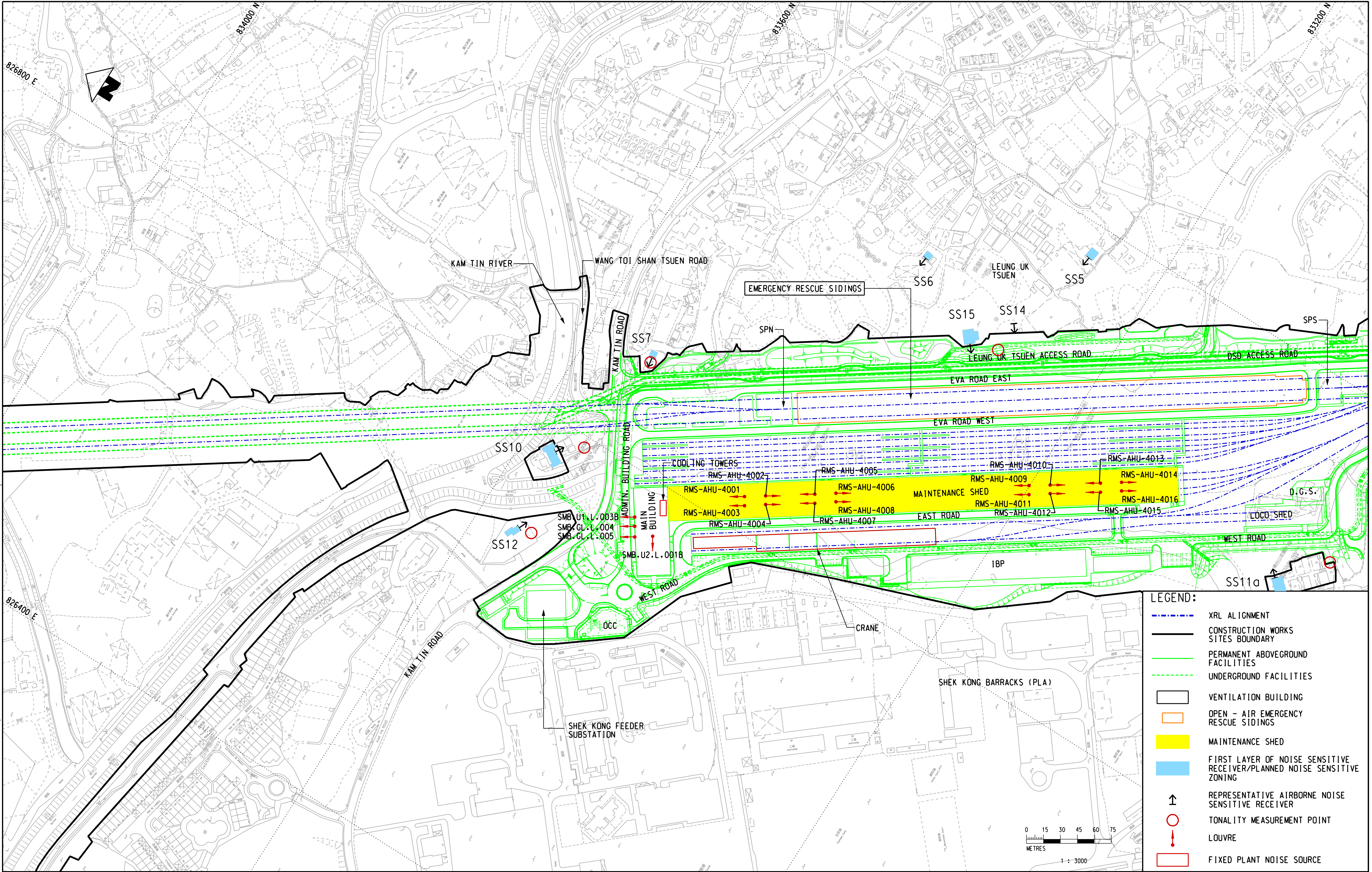
ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATIONS OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS (SSS)

SCALE 1 : 5000 (A3)

FIGURE NO. FIGURE 2.1

REV. A



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DRAWN	YJP
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CHECKED	KCC
APPROVED	PL
DATE	28/MAY/2012

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ENS_M52_102A.dgn

TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS, FIXED PLANT NOISE SOURCES AND TONALITY MEASUREMENT POINTS (SHEET 1 OF 2)

SCALE 1 : 3000 (A3) | FIGURE NO. FIGURE 2.2 | REV. A

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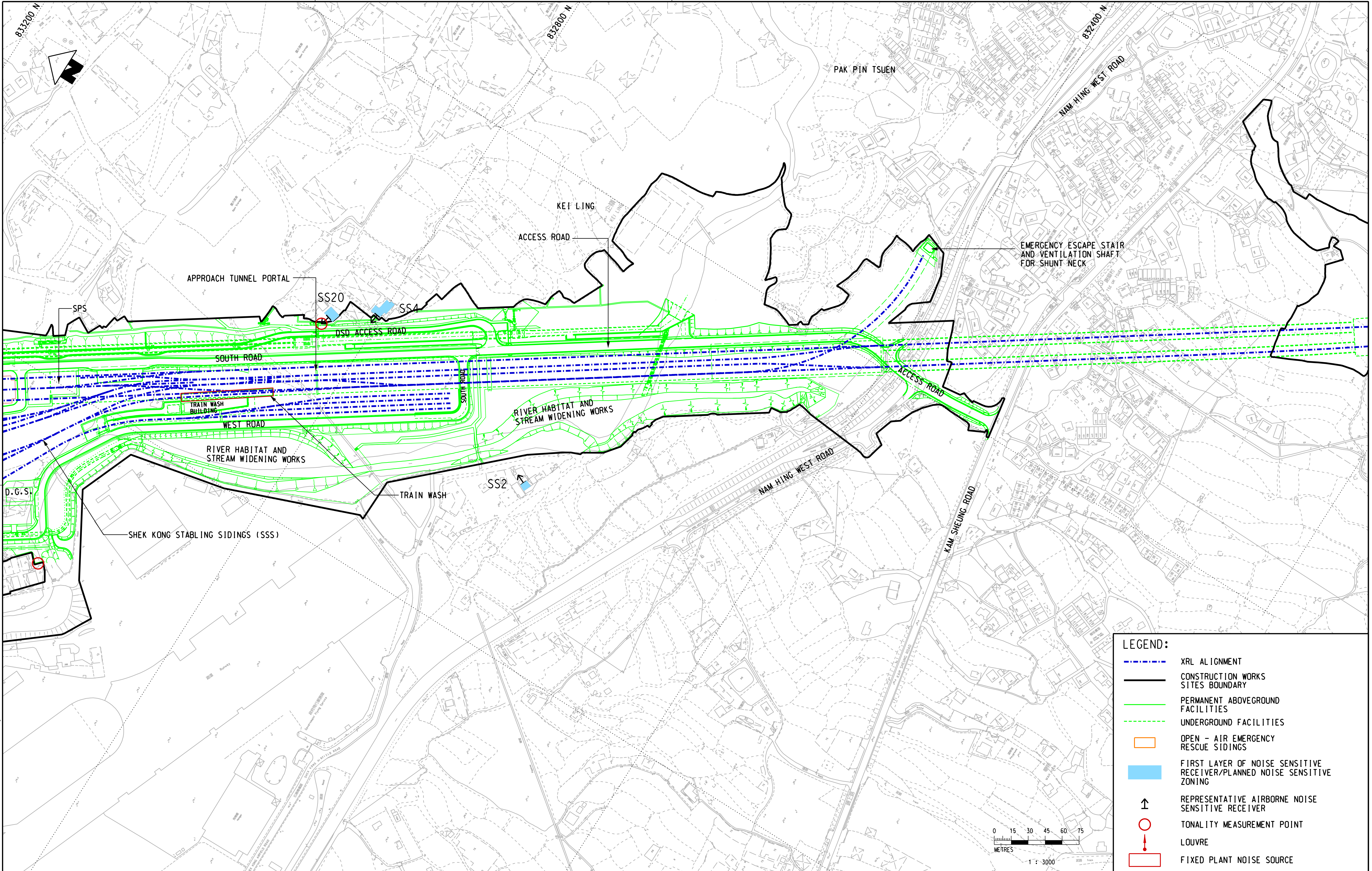

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DRAWN	YJP
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	28/MAY/2012

DO NOT SCALE DRAWINGS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.

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TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE NOISE SENSITIVE RECEIVERS, FIXED PLANT NOISE SOURCES AND TONALITY MEASUREMENT POINTS (SHEET 2 OF 2)

SCALE 1 : 3000 (A3)

FIGURE NO. FIGURE 2.3

REV. A

Appendix A1 –Measurement Methodology

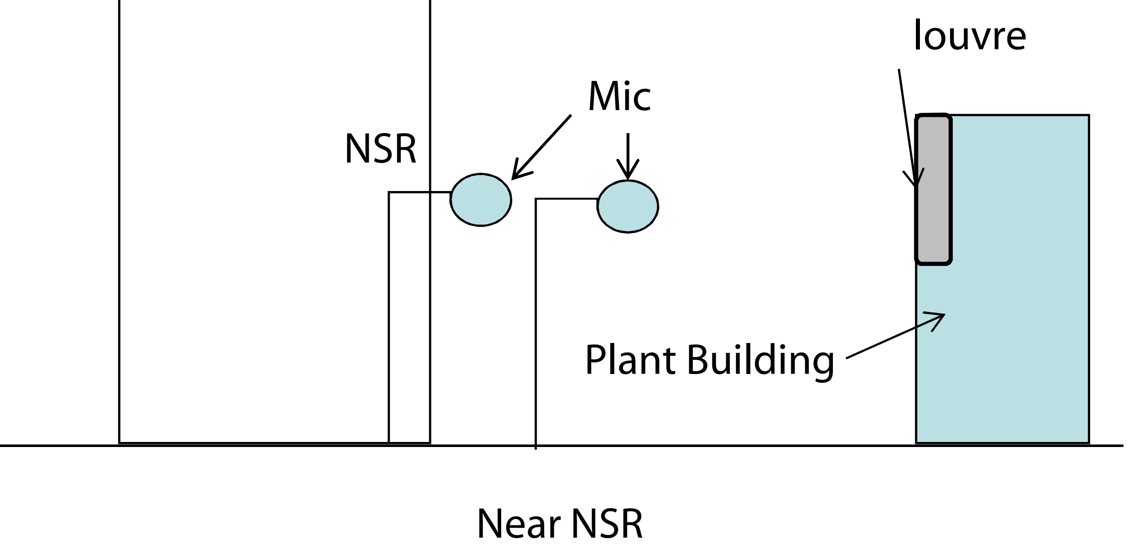
Summary of Testing Methodology

Method	Standard	No of repeated measurement	No of measurement point	Measurement distance, D	To Verify
Method 1 (NSR Method)	NCO - TM	3 sets of Leq 1min	Depend on number of NSRs nearby	At the most affected NSR or near NSR	ANL-5 or Background Prevailing
Method 2 (Far Field Method)	Basic Acoustic Principle	3 sets of Leq 1min	1 (for louvre/plant with uniform plane source)	D ≧2b and roundup to integer	ANL-5 or Background Prevailing
Method 3 (Near Field Method)	Developed based on ISO3746:2010	1 set of Leq 10s [(a)] /1min	Depend on the size of the louvre/plant and the measurement distance should follow guideline in ISO3746	At least 1m from the louvre opening/plant (unless otherwise specified)	ANL-5 or Background Prevailing

Note :
(a) If fixed plant items are operated at their noisiest operating modes and are steady during measurement, 10-second will be adopted for the duration of measurement.

Method 1 – Sound Pressure Level at NSR or Near NSR for louvre or Plant

"b" is the long side of the louvre
"D" is the separation between louvre and microphone

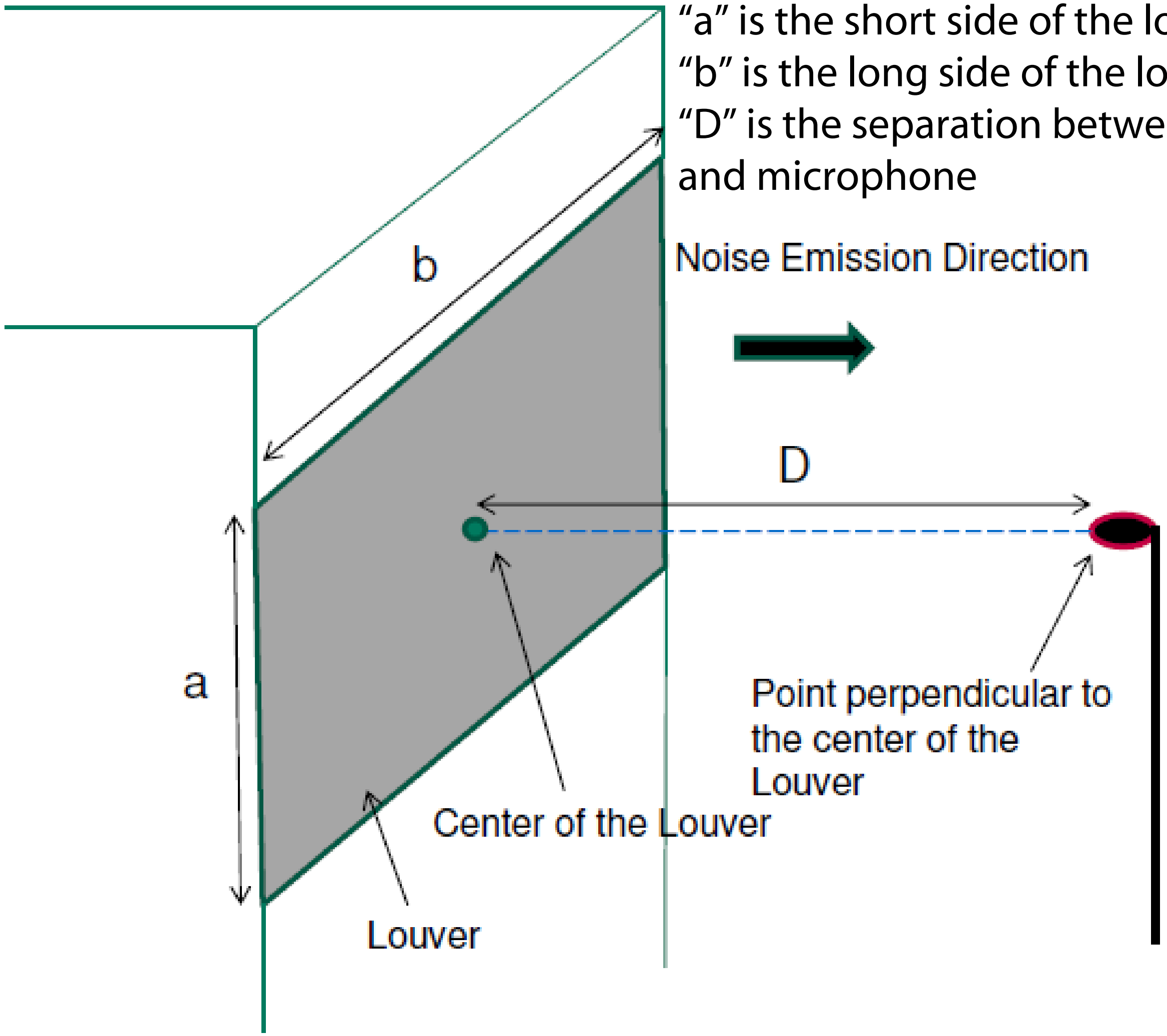


- Based on NCO - TM
- The locations of measurement points are depended on the site situation
- 3.0 dB façade correction should be considered if the location of measurement point is not at assessment point as defined in NCO-TM
- "D" must be greater than 2b and roundup to integer
- Detail calculation of the SPL should refer to the NCO-TM.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

Background corrected SPL = Mean $L_{Aeq1min}$ + BG - [20log (D) +8] (if applicable) + façade correction (if applicable)

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for louvre



"a" is the short side of the louvre
"b" is the long side of the louvre
"D" is the separation between louvre and microphone

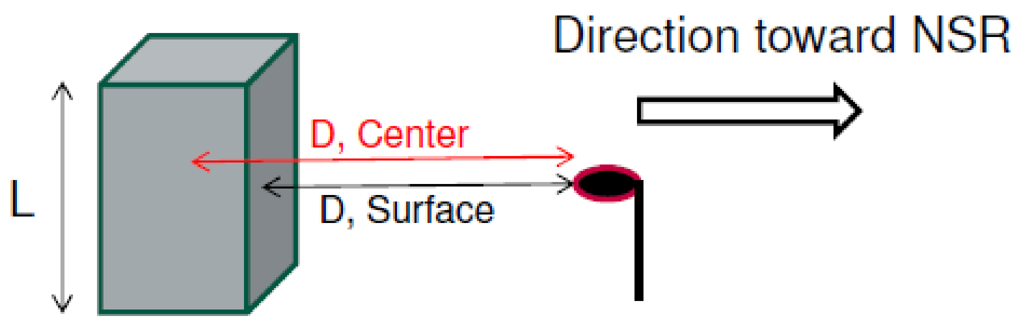
- Based on basic acoustic principle
- "D" must be greater than 2b and roundup to integer, i.e.: D≧2b
- The microphone must point to the center of the louvre.
- At least 3 sets of LAeq, 1min should be obtained
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 +BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 2 – Far Field Sound Power Testing Method for Plant

"L" is the longest side of the plant item
"D, Center" is the separation between center of the plant item and microphone
"D, Surface" is the separation between surface of the plant item and microphone

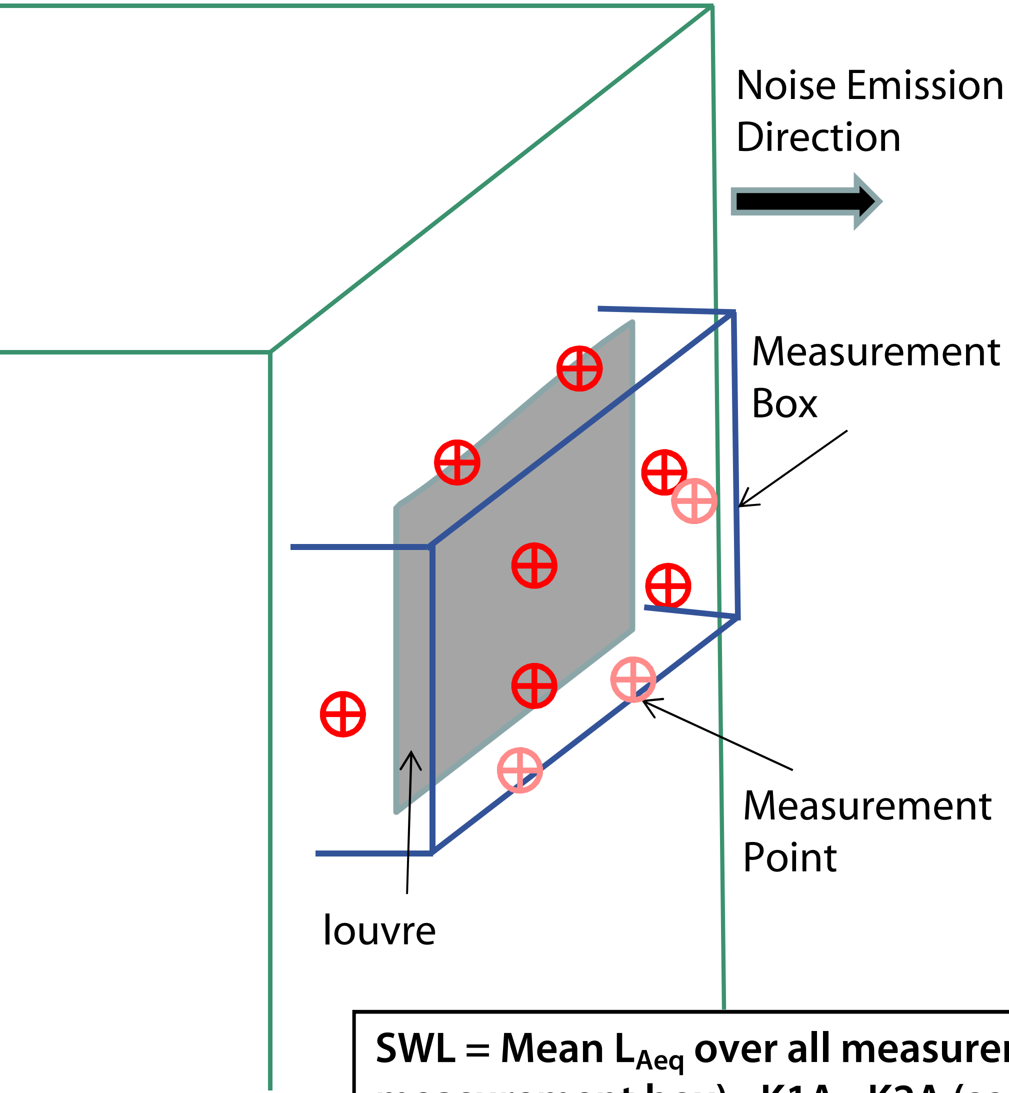


- "D, Surface" must be greater than twice of L (2L) and roundup to integer
- The microphone must be pointing to the center of the plant
- At least 3 sets of LAeq, 1min should be obtained at each measurement point.
- Background noise level (BGL) should be taken for determination of background correction (BG)
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, BG should be capped to 3.0 dB

SWL (Sound Power Level) = Mean measured $L_{Aeq1min}$ + 20 log (D, center) + 8 + BG

if the difference between the maximum and minimum Leq >1dB(A); maximum Leq would be adopted as a conservative approach

Method 3 – Near Field Sound Power Testing Method for louvre

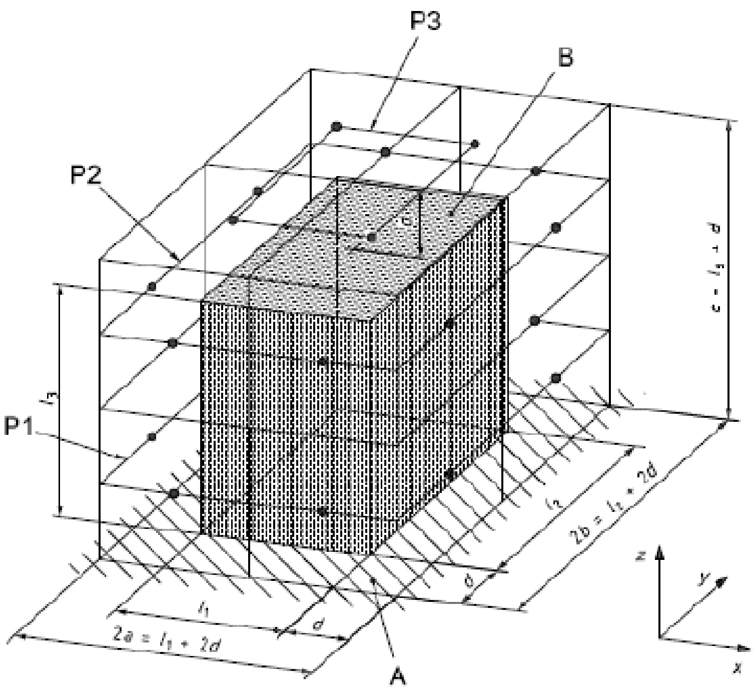


- Based on the principle of ISO3746 – 2010
- First step is to determine a hypothetical measurement surface /box with not less than 1m separation from the louvre.
- Second, determine the location of measurement point in accordance with the latest edition of ISO3746.
- Background noise level (BGL) should be taken at each measurement point for determination of background correction (K1A)
- At least 1 set of Leq, 10s/1min should be obtained at each measurement point
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Details calculation of the SWL should refer to the latest edition of ISO3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Method 3 – Near Field Sound Power Testing Method for Plant



- Based on ISO 3746
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalised (See figure on the left for example).
- Extra localized microphone positions on the measurement surface in the region of high noise radiation would be considered following relevant procedures in ISO 3744
- If the difference between the BGL and measured noise level (MNL) is less than 3.0 dB, K1A should be capped to 3.0 dB
- The measurement distance would be reduced if necessary to obtain higher MNL for valid measurement results
- Detail calculation of the SWL should refer to the latest edition of ISO 3746.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) - K1A - K2A (sound absorption and reflection correction)

K1A refers to background noise correction factor
K2A refers to environmental correction for sound absorption and reflection

Appendix A2 – Calibration Certificates

Appendix A2a – Calibration Certificates (Noise Measurement for the Fixed Plants)

Certificate of Calibration
校正證書

Certificate No. : C152985
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC15-1132)   Date of Receipt / 收件日期 : 19 May 2015

Description / 儀器名稱	:	Sound Level Meter
Manufacturer / 製造商	:	Lutron
Model No. / 型號	:	SL-4022
Serial No. / 編號	:	I.328198
Supplied By / 委託者	:	The Jardine Engineering Corporation, Limited 5/F., Tower A, Manulife Financial Centre, 223-231 Wai Yip Street, Kwun Tong, Kowloon

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C   Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 30 May 2015

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory

Tested By 測試 : K C Lee, Project Engineer

Certified By 核證 : K M Wu, Engineer

Date of Issue 簽發日期 : 3 June 2015

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606   Fax/傳真: 2744 8986   E-mail/電郵: callab@suncreation.com   Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C152985
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

Equipment ID	Description	Certificate No.
CL281	Multifunction Acoustic Calibrator	DC130171

5. Test procedure : MA101N.
6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting			Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
60 - 100	A	F	94.00	1	93.9	± 1.1

6.1.2 Linearity

UUT Setting			Applied Value		UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
90 - 130	A	F	94.00	1	94.1 (Ref.)
			104.00		104.1
			114.00		114.2

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

6.2 Time Weighting

UUT Setting			Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
60 - 100	A	F	94.00	1	93.9	Ref.
		S			93.9	± 0.3

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Certificate of Calibration
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Certificate No. : C152985
證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting			Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
60 - 100	A	F	94.00	63 Hz	68.7	-26.2 ± 1.5
				125 Hz	78.4	-16.1 ± 1.5
				250 Hz	85.7	-8.6 ± 1.4
				500 Hz	90.9	-3.2 ± 1.4
				1 kHz	93.9	Ref.
				2 kHz	94.8	+1.2 ± 1.6
				4 kHz	93.9	+1.0 ± 1.6

6.3.2 C-Weighting

UUT Setting			Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
60 - 100	C	F	94.00	63 Hz	93.1	-0.8 ± 1.5
				125 Hz	93.8	-0.2 ± 1.5
				250 Hz	93.9	0.0 ± 1.4
				500 Hz	93.9	0.0 ± 1.4
				1 kHz	93.8	Ref.
				2 kHz	93.3	-0.2 ± 1.6
				4 kHz	92.0	-0.8 ± 1.6

Remarks : - Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB :	63 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
104 dB :	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB :	1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C173768
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-1522) Date of Receipt / 收件日期 : 30 June 2017

Description / 儀器名稱 : Sound Level Meter
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 2250
Serial No. / 編號 : 2704790
Supplied By / 委託者 : ANewR Consulting Limited
Unit 517, 5/F., Tower A, Regent Centre,
63 Wo Yi Hop Road, Kwai Chung, N.T. Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 11 July 2017

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By : K C Lee
測試 Engineer

Certified By : H C Chan
核證 Engineer

Date of Issue : 12 July 2017
簽發日期

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C173768
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration using laboratory acoustic calibrator was performed before the test 6.1.1.2 to 6.3.2.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C170048
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.1

6.1.1.2 After Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	± 1.1

6.1.2 Linearity

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.0 (Ref.)
		104.00		104.0
		114.00		114.0

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

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6.2 Time Weighting

UUT Setting		Applied Value		UUT Reading	IEC 61672 Class 1
Range (dB)	Main	Level (dB)	Freq. (kHz)	(dB)	Spec. (dB)
20 - 140	LAF (SPL)	94.00	1	94.0	Ref.
	LAS (SPL)			94.0	± 0.3

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting		Applied Value		UUT Reading	IEC 61672 Class 1 Spec.
Range (dB)	Main	Level (dB)	Freq.	(dB)	(dB)
20 - 140	LAF (SPL)	94.00	63 Hz	67.8	-26.2 ± 1.5
			125 Hz	77.8	-16.1 ± 1.5
			250 Hz	85.3	-8.6 ± 1.4
			500 Hz	90.7	-3.2 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	95.2	+1.2 ± 1.6
			4 kHz	95.0	+1.0 ± 1.6
			8 kHz	92.9	-1.1(+2.1 ; -3.1)
			12.5 kHz	89.3	-4.3(+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting		Applied Value		UUT Reading	IEC 61672 Class 1 Spec.
Range (dB)	Main	Level (dB)	Freq.	(dB)	(dB)
20 - 140	LCF (SPL)	94.00	63 Hz	93.2	-0.8 ± 1.5
			125 Hz	93.8	-0.2 ± 1.5
			250 Hz	94.0	0.0 ± 1.4
			500 Hz	94.0	0.0 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	93.8	-0.2 ± 1.6
			4 kHz	93.2	-0.8 ± 1.6
			8 kHz	91.0	-3.0 (+2.1 ; -3.1)
			12.5 kHz	87.4	-6.2 (+3.0 ; -6.0)

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Remarks : - UUT Microphone Model No. : 4189 & S/N : 2695392

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	:	63 Hz - 125 Hz	: ± 0.35 dB
		250 Hz - 500 Hz	: ± 0.30 dB
		1 kHz	: ± 0.20 dB
		2 kHz - 4 kHz	: ± 0.35 dB
		8 kHz	: ± 0.45 dB
		12.5 kHz	: ± 0.70 dB
104 dB	:	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	:	1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

Sun Creation Engineering Limited – Calibration & Testing Laboratory
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c/o 香港新界屯門興安里一號青山灣機樓四樓
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Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. **704083**

Customer : 宏業承造有限公司
Address : 沙田火炭坳背灣街61-63號盈力工業大廈203室
Order No. : Q71682
Date of receipt : 8-May-17

Item Tested

Description : Sound Level Meter
Manufacturer : CASELLA
Model : CEL-63X
I.D. : CBSM0103
Serial No. : 5044655

Test Conditions

Date of Test : 11-May-17
Ambient Temperature : (23 ± 3)°C
Supply Voltage : --
Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure : Z01, IEC 61672, IEC 61260.

Test Results

All results were within the IEC 61672 Type 1 or IEC 61260 Class 1 specification.
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C170120	SCL-HKSAR
S240	Sound Level Calibrator	701036	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Kin Wong

Approved by : Alan Chu

Date: 11-May-17

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

Hong Kong Calibration Ltd
香港校正有限公司

Calibration Certificate

Certificate No. 704083

Results :

1. **Self-generated noise:** 0.2 dBA (Mfr's Spec (Electrical) ≤ 17.5 dBA)

2. **Acoustical signal test**

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Octave Filter		
0-140	A	F	OFF	94.0	93.8
		S	OFF		93.8
	C	F	OFF		94.0
	Z	F	OFF		93.8
	A	F	1/1		93.8
	A	F	1/3		93.8
	A	F	OFF	114.0	113.8
		S	OFF		113.8
	C	F	OFF		113.8
	Z	F	OFF		113.8
	A	F	1/1		113.9
	A	F	1/3		113.8

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.3 dB

3 **Electrical signal tests of frequency weightings** (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.4	- 39.4 dB, ± 2 dB
63 Hz	-26.2	- 26.2 dB, ± 1.5 dB
125 Hz	-16.1	- 16.1 dB, ± 1.5 dB
250 Hz	-8.7	- 8.6 dB, ± 1 dB
500 Hz	-3.2	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.3	+ 1.2 dB, ± 1.6 dB
4 kHz	+0.9	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.4	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-9.5	- 6.6 dB, + 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

Calibration Certificate

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
A	94.0	93.8 (Ref.)	- -	± 0.4 dB
C	94.0	94.0	+0.2	
Z	94.0	93.8	0.0	

4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
Fast	94.0	93.8 (Ref.)	- -	± 0.3 dB
Slow	94.0	93.8	0.0	
Time-averaging	94.0	93.8	0.0	

Uncertainty : ± 0.1 dB

5. Filter Characteristics

5.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
125 Hz	-61.5	< - 61
250 Hz	-43.7	< - 42
500 Hz	-21.2	< - 17.5
707 Hz	-3.7	- 2 ~ - 5
1 kHz (Ref)	- -	--
1.414 kHz	-3.8	- 2 ~ - 5
2 kHz	-24.2	< - 17.5
4 kHz	-66.0	< - 42
8 kHz	-62.1	< - 61

Uncertainty : ± 0.25 dB

Calibration Certificate

5.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
326 Hz	-61.3	< - 61
530 Hz	-46.3	< - 42
772 Hz	-22.1	< - 17.5
891 Hz	-3.6	+ 0.3 ~ - 5.0
1 kHz (Ref)	- -	--
1.122 kHz	-3.6	+ 0.3 ~ - 5.0
1.296 kHz	-23.3	< - 17.5
1.887 kHz	-50.7	< - 42
3.070 kHz	-72.5	< - 61

Uncertainty : ± 0.25 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1029 hPa
4. Preamplifier model : CEL-495 , S/N : 002374.
5. Firmware Version: 129-08
6. Power Supply Check: OK
7. The UUT was adjusted with the laboratory's sound calibrator at the reference sound pressure level before the calibration.

----------- END -----------

北京航天计量测试技术研究所
Beijing Aerospace Institute for Metrology and Measurement Technology

中国航天

证书编号：NO.JZ3f2012-01-0122 第 1 页 共 12 页
CERTIFICATE No.: PAGE 1 OF 12 PAGES

校准证书

CERTIFICATE OF CALIBRATION

委托方 CLIENT

名称：南车青岛四方机车车辆股份有限公司
NAME:

地址：/
ADDRESS:

计量器具 MEASURING INSTRUMENTS

名称：数采 型号：SCM05 编号：53102514
NAME: TYPE: NO.:

制造者：LMS
MANUFACTURER:

校准人：
OPERATOR:

核验人：李蓉
INSPECTOR:

签发人：
APPROVED SIGNATORY:

发证机构（专用章）
ISSUED BY (STAMP)

接收日期： RECEIVED DATE	2012	年 YEAR	01	月 MONTH	04	日 DAY
校准日期： CAL. DATE	2012	年 YEAR	01	月 MONTH	05	日 DAY
建议下次校准日期： NEXT TIME TO CALIBRATION:	2013	年 YEAR	01	月 MONTH	05	日 DAY

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HT10211124905

北京航天计量测试技术研究所
Beijing Aerospace Institute for Metrology and Measurement Technology

证书编号：NO.JZ3f2012-01-0122
CERTIFICATE No.:

本实验室是法定计量检定机构（包括被授权的计量检定机构）
This body is an institute of legal verification (including authorization body)
授权单位：国防科学技术工业委员会
Authorization body: Committee of Science and Technology Industry of National Defence (CSTIND)
授权证书号：XK 国防-JLJG-1-003
Authorized certificate No.: XK 国防-JLJG-1-003
测量溯源性的说明：国家计量基准
A statement of Measurement traceability: National Metrology Standards

校准所使用的计量标准
STANDARD OF MEASUREMENT USED IN THE CALIBRATION

名 称：直流电压校准仪 5440A
NAME:
测量范围：DCV:0.1mV～1000V
MEASURING RANGE:
扩展（或合成标准）不确定度（或准确度）：电压：±0.01%
EXPANDED (OR COMBINE STANDARD) UNCERTAINTY(OR ACCURACY):
计量标准证书号：JD3f2011-6-0090
CERTIFICATE NO.:
有效期至：2012 年 05 月 03 日
VALID DATE TO: YEAR MONTH DAY

校准所依据的技术文件（编号、名称）
BASIS OF CALIBRATION (CODE、NAME)

JJG 1048-95 数据采集系统校准规范

校准的环境条件；限制使用条件和测量范围
ENVIROMENTAL CONDITION IN THE CALIBRATION,LIMITING CONDITION IN USE AND MEASURING RANGE

温度 Temperature: 24 ℃
湿度 Moisture: 19 %RH
限制使用条件和测量范围 Limiting condition in use and measuring range:

地址：北京丰台区东高地南大红门路一号
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证书编号：NO.JZ3f2012-01-0122
CERTIFICATE No.:

校准结果

RESULTS OF CALIBRATION

模拟量输入直流电压采集准确度

通道	量程/V	标准值/V	示值/V	通道	量程/V	标准值/V	示值/V
1	0.316	0.3	0.300	2	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.000		3.16	3	3.000
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.000		10	8	8.000
		5	5.000			5	5.000
		2	2.000			2	2.000
		0	0.000			0	0.000
3	0.316	0.3	0.300	4	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800

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		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.000		3.16	3	3.000
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.000		10	8	8.000
		5	5.000			5	5.000
		2	2.000			2	2.000
		0	0.000			0	0.000
5	0.316	0.3	0.300	6	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.001		3.16	3	3.001
		2	2.001			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.002		10	8	8.002
		5	5.001			5	5.001
		2	2.000			2	2.000
		0	0.000			0	0.000

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CERTIFICATE No.:

7	0.316	0.3	0.300	8	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.001		3.16	3	3.001
		2	2.001			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.003		10	8	8.002
		5	5.002			5	5.001
		2	2.001			2	2.000
		0	0.000			0	0.000
9	0.316	0.3	0.300	10	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.099
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.001		3.16	3	3.000
		2	2.000			2	2.000
		1	1.000			1	1.000

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Tel:86-10-68383637, 86-10-68756349
Fax:86-10-68383627

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		0	0.000			0	0.000
	10	8	8.002		10	8	8.001
		5	5.001			5	5.001
		2	2.001			2	2.000
		0	0.000			0	0.000
11	0.316	0.3	0.300	12	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.099
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.000		3.16	3	3.001
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.001		10	8	8.001
		5	5.000			5	5.000
		2	2.000			2	2.000
		0	0.000			0	0.000
13	0.316	0.3	0.300	14	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.099
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.499

地址：北京丰台区东高地南大红门路一号
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P.O.Box:9200-24,Beijing ,China. Zip:100076
Tel:86-10-68383637，86-10-68756349
Fax:86-10-68383627

HT10211124905

		0.3	0.300			0.3	0.299
		0	0.000			0	0.000
	3.16	3	3.000		3.16	3	3.000
		2	2.000			2	2.000
		1	1.000			1	0.999
		0	0.000			0	0.000
	10	8	8.001		10	8	8.000
		5	5.001			5	4.999
		2	2.000			2	1.999
		0	0.000			0	0.000
15	0.316	0.3	0.300	16	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.000		3.16	3	3.001
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.001		10	8	8.002
		5	5.000			5	5.001
		2	2.000			2	2.001
		0	0.000			0	0.000
17	0.316	0.3	0.300	18	0.316	0.3	0.300

		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.000		3.16	3	3.001
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.002		10	8	8.002
		5	5.001			5	5.000
		2	2.001			2	2.000
		0	0.000			0	0.000
19	0.316	0.3	0.300	20	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.001		3.16	3	3.000
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000

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HT10211124905

北京航天计量测试技术研究所
Beijing Aerospace Institute for Metrology and Measurement Technology

	10	8	8.002		10	8	8.003
		5	5.001			5	5.002
		2	2.000			2	2.001
		0	0.000			0	0.000
21	0.316	0.3	0.300	22	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.001		3.16	3	3.001
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.001		10	8	8.001
		5	5.001			5	5.001
		2	2.001			2	2.000
		0	0.000			0	0.000
23	0.316	0.3	0.300	24	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.099
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300

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		0	0.000			0	0.000
	3.16	3	3.000		3.16	3	3.000
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.001		10	8	8.001
		5	5.000			5	5.000
		2	2.000			2	2.000
		0	0.000			0	0.001
25	0.316	0.3	0.300	26	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.000		3.16	3	3.000
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.001		10	8	8.001
		5	5.001			5	5.001
		2	2.000			2	2.000
		0	0.000			0	0.000
27	0.316	0.3	0.300	28	0.316	0.3	0.300
		0.2	0.200			0.2	0.200

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HT10211124905

		0.1	0.100			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.001		3.16	3	3.000
		2	2.000			2	1.999
		1	1.000			1	0.999
		0	0.000			0	0.000
	10	8	8.001		10	8	8.000
		5	5.001			5	5.000
		2	2.000			2	2.000
		0	0.000			0	0.000
29	0.316	0.3	0.300	30	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.099			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.001		3.16	3	3.000
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.001		10	8	8.001

		5	5.001			5	5.001
		2	2.001			2	2.000
		0	0.000			0	0.000
31	0.316	0.3	0.300	32	0.316	0.3	0.300
		0.2	0.200			0.2	0.200
		0.1	0.099			0.1	0.100
		0	0.000			0	0.000
	1	0.8	0.800		1	0.8	0.800
		0.5	0.500			0.5	0.500
		0.3	0.300			0.3	0.300
		0	0.000			0	0.000
	3.16	3	3.000		3.16	3	3.000
		2	2.000			2	2.000
		1	1.000			1	1.000
		0	0.000			0	0.000
	10	8	8.001		10	8	8.001
		5	5.000			5	5.000
		2	2.000			2	2.000
		0	0.000			0	0.000

以下空白

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Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. **704084** Page 1 of 2 Pages

Customer : 宏業承造有限公司
Address : 沙田火炭坳背灣街61-63號盈力工業大廈203室
Order No. : Q71682 **Date of receipt :** 8-May-17

Item Tested

Description : Sound Level Calibrator
Manufacturer : Casella **I.D.** : CBSM0103
Model : CEL-120/1 **Serial No.** : 5060836

Test Conditions

Date of Test : 11-May-17 **Supply Voltage** : --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure: IEC 60942, F21, Z02.

Test Results

All results were within the IEC 60942 Class 1 specification.
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S014	Spectrum Analyzer	605758	NIM-PRC & SCL-HKSAR
S240	Sound Level Calibrator	701036	NIM-PRC & SCL-HKSAR
S041	Universal Counter	607883	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : ____________ Kin Wong **Approved by :** ____________ Alan Chu

Date: 11-May-17

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

E

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 704084

Results :

1. Generated Sound Pressure Level

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94	94.2	± 0.4 dB
114	114.2	

Uncertainty : ± 0.2 dB

2. Short-term Level Fluctuation : 0.0 dB
IEC 60942 Class 1 Spec. : ± 0.1 dB
Uncertainty : ± 0.01 dB

3. Frequency

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	1.000	± 1 %

Uncertainty : ± 3.6×10^{-6}

4. Total Distortion : < 0.2 %
IEC 60942 Class 1 Spec. : < 3 %
Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1029 hPa.

---------- END ----------

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港黃竹坑道37號利達中心12樓
12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

ilac-MRA HKAS HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 18CA0524 04-04

Item tested

Description: Acoustical Calibrator (Class 1)
Manufacturer: B & K
Type/Model No.: 4231
Serial/Equipment No.: 1858983
Adaptors used: -

Item submitted by

Curstomer: MTR Corporation Ltd.
Address of Customer: -
Request No.: -
Date of receipt: 24-May-2018

Date of test: 25-May-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	20-Apr-2019	SCL
Preamplifier	B&K 2673	2743150	27-Apr-2019	CEPREI
Measuring amplifier	B&K 2610	2346941	08-May-2019	CEPREI
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Digital multi-meter	34401A	US36087050	23-Apr-2019	CEPREI
Audio analyzer	8903B	GB41300350	23-Apr-2019	CEPREI
Universal counter	53132A	MY40003662	24-Apr-2019	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1005 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Jun Qi **Date:** 28-May-2018 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
香港黃竹坑道37號利達中心12樓
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E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

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CERTIFICATE OF CALIBRATION

(Continuation Page)

1, **Measured Sound Pressure Level**

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	93.86	0.10

2, **Sound Pressure Level Stability - Short Term Fluctuations**

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.010 dB**

Estimated expanded uncertainty 0.005 dB

3, **Actual Output Frequency**

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency =999.84 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, **Total Noise and Distortion**

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.5 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip
Date: 25-May-2018

Checked by: Shek Kwong Tat
Date: 28-May-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Appendix A2b – Calibration Certificates (Noise Measurement to Confirm Any Characteristics of Tonality, Impulsiveness and Intermittency at NSRs)

綜合試驗有限公司
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12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

ilac-MRA HKAS HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0902 02-02

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250	4950	ZC0032
Serial/Equipment No.:	2718890	2827088	24967
Adaptors used:	-	-	-

Item submitted by

Customer Name: Anewr Consulting Limited
Address of Customer: Unit 517, 5/F Tower A, Regent Centre, 63 Wo Yip Hop Road, Kwai Chung
Request No.: -
Date of receipt: 02-Sep-2017

Date of test: 09-Sep-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	08-Sep-2018	CIGISMEC
Signal generator	DS 360	33873	25-Apr-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1010 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of $\pm$20%.
3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: ~~Huang Jian Min~~/Feng Jun Qi **Date:** 09-Sep-2017 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

綜合試驗有限公司
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Tel: (852) 2873 6860
Fax: (852) 2555 7533

HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA0902 02-02

1, **Electrical Tests**

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, **Acoustic tests**

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, **Response to associated sound calibrator**

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Lai Sheng Jie
Date: 09-Sep-2017

Checked by: Fung Chi Yip
Date: 09-Sep-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Form No.CARP152-2/Issue 1/Rev.C/01/02/2007

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SMECLab

Sound level meter type:	2250	Serial No.	2718890	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2827088		
Preamp type:	ZC0032	Serial No.	24967	Report:	17CA0902 02-02

SELF GENERATED NOISE TEST

The noise test is performed in the most sensitive range of the SLM with the microphone replaced by an equivalent impedance.

Noise level in A weighting	12.2	dB
Noise level in C weighting	12.8	dB
Noise level in Lin	17.9	dB

LINEARITY TEST

The linearity is tested relative to the reference sound pressure level using a continuous sinusoidal signal of frequency 4 kHz. The measurement is made on the reference range for indications at 5 dB intervals starting from the 94 dB reference sound pressure level. And until within 5 dB of the upper and lower limits of the reference range, the measurements shall be made at 1 dB intervals.(SLM set to LEQ/SPL)

Reference/Expected level	Actual level		Tolerance	Deviation	
	non-integrated	integrated		non-integrated	integrated
dB	dB	dB	+/- dB	dB	dB
94.0	94.0	94.0	0.7	0.0	0.0
99.0	99.0	99.0	0.7	0.0	0.0
104.0	104.0	104.0	0.7	0.0	0.0
109.0	109.0	109.0	0.7	0.0	0.0
114.0	114.0	114.0	0.7	0.0	0.0
119.0	119.0	119.0	0.7	0.0	0.0
124.0	124.0	124.0	0.7	0.0	0.0
129.0	129.0	129.0	0.7	0.0	0.0
134.0	134.0	134.0	0.7	0.0	0.0
135.0	135.0	135.0	0.7	0.0	0.0
136.0	136.0	136.0	0.7	0.0	0.0
137.0	137.0	137.0	0.7	0.0	0.0
138.0	138.0	138.0	0.7	0.0	0.0
139.0	139.0	139.0	0.7	0.0	0.0
140.0	140.0	140.0	0.7	0.0	0.0
89.0	89.0	89.0	0.7	0.0	0.0
84.0	84.0	84.0	0.7	0.0	0.0
79.0	79.0	79.0	0.7	0.0	0.0
74.0	74.0	74.0	0.7	0.0	0.0
69.0	69.0	69.0	0.7	0.0	0.0
64.0	64.0	64.0	0.7	0.0	0.0
59.0	59.0	59.0	0.7	0.0	0.0
54.0	54.0	54.0	0.7	0.0	0.0
49.0	49.0	49.0	0.7	0.0	0.0
44.0	44.0	44.0	0.7	0.0	0.0
39.0	39.0	39.0	0.7	0.0	0.0

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SMECLab

Sound level meter type:	2250	Serial No.	2718890	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2827088		
Preamp type:	ZC0032	Serial No.	24967	Report:	17CA0902 02-02

34.0	34.1	34.1	0.7	0.1	0.1
33.0	33.1	33.1	0.7	0.1	0.1
32.0	32.1	32.0	0.7	0.1	0.0
31.0	31.0	31.0	0.7	0.0	0.0
30.0	30.1	30.1	0.7	0.1	0.1

Measurements for an indication of the reference SPL on all other ranges which include it

Other ranges	Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
20-140	94.0	94.0	0.7	0.0

Measurements on all level ranges for indications 2 dB below the upper limit and 2 dB above the lower limit

Ranges	Reference/Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
20-140	30.0	30.1	0.7	0.1
	138.0	138.0	0.7	0.0

FREQUENCY WEIGHTING TEST

The frequency response of the weighting netwoks are tested at octave intervals over the frequency ranges 31.5 Hz to 12500 Hz. The signal level at 1000 Hz is set to give an indication of the reference SPL.

Frequency weighting A:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	54.6	0.0	54.6	1.5	1.5	0.0
63.1	94.0	67.8	0.0	67.8	1.5	1.5	0.0
125.9	94.0	77.9	0.0	77.9	1.0	1.0	0.0
251.2	94.0	85.4	0.0	85.3	1.0	1.0	-0.1
501.2	94.0	90.8	0.0	90.7	1.0	1.0	-0.1
1995.0	94.0	95.2	0.0	95.2	1.0	1.0	0.0
3981.0	94.0	95.0	-0.1	94.9	1.0	1.0	0.0
7943.0	94.0	92.9	-0.3	92.6	1.5	3.0	0.0
12590.0	94.0	89.7	-0.3	89.4	3.0	6.0	0.0

Frequency weighting C:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	91.0	0.0	90.9	1.5	1.5	-0.1
63.1	94.0	93.2	0.0	93.2	1.5	1.5	0.0
125.9	94.0	93.8	0.0	93.8	1.0	1.0	0.0

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SMECLab

Sound level meter type:	2250	Serial No.	2718890	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2827088		
Preamp type:	ZC0032	Serial No.	24967	Report:	17CA0902 02-02

251.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
1995.0	94.0	93.8	0.0	93.8	1.0	1.0	0.0
3981.0	94.0	93.2	-0.1	93.1	1.0	1.0	0.0
7943.0	94.0	91.0	-0.3	90.7	1.5	3.0	0.0
12590.0	94.0	87.8	-0.3	87.4	3.0	6.0	-0.1

Frequency weighting Lin:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	94.0	0.0	94.0	1.5	1.5	0.0
63.1	94.0	94.0	0.0	94.0	1.5	1.5	0.0
125.9	94.0	94.0	0.0	94.0	1.0	1.0	0.0
251.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
1995.0	94.0	94.0	0.0	94.0	1.0	1.0	0.0
3981.0	94.0	94.0	-0.1	93.9	1.0	1.0	0.0
7943.0	94.0	94.0	-0.3	93.7	1.5	3.0	0.0
12590.0	94.0	94.0	-0.3	93.7	3.0	6.0	0.0

*Deviation = Actual level - (Expected level + Correction of electrical response)
The correction of electrical response is specified in the Table A.2 of technical documentation of BE 1712-21. The maximum expanded uncertainty of correction of electrical response is 0.29 dB.

TIME WEIGHTING FAST TEST

Time weighting F is tested on the reference range with a single sinusoidal burst of duration 200 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
dB	dB	dB	+	-	dB
116.0	115.0	115.0	1.0	1.0	0.0

TIME WEIGHTING SLOW TEST

Time weighting S is tested on the reference range with a single sinusoidal burst of duration 500 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
dB	dB	dB	+	-	dB
116.0	111.9	111.9	1.0	1.0	0.0

PEAK RESPONSE TEST

The onset time of the peak detector is tested on the reference range by comparing the response to a 100 us rectangular test pulse with the response to a 10 ms reference pulse of the same amplitude. The amplitude of the

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SMECLab

Sound level meter type:	2250	Serial No.	2718890	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2827088		
Preamp type:	ZC0032	Serial No.	24967	Report:	17CA0902 02-02

10 ms reference pulse is such as to produce an indication 1 dB below the upper limit of the primary indicator range.

Positive polarities: (Weighting Z, set the generator signal to single, LZPeak)

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.2	2.0	0.2

Negative polarities:

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.4	2.0	0.4

RMS ACCURACY TEST

The RMS detector accuracy is tested on the reference range for a crest factor of 3.

Test frequency: 2000 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz. (Set to INT)

	Ref. Level	Expected level	Tone burst signal	Tolerance	Deviation
Time wighting	dB	dB	indication(dB)	+/- dB	dB
Slow	118.0+6.6	118.0	118.0	0.5	0.0

TIME WEIGHTING IMPULSE TEST

Time weighting I is tested on the reference range (Set the SLM to LAImax)
Test frequency: 2000 Hz
Amplitude: The upper limit of the primary indicator range.

Single sinusoidal burst of duration 5 ms:

Ref. Level	Single burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	111.2	111.1	2.0	-0.1

Repeated at 100 Hz

Ref. Level	Repeated burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	117.3	117.2	1.0	-0.1

TIME AVERAGING TEST

This test compares the SLM reading for continuous sine signals with readings obtained from a sine tone burst sequence having the same RMS level. The test level is 30 dB below the upper limit of the linearity range and repeated for Type 1 SLM with 40 dB below the upper limit of the linearity.

Frequency of tone burst: 4000 Hz
Duration of tone burst: 1 ms

Repetition Time	Level of tone burst	Expected Leq	Actual Leq	Tolerance	Deviation	Remarks
msec	dB	dB	dB	+/- dB	dB	
1000	110.0	110.0	109.9	1.0	-0.1	60s integ.
10000	100.0	100.0	99.9	1.0	-0.1	6min. integ.

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SMECLab

Sound level meter type:	2250	Serial No.	2718890	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2827088		
Preamp type:	ZC0032	Serial No.	24967	Report:	17CA0902 02-02

PULSE RANGE AND SOUND EXPOSURE LEVEL TEST

The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference rar

Test frequency: 4000 Hz

Integration time: 10 sec

The integrating sound level meter set to Leq:

Duration msec	Rms level of tone burst (dB)	Expected dB	Actual dB	Tolerance +/- dB	Deviation dB
10	88.0	58.0	58.0	1.7	0.0

The integrating sound level meter set to SEL:

Duration msec	Rms level of tone burst (dB)	Expected dB	Actual dB	Tolerance +/- dB	Deviation dB
10.0	88.0	68.0	68.0	1.7	0.0

OVERLOAD INDICATION TEST

For SLM capable of operating in a non-integrating mode.

Test frequency: 2000 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz.

Level at overload (dB)	Level reduced by 1 dB	Further reduced 3 dB	Difference dB	Tolerance dB	Deviation dB
134.3	133.3	130.3	3.0	1.0	0.0

For integrating SLM, with the instrument indicating Leq.

For integrating SLM, with the instrument indicating Leq and set to the reference range. The test signal as follow
The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference rar

Test frequency: 4000 Hz
Integration time: 10 sec
Single burst duration: 1 msec

Rms level at overload (dB)	Level reduced by 1 dB	Expected level dB	Actual level dB	Tolerance dB	Deviation dB
141.3	140.3	100.3	100.2	2.2	-0.1

ACOUSTIC TEST

The acoustic test of the complete SLM is tested at the frequency 125 Hz and 8000 Hz using a B&K type 4226 Multifunction Acoustic Calibrator. The test is performed in A weighting.

Frequency Hz	Expected level dB	Actual level Measured (dB)	Tolerance (dB) +	Tolerance (dB) -	Deviation dB
1000	94.0	94.0	0.0	0.0	0.0
125	77.9	78.3	1.0	1.0	0.4
8000	92.9	91.9	1.5	3.0	-1.0

----------END---------

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HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.:	17CA0615 01-01	Page	1	of	2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250-L	4950	ZC0032
Serial/Equipment No.:	2718884	2698644	13482
Adaptors used:	-	-	-

Item submitted by

Customer Name:	Anewr Consulting Limited
Address of Customer:	Unit 517, 5/F Tower A, Regent Centre, 63 Wo Yip Hop Road, Kwai Chung
Request No.:	-
Date of receipt:	15-Jun-2017

Date of test: 26-Jun-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	17-Jun-2018	CIGISMEC
Signal generator	DS 360	33873	25-Apr-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI

Ambient conditions

Temperature:	23 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1010 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang ~~Jian Min~~/Feng Jun Qi **Date:** 27-Jun-2017 **Company Chop:**

SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA0615 01-01

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Lai Sheng Jie
Date: 26-Jun-2017

Checked by: Fung Chi Yip
Date: 27-Jun-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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SMECLab

Test Data for Sound Level Meter

Sound level meter type:	2250-L	Serial No.	2718884	Date	26-Jun-2017
Microphone type:	4950	Serial No.	2698644		
Preamp type:	ZC0032	Serial No.	13482	Report:	17CA0615 01-01

SELF GENERATED NOISE TEST

The noise test is performed in the most sensitive range of the SLM with the microphone replaced by an equivalent impedance.

Noise level in A weighting	14.2	dB
Noise level in C weighting	16.2	dB
Noise level in Lin	23.3	dB

LINEARITY TEST

The linearity is tested relative to the reference sound pressure level using a continuous sinusoidal signal of frequency 4 kHz. The measurement is made on the reference range for indications at 5 dB intervals starting from the 94 dB reference sound pressure level. And until within 5 dB of the upper and lower limits of the reference range, the measurements shall be made at 1 dB intervals.(SLM set to LEQ/SPL)

Reference/Expected level	Actual level		Tolerance	Deviation	
	non-integrated	integrated		non-integrated	integrated
dB	dB	dB	+/- dB	dB	dB
94.0	94.0	94.0	0.7	0.0	0.0
99.0	99.0	99.0	0.7	0.0	0.0
104.0	104.0	104.0	0.7	0.0	0.0
109.0	109.0	109.0	0.7	0.0	0.0
114.0	114.0	114.0	0.7	0.0	0.0
119.0	119.0	119.0	0.7	0.0	0.0
124.0	124.0	124.0	0.7	0.0	0.0
129.0	129.0	129.0	0.7	0.0	0.0
134.0	134.0	134.0	0.7	0.0	0.0
135.0	135.0	135.0	0.7	0.0	0.0
136.0	136.0	136.0	0.7	0.0	0.0
137.0	137.0	137.0	0.7	0.0	0.0
138.0	138.0	138.0	0.7	0.0	0.0
139.0	139.0	139.0	0.7	0.0	0.0
140.0	140.0	140.0	0.7	0.0	0.0
89.0	89.0	89.0	0.7	0.0	0.0
84.0	84.0	84.0	0.7	0.0	0.0
79.0	79.0	79.0	0.7	0.0	0.0
74.0	74.0	74.0	0.7	0.0	0.0
69.0	69.0	69.0	0.7	0.0	0.0
64.0	64.0	64.0	0.7	0.0	0.0
59.0	59.0	59.0	0.7	0.0	0.0
54.0	54.0	54.0	0.7	0.0	0.0
49.0	49.0	49.0	0.7	0.0	0.0
44.0	44.0	44.0	0.7	0.0	0.0
39.0	39.0	39.0	0.7	0.0	0.0

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SMECLab

Sound level meter type:	2250-L	Serial No.	2718884	Date	26-Jun-2017
Microphone type:	4950	Serial No.	2698644		
Preamp type:	ZC0032	Serial No.	13482	Report:	17CA0615 01-01

34.0	34.0	34.0	0.7	0.0	0.0
33.0	33.0	33.0	0.7	0.0	0.0
32.0	32.1	32.1	0.7	0.1	0.1
31.0	31.1	31.0	0.7	0.1	0.0
30.0	30.1	30.1	0.7	0.1	0.1

Measurements for an indication of the reference SPL on all other ranges which include it

Other ranges	Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
20-140	94.0	94.0	0.7	0.0

Measurements on all level ranges for indications 2 dB below the upper limit and 2 dB above the lower limit

Ranges	Reference/Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
20-140	30.0	30.1	0.7	0.1
	138.0	138.0	0.7	0.0

FREQUENCY WEIGHTING TEST

The frequency response of the weighting netwoks are tested at octave intervals over the frequency ranges 31.5 Hz to 12500 Hz. The signal level at 1000 Hz is set to give an indication of the reference SPL.

Frequency weighting A:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	54.6	N/A	54.6	1.5	1.5	0.0
63.1	94.0	67.8	0.0	67.8	1.5	1.5	0.0
125.9	94.0	77.9	0.0	77.9	1.0	1.0	0.0
251.2	94.0	85.4	0.0	85.3	1.0	1.0	-0.1
501.2	94.0	90.8	0.0	90.7	1.0	1.0	-0.1
1995.0	94.0	95.2	0.0	95.2	1.0	1.0	0.0
3981.0	94.0	95.0	-0.1	94.9	1.0	1.0	0.0
7943.0	94.0	92.9	-0.3	92.6	1.5	3.0	0.0
12590.0	94.0	89.7	-0.3	89.4	3.0	6.0	0.0

Frequency weighting C:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	91.0	N/A	91.1	1.5	1.5	0.1
63.1	94.0	93.2	0.0	93.2	1.5	1.5	0.0
125.9	94.0	93.8	0.0	93.8	1.0	1.0	0.0

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12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

SMECLab

Sound level meter type:		2250-L	Serial No.	2718884	Date 26-Jun-2017
Microphone	type:	4950	Serial No.	2698644	
Preamp	type:	ZC0032	Serial No.	13482	Report: 17CA0615 01-01

251.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
1995.0	94.0	93.8	0.0	93.8	1.0	1.0	0.0
3981.0	94.0	93.2	-0.1	93.1	1.0	1.0	0.0
7943.0	94.0	91.0	-0.3	90.7	1.5	3.0	0.0
12590.0	94.0	87.8	-0.3	87.4	3.0	6.0	-0.1

Frequency weighting Lin:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	94.0	N/A	94.1	1.5	1.5	0.1
63.1	94.0	94.0	0.0	94.0	1.5	1.5	0.0
125.9	94.0	94.0	0.0	94.0	1.0	1.0	0.0
251.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
1995.0	94.0	94.0	0.0	94.0	1.0	1.0	0.0
3981.0	94.0	94.0	-0.1	93.9	1.0	1.0	0.0
7943.0	94.0	94.0	-0.3	93.7	1.5	3.0	0.0
12590.0	94.0	94.0	-0.3	93.7	3.0	6.0	0.0

*Deviation = Actual level - (Expected level + Correction of electrical response)
The correction of electrical response is specified in the Table A.2 of technical documentation of BE 1853-11. The maximum expanded uncertainty of correction of electrical response is 0.3 dB.

TIME WEIGHTING FAST TEST

Time weighting F is tested on the reference range with a single sinusoidal burst of duration 200 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
dB	dB	dB	+	-	dB
116.0	115.0	115.0	1.0	1.0	0.0

TIME WEIGHTING SLOW TEST

Time weighting S is tested on the reference range with a single sinusoidal burst of duration 500 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
dB	dB	dB	+	-	dB
116.0	111.9	111.9	1.0	1.0	0.0

PEAK RESPONSE TEST

The onset time of the peak detector is tested on the reference range by comparing the response to a 100 us rectangular test pulse with the response to a 10 ms reference pulse of the same amplitude. The amplitude of the

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SMECLab

Sound level meter type:	2250-L	Serial No.	2718884	Date	26-Jun-2017
Microphone type:	4950	Serial No.	2698644		
Preamp type:	ZC0032	Serial No.	13482	Report:	17CA0615 01-01

10 ms reference pulse is such as to produce an indication 1 dB below the upper limit of the primary indicator range.

Positive polarities: (Weighting L, set the generator signal to single, Lcpeak)

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.0	2.0	0.0

Negative polarities:

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.2	2.0	0.2

RMS ACCURACY TEST

The RMS detector accuracy is tested on the reference range for a crest factor of 3.

Test frequency:	2000 Hz
Amplitude:	2 dB below the upper limit of the primary indicator range.
Burst repetition frequency:	40 Hz
Tone burst signal:	11 cycles of a sine wave of frequency 2000 Hz. (Set to INT)

	Ref. Level	Expected level	Tone burst signal	Tolerance	Deviation
Time wighting	dB	dB	indication(dB)	+/- dB	dB
Slow	118.0+6.6	118.0	118.0	0.5	0.0

TIME WEIGHTING IMPULSE TEST

Time weighting I is tested on the reference range (Set the SLM to LAImax)

Test frequency: 2000 Hz

Amplitude: The upper limit of the primary indicator range.

Single sinusoidal burst of duration 5 ms:

Ref. Level	Single burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	111.2	111.1	2.0	-0.1

Repeated at 100 Hz

Ref. Level	Repeated burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	117.3	117.2	1.0	-0.1

TIME AVERAGING TEST

This test compares the SLM reading for continuous sine signals with readings obtained from a sine tone burst sequence having the same RMS level. The test level is 30 dB below the upper limit of the linearity range and repeated for Type 1 SLM with 40 dB below the upper limit of the linearity.

Frequency of tone burst: 4000 Hz

Duration of tone burst: 1 ms

Repetition Time	Level of tone burst	Expected Leq	Actual Leq	Tolerance	Deviation	Remarks
msec	dB	dB	dB	+/- dB	dB	
1000	110.0	110.0	109.9	1.0	-0.1	60s integ.
10000	100.0	100.0	99.9	1.0	-0.1	6min. integ.

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Fax: (852) 2555 7533

SMECLab

Sound level meter type:	2250-L	Serial No.	2718884	Date	26-Jun-2017
Microphone type:	4950	Serial No.	2698644		
Preamp type:	ZC0032	Serial No.	13482	Report:	17CA0615 01-01

PULSE RANGE AND SOUND EXPOSURE LEVEL TEST

The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference rar

Test frequency: 4000 Hz

Integration time: 10 sec

The integrating sound level meter set to Leq:

Duration msec	Rms level of tone burst (dB)	Expected dB	Actual dB	Tolerance +/- dB	Deviation dB
10	88.0	58.0	57.9	1.7	-0.1

The integrating sound level meter set to SEL:

Duration msec	Rms level of tone burst (dB)	Expected dB	Actual dB	Tolerance +/- dB	Deviation dB
10.0	88.0	68.0	67.9	1.7	-0.1

OVERLOAD INDICATION TEST

For SLM capable of operating in a non-integrating mode.

Test frequency: 2000 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz.

Level at overload (dB)	Level reduced by 1 dB	Further reduced 3 dB	Difference dB	Tolerance dB	Deviation dB
136.3	135.3	132.3	3.0	1.0	0.0

For integrating SLM, with the instrument indicating Leq.

For integrating SLM, with the instrument indicating Leq and set to the reference range. The test signal as follow
The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference rar

Test frequency: 4000 Hz
Integration time: 10 sec
Single burst duration: 1 msec

Rms level at overload (dB)	Level reduced by 1 dB	Expected level dB	Actual level dB	Tolerance dB	Deviation dB
143.3	142.3	102.3	102.2	2.2	-0.1

ACOUSTIC TEST

The acoustic test of the complete SLM is tested at the frequency 125 Hz and 8000 Hz using a B&K type 4226 Multifunction Acoustic Calibrator. The test is performed in A weighting.

Frequency Hz	Expected level dB	Actual level Measured (dB)	Tolerance (dB) +	Tolerance (dB) -	Deviation dB
1000	94.0	94.0	0.0	0.0	0.0
125	77.9	78.0	1.0	1.0	0.1
8000	92.9	93.0	1.5	3.0	0.1

----------END---------

Calibration Certificate

Certificate No. **804865** Page 1 of 4 Pages

Customer : ATAL Engineering Ltd
Address : 13/F., Island Place Tower, 510 King's Road, North Point, H. K.
Order No. : Q81893 **Date of receipt :** 16-May-18

Item Tested

Description : Sound Level Meter
Manufacturer : CASELLA **I.D.** : --
Model : CEL-63X **Serial No.** : 5044655

Test Conditions

Date of Test : 18-May-18 **Supply Voltage** : --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.
Ref. Document/Procedure : Z01, IEC 61672, IEC 61260.

Test Results

All results were within the IEC 61672 Type 1 or IEC 61260 Class 1 specification. (where applicable)
The results are shown in the attached page(s).

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C170120	SCL-HKSAR
S240	Sound Level Calibrator	803357	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : Elva Chong

Approved by : Kin Wong

Date: 18-May-18

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street,Kwai Chung, NT,Hong Kong.
Tel: 2425 8801 Fax: 2425 8646

Calibration Certificate

Results :

1. **Self-generated noise:** 23.2 dBA

2. **Acoustical signal test**

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Octave Filter		
0-140	A	F	OFF	94.0	93.3
		S	OFF		93.3
	C	F	OFF		93.3
	Z	F	OFF		93.3
	A	F	1/1		93.3
	A	F	1/3		93.3
	A	F	OFF	114.0	113.4
		S	OFF		113.4
	C	F	OFF		113.4
	Z	F	OFF		113.4
	A	F	1/1		113.4
	A	F	1/3		113.4

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.3 dB

3 **Electrical signal tests of frequency weightings** (A weighting)

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.5	- 39.4 dB, ± 2 dB
63 Hz	-26.3	- 26.2 dB, ± 1.5 dB
125 Hz	-16.3	- 16.1 dB, ± 1.5 dB
250 Hz	-8.8	- 8.6 dB, ± 1 dB
500 Hz	-3.3	- 3.2 dB, ± 1.4 dB
1 kHz	0.0 (Ref)	0 dB, ± 1.1 dB
2 kHz	+1.2	+ 1.2 dB, ± 1.6 dB
4 kHz	+0.8	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.5	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-9.5	- 6.6 dB, + 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

4. Frequency & Time weightings at 1 kHz

4.1 Frequency Weighting (Fast)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
A	94.0	94.0 (Ref.)	- -	± 0.4 dB
C	94.0	94.0	0.0	
Z	94.0	94.0	0.0	

4.2 Time Weighting (A-weighted)

UUT Setting	Applied Value (dB)	UUT Reading (dB)	Difference (dB)	IEC 61672 Type 1 Spec.
Fast	94.0	94.0 (Ref.)	- -	± 0.3 dB
Slow	94.0	94.0	0.0	
Time-averaging	94.0	94.0	0.0	

Uncertainty : ± 0.1 dB

5. Filter Characteristics

5.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
125 Hz	-61.4	< - 61
250 Hz	-43.7	< - 42
500 Hz	-21.2	< - 17.5
707 Hz	-3.7	- 2 ~ - 5
1 kHz (Ref)	- -	--
1.414 kHz	-3.8	- 2 ~ - 5
2 kHz	-24.2	< - 17.5
4 kHz	-65.4	< - 42
8 kHz	-61.9	< - 61

Uncertainty : ± 0.25 dB

Calibration Certificate

5.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	IEC 61260 Class 1 (dB)
326 Hz	-61.3	< - 61
530 Hz	-46.3	< - 42
772 Hz	-22.1	< - 17.5
891 Hz	-3.6	+ 0.3 ~ - 5.0
1 kHz (Ref)	- -	--
1.122 kHz	-3.7	+ 0.3 ~ - 5.0
1.296 kHz	-23.3	< - 17.5
1.887 kHz	-50.7	< - 42
3.070 kHz	-72.4	< - 61

Uncertainty : ± 0.25 dB

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 006 hPa
4. Preamplifier model : CEL-495 , S/N : 002374
5. Firmware Version: 129-08
6. Power Supply Check: OK
7. The UUT was adjusted with the supplied sound calibrator at the reference sound pressure level before the calibration.

---------- END ----------

Certificate of Calibration
校正證書

Certificate No. : C173769
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號： IC17-1522) Date of Receipt / 收件日期： 30 June 2017

Description / 儀器名稱	:	Sound Level Meter
Manufacturer / 製造商	:	Brüel & Kjær
Model No. / 型號	:	2250-L
Serial No. / 編號	:	2701830
Supplied By / 委託者	:	ANewR Consulting Limited Unit 517, 5/F., Tower A, Regent Centre, 63 Wo Yi Hop Road, Kwai Chung, N.T. Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 11 July 2017

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By : K C Lee
測試 Engineer

Certified By : H C Chan
核證 Engineer

Date of Issue : 12 July 2017
簽發日期

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 – 校正及檢測實驗所
c/o 香港新界屯門興安里一號青山灣機樓四樓
Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
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Certificate No. : C173769
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration using laboratory acoustic calibrator was performed before the test 6.1.1.2 to 6.3.2.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C170048
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.1

6.1.1.2 After Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	± 1.1

6.1.2 Linearity

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.0 (Ref.)
		104.00		104.0
		114.00		114.0

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

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Certificate of Calibration
校正證書

Certificate No. : C173769
證書編號

6.2 Time Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	Ref.
	LAS (SPL)			94.0	± 0.3

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LAF (SPL)	94.00	63 Hz	67.8	-26.2 ± 1.5
			125 Hz	77.8	-16.1 ± 1.5
			250 Hz	85.3	-8.6 ± 1.4
			500 Hz	90.8	-3.2 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	95.2	+1.2 ± 1.6
			4 kHz	94.9	+1.0 ± 1.6
			8 kHz	92.5	-1.1(+2.1 ; -3.1)
			12.5 kHz	89.5	-4.3(+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LCF (SPL)	94.00	63 Hz	93.2	-0.8 ± 1.5
			125 Hz	93.8	-0.2 ± 1.5
			250 Hz	94.0	0.0 ± 1.4
			500 Hz	94.0	0.0 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	93.8	-0.2 ± 1.6
			4 kHz	93.1	-0.8 ± 1.6
			8 kHz	90.7	-3.0 (+2.1 ; -3.1)
			12.5 kHz	87.5	-6.2 (+3.0 ; -6.0)

Sun Creation Engineering Limited – Calibration & Testing Laboratory
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Certificate of Calibration
校正證書

Certificate No. : C173769
證書編號

Remarks : - UUT Microphone Model No. : 4950 & S/N : 2678779

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 Hz - 125 Hz	:	± 0.35 dB
	250 Hz - 500 Hz	:	± 0.30 dB
	1 kHz	:	± 0.20 dB
	2 kHz - 4 kHz	:	± 0.35 dB
	8 kHz	:	± 0.45 dB
	12.5 kHz	:	± 0.70 dB
104 dB	1 kHz	:	± 0.10 dB (Ref. 94 dB)
114 dB	1 kHz	:	± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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Tel: (852) 2873 6860
Fax: (852) 2555 7533

CERTIFICATE OF CALIBRATION

Certificate No.: 18CA0524 04-01

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250	4950	ZC0032
Serial/Equipment No.:	2749852	2717593	14333
Adaptors used:	-	-	-

Item submitted by

Customer Name: MTR Corporation Ltd.
Address of Customer: -
Request No.: -
Date of receipt: 24-May-2018

Date of test: 28-May-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	08-Sep-2018	CIGISMEC
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Signal generator	DS 360	61227	23-Apr-2019	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 55 ± 10 %
Air pressure: 1005 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Feng Junqi Date: 28-May-2018 Company Chop: SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

 Form No CARP152-1/Issue 1/Rev C/01/02/2007

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CERTIFICATE OF CALIBRATION

(Continuation Page)

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10^{3} at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10^{4} at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

\- End -

Calibrated by: Fung Chi Yip
Date: 28-May-2018

Checked by: Shek Kwong Tat
Date: 28-May-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

輝創工程
Sun Creation Engineering

輝創工程有限公司
Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C173768
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-1522) Date of Receipt / 收件日期 : 30 June 2017

Description / 儀器名稱	:	Sound Level Meter
Manufacturer / 製造商	:	Brüel & Kjær
Model No. / 型號	:	2250
Serial No. / 編號	:	2704790
Supplied By / 委託者	:	ANewR Consulting Limited Unit 517, 5/F., Tower A, Regent Centre, 63 Wo Yi Hop Road, Kwai Chung, N.T. Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (55 ± 20)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 11 July 2017

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By 測試 : K C Lee
Engineer

Certified By 核證 : Chan Hon Ck
H C Chan
Engineer

Date of Issue 簽發日期 : 12 July 2017

Sun Creation Engineering Limited – Calibration & Testing Laboratory
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Certificate No. : C173768
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration using laboratory acoustic calibrator was performed before the test 6.1.1.2 to 6.3.2.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C170048
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.1

6.1.1.2 After Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	± 1.1

6.1.2 Linearity

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.0 (Ref.)
		104.00		104.0
		114.00		114.0

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

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Certificate No. : C173768
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6.2 Time Weighting

UUT Setting		Applied Value		UUT Reading	IEC 61672 Class 1
Range (dB)	Main	Level (dB)	Freq. (kHz)	(dB)	Spec. (dB)
20 - 140	LAF (SPL)	94.00	1	94.0	Ref.
	LAS (SPL)			94.0	± 0.3

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting		Applied Value		UUT Reading	IEC 61672 Class 1 Spec.
Range (dB)	Main	Level (dB)	Freq.	(dB)	(dB)
20 - 140	LAF (SPL)	94.00	63 Hz	67.8	-26.2 ± 1.5
			125 Hz	77.8	-16.1 ± 1.5
			250 Hz	85.3	-8.6 ± 1.4
			500 Hz	90.7	-3.2 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	95.2	+1.2 ± 1.6
			4 kHz	95.0	+1.0 ± 1.6
			8 kHz	92.9	-1.1(+2.1 ; -3.1)
			12.5 kHz	89.3	-4.3(+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting		Applied Value		UUT Reading	IEC 61672 Class 1 Spec.
Range (dB)	Main	Level (dB)	Freq.	(dB)	(dB)
20 - 140	LCF (SPL)	94.00	63 Hz	93.2	-0.8 ± 1.5
			125 Hz	93.8	-0.2 ± 1.5
			250 Hz	94.0	0.0 ± 1.4
			500 Hz	94.0	0.0 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	93.8	-0.2 ± 1.6
			4 kHz	93.2	-0.8 ± 1.6
			8 kHz	91.0	-3.0 (+2.1 ; -3.1)
			12.5 kHz	87.4	-6.2 (+3.0 ; -6.0)

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Certificate of Calibration
校正證書

Certificate No. : C173768
證書編號

Remarks : - UUT Microphone Model No. : 4189 & S/N : 2695392

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	:	63 Hz - 125 Hz	: ± 0.35 dB
		250 Hz - 500 Hz	: ± 0.30 dB
		1 kHz	: ± 0.20 dB
		2 kHz - 4 kHz	: ± 0.35 dB
		8 kHz	: ± 0.45 dB
		12.5 kHz	: ± 0.70 dB
104 dB	:	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	:	1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 18CA0524 04-04

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	B & K
Type/Model No.:	4231
Serial/Equipment No.:	1858983
Adaptors used:	-

Item submitted by

Curstomer:	MTR Corporation Ltd.
Address of Customer:	-
Request No.:	-
Date of receipt:	24-May-2018

Date of test: 25-May-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	20-Apr-2019	SCL
Preamplifier	B&K 2673	2743150	27-Apr-2019	CEPREI
Measuring amplifier	B&K 2610	2346941	08-May-2019	CEPREI
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Digital multi-meter	34401A	US36087050	23-Apr-2019	CEPREI
Audio analyzer	8903B	GB41300350	23-Apr-2019	CEPREI
Universal counter	53132A	MY40003662	24-Apr-2019	CEPREI

Ambient conditions

Temperature:	21 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1005 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Feng Jun Qi **Date:** 28-May-2018 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 18CA0524 04-04

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	93.86	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.010 dB**

Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency =999.84 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.5 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

\- End -

Calibrated by: Fung Chi Yip **Checked by:** Shek Kwong Tat

Date: 25-May-2018 **Date:** 28-May-2018

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Appendix A3 – Fixed Plant Noise Summary

SEL for SSS Calculation derived from specification

CRH train	Train Length	Assumed Speed for starting from standstill	25m setback	25m setback	15m setback
			Lmax^	SEL*	SEL
	m	km/h	dB(A)	dB(A)	dB(A)
Short haul	214	25	69	83.9	86.1
Long hual	427	25	69	86.9	89.1

Remark ^: The Lmax of 75 dB(A) as indicated in the ERR-SSS represented the design criteria of China Railway High-speed (CRH) train when starting from standstill in open section under XRL Contract 840 for rolling stock, while Lmax of 69 dB(A) presented in this Report is the actual measurement result of XRL Contract 840 CRH train under the same specified operation mode.

Remark *: The formula shown below is employed to convert Lmax to SEL.

SEL = Lmax + 10log(len/S) - 10log{(4D/len)/[4(D/len)^2+1] + 2tan^{-1}(len/2D)} + 10.5

where SEL = Sound Pressure Level

len = Length of propulsion cars or train, in m

S = Train speed, in km/h

D = Distance, in m

Leq Reference for SSS Calculation

SSS Event	Setback	Leq
	m	dB(A)
1 Trains Idle outdoor ^	7.5	70
1 Train Wash #	6	62

Remark ^: The Leq(30mins) is calculated based on the measured Leq 78dB(A) for the first 5 mins and Leq 58dB(A) for the remaining 25 mins.

Remark #: Measurement result at 6m setback from the full wash operation .

SWL Reference for SSS Calculation

SSS Event	SWL	Height
	dB(A)	m
Crane Operation	90	3.0

SSS Event	Train Type	Train Length	Max 30 minutes volume of train in SSS (V/30min)		
		m	Day	Night	24hr
Shunting (single movement)	**Short Train**	214	6	2	5
	Long Train	427	0	0	0
Idle outdoor	**Short Train**	214	1	0	1
	Long Train	427	0	0	0
Idle in Shed	**Short Train**	214	0	0	0
	Long Train	427	0	1	1

SSS Calculation of Sound Power Level for Idling Trains in Maintenance Shed

SPL of Idling Train at 7.5m setback outdoor

Leq
dB(A)
70

Ref: Contract 840 PS clause 4.3.5.1 - 4.3.5.4

Legend:
Lw: Sound Power Level dB re 10-12 W
SPL (or Lp): Sound Pressure Level dB re 20μPa
α: Absorption coefficient of wall/ceiling/opening
Abs Panel: Absorption Panel
S: Surface area
R: Room constant
r: Setback from train inside the shed for obtaining sufficient constant reverberant field
Q: Directivity factor

Step 1

Line Source Power of the Short Train

SPL setback	Train length	Line source power density	Line source power for whole train
d	L	Lw/L	Lw
m	m	dB(A)	dB(A)
7.5	214	82.4	105.7

Ref: Transportation Noise Reference Book equation 2.19

Step 2

SPL of Idling Train in Reverberant Shed

Shed Internal Dimension

	Length L	Width W	Height H
m	450	28.5	9
feet	1476.4	93.5	29.5

Absorption coefficient

Material	Painting	Open End	Acoustic Ceiling
α	0.1	1.0	0.5

Internal walls inside the shed

Side Wall		Open End at Exit		Closed End Wall		Ceiling		Floor	
S	α	S	α	S	α	S	α	S	α
LxH		WxH		WxH		LxW		LxW	
sq feet	Painting	sq feet	Open End	sq feet	Painting	sq feet	Acoustic Ceiling	sq feet	Painting
43593.8	0.1	2760.9	1.0	2760.9	0.1	138047.2	0.5	138047.2	0.1

Room Absorption			
Total S	Total Sα	Average α	R
sq feet			
368803.9	94584.1	0.256	127208.1

r	Q	SPL/Intensity of Idling Train in Reverberant Shed Lp	
feet		dB(A)	
30	2	78.7	Direct
(=10m)		71.2	Reverberent
		65.2	Reverberent Intensity
		78.9	Total Intensity

Ref Formula: general equation for calculating sound pressure from sound power in reverberant room.

Step 3

Intensity of One Idling Short Train at Gate & Louvre

Leq	Split	Split into 7 parts	for long train	
dB(A)	dB(A)	dB(A)	dB(A)	
78.9	-8.5	70.4	73.4	(+3dB for long train)

Total Lw for One Idling Short Train at Gate of Shed

Door Width	Door Height	no. of Door	S	Lw
W	H	n	WxHxn	
m	m		sq m	dB(A)
3.6	7	4	100.8	93.5

Total Lw for One Idling Short Train at One Set of Side Louvre of Shed

Window Width	Window Height	no. of Window for one set	S	Lw
W	H	n	WxHxn	
m	m		sq m	dB(A)
0.9	1.4	27	34.0	88.7

Remark: Louvre on side wall of shed are divided into seven sets. Each set contains 3 X 9 pieces of Louvre.

Total Lw for One Idling Short Train at One Set of Roof Operable Skylight of Shed

Skylight Width	Skylight Length	no. of Skylight for one set	S	Lw	
W	L	n	WxLxn		
m	m		sq m	dB(A)	
1.6	5.6	14	125.4	0.0	Assume all roof window closed.

Remark: Roof louvre of shed are divided into seven sets. Each set contains 14 pieces of louvre.

Ancillary Table for SSS Calculation

Angle Correction Factor for angle between shed gate direction to NSR

Angle	Loss	Gradient
Degree	dB	dB/degree
0	0	0.111
45	5	0.078
90	8.5	0.144
135	15	0.200
165	21	0.200

SSS Calculation at NSR SS2 — Mitigated

Barrier height (m)= 9

NSR	No. of Storey	Ground Level mPD	Hr m	ASR	Result:		Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
SS2						Leq, day	31.4	0.0	30.8	19.2	32.0	36.3	49	OK
	1	20.5	1.5	B	After 0030	Leq, night	26.6	34.0	0.0	-	-	34.7	39	OK
						Leq, 24hr	30.3	29.2	29.1	17.4	30.2	35.8		
						Lmax	36.4	34.0	30.8	19.2	32.0	36.4		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D m	Angle Deg	(1) SEL 15m	for 30min (2) SEL NSR	At NSR, no shield (3) Leq NSR	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	(4) A barrier	IL barrier	At NSR, incl façade Leq	(5) Lmax NSR	(6) Shadow zone?
Track 1 Short Train	1	101	11.5	86.1	65.9	33.3	Barrier	14	9	47	54	1.2	101.2	0.4	14.4	14.4	21.9	36.4	Yes
	2	191	8.4	86.1	61.7	29.1	Barrier	15	9	73	118	1.2	191.1	0.3	13.5	13.5	18.6	32.7	Yes
Track 2 Short Train	1	96	11.5	86.1	66.1	33.5	Barrier	14	9	42	54	1.2	96.2	0.5	15.0	15.0	21.5	36.1	Yes
	2	221	16.8	86.1	64.1	31.5	Barrier	15	9	27	194	1.2	221.1	1.0	15.0	15.0	19.5	33.3	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet.

	At NSR, incl façade Leq	Lmax NSR
Move to shunting track	23.5	36.4
Return to stabling track	23.6	36.1

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 short train	26.6			
Day: 6 short	31.4	49	OK	36.4
Night: 2 short	26.6	39	OK	36.4

Idling in Shed

	Hor D m	Exit Angle Deg	Direction Correction (7)	Lw	At NSR, no shield (8) Leq NSR	Louvre Reduction dB	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	At NSR, incl façade Leq	Shadow zone?
at Gate	558	1.9	0.2	93.5	30.3	-	-	15		558			558.0	7.0	0.0	0.0	33.3	-
at Side Louvre 1	590	-	0	88.7	25.3	-9	-	15		590			590.0	7.0	0.0	0.0	19.3	-
at Side Louvre 2	655	-	0	88.7	24.4	-9	-	15		655			655.0	7.0	0.0	0.0	18.4	-
at Side Louvre 3	719	-	0	88.7	23.6	-9	-	15		719			719.0	7.0	0.0	0.0	17.6	-
at Side Louvre 4	783	-	0	88.7	22.9	-9	-	15		783			783.0	7.0	0.0	0.0	16.9	-
at Side Louvre 5	848	-	0	88.7	22.2	-9	-	15		848			848.0	7.0	0.0	0.0	16.2	-
at Side Louvre 6	912	-	0	88.7	21.5	-9	-	15		912			912.0	7.0	0.0	0.0	15.5	-
at Side Louvre 7	976	-	0	88.7	21.0	-9	-	15		976			976.0	7.0	0.0	0.0	15.0	-
at Roof Skylight 1	591	-	6	0.0	-69.4	-	-	15		591			591.0	7.0	0.0	0.0	-66.4	-
at Roof Skylight 2	655	-	6	0.0	-70.3	-	-	15		655			655.0	7.0	0.0	0.0	-67.3	-
at Roof Skylight 3	719	-	6	0.0	-71.1	-	-	15		719			719.0	7.0	0.0	0.0	-68.1	-
at Roof Skylight 4	784	-	6	0.0	-71.9	-	-	15		784			784.0	7.0	0.0	0.0	-68.9	-
at Roof Skylight 5	848	-	6	0.0	-72.6	-	-	15		848			848.0	7.0	0.0	0.0	-69.6	-
at Roof Skylight 6	912	-	6	0.0	-73.2	-	-	15		912			912.0	7.0	0.0	0.0	-70.2	-
at Roof Skylight 7	977	-	6	0.0	-73.8	-	-	15		977			977.0	7.0	0.0	0.0	-70.8	-

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 long train	34.0			34.0
Day: 0 long	0.0	49	OK	0.0
Night: 1 long	34.0	39	OK	34.0

Idling outside — Day

	Hor D m	Angle Deg	Leq 7.5m	for 30min Leq NSR	At NSR, no shield, 1hr Leq NSR	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
1 Short Train	72	3	70	42.8	42.8	Barrier	15	9	33	39	1.2	72.2	0.7	15.0	15.0	30.8	Yes

Others — Day

	Hor D m	Leq 6m	Lw	for 30min Leq NSR	At NSR, no shield, 1hr Leq NSR	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
Crane	773		90	24.2	24.2	Loco Shed	15	10.2	274	499	3	773.0	0.1	8.0	8.0	19.2	Yes
Car Wash	268	62		29.0	29.0	-	15		268			268.1	6.9	0.0	0.0	32.0	-

Legend:
- Hr: Height of highest floor at receiver
- Hor D: Horizontal distance
- Angle: Angle of View
- Hb: Height of barrier or shield
- Dsb: Horizontal distance from noise source to barrier
- Dbr: Horizontal distance from barrier to receiver
- Hs: Height of noise source
- D: Direct path
- P: Path difference=Shielded path - D
- A barrier: Barrier attenuation (dB)
- IL barrier: Barrier loss (dB)

Remark for Equations:
- (1): plus 3dB is to adjust SEL from short train to long train.
- (2): distance attenuation and angle of view adjustment.
- (3): SEL conversion to Leq: Leq = SEL + 10 log V -35.6 ref: FTA Guidance Manual Table 5-2 Rail vehicle ; plus 10log(2) is to convert Leq(30min) to Leq(1hr).
- (4): Barrier effect, ref: FTA Guidance Manual, Table 6-9.
- (5): Ref: Transportation Noise Reference Book equation 15.21
- (6): To check whether the direct path ray is under shadow zone of shielding.
- (7): Direction correction factor for angle between shed exit direction to NSR or direction correction for roof louvre to NSR.
- (8): general equation for calculating sound pressure from sound power in free field.
- (9): Wheel Squeal is added to the required segments, such as turnout and curve.

SSS Calculation at NSR SS4 — Mitigated

Barrier height (m)= 12 (relative to rail level 15mPD; equivalent to 5m high barrier top at 27mPD on ground level 22mPD)

NSR	No. of Storey	Ground Level mPD	Hr m	ASR
SS4	1	22.9	1.5	B

Result:		Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
	Leq, day	35.4	0.0	32.1	13.3	24.1	37.3	49	OK
After 0030	Leq, night	30.6	26.4	0.0	-	-	32.0	40	OK
	Leq, 24hr	34.3	21.7	30.3	11.5	22.3	36.1		
	Lmax	40.5	26.4	32.1	13.3	24.1	40.5		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D	Angle	SEL	SEL (for 30min)	Leq (At NSR, no shield)	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq (At NSR, incl façade)	Lmax	Shadow zone?
		m	Deg	15m	NSR	NSR		mPD	m	m	m	m	m	m				NSR	
Track 1 Short Train	1a	50	16.1	86.1	70.4	37.8	Barrier	13.3	12	20	30	1.2	51.0	1.8	15.0	15.0	25.8	40.5	Yes
	1b	50	6.6	86.1	66.5	33.9	Barrier	14.2	12	20	30	1.2	50.8	2.0	15.0	15.0	21.9	36.6	Yes
	2	50	1.8	86.1	60.9	28.3	Barrier	15	12	20	30	1.2	50.7	2.2	15.0	15.0	16.3	31.0	Yes
Track 2 Short Train	1a	50	16.1	86.1	70.4	37.8	Barrier	13.3	12	20	30	1.2	51.0	1.8	15.0	15.0	25.8	40.5	Yes
	1b	50	6.6	86.1	66.5	33.9	Barrier	14.2	12	20	30	1.2	50.8	2.0	15.0	15.0	21.9	36.6	Yes
	2	50	1.8	86.1	60.9	28.3	Barrier	15	12	20	30	1.2	50.7	2.2	15.0	15.0	16.3	31.0	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet.

	Leq (At NSR, incl façade)	Lmax
		NSR
Move to shunting track	27.6	40.5
Return to stabling track	27.6	40.5

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 short train	30.6			
Day: 6 short	35.4	49	OK	40.5
Night: 2 short	30.6	40	OK	40.5

Idling in Shed

	Hor D	Exit Angle	Direction Correction	Lw	Leq (At NSR, no shield)	Louvre Reduction	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq (At NSR, incl façade)	Shadow zone?
	m	Deg			NSR	dB		mPD	m	m	m	m	m	m				
at Gate	468	16.4	1.8	93.5	30.2	-	Barrier	15	12	363	105	3.5	468.0	0.1	8.0	8.0	25.2	Yes
at Side Louvre 1	496	-	0	88.7	26.8	-9	Barrier	15	12	370	126	3.8	496.0	0.1	7.7	7.7	13.2	Yes
at Side Louvre 2	557	-	0	88.7	25.8	-9	Barrier	15	12	416	141	3.8	557.0	0.1	7.2	7.2	12.6	Yes
at Side Louvre 3	619	-	0	88.7	24.9	-9	Barrier	15	12	462	157	3.8	619.0	0.1	6.8	6.8	12.1	Yes
at Side Louvre 4	681	-	0	88.7	24.1	-9	Barrier	15	12	510	171	3.8	681.0	0.1	6.4	6.4	11.7	Yes
at Side Louvre 5	743	-	0	88.7	23.3	-9	Barrier	15	12	560	183	3.8	743.0	0.1	6.1	6.1	11.2	Yes
at Side Louvre 6	805	-	0	88.7	22.6	-9	Barrier	15	12	610	195	3.8	805.0	0.1	5.8	5.8	10.8	Yes
at Side Louvre 7	867	-	0	88.7	22.0	-9	Barrier	15	12	657	210	3.8	867.0	0.0	5.6	5.6	10.4	Yes
at Roof Skylight 1	499	-	6	0.0	-68.0	-	-	15		499			499.1	9.3	0.0	0.0	-65.0	-
at Roof Skylight 2	560	-	6	0.0	-69.0	-	-	15		560			560.1	9.3	0.0	0.0	-66.0	-
at Roof Skylight 3	622	-	6	0.0	-69.9	-	-	15		622			622.1	9.3	0.0	0.0	-66.9	-
at Roof Skylight 4	683	-	6	0.0	-70.7	-	-	15		683			683.1	9.3	0.0	0.0	-67.7	-
at Roof Skylight 5	745	-	6	0.0	-71.4	-	-	15		745			745.1	9.3	0.0	0.0	-68.4	-
at Roof Skylight 6	807	-	6	0.0	-72.1	-	-	15		807			807.1	9.3	0.0	0.0	-69.1	-
at Roof Skylight 7	870	-	6	0.0	-72.8	-	-	15		870			870.1	9.3	0.0	0.0	-69.8	-

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 long train	26.4			26.4
Day: 0 long	0.0	49	OK	0.0
Night: 1 long	26.4	40	OK	26.4

Idling outside

Day

	Hor D	Angle	Leq	Leq (for 30min)	Leq (At NSR, no shield, 1hr)	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq, day (At NSR, incl façade)	Shadow zone?
	m	Deg	7.5m	NSR	NSR		mPD	m	m	m	m	m	m				
1 Short Train	109	6.1	70	44.1	44.1	Barrier	15	10	16	93	1.2	109.3	2.0	15.0	15.0	32.1	Yes

Others

Day

	Hor D	Leq	Lw	Leq (for 30min)	Leq (At NSR, no shield, 1hr)	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq, day (At NSR, incl façade)	Shadow zone?
	m	6m		NSR	NSR		mPD	m	m	m	m	m	m				
Crane	684		90	25.3	25.3	Mainten' Shed	15	10.1	44	640	3	684.0	0.5	15.0	15.0	13.3	Yes
Car Wash	159	62		33.5	33.5	Barrier	13.3	12	86	73	3	159.2	0.3	12.5	12.5	24.1	Yes

SSS Calculation at NSR SS5 — Mitigated

Barrier height (m)= 10

NSR	No. of Storey	Ground Level	Hr	ASR	Result:		Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
SS5		mPD	m			Leq, day	38.0	0.0	41.1	21.0	28.6	43.0	52	OK
	3	17.3	7.5	B	After 0030	Leq, night	33.2	28.7	0.0	-	-	34.5	45	OK
						Leq, 24hr	36.9	23.9	39.3	19.3	26.9	41.5		
						Lmax	41.3	28.7	41.1	21.0	28.6	41.3		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D	Angle	SEL	SEL for 30min	Leq At NSR, no shield	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq At NSR, incl façade	Lmax	Shadow zone?
		m	Deg	15m	NSR	NSR		mPD	m	m	m	m	m	m				NSR	
Track 1 Short Train	1	146	28.3	86.1	68.2	35.6	Barrier	15	10	2	144	1.2	146.3	6.8	15.0	15.0	23.6	37.9	Yes
	2	146	61.1	86.1	71.5	38.9	Barrier	15	10	2	144	1.2	146.3	6.8	15.0	15.0	26.9	41.3	Yes
	3	146	28.7	86.1	68.2	35.6	Barrier	15	10	2	144	1.2	146.3	6.8	15.0	15.0	23.6	38.0	Yes
	4	119	20.8	86.1	67.7	35.1	Barrier2	15	8	23	96	1.2	119.3	0.7	15.0	15.0	23.1	37.6	Yes
Track 2 Short Train	1	182	23.8	86.1	66.5	33.9	Barrier	15	10	38	144	1.2	182.2	0.8	15.0	15.0	21.9	36.0	Yes
	2	182	61.1	86.1	70.6	38.0	Barrier	15	10	38	144	1.2	182.2	0.8	15.0	15.0	26.0	40.1	Yes
	3	182	28.7	86.1	67.3	34.7	Barrier	15	10	38	144	1.2	182.2	0.8	15.0	15.0	22.7	36.8	Yes
	4	123	20.8	86.1	67.6	35.0	Barrier2	15	8	27	96	1.2	123.3	0.6	15.0	15.0	23.0	37.5	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet "SS2".

	Leq At NSR, incl façade	Lmax
		NSR
Move to shunting track	30.6	41.3
Return to stabling track	29.7	40.1

	Leq (At NSR, incl façade)	Leq (Noise criteria)	Status	Lmax
	Total			NSR
1 short train	33.2			
Day: 6 short	38.0	52	OK	41.3
Night: 2 short	33.2	45	OK	41.3

Idling in Shed

	Hor D	Exit Angle	Direction Correction	Lw	Leq At NSR, no shield	Louvre Reduction	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq At NSR, incl façade	Shadow zone?
	m	Deg			NSR	dB		mPD	m	m	m	m	m	m				
at Gate	212	108.7	11.2	93.5	27.7	-	Barrier	15	10	110	102	3.5	212.1	0.1	8.2	8.2	22.5	Yes
at Side Louvre 1	189	-	0	88.7	35.2	-9	Barrier	15	10	89	100	3.8	189.1	0.1	9.0	9.0	20.2	Yes
at Side Louvre 2	188	-	0	88.7	35.3	-9	Barrier	15	10	89	99	3.8	188.1	0.1	9.0	9.0	20.2	Yes
at Side Louvre 3	208	-	0	88.7	34.4	-9	Barrier	15	10	99	109	3.8	208.1	0.1	8.6	8.6	19.8	Yes
at Side Louvre 4	244	-	0	88.7	33.0	-9	Barrier	15	10	116	128	3.8	244.1	0.1	7.9	7.9	19.1	Yes
at Side Louvre 5	290	-	0	88.7	31.5	-9	Barrier	15	10	138	152	3.8	290.1	0.1	7.2	7.2	18.3	Yes
at Side Louvre 6	341	-	0	88.7	30.1	-9	Barrier	15	10	161	180	3.8	341.1	0.1	6.7	6.7	17.4	Yes
at Side Louvre 7	397	-	0	88.7	28.8	-9	Barrier	15	10	188	209	3.8	397.0	0.1	6.1	6.1	16.7	Yes
at Roof Skylight 1	203	-	6	0.0	-60.1	-	Barrier	15	10	104	99	10.1	203.0	0.0	0.0	0.0	-57.2	Yes
at Roof Skylight 2	202	-	6	0.0	-60.1	-	Barrier	15	10	103	99	10.1	202.0	0.0	0.0	0.0	-57.1	Yes
at Roof Skylight 3	221	-	6	0.0	-60.9	-	Barrier	15	10	113	108	10.1	221.0	0.0	0.0	0.0	-57.9	Yes
at Roof Skylight 4	255	-	6	0.0	-62.1	-	Barrier	15	10	130	125	10.1	255.0	0.0	0.0	0.0	-59.1	Yes
at Roof Skylight 5	299	-	6	0.0	-63.5	-	Barrier	15	10	153	146	10.1	299.0	0.0	0.0	0.0	-60.5	Yes
at Roof Skylight 6	349	-	6	0.0	-64.9	-	Barrier	15	10	178	171	10.1	349.0	0.0	0.0	0.0	-61.9	Yes
at Roof Skylight 7	404	-	6	0.0	-66.1	-	Barrier	15	10	207	197	10.1	404.0	0.0	0.0	0.0	-63.1	Yes

	Leq (At NSR, incl façade)	Leq (Noise criteria)	Status	Lmax
	Total			NSR
1 long train	28.7			28.7
Day: 0 long	0.0	52	OK	0.0
Night: 1 long	28.7	45	OK	28.7

Idling outside — Day

	Hor D	Angle	Leq	Leq for 30min	Leq At NSR, no shield, 1hr	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq, day At NSR, incl façade	Shadow zone?
	m	Deg	7.5m	NSR	NSR		mPD	m	m	m	m	m	m				
1 Short Train	177	78.4	70	53.1	53.1	Barrier	15	10	33	144	1.2	177.2	0.9	15.0	15.0	41.1	Yes

Others — Day

	Hor D	Leq	Lw	Leq for 30min	Leq At NSR, no shield, 1hr	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq, day At NSR, incl façade	Shadow zone?
	m	6m		NSR	NSR		mPD	m	m	m	m	m	m				
Crane	281		90	33.0	33.0	Mainten' Shed	15	10.1	27	254	3	281.1	0.8	15.0	15.0	21.0	Yes
Car Wash	395	62		25.6	25.6	-	15		395			395.1	9.7	0.0	0.0	28.6	-

SSS Calculation at NSR SS6 — Mitigated

Barrier height (m)= 10

NSR	No. of Storey	Ground Level mPD	Hr m	ASR		Result:	Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
SS6						Leq, day	37.5	0.0	42.0	22.3	26.0	43.4	52	OK
	2	15.3	4.5	B	After 0030	Leq, night	32.8	23.6	0.0	-	-	33.3	45	OK
						Leq, 24hr	36.4	18.9	40.2	20.5	24.3	41.9		
						Lmax	41.4	23.6	42.0	22.3	26.0	42.0		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D	Angle	SEL	for 30min SEL	At NSR, no shield Leq	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq	Lmax	Shadow zone?
		m	Deg	15m	NSR	NSR		mPD	m	m	m	m	m	m				NSR	
Track 1 Short Train	1	153	66.8	86.1	71.7	39.1	Barrier	15	10	4	149	1.2	153.0	5.7	15.0	15.0	27.1	41.4	Yes
	2	153	39.1	86.1	69.4	36.8	Barrier	15	10	4	149	1.2	153.0	5.7	15.0	15.0	24.8	39.1	Yes
	3	153	16.2	86.1	65.6	33.0	Barrier	15	10	4	149	1.2	153.0	5.7	15.0	15.0	21.0	35.3	Yes
	4	124	11.6	86.1	65.0	32.4	Barrier2	15	8	22	102	1.2	124.1	1.0	15.0	15.0	20.4	34.9	Yes
Track 2 Short Train	1	188	61	86.1	70.4	37.8	Barrier	15	10	39	149	1.2	188.0	1.0	15.0	15.0	25.8	39.9	Yes
	2	188	39.1	86.1	68.5	35.9	Barrier	15	10	39	149	1.2	188.0	1.0	15.0	15.0	23.9	38.0	Yes
	3	188	16.2	86.1	64.7	32.1	Barrier	15	10	39	149	1.2	188.0	1.0	15.0	15.0	20.1	34.1	Yes
	4	129	11.6	86.1	64.8	32.3	Barrier2	15	8	27	102	1.2	129.1	0.8	15.0	15.0	20.3	34.7	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet "SS2".

	At NSR, incl façade Leq	Lmax
		NSR
Move to shunting track	30.2	41.4
Return to stabling track	29.2	39.9

	At NSR, incl façade Leq	Noise criteria Leq	Status	Lmax
	Total			NSR
1 short train	32.8			
Day: 6 short	37.5	52	OK	41.4
Night: 2 short	32.8	45	OK	41.4

Idling in Shed

	Hor D	Exit Angle	Direction Correction	Lw	At NSR, no shield Leq	Louvre Reduction	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq	Shadow zone?
	m	Deg			NSR	dB		mPD	m	m	m	m	m	m				
at Gate	296	135.8	15.2	93.5	20.9	-	Barrier	15	10	150	146	3.5	296.0	0.2	11.8	11.8	12.1	Yes
at Side Louvre 1	263	-	0	88.7	32.3	-9	Barrier	15	10	121	142	3.8	263.0	0.3	12.2	12.2	14.2	Yes
at Side Louvre 2	224	-	0	88.7	33.7	-9	Barrier	15	10	103	121	3.8	224.0	0.3	12.9	12.9	14.9	Yes
at Side Louvre 3	198	-	0	88.7	34.8	-9	Barrier	15	10	91	107	3.8	198.0	0.3	13.4	13.4	15.4	Yes
at Side Louvre 4	192	-	0	88.7	35.1	-9	Barrier	15	10	88	104	3.8	192.0	0.3	13.5	13.5	15.5	Yes
at Side Louvre 5	207	-	0	88.7	34.4	-9	Barrier	15	10	95	112	3.8	207.0	0.3	13.2	13.2	15.2	Yes
at Side Louvre 6	238	-	0	88.7	33.2	-9	Barrier	15	10	109	129	3.8	238.0	0.3	12.6	12.6	14.6	Yes
at Side Louvre 7	281	-	0	88.7	31.8	-9	Barrier	15	10	129	152	3.8	281.0	0.2	11.9	11.9	13.9	Yes
at Roof Skylight 1	273	-	6	0.0	-62.7	-	Barrier	15	10	136	137	10.1	273.1	0.0	5.4	5.4	-65.1	Yes
at Roof Skylight 2	236	-	6	0.0	-61.5	-	Barrier	15	10	117	119	10.1	236.1	0.1	5.9	5.9	-64.3	Yes
at Roof Skylight 3	212	-	6	0.0	-60.5	-	Barrier	15	10	105	107	10.1	212.1	0.1	6.3	6.3	-63.8	Yes
at Roof Skylight 4	206	-	6	0.0	-60.3	-	Barrier	15	10	102	104	10.1	206.1	0.1	6.4	6.4	-63.7	Yes
at Roof Skylight 5	220	-	6	0.0	-60.8	-	Barrier	15	10	109	111	10.1	220.1	0.1	6.1	6.1	-64.0	Yes
at Roof Skylight 6	250	-	6	0.0	-62.0	-	Barrier	15	10	124	126	10.1	250.1	0.1	5.7	5.7	-64.6	Yes
at Roof Skylight 7	291	-	6	0.0	-63.3	-	Barrier	15	10	145	146	10.1	291.0	0.0	5.2	5.2	-65.5	Yes

	At NSR, incl façade Leq	Noise criteria Leq	Status	Lmax
	Total			NSR
1 long train	23.6			23.6
Day: 0 long	0.0	52	OK	0.0
Night: 1 long	23.6	45	OK	23.6

Idling outside — Day

	Hor D	Angle	Leq	for 30min Leq	At NSR, no shield, 1hr Leq	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
	m	Deg	7.5m	NSR	NSR		mPD	m	m	m	m	m	m				
1 Short Train	183	99.8	70	54.0	54.0	Barrier	15	10	34	149	1.2	183.0	1.2	15.0	15.0	42.0	Yes

Others — Day

	Hor D	Leq	Lw	for 30min Leq	At NSR, no shield, 1hr Leq	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
	m	6m		NSR	NSR		mPD	m	m	m	m	m	m				
Crane	244		90	34.3	34.3	Mainten' Shed	15	10.1	22	222	3	244.0	1.2	15.0	15.0	22.3	Yes
Car Wash	534	62		23.0	23.0	-	15		534			534.0	4.8	0.0	0.0	26.0	-

SSS Calculation at NSR SS7 — Mitigated

Barrier height (m)= 10

NSR	No. of Storey	Ground Level	Hr	ASR		Result:	Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
SS7	Storey	mPD	m			Leq, day	38.0	0.0	43.7	25.6	8.9	44.7	49	OK
	2	13.6	4.5	B	After 0030	Leq, night	33.2	37.2	0.0	-	-	38.6	47	OK
						Leq, 24hr	36.9	32.4	41.9	23.8	7.1	43.5		
						Lmax	44.2	37.2	43.7	25.6	8.9	44.2		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D	Angle	SEL	SEL for 30min	Leq At NSR, no shield	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq At NSR, incl façade	Lmax	Shadow zone?
		m	Deg	15m	NSR	NSR		mPD	m	m	m	m	m	m				NSR	
Track 1 Short Train	1	75	57.1	86.1	74.1	41.5	Barrier	15	10	4	71	1.2	75.0	6.0	15.0	15.0	29.5	44.2	Yes
	2	75	15.8	86.1	68.5	35.9	Vent Build	15	13.7	12	63	1.2	75.0	6.2	15.0	15.0	23.9	38.6	Yes
	3	75	5.2	86.1	63.7	31.1	Barrier	15	10	4	71	1.2	75.0	6.0	15.0	15.0	19.1	33.8	Yes
	4	75	3.5	86.1	62.0	29.4	Barrier	15	10	4	71	1.2	75.0	6.0	15.0	15.0	17.4	32.1	Yes
Track 2 Short Train	1	109	55.9	86.1	72.4	39.8	Barrier	15	10	38	71	1.2	109.0	1.3	15.0	15.0	27.8	42.4	Yes
	2	109	15.8	86.1	66.9	34.3	Vent Build	15	13.7	46	63	1.2	109.0	2.5	15.0	15.0	22.3	36.9	Yes
	3	109	3.1	86.1	59.8	27.3	Barrier	15	10	38	71	1.2	109.0	1.3	15.0	15.0	15.3	29.8	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet "SS2".

	At NSR, incl façade Leq	Lmax NSR
Move to shunting track	31.1	44.2
Return to stabling track	29.1	42.4

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 short train	33.2			
Day: 6 short	38.0	49	OK	44.2
Night: 2 short	33.2	47	OK	44.2

Idling in Shed

	Hor D	Exit Angle	Direction Correction	Lw	Leq At NSR, no shield	Louvre Reduction	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq At NSR, incl façade	Shadow zone?
	m	Deg			NSR	dB		mPD	m	m	m	m	m	m				
at Gate	475	164.4	20.9	93.5	11.0	-	-	15		475			475.0	3.1	0.0	0.0	14.0	-
at Side Louvre 1	440	-	0	88.7	27.9	-9	-	15		440			440.0	3.1	0.0	0.0	21.9	-
at Side Louvre 2	378	-	0	88.7	29.2	-9	-	15		378			378.0	3.1	0.0	0.0	23.2	-
at Side Louvre 3	317	-	0	88.7	30.7	-9	-	15		317			317.0	3.1	0.0	0.0	24.7	-
at Side Louvre 4	258	-	0	88.7	32.5	-9	-	15		258			258.0	3.1	0.0	0.0	26.5	-
at Side Louvre 5	202	-	0	88.7	34.6	-9	-	15		202			202.0	3.1	0.0	0.0	28.6	-
at Side Louvre 6	153	-	0	88.7	37.0	-9	-	15		153			153.0	3.1	0.0	0.0	31.0	-
at Side Louvre 7	120	-	0	88.7	39.2	-9	-	15		120			120.0	3.1	0.0	0.0	33.2	-
at Roof Skylight 1	444	-	6	0.0	-66.9	-	-	15		444			444.0	3.1	0.0	0.0	-63.9	-
at Roof Skylight 2	383	-	6	0.0	-65.7	-	-	15		383			383.0	3.1	0.0	0.0	-62.7	-
at Roof Skylight 3	323	-	6	0.0	-64.2	-	-	15		323			323.0	3.1	0.0	0.0	-61.2	-
at Roof Skylight 4	265	-	6	0.0	-62.5	-	-	15		265			265.0	3.1	0.0	0.0	-59.5	-
at Roof Skylight 5	211	-	6	0.0	-60.5	-	-	15		211			211.0	3.1	0.0	0.0	-57.5	-
at Roof Skylight 6	164	-	6	0.0	-58.3	-	-	15		164			164.0	3.1	0.0	0.0	-55.3	-
at Roof Skylight 7	133	-	6	0.0	-56.5	-	-	15		133			133.0	3.1	0.0	0.0	-53.5	-

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 long train	37.2			37.2
Day: 0 long	0.0	49	OK	0.0
Night: 1 long	37.2	47	OK	37.2

Idling outside — Day

	Hor D	Angle	Leq	Leq for 30min	Leq At NSR, no shield, 1hr	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
	m	Deg	7.5m	NSR	NSR		mPD	m	m	m	m	m	m				
1 Short Train	105	83.9	70	55.7	55.7	Barrier	15	10	34	71	1.2	105.0	1.4	15.0	15.0	43.7	Yes

Others — Day

	Hor D	Leq	Lw	Leq for 30min	Leq At NSR, no shield, 1hr	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
	m	14m		NSR	NSR		mPD	m	m	m	m	m	m				
Crane	166		90	37.6	37.6	Mainten' Shed	15	10.1	21	145	3	166.0	1.3	15.0	15.0	25.6	Yes
Car Wash	764	62		19.9	19.9	Vent Build	15	13.1	170	594	3	764.0	0.4	14.0	14.0	8.9	Yes

SSS Calculation at NSR SS10 — Mitigated

Barrier height (m)= 3.5

NSR	No. of Storey	Ground Level mPD	Hr m	ASR	Result:	Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
SS10	1	11.5	1.5	B	Leq, day	36.7	0.0	42.3	26.3	21.9	43.5	49	OK
					After 0030 Leq, night	31.9	25.5	0.0	-	-	32.8	47	OK
					Leq, 24hr	35.6	20.8	40.5	24.5	20.2	41.9		
					Lmax	43.7	25.5	42.3	26.3	21.9	43.7		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D	Angle	SEL	for 30min SEL	At NSR, no shield Leq	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq	Lmax	Shadow zone?
		m	Deg	15m	NSR	NSR		mPD	m	m	m	m	m	m				NSR	
Track 1 Short Train	1	39	25	86.1	73.4	40.8	Barrier	15	3.5	21	18	1.2	39.1	0.8	15.0	15.0	28.8	43.5	Yes
Track 2 Short Train	1	4	2.7	86.1	73.6	41.0	Barrier	15	3.5	2	2	1.2	5.1	3.8	15.0	15.0	29.0	43.7	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet "SS2".

	At NSR, incl façade Leq	Lmax NSR
Move to shunting track	28.8	43.5
Return to stabling track	29.0	43.7

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 short train	31.9			
Day: 6 short	36.7	49	OK	43.7
Night: 2 short	31.9	47	OK	43.7

Idling in Shed

	Hor D	Exit Angle	Direction Correction	Lw	At NSR, no shield Leq	Louvre Reduction	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq	Shadow zone?
	m	Deg			NSR	dB		mPD	m	m	m	m	m	m				
at Gate	554	174.1	22.8	93.5	7.8	-	Barrier	15	3.5	492	62	3.5	554.0	0.2	11.5	11.5	-0.7	Yes
at Side Louvre 1	519	-	0	88.7	26.4	-9	Barrier	15	3.5	457	62	3.8	519.0	0.2	11.4	11.4	9.0	Yes
at Side Louvre 2	456	-	0	88.7	27.6	-9	Barrier	15	3.5	394	62	3.8	456.0	0.2	11.3	11.3	10.2	Yes
at Side Louvre 3	392	-	0	88.7	28.9	-9	Barrier	15	3.5	330	62	3.8	392.0	0.2	11.2	11.2	11.7	Yes
at Side Louvre 4	328	-	0	88.7	30.4	-9	Barrier	15	3.5	266	62	3.8	328.1	0.2	11.0	11.0	13.4	Yes
at Side Louvre 5	264	-	0	88.7	32.3	-9	Barrier	15	3.5	202	62	3.8	264.1	0.2	10.7	10.7	15.6	Yes
at Side Louvre 6	201	-	0	88.7	34.7	-9	Barrier	15	3.5	139	62	3.8	201.1	0.2	10.2	10.2	18.5	Yes
at Side Louvre 7	139	-	0	88.7	37.9	-9	Barrier	15	3.5	76	63	3.8	139.1	0.1	9.0	9.0	22.9	Yes
at Roof Skylight 1	521	-	6	0.0	-68.3	-	Barrier	15	3.5	459	62	10.1	521.1	0.2	10.0	10.0	-75.3	Yes
at Roof Skylight 2	457	-	6	0.0	-67.2	-	Barrier	15	3.5	395	62	10.1	457.2	0.1	9.6	9.6	-73.8	Yes
at Roof Skylight 3	393	-	6	0.0	-65.9	-	Barrier	15	3.5	331	62	10.1	393.2	0.1	9.1	9.1	-72.0	Yes
at Roof Skylight 4	330	-	6	0.0	-64.4	-	Barrier	15	3.5	268	62	10.1	330.2	0.1	8.4	8.4	-69.7	Yes
at Roof Skylight 5	267	-	6	0.0	-62.5	-	Barrier	15	3.5	205	62	10.1	267.3	0.1	7.1	7.1	-66.7	Yes
at Roof Skylight 6	204	-	6	0.0	-60.2	-	Barrier	15	3.5	141	63	10.1	204.4	0.0	4.5	4.5	-61.7	Yes
at Roof Skylight 7	143	-	6	0.0	-57.1	-	Barrier	15	3.5	79	64	10.1	143.5	0.0	0.0	0.0	-54.1	Yes

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 long train	25.5			25.5
Day: 0 long	0.0	49	OK	0.0
Night: 1 long	25.5	47	OK	25.5

Idling outside — Day

	Hor D	Angle	Leq	for 30min Leq	At NSR, no shield, 1hr Leq	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
	m	Deg	7.5m	NSR	NSR		mPD	m	m	m	m	m	m				
1 Short Train	34	19.8	70	54.3	54.3	Barrier	15	3.5	16	18	1.2	34.2	0.8	15.0	15.0	42.3	Yes

Others — Day

	Hor D	Leq	Lw	for 30min Leq	At NSR, no shield, 1hr Leq	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
	m	6m		NSR	NSR		mPD	m	m	m	m	m	m				
Crane	153		90	38.3	38.3	Main Bldg	15	14.6	27	126	3	153.1	3.4	15.0	15.0	26.3	Yes
Car Wash	854	62		18.9	18.9	-	15		854			854.0	2.0	0.0	0.0	21.9	-

SSS Calculation at NSR SS11a — Mitigated

Barrier height (m)= 5.5

NSR	No. of Storey	Ground Level mPD	Hr m	ASR		Result:	Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
SS11a						Leq, day	41.0	0.0	40.0	24.8	28.8	43.7	52	OK
	2	15	4.5	B	After 0030	Leq, night	36.2	38.7	0.0	-	-	40.7	50	OK
						Leq, 24hr	39.9	34.0	38.2	23.0	27.1	42.9		
						Lmax	45.8	38.7	40.0	24.8	28.8	45.8		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D m	Angle Deg	SEL 15m	for 30min SEL NSR	At NSR, no shield Leq NSR	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	At NSR, incl façade Leq	Lmax NSR	Shadow zone?
Track 1 Short Train	1	94	22.8	86.1	69.2	36.6	Barrier	15	5.5	64	30	1.2	94.1	0.1	8.4	8.4	31.2	45.8	Yes
	2	85	67.8	86.1	74.3	41.7	Loco Shed	15	10.2	48	37	1.2	85.1	1.2	15.0	15.0	29.7	44.4	Yes
Track 2 Short Train	1	141	38.2	86.1	69.6	37.0	Mainten' Shed	15	10.1	39	102	1.2	141.0	1.1	15.0	15.0	25.0	39.4	Yes
	2	141	15	86.1	65.6	33.0	Barrier	15	5.5	115	26	1.2	141.0	0.1	6.3	6.3	29.7	44.0	Yes
	3	122	67.8	86.1	72.8	40.2	Loco Shed	15	10.2	80	42	1.2	122.0	0.8	15.0	15.0	28.2	42.6	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet "SS2".

	At NSR, incl façade Leq	Lmax NSR
Move to shunting track	33.5	45.8
Return to stabling track	32.8	44.0

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 short train	36.2			
Day: 6 short	41.0	52	OK	45.8
Night: 2 short	36.2	50	OK	45.8

Idling in Shed

	Hor D m	Exit Angle Deg	Direction Correction	Lw	At NSR, no shield Leq NSR	Louvre Reduction dB	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	At NSR, incl façade Leq	Shadow zone?
at Gate	117	48	5.2	93.5	38.9	-	Barrier	15	5.5	81	36	3.5	117.0	0.0	4.4	4.4	37.5	Yes
at Side Louvre 1	132	-	0	88.7	38.3	-9	Barrier	15	5.5	83	49	3.8	132.0	0.0	3.6	3.6	28.8	Yes
at Side Louvre 2	188	-	0	88.7	35.3	-9	Barrier	15	5.5	125	63	3.8	188.0	0.0	2.7	2.7	26.5	Yes
at Side Louvre 3	247	-	0	88.7	32.9	-9	Barrier	15	5.5	184	63	3.8	247.0	0.0	2.3	2.3	24.6	Yes
at Side Louvre 4	308	-	0	88.7	31.0	-9	Barrier	15	5.5	245	63	3.8	308.0	0.0	2.1	2.1	22.9	Yes
at Side Louvre 5	370	-	0	88.7	29.4	-9	Barrier	15	5.5	306	64	3.8	370.0	0.0	1.9	1.9	21.5	Yes
at Side Louvre 6	432	-	0	88.7	28.0	-9	IMPD	15	8.4	267	165	3.8	432.0	0.1	7.6	7.6	14.4	Yes
at Side Louvre 7	494	-	0	88.7	26.9	-9	IMPD	15	8.4	330	164	3.8	494.0	0.1	7.3	7.3	13.6	Yes
at Roof Skylight 1	141	-	6	0.0	-57.0	-	Barrier	15	5.5	98	43	10.1	141.1	0.0	0.0	0.0	-54.0	No
at Roof Skylight 2	194	-	6	0.0	-59.8	-	Barrier	15	5.5	135	59	10.1	194.1	0.0	0.0	0.0	-56.8	No
at Roof Skylight 3	252	-	6	0.0	-62.0	-	Barrier	15	5.5	189	63	10.1	252.1	0.0	0.0	0.0	-59.0	No
at Roof Skylight 4	312	-	6	0.0	-63.9	-	Barrier	15	5.5	249	63	10.1	312.1	0.0	0.0	0.0	-60.9	No
at Roof Skylight 5	373	-	6	0.0	-65.4	-	Barrier	15	5.5	310	63	10.1	373.0	0.0	0.0	0.0	-62.4	Yes
at Roof Skylight 6	434	-	6	0.0	-66.7	-	Barrier	15	5.5	370	64	10.1	434.0	0.0	0.1	0.1	-63.8	Yes
at Roof Skylight 7	496	-	6	0.0	-67.9	-	Barrier	15	5.5	432	64	10.1	496.0	0.0	0.1	0.1	-65.0	Yes

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 long train	38.7			38.7
Day: 0 long	0.0	52	OK	0.0
Night: 1 long	38.7	50	OK	38.7

Idling outside — Day

	Hor D m	Angle Deg	Leq 7.5m	for 30min Leq NSR	At NSR, no shield, 1hr Leq NSR	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
1 Short Train	111	38.1	70	52.0	52.0	Mainten' Shed	15	10.1	9	102	1.2	111.0	3.8	15.0	15.0	40.0	Yes

Others — Day

	Hor D m	Leq 6m	Lw	for 30min Leq NSR	At NSR, no shield, 1hr Leq NSR	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
Crane	298		90	32.5	32.5	IMPD Bldg	15	8.4	100	198	3	298.0	0.2	10.7	10.7	24.8	Yes
Car Wash	274	62		28.8	28.8	Barrier	15	5.5	227	47	3	274.0	0.0	3.0	3.0	28.8	Yes

SSS Calculation at NSR SS12			Mitigated					Barrier height (m)=	3.5												
NSR	No. of	Ground Level	Hr	ASR				Result:		Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status				
SS12	Storey	mPD	m						Leq, day	37.6	0.0	43.7	26.1	6.6	44.7	49	OK				
	2	12.3	4.5	B				After 0030	Leq, night	32.8	34.2	0.0	-	-	36.6	47	OK				
									Leq, 24hr	36.5	29.4	41.9	24.4	4.8	43.2						
									Lmax	44.4	34.2	43.7	26.1	6.6	44.4						

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

					for 30min	At NSR, no shield												At NSR, incl façade			
	Segment	Hor D	Angle	SEL	SEL	Leq		Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq	Lmax		Shadow zone?
		m	Deg	15m	NSR	NSR			mPD	m	m	m	m	m	m				NSR		
Track 1 Short Train	1	53	9.2	86.1	67.7	35.1		Barrier	15	3.5	18	35	1.2	53.0	0.2	10.8	10.8	27.3	42.0		Yes
	2	53	11.2	86.1	68.6	36.0		Main Bldg	15	14.6	34	19	1.2	53.0	6.5	15.0	15.0	24.0	38.7		Yes
Track 2 Short Train	1	68	15.2	86.1	68.8	36.2		Barrier	15	3.5	26	42	1.2	68.0	0.1	9.4	9.4	29.8	44.4		Yes
	2	68	10.3	86.1	67.1	34.5		Main Bldg	15	14.6	48	20	1.2	68.0	5.6	15.0	15.0	22.5	37.2		Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet "SS2".

	At NSR, incl façade	
	Leq	Lmax
		NSR
Move to shunting track	28.9	42.0
Return to stabling track	30.5	44.4

At NSR, incl façade			Noise criteria			
	Leq		Leq	Status		Lmax
	Total					NSR
1 short train	32.8					
Day: 6 short	37.6		49	OK		44.4
Night: 2 short	32.8		47	OK		44.4

Idling in Shed

				Direction		At NSR, no shield												At NSR, incl façade			
		Hor D	Exit Angle	Correction	Lw	Leq	Louvre Reduction	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq			Shadow zone?
		m	Deg			NSR	dB		mPD	m	m	m	m	m	m						
at Gate		585	178.5	23.7	93.5	6.4	-	-	15		585			585.0	1.8	0.0	0.0	9.4			-
at Side Louvre 1		552	-	0	88.7	25.9	-9	-	15		552			552.0	1.8	0.0	0.0	19.9			-
at Side Louvre 2		488	-	0	88.7	27.0	-9	-	15		488			488.0	1.8	0.0	0.0	21.0			-
at Side Louvre 3		423	-	0	88.7	28.2	-9	-	15		423			423.0	1.8	0.0	0.0	22.2			-
at Side Louvre 4		359	-	0	88.7	29.6	-9	-	15		359			359.0	1.8	0.0	0.0	23.6			-
at Side Louvre 5		295	-	0	88.7	31.3	-9	-	15		295			295.0	1.8	0.0	0.0	25.3			-
at Side Louvre 6		230	-	0	88.7	33.5	-9	-	15		230			230.0	1.8	0.0	0.0	27.5			-
at Side Louvre 7		166	-	0	88.7	36.3	-9	-	15		166			166.0	1.8	0.0	0.0	30.3			-
at Roof Skylight 1		552	-	6	0.0	-68.8	-	-	15		552			552.0	1.8	0.0	0.0	-65.8			-
at Roof Skylight 2		488	-	6	0.0	-67.8	-	-	15		488			488.0	1.8	0.0	0.0	-64.8			-
at Roof Skylight 3		424	-	6	0.0	-66.5	-	-	15		424			424.0	1.8	0.0	0.0	-63.5			-
at Roof Skylight 4		359	-	6	0.0	-65.1	-	-	15		359			359.0	1.8	0.0	0.0	-62.1			-
at Roof Skylight 5		295	-	6	0.0	-63.4	-	-	15		295			295.0	1.8	0.0	0.0	-60.4			-
at Roof Skylight 6		231	-	6	0.0	-61.3	-	-	15		231			231.0	1.8	0.0	0.0	-58.3			-
at Roof Skylight 7		167	-	6	0.0	-58.5	-	-	15		167			167.0	1.8	0.0	0.0	-55.5			-

At NSR, incl façade			Noise criteria			
	Leq		Leq	Status		Lmax
	Total					NSR
1 long train	34.2					34.2
Day: 0 long	0.0		49	OK		0.0
Night: 1 long	34.2		47	OK		34.2

Idling outside

Day

					for 30min	At NSR, no shield, 1hr												At NSR, incl façade			
		Hor D	Angle	Leq	Leq	Leq		Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq, day			Shadow zone?
		m	Deg	7.5m	NSR	NSR			mPD	m	m	m	m	m	m						
1 Short Train		68	15.2	70	50.1	50.1		Barrier	15	3.5	26	42	1.2	68.0	0.1	9.4	9.4	43.7			Yes

Others

Day

					for 30min	At NSR, no shield, 1hr												At NSR, incl façade			
		Hor D	Leq	Lw	Leq	Leq		Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq, day			Shadow zone?
		m	6m		NSR	NSR			mPD	m	m	m	m	m	m						
Crane		156		90	38.1	38.1		Main Bldg	15	14.6	52	104	3	156.0	2.1	15.0	15.0	26.1			Yes
Car Wash		892	62		18.6	18.6		Main Bldg	15	14.6	788	104	3	892.0	0.9	15.0	15.0	6.6			Yes

SSS Calculation at NSR SS14 — Mitigated

Barrier height (m)= 10

NSR	No. of Storey	Ground Level mPD	Hr m	ASR
SS14	3	17	7.5	B

Result:

		Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
	Leq, day	40.5	0.0	44.2	24.1	23.5	45.8	49	OK
After 0030	Leq, night	35.8	31.6	0.0	-	-	37.2	47	OK
	Leq, 24hr	39.4	26.9	42.5	22.3	21.7	44.4		
	Lmax	44.7	31.6	44.2	24.1	23.5	44.7		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D m	Angle Deg	SEL 15m	SEL for 30min NSR	Leq At NSR, no shield NSR	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	Leq At NSR, incl façade	Lmax NSR	Shadow zone?
Track 1 Short Train	1	93	62.8	86.1	73.6	41.0	Barrier	15	10	3	90	1.2	93.4	5.9	15.0	15.0	29.0	43.6	Yes
	2	93	80.2	86.1	74.7	42.1	Barrier	15	10	3	90	1.2	93.4	5.9	15.0	15.0	30.1	44.7	Yes
	3	93	3.8	86.1	61.4	28.8	Barrier2	15	8	51	42	1.2	93.4	0.1	8.6	8.6	23.2	37.8	Yes
Track 2 Short Train	1	128	56.9	86.1	71.8	39.2	Barrier	15	10	38	90	1.2	128.3	0.7	15.0	15.0	27.2	41.6	Yes
	2	128	80.2	86.1	73.3	40.7	Barrier	15	10	38	90	1.2	128.3	0.7	15.0	15.0	28.7	43.1	Yes
	3	128	3.8	86.1	60.0	27.4	Barrier2	15	8	86	42	1.2	128.3	0.0	3.6	3.6	26.8	41.3	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet "SS2".

	At NSR, incl façade Leq	Lmax NSR
Move to shunting track	33.1	44.7
Return to stabling track	32.4	43.1

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 short train	35.8			
Day: 6 short	40.5	49	OK	44.7
Night: 2 short	35.8	47	OK	44.7

Idling in Shed

	Hor D m	Exit Angle Deg	Direction Correction	Lw	Leq At NSR, no shield NSR	Louvre Reduction dB	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	Leq At NSR, incl façade	Shadow zone?
at Gate	206	134.7	15.0	93.5	24.2	-	Barrier	15	10	147	59	3.5	206.1	0.1	6.2	6.2	21.1	Yes
at Side Louvre 1	173	-	0	88.7	36.0	-9	Barrier	15	10	116	57	3.8	173.1	0.1	7.1	7.1	22.9	Yes
at Side Louvre 2	140	-	0	88.7	37.8	-9	Barrier	15	10	94	46	3.8	140.1	0.1	7.9	7.9	23.9	Yes
at Side Louvre 3	133	-	0	88.7	38.3	-9	Barrier	15	10	89	44	3.8	133.1	0.1	8.1	8.1	24.2	Yes
at Side Louvre 4	155	-	0	88.7	36.9	-9	Barrier	15	10	104	51	3.8	155.1	0.1	7.5	7.5	23.5	Yes
at Side Louvre 5	196	-	0	88.7	34.9	-9	Barrier	15	10	131	65	3.8	196.1	0.1	6.6	6.6	22.3	Yes
at Side Louvre 6	248	-	0	88.7	32.9	-9	Barrier	15	10	166	82	3.8	248.1	0.1	5.7	5.7	21.1	Yes
at Side Louvre 7	304	-	0	88.7	31.1	-9	Barrier	15	10	203	101	3.8	304.1	0.0	5.1	5.1	20.0	Yes
at Roof Skylight 1	184	-	6	0.0	-59.3	-	Barrier	15	10	129	55	10.1	184.0	0.0	0.3	0.3	-56.6	Yes
at Roof Skylight 2	153	-	6	0.0	-57.7	-	Barrier	15	10	107	46	10.1	153.0	0.0	0.3	0.3	-55.0	Yes
at Roof Skylight 3	147	-	6	0.0	-57.3	-	Barrier	15	10	103	44	10.1	147.0	0.0	0.3	0.3	-54.7	Yes
at Roof Skylight 4	167	-	6	0.0	-58.5	-	Barrier	15	10	117	50	10.1	167.0	0.0	0.3	0.3	-55.7	Yes
at Roof Skylight 5	206	-	6	0.0	-60.3	-	Barrier	15	10	145	61	10.1	206.0	0.0	0.2	0.2	-57.5	Yes
at Roof Skylight 6	256	-	6	0.0	-62.2	-	Barrier	15	10	180	76	10.1	256.0	0.0	0.2	0.2	-59.4	Yes
at Roof Skylight 7	311	-	6	0.0	-63.9	-	Barrier	15	10	218	93	10.1	311.0	0.0	0.2	0.2	-61.0	Yes

	At NSR, incl façade Leq Total	Noise criteria Leq	Status	Lmax NSR
1 long train	31.6			31.6
Day: 0 long	0.0	49	OK	0.0
Night: 1 long	31.6	47	OK	31.6

Idling outside — Day

	Hor D m	Angle Deg	Leq 7.5m	Leq for 30min NSR	Leq At NSR, no shield, 1hr NSR	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
1 Short Train	123	112.4	70	56.2	56.2	Barrier	15	10	33	90	1.2	123.3	0.9	15.0	15.0	44.2	Yes

Others — Day

	Hor D m	Leq 6m	Lw	Leq for 30min NSR	Leq At NSR, no shield, 1hr NSR	Shield	Track Level mPD	Hb m	Dsb m	Dbr m	Hs m	D m	P m	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
Crane	198		90	36.1	36.1	Mainten' Shed	15	10.1	25	173	3	198.1	0.9	15.0	15.0	24.1	Yes
Car Wash	455	62		24.4	24.4	Vent Build	15	7.3	135	320	3	455.0	0.0	3.9	3.9	23.5	Yes

SSS Calculation at NSR SS15 — Mitigated

Barrier height (m)= 10

NSR	No. of	Ground Level	Hr	ASR		Result:	Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
SS15	Storey	mPD	m			Leq, day	41.0	0.0	45.2	25.2	13.9	46.6	49	OK
	3	15.7	7.5	B	After 0030	Leq, night	36.2	29.6	0.0	-	-	37.1	47	OK
						Leq, 24hr	39.9	24.9	43.5	23.5	12.2	45.1		
						Lmax	47.1	29.6	45.2	25.2	13.9	47.1		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D	Angle	SEL	for 30min SEL	At NSR, no shield Leq	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq	Lmax	Shadow zone?
		m	Deg	15m	NSR	NSR		mPD	m	m	m	m	m	m				NSR	
Track 1 Short Train	1	78	116.9	86.1	77.1	44.5	Barrier	15	10	4	74	1.2	78.3	5.4	15.0	15.0	32.5	47.1	Yes
	2	78	22.5	86.1	69.9	37.3	Barrier	15	10	4	74	1.2	78.3	5.4	15.0	15.0	25.3	40.0	Yes
	3	78	9.8	86.1	66.3	33.7	Barrier	15	10	4	74	1.2	78.3	5.4	15.0	15.0	21.7	36.4	Yes
	4	78	3	86.1	61.2	28.6	Barrier2	15	8	51	27	1.2	78.3	0.1	9.6	9.6	21.9	36.6	Yes
Track 2 Short Train	1	113	110.3	86.1	75.2	42.6	Barrier	15	10	39	74	1.2	113.2	0.8	15.0	15.0	30.6	45.1	Yes
	2	113	22.5	86.1	68.3	35.7	Barrier	15	10	39	74	1.2	113.2	0.8	15.0	15.0	23.7	38.2	Yes
	3	113	9.8	86.1	64.7	32.1	Barrier	15	10	39	74	1.2	113.2	0.8	15.0	15.0	20.1	34.6	Yes
	4	113	3	86.1	59.5	27.0	Barrier2	15	8	86	27	1.2	113.2	0.1	5.8	5.8	24.2	38.7	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet "SS2".

	At NSR, incl façade Leq	Lmax
		NSR
Move to shunting track	33.8	47.1
Return to stabling track	32.4	45.1

	At NSR, incl façade Leq	Noise criteria Leq	Status	Lmax
	Total			NSR
1 short train	36.2			
Day: 6 short	41.0	49	OK	47.1
Night: 2 short	36.2	47	OK	47.1

Idling in Shed

	Hor D	Exit Angle	Direction Correction	Lw	At NSR, no shield Leq	Louvre Reduction	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq	Shadow zone?
	m	Deg			NSR	dB		mPD	m	m	m	m	m	m				
at Gate	222	143.8	16.8	93.5	21.8	-	Barrier	15	10	177	45	3.5	222.0	0.1	8.5	8.5	16.3	Yes
at Side Louvre 1	187	-	0	88.7	35.3	-9	Barrier	15	10	141	46	3.8	187.1	0.1	9.0	9.0	20.3	Yes
at Side Louvre 2	142	-	0	88.7	37.7	-9	Barrier	15	10	107	35	3.8	142.1	0.2	10.2	10.2	21.5	Yes
at Side Louvre 3	118	-	0	88.7	39.3	-9	Barrier	15	10	89	29	3.8	118.1	0.2	10.9	10.9	22.4	Yes
at Side Louvre 4	126	-	0	88.7	38.7	-9	Barrier	15	10	95	31	3.8	126.1	0.2	10.7	10.7	22.1	Yes
at Side Louvre 5	161	-	0	88.7	36.6	-9	Barrier	15	10	122	39	3.8	161.1	0.1	9.6	9.6	21.0	Yes
at Side Louvre 6	211	-	0	88.7	34.3	-9	Barrier	15	10	160	51	3.8	211.0	0.1	8.5	8.5	19.8	Yes
at Side Louvre 7	267	-	0	88.7	32.2	-9	Barrier	15	10	202	65	3.8	267.0	0.1	7.5	7.5	18.7	Yes
at Roof Skylight 1	196	-	6	0.0	-59.8	-	Barrier	15	10	153	43	10.1	196.0	0.0	3.8	3.8	-60.7	Yes
at Roof Skylight 2	154	-	6	0.0	-57.8	-	Barrier	15	10	120	34	10.1	154.0	0.0	4.5	4.5	-59.3	Yes
at Roof Skylight 3	132	-	6	0.0	-56.4	-	Barrier	15	10	103	29	10.1	132.0	0.0	5.0	5.0	-58.4	Yes
at Roof Skylight 4	139	-	6	0.0	-56.9	-	Barrier	15	10	109	30	10.1	139.0	0.0	4.9	4.9	-58.8	Yes
at Roof Skylight 5	172	-	6	0.0	-58.7	-	Barrier	15	10	135	37	10.1	172.0	0.0	4.3	4.3	-60.0	Yes
at Roof Skylight 6	219	-	6	0.0	-60.8	-	Barrier	15	10	171	48	10.1	219.0	0.0	3.5	3.5	-61.3	Yes
at Roof Skylight 7	273	-	6	0.0	-62.7	-	Barrier	15	10	214	59	10.1	273.0	0.0	3.0	3.0	-62.8	Yes

	At NSR, incl façade Leq	Noise criteria Leq	Status	Lmax
	Total			NSR
1 long train	29.6			29.6
Day: 0 long	0.0	49	OK	0.0
Night: 1 long	29.6	47	OK	29.6

Idling outside — Day

	Hor D	Angle	Leq	for 30min Leq	At NSR, no shield, 1hr Leq	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
	m	Deg	7.5m	NSR	NSR		mPD	m	m	m	m	m	m				
1 Short Train	108	123.8	70	57.2	57.2	Barrier	15	10	33	75	1.2	108.2	0.9	15.0	15.0	45.2	Yes

Others — Day

	Hor D	Leq	Lw	for 30min Leq	At NSR, no shield, 1hr Leq	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	At NSR, incl façade Leq, day	Shadow zone?
	m	6m		NSR	NSR		mPD	m	m	m	m	m	m				
Crane	173		90	37.2	37.2	Mainten' Shed	15	10.1	23	150	3	173.1	1.0	15.0	15.0	25.2	Yes
Car Wash	487	62		23.8	23.8	Vent Build	15	13.1	178	309	3	487.0	0.3	12.9	12.9	13.9	Yes

SSS Calculation at NSR SS20 — Mitigated

Barrier height (m)= 12 (relative to rail level 15mPD; equivalent to 5m high barrier top at 27mPD on ground level 22mPD)

NSR	No. of Storey	Ground Level	Hr	ASR		Result:	Shunting	Idle in shed	Idle outside	Crane	Wash	Total	Criteria Leq	Status
SS20	Storey	mPD	m			Leq, day	38.6	0.0	32.8	16.9	27.9	39.9	49	OK
	2	22.2	4.5	B	After 0030	Leq, night	33.8	30.8	0.0	-	-	35.6	40	OK
						Leq, 24hr	37.5	26.0	31.0	15.2	26.2	38.9		
						Lmax	43.9	30.8	32.8	16.9	27.9	43.9		

Shunting

Remark: plus 10log(2) is for converting of Leq(30min) to Leq(1hr).

	Segment	Hor D	Angle	SEL	SEL (for 30min)	Leq (At NSR, no shield)	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq (At NSR, incl façade)	Lmax	Shadow zone?
		m	Deg	15m	NSR	NSR		mPD	m	m	m	m	m	m				NSR	
Track 1 Short Train	1a	52	36.4	86.1	73.8	41.2	Barrier	14.2	12	21	31	1.2	53.2	1.4	15.0	15.0	29.2	43.9	Yes
	1b	52	18.6	86.1	70.8	38.2	Barrier	14.2	12	21	31	1.2	53.2	1.4	15.0	15.0	26.2	41.0	Yes
	2	52	2.5	86.1	62.1	29.5	Barrier	15	12	21	31	1.2	53.0	1.6	15.0	15.0	17.5	32.2	Yes
Track 2 Short Train	1a	57	36.4	86.1	73.4	40.8	Barrier	14.2	12	26	31	1.2	58.1	1.0	15.0	15.0	28.8	43.5	Yes
	1b	57	12.1	86.1	68.6	36.0	Barrier	14.2	12	26	31	1.2	58.1	1.0	15.0	15.0	24.0	38.7	Yes
	2	57	5.7	86.1	65.3	32.7	Barrier	15	12	26	31	1.2	58.0	1.2	15.0	15.0	20.7	35.4	Yes

Remark: For legend of parameters and remark for equations, please refers to the bottom of spreadsheet.

	Leq (At NSR, incl façade)	Lmax
		NSR
Move to shunting track	31.1	43.9
Return to stabling track	30.5	43.5

	At NSR, incl façade Leq	Noise criteria Leq	Status	Lmax
	Total			NSR
1 short train	33.8			
Day: 6 short	38.6	49	OK	43.9
Night: 2 short	33.8	40	OK	43.9

Idling in Shed

	Hor D	Exit Angle	Direction Correction	Lw	Leq (At NSR, no shield)	Louvre Reduction	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq (At NSR, incl façade)	Shadow zone?
	m	Deg			NSR	dB		mPD	m	m	m	m	m	m				
at Gate	418	18.7	2.1	93.5	31.0	-	Barrier	15	12	320	98	3.5	418.1	0.0	4.3	4.3	29.7	Yes
at Side Louvre 1	445	-	0	88.7	27.8	-9	Barrier	15	12	328	117	3.8	445.1	0.0	4.2	4.2	17.5	Yes
at Side Louvre 2	506	-	0	88.7	26.7	-9	Barrier	15	12	376	130	3.8	506.1	0.0	3.8	3.8	16.9	Yes
at Side Louvre 3	567	-	0	88.7	25.7	-9	Barrier	15	12	423	144	3.8	567.1	0.0	3.5	3.5	16.2	Yes
at Side Louvre 4	629	-	0	88.7	24.8	-9	Barrier	15	12	470	159	3.8	629.0	0.0	3.2	3.2	15.6	Yes
at Side Louvre 5	691	-	0	88.7	24.0	-9	Barrier	15	12	516	175	3.8	691.0	0.0	3.0	3.0	15.0	Yes
at Side Louvre 6	753	-	0	88.7	23.2	-9	Barrier	15	12	562	191	3.8	753.0	0.0	2.8	2.8	14.4	Yes
at Side Louvre 7	815	-	0	88.7	22.5	-9	Barrier	15	12	608	207	3.8	815.0	0.0	2.6	2.6	13.9	Yes
at Roof Skylight 1	449	-	6	0.0	-67.0	-	-	15		449			449.2	11.5	0.0	0.0	-64.0	-
at Roof Skylight 2	510	-	6	0.0	-68.2	-	-	15		510			510.1	11.6	0.0	0.0	-65.2	-
at Roof Skylight 3	571	-	6	0.0	-69.1	-	-	15		571			571.1	11.6	0.0	0.0	-66.1	-
at Roof Skylight 4	632	-	6	0.0	-70.0	-	-	15		632			632.1	11.6	0.0	0.0	-67.0	-
at Roof Skylight 5	694	-	6	0.0	-70.8	-	-	15		694			694.1	11.6	0.0	0.0	-67.8	-
at Roof Skylight 6	756	-	6	0.0	-71.6	-	-	15		756			756.1	11.6	0.0	0.0	-68.6	-
at Roof Skylight 7	818	-	6	0.0	-72.3	-	-	15		818			818.1	11.6	0.0	0.0	-69.3	-

	At NSR, incl façade Leq	Noise criteria Leq	Status	Lmax
	Total			NSR
1 long train	30.8			30.8
Day: 0 long	0.0	49	OK	0.0
Night: 1 long	30.8	40	OK	30.8

Idling outside — Day

	Hor D	Angle	Leq	Leq (for 30min)	Leq (At NSR, no shield, 1hr)	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq, day (At NSR, incl façade)	Shadow zone?
	m	Deg	7.5m	NSR	NSR		mPD	m	m	m	m	m	m				
1 Short Train	111	7.3	70	44.8	44.8	Barrier	15	10	34	77	1.2	111.5	0.6	15.0	15.0	32.8	Yes

Others — Day

	Hor D	Leq	Lw	Leq (for 30min)	Leq (At NSR, no shield, 1hr)	Shield	Track Level	Hb	Dsb	Dbr	Hs	D	P	A barrier	IL barrier	Leq, day (At NSR, incl façade)	Shadow zone?
	m	6m		NSR	NSR		mPD	m	m	m	m	m	m				
Crane	636		90	25.9	25.9	Mainten' Shed	15	10.1	84	552	3	636.1	0.2	12.0	12.0	16.9	Yes
Car Wash	114	62		36.4	36.4	Barrier	13.3	12	60	54	3	114.5	0.2	11.5	11.5	27.9	Yes

Commissioning Test - SSS Calculation Result for Fixed Plant at NSR

	Shunting				Train Idling in Shed				Train Idling outside				Crane Operation				Car Washing				Loco Shunting + Idling				Total			
NSR	Leq, day	Leq, night	Leq, 24h	Lmax	Leq, day	Leq, night	Leq, 24h	Lmax	Leq, day	Leq, night	Leq, 24h	Lmax	Leq, day	Leq, night	Leq, 24h	Lmax	Leq, day	Leq, night	Leq, 24h	Lmax	Leq, day	Leq, night	Leq, 24h	Lmax	Leq, day	Leq, night	Leq, 24h	Lmax
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
SS2	31.4	26.6	30.3	36.4	-	34.0	29.2	34.0	30.8	-	29.1	30.8	19.2	-	17.4	19.2	32.0	-	30.2	32.0	-	-	35.4	53.0	36.3	34.7	38.0	53.0
SS4	35.4	30.6	34.3	40.5	-	26.4	21.7	26.4	32.1	-	30.3	32.1	13.3	-	11.5	13.3	24.1	-	22.3	24.1	-	-	37.9	55.4	37.3	32.0	40.1	55.4
SS5	38.0	33.2	36.9	41.3	-	28.7	23.9	28.7	41.1	-	39.3	41.1	21.0	-	19.3	21.0	28.6	-	26.9	28.6	-	-	37.7	54.9	43.0	34.5	42.9	54.9
SS6	37.5	32.8	36.4	41.4	-	23.6	18.9	23.6	42.0	-	40.2	42.0	22.3	-	20.5	22.3	26.0	-	24.3	26.0	-	-	31.4	45.0	43.4	33.3	42.2	45.0
SS7	38.0	33.2	36.9	44.2	-	37.2	32.4	37.2	43.7	-	41.9	43.7	25.6	-	23.8	25.6	8.9	-	7.1	8.9	-	-	26.0	49.1	44.7	38.6	43.6	49.1
SS10	36.7	31.9	35.6	43.7	-	25.5	20.8	25.5	42.3	-	40.5	42.3	26.3	-	24.5	26.3	21.9	-	20.2	21.9	-	-	29.2	47.7	43.5	32.8	42.1	47.7
SS11a	41.0	36.2	39.9	45.8	-	38.7	34.0	38.7	40.0	-	38.2	40.0	24.8	-	23.0	24.8	28.8	-	27.1	28.8	-	-	39.2	61.0	43.7	40.7	44.4	61.0
SS12	37.6	32.8	36.5	44.4	-	34.2	29.4	34.2	43.7	-	41.9	43.7	26.1	-	24.4	26.1	6.6	-	4.8	6.6	-	-	29.1	45.0	44.7	36.6	43.4	45.0
SS14	40.5	35.8	39.4	44.7	-	31.6	26.9	31.6	44.2	-	42.5	44.2	24.1	-	22.3	24.1	23.5	-	21.7	23.5	-	-	35.1	50.7	45.8	37.2	44.8	50.7
SS15	41.0	36.2	39.9	47.1	-	29.6	24.9	29.6	45.2	-	43.5	45.2	25.2	-	23.5	25.2	13.9	-	12.2	13.9	-	-	34.6	53.1	46.6	37.1	45.5	53.1
SS20	38.6	33.8	37.5	43.9	-	30.8	26.0	30.8	32.8	-	31.0	32.8	16.9	-	15.2	16.9	27.9	-	26.2	27.9	-	-	40.1	59.1	39.9	35.6	42.5	59.1

Fixed Plant Noise Calculation at NSRs (SSS)

Noise Assessment Points	Time Period	Plant item	Distance, m [5]	SWL, dB(A)	Correction for line of sight, dB(A) [1]	Distance Correction, dB(A) [2]	Façade Correction, dB(A)	Corrected SPL[3], dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS2	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash[4]						36.3			
		Cooling Tower (3 nos.)	1010	86.8	0	-	3	-			
		RMS-AHU-4001	940	76.0	-10	-	3	-			
		RMS-AHU-4003	940	75.0	-10	-	3	-			
		RMS-AHU-4005	878	72.0	-10	-	3	-			
		RMS-AHU-4007	878	74.0	-10	-	3	-			
		RMS-AHU-4009	691	76.0	-10	-	3	-			
		RMS-AHU-4012	669	72.0	-10	-	3	-			
		RMS-AHU-4013	627	77.0	-10	-	3	-			
		RMS-AHU-4015	627	77.0	-10	-	3	-			
		SMB.GL.L.004	1040	77.0	-10	-	3	-			
		SMB.GL.L.005	1040	74.0	-10	-	3	-			
		SMB.U1.L.003B	1040	75.0	-10	-	3	-			
		SMB.U2.L.001B	1020	70.0	-10	-	3	-	36	49	Yes
	Nightime	Train Movement + Idling Noise[4]						34.7			
		Cooling Tower (1 nos.)	1010	82.0	0	-	3	-			
		RMS-AHU-4001	940	76.0	-10	-	3	-			
		RMS-AHU-4003	940	75.0	-10	-	3	-			
		RMS-AHU-4005	878	72.0	-10	-	3	-			
		RMS-AHU-4007	878	74.0	-10	-	3	-			
		RMS-AHU-4009	691	76.0	-10	-	3	-			
		RMS-AHU-4012	669	72.0	-10	-	3	-			
		RMS-AHU-4013	627	77.0	-10	-	3	-			
		RMS-AHU-4015	627	77.0	-10	-	3	-			
		SMB.GL.L.004	1040	77.0	-10	-	3	-			
		SMB.GL.L.005	1040	74.0	-10	-	3	-			
		SMB.U1.L.003B	1040	75.0	-10	-	3	-			
		SMB.U2.L.001B	1020	70.0	-10	-	3	-	35	39	Yes

Noise Assessment Points	Time Period	Plant item	Distance, m [5]	SWL, dB(A)	Correction for line of sight, dB(A) [1]	Distance Correction, dB(A) [2]	Façade Correction, dB(A)	Corrected SPL[3], dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS4	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash[4]						37.3			
		Cooling Tower (3 nos.)	892	86.8	0	-	3	-			
		RMS-AHU-4001	829	76.0	-10	-	3	-			
		RMS-AHU-4003	830	75.0	-10	-	3	-			
		RMS-AHU-4005	769	72.0	-10	-	3	-			
		RMS-AHU-4007	771	74.0	-10	-	3	-			
		RMS-AHU-4009	584	76.0	-10	-	3	-			
		RMS-AHU-4012	564	72.0	-10	-	3	-			
		RMS-AHU-4013	521	77.0	-10	-	3	-			
		RMS-AHU-4015	524	77.0	-10	-	3	-			
		SMB.GL.L.004	927	77.0	-10	-	3	-			
		SMB.GL.L.005	927	74.0	-10	-	3	-			
		SMB.U1.L.003B	927	75.0	-10	-	3	-			
		SMB.U2.L.001B	912	70.0	-10	-	3	-	37	49	Yes
	Nightime	Train Movement + Idling Noise[4]						32.0			
		Cooling Tower (1 nos.)	892	82.0	0	-	3	-			
		RMS-AHU-4001	829	76.0	-10	-	3	-			
		RMS-AHU-4003	830	75.0	-10	-	3	-			
		RMS-AHU-4005	769	72.0	-10	-	3	-			
		RMS-AHU-4007	771	74.0	-10	-	3	-			
		RMS-AHU-4009	584	76.0	-10	-	3	-			
		RMS-AHU-4012	564	72.0	-10	-	3	-			
		RMS-AHU-4013	521	77.0	-10	-	3	-			
		RMS-AHU-4015	524	77.0	-10	-	3	-			
		SMB.GL.L.004	927	77.0	-10	-	3	-			
		SMB.GL.L.005	927	74.0	-10	-	3	-			
		SMB.U1.L.003B	927	75.0	-10	-	3	-			
		SMB.U2.L.001B	912	70.0	-10	-	3	-	32	40	Yes

Noise Assessment Points	Time Period	Plant item	Distance, m [5]	SWL, dB(A)	Correction for line of sight, dB(A) [1]	Distance Correction, dB(A) [2]	Façade Correction, dB(A)	Corrected SPL[3], dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS5	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash[4]						43.0			
		Cooling Tower (3 nos.)	419	86.8	0	-	3	-			
		RMS-AHU-4001	365	76.0	-10	-	3	-			
		RMS-AHU-4003	369	75.0	-10	-	3	-			
		RMS-AHU-4005	315	72.0	-10	-	3	-			
		RMS-AHU-4007	320	74.0	-10	-	3	-			
		RMS-AHU-4009	206	76.0	-10	-54.3	3	14.7			
		RMS-AHU-4012	208	72.0	-10	-54.4	3	10.6			
		RMS-AHU-4013	198	77.0	-10	-53.9	3	16.1			
		RMS-AHU-4015	205	77.0	-10	-54.2	3	15.8			
		SMB.GL.L.004	460	77.0	-10	-	3	-			
		SMB.GL.L.005	460	74.0	-10	-	3	-			
		SMB.U1.L.003B	454	75.0	-10	-	3	-			
		SMB.U2.L.001B	457	70.0	-10	-	3	-	43	52	Yes
	Nightime	Train Movement + Idling Noise[4]						34.5			
		Cooling Tower (1 nos.)	419	82.0	0	-	3	-			
		RMS-AHU-4001	365	76.0	-10	-	3	-			
		RMS-AHU-4003	369	75.0	-10	-	3	-			
		RMS-AHU-4005	315	72.0	-10	-	3	-			
		RMS-AHU-4007	320	74.0	-10	-	3	-			
		RMS-AHU-4009	206	76.0	-10	-54.3	3	14.7			
		RMS-AHU-4012	208	72.0	-10	-54.4	3	10.6			
		RMS-AHU-4013	198	77.0	-10	-53.9	3	16.1			
		RMS-AHU-4015	205	77.0	-10	-54.2	3	15.8			
		SMB.GL.L.004	460	77.0	-10	-	3	-			
		SMB.GL.L.005	460	74.0	-10	-	3	-			
		SMB.U1.L.003B	454	75.0	-10	-	3	-			
		SMB.U2.L.001B	457	70.0	-10	-	3	-	35	45	Yes

Fixed Plant Noise Calculation at NSRs (SSS)

Noise Assessment Points	Time Period	Plant item	Distance, m [5]	SWL, dB(A)	Correction for line of sight, dB(A) [1]	Distance Correction, dB(A) [2]	Façade Correction, dB(A)	Corrected SPL[3], dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS6	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash[4]						43.4			
		Cooling Tower (3 nos.)	301	86.8	0	-	3	-			
		RMS-AHU-4001	264	76.0	-10	-56.4	3	12.6			
		RMS-AHU-4003	265	75.0	-10	-56.5	3	11.5			
		RMS-AHU-4005	227	72.0	-10	-55.1	3	9.9			
		RMS-AHU-4007	233	74.0	-10	-55.3	3	11.7			
		RMS-AHU-4009	221	76.0	-10	-54.9	3	14.1			
		RMS-AHU-4012	237	72.0	-10	-55.5	3	9.5			
		RMS-AHU-4013	250	77.0	-10	-56.0	3	14.0			
		RMS-AHU-4015	259	77.0	-10	-56.3	3	13.7			
		SMB.GL.L.004	343	77.0	-10	-	3	-			
		SMB.GL.L.005	343	74.0	-10	-	3	-			
		SMB.U1.L.003B	336	75.0	-10	-	3	-			
		SMB.U2.L.001B	344	70.0	-10	-	3	-	43	52	Yes
	Nightime	Train Movement + Idling Noise[4]						33.3			
		Cooling Tower (1 nos.)	301	82.0	0	-	3	-			
		RMS-AHU-4001	264	76.0	-10	-56.4	3	12.6			
		RMS-AHU-4003	265	75.0	-10	-56.5	3	11.5			
		RMS-AHU-4005	227	72.0	-10	-55.1	3	9.9			
		RMS-AHU-4007	233	74.0	-10	-55.3	3	11.7			
		RMS-AHU-4009	221	76.0	-10	-54.9	3	14.1			
		RMS-AHU-4012	237	72.0	-10	-55.5	3	9.5			
		RMS-AHU-4013	250	77.0	-10	-56.0	3	14.0			
		RMS-AHU-4015	259	77.0	-10	-56.3	3	13.7			
		SMB.GL.L.004	343	77.0	-10	-	3	-			
		SMB.GL.L.005	343	74.0	-10	-	3	-			
		SMB.U1.L.003B	336	75.0	-10	-	3	-			
		SMB.U2.L.001B	344	70.0	-10	-	3	-	34	45	Yes

Noise Assessment Points	Time Period	Plant item	Distance, m [5]	SWL, dB(A)	Correction for line of sight, dB(A) [1]	Distance Correction, dB(A) [2]	Façade Correction, dB(A)	Corrected SPL[3], dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS7	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash[4]						44.7			
		Cooling Tower (3 nos.)	114	86.8	0	-49.1	3	40.7			
		RMS-AHU-4001	142	76.0	-10	-51.0	3	18.0			
		RMS-AHU-4003	149	75.0	-10	-51.5	3	16.5			
		RMS-AHU-4005	186	72.0	-10	-53.4	3	11.6			
		RMS-AHU-4007	191	74.0	-10	-53.6	3	13.4			
		RMS-AHU-4009	353	76.0	-10	-	3	-			
		RMS-AHU-4012	377	72.0	-10	-	3	-			
		RMS-AHU-4013	414	77.0	-10	-	3	-			
		RMS-AHU-4015	417	77.0	-10	-	3	-			
		SMB.GL.L.004	140	77.0	-10	-50.9	3	19.1			
		SMB.GL.L.005	140	74.0	-10	-50.9	3	16.1			
		SMB.U1.L.003B	129	75.0	-10	-50.2	3	17.8			
		SMB.U2.L.001B	156	70.0	-10	-51.9	3	11.1	46	49	Yes
	Nightime	Train Movement + Idling Noise[4]						38.6			
		Cooling Tower (1 nos.)	114	82.0	0	-49.1	3	35.9			
		RMS-AHU-4001	142	76.0	-10	-51.0	3	18.0			
		RMS-AHU-4003	149	75.0	-10	-51.5	3	16.5			
		RMS-AHU-4005	186	72.0	-10	-53.4	3	11.6			
		RMS-AHU-4007	191	74.0	-10	-53.6	3	13.4			
		RMS-AHU-4009	353	76.0	-10	-	3	-			
		RMS-AHU-4012	377	72.0	-10	-	3	-			
		RMS-AHU-4013	414	77.0	-10	-	3	-			
		RMS-AHU-4015	417	77.0	-10	-	3	-			
		SMB.GL.L.004	140	77.0	-10	-50.9	3	19.1			
		SMB.GL.L.005	140	74.0	-10	-50.9	3	16.1			
		SMB.U1.L.003B	129	75.0	-10	-50.2	3	17.8			
		SMB.U2.L.001B	156	70.0	-10	-51.9	3	11.1	41	47	Yes

Noise Assessment Points	Time Period	Plant item	Distance, m [5]	SWL, dB(A)	Correction for line of sight, dB(A) [1]	Distance Correction, dB(A) [2]	Façade Correction, dB(A)	Corrected SPL[3], dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS10	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash[4]						43.5			
		Cooling Tower (3 nos.)	104	86.8	-10	-48.3	3	31.5			
		RMS-AHU-4001	172	76.0	-10	-52.7	3	16.3			
		RMS-AHU-4003	174	75.0	-10	-52.8	3	15.2			
		RMS-AHU-4005	232	72.0	-10	-55.3	3	9.7			
		RMS-AHU-4007	234	74.0	-10	-55.4	3	11.6			
		RMS-AHU-4009	419	76.0	-10	-	3	-			
		RMS-AHU-4012	441	72.0	-10	-	3	-			
		RMS-AHU-4013	482	77.0	-10	-	3	-			
		RMS-AHU-4015	482	77.0	-10	-	3	-			
		SMB.GL.L.004	95	77.0	0	-47.6	3	32.4			
		SMB.GL.L.005	95	74.0	0	-47.6	3	29.4			
		SMB.U1.L.003B	89	75.0	0	-47.0	3	31.0			
		SMB.U2.L.001B	103	70.0	-10	-48.3	3	14.7	44	49	Yes
	Nightime	Train Movement + Idling Noise[4]						32.8			
		Cooling Tower (1 nos.)	104	82.0	-10	-48.3	3	26.7			
		RMS-AHU-4001	172	76.0	-10	-52.7	3	16.3			
		RMS-AHU-4003	174	75.0	-10	-52.8	3	15.2			
		RMS-AHU-4005	232	72.0	-10	-55.3	3	9.7			
		RMS-AHU-4007	234	74.0	-10	-55.4	3	11.6			
		RMS-AHU-4009	419	76.0	-10	-	3	-			
		RMS-AHU-4012	441	72.0	-10	-	3	-			
		RMS-AHU-4013	482	77.0	-10	-	3	-			
		RMS-AHU-4015	482	77.0	-10	-	3	-			
		SMB.GL.L.004	95	77.0	0	-47.6	3	32.4			
		SMB.GL.L.005	95	74.0	0	-47.6	3	29.4			
		SMB.U1.L.003B	89	75.0	0	-47.0	3	31.0			
		SMB.U2.L.001B	103	70.0	-10	-48.3	3	14.7	38	47	Yes

Fixed Plant Noise Calculation at NSRs (SSS)

Noise Assessment Points	Time Period	Plant item	Distance, m (5)	SWL, dB(A)	Correction for line of sight, dB(A) (1)	Distance Correction, dB(A) (2)	Façade Correction, dB(A)	Corrected SPL(3), dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS11a	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash(4)						43.7			
		Cooling Tower (3 nos.)	529	86.8	0	-	3	-			
		RMS-AHU-4001	470	76.0	-10	-	3	-			
		RMS-AHU-4003	467	75.0	-10	-	3	-			
		RMS-AHU-4005	408	72.0	-10	-	3	-			
		RMS-AHU-4007	406	74.0	-10	-	3	-			
		RMS-AHU-4009	227	76.0	-10	-55.1	3	13.9			
		RMS-AHU-4012	205	72.0	-10	-54.2	3	10.8			
		RMS-AHU-4013	170	77.0	-10	-52.6	3	17.4			
		RMS-AHU-4015	167	77.0	-10	-52.5	3	17.5			
		SMB.GL.L.004	559	77.0	-10	-	3	-			
		SMB.GL.L.005	559	74.0	-10	-	3	-			
		SMB.U1.L.003B	561	75.0	-10	-	3	-			
		SMB.U2.L.001B	547	70.0	-10	-	3	-	44	52	Yes
	Nightime	Train Movement + Idling Noise(4)						40.7			
		Cooling Tower (1 nos.)	529	82.0	0	-	3	-			
		RMS-AHU-4001	470	76.0	-10	-	3	-			
		RMS-AHU-4003	467	75.0	-10	-	3	-			
		RMS-AHU-4005	408	72.0	-10	-	3	-			
		RMS-AHU-4007	406	74.0	-10	-	3	-			
		RMS-AHU-4009	227	76.0	-10	-55.1	3	13.9			
		RMS-AHU-4012	205	72.0	-10	-54.2	3	10.8			
		RMS-AHU-4013	170	77.0	-10	-52.6	3	17.4			
		RMS-AHU-4015	167	77.0	-10	-52.5	3	17.5			
		SMB.GL.L.004	559	77.0	-10	-	3	-			
		SMB.GL.L.005	559	74.0	-10	-	3	-			
		SMB.U1.L.003B	561	75.0	-10	-	3	-			
		SMB.U2.L.001B	547	70.0	-10	-	3	-	41	50	Yes

Noise Assessment Points	Time Period	Plant item	Distance, m (5)	SWL, dB(A)	Correction for line of sight, dB(A) (1)	Distance Correction, dB(A) (2)	Façade Correction, dB(A)	Corrected SPL(3), dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS12	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash(4)						44.7			
		Cooling Tower (3 nos.)	140	86.8	-10	-50.9	3	28.9			
		RMS-AHU-4001	211	76.0	-10	-54.5	3	14.5			
		RMS-AHU-4003	211	75.0	-10	-54.5	3	13.5			
		RMS-AHU-4005	272	72.0	-10	-56.7	3	8.3			
		RMS-AHU-4007	272	74.0	-10	-56.7	3	10.3			
		RMS-AHU-4009	459	76.0	-10	-	3	-			
		RMS-AHU-4012	481	72.0	-10	-	3	-			
		RMS-AHU-4013	523	77.0	-10	-	3	-			
		RMS-AHU-4015	523	77.0	-10	-	3	-			
		SMB.GL.L.004	112	77.0	0	-49.0	3	31.0			
		SMB.GL.L.005	112	74.0	0	-49.0	3	28.0			
		SMB.U1.L.003B	112	75.0	0	-49.0	3	29.0			
		SMB.U2.L.001B	116	70.0	-10	-49.3	3	13.7	45	49	Yes
	Nightime	Train Movement + Idling Noise(4)						36.6			
		Cooling Tower (1 nos.)	140	82.0	-10	-50.9	3	24.1			
		RMS-AHU-4001	211	76.0	-10	-54.5	3	14.5			
		RMS-AHU-4003	211	75.0	-10	-54.5	3	13.5			
		RMS-AHU-4005	272	72.0	-10	-56.7	3	8.3			
		RMS-AHU-4007	272	74.0	-10	-56.7	3	10.3			
		RMS-AHU-4009	459	76.0	-10	-	3	-			
		RMS-AHU-4012	481	72.0	-10	-	3	-			
		RMS-AHU-4013	523	77.0	-10	-	3	-			
		RMS-AHU-4015	523	77.0	-10	-	3	-			
		SMB.GL.L.004	112	77.0	0	-49.0	3	31.0			
		SMB.GL.L.005	112	74.0	0	-49.0	3	28.0			
		SMB.U1.L.003B	112	75.0	0	-49.0	3	29.0			
		SMB.U2.L.001B	116	70.0	-10	-49.3	3	13.7	39	47	Yes

Noise Assessment Points	Time Period	Plant item	Distance, m (5)	SWL, dB(A)	Correction for line of sight, dB(A) (1)	Distance Correction, dB(A) (2)	Façade Correction, dB(A)	Corrected SPL(3), dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS14	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash(4)						45.8			
		Cooling Tower (3 nos.)	334	86.8	0	-	3	-			
		RMS-AHU-4001	278	76.0	-10	-56.9	3	12.1			
		RMS-AHU-4003	282	75.0	-10	-57.0	3	11.0			
		RMS-AHU-4005	228	72.0	-10	-55.2	3	9.8			
		RMS-AHU-4007	233	74.0	-10	-55.3	3	11.7			
		RMS-AHU-4009	147	76.0	-10	-51.3	3	17.7			
		RMS-AHU-4012	157	72.0	-10	-51.9	3	13.1			
		RMS-AHU-4013	165	77.0	-10	-52.3	3	17.7			
		RMS-AHU-4015	171	77.0	-10	-52.7	3	17.3			
		SMB.GL.L.004	374	77.0	-10	-	3	-			
		SMB.GL.L.005	374	74.0	-10	-	3	-			
		SMB.U1.L.003B	369	75.0	-10	-	3	-			
		SMB.U2.L.001B	370	70.0	-10	-	3	-	46	49	Yes
	Nightime	Train Movement + Idling Noise(4)						37.2			
		Cooling Tower (1 nos.)	334	82.0	0	-	3	-			
		RMS-AHU-4001	278	76.0	-10	-56.9	3	12.1			
		RMS-AHU-4003	282	75.0	-10	-57.0	3	11.0			
		RMS-AHU-4005	228	72.0	-10	-55.2	3	9.8			
		RMS-AHU-4007	233	74.0	-10	-55.3	3	11.7			
		RMS-AHU-4009	147	76.0	-10	-51.3	3	17.7			
		RMS-AHU-4012	157	72.0	-10	-51.9	3	13.1			
		RMS-AHU-4013	165	77.0	-10	-52.3	3	17.7			
		RMS-AHU-4015	171	77.0	-10	-52.7	3	17.3			
		SMB.GL.L.004	374	77.0	-10	-	3	-			
		SMB.GL.L.005	374	74.0	-10	-	3	-			
		SMB.U1.L.003B	369	75.0	-10	-	3	-			
		SMB.U2.L.001B	370	70.0	-10	-	3	-	37	47	Yes

Fixed Plant Noise Calculation at NSRs (SSS)

Noise Assessment Points	Time Period	Plant item	Distance, m [5]	SWL, dB(A)	Correction for line of sight, dB(A) [1]	Distance Correction, dB(A) [2]	Façade Correction, dB(A)	Corrected SPL[3], dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS15	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash[4]						46.6			
		Cooling Tower (3 nos.)	289	86.8	0	-57.2	3	32.6			
		RMS-AHU-4001	237	76.0	-10	-55.5	3	13.5			
		RMS-AHU-4003	239	75.0	-10	-55.6	3	12.4			
		RMS-AHU-4005	185	72.0	-10	-53.3	3	11.7			
		RMS-AHU-4007	190	74.0	-10	-53.6	3	13.4			
		RMS-AHU-4009	136	76.0	-10	-50.7	3	18.3			
		RMS-AHU-4012	151	72.0	-10	-51.6	3	13.4			
		RMS-AHU-4013	171	77.0	-10	-52.7	3	17.3			
		RMS-AHU-4015	176	77.0	-10	-52.9	3	17.1			
		SMB.GL.L.004	330	77.0	-10	-	3	-			
		SMB.GL.L.005	330	74.0	-10	-	3	-			
		SMB.U1.L.003B	324	75.0	-10	-	3	-			
		SMB.U2.L.001B	323	70.0	-10	-	3	-	47	49	Yes
	Nightime	Train Movement + Idling Noise[4]						37.1			
		Cooling Tower (1 nos.)	289	82.0	0	-57.2	3	27.8			
		RMS-AHU-4001	237	76.0	-10	-55.5	3	13.5			
		RMS-AHU-4003	239	75.0	-10	-55.6	3	12.4			
		RMS-AHU-4005	185	72.0	-10	-53.3	3	11.7			
		RMS-AHU-4007	190	74.0	-10	-53.6	3	13.4			
		RMS-AHU-4009	136	76.0	-10	-50.7	3	18.3			
		RMS-AHU-4012	151	72.0	-10	-51.6	3	13.4			
		RMS-AHU-4013	171	77.0	-10	-52.7	3	17.3			
		RMS-AHU-4015	176	77.0	-10	-52.9	3	17.1			
		SMB.GL.L.004	330	77.0	-10	-	3	-			
		SMB.GL.L.005	330	74.0	-10	-	3	-			
		SMB.U1.L.003B	324	75.0	-10	-	3	-			
		SMB.U2.L.001B	323	70.0	-10	-	3	-	38	47	Yes

Noise Assessment Points	Time Period	Plant item	Distance, m [5]	SWL, dB(A)	Correction for line of sight, dB(A) [1]	Distance Correction, dB(A) [2]	Façade Correction, dB(A)	Corrected SPL[3], dB(A)	Total SPL, dB(A)	Noise Criteria, dB(A)	Compliance (Yes/No)
SS20	Daytime and Evening	Train Movement + Idling Noise + Gantry Crane + Train Wash[4]						39.9			
		Cooling Tower (3 nos.)	846	86.8	0	-	3	-			
		RMS-AHU-4001	784	76.0	-10	-	3	-			
		RMS-AHU-4003	786	75.0	-10	-	3	-			
		RMS-AHU-4005	723	72.0	-10	-	3	-			
		RMS-AHU-4007	725	74.0	-10	-	3	-			
		RMS-AHU-4009	540	76.0	-10	-	3	-			
		RMS-AHU-4012	521	72.0	-10	-	3	-			
		RMS-AHU-4013	478	77.0	-10	-	3	-			
		RMS-AHU-4015	480	77.0	-10	-	3	-			
		SMB.GL.L.004	882	77.0	-10	-	3	-			
		SMB.GL.L.005	882	74.0	-10	-	3	-			
		SMB.U1.L.003B	880	75.0	-10	-	3	-			
		SMB.U2.L.001B	874	70.0	-10	-	3	-	40	49	Yes
	Nightime	Train Movement + Idling Noise[4]						35.6			
		Cooling Tower (1 nos.)	846	82.0	0	-	3	-			
		RMS-AHU-4001	784	76.0	-10	-	3	-			
		RMS-AHU-4003	786	75.0	-10	-	3	-			
		RMS-AHU-4005	723	72.0	-10	-	3	-			
		RMS-AHU-4007	725	74.0	-10	-	3	-			
		RMS-AHU-4009	540	76.0	-10	-	3	-			
		RMS-AHU-4012	521	72.0	-10	-	3	-			
		RMS-AHU-4013	478	77.0	-10	-	3	-			
		RMS-AHU-4015	480	77.0	-10	-	3	-			
		SMB.GL.L.004	882	77.0	-10	-	3	-			
		SMB.GL.L.005	882	74.0	-10	-	3	-			
		SMB.U1.L.003B	880	75.0	-10	-	3	-			
		SMB.U2.L.001B	874	70.0	-10	-	3	-	36	40	Yes

Remark:
(1) A negative correction of 10 dB(A) has been adopted to the louvers that the direction facing is totally screened by buildings.
(2) Since the setback distance of the Assessment Point is larger than the longest dimension of louver divided by pi, the noise emission from that louvre would be considered as point source. Thus, the calculation would not take into account of the dimensions of louvers. (i.e. Dist. Corr. = -20log(r)-8).
(3) There will be insignificant noise contribution from the noise sources located more than 300m from the NSRs, and thus no calculation is made for these noise sources.
(4) Results refer to "Commissioning Test - SSS Calculation Result for Fixed Plant at NSR".
(5) For NSR which its distance to the plant item exceeds 300m assessment area, it is excluded from the fixed plant noise calculation.

Commissioning Test - SSS Fixed Plant Noise Calculation Summary

NSR	Use	Address	ASR	No. of Storey	Ground Level	Daytime Background incl façade	Criteria Leq, day	Night time Background incl façade	Criteria Leq, night		Total Leq, day	Total Leq, night	Criteria Leq, day	Criteria Leq, night	Exceedence Leq, day	Exceedence Leq, night
					mPD	dB(A)	dB(A)	dB(A)	dB(A)		dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
SS2	Residential	Nan Hing Lane, Wang Toi Shan, Pat Heung, N.T.	B	1	20.5	49	49	39	39		36	35	49	39	-	-
SS4	Residential	Leung Uk Tsuen Village House	B	1	22.9	49	49	40	40		37	32	49	40	-	-
SS5	Residential	51A Leung Uk Tsuen, Wang Toi Shan, Pat Heung, N.T.	B	3	17.3	52	52	45	45		43	35	52	45	-	-
SS6	Residential	32 Leung Uk Tsuen, Wang Toi Shan, Kam Tin Road, N.T.	B	2	15.3	52	52	45	45		43	34	52	45	-	-
SS7	Residential	Leung Uk Tsuen, Wang Toi Shan, Kam Tin Road, N.T.	B	2	13.6	49	49	47	47		46	41	49	47	-	-
SS10	Residential	DD110 LOT 482, Wang Toi Shan Choi Yuen Tsuen, Wang Toi Shan, Pat Heung, N.T.	B	1	11.5	49	49	47	47		44	38	49	47	-	-
SS11a	Residential	Potential Development (20m setback from fence), Wang Toi Shan, Kam Tin Road, N.T.	B	2	15.0	52	52	50	50		44	41	52	50	-	-
SS12	Residential	265 Kam Tai Road, Wang Toi Shan, Pat Heung, N.T.	B	2	12.3	49	49	47	47		45	39	49	47	-	-
SS14	Residential	Village Zone West Boundary, Leung Uk Tsuen, Wang Toi Shan, Pat Heung, N.T.	B	3	17.0	49	49	47	47		46	37	49	47	-	-
SS15	Residential	Abandoned Shek Kong village house	B	3	15.7	49	49	47	47		47	38	49	47	-	-
SS20	Residential	Shek Kong village house	B	2	22.2	49	49	40	40		40	36	49	40	-	-

Summary of Fixed Plant Noise Source

Description	ID	Plant or Louvre? (P/L/NA)	In Operation ? (Y/N)	Louvre Size (m)		Method (1)	Measurement Distance, D_M [m] (2)	Surface Area of Measurement Box, S (m^2)	Measured L_{Aeq} [dB(A)]	Average Background L_{Aeq} [dB(A)]	Difference L_{Aeq} [dB(A)]	Background Corrected Measured L_{Aeq} [dB(A)]	Calculated SWL L_{Aeq} [dB(A)] (3)
				Width	Height								
Gantry Crane	-	P	Y	-	-	2	3	-	72.5	-	-	-	90
Train Wash	-	P	Y	-	-	2	6	-	61.8	-	-	-	85
Cooling Tower	-	P	Y	-	-	2	15	-	50.0	-	-	-	82
AHU(4)	RMS-AHU-4001	L	Y	2.5	2	2	5	-	55.1	49.8	5.3	53.6	76
	RMS-AHU-4002	L	Y	2.5	2	2	5	-	54.7	49.8	4.9	53.0	75
	RMS-AHU-4003	L	Y	2.5	2	2	5	-	54.7	49.8	4.9	53.0	75
	RMS-AHU-4004	L	Y	2.5	2	2	5	-	53.2	49.8	3.4	50.5	72
	RMS-AHU-4005	L	Y	2.5	2	2	5	-	53.2	49.8	3.4	50.5	72
	RMS-AHU-4006	L	Y	2.5	2	2	5	-	53.2	49.8	3.4	50.5	72
	RMS-AHU-4007	L	Y	2.5	2	2	5	-	54.2	49.8	4.4	52.2	74
	RMS-AHU-4008	L	Y	2.5	2	2	5	-	52.8	49.8	3.0	49.8	72
	RMS-AHU-4009	L	Y	2.5	2	2	5	-	55.1	49.8	5.3	53.6	76
	RMS-AHU-4010	L	Y	2.5	2	2	5	-	54.2	49.8	4.4	52.2	74
	RMS-AHU-4011	L	Y	2.5	2	2	5	-	53.1	49.8	3.3	50.4	72
	RMS-AHU-4012	L	Y	2.5	2	2	5	-	51.6	45.0	6.6	50.5	72
	RMS-AHU-4013	L	Y	2.5	2	2	5	-	55.4	45.0	10.4	55.4	77
	RMS-AHU-4014	L	Y	2.5	2	2	5	-	54.9	45.0	9.9	54.4	76
	RMS-AHU-4015	L	Y	2.5	2	2	5	-	55.4	45.0	10.4	55.4	77
	RMS-AHU-4016	L	Y	2.5	2	2	5	-	54.2	45.2	9.0	53.6	76
Ventilation Louvres	SMB.GL.L.004	L	Y	3.5	1.6	3	1	38	62.5	55.8	6.7	61.5	77
	SMB.GL.L.005	L	Y	3.5	1.2	3	1	35	60.2	55.8	4.4	58.2	74
	SMB.U1.L.003B	L	Y	2	2	3	0.5	15	64.2	55.8	8.4	63.5	75
	SMB.U2.L.001B	L	Y	2	1.8	2	4	-	51.7	46.3	5.4	50.2	70

Note:
(1) Method 2: Far-field measurement; Method 3: Near-field measurement.
(2) It is confirmed that the measurement distance between the noise emitting parts of concerned plant items (e.g. gantry crane and train wash) and the microphone are greater than twice of the longest side of the plant items. The hoist of the gantry crane is about 0.5m x 0.5m x 1m, while the moving part of the train wash plant is about 0.5m x 0.5m x 3m. However, due to site constraints, the noise measurement of cooling towers is considered less representative. The SWL of cooling tower provided by the manufacturer is therefore adopted for calculation.
(3) Calculated SWL for far-field method = Max. Measured SPL + 20log$D$ + 8 + background noise correction; Calculated SWL for near-field method = Max. Measured SPL + 10logS + background noise correction
(4) A total of 16 AHUs (total 8 groups) are on the roof of Running Maintenance Shed and only 8 AHUs (one of each group) will operate 24-hour. As a conservative approach, the maximum SWL of each group AHU is adopted in the noise calculation. Please note there is no direct line-of-sight between all AHUs and NSRs as they are totally screened by noise barriers at site boundary or SSS main building or the maintenance shed.

SSS - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(2)	Location/ Measurement	L_{Aeq} (dB)
Gantry Crane	-	Normal	2	measurement 1	70.4
	-	Normal	2	measurement 2	66.6
	-	Normal	2	measurement 3	72.5
				MAXIMUM	**72.5**
Train Wash	-	Normal	2	measurement 1	61.6
	-	Normal	2	measurement 2	62.1
	-	Normal	2	measurement 3	61.7
				AVERAGE	**61.8**
Cooling Tower(1)	-	Normal	3	N/A	N/A
AHU(3)	RMS-AHU-4001	Normal	2	measurement 1	55.4
		Normal	2	measurement 2	54.6
		Normal	2	measurement 3	55.3
				AVERAGE	**55.1**
	RMS-AHU-4002	Normal	2	measurement 1	54.9
		Normal	2	measurement 2	54.6
		Normal	2	measurement 3	54.7
				AVERAGE	**54.7**
	RMS-AHU-4003	Normal	2	measurement 1	54.8
		Normal	2	measurement 2	54.9
		Normal	2	measurement 3	54.4
				AVERAGE	**54.7**
	RMS-AHU-4004	Normal	2	measurement 1	53.6
		Normal	2	measurement 2	52.9
		Normal	2	measurement 3	52.9
				AVERAGE	**53.2**
	RMS-AHU-4005	Normal	2	measurement 1	52.9
		Normal	2	measurement 2	53.3
		Normal	2	measurement 3	53.4
				AVERAGE	**53.2**
	RMS-AHU-4006	Normal	2	measurement 1	53.0
		Normal	2	measurement 2	53.1
		Normal	2	measurement 3	53.3
				AVERAGE	**53.2**
	RMS-AHU-4007	Normal	2	measurement 1	54.2
		Normal	2	measurement 2	53.8
		Normal	2	measurement 3	54.7
				AVERAGE	**54.2**
	RMS-AHU-4008	Normal	2	measurement 1	53.1
		Normal	2	measurement 2	52.8
		Normal	2	measurement 3	52.3
				AVERAGE	**52.8**
	RMS-AHU-4009	Normal	2	measurement 1	55.4
		Normal	2	measurement 2	54.6
		Normal	2	measurement 3	55.3
				AVERAGE	**55.1**
	RMS-AHU-4010	Normal	2	measurement 1	54.0
		Normal	2	measurement 2	54.3
		Normal	2	measurement 3	54.2
				AVERAGE	**54.2**
	RMS-AHU-4011	Normal	2	measurement 1	52.8
		Normal	2	measurement 2	53.2
		Normal	2	measurement 3	53.2
				AVERAGE	**53.1**
	RMS-AHU-4012	Normal	2	measurement 1	51.6
		Normal	2	measurement 2	51.2
		Normal	2	measurement 3	52.1
				AVERAGE	**51.6**
	RMS-AHU-4013	Normal	2	measurement 1	54.8
		Normal	2	measurement 2	55.7
		Normal	2	measurement 3	55.5
				AVERAGE	**55.4**
	RMS-AHU-4014	Normal	2	measurement 1	55.0
		Normal	2	measurement 2	54.8
		Normal	2	measurement 3	54.9
				AVERAGE	**54.9**
	RMS-AHU-4015	Normal	2	measurement 1	55.3
		Normal	2	measurement 2	55.4
		Normal	2	measurement 3	55.4
				AVERAGE	**55.4**
	RMS-AHU-4016	Normal	2	measurement 1	54.2
		Normal	2	measurement 2	54.0
		Normal	2	measurement 3	54.4
				AVERAGE	**54.2**

SSS - Noise Measurement Result - data

Description	Louvre ID	Scenario	Method(2)	Location/ Measurement	L_{Aeq} (dB)
Ventilation Louvres	SMB.GL.L.004	Normal	3	measurement 1	64.1
		Normal	3	measurement 2	62.0
		Normal	3	measurement 3	60.8
		Normal	3	measurement 4	64.1
		Normal	3	measurement 5	61.9
		Normal	3	measurement 6	60.7
		Normal	3	measurement 7	63.8
		Normal	3	measurement 8	63.7
		Normal	3	measurement 9	61.3
		Normal	3	measurement 10	62.9
		Normal	3	measurement 11	58.5
		Normal	3	measurement 12	62.5
				AVERAGE	**62.5**
	SMB.GL.L.005	Normal	3	measurement 1	58.6
		Normal	3	measurement 2	61.9
		Normal	3	measurement 3	57.7
		Normal	3	measurement 4	60.9
		Normal	3	measurement 5	59.5
		Normal	3	measurement 6	60.6
		Normal	3	measurement 7	59.5
		Normal	3	measurement 8	60.7
		Normal	3	measurement 9	60.4
		Normal	3	measurement 10	59.5
		Normal	3	measurement 11	59.7
		Normal	3	measurement 12	61.4
				AVERAGE	**60.2**
	SMB.U1.L.003B	Normal	3	measurement 1	63.0
		Normal	3	measurement 2	63.3
		Normal	3	measurement 3	63.9
		Normal	3	measurement 4	63.6
		Normal	3	measurement 5	64.6
		Normal	3	measurement 6	65.1
		Normal	3	measurement 7	64.2
		Normal	3	measurement 8	65.4
		Normal	3	measurement 9	63.1
		Normal	3	measurement 10	64.4
		Normal	3	measurement 11	64.9
		Normal	3	measurement 12	63.6
		Normal	3	**AVERAGE**	**64.2**
	SMB.U2.L.001B	Normal	2	measurement 1	51.7
		Normal	2	measurement 2	50.0
		Normal	2	measurement 3	50.2
				MAXIMUM	**51.7**

Remark:
(1): Commissioning test was conducted by the Manufacturer.
(2): 2: Far-field measurement; 3: Near-field measurement.
(3): A total of 16 AHUs (total 8 groups) are on the roof of Running Maintenance Shed and only 8 AHUs (one of each group) will operate 24-hour. As a conservative approach, the maximum SWL of each group AHU is adopted in the noise calculation.

Appendix A4 – Measurement Results at NSRs

Appendix A4 - Measurement Results at NSRs

NSR	Scenario	Measurement Type	Start Time	End Time	$L_{Aeq,}$ dB(A)
SS7	1	Background Noise Levels	20/06/2018 22:20	20/06/2018 22:25	51.5
			20/06/2018 22:25	20/06/2018 22:30	52.4
		Measured Noise Levels	20/06/2018 22:58	20/06/2018 23:28	51.8
			20/06/2018 23:28	20/06/2018 23:58	50.4
	2	Background Noise Levels	21/06/2018 01:30	21/06/2018 01:35	48.8
			21/06/2018 01:39	21/06/2018 01:44	51.4
		Measured Noise Levels	21/06/2018 00:24	21/06/2018 00:54	50.6
			21/06/2018 00:54	21/06/2018 01:24	51.5
SS10	1	Background Noise Levels	20/06/2018 22:22	20/06/2018 22:27	67.7
			20/06/2018 22:32	20/06/2018 22:37	69.8
		Measured Noise Levels	20/06/2018 22:58	20/06/2018 23:28	68.5
			20/06/2018 23:28	20/06/2018 23:58	66.9
	2	Background Noise Levels	21/06/2018 00:07	21/06/2018 00:12	66.5
			21/06/2018 00:12	21/06/2018 00:17	66.5
		Measured Noise Levels	21/06/2018 00:24	21/06/2018 00:54	65.9
			21/06/2018 00:54	21/06/2018 01:24	66.2
SS11a	1	Background Noise Levels	20/06/2018 22:14	20/06/2018 22:19	51.1
			20/06/2018 22:47	20/06/2018 22:52	51.7
		Measured Noise Levels	20/06/2018 22:58	20/06/2018 23:28	52.7
			20/06/2018 23:28	20/06/2018 23:58	53.2
	2	Background Noise Levels	21/06/2018 00:09	21/06/2018 00:14	52.0
			21/06/2018 00:18	21/06/2018 00:23	51.8
		Measured Noise Levels	21/06/2018 00:24	21/06/2018 00:54	52.2
			21/06/2018 00:54	21/06/2018 01:24	51.2
SS12	1	Background Noise Levels	20/06/2018 22:34	20/06/2018 22:39	69.3
			20/06/2018 22:44	20/06/2018 22:49	68.6
		Measured Noise Levels	20/06/2018 22:58	20/06/2018 23:28	67.6
			20/06/2018 23:28	20/06/2018 23:58	66.3
	2	Background Noise Levels	21/06/2018 00:10	21/06/2018 00:15	65.7
			21/06/2018 00:15	21/06/2018 00:20	66.1
		Measured Noise Levels	21/06/2018 00:24	21/06/2018 00:54	65.4
			21/06/2018 00:54	21/06/2018 01:24	64.4
SS15	1	Background Noise Levels	20/06/2018 22:05	20/06/2018 22:10	57.1
			20/06/2018 22:11	20/06/2018 22:16	57.4
		Measured Noise Levels	20/06/2018 22:58	20/06/2018 23:28	57.4
			20/06/2018 23:28	20/06/2018 23:58	57.3
	2	Background Noise Levels	21/06/2018 00:07	21/06/2018 00:12	57.5
			21/06/2018 00:13	21/06/2018 00:18	57.5
		Measured Noise Levels	21/06/2018 00:24	21/06/2018 00:54	57.8
			21/06/2018 00:54	21/06/2018 01:24	57.9
SS20	1	Background Noise Levels	20/06/2018 22:35	20/06/2018 22:40	54.1
			20/06/2018 22:41	20/06/2018 22:46	54.2
		Measured Noise Levels	20/06/2018 22:58	20/06/2018 23:28	54.6
			20/06/2018 23:28	20/06/2018 23:58	54.5
	2	Background Noise Levels	21/06/2018 00:07	21/06/2018 00:12	54.6
			21/06/2018 00:18	21/06/2018 00:23	54.3
		Measured Noise Levels	21/06/2018 00:24	21/06/2018 00:54	54.4
			21/06/2018 00:54	21/06/2018 01:24	54.5

Note:

(1) The measurements were conducted between evening-time to night-time (i.e. 2200 – 0130), which is considered as a representative period due to relatively lower background noise level. The measurement results of both operation scenarios were therefore less affected by background noise.

(2) Fixed plant noise was inaudible at all NSRs. In addition, based on site observations, the measured noise levels were dominated by the background noise including traffic noise or natural ambient sound. Due to fluctuation of background noise, it is possible the “Averaged Background Noise Level” presented above is higher than the “Measured Noise Level”.

AECOM

MTR Corporation Limited

Consultancy Agreement No. C8016

Environmental Term Consultancy for Express Rail Link

Commissioning Test Report for Train Noise

September 2018

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1 INTRODUCTION

1.1 Background

1.1.1 The "Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL)" Project (hereinafter known as "the Project") covers a 26km long underground rail line on a dedicated track that runs from the terminus in West Kowloon to the boundary at Huanggang, where is connect with the XRL Mainland section. XRL Project also covers ventilation buildings, emergency access points, stabling sidings and maintenance facilities and an emergency rescue siding (ERS) (formerly known as rescue emergency station).

1.1.2 An Environmental Impact Assessment (EIA) study for the Project was conducted in accordance with the EIA Study Brief No. ESB-197/2008. The EIA study concluded that the Project would be environmentally acceptable with the implementation of mitigation measures.

1.1.3 The EIA Report (Register No.: AEIA-143/2009) was approved on 28 September 2009 by the Director of Environmental Protection (DEP) under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Report, an environmental permit (EP) was granted on 16 October 2009 (EP No: EP-349/2009) for the construction and operation of the Project. Variations of environmental permit (VEP) were subsequently applied and the latest Environmental Permit (EP No: EP-349/2009/N) (hereinafter known as "the EP") was issued by Director of Environmental Protection (DEP) on 20 August 2018.

1.1.4 As stipulated in EP Condition 2.36, "*The Permit Holder, shall no later than two weeks before the commencement of the operation of the Project, deposit with the Director a Commissioning Test Report to confirm the compliance of the operational air-borne and ground-borne noise levels in accordance with the EIA Report and the application for variation of an environmental permit No. VEP-377/2012 and its attached documents.*", MTR Corporation Limited (MTR) therefore has commissioned AECOM Asia Co. Ltd to carry out the operational airborne and ground-borne railway noise commissioning test.

1.1.5 Commissioning tests were conducted at the selected airborne noise sensitive receivers (ABNSRs) on 29 and 30 December 2017, while ground-borne noise commissioning tests were conducted at the ground-borne noise sensitive receivers (GBNSRs) on 29 and 30 December 2017, 12, 22 and 27 June, and 23 July 2018.

1.2 Purpose of This Report

1.2.1 This Report presents the measurement results of the commissioning tests at the selected measurement locations, and the operational ground-borne and airborne railway noise levels evaluated based on the measurement results to demonstrate the compliance of these noise levels with the relevant noise criteria in the EIA Report and the document attached to the application for VEP-377/2012, i.e. Environmental Review Report for the Proposed Design Changes at Shek Kong Stabling Sidings (September 2012)[1] (SSS ERR).

1.3 Structure of This Report

1.3.1 This Report comprises the following sections:

- Section 1 presents the background information.
- Section 2 presents the train operation parameters during commissioning tests.
- Section 3 presents the details of the commissioning tests on operational ground-borne railway noise.
- Section 4 presents the details of the commissioning tests on operational airborne railway noise.
- Section 5 presents the overall conclusion.

[1] Environmental Review Report for the Proposed Design Changes at Shek Kong Stabling Sidings was submitted to support variation of an environmental permit No. VEP-377/2012 in September 2012.

2 TRAIN OPERATION PARAMETERS DURING COMMISSIONING TEST

2.1 Train System

2.1.1 China Railway High-Speed (CRH) trains with two types of train (i.e. long and short trains) will be used in XRL. Both long (not more than 430m in length) and short trains (not more than 241m in length) will be provided by the relevant operation entities, but only short trains (i.e. CRH 380) were available for noise measurement during commissioning test. Long trains would be equipped with equipment similar to short trains and thus the noise performance of long trains would be similar to short train with major different in train length correction factor. Correction factor accounting for train length has been adopted to evaluate the noise contribution from the operation of long train for daytime operational ground-borne and airborne noise prediction.

2.1.2 According to Section 2.2.5 in Appendix 2.1A of Updated Operational Ground-borne Noise Prediction Report (August 2013)[2] (OGBNPR) (**Appendix A1** refers), the loading/unloading condition would only have an insignificant effect on the dynamic load and on force density level (FDL). In addition, Annex E of MTR *South Island Line (East) - Operational Air-borne Noise Performance Test Report (***Appendix B** refers*)*, train loading has no significant effect on airborne noise emission of service train. Thus, unloaded trains were employed during commissioning test.

2.2 Train Speed Profile

2.2.1 The speed profile for the train operation as adopted in OGBNPR is presented in **Appendix A1**. According to the speed profile, the maximum operation speed of the Project is 200kph. The train speed profile during commissioning test followed the speed profile with maximum operation speed up to 200kph.

2.3 Train Operation Schedule and Frequency

2.3.1 The airborne noise commissioning test was conducted on 29 and 30 December 2017, while the ground-borne noise commissioning tests were conducted on 29 and 30 December 2017, 12, 22 and 27 June, and 23 July 2018. Details of the train operation during commissioning test are summarized in **Table 2.1**.

Table 2.1 Details of Train Operation during Commissioning Test

Date and Time	Train Type	Direction	No. of train passby
From 2300 hr, 29 Dec 2017 to 0130 hr, 30 Dec 2017	Short Train	Northbound (from West Kowloon Station to Futian Station)	3
		Southbound (from Futian Station to West Kowloon Station)	4
From 1130 hr to 1430 hr, 12 Jun 2018	Short Train	Northbound (from West Kowloon Station to Futian Station)	6
		Southbound (from Futian Station to West Kowloon Station)	7
From 1100 hr to 1600 hr, 22 Jun 2018	Short Train	Northbound (from West Kowloon Station to Futian Station)	3
		Southbound (from Futian Station to West Kowloon Station)	3
From 1100 hr to 1600 hr, 27 Jun 2018	Short Train	Northbound (from West Kowloon Station to Futian Station)	4
		Southbound (from Futian Station to West Kowloon Station)	3
From 1330 hr to 1700 hr, 23 Jul 2018	Short Train	Northbound (from West Kowloon Station to Futian Station)	3
		Southbound (from Futian Station to West Kowloon Station)	4

[2] Pursuant to EP Condition 2.26, an Updated Ground-borne Noise Prediction Report was deposited to DEP in August 2013.

2.4 Evaluation of Railway Noise Levels from Measurement Results of Commissioning Tests

2.4.1 Assumptions of train operation for evaluating ground-borne and airborne railway noise from noise measurement results of commissioning tests are same as those developed and adopted in OGBNPR and SSS ERR (**Appendices A1** and **A2** refers) respectively. Additional train operation Scenarios were developed according to the recent discussion with relevant operation entities in Mainland. A Noise Review Report for Additional Train Operation Scenarios (August 2018) (NRR) which was prepared to demonstrate the noise compliance associated with additional train operation scenarios was approved by EPD on 5 September 2018.

2.4.2 The train operation schedules and frequencies for noise evaluation as extracted from the above-mentioned documents are shown in **Table 2.2** and **Table 2.3**.

Table 2.2 Maximum Train Frequency per 30 Minutes in EP Condition 2.27

Time Period	Direction	Train Type	
		Short Haul Train	Long Haul Train
Day & Evening time	Northbound	7	2
	Southbound	6	2
Night-time	Northbound	3	0
	Southbound	3	0

Table 2.3 Train Frequency – Hourly and Per 30 Minutes under Additional Train Operation Scenarios

				No. of Train Frequency			
				Hourly Window			
Time Period	Direction	Hourly Frequency		Maximum no. in 30 mins		Other 30 mins	
		Short Train	Long Train	Short Train	Long Train	Short Train	Long Train
Day & Evening time	Northbound	9	6	5	3	4	3
	Southbound	6	6	3	3	3	3
Scenario 1A							
Night-time	Northbound	2	2	2	1	0	1
	Southbound	2	2	2	1	0	1
Scenario 1B							
Night-time	Northbound	2	1	1	0	1	1
	Southbound	2	2	1	2	1	0

2.4.3 Details of the ground-borne and airborne railway noise commissioning tests are presented in **Section 3** and **4** of this Report respectively.

3 OPERATIONAL GROUND-BORNE RAILWAY NOISE COMMISSIONING TEST

3.1 Operational Ground-borne Railway Noise Criteria

3.1.1 The operational ground-borne railway noise criteria as stipulated in the EIA Report and the OGBNPR are presented in **Table 3.1** below

Table 3.1 Operational Ground-borne Railway Noise Criteria

Ground-borne Noise Sensitive Receivers (GBNSR) Description	Ground-borne Railway Noise Criteria ($L_{eq, 30min}$, dB(A))					
	Day and Evening Periods (0700 to 2300 hrs)			Night-time Period (2300 to 0700 hrs)		
	A	B	C	A	B	C
Churches/temples, schools, medical clinics, libraries, courts and performing arts	50	55	60	40	45	50
Domestic premises, hotels and hospitals						

3.2 Ground-borne Noise Measurement Locations

3.2.1 Locations of representative GBNSRs for conducting ground-borne railway noise commissioning tests have been preliminarily selected and listed in Table 4.2 of XRL EM&A Manual. They are GN3, GN5, GN7, GN8 and GN31 as listed in Table 3.2 below. These GBNSRs were predicted with the highest construction ground-borne noise levels and relatively higher operational ground-borne railway noise levels. According to the results in Table 2.9 of OGBNPR (**Appendix A1** refers), the predicted operational ground-borne railway noise levels at GN31 are higher than other NSRs along the northern section of XRL. The predicted noise levels at GN3, GN5 and GN8 are among the highest levels of those NSRs along the southern section of XRL. GBNSR, GN11a, predicted with the highest noise levels among the NSRs along the southern section has not been selected for noise commissioning test because it was still under construction during the commissioning period.

3.2.2 As indicated in Section 4.18 of the XRL EM&A Manual, the ground-borne railway noise commissioning test should not be limited to the above selected locations. Further review on the locations for noise commissioning tests have been conducted. The review found that GN38 and GN42 should be included for commissioning tests as these GBNSRs are located directly above the railway tunnels and in areas with higher noise sensitivity. These additional locations proposed by the ET Leader were agreed by the IEC and EPD.

3.2.3 Access to the buildings was obtained from the property managements/owners/occupants for conducting site visits and noise measurement. Identifications of suitable locations within the building for noise measurement were also conducted and agreed with property managements/owners/occupants during the site visits prior to the commencement of commissioning test. The agreed ground-borne noise measurement locations were generally on either the lowest floor of the building with GBNSRs or lower floor if consent for entering the GBNSRs could not be obtained from the owners/occupants. Based on the measurement situations, a correction factor to account for floor-to-floor attenuation was applied accordingly to the measurement results for projection of the ground-borne noise level at the GBNSRs (See **Section 3.5**).

3.2.4 Details of the selected GBNSRs for the ground-borne railway noise commissioning test is summarised in **Table 3.2** and their locations are shown in **Figure Nos. C8016/C/XRL/ACM/M53/101 - 104**.

Table 3.2 Selected GBNSRs for Commissioning Test

GBNSR No.	Location	Floor with Measurement Equipment	Use	ASR	Criterion, dB(A)	
					$L_{eq, 30min}$ (day)	$L_{eq, 30min}$ (night)
GN3	Yaumati Catholic Primary School (Hoi Wang Road)	1/F	Educational Institution	B	55	-(1)
GN5	Tower 5 Phase 1 Park Avenue	2/F	Residential	B	55	45
GN7	Tai Fung Building (Block F) Cosmopolitan Estates (2)	1/F	Residential	B	55	45
GN8	Chung Yew Building	G/F(4)	Residential	B	55	45
GN31	DD110 LOT 482, Wang Toi Shan	G/F	Residential	B	55	45
GN38(3)	45 Wai Tsai Tsuen	G/F	Residential	A	50	40
GN42(3)	House A77Maple Garden	1/F(5)	Residential	A	50	40

Notes:
(1) Educational institutions are considered to be noise sensitive during daytime and evening only.
(2) Ground-borne noise measurement was conducted at Tai Shing Shopping Centre during commissioning test as consent could not be obtained for accessing NSRs on the lowest sensitive floor in Tai Fung Building. Tai Shing Shopping Centre is located on the same podium structure of Tai Fung Building and is directly above the railway tunnels. The measurement instrument was located on 1/F of Tai Shing Shopping Centre which is equivalent to the lowest sensitive floor of Tai Fung Building. Therefore, no floor-to-floor attenuation was applied to the measurement result.
(3) Apart from the representative GBNSRs selected in XRL EM&A Manual for noise measurement during commissioning test, GN38 and GN42 are the additional noise monitoring locations.
(4) Consent could not be obtained for accessing 1/F of GN8, which was the lowest floor with GBNSRs. Measurement was therefore conducted at G/F of GN8, and thus floor-to-floor attenuation (i.e. -2dB(A)) was applied to the measurement result.
(5) Measurement instrument was placed on the 1/F of GN42 due to disturbance from the occupant(s) on G/F. As G/F is the lowest noise sensitive floor and therefore a floor-to-floor attenuation (i.e. +2dB(A)) was applied to the measurement result.

3.3 Measurement Instrumentation and Procedures

3.3.1 According to the requirements of the Technical Memorandum (TM) issued under the NCO, sound level meters adopted for measurement comply with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications and other noise measuring and analysis instrumentation are of a comparable professional quality. Immediately prior to and following each noise measurement the accuracy of the sound level meter was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements were accepted as valid with the difference between the calibration levels obtained before and after each noise measurement was less than 1.0 dB.

3.3.2 The measurement instruments adopted for the ground-borne noise commissioning test met the above requirements and are listed in **Table 3.3**. The calibration records of the instruments are provided in **Appendix C**.

Table 3.3 Measurement Instrumentation

Instrument	Brand and Model No.
Sound & Vibration Analyzer	Svantek SVAN 958, SVAN 958A
Microphone & Preamplifier	PCB 378B02
Accelerometer	PCB 393A03
Acoustic Calibrator	Svantek SV30A, Larson Davis CAL200
Vibration Calibrator	IMI 699A02

3.3.3 All ground-borne noise measurements were conducted indoor inside the buildings, with microphones and an accelerometer set up at each selected monitoring location. The microphones were placed inside a room at around 1.2m above floor level at all selected GBNSR locations, except GN7 of which measurement point inside electric meter room with limited clearance due to safety concern, and the accelerometer was placed on floor. The vibration levels collected from accelerometer were used to determine the train passby. Photograph showing typical measurement setup is provided in **Appendix D1**. The windows of the room were kept closed during the noise measurements.

3.4 Measurement Parameters

3.4.1 Noise levels (including L_{eq}) and vibration levels were measured and logged at 1 second interval for the necessary periods at each GBNSR location. The periods need to cover at least three passbys of northbound trains, three passbys of southbound trains (i.e. no less than 6 passbys in total) and over 60 seconds' background noise level, at 30 seconds ahead of each passby. Site observation was carried out during background and train passby noise measurement in order to detect whether the noise measurements were affected by other extraneous noise and to determine the representative of the measured noise levels.

3.4.2 Typically, train passby duration including head-tail period was determined when train noise was being perceived. However, if noise of train passby could not be perceived, it would be determined when there was an increase of vibration levels recorded by the accelerometer placed at the testing location. Vibration levels above background generally indicate train passby and its duration was checked against the train running schedule provided by MTR Corporation. Vibration levels were therefore extracted for identification of train passby time and duration when train noise could not be perceived.

3.5 Data Analysis and Evaluation of Ground-borne Railway Noise Impact

3.5.1 The collected noise data of train passbys and the evaluation of ground-borne noise impact ($L_{eq,30min}$) followed the steps as presented below.

i. Train passby data was extracted according to the perception of train noise, or recorded vibration levels and train running schedule provided by MTR. Noise level during a passby event was considered representative if the noise measurement was not affected by other extraneous noise.

ii. Background noise level was determined from averaging the noise level of over 60 seconds' measurement, at 30 second ahead of each passby. Background noise level was considered representative if the noise measurement was not affected by other extraneous noise.

iii. As the measured event noise levels would be used for further evaluation of $L_{Aeq,30min}$ to check against the relevant noise criteria in the OGBNPR, the measured event noise level should be corrected to account for the contribution from background. If the difference between the noise level during a passby event and the corresponding background noise level is equal to or greater than 3.0 dB(A), the measurements indicate that the event noise level is equal to or above the background noise level. In this case, the background corrected noise level could be determined by the following equation:

$$L_{eq,passby} = 10 \times log\left(10^{Leq,during\ passby/10} - 10^{Leq,background/10}\right)$$

Where $L_{eq,during\ passby}$ is the noise level during train passby, dB(A)
$L_{eq,background}$ is the background noise level, dB(A)

$L_{eq,passby}$ is the background corrected noise level, dB(A)

If the difference between the noise level during the passby event and the background noise level is less than 3.0 dB(A), the measurements indicate that the event noise level is below the background noise level and the accuracy of the above equation would be reduced and any background correction, if made, should only be regarded as approximate. In such case, as a conservative approach, no background correction would be applied for the measured noise level during the passby event.

iv. Sound Exposure Level (SEL) for northbound and southbound trains was determined by the following equation:

For Short Trains:

$$SEL_{North,short} = L_{eq,passby,north} + 10 \times log(T_{north})$$
$$SEL_{South,short} = L_{eq,passby,south} + 10 \times log(T_{south})$$

Where T is the train passby duration, second

For Long Trains:

$$SEL_{North,long} = SEL_{North,short} + 10 \times log\left(\frac{Len_{long}}{Len_{ref}}\right)$$
$$SEL_{South,long} = SEL_{South,short} + 10 \times log\left(\frac{Len_{long}}{Len_{ref}}\right)$$

Where T is the train passby duration, second
Len_{long} is length of long train, meter
Len_{ref} is length of the train during commissioning test (i.e. short train), meter

v. Ground-borne railway noise level ($L_{eq,30min}$) for compliance check was determined by the following equations:

For Daytime/Evening:

$$\begin{aligned}L_{eq,30min} = 10 \times log\Big(&10^{(SEL_{North,long}+10\times log(N_{North,long})-10\times log(1800)+Attfloor)/10} \\ &+ 10^{(SEL_{South,long}+10\times log(N_{South,long})-10\times log(1800)+Attfloor))/10} \\ &+ 10^{(SEL_{North,short}+10\times log(N_{North,short})-10\times log(1800)+Attfloor)/10} \\ &+ 10^{(SEL_{South,short}+10\times log(N_{South,short})-10\times log(1800)+Attfloor)/10}\Big)\end{aligned}$$

Where N north/south, short is number of short train passby in 30 minutes
Att_{floor} is floor-to-floor attenuation of +/-2 dB(A) per floor for the measurement which was not be able to be conducted at the lowest floor with NSRs

For Night-time:

$$\begin{aligned}L_{eq,30min} = 10 \times log\Big(&10^{(SEL_{North,short}+10\times log(N_{North,short})-10\times log(1800)+Attfloor)/10} \\ &+ 10^{(SEL_{South,short}+10\times log(N_{South,short})-10\times log(1800)+Attfloor)/10}\Big)\end{aligned}$$

3.6 Evaluation Results of Commissioning Test

3.6.1 As discussed in **Section 3.5.1 (iii)**, correction for background noise would generally be adopted to account for the contribution of background noise. During the course of measurement, train noise could not be perceived at the measurement locations during train passby. As shown in the time history and noise measurement results recorded at the measurement locations (**Appendix E** refers), the background noise levels were in general similar to the measured noise levels during train passby. Some background noise levels were even higher than the measured noise levels during train passby. In such cases, the change of noise levels during train passby were likely due to fluctuation of background noise instead of the ground-borne railway noise. Since most measured noise levels during train passby were less than 3 dB(A) above the background noise levels, as a conservative approach, all the measured noise levels during train passby were not corrected for background noise in evaluating the ground-borne railway noise level (i.e. with inclusion of background noise) for noise criteria compliance check. It is anticipated that the actual operational ground-borne railway noise levels at the GBNSRs would be substantially lower than the evaluation results. Based on this conservative approach, the evaluated operational ground-borne railway noise levels, with the inclusion of background noise, at all the selected GBNSRs comply with the noise criteria in both daytime/evening and night-time periods.

3.6.2 The evaluation results during daytime/evening and night-time periods according to different operational scenarios (**Table 2.2** and **Table 2.3** refer) are summarised in **Table 3.4** and **Table 3.5** respectively. Measurement results and detailed calculations are provided in **Appendix E**.

Table 3.4 Ground-Borne Railway Noise Calculation Results (Without Background Correction) during Daytime/Evening Period (0700 - 02300 hrs)

GBNSR No.	Location	Ground-borne Railway Noise Level (1), $L_{eq\ 30min}$, dB(A)		Noise Criterion, $L_{eq\ 30min}$, dB(A)	Compliance (Y/N)
		Scenario: EP Condition 2.27	Scenario: Additional Train Operation Scenario		
GN3	Yaumati Catholic Primary School (Hoi Wang Road)	<28	<28	55	Y
GN5	Tower 5 Phase 1 Park Avenue	<30	<29	55	Y
GN7	Tai Fung Building (Block F) Cosmopolitan Estates	<36	<36	55	Y
GN8	Chung Yew Building	<29	<29	55	Y
GN31	DD110 LOT 482, Wang Toi Shan	<32	<32	55	Y
GN38	45 Wai Tsai Tsuen	<30	<29	50	Y
GN42	House A77 Maple Garden	<29	<29	50	Y

Note:
(1) Since most measured noise levels during train passby were less than 3dB(A) above the background noise levels, as a conservative approach, all the measured noise levels during train passby were not corrected for background noise in evaluating the $L_{eq,\ 30min}$. It is therefore anticipated that the actual operational ground-borne railway noise levels at the GBNSRs would be substantially lower than the evaluation results.

Table 3.5 Ground-Borne Railway Noise Calculation Results (Without Background Correction) during Night-time period (2300-0700 hrs)

GBNSR No.	Location	Ground-borne Railway Noise Level (1), $L_{eq\ 30min}$, dB(A)			Noise Criterion, $L_{eq\ 30min}$, dB(A)	Compliance (Y/N)
		Scenario: EP Condition 2.27	Scenario: Additional Train Operation Scenario 1A	Scenario: Additional Train Operation Scenario 1B		
GN3	Yaumati Catholic Primary School (Hoi Wang Road)	N.A.(2)	N.A.	N.A.	N.A.	N.A.
GN5	Tower 5 Phase 1 Park Avenue	<24	<25	<24	45	Y
GN7	Tai Fung Building (Block F) Cosmopolitan Estates	<30	<32	<30	45	Y
GN8	Chung Yew Building	<24	<25	<24	45	Y
GN31	DD110 LOT 482, Wang Toi Shan	<27	<28	<26	45	Y
GN38	45 Wai Tsai Tsuen	<24	<25	<24	40	Y
GN42	House A77 Maple Garden	<23	<25	<23	40	Y

Notes:
(1) Since most measured noise levels during train passby were less than 3dB(A) above the background noise levels, as a conservative approach, all the measured noise levels during train passby were not corrected for background noise in evaluating the $L_{eq,\ 30min}$. It is therefore anticipated that the actual operational ground-borne railway noise levels at the GBNSRs would be substantially lower than the evaluation results.
(2) N.A.- Not Applicable as there is no sensitive use at school during night-time period.

3.6.3 Based on the findings of commissioning test, the actual operational ground-borne railway noise levels at the GBNSRs would be substantially lower than the evaluation results and it is concluded that no adverse impact is anticipated at the GBNSRs in both daytime/evening and night-time periods. Therefore no further mitigation measures will be required. While additional noise mitigation measures are not required based on the commissioning test results, flexibility has been allowed in the design for the implementation of further noise mitigation measures including extending low noise trackform to deal with any unforeseeable impact to any noise sensitive receiver pursuant to EP Condition 2.31.

4 OPERATIONAL AIRBORNE RAILWAY NOISE COMMISSIONING TEST

4.1 Operational Airborne Railway Noise Criteria

4.1.1 The operational airborne railway noise criteria stipulated in the SSS ERR are shown in **Table 4.1**.

Table 4.1 Operational Airborne Railway Noise Criteria

ABNSR Description	Airborne Railway Noise Criteria								
	$L_{eq,\,30min}$, dB(A)						L_{max}, dB(A)		
	Day and Evening Periods (0700 to 2300 hrs)			Night-time Period (2300 to 0700 hrs)			Night-time Period (2300 to 0700 hrs)		
	A	B	C	A	B	C	A	B	C
Churches/temples, schools, medical clinics, libraries, courts and performing arts	60	65	70	50	55	60	85	85	85
Domestic premises, hotels and hospitals	60	65	70	50	55	60	85	85	85

4.2 Airborne Noise Measurement Locations for Commissioning Test

4.2.1 The airborne railway noise commissioning test should be performed at the potentially worst affected noise sensitive receivers as listed in Table 3.6 of XRL EM&A Manual (i.e. SS7, SS10 and SS15).

4.2.2 Site visit was conducted at the selected airborne noise sensitive receivers (ABNSRs) to identify suitable locations for airborne noise measurement. Photographs taken during site visit are presented in **Appendix D2**. As observed on site, there is no sensitive use at the upper floor of SS10 and the lower floor of SS10 is totally screened by its boundary wall (**Appendix D2** refers). In addition, SS10 is located at more than 200m from the ERS, it is therefore considered that noise measurement at SS7 and SS15 would be adequate for noise compliance check and thus noise measurement was not conducted at SS10. This proposed updated monitoring locations was approved by the ER and agreed by the IEC and EPD.

4.2.3 Details of the selected ABNSRs for airborne railway noise commissioning test is summarised in **Table 4.2** and their locations are shown in **Figure Nos. C8016/C/XRL/ACM/M53/105**.

Table 4.2 Selected ABNSRs for Commissioning Test

Monitoring Station No.(1)	ABNSR No.	Location	Use	ASR	Criterion, dB(A)	
					$Leq_{,\,30min}$ (day)	$Leq_{,\,30min}$ (night)
ON1	SS7	Leung Uk Tsuen Village House	Residential	B	65	55
ON3	SS15	Leung Uk Tsuen Squats	Residential	B	65	55

Note:
(1) Monitoring Station no. as identified in Table 3.6 of XRL EM&A Manual.

4.3 Measurement Instrumentation, Parameters and Procedures

4.3.1 The sound level meters used for the airborne railway noise commissioning test comply with the prevailing International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) and other noise measuring and analysis instrumentation are of a comparable professional quality. The measurement instruments adopted for airborne railway noise commissioning test are provided in **Table 4.3** and the calibration records of the instruments are provided in **Appendix C**.

Table 4.3 Measurement Instrumentation

Instrument	Model No.
Integrating Sound Level Meter	B&K Brand Type 2250 (Serial No. 3001291)
	B&K Brand Type 2270 (Serial No. 2644597)
Calibrator	B&K 4231 (Serial No. 3006428)
	B&K 4231 (Serial No. 3014024)

4.3.2 During the noise measurement, the following procedures were followed:

- Sound level meters were set at each selected ABNSRs with the microphone positioned at 1m exterior of SS7 (i.e. facade measurement) and about 2m exterior of SS15 (i.e. free-field measurement).
- Parameter such as frequency weighting, the weighting and noise descriptors were set as follows:
  - Frequency weighting : A
  - Time weighting : Fast
  - Noise Descriptors : L_{eq} with 1 second or shorter logging interval and L_{max}, together with L10 and L90 as reference
- Immediately prior to and following each noise measurement the accuracy of the sound level meter was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements were accepted as valid as the difference between the calibration levels obtained before and after the noise measurement is less than 1.0 dB.
- The sound level meter logged the noise level continuously. In post-processing, noise level of each train passby was extracted from raw data as a single event. The definition of train passby measurement period (including head-tail period) was determined during the period when train noise was perceived, together with the recorded noise levels. Noise levels above background generally indicate train passby and its duration would be checked against the marking of train passby time. Background noise was also recorded during the whole measurement outside the train passby time.
- Details were recorded when any intrusive noise was observed for determining the representative of the measured noise levels.
- Weather was recorded during the airborne railway noise commissioning test. It was cloudy and the wind speed was less than $5ms^{-1}$ during the measurement.

4.4 Data Analysis and Evaluation of Airborne Railway Noise Impact

4.4.1 The collected noise data of train passbys and the evaluation of airborne noise impact ($L_{eq,30min}$) followed the steps as presented below.

i. Train passby data was extracted according to the perception of train noise, together with the recorded noise levels and the marked train passby time. Noise level during a passby event was considered representative if the noise measurement was not affected by other extraneous noise.

ii. Background noise level was determined from averaging the noise level of over 60 seconds' measurement, at 30 seconds ahead of each passby. The background noise level was considered representative if the noise measurement was not affected by other extraneous noise.

iii. As the measured event noise levels would be used for further evaluation of $L_{Aeq,30min}$ to check against the relevant noise criteria in the SSS ERR, the measured event noise level should be corrected to account for the contribution from background. If the difference between the noise level during the passby event and the background noise level is equal to or greater than 3.0 dB(A), the measurements indicate that the event noise level is equal to or above the background noise level. In this case, the background corrected noise level could be determined by the following equation:

$$L_{eq,passby} = 10 \times log\left(10^{Leq,during\ passby/10} - 10^{Leq,background/10}\right)$$

Where $L_{eq,during\ passby}$ is the noise level during train passby, dB(A)
$L_{eq,background}$ is the background noise level, dB(A)
$L_{eq,passby}$ is the background corrected noise level, dB(A)

If the difference between the noise level during the passby event and the background noise level is less than 3.0 dB(A), the measurements indicate that the event noise level is below the background noise level and the accuracy of the above equation would be reduced and any background correction, if made, should only be regarded as approximate. In such case, as a conservative approach, no background correction would be applied for the measured noise level during the passby event.

iv. Sound Exposure Level (SEL) for northbound and southbound trains was determined by the following equation:

For Short Trains:

$$SEL_{North,short} = L_{eq,passby,north} + 10 \times log(T_{north})$$
$$SEL_{South,short} = L_{eq,passby,south} + 10 \times log(T_{south})$$

Where T is the train passby duration, second

For Long Trains:

$$SEL_{North,long} = SEL_{North,short} + 10 \times log\left(\frac{Len_{long}}{Len_{ref}}\right)$$
$$SEL_{South,long} = SEL_{South,short} + 10 \times log\left(\frac{Len_{long}}{Len_{ref}}\right)$$

Where T is the train passby duration, second
Len_{long} is length of long train, meter
Len_{ref} is length of the train during commissioning test (i.e. short train), meter

v. Airborne railway noise level ($L_{eq,30min}$) for compliance check was determined by the following equations:

For Daytime/Evening:

$$\begin{aligned} L_{eq,30min} = 10 \times log\Big(&10^{(SEL_{North,long}+10\times log(N_{North,long})-10\times log(1800)+FacCorr)/10} \\ &+ 10^{(SEL_{South,long}+10\times log(N_{South,long})-10\times log(1800)+FacCorr))/10} \\ &+ 10^{(SEL_{North,short}+10\times log(N_{North,short})-10\times log(1800)+FacCorr)/10} \\ &+ 10^{(SEL_{South,short}+10\times log(N_{South,short})-10\times log(1800)+FacCorr)/10}\Big) \end{aligned}$$

Where N north/south, short is number of short train passby in 30 minutes
FacCorr is a façade correction of +3 dB(A) which was included in the measurement results when the measurement was conducted in free-field conditions

For Night-time:

$$\begin{aligned} L_{eq,30min} = 10 \times log\Big(&10^{(SEL_{North,short}+10\times log(N_{North,short})-10\times log(1800)+FacCorr)/10} \\ &+ 10^{(SEL_{South,short}+10\times log(N_{South,short})-10\times log(1800)+FacCorr)/10}\Big) \end{aligned}$$

4.5 Evaluation Results of Commissioning Test

4.5.1 As discussed in **Section 4.4.1 (iii)**, correction for background noise would generally be adopted to account for the contribution of background noise. As shown in the noise measurement results presented in **Appendix F**, most measured noise levels during train passby at SS7 and SS15 were higher than the background noise levels, but some of them were less than 3 dB(A) above the background noise levels. There are also two measured event noise levels even slightly lower than the background noise levels. In this case, the change of noise levels during train passby were likely due to fluctuation of background noise instead of the airborne railway noise. Since some measured noise levels during train passby were less than 3 dB(A) above the background noise levels, as a conservative approach, all the measured noise level during train passby were not corrected for background noise in evaluating the airborne railway noise level (i.e. with inclusion of background noise) for noise criteria compliance check. It is anticipated that the actual operational airborne railway noise levels at the ABNSRs would still be lower than the evaluation results. Based on this conservative approach, the evaluated operational airborne railway noise levels, with the inclusion of background noise, at all the selected ABNSRs comply with the criteria in both daytime/evening and night-time periods. The evaluation results during daytime/evening and night-time periods based on different operational scenarios (**Table 2.2** and **Table 2.3** refer) are summarised in **Table 4.4** and **Table 4.5**. Measurement results and detailed calculations are provided in **Appendix F**.

Table 4.4 Airborne Railway Noise Calculation Results (Without Background Correction) during Daytime/Evening Period (0700-2300 hrs)

ABNSR No.	Location	Airborne Railway Noise Level (1), $L_{eq\ 30min}$, dB(A)		Noise Criterion, $L_{eq\ 30min}$, dB(A)	Compliance (Y/N)
		Scenario: EP Condition 2.27	Scenario: Additional Train Operation Scenario		
SS7	Leung Uk Tsuen Village House	<38	<38	65	Y
SS15	Leung Uk Tsuen Squats	<51	<50	65	Y

Note:
(1) Since some measured noise levels during train passby were less than 3 dB(A) above the background noise levels, as a conservative approach, all the measured noise level during train passby were not corrected for background noise in evaluating the airborne railway noise level (i.e. with inclusion of background noise) for noise criteria compliance check. It is anticipated that the actual operational airborne railway noise levels at the ABNSRs would still be lower than the evaluation results.

Table 4.5 Airborne Railway Noise Calculation Results (Without Background Correction) during Night-time period (2300-0700 hrs)

ABNSR No.	Location	Airborne Railway Noise Level, dB(A)				Noise Criterion, dB(A)		Compliance (Y/N)
		$L_{eq,\ 30min}$ (1)			L_{max}	$L_{eq,\ 30min}$	L_{max}	
		Scenario: EP Condition 2.27	Scenario: Additional Train Operation Scenario 1A	Scenario: Additional Train Operation Scenario 1B				
SS7	Leung Uk Tsuen Village House	<33	<34	<33	53	55	85	Y
SS15	Leung Uk Tsuen Squats	<45	<46	<44	60	55	85	Y

Note:
(1) Since some measured noise levels during train passby were less than 3 dB(A) above the background noise levels, as a conservative approach, all the measured noise level during train passby were not corrected for background noise in evaluating the airborne railway noise level (i.e. with inclusion of background noise) for noise criteria compliance check. It is anticipated that the actual operational airborne railway noise levels at the ABNSRs would still be lower than the evaluation results.

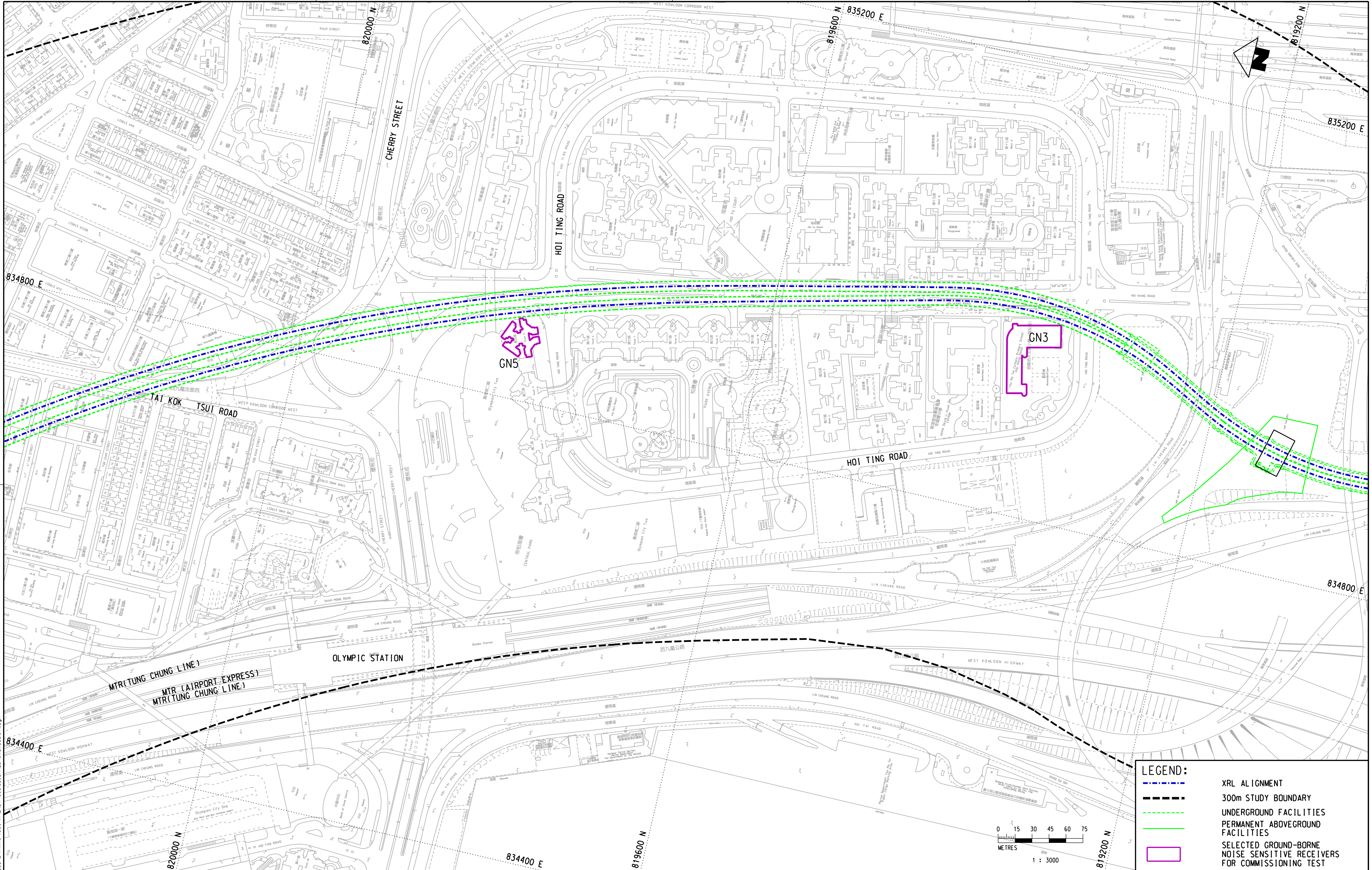
4.5.2 During the study of airborne railway noise assessment in SSS ERR, additional and substantial mitigation measures have been recommended and implemented to protect the nearby ABNSRs. Based on the findings of commissioning test, the actual operational airborne railway noise levels even at the ABNSRs would still be lower than the evaluation results. Even with the inclusion of background noise, the evaluation results are well within the noise criteria and it is concluded that no adverse impact is anticipated at the ABNSRs in both daytime/evening and night-time periods. Therefore no further mitigation measures will be required. While additional noise mitigation measures are not required based on the commissioning test results, flexibility has been allowed in the design for the implementation of further noise mitigation measures including installation of additional noise absorptive panels at the ERS and extension of noise barriers at the ERS and the SSS to deal with any unforeseeable impact to any noise sensitive receiver pursuant to EP Condition 2.34.

5 CONCLUSION

5.1.1 Operational ground-borne noise commissioning test were conducted at 7 representative GBNSRs on 29 and 30 December 2017, 12, 22 and 27 June, and 23 July 2018, while airborne noise commissioning test was conducted at 2 representative ABNSRs on 29 and 30 December 2017.

5.1.2 The results show that both ground-borne and airborne railway noise levels at all selected GBNSRs and ABNSRs comply with the stipulated noise criteria. Based on the findings of the railway noise commissioning tests, there would be no adverse railway noise impact arising from the operation of the Project to both GBNSRs and ABNSRs.

Figure



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DATE	31/05/2017

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CADD REF. C8016_C_XRL_ACM_M53_101A.dgn

TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATION OF SELECTED GBNSRS FOR COMMISSIONING TEST

(SHEET 1 OF 3)

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/101

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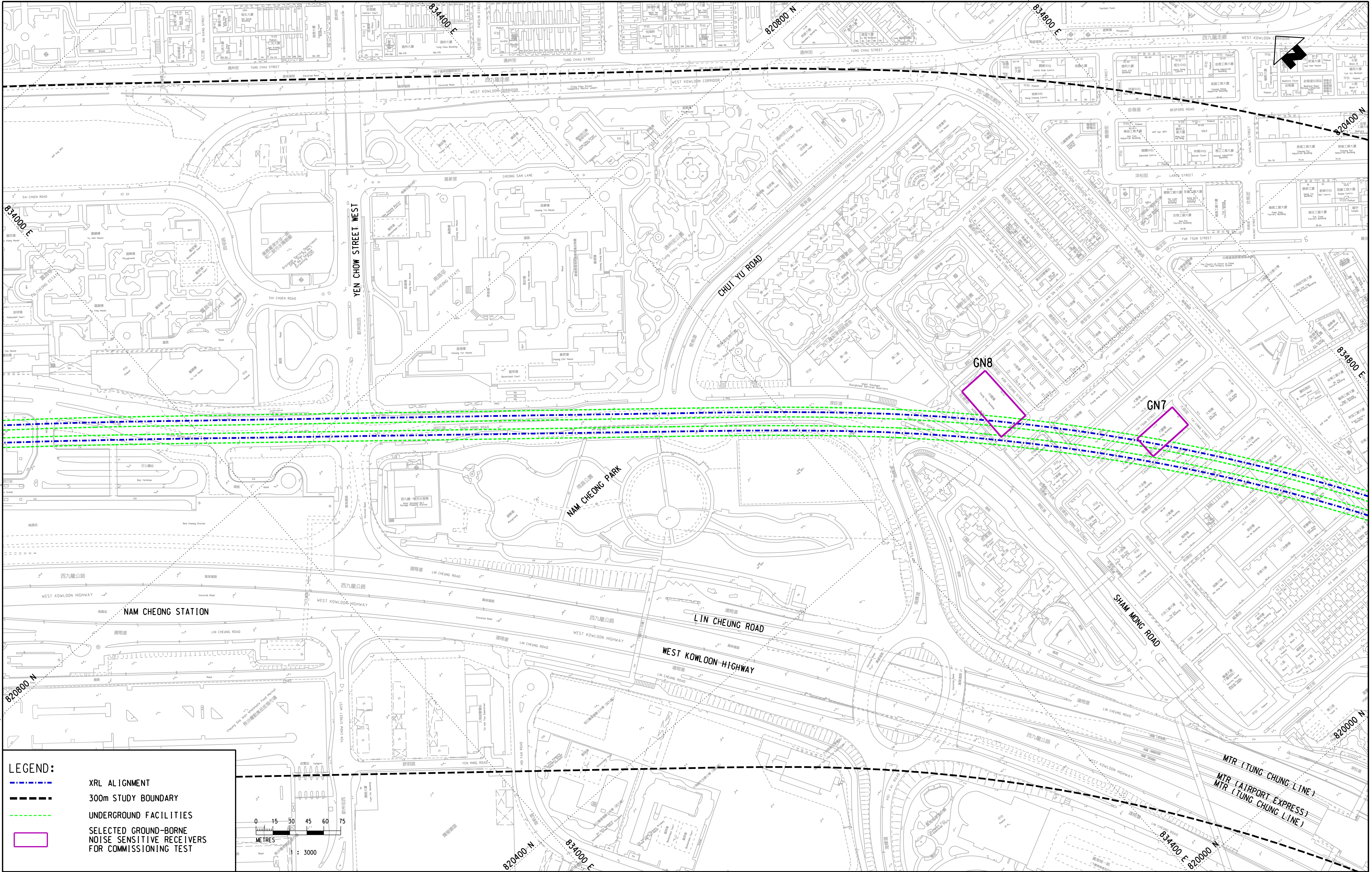

LEGEND:

(blue dash-dot line)	XRL ALIGNMENT
(black dashed line)	300m STUDY BOUNDARY
(green dashed line)	UNDERGROUND FACILITIES
(magenta box)	SELECTED GROUND-BORNE NOISE SENSITIVE RECEIVERS FOR COMMISSIONING TEST

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	31/05/2017

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CADD REF. C8016_C_XRL_ACM_M53_102A.dgn

TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATION OF SELECTED GBNSRS FOR COMMISSIONING TEST (SHEET 2 OF 3)

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/102

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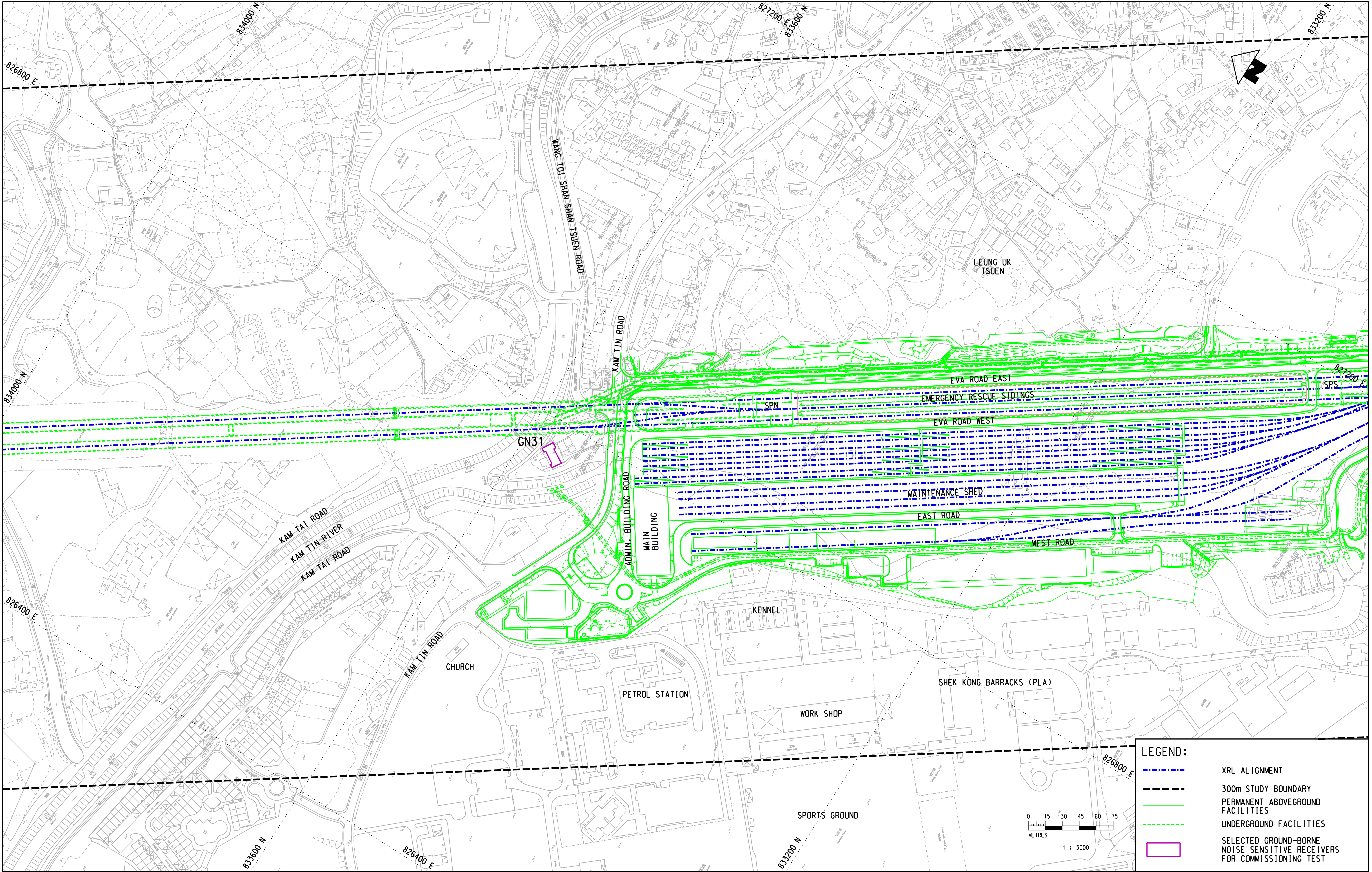

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TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATION OF SELECTED GBNSRS FOR COMMISSIONING TEST (SHEET 3 OF 3)

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/103

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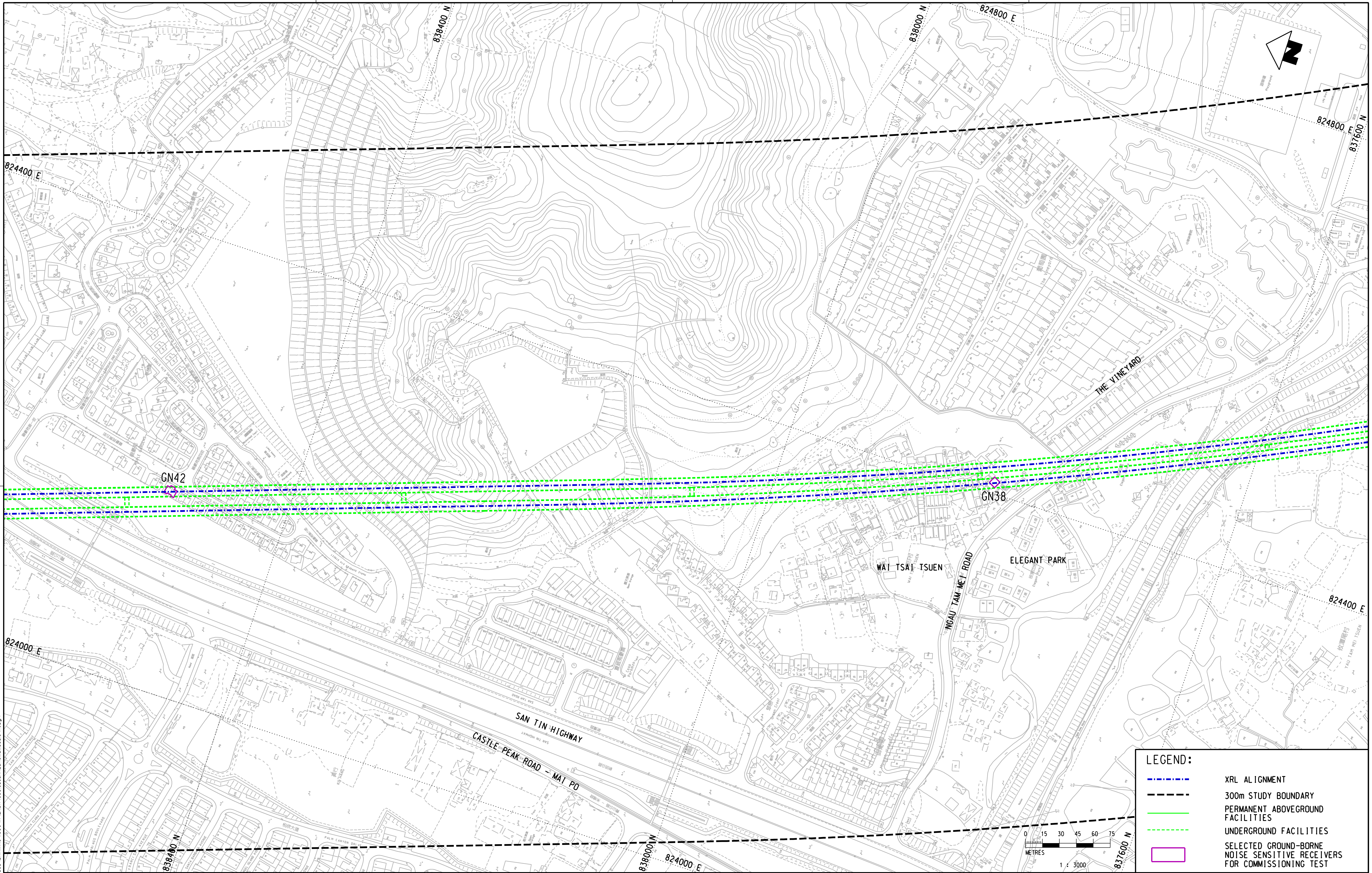

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ORIGINATOR

AECOM

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TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATION OF SELECTED GBNSRS FOR COMMISSIONING TEST

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/104

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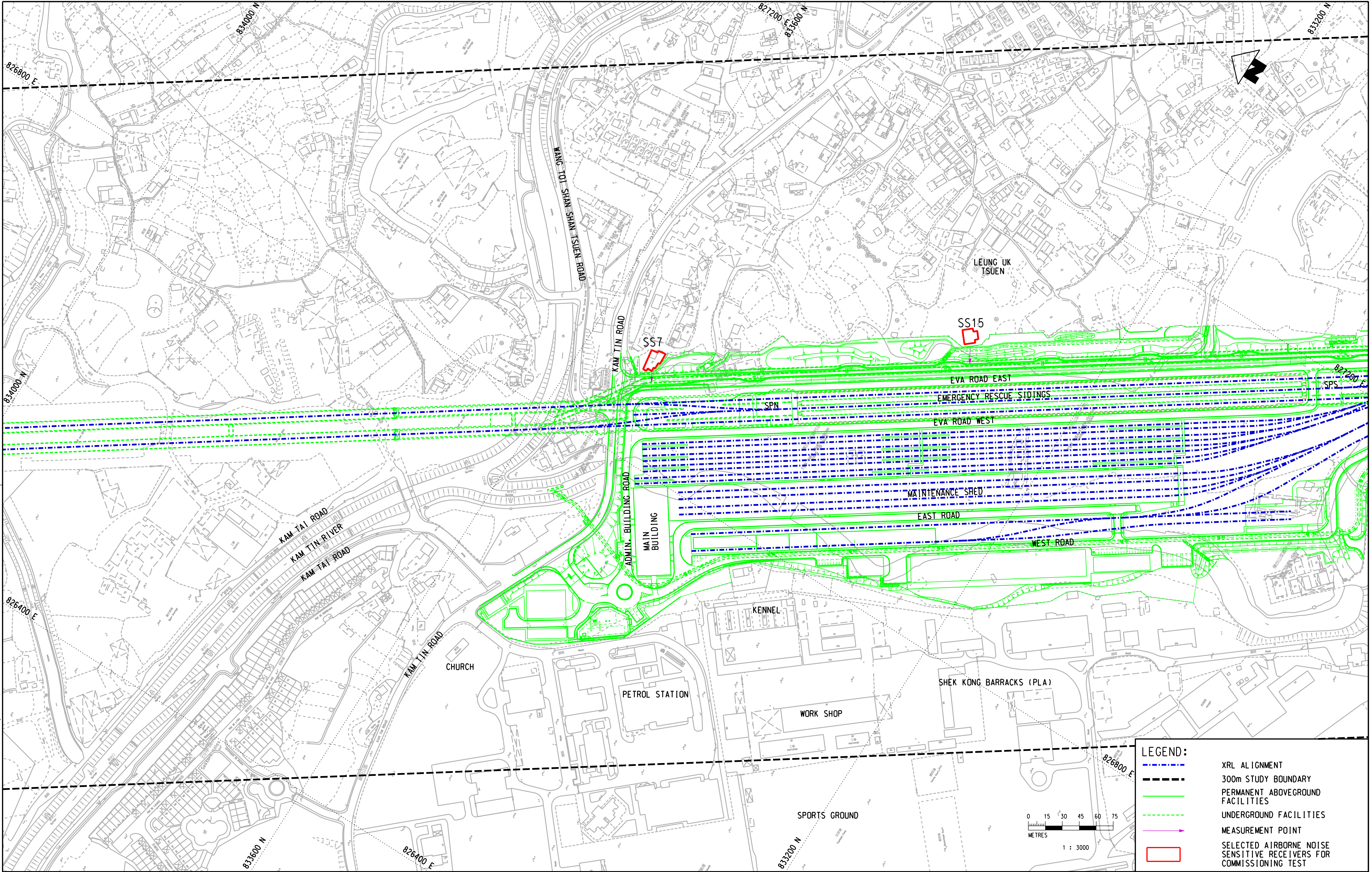

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DATE	31/05/2017

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ACM_M53_105A.dgn

TITLE
C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATION OF SELECTED ABNSRS FOR COMMISSIONING TEST

SCALE	FIGURE NO.	REV.
1 : 3000 (A3)	C8016/C/XRL/ACM/M53/105	A

Appendix A1

Excerpt of Updated Operational Ground-borne Noise Prediction Report (August 2013)

For Leq(24hour): V = N(24hour) / 24 (N = number of movements)

Vshort Number of short haul train movements in the relevant 30 minute or 24 hour period, expressed as the average number of movements per hour:
For Leq(30min): V = N(30min) x 2 (N = number of movements)
For Leq(24hour): V = N(24hour) / 24 (N = number of movements)

2.5 Operational Ground-borne Noise Impact Assessment

2.5.1 Operational vibration and ground-borne noise levels were calculated by incorporating the algorithms discussed in a 3-D model, MoleRat, which is developed by Wilkinson Murray Limited. $Leq_{(30min)}$ for day and night, Leq(24hr) and Lmax levels were calculated at most affected floor levels and the noise impact has been quantified by indicating the total number of dwellings or other sensitive elements exposed to levels exceeding the criteria.

Operational Information

2.5.2 Two train types are expected to operate for the Project; a long haul train of length 427m and a short haul train of length 214m.

2.5.3 The maximum train movements during daytime and evening (0700 – 2300 hours) and night-time (2300 – 2400 and 0600 – 0700 hours) have been updated according to latest time table of XRL and are presented in **Table 2.4**. In addition to this, there will be launching movements between SSS and WKT during the operational hours, and these need to be added to allow calculation of total ground-borne noise levels. However, since no speed profiles are available for launching trains, a conservative approach has been adopted whereby the shunting trains are assumed to travel the full length of the project.

Table 2.4 Train Movements

Track	Train Type	Movements per Hour				
		Mainline Operation(1)		Train Launching to/from SSS		Total
		Daytime and evening	Night-time	Daytime and evening	Night-time	24 Hour(2)
Northbound	Short	13	6	1	3	6
	Long	4	0	2	1	2
	Total	*17*	*6*	*3*	*4*	*8*
Southbound	Short	12	6	1	0	6
	Long	3	0	3	1	2
	Total	*15*	*6*	*4*	*1*	*8*

Notes:
(1) Long haul and short haul trains will be operated during the period of 0600 – 2400 hours only.
(2) Train frequency for 24 hours was calculated based on the average hour of total 24-hour train movements.

2.5.4 The worst hours for mainline operation and launching trains at night are not the same. Nevertheless, the worst hours were added in a conservative approach. Where 30 minute train movements are required, these are derived by dividing the hourly movements by two.

2.5.5 The latest speed profiles of XRL are presented in **Appendix 2.7**. As a worst case scenario, speed profiles for train not stopping at Futian, i.e. higher speed passing through Hong Kong Boundary, have been adopted in the present assessment.

2.5.6 Based on latest detailed design, the turnouts of the inclined type have been proposed at the locations as shown in **Table 2.5**.

to further minimise the ground-borne noise levels. With considerations given to suitability, environmental performance, constructability, maintenance constraints of different types of low noise trackform, the low noise trackform suitable for XRL includes alternative 1 fastening system (Alt 1) (or similar such as Vossloh 300-1U and low vibration trackform (LVT)), isolated slab trackform (IST), Vanguard and floating slab track (FST), with their insertion loss values shown in **Appendix 2.2**.

Table 2.7 Approximate Chainages where GBNSRs subject to Relative High Groundborne Noise Levels

Location	From	To
Nam Cheong		
Southbound	137+835	137+935
Northbound	137+860	137+960
West Kowloon Terminus		
Long Haul Platform	141+150	141+600
Short Haul Platform	141+385	141+600

Table 2.8 Chainages with Low Noise Trackform as Stipulated in EIA Report/EP Condition 2.28

From	To
Southbound	
123+040	123+640
133+160	133+660
137+600	138+350
139+100	139+600
140+900	141+600
Northbound	
123+050	123+650
133+170	133+670
137+620	138+370
139+120	139+620
140+900	141+600

2.5.10 The noise levels at the representative GBNSRs would be reduced to those shown in **Table 2.8** with the provision of low noise trackform. With the provision of low noise trackform at WKT, the Lmax levels at areas within the WKCD site and outside the WKT boundary were predicted to be in general lower than 25dB(A). **Appendix 2.9** shows the sample calculation of selected GBNSRs with the provision of low noise trackform.

Table 2.9 Predicted Ground-borne Railway Noise Levels (Mitigated)

GBNSR No.	Location	Predicted Ground-borne Noise Level, dB(A)				Criterion, dB(A)		Down Track Calculated Distance(1) (m)	Up Track Calculated Distance(1) (m)
		Leq_{30min} (day)	Leq_{30min} (night)	Leq (24hr)	Lmax	Leq_{30min} (day)	Leq_{30min} (night)		
GN1	Future Development at West Kowloon Cultural District	15	<15	<15	21	N.A.	N.A.	20	20

GBNSR No.	Location	Predicted Ground-borne Noise Level, dB(A)				Criterion, dB(A)		Down Track Calculated Distance(1) (m)	Up Track Calculated Distance(1) (m)
		Leq, 30min (day)	Leq, 30min (night)	Leq (24hr)	Lmax	Leq, 30min (day)	Leq, 30min (night)		
GN1a	Future Development at West Kowloon Cultural District	<15	<15	<15	22	N.A.	N.A.	86(2)	86(2)
GN1b	Future Development at West Kowloon Cultural District	<15	<15	<15	20	N.A.	N.A.	16	16
GN2	Future Development at West Kowloon Cultural District	<15	<15	<15	15	N.A.	N.A.	40	40
GN2d	Block 6 Phase 1 Sorrento	<15	<15	<15	<15	55	45	52	42
GN2e	Man King Building	<15	<15	<15	<15	55	45	59	67
GN3	Yaumati Catholic Primary School (Hoi Wang Road)	27	22	24	40	55	45	16	5
GN4	Block 9, Charming Garden	26	21	23	37	55	45	5	17
GN5	Tower 5 Phase 1 Park Avenue	25	20	22	37	55	45	21	6
GN6	Hing Wong Mansion	<15	<15	<15	25	55	45	37	37
GN7	Tai Fung Building (Block F) Cosmopolitan Estates	<15	<15	<15	27	55	45	36	36
GN8	Chung Yew Building	24	18	21	37	55	45	18	21
GN9	West Kowloon Disciplined Services Quarters Block 1	19	<15	16	31	55	45	22	39
GN10	Fu Yun House, Fu Cheong Estate	23	18	20	39	55	45	15	31
GN11	Planned Nam Cheong Station Property Development	20	15	17	34	55	45	7	7
GN11a	Planned Residential Development in Site 6	29	24	26	42	55	45	28	15
GN11b	Planned Residential Development in Site 6	26	21	23	38	55	45	28	15
GN11c	Planned Residential Development in Site 6	24	18	21	36	55	45	41	28
GN11d	Planned Residential Development in Site 6	20	15	17	32	55	45	55	42
GN11e(3)	Planned Residential Development in Site 6	16	<15	<15	31	55	45	27	30
GN12	SKH St. Mary's Church Mok Hing Yiu College	19	<15	16	33	55	45	36	23
GN12a	Tack Ching Girls' Secondary School	<15	<15	<15	22	55	45	40	53
GN13	Tower 6 Aqua Marine	<15	<15	<15	19	55	45	22	36
GN14	HKIVE Haking Wong Waterfront Annex	<15	<15	<15	28	55	45	35	41
GN14a	Lai Chi Kok Reception Centre	26	21	24	39	55	45	25	23

GBNSR No.	Location	Predicted Ground-borne Noise Level, dB(A)				Criterion, dB(A)		Down Track Calculated Distance(1) (m)	Up Track Calculated Distance(1) (m)
		Leq, 30min (day)	Leq, 30min (night)	Leq (24hr)	Lmax	Leq, 30min (day)	Leq, 30min (night)		
GN14b	Ward A, Lai Chi Kok Hospital	<15	<15	<15	27	55	45	90	74
GN15	40A Cheung Hang Village	<15	<15	<15	<15	50	40	235	235
GN16	Tower 6 Regency Park	<15	<15	<15	<15	55	45	249	248
GN17	Block 21 Wonderland Villas	<15	<15	<15	<15	55	45	275	275
GN18	Block 2 Greenknoll Court	<15	<15	<15	24	55	45	90	90
GN18b	Kwai Ying Building	22	17	19	34	55	45	60	63
GN19	Tower B Kwai Sing Centre	21	16	18	32	55	45	44	46
GN19a	Ming Tak Building	20	15	17	29	55	45	48	51
GN20	Block B Hutchison Estate	25	20	22	38	55	45	36	38
GN21	184 Yau Ma Hom Resite Village	15	<15	<15	28	55	45	73	73
GN22	18 Da Chuen Ping Village	15	<15	<15	28	50	40	87	87
GN23	35 Sheung Kwai Chung Village	<15	<15	<15	<15	50	40	98	98
GN24	Sau Shan House, Cheung Shan Estate	<15	<15	<15	<15	55	45	125	125
GN25	Tsuen Wan Lutheran School	<15	<15	<15	<15	55	45	124	124
GN26	426A Tsang Uk Tsuen	16	<15	<15	29	50	40	26	23
GN27	431A Tsang Uk Tsuen	<15	<15	<15	25	50	40	27	26
GN28	510B Nam Hing Lei	<15	<15	<15	25	50	40	26	29
GN29	630 Shueng Tsuen	17	<15	<15	32	50	40	28	42
GN30	51A Leung Uk Tsuen	<15	<15	<15	<15	55	45	113	132
GN30a	Village Zone West Boundary, Leung Uk Tsuen	<15	<15	<15	<15	55	45	61	79
GN30b	Village house in Leung Uk Tsuen	<15	<15	<15	20	55	45	46	64
GN31	DD110 LOT 482, Wang Toi Shan Choi Yuen Tsuen	24	18	21	36	55	45	35	19
GN33	348 Tsat Sing Kong	21	15	18	33	50	40	29	27
GN34	349 Tsat Sing Kong	20	15	17	33	50	40	27	34
GN35	374 Chuk Yau Road	19	<15	16	32	50	40	46	52

GBNSR No.	Location	Predicted Ground-borne Noise Level, dB(A)				Criterion, dB(A)		Down Track Calculated Distance(1) (m)	Up Track Calculated Distance(1) (m)
		Leq, 30min (day)	Leq, 30min (night)	Leq (24hr)	Lmax	Leq, 30min (day)	Leq, 30min (night)		
GN36	DD104 LOT 1786, Chuk Yau Road	21	16	18	34	50	40	31	33
GN37	DD104 LOT 1396, Yau Tam Mei Tsuen, Chuk Yau Road	21	16	19	35	50	40	30	29
GN37a	Chun Shin Road, Yau Tam Mei Tsuen	<15	<15	<15	18	50	40	67	55
GN38	45 Wai Tsai Tsuen	21	16	18	34	50	40	33	32
GN38a	Petrus Avenue House 21 Phase 1 The Vineyard	<15	<15	<15	30	50	40	33	39
GN38b	China Bible Seminary	17	<15	<15	31	50	40	33	29
GN39	62D Wai Tsai Tsuen	19	<15	16	33	50	40	34	34
GN40	House 1, Green Crest	<15	<15	<15	19	50	40	53	43
GN41	House A73 Maple Gardens	17	<15	<15	32	50	40	42	39
GN42	House A78 Maple Gardens	<15	<15	<15	26	50	40	38	40
GN43	Area Zoned as R(A)	20	15	17	34	50	40	31	32
GN44	House 5 Phase A Royal Palms	<15	<15	<15	15	50	40	65	51
GN45	Village house in Mai Po	20	15	17	34	50	40	36	32

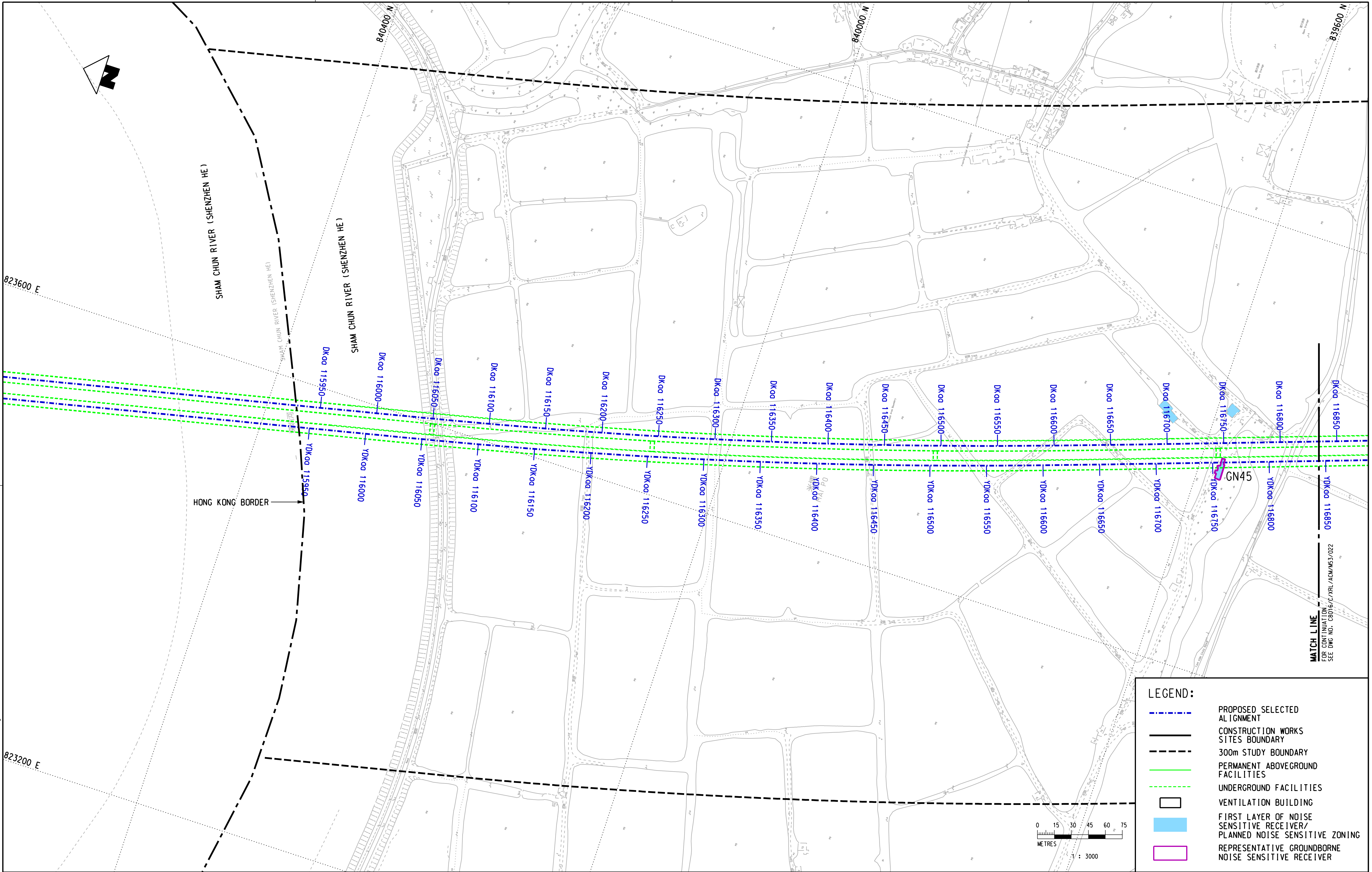
Note:
(1) Distances were measured from latest survey plan.
(2) Distance was measured from the southern end of platform at WKT where the front end of trains stop.
(3) Based on latest available information at Site 6, the proposed usage at GN11e would be carpark / market block. As a worst case scenario, GN11e is considered as a NSR in this assessment.

Cumulative Effect from Other Rail Lines

2.5.11 The Project will run close to other existing rail lines and the cumulative effect from other rail lines has been reviewed. Locations where other rail lines are relatively close are as follows:

- The WKT will be located in the vicinity of the KSL Austin Station
- The XRL will be parallel to KSL and reasonably close just north of WKT, and also parallel to, but further away, Tung Chung Line (TCL) and Airport Express Link (AEL)
- The XRL will pass close to the Tung Chung Line (TCL) Nam Cheong station
- The XRL will pass under the Tsuen Wan Line (TWL) at Lai Chi Kok

2.5.12 Any cumulative effect from KSL would relate to West Kowloon Cultural District. Whilst predicted noise levels Lmax at GN1b, the nearest GBNSRs to WKT and KSL, which is located at approx. 16m from the tracks at WKT, is 20dB(A), KSL would be at least 100m from GN1b. At this distance low ground-borne noise levels are expected. As such cumulative impact from the Project and KSL is not anticipated at GN1b. According to the WKCD EIA Report (Application No. EIA-215/2013), appropriate noise and vibration control measures such as building isolation and/or box-in-box installation would be adopted by future developers to



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TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/021

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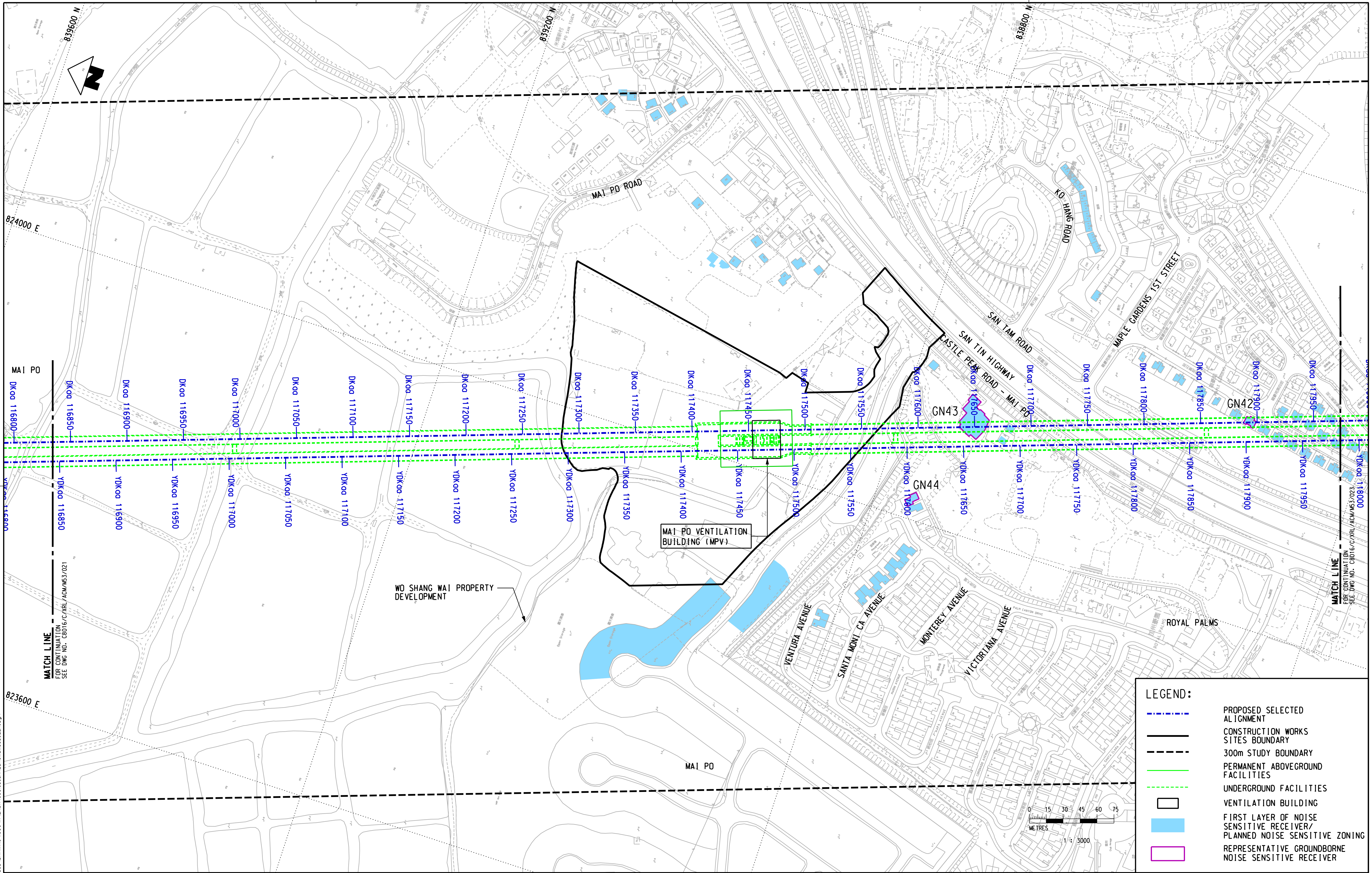

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SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/022

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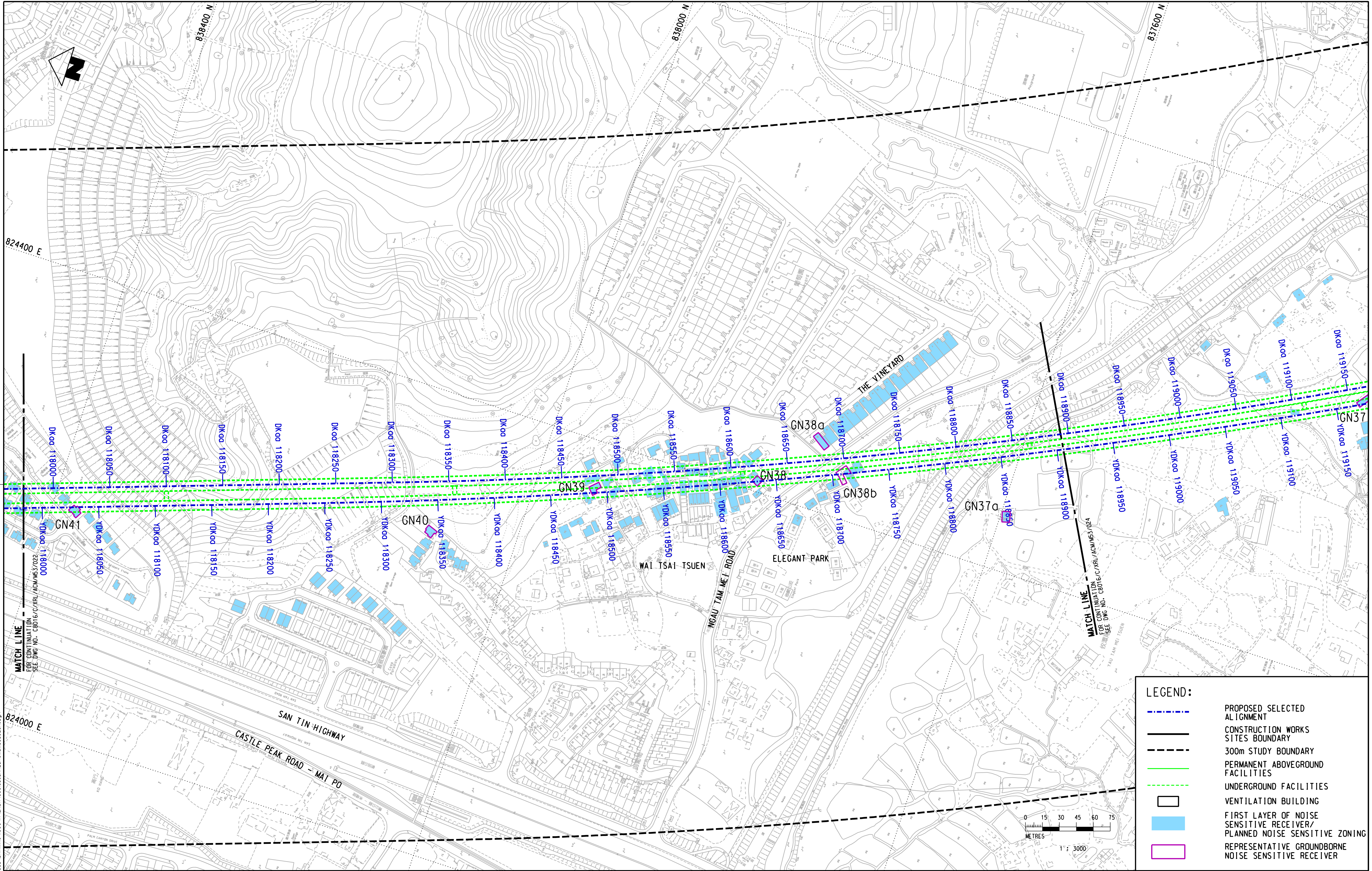

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LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/023

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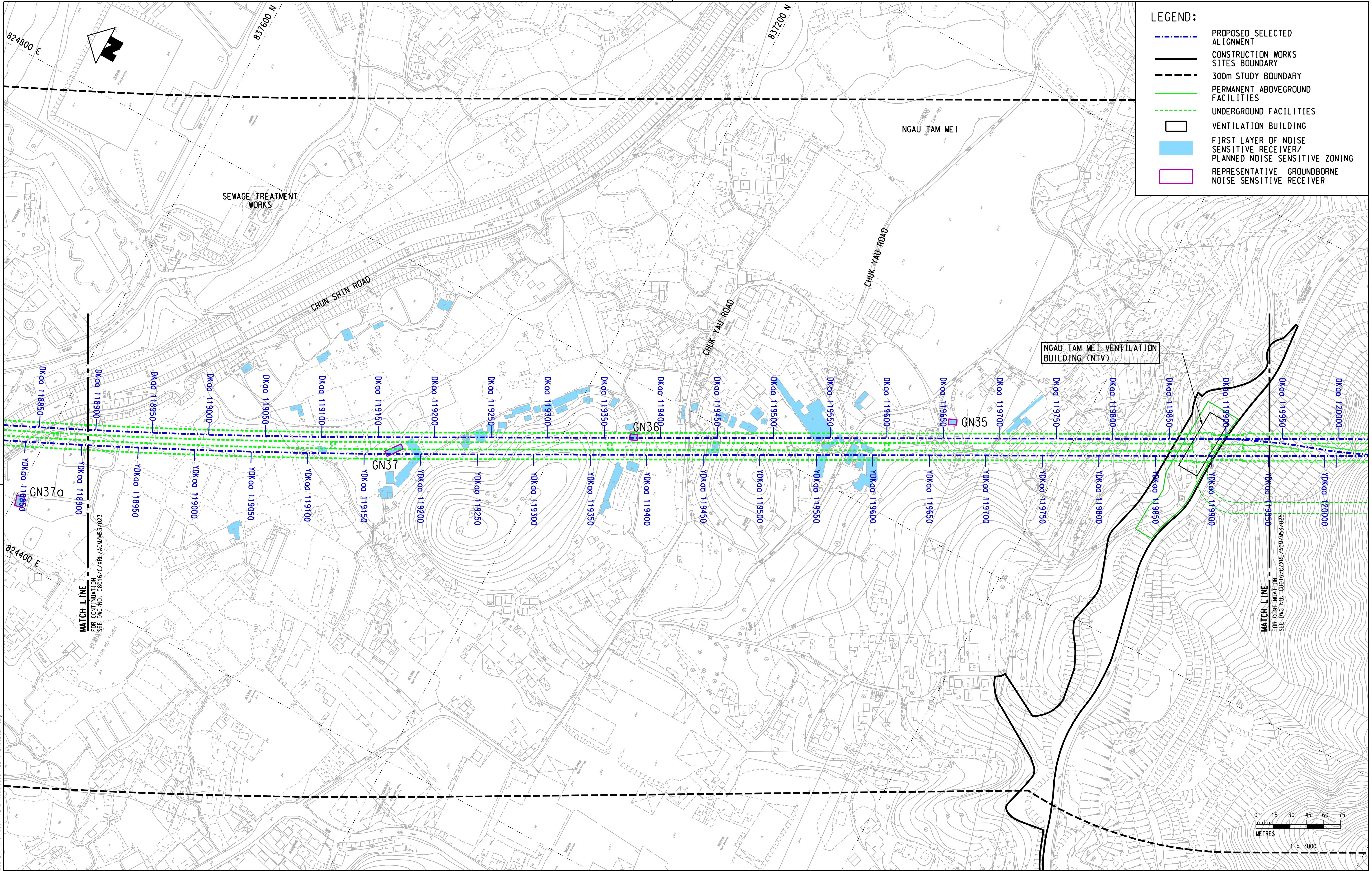

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C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/024

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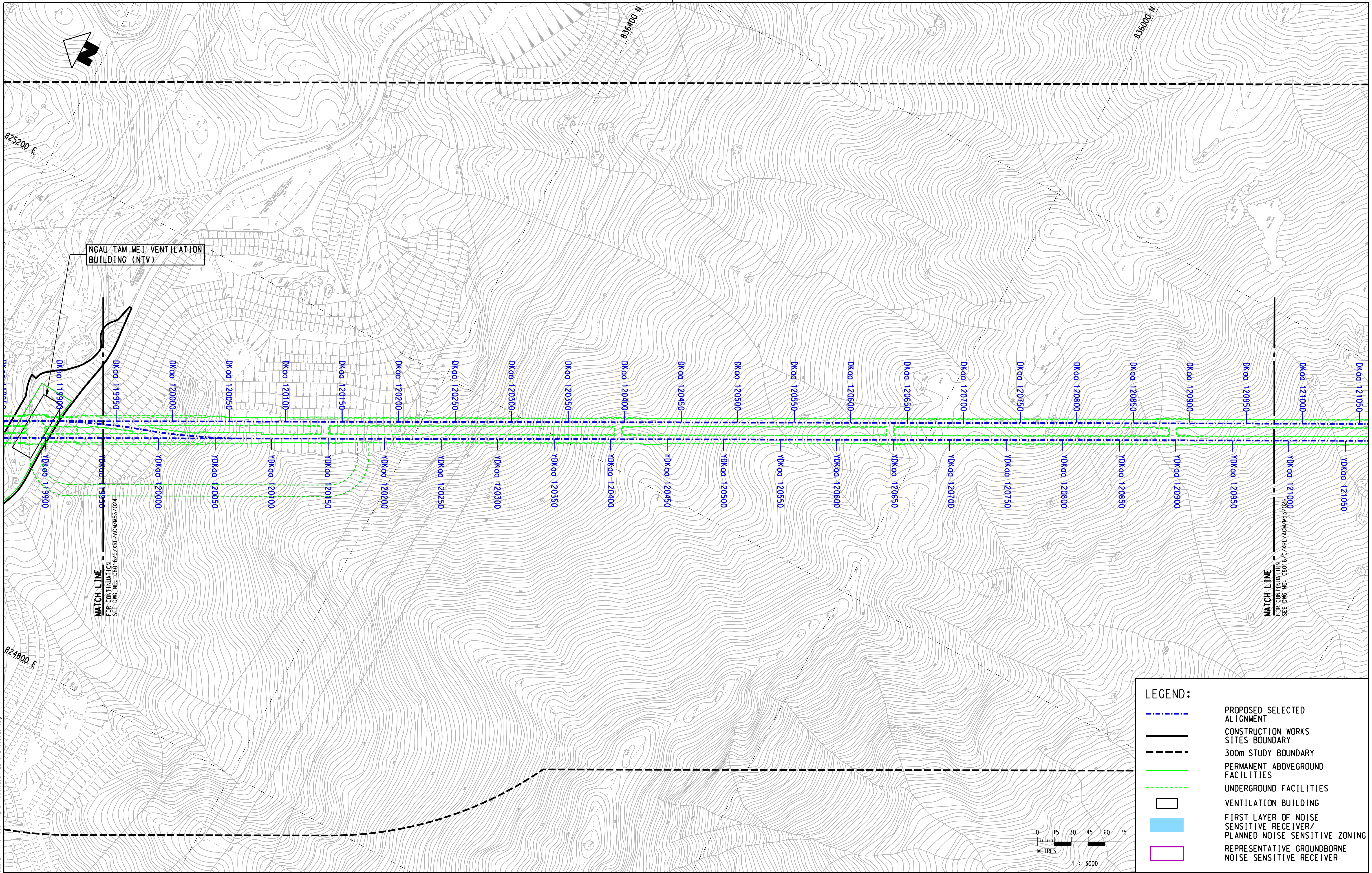

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- CONSTRUCTION WORKS SITES BOUNDARY
- 300m STUDY BOUNDARY
- PERMANENT ABOVEGROUND FACILITIES
- UNDERGROUND FACILITIES
- VENTILATION BUILDING
- FIRST LAYER OF NOISE SENSITIVE RECEIVER/ PLANNED NOISE SENSITIVE ZONING
- REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVER

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LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/025

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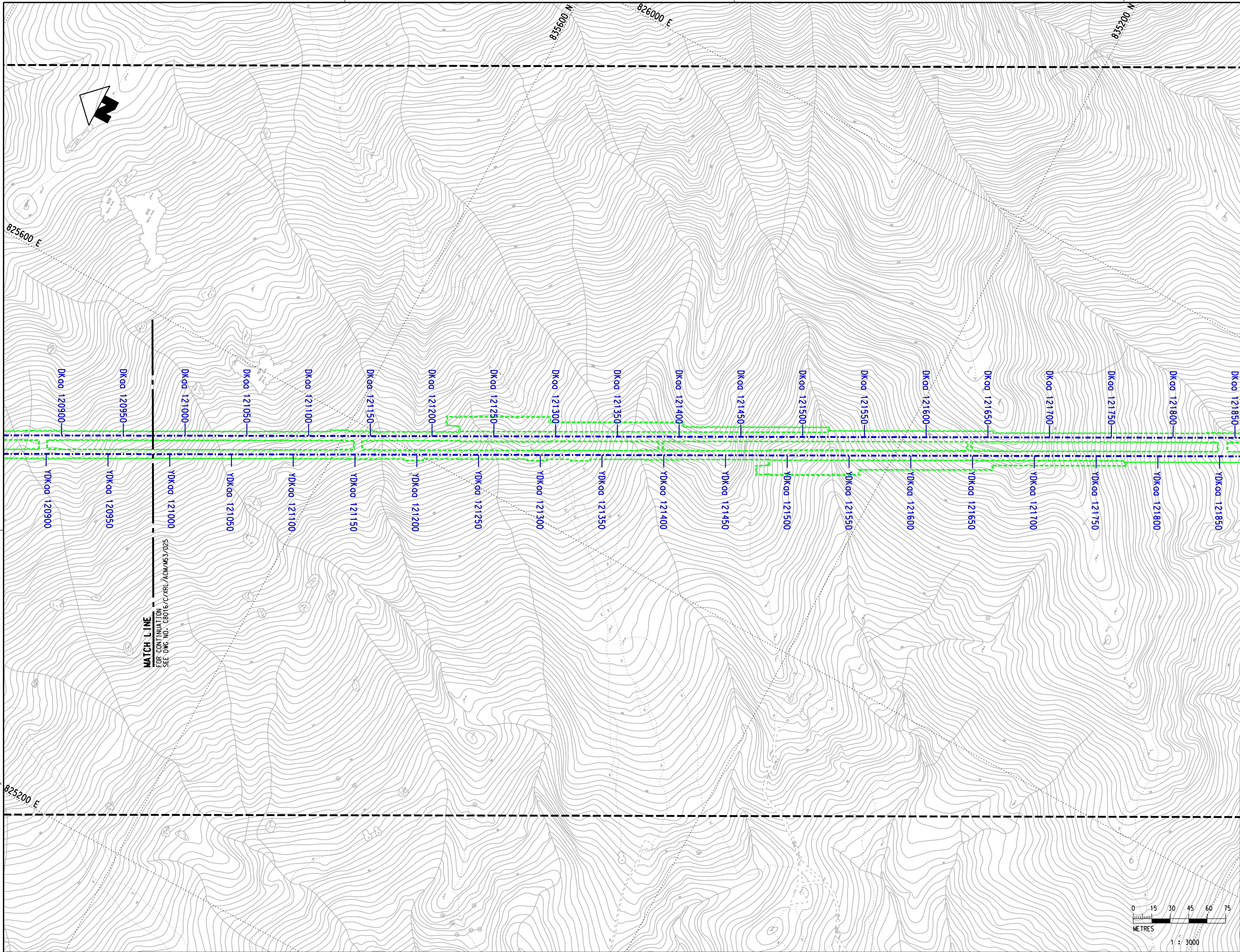

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LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

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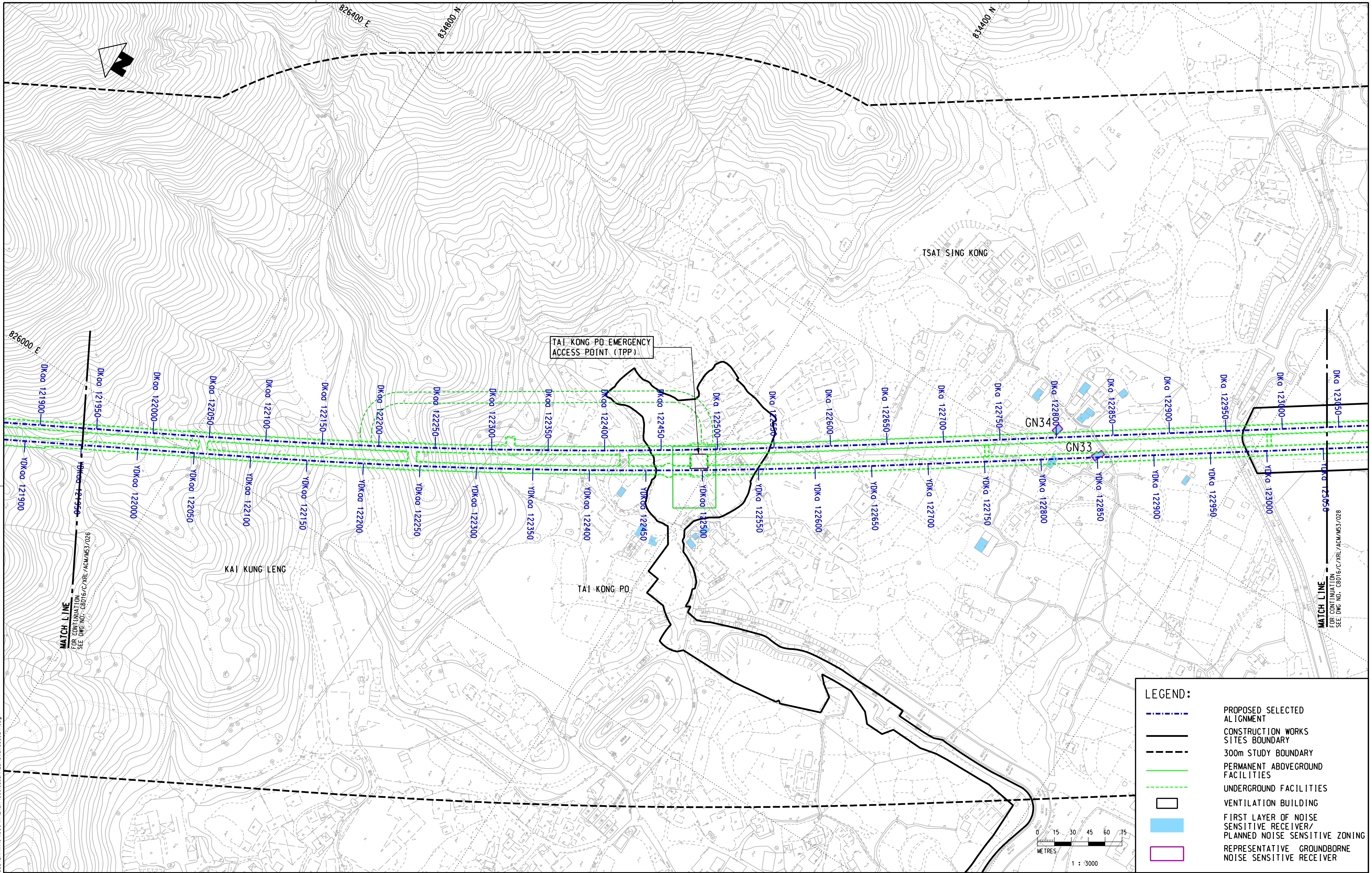

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LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

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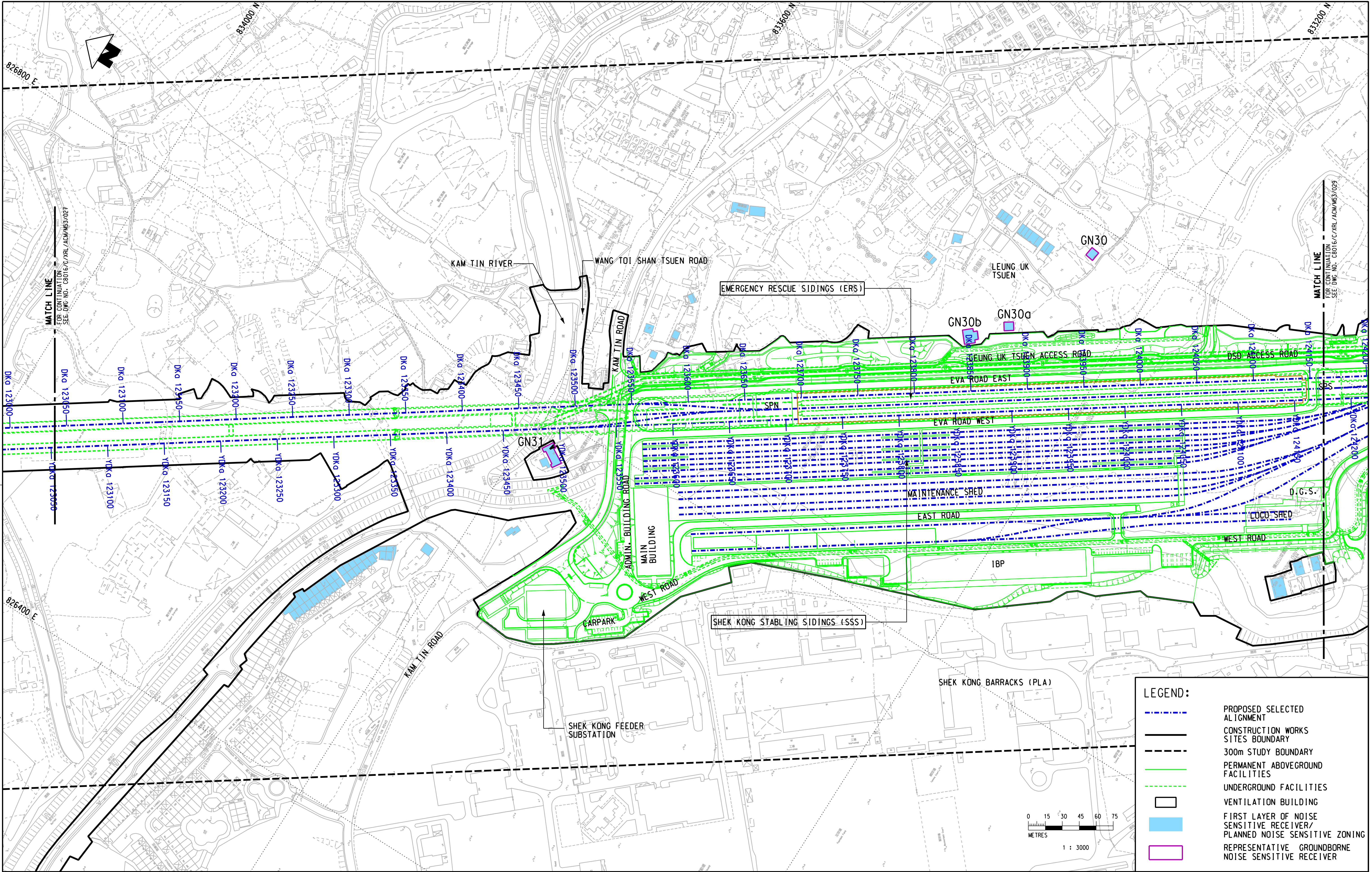

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ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/028

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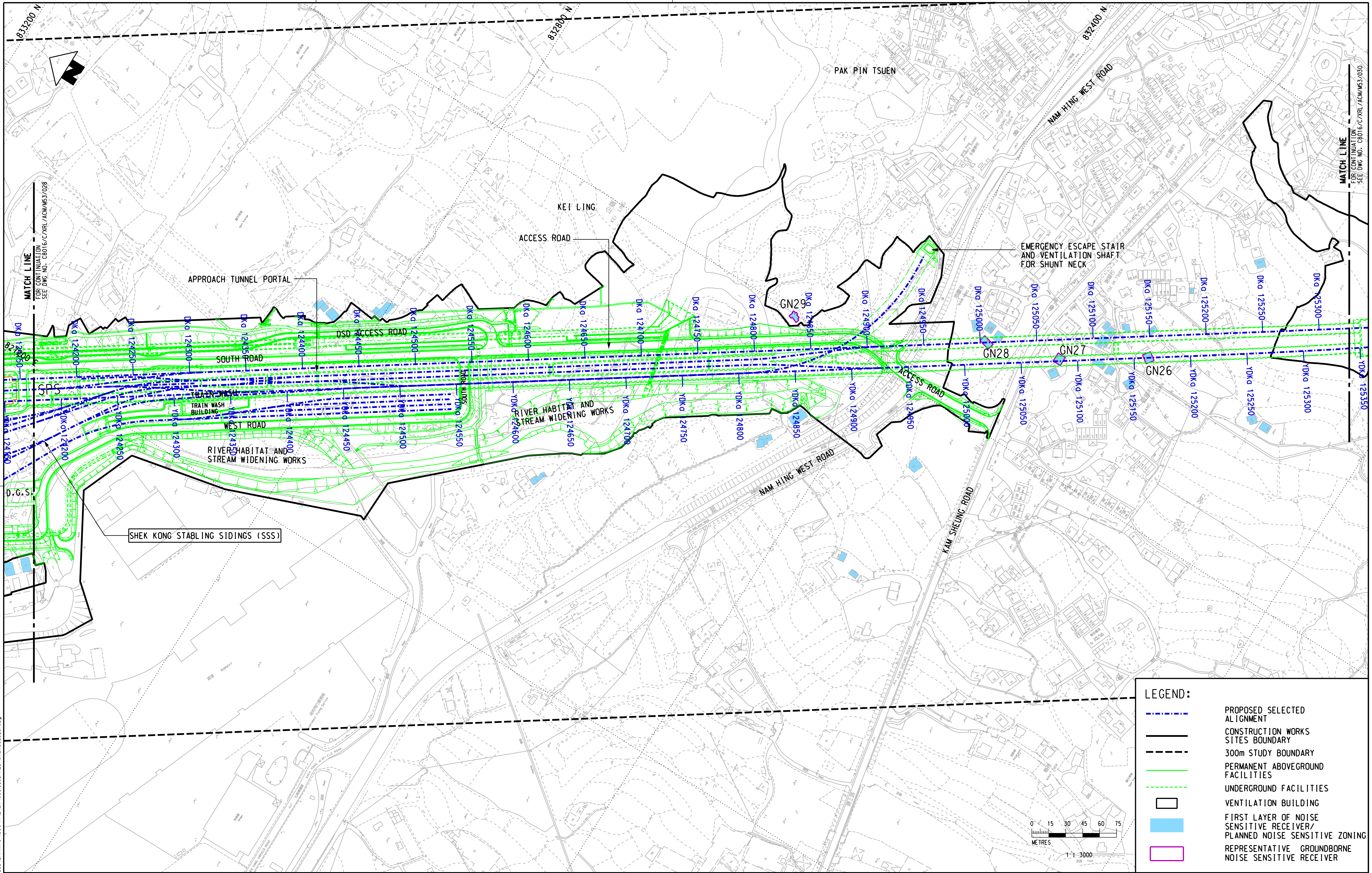

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ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/029

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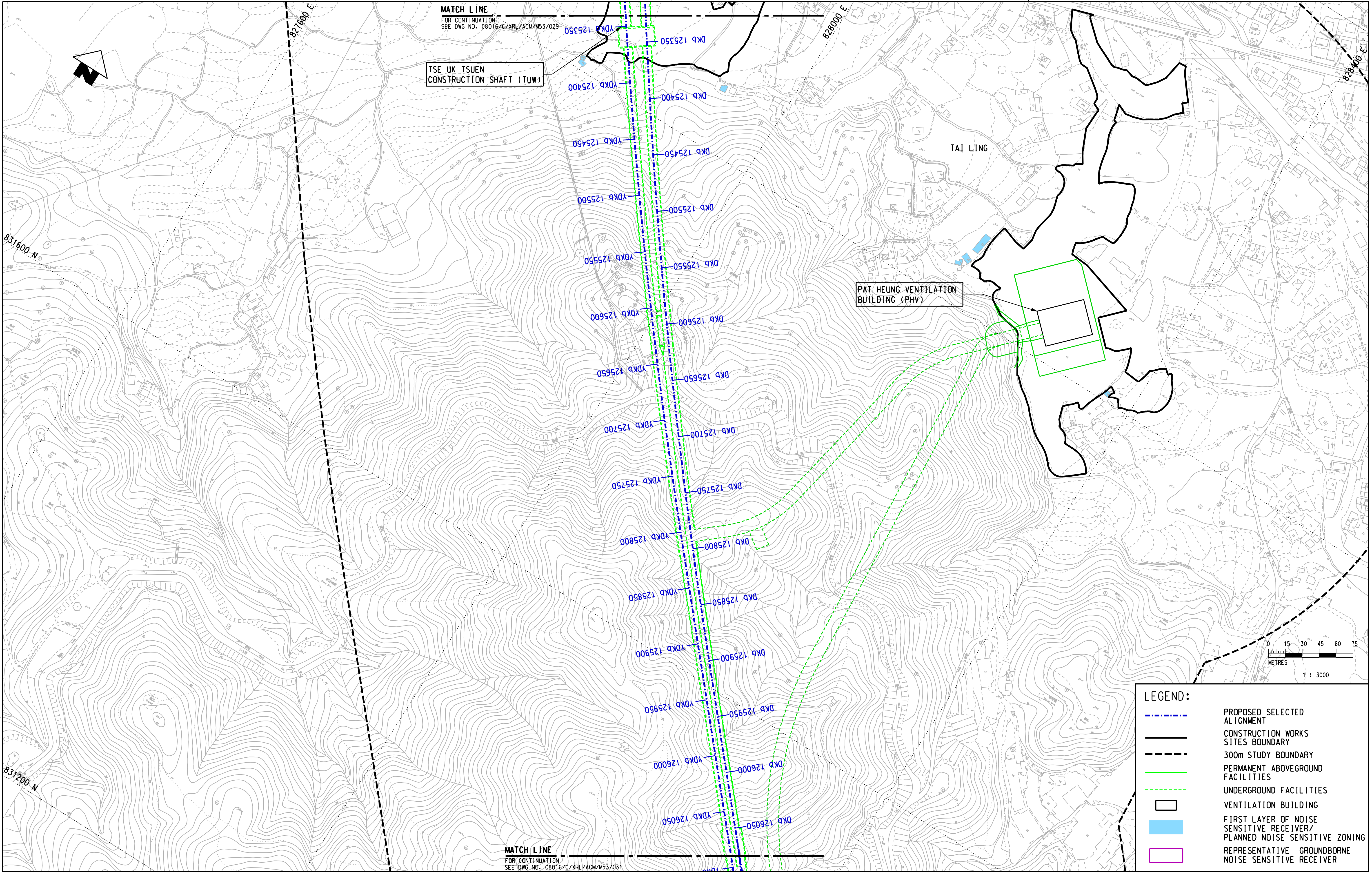

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AECOM

CADD REF. C8016_C_XRL_ACM_M53_030A.dgn

TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE
GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/030

REV. A

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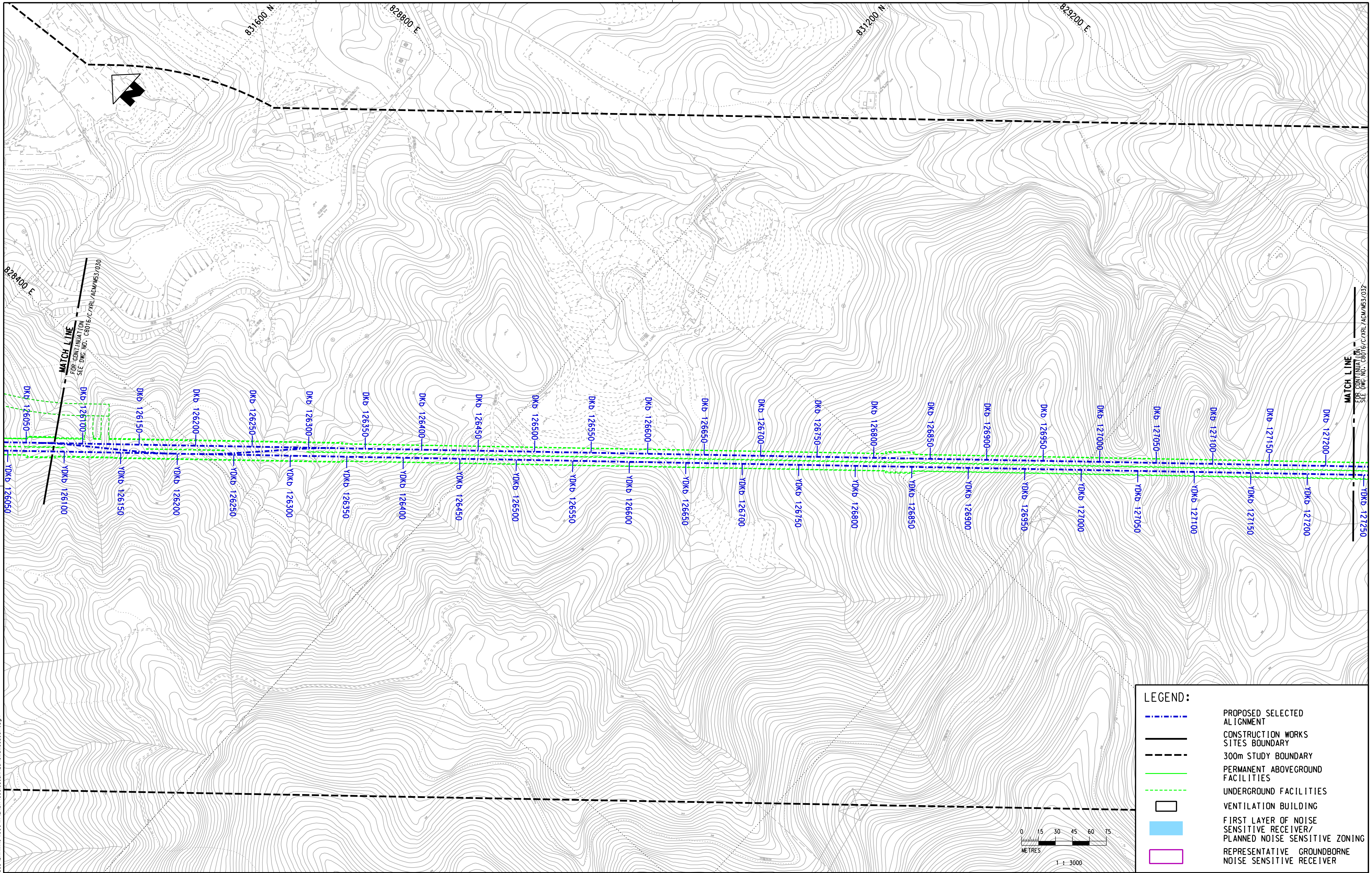

LEGEND:

- PROPOSED SELECTED ALIGNMENT
- CONSTRUCTION WORKS SITES BOUNDARY
- 300m STUDY BOUNDARY
- PERMANENT ABOVEGROUND FACILITIES
- UNDERGROUND FACILITIES
- VENTILATION BUILDING
- FIRST LAYER OF NOISE SENSITIVE RECEIVER/ PLANNED NOISE SENSITIVE ZONING
- REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVER

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

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ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ACM_M53_031A.dgn

TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/031

REV. A

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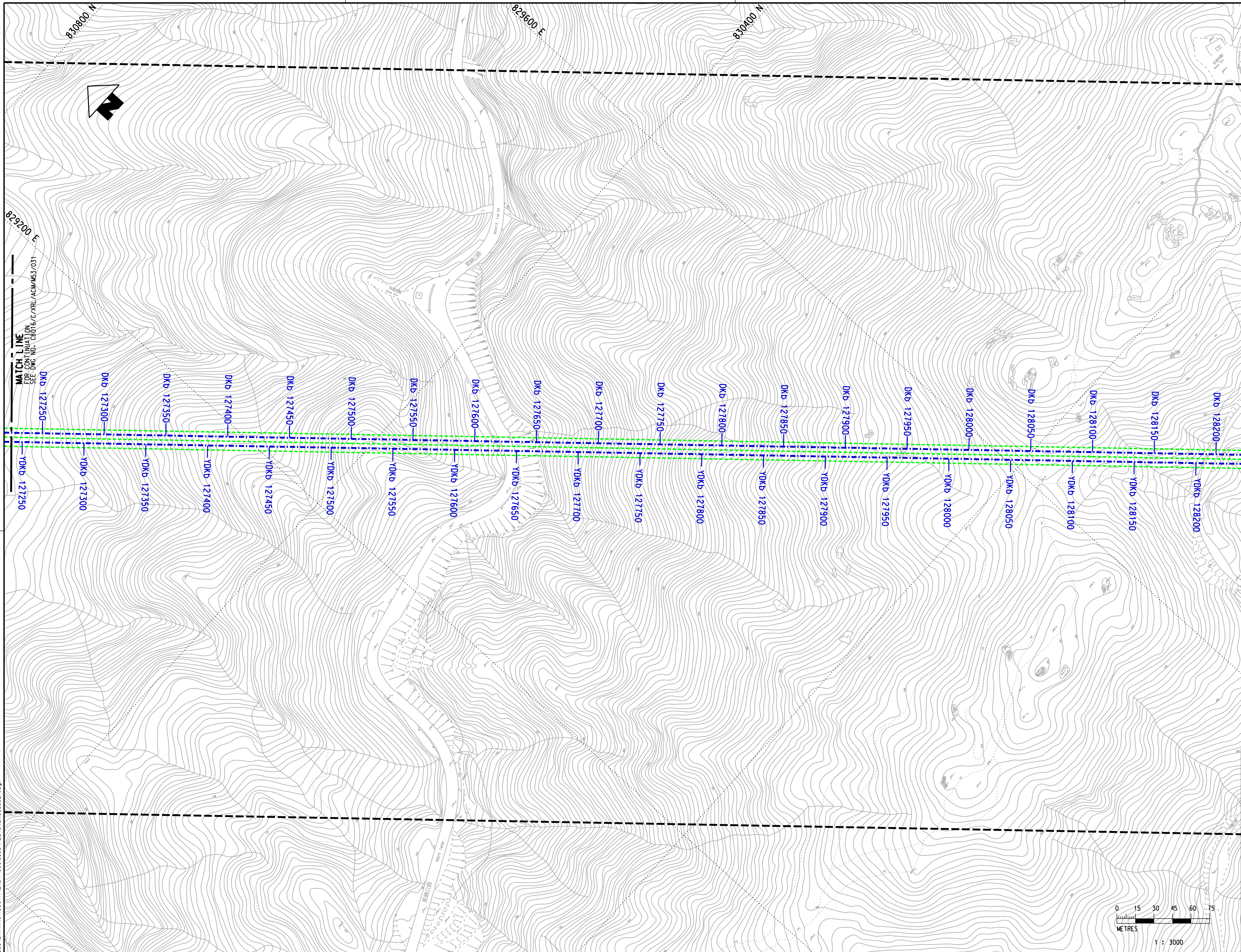

LEGEND:

- PROPOSED SELECTED ALIGNMENT
- CONSTRUCTION WORKS SITES BOUNDARY
- 300m STUDY BOUNDARY
- PERMANENT ABOVEGROUND FACILITIES
- UNDERGROUND FACILITIES
- VENTILATION BUILDING
- FIRST LAYER OF NOISE SENSITIVE RECEIVER/ PLANNED NOISE SENSITIVE ZONING
- REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVER

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	GXH
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CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

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EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ACM_M53_032A.dgn

TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/032

REV. A

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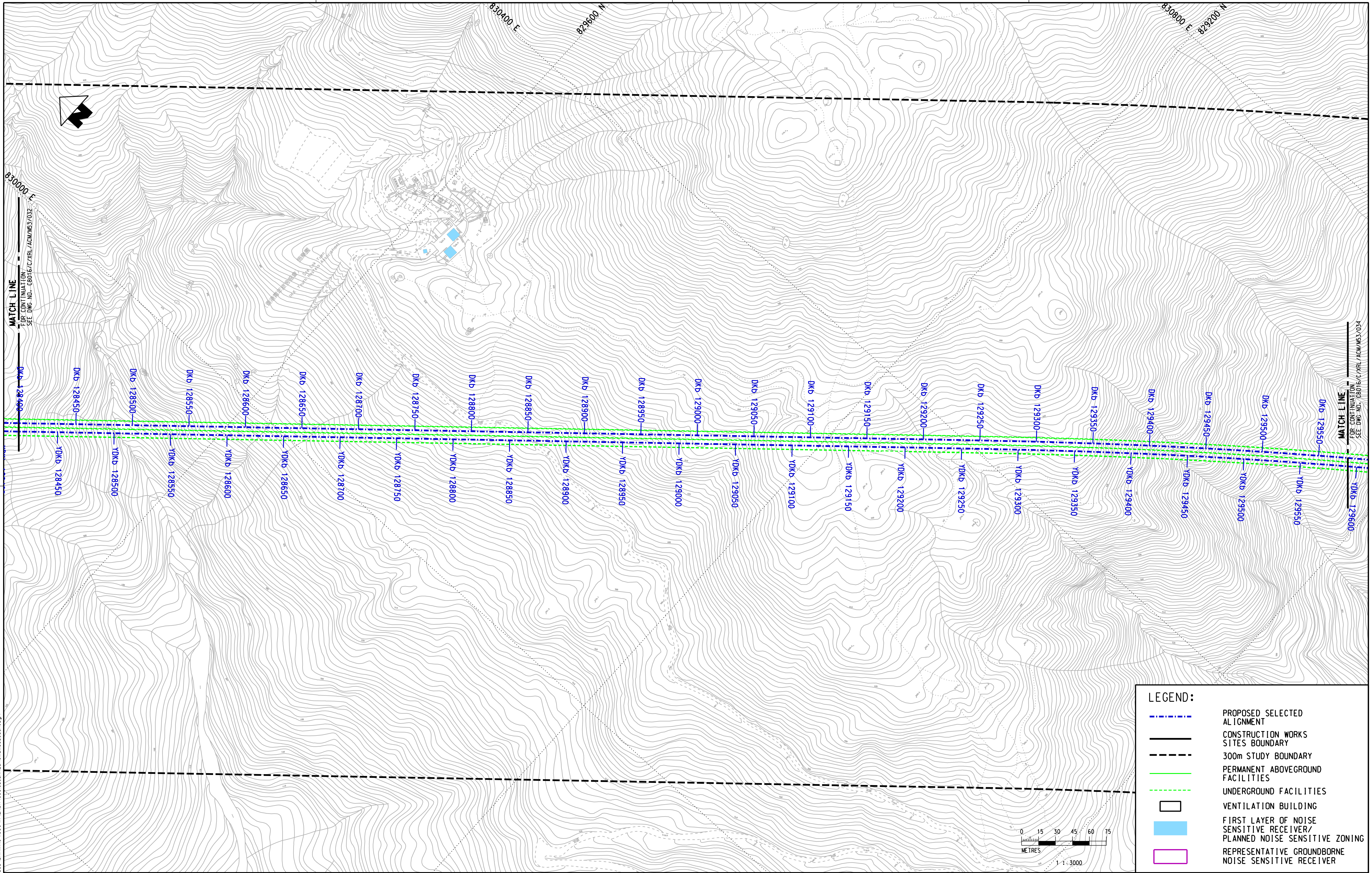

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DRAWN	GXH
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CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ACM_M53_033A.dgn

TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/033

REV. A

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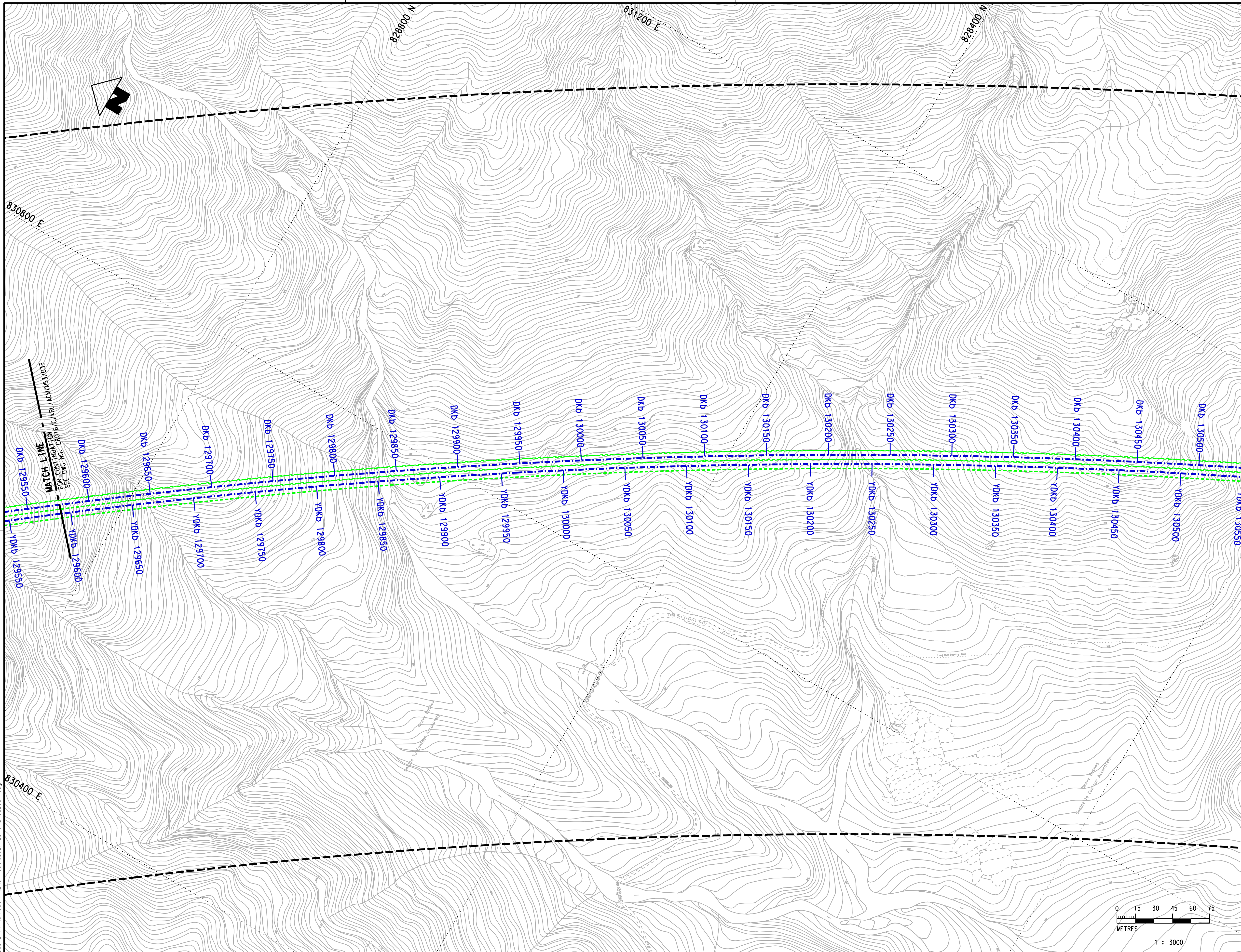

LEGEND:

- PROPOSED SELECTED ALIGNMENT
- CONSTRUCTION WORKS SITES BOUNDARY
- 300m STUDY BOUNDARY
- PERMANENT ABOVEGROUND FACILITIES
- UNDERGROUND FACILITIES
- VENTILATION BUILDING
- FIRST LAYER OF NOISE SENSITIVE RECEIVER/ PLANNED NOISE SENSITIVE ZONING
- REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVER

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ACM_M53_034A.dgn

TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/034

REV. A

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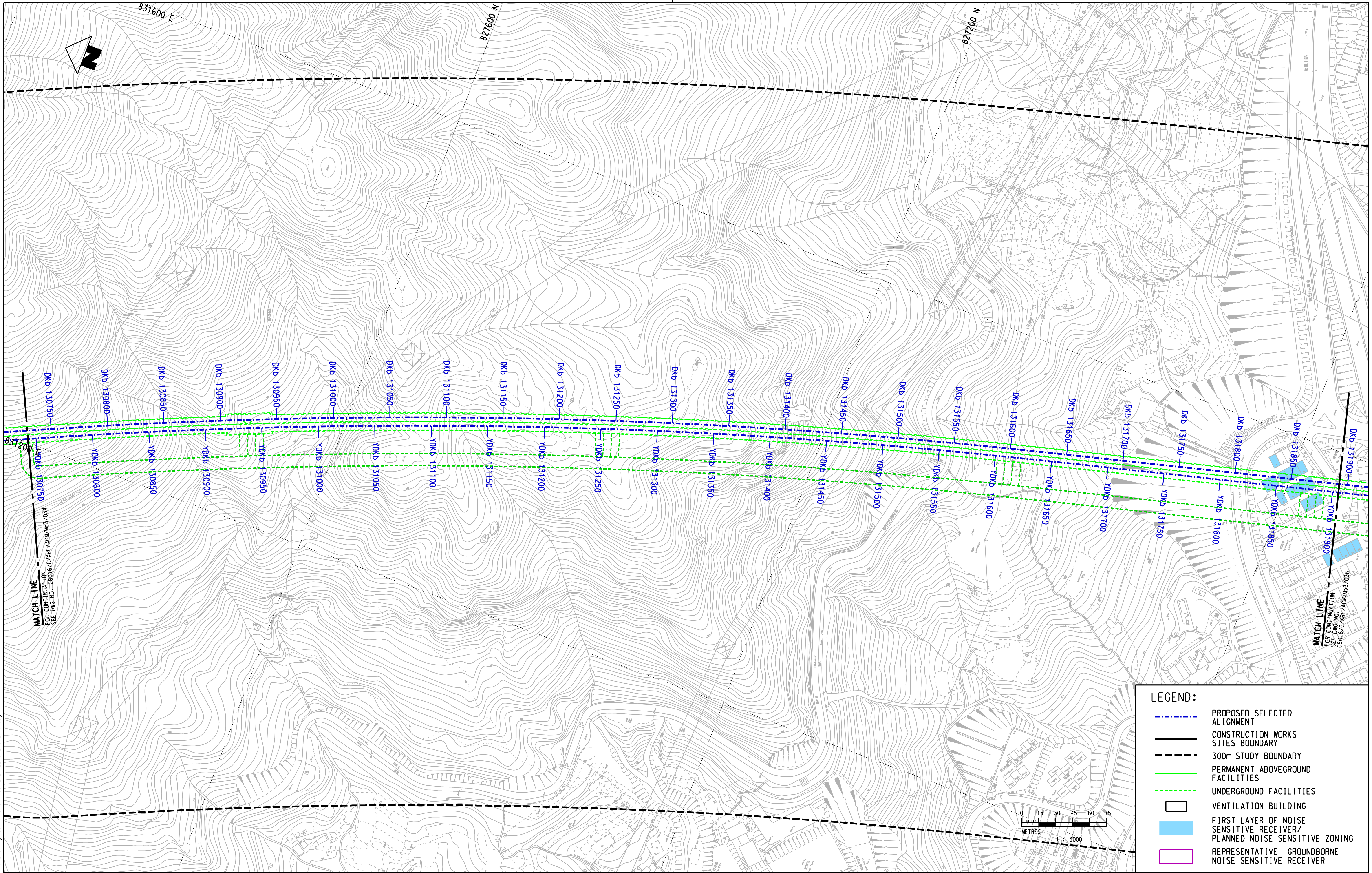

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DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

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AECOM

CADD REF. $FILEA$

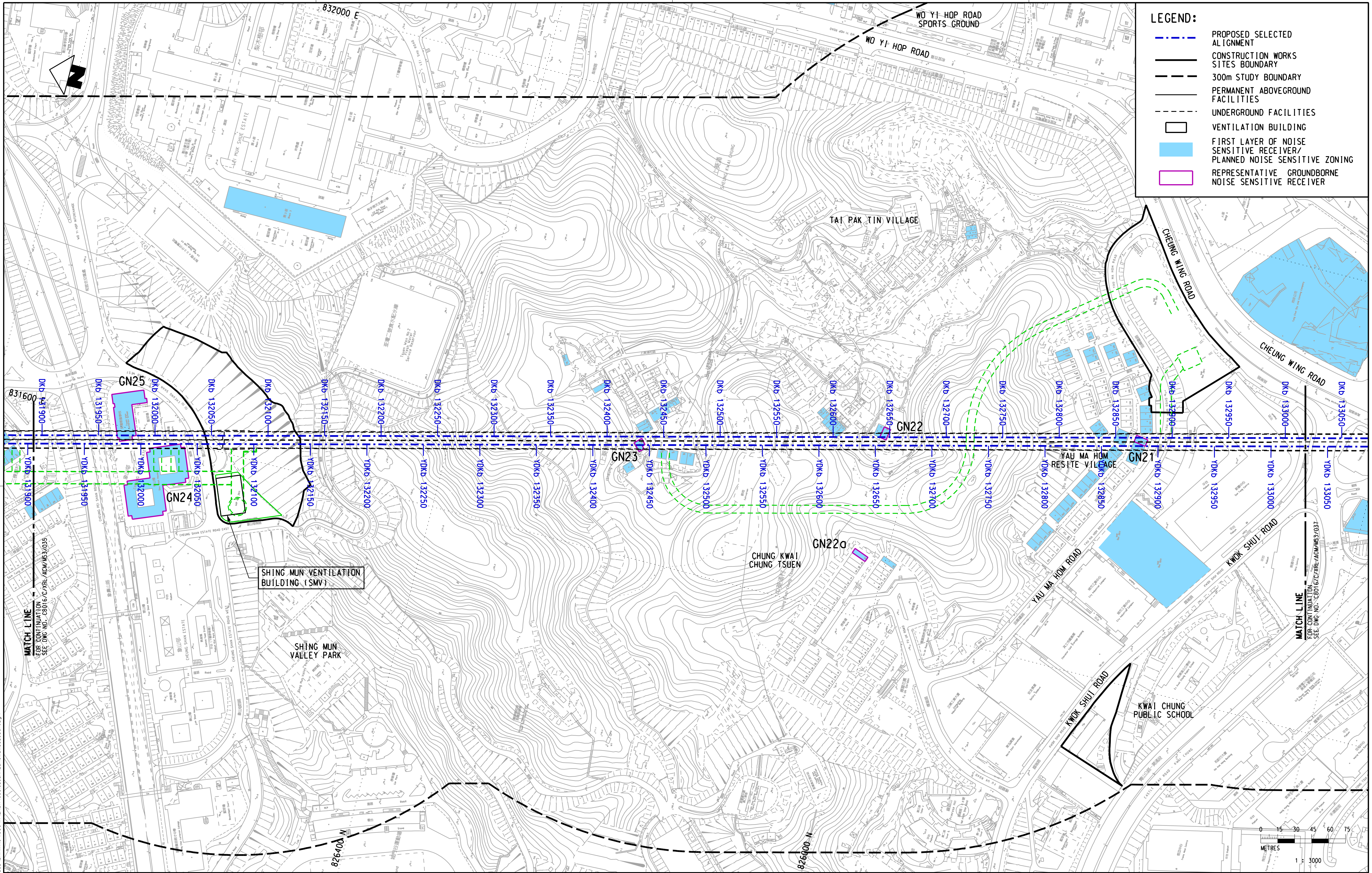
TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/035

REV. A



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CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

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CADD REF. C8016_C_XRL_ACM_M53_036A.dgn

TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/036

REV. A

LEGEND:

(blue dash-dot line)	PROPOSED SELECTED ALIGNMENT
(solid black line)	CONSTRUCTION WORKS SITES BOUNDARY
(dashed black line)	300m STUDY BOUNDARY
(solid green line)	PERMANENT ABOVEGROUND FACILITIES
(dashed green line)	UNDERGROUND FACILITIES
(black box)	VENTILATION BUILDING
(blue fill)	FIRST LAYER OF NOISE SENSITIVE RECEIVER/ PLANNED NOISE SENSITIVE ZONING
(magenta box)	REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVER

DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

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ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ACM_M53_037A.dgn

TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)
FIGURE NO. C8016/C/XRL/ACM/M53/037
REV. A

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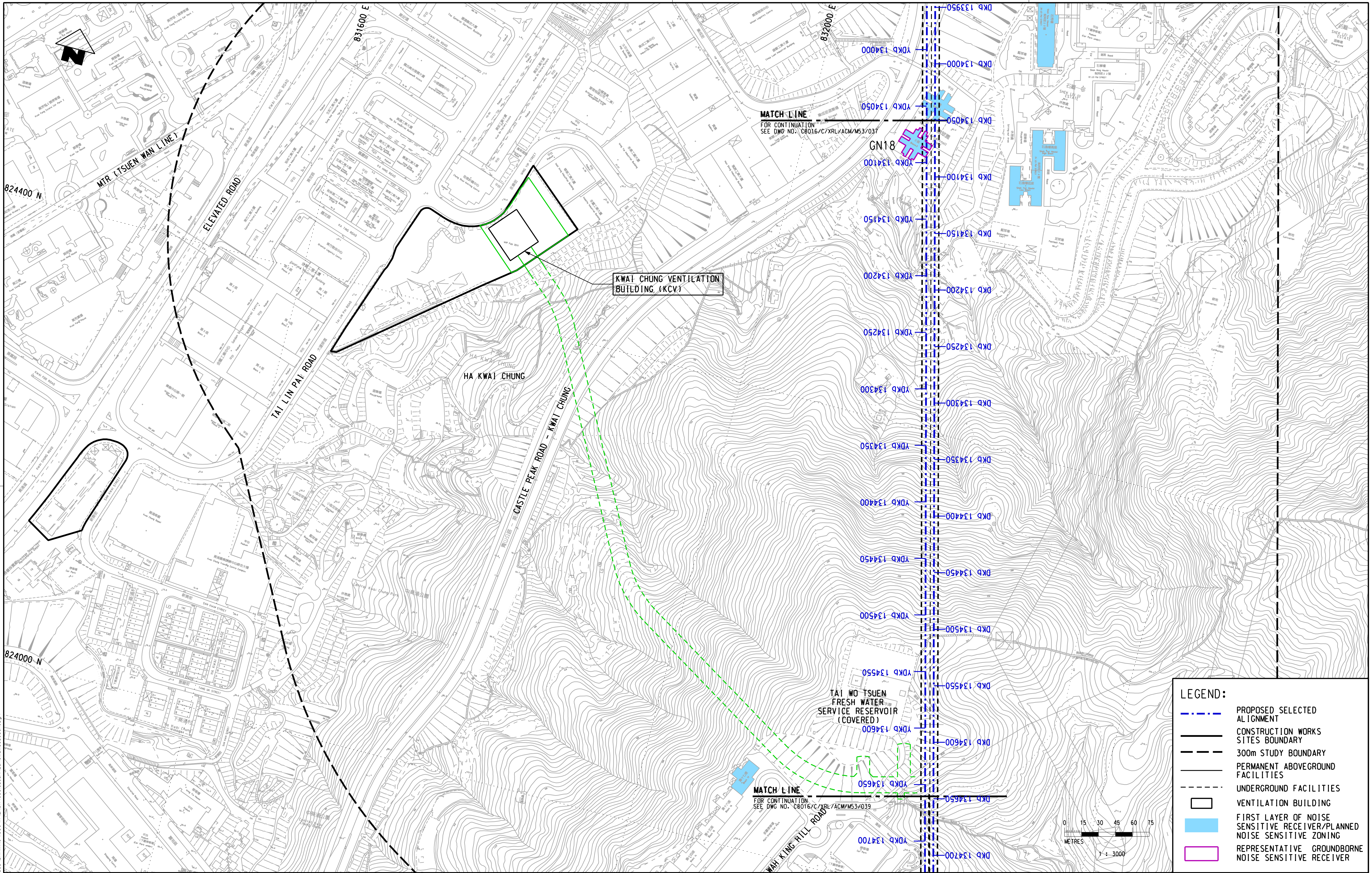

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CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

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EXPRESS RAIL LINK

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AECOM

CADD REF. C8016_C_XRL_ACM_M53_038A.dgn

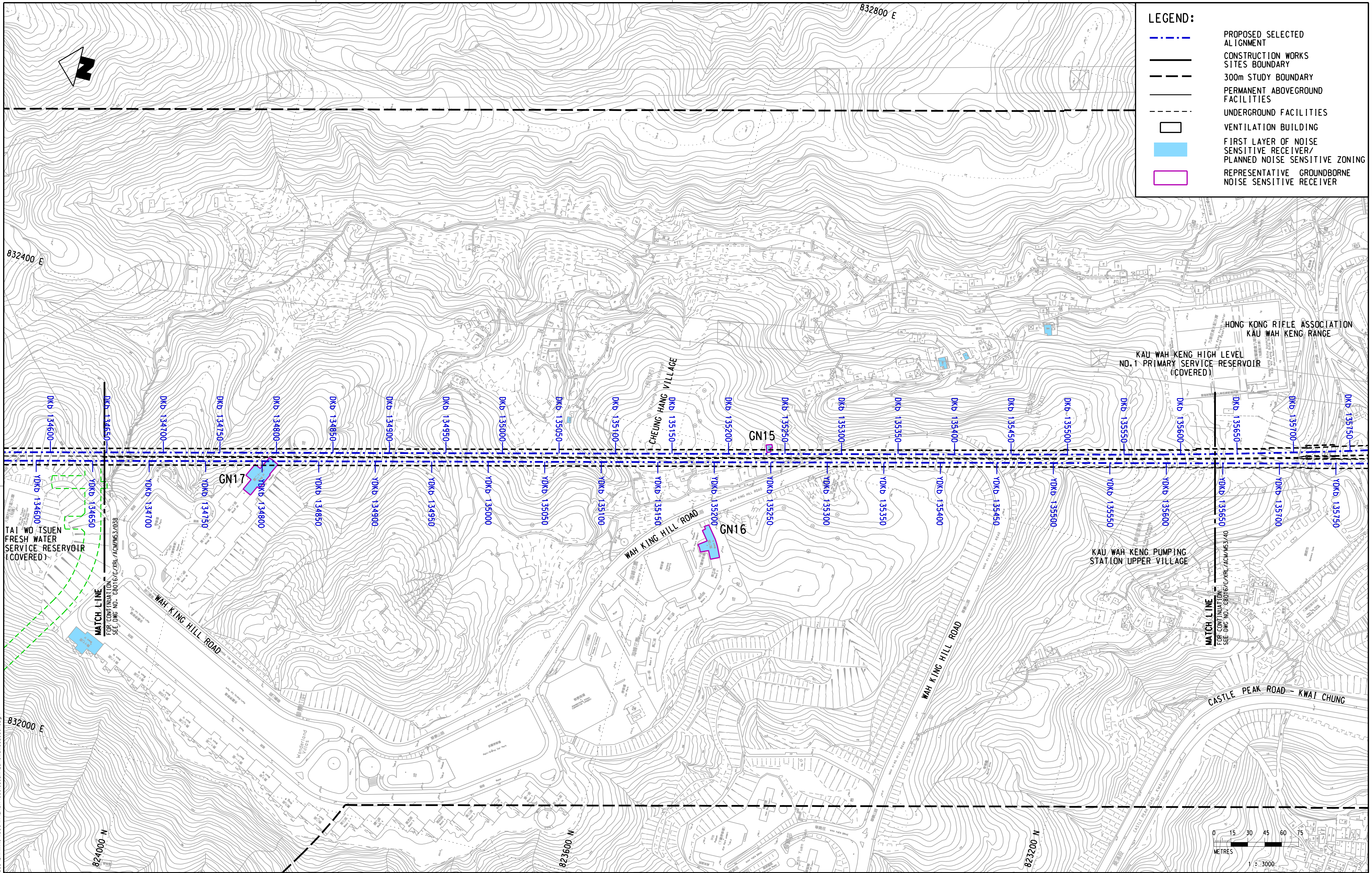
TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/038

REV. A



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CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

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EXPRESS RAIL LINK

ORIGINATOR

AECOM

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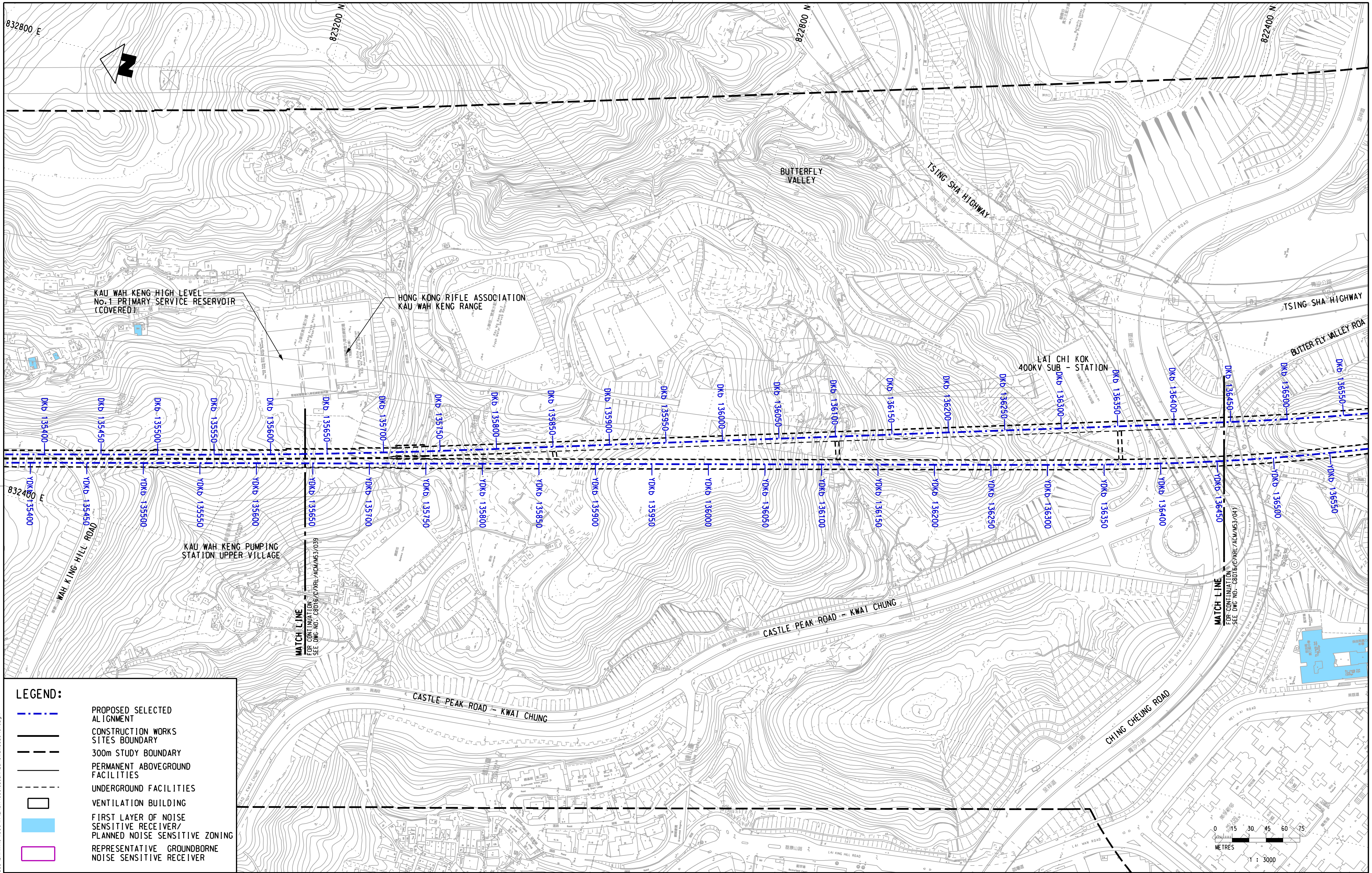
TITLE
C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)
FIGURE NO. C8016/C/XRL/ACM/M53/039
REV. A



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REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

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AECOM

CADD REF. C8016_C_XRL_ACM_M53_040A.dgn

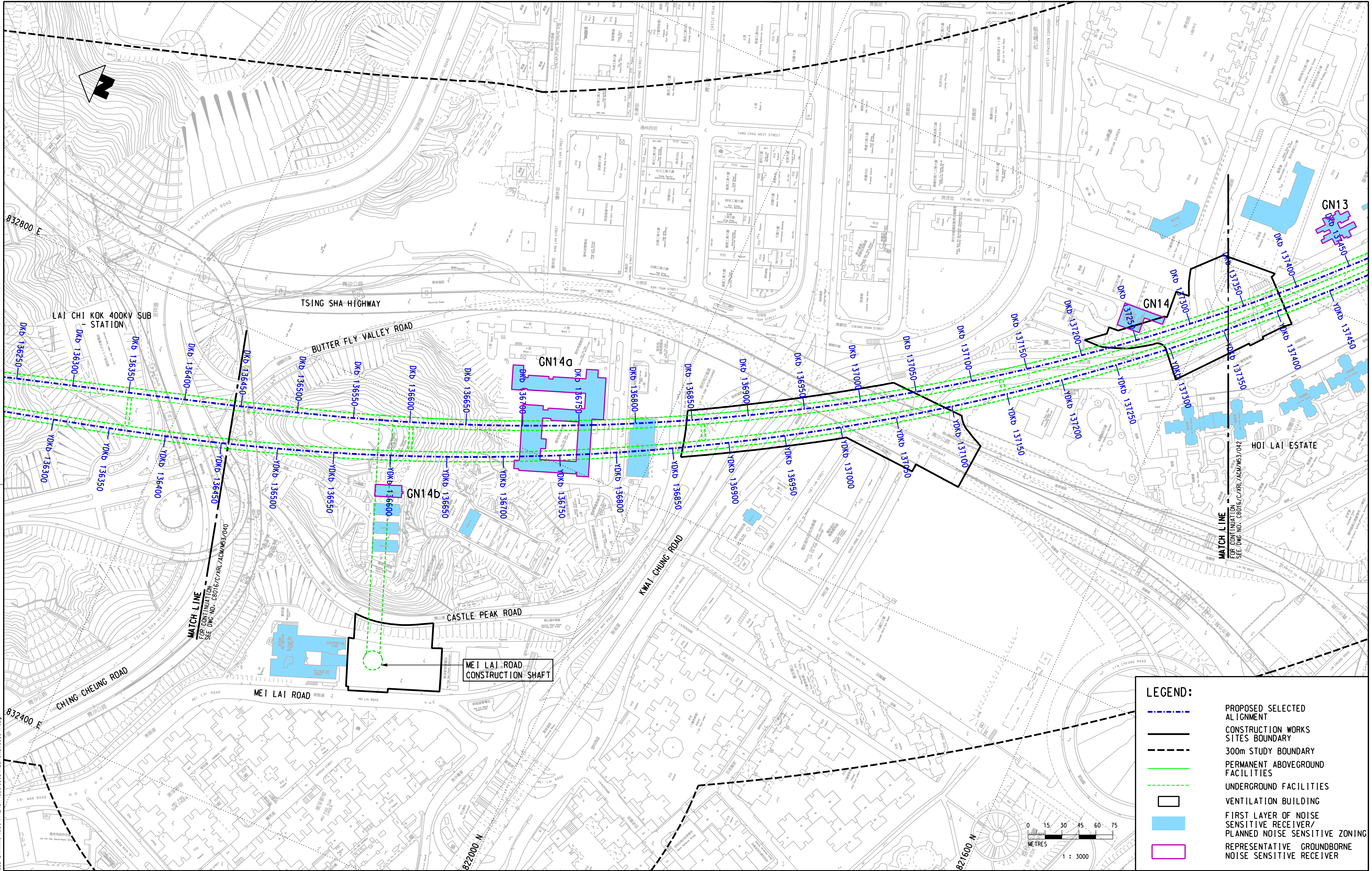
TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/040

REV. A



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DATE	19/AUG./2008

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EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ACM_M53_041A.dgn

TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/041

REV. A

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

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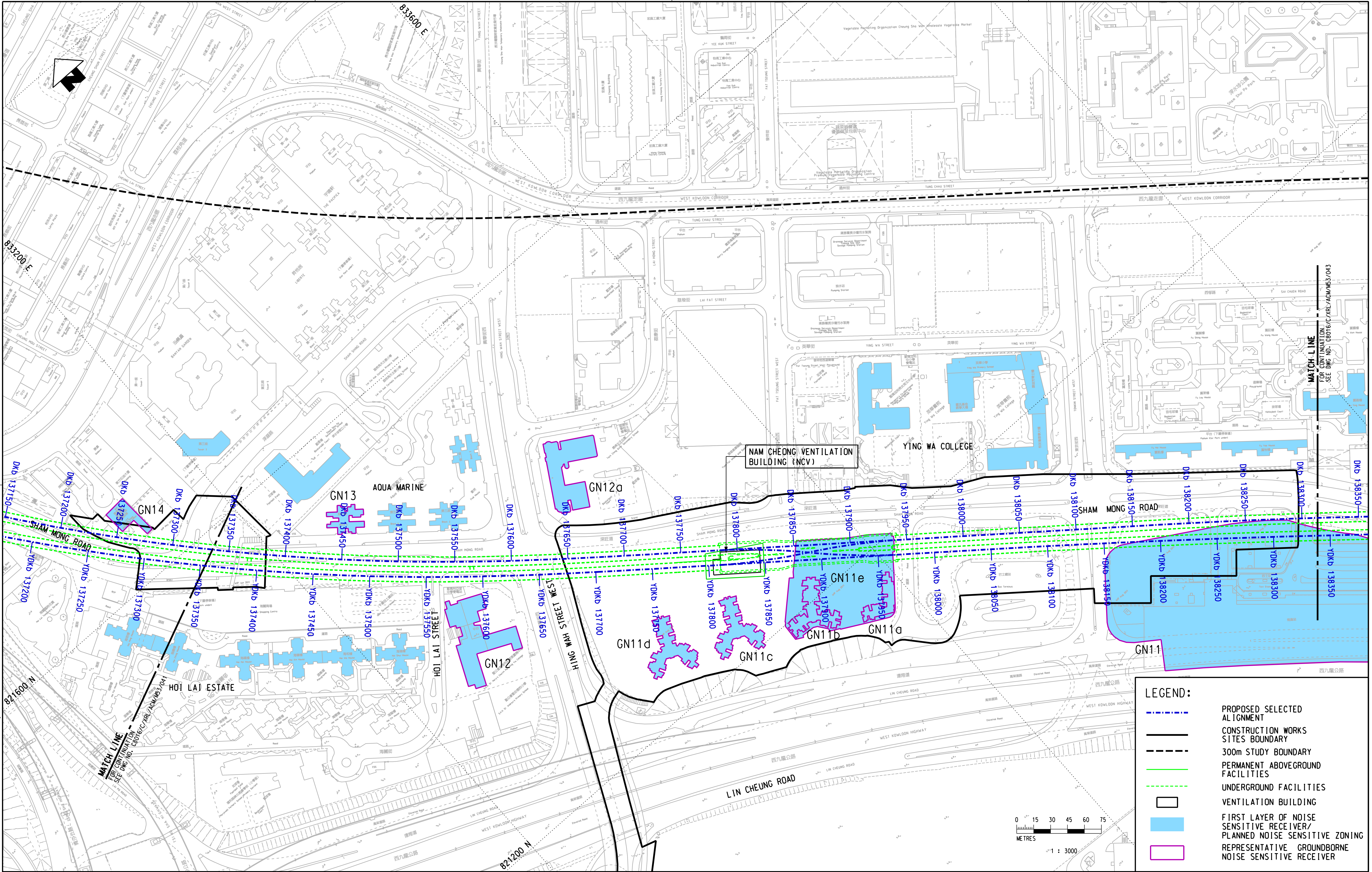

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DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

MTR

EXPRESS RAIL LINK

ORIGINATOR

AECOM

CADD REF. C8016_C_XRL_ACM_M53_042A.dgn

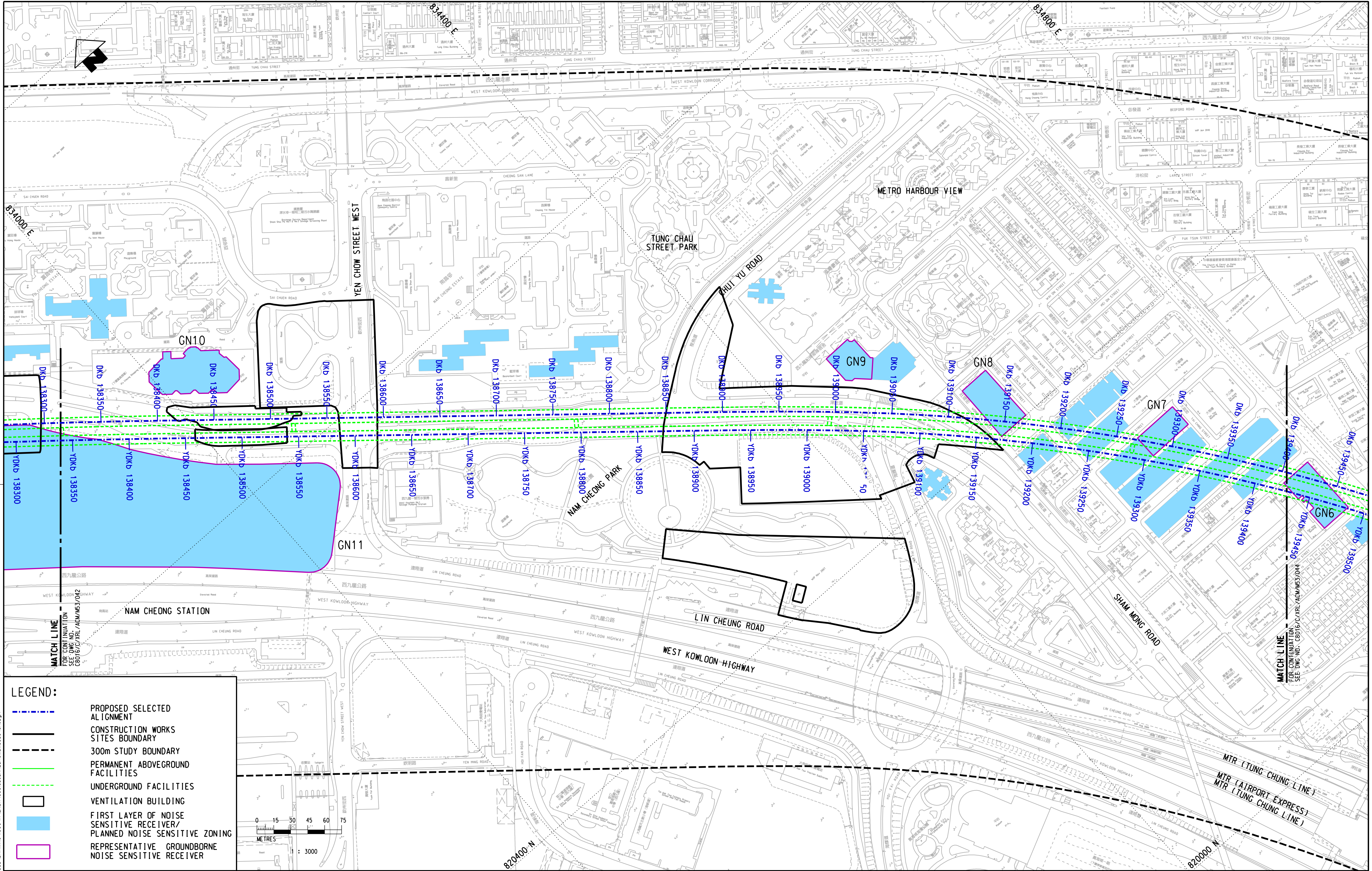
TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/042

REV. A



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DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

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AECOM

CADD REF. C8016_C_XRL_ACM_M53_043A.dgn

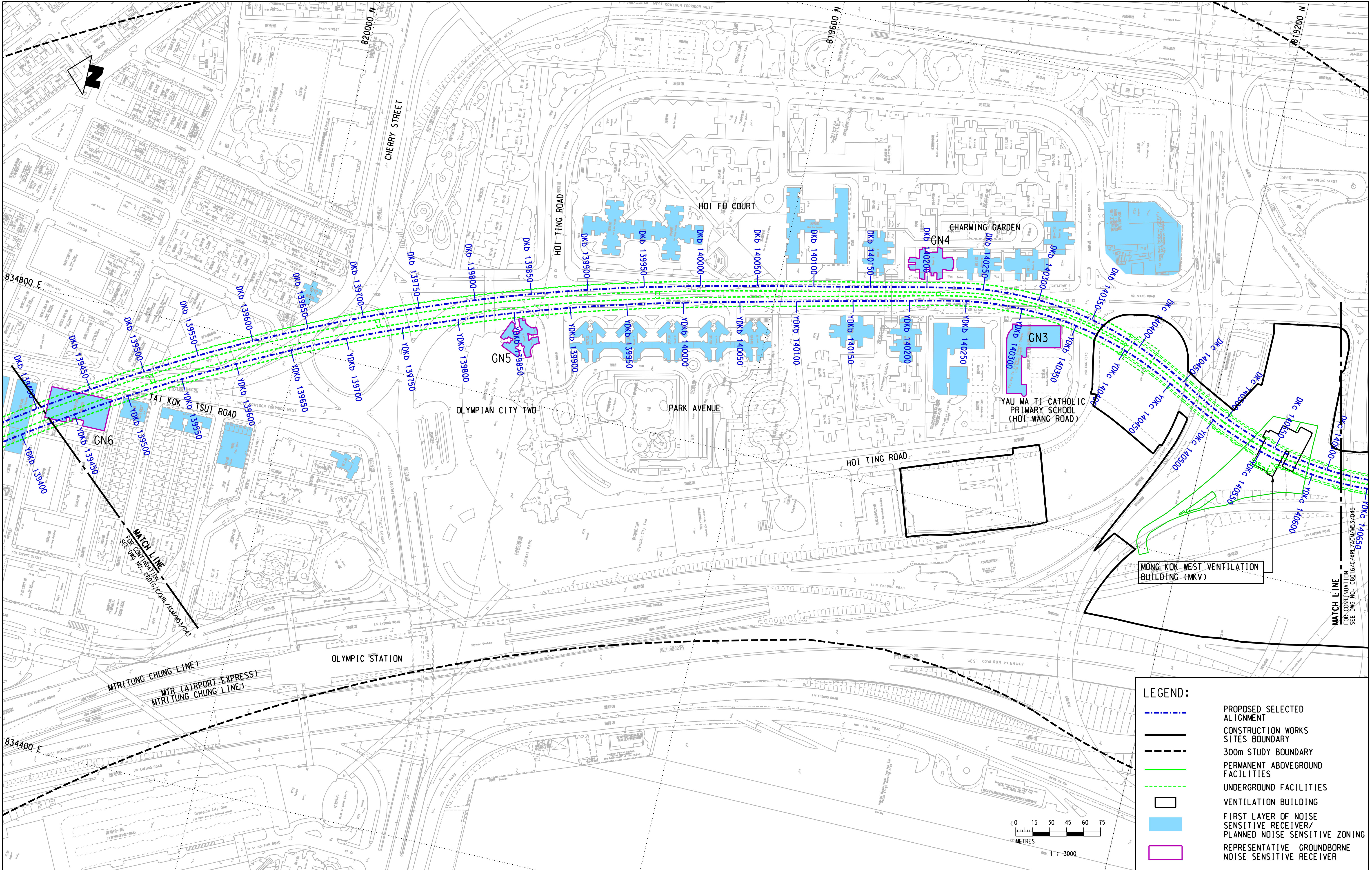
TITLE

C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/043

REV. A



LEGEND:

- PROPOSED SELECTED ALIGNMENT
- CONSTRUCTION WORKS SITES BOUNDARY
- 300m STUDY BOUNDARY
- PERMANENT ABOVEGROUND FACILITIES
- UNDERGROUND FACILITIES
- VENTILATION BUILDING
- FIRST LAYER OF NOISE SENSITIVE RECEIVER/ PLANNED NOISE SENSITIVE ZONING
- REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVER

DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

DO NOT SCALE DRAWINGS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.

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CADD REF. C8016_C_XRL_ACM_M53_044A.dgn

TITLE
C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3) FIGURE NO. C8016/C/XRL/ACM/M53/044 REV. A

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

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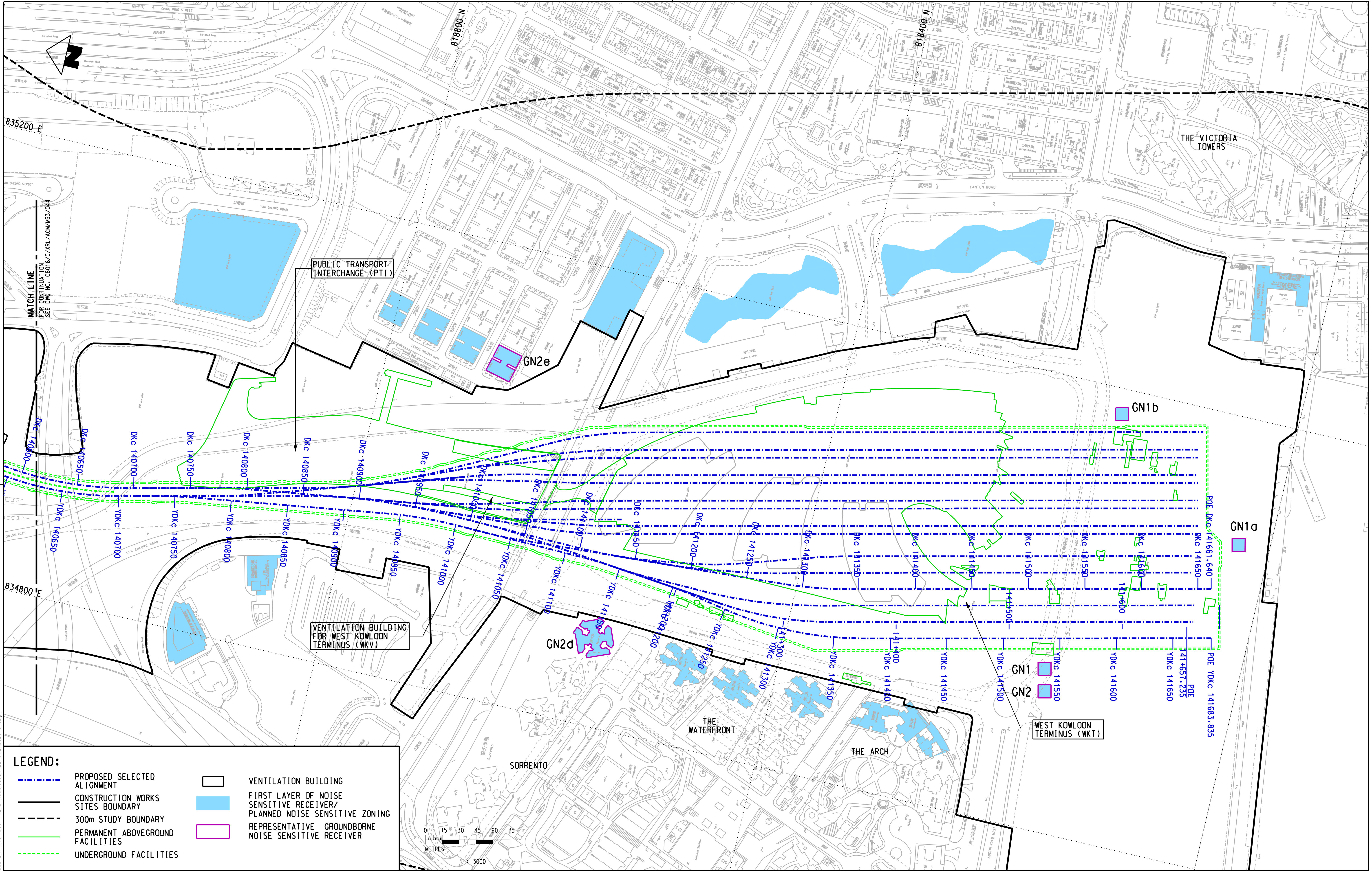

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REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	GXH
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	19/AUG./2008

DO NOT SCALE DRAWINGS. ALL DIMENSIONS SHALL BE VERIFIED ON SITE.

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CADD REF. C8016_C_XRL_ACM_M53_045A.dgn

TITLE

C8016

ENVIRONMENTAL TERM CONSULTANCY FOR XRL

LOCATIONS OF REPRESENTATIVE GROUNDBORNE NOISE SENSITIVE RECEIVERS

SCALE 1 : 3000 (A3)

FIGURE NO. C8016/C/XRL/ACM/M53/045

REV. A

APPENDIX 2.1A

FORCE DENSITY LEVEL MEASUREMENT AND PREDICTION REPORT (CRH 380B)

2 TRAIN VIBRATION AND TRANSFER MOBILITY MEASUREMENT

2.1 Background

2.1.1 A FDL Test Plan was prepared to specify the requirements and methodology of the vibration and transfer mobility measurement in order to obtain the data for the prediction of FDL. The Test Plan has been provided to CARS before commencement of the measurement.

2.1.2 The vibration and transfer mobility measurement commenced on 7 July and was completed on 9 July 2011. The FDL Test Measurement Report was prepared by CARS in Chinese and a summary of the measurement information is presented in the following sections.

2.2 Train Vibration and Transfer Mobility Measurement

Measurement Section

2.2.1 The vibration and transfer mobility measurement has been conducted at suitable testing location which is an at-grade section with trackforms similar to that proposed for the Project (i.e. Rheda) to obtain representative information for FDL determination.

2.2.2 The measurement section was selected in the Guangzhou-Shenzhen section of Guangzhou-Shenzhen-Hong Kong Express Rail Link. This section is a two-way passenger line with spacing of 5m between up and down tracks and maximum slope of 20%. Maximum design speed at this section is 350km/h.

2.2.3 Measurement section was selected at the at-grade and tangent up track section which adjoins Shiziyang Tunnel. There were no turnouts in the vicinity of the measurement locations in order to obtain data under normal operational situations. Given that there was a speed restriction for the rail section at Shiziyang Tunnel, the maximum design speed at the measurement location was 270kph.

Trackform at Measurement Section

2.2.4 Trackform at measurement section is CRTS-I non-ballast track, baseplate WJ-7B, with prestressed frame plate (PF). This type of baseplate is similar to, but not as stiff as, the baseplate proposed for Rheda, and thus a correction for stiffness has been made in the analysis (details refer to **Section 3.3.1**). Major component of frame type slab track includes rail, elastic splitting fastener, filling plate, rail plate, cement asphalt (CA) mortar adjustment layer, convex shift-resisting poles and concrete block base. Thickness of each component of frame type slab track is given in **Table 2.1**. Stiffness of base plate under elastic splitting fastener is 25kN/mm (± 5kN/mm). Measurement was conducted a few days after rail grinding and transverse marks from the grinding process were observed during inspection. Otherwise, the rails were smooth with no sign of corrugation.

Table 2.1 Thickness of Frame Type Slab Track Structure

Type	Rail (mm)	Fastener (mm)	Slab (mm)	CA Mortar (mm)	Concrete Base (mm)	Overall Track Structure (mm)
At-grade Non-ballast track	176	41	190	50	299	756

Information of High-speed Train Passby During Measurement

2.2.5 The China Railway High-Speed (CRH) trains running on the measurement section were CRH380B-002 high-speed electric multiple unit (EMU), comprising 8 subgroups (6M2T) with a total train length of 200m. This type of train had been running for the commissioning tests for about 6 months and the wheels had not been ground or replaced. During the measurement, the train was unloaded, nonetheless, the loading/unloading condition would only have an insignificant effect on the dynamic load and on FDL.

Instrumentation

2.2.6 The vibration and transfer mobility measurement was conducted using the instruments as listed in **Table 2.2.**

Table 2.2 Instruments Used in the Measurement

Instrument	Manufacturer / Model No.	Purpose
Multi Channel Vibration Analyser	Bruel & Kjaer Model LANXI	Spectrum analyser for data acquisition
Accelerometer with compatible charge amplifier	Bruel & Kjaer Type 4370V	Vibration transducer to measure vibration levels
Large modal Hammer (peak force at least 60kN) or larger impact rig (peak force at least 200kN) with Force Transducer	Bruel & Kjaer Model 2304	For applying a known impact force at the test location
Charge to DeltaTron® Converters	Bruel & Kjaer Model 2647A	Pre-amplifier for LANXI
Accelerometer calibrator	Bruel & Kjaer Type 4294	For checking the calibration of the instrument
Train passage sensor	Motion detector	Magnetic sensor on rails to detect wheels and to trigger LANXI recording, and also to measure train speed

Measurement Procedures

2.2.7 The measurement was conducted according to the FDL Test Plan with the procedures summarised as below.

<u>Measurement of Train Vibration Levels</u>

2.2.8 Train vibration levels have been measured according to procedures provided below:

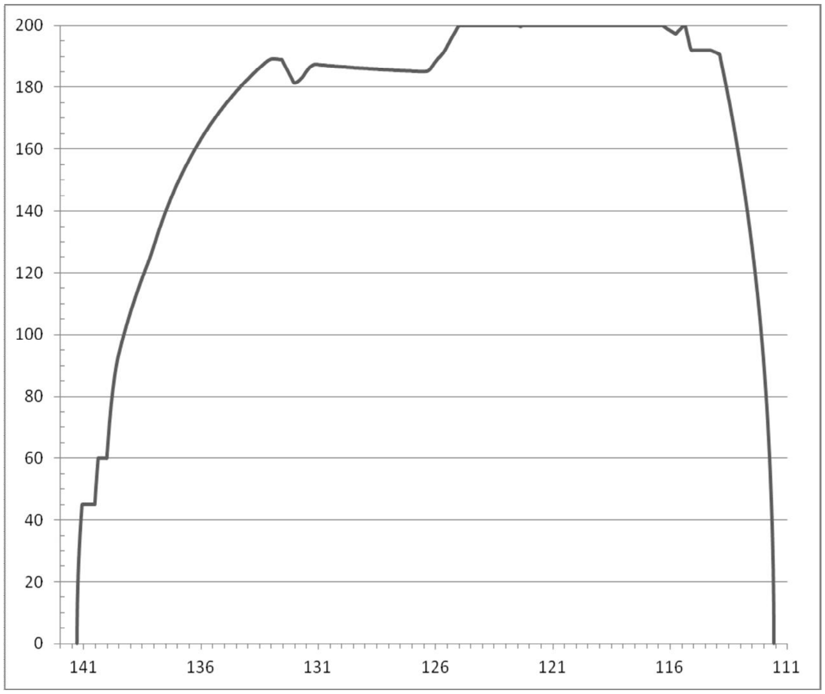
- The accelerometers were fixed into position with bees wax in preparation for measurement ensuring good coupling to the ground.
- The vibration analyser was set to fast weighting and one-third octave bands from 6.3Hz to 500Hz. The sampling rate was set to 10 samples per second. The calibrator was applied to set the system levels.
- The one third octave band vibration levels were recorded during the train movements (see **Table 2.3**) on the nearest track. During the vibration measurement, the train speed was also measured. Details of train type, train length, train speed and track form were recorded for each measurement.
- The recordings were later analysed by passing a window of length 2s along the signal to obtain the 5s sample with the highest energy average vibration level (Leq in dB re 10^{-9} m/s) for each train movement.
- The 90th percentile vibration levels (normally vibration levels from the train movement generating the highest vibration when fewer than ten movements) were determined in one third octave bands for the train at each speed.

APPENDIX 2.7

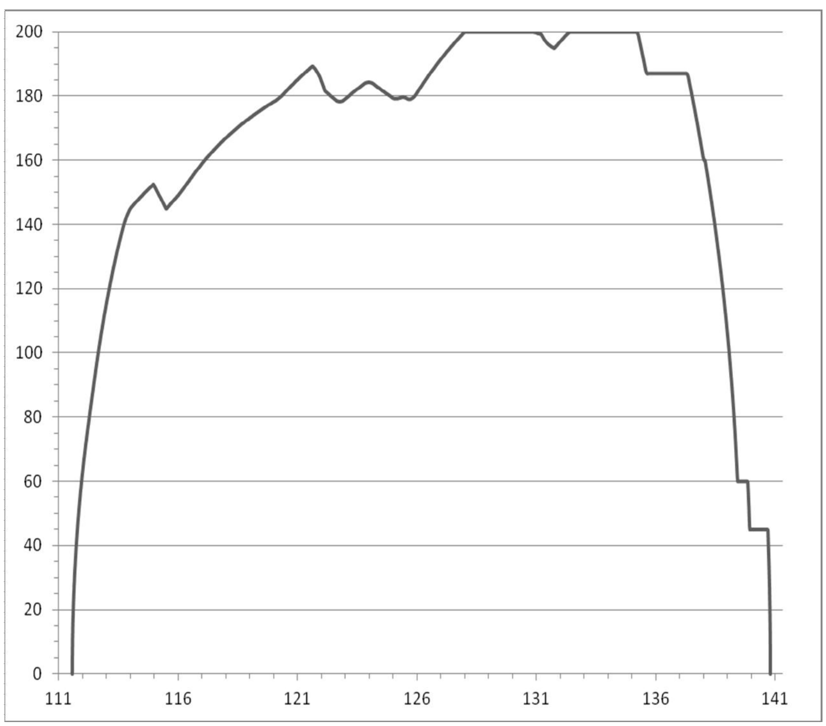
SPEED PROFILE OF THE PROJECT

Appendix 2.7 Speed Profile of the Project

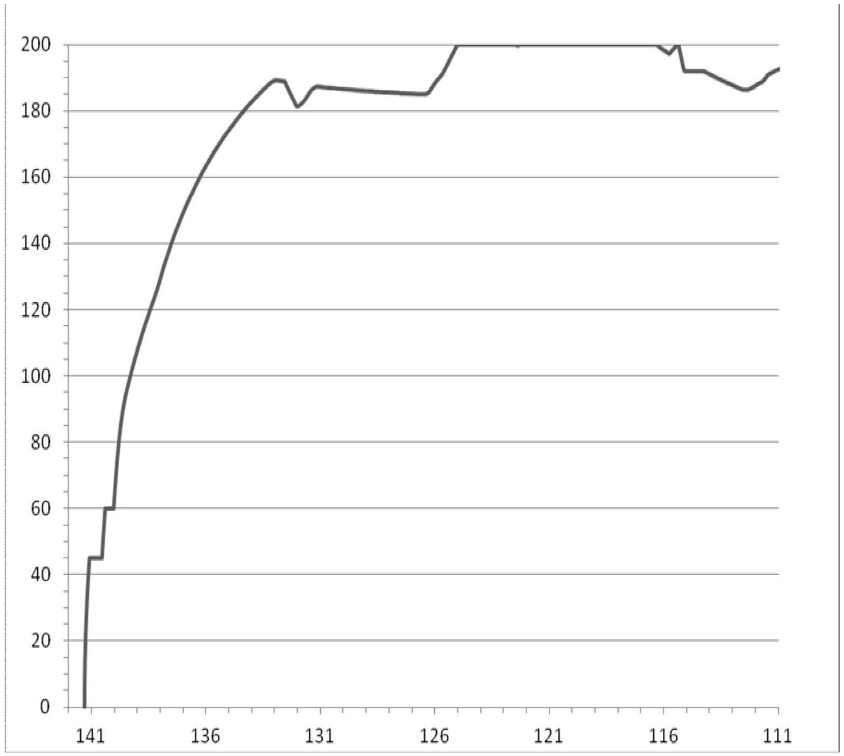
Train Speed from West Kowloon Terminus to Futian, Shenzhen



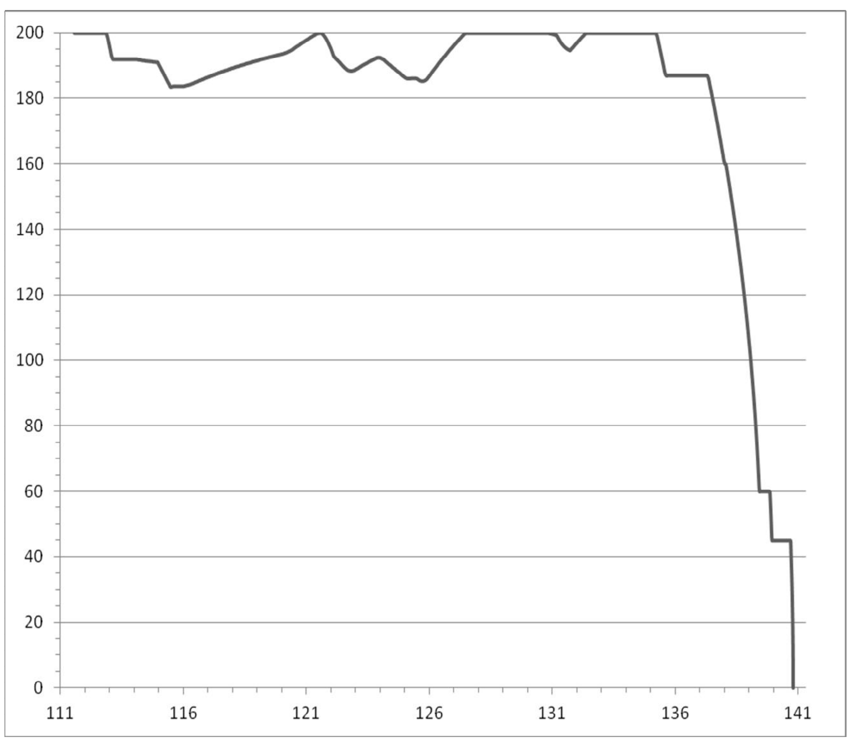
Train Speed from Futian, Shenzhen to West Kowloon Terminus



Train Speed from West Kowloon Terminus to Futian, Shenzhen (Non-Stop at Futian)



Train Speed from Futian, Shenzhen to West Kowloon Terminus (Non-Stop at Futian)



Appendix A2

Excerpt of Environmental Review Report for Proposed Design Changes at Shek Kong Stabling Sidings (September 2013)

Train Operation	Latest Assumptions	EIA Assumptions[3]
	• No Long Haul movements will occur during night-time operation • Operation only for two night-time periods (0600 – 0700 hours and 2300 – 2400 hours)	• No Long Haul movements will occur during night-time operation • Operation only for two night-time periods (0600 – 0700 hours and 2300 – 2400 hours)
24 hour Operation	• A total of 140 pairs of short haul train and 33 long haul trains	• A total of 140 pairs of short haul train and 33 long haul trains

Notes:
(1) Only hourly frequency is available. In view of the consistency of movements, the 30 minute train movements were assumed to be 50% of the hourly movements provided.
(2) The length of Long haul train (427m long) and Short haul train (214m long) remains unchanged.
(3) Train frequencies are taken from Table 5.12 of the EIA Report.

Train Source Term at 200km/h

3.6 A summary of train source term running at 200km/h adopted in this assessment and the EIA Report is presented in **Table 3.2**.

Table 3.2 Subsources of High Speed Train Adopted in this Assessment and EIA Report

Subsource component	Subsource Parameters		SEL (dB(A)) at 15m setback (at 200km/h)			
	Length Definition	Height above Rails (m)	Latest Assumptions[1]		EIA Assumptions[2]	
			Long Haul	Short Haul	Long Haul	Short Haul
Propulsion	len_{power}	3	96.2	93.2	97.6	94.6
Wheel-rail	len_{train}	0.3	95.9	92.9	97.2	94.2

Notes:
(1) According to the specification of China Railway High-Speed (CRH) trains, the transit exposure level (TEL) measured at 25m from track centre and 3.5m from top of rail shall not exceed 88dB(A), when operating at 200km/h in open section. For calculation purposes, this total noise level has been split into wheel/rail noise at a height of 0.3m and propulsion noise at a height of 3m, with reference to the FRA High speed Guidance Manual. Details of converting TEL to SEL are given in Appendix 3.1.
(2) Corrected train Source Terms are taken from Appendix 5.3 of the EIA Report.

Speed Profile

3.7 Based on the latest speed profile provided by relevant operation entities, the speed of southbound and northbound trains passing through ERS have been updated accordingly. A summary of train speed adopted in this assessment and the EIA Report is presented in **Table 3.3**.

Table 3.3 Speed of Train Adopted in this Assessment and EIA Report

Direction	Speed of Train Passing Through ERS (km/h)	
	Latest Assumptions	EIA Assumptions
Northbound	200	200
Southbound	182	200

Conversion of SEL to Leq

3.8 The source levels as discussed in **Table 3.2** apply to a train of a defined length, rather than to one car. The Leq level for both propulsion and wheel-rail noise at the reference distance was determined by accounting for the train length, the speed of the train and the number of movements in the relevant 30 minutes or 24 hours:

noise issue will be minimised. No rail squeal correction is therefore required to be applied to the noise emitted from this area.

Airborne Railway Noise from Train Operations at Shek Kong Stabling Sidings

3.23 This type of noise will be generated by passenger trains being launching from and arriving at the SSS. The methodology for this type of noise follows the same methodology as adopted in the EIA Report.

Nos. of Train Launching from and Arriving at SSS

3.24 For the prediction of cumulative railway noise from trains passing through the ERS and passenger trains launching from and arriving at the SSS, the train launching from and arriving at SSS within the same period of the maximum mainline train frequency as provided in **Table 3.1** has been investigated. A summary of train movements within SSS adopted in this assessment and the EIA Report is presented in **Table 3.4**.

Table 3.4 Train Launching from and Arriving at SSS within the Same Period of Maximum Mainline Train Frequency (Latest and EIA Assumptions)

Train Type	Train Launching from and Arrival at SSS (30-minute Period)				Average Hourly Train Movements	
	Daytime and Evening (0700 – 2300 hours)		Night-time (2300 – 0700 hours)		24 Hours	
	Latest Assumption	EIA Assumption*	Latest Assumption	EIA Assumption*	Latest Assumption	EIA Assumption*
Short haul	0	1	1	2	1	1
Long haul	1	3	0	1	1	2

Note:
* Worst case launchings from and arrivals at SSS is presented in Table 5.14 of the approved EIA Report.

Train Source Term at 25km/h

3.25 A summary of train source term running at 25km/h adopted in this assessment and the EIA Report is presented in **Table 3.5**.

Table 3.5 Noise Levels of High Speed Train Running at 25km/h Adopted in this Assessment and EIA Report

Train Type	SEL (dB(A)) at 15m setback (at 25km/h)	
	Latest Assumptions(1)	EIA Assumptions(2)
Short Haul	92.1 (source height: 1.2m)	76.5 (source height: 3m)
Long Haul	95.1 (source height: 1.2m)	79.5 (source height: 3m)

Notes:
(1) According to the specification of China Railway High-Speed (CRH) trains, the exterior noise (Lmax) measured at 25m from track centre and 3.5m from rail top shall not exceed 75dB(A) when starting from standstill in open section (it is equivalent to the case of train moving at 25km/h). Dominant noise source was identified as the blowers located under the floor instead of air conditioning or wheel/rail noise. Details of converting Lmax to SEL are given in Appendix 3.1.
(2) Due to information of CRH trains not being available during the preparation of EIA Report, the noise induced from trains launching/arriving/moving at SSS was considered to be similar to that at Pat Heung Maintenance Centre (PHMC). Noise measurements carried out at the northern end of Pat Heung of four train launchings similar to those proposed at SSS, at typical speeds of 25km/h. The corrected maximum SEL of short haul and long haul train is 76.5 dB(A) and 79.5 dB(A) respectively at 15m for a train movement at 25km/h.

Calculation of Leq

3.26 Airborne railway noise from train launching from and arriving at SSS was predicted in accordance with Table 5-2 of The Transit Noise and Vibration Impact Assessment[1] published by U.S. Department of Transportation Federal Transit Administration (FTA Guidance Manual). The Leq level for train noise at the reference distance was determined by accounting for the number of movements in the relevant 30 minutes or 24 hours:

[1] Transit Noise and Vibration Impact Assessment. Report No. FTA-VA-90-1003-06

Cumulative Noise Impact from Airborne Railway Noise and Fixed Plant Noise During Night-time Period

3.45 In order to evaluate the cumulative noise levels from airborne railway noise and fixed plant noise within the same worst case period as discussed in **Section 3.30**, the number of train movements (launching from and arriving at the SSS, and train passing through ERS) was investigated and are shown in **Table 3.8** and **Table 3.9**.

Table 3.8 Train Launching from and Arriving at SSS within the Same Worst Case Period of Fixed Plant Noise

Train Type	Train Launching from and Arrival at SSS within 30-minute period(1)		Average Hourly Train Movements
	Daytime and Evening (0700 – 2300 hours)	Night-time (2300 – 0700 hours)	24 Hours
Short haul	3	0	1
Long haul	1	0	1

Note:
(1) During the EIA stage, cumulative noise levels from airborne railway noise and fixed plant noise were predicted based on different operation periods with maximum train nos. launching from and arrival at SSS which would not occur within the same worst case period of fixed plant noise assessment.

Table 3.9 Train Passing Through ERS within the Same Worst Case Period of Fixed Plant Noise

Train Type	Train Passing Through ERS within 30-minute period(1)		Average Hourly Train Movements
	Daytime and Evening (0700 – 2300 hours)	Night-time (2300 – 0700 hours)	24 Hours
Short haul	3 (northbound) 4 (southbound)	0	3 (northbound) 3 (southbound)
Long haul	1 (northbound) 1 (southbound)	0	1 (northbound) 1 (southbound)

Note:
(1) During the EIA stage, cumulative noise levels from airborne railway noise and fixed plant noise were predicted based on different operation periods with maximum train nos. passing through ERS which would not occur within the same worst case period of fixed plant noise assessment.

Construction Noise from Maintenance Train Movement During Night-time Period

3.46 The methodology for this type of noise follows the same methodology as adopted in the EIA Report. Maintenance trains involving maintenance wagons powered by two locos will depart from the SSS around midnight and will return before the commencement of passenger services the next morning.

3.47 A summary of source term of maintenance train adopted in this assessment and the EIA Report is presented in **Table 3.10**.

Table 3.10 Source Term of Maintenance Train Adopted in this Assessment and EIA Report

Operation Scenario	Source Term	
	Latest Assumptions(1)	EIA Assumptions(2)
Idling within the shed	84 dB(A) SPL, Leq	78 dB(A) SPL, Leq
Running at 25km/h	83dB(A) SEL at 15m setback	85dB(A) SEL at 15m setback

Notes:
(1) The specification of all engineering trains measured at 25 metres from the track centre line and with all auxiliary equipment in operation shall not exceed: i) 65 dB(A) at standstill; and ii) the transit exposure level (TEL) of 75 dB(A) up to 25 km/h travelling speed. Details of converting TEL to SEL and calculation of noise from the shed are given in Appendix 3.5.
(2) Based on measurements in PHMC, the noise level of the loco idling with exhaust fans operating was taken as 78dB(A) and the SEL of the movement of one loco was taken as 85dB(A) at a distance of 15m.

3.48 The loco train movements adopted in this assessment and the EIA Report are presented in **Table 3.11**.

TOP FLOOR

NSR	Description	ASR	Overall Result (dBA) Leq, day	Overall Result (dBA) Leq, night	Overall Result (dBA) Lmax	Noise Criteria ANL (dBA) Leq, day	Noise Criteria ANL (dBA) Leq, night	Noise Criteria ANL (dBA) Lmax
SS7	Leung Uk Tsuen	B	50	41	72	65	55	85
SS10	DD110 LOT 482, Wang Toi Shan	B	48	38	75	65	55	85
SS11a	Leung Uk Tsuen Squats	B	52	44	67	65	55	85
SS12	No. 265 Kam Tai Road	B	49	40	69	65	55	85
SS14	Planned village house at Village Zone	B	55	42	70	65	55	85
SS15	Abandoned village house in Shek Kong	B	56	42	71	65	55	85
SS20	Village house in Shek Kong	B	49	40	77	65	55	85

Airborne Railway Noise from SSS and ERS Due to Maximum Train Movements on Mainline

3.71 With the provision of sound absorption treatment and noise barriers recommended in the EIA Report, in addition to the additional mitigation measures as stated in **Section 3.64**, the predicted noise levels due to maximum train movements passing through ERS and train launching from and arriving at SSS, as presented in **Table 3.17,** would comply with the noise criteria. Details of the calculation are given in **Appendix 3.4**.

Table 3.17 Predicted Maximum Airborne Railway Noise Levels

NSR	Description	Predicted Max. Noise Levels (dBA)				Noise Criteria (dBA)			Exceedence (dBA)		
		Leq, day	Leq, night	Leq, 24h	Lmax	Leq, day	Leq, night	Lmax	Leq, day	Leq, night	Lmax
SS2	Nan Hing Lane, Wang Toi Shan, Pat Heung, N.T.	41	37	39	69	65	55	85	-	-	-
SS4	Leung Uk Tsuen Village House	45	41	44	73	65	55	85	-	-	-
SS5	51A Leung Uk Tsuen, Wang Toi Shan, Pat Heung, N.T.	52	48	50	68	65	55	85	-	-	-
SS6	32 Leung Uk Tsuen, Wang Toi Shan, Kam Tin Road, N.T.	52	47	50	68	65	55	85	-	-	-
SS7	Leung Uk Tsuen, Wang Toi Shan, Kam Tin Road, N.T.	48	44	46	72	65	55	85	-	-	-
SS10	DD110 LOT 482, Wang Toi Shan Choi Yuen Tsuen, Wang Toi Shan, Pat Heung, N.T.	46	42	44	75	65	55	85	-	-	-
SS11a	Leung Uk Tsuen Squats	50	46	49	67	65	55	85	-	-	-
SS12	265 Kam Tai Road, Wang Toi Shan, Pat Heung, N.T.	45	41	43	69	65	55	85	-	-	-
SS14	Village Zone West Boundary, Leung Uk Tsuen, Wang Toi Shan, Pat Heung, N.T.	55	51	53	70	65	55	85	-	-	-

NSR	Description	Predicted Max. Noise Levels (dBA)				Noise Criteria (dBA)			Exceedence (dBA)		
		Leq, day	Leq, night	Leq, 24h	Lmax	Leq, day	Leq, night	Lmax	Leq, day	Leq, night	Lmax
SS15	Abandoned Shek Kong village house	57	52	54	71	65	55	85	-	-	-
SS20	Shek Kong village house	48	44	47	77	65	55	85	-	-	-

Construction Noise from Maintenance Train Movement During Night-time Period

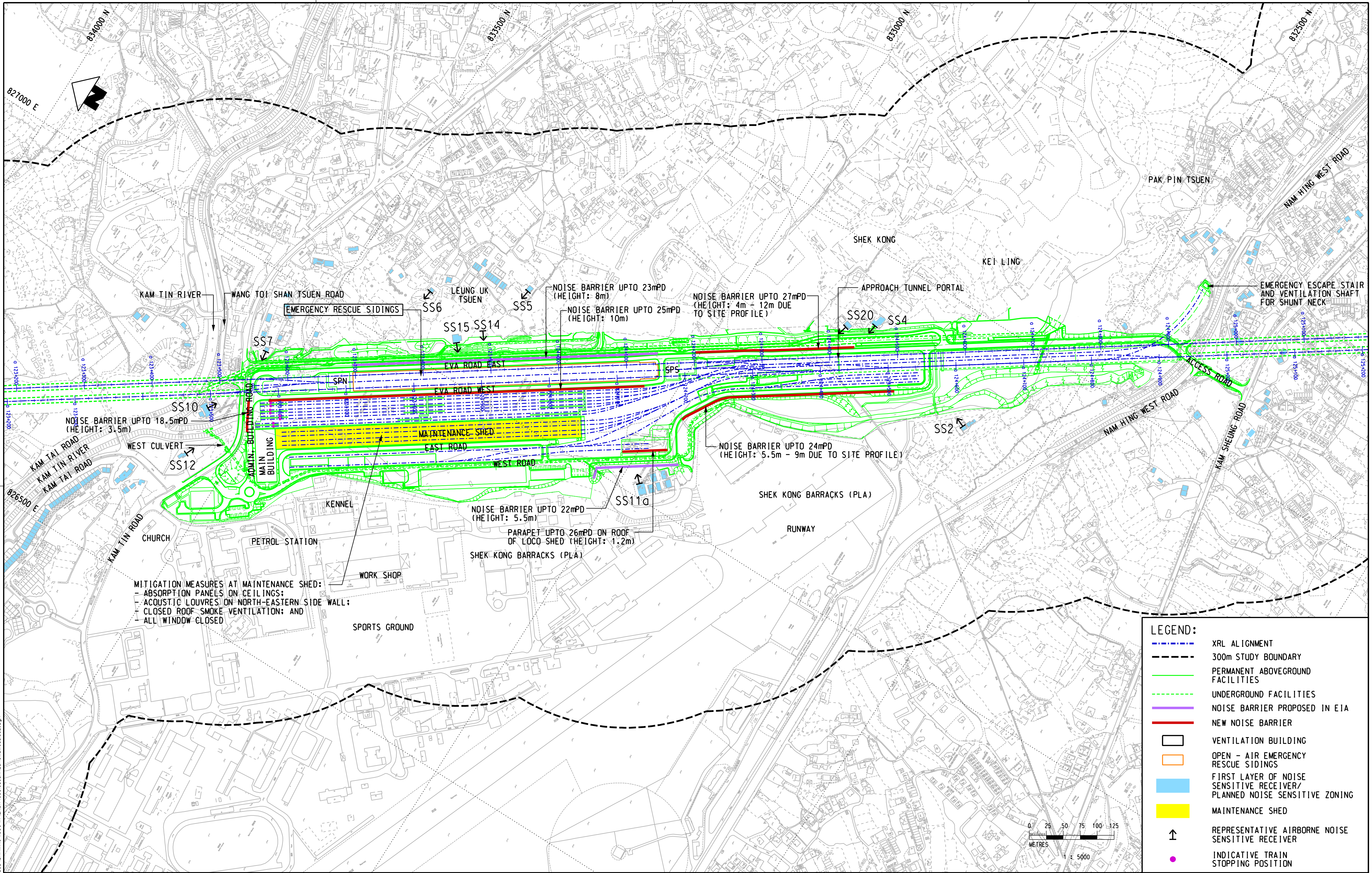
3.72 With the provision of mitigation measures, the predicted construction noise levels at NSRs, as shown in **Table 3.18**, would comply with the noise criteria. Sample of detailed calculation is given in **Appendix 3.5**.

Table 3.18 Mitigated Noise Levels from Maintenance Train Movement During Night-time Period

NSR	Description	ASR	Loco Launch / Arrive Leq, night(1) dB(A)	CNP Criteria Leq, night dB(A)	Level of Exceedence Leq, night dB(A)
SS2	Nam Hing Lei	B	37	50	-
SS4	Leung Uk Tsuen Village House	B	39	50	-
SS5	51A Leung Uk Tsuen	B	38	50	-
SS6	32 Leung Uk Tsuen	B	32	50	-
SS7	Leung Uk Tsuen	B	26	50	-
SS10	DD110 LOT 482, Wang Toi Shan	B	26	50	-
SS11a	Leung Uk Tsuen Squats	B	38	50	-
SS12	No. 265 Kam Tai Road	B	25	50	-
SS14	Planned village house at Village Zone	B	34	50	-
SS15	Abandoned village house in Shek Kong	B	35	50	-
SS20	Village house in Shek Kong	B	41	50	-

Fixed Plant Sources – Ventilation Building/Shaft

3.73 The maximum sound power levels (SWLs) of the fixed noise sources at ERS north and south plant buildings have been calculated and presented in **Table 3.14**. Details of the calculation are given in **Appendix 3.6**.



REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	YJP
DESIGNED	TWF
CHECKED	KCC
APPROVED	PL
DATE	10/FEB./2012

MTR

EXPRESS RAIL LINK

ORIGINATOR
AECOM

CADD REF. C8016_C_XRL_ACM_M63_188B.dgn

TITLE
C8016
ENVIRONMENTAL TERM CONSULTANCY FOR XRL
LOCAITONS OF NOISE MITIGATION
MEASURES IN SSS AND ERS

SCALE 1 : 5000 (A3)
FIGURE NO. C8016/C/XRL/ACM/M63/188
REV. B

Appendix A3

Excerpt of Noise Review Report for Additional Train Operation Scenario (August 2018)

2 ADDITIONAL TRAIN OPERATION SCENARIOS

2.1 Train Operation in EP Condition 2.27

2.1.1 Pursuant to EP Condition 2.27, the train operation shall be confined within 0000 to 0015 hours and 0415 to 2400 hours with details presented in **Table 2.1** below.

Table 2.1 Train Operation Details in EP Condition 2.27

Train Operation Details	**EP Condition 2.27**
Train Length	• Long haul train: not more than 427m long • Short haul train: not more than 241m long
Daily Operation	Not more than a total of 280 short haul trains and 66 long haul trains
Operation Period from 0700 to 2300 hours	Hourly frequency: not more than 13 short haul and 4 long haul trains at northbound and not more than 12 short haul and 3 long haul trains at southbound
Operation Periods of 0000 to 0015 hours, 0415 to 0700 hours and 2300 to 2400 hours	Hourly frequency of 0600 to 0700 hours and 2300 to 2400 hours: not more than 6 short haul trains at northbound and 6 short haul trains at southbound; no long haul train movements in these periods. Frequency of 0000 to 0015 hours: not more than 1 short haul train at northbound. Frequency of 0415 to 0500 hours: not more than 1 short haul train at northbound and 1 short haul train at southbound. Frequency of 0500 to 0600 hours: not more than 1 short haul train at northbound and 2 short haul trains at southbound.
Train Speed	Not faster than 200 km/hr

2.1.2 Based on the train operation details in EP Condition 2.27, the maximum train frequency per 30 minutes is presented in **Table 2.2**. Based on the assessment findings in **SSS ERR** and **OGBNPR**, the railway noise induced by the train operation as detailed in **Table 2.1** above comply with the stipulated noise limits.

Table 2.2 Maximum Train Frequency per 30 Minutes in EP Condition 2.27

Time Period	**Direction**	**Train Type**	
		Short Haul Train	**Long Haul Train**
Day & Evening time	Northbound	7	2
	Southbound	6	2
Night-time	Northbound	3	0
	Southbound	3	0

2.2 Additional Operation Scenarios

2.2.1 As discussed in **Section 1.1.5**, there would be additional operation scenarios available for the Project. There is also an insignificant change to the length of long trains from not more than 427m to not more than 430m.

2.2.2 The maximum train movements during daytime and evening (0700 – 2300 hours) and night-time (2300 – 0100 and 0400 – 0700 hours) in the additional operation scenarios have been identified according to latest timetable of XRL and are presented in **Table 2.3**.

Table 2.3 Train Operation Details in Additional Operation Scenarios

Train Operation Details	**Additional Operation Scenarios**
Train Length	• Long train: not more than 430m long • Short train: not more than 241m long
Daily Operation	Not more than a total of 190 short trains and 156 long trains
Operation Period from 0700 to 2300 hours	Hourly frequency: not more than 9 short and 6 long trains at northbound and not more than 6 short and 6 long trains at southbound
Operation Periods of 0400 to 0700 hours and 2300 to 0100 hours(1)	Hourly frequency: not more than 2 short and 2 long trains at northbound and not more than 2 short and 2 long trains at southbound
Train Speed	Not faster than 200 km/hr

Note:
(1) Since the XRL Hong Kong Section is connected to the Mainland High Speed Rail Network, the XRL train operation in Hong Kong will be subject to the train operation in the Mainland. In the event of special incident or urgent train services arrangement in the Mainland, the XRL train services in Hong Kong would be advanced, delayed or changed beyond the schedule. Therefore the train services may be operated beyond the operation hours mentioned in **Table 2.3**, but the train frequency will not exceed the maximum 30min frequency and the hourly frequency mentioned in **Table 2.4**.

2.2.3 Based on the proposed train operation details in **Table 2.3** and the latest timetable of XRL, the maximum train frequency per 30 minutes has been developed and is presented in **Table 2.4**.

Table 2.4 Train Frequency – Hourly and Per 30 Minutes

<table>
<tr><th colspan="4"></th><th colspan="4">No. of Train Frequency(1)</th></tr>
<tr><th colspan="4"></th><th colspan="4">Hourly Window</th></tr>
<tr><th rowspan="2">Time Period</th><th rowspan="2">Direction</th><th colspan="2">Hourly Frequency</th><th colspan="2">Maximum no. in 30 mins</th><th colspan="2">Other 30 mins</th></tr>
<tr><th>Short Train</th><th>Long Train</th><th>Short Train</th><th>Long Train</th><th>Short Train</th><th>Long Train</th></tr>
<tr><td rowspan="2">Day & Evening time</td><td>Northbound</td><td>9</td><td>6</td><td>5</td><td>3</td><td>4</td><td>3</td></tr>
<tr><td>Southbound</td><td>6</td><td>6</td><td>3</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td colspan="8">Scenario 1A</td></tr>
<tr><td rowspan="2">Night-time</td><td>Northbound</td><td>2</td><td>2</td><td>2</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>Southbound</td><td>2</td><td>2</td><td>2</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td colspan="8">Scenario 1B</td></tr>
<tr><td rowspan="2">Night-time</td><td>Northbound</td><td>2</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>Southbound</td><td>2</td><td>2</td><td>1</td><td>2</td><td>1</td><td>0</td></tr>
</table>

Note:
(1) Since the XRL Hong Kong Section is connected to the Mainland High Speed Rail Network, the XRL train operation in Hong Kong will be subject to the train operation in the Mainland. In the event of special incident or urgent train services arrangement in the Mainland, the XRL train services in Hong Kong would be advanced, delayed or changed beyond the schedule. Therefore the train services may be operated beyond the operation hours mentioned in **Table 2.3**, but the train frequency will not exceed the maximum 30min frequency and the hourly frequency mentioned in **Table 2.4**.

2.3 Review of Representative Noise Sensitive Receivers

2.3.1 Representative noise sensitive receivers were identified in **OGBNPR** and **SSS ERR**. A review of representative GBNSRs and ABNSRs has been conducted and it is revealed that there are

Appendix B

Excerpt of Annex E of MTR South Island Line (East) - Operational Air-borne Noise Performance Test Report

Table 5.3 Tentative Rundown

Time	**Activity**
2200 hr - 2300 hr	Measurement setup
2300 hr - 0100 hr	Noise performance test
0100 hr - 0200 hr	Collecting Measurement Equipment

5.3. Test Train Arrangement

S-Stock train (3-car) will be deployed for the operation of SIL(E) instead of K-stock train stipulated in EP condition 2.24. According to the *Noise Performance Report for S-Stock Train (3-Car)* as prepared by ET leader and verified by IEC in January 2015, both the air-borne and ground-borne noise performance of S-Stock train are equivalent or better than the relevant EIA requirement of K-Stock train. Therefore, S-Stock train meets the requirement of EP condition 2.24, and would be arranged for the air-borne noise performance test.

Test trains would be arranged to run at design operational speed according to the target speed profile as shown in **Figure E.1** to **Figure E.6** in Appendix E. The air-conditioning units would be manually set at full load during the test. No less than 5 passbys would be measured for up track and down track respectively.

Various literatures suggested that train loading has no significant effect on air-borne noise of EMU (ref: "*Calculation of Railway Noise 1995*", "*Additional railway noise source terms For 'Calculation of Railway Noise 1995'*", and "*Acoustics – Railway applications – Measurement of noise emitted by railbound vehicles (ISO 3095:2013)*"). Previous measurement data for trains running along existing railway line also indicates that train load has no significant effect on the air-borne noise. The average train passby noise spectra at a viaduct section near Tai Shui Hang station among the SP1950 fleet of Ma On Shan Line are shown in **Figure 5.1**. Green and blue solid line represent the spectra averaged from at least 10 passbys during non-peak hours (0600hr - 0700hr) and peak hours (0800hr - 0900hr) respectively. Green dash lines and blue dash lines are the spectra +/- 1 standard deviation respectively. Taken into account the variations, there is no significant difference for the air-borne noise level during non-peak and peak hours, despite the difference in train loading. Test trains arranged for the noise performance test would be without loading.

Appendix C

Calibration Certificates of Monitoring Equipment

Acoustic Calibrator

MAX

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	5-Mar-2018	**Certificate Number**	MLCN180297S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	29088
Equipment Number	--

Calibration Particular

Date of Calibration	5-Mar-2018		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-18 1351(MLTE049) / MLEC17/06/02 / 6-Jun-18		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 5-Mar-2018

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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Certificate No. MLCN180297S

Calibration Data				
EUT Setting	**Standard Reading**	**EUT Error**	**Calibration Uncertainty**	**EUT Specification**
94 dB	93.7 dB	0.3 dB	0.15 dB	± 0.3 dB
114 dB	113.7 dB	0.3 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Patrick
Date : 5-Mar-18

Checked By : K.O. Lo
Date : 5-Mar-18

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Acoustic Calibrator Larson Davis

MAX

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CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	8-Sep-2017	**Certificate Number**	MLCN171891S

Customer Information

Company Name	Wilson Acoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T.

Equipment-under-Test (EUT)

Description	Precision Acoustic Calibrator
Manufacturer	Larson Davis
Model Number	CAL200
Serial Number	10478
Equipment Number	--

Calibration Particular

Date of Calibration	8-Sep-2017		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-18 1357(MLTE190) / MLEC17/05/02 / 25-May-18		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 8-Sep-2017

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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Certificate No. MLCN171891S

Calibration Data

EUT Setting	Standard Reading	EUT Error from Setting	Calibration Uncertainty	EUT Specification
94 dB	93.9 dB	-0.1 dB	0.15 dB	± 0.2 dB
114 dB	113.9 dB	-0.1 dB	0.15 dB	± 0.2 dB

- END -

Calibrated By : Patrick
Date : 8-Sep-17

Checked By : K.O. Lo
Date : 8-Sep-17

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Sound & Vibration Analyzer SVAN958 (Serial No. 20890)

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CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	23-Jun-2017	**Certificate Number**	MLCN171137S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	20890
Equipment Number	--

Calibration Particular

Date of Calibration	23-Jun-2017		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-2018		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 23-Jun-2017

Statements

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Certificate No.MLCN171137S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	A / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	A / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB

- END -

Calibrated By : Patrick
Date : 23-Jun-2017

Checked By : K.O. Lo
Date : 23-Jun-2017

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Sound & Vibration Analyzer SVAN958 (Serial No. 23412)

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CALIBRATION CERTIFICATE

Certificate Information			
Date of Issue	13-Mar-2017	**Certificate Number**	MLCN170405S

Customer Information	
Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)	
Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	23412
Equipment Number	--

Calibration Particular			
Date of Calibration	13-Mar-2017		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-2018		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date		
	K.O. Lo	13-Mar-2017

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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Certificate No.MLCN170405S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Patrick
Date : 13-Mar-2017

Checked By : K.O. Lo
Date : 13-Mar-2017

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Sound & Vibration Analyzer SVAN958 (Serial No. 28422)

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CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	7-May-2018	**Certificate Number**	MLCN180788S

Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	28422
Equipment Number	--

Calibration Particular

Date of Calibration	7-May-2018		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-2018		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 7-May-2018

Statements

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Certificate No. MLCN180788S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / IMPULSE (1 kHz Input)	105 dB	93.9 dB	94.0 dB	-0.1 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 7-May-2018

Checked By : K.O. Lo
Date : 7-May-2018

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Sound & Vibration Analyzer SVAN958A (Serial No. 59120)

SVANTEK ISO9001 certified

FACTORY CALIBRATION DATA OF THE SVAN 958 *No. 59120*

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: LIN; Input signal =114.0dB, f_{sin}=1kHz

	Range 105dB		Range 130dB	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	113.99	-0.01	114.02	0.02
Channel 2	113.98	-0.02	114.03	0.03
Channel 3	113.98	-0.02	114.03	0.03
Channel 4	113.98	-0.02	114.02	0.02

2. CALIBRATION* (acoustical)

LEVEL METER; Range: 130 dB; Reference frequency: 1000Hz;

Filter	LIN		A		C	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	114.0	0.0	114.0	0.0	114.0	0.0
Channel 2	114.0	0.0	114.0	0.0	114.0	0.0
Channel 3	114.0	0.0	114.0	0.0	114.0	0.0
Channel 4	114.0	0.0	114.0	0.0	114.0	0.0

Calibration measured with the microphone SVANTEK type SV22 No. 4013604. Calibration factor: -0.4dB

3. LINEARITY TEST* (electrical)

LEVEL METER; Range: 105 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	24.0	30.0	40.0	60.0	80.0	100.0	114.0
Channel 1	Error [dB]	0.24	0.11	0.04	-0.0i	0.00	0.01	0.01
Channel 2	Error [dB]	0.28	0.10	0.04	-0.01	0.00	0.01	0.01
Channel 3	Error [dB]	0.20	0.10	0.04	-0.01	0.00	0.01	0.01
Channel 4	Error [dB]	0.21	0.09	0.04	-0.01	0.00	0.01	0.01

LEVEL METER; Range: 130 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	45.0	50.0	60.0	80.0	100.0	120.0	135.0
Channel 1	Error [dB]	0.09	0.07	0.03	0.00	0.01	0.00	0.01
Channel 2	Error [dB]	0.10	0.06	0.03	0.00	0.01	0.00	0.01
Channel 3	Error [dB]	0.03	0.05	0.02	0.01	0.01	0.01	0.02
Channel 4	Error [dB]	0.00	0.04	0.02	0.00	0.01	0.00	0.01

1/3 OCTAVE (1kHz); Range: 130 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	35.0	40.0	60.0	80.0	100.0	120.0	135.0
Channel 1	Error [dB]	0.39	0.15	0.03	0.01	0.01	0.00	0.01
Channel 2	Error [dB]	0.37	0.14	0.03	0.01	0.01	-0.00	0.02
Channel 3	Error [dB]	0.23	0.05	0.03	0.00	0.01	0.00	0.01
Channel 4	Error [dB]	0.23	0.03	0.02	0.01	0.01	0.01	0.02

*** SVAN958 No. 59120 page 1 ***

4. TONEBURST RESPONSE* (electrical)

LEVEL METER; Characteristic: A; f_{sin}= 4000 Hz; Burst duration: 2s;

Range: **105dB**; Equivalent input steady level = 112dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	**Indication [dB]**	112.0	111.9	111.0	109.4	107.2	103.7	100.9	97.9	94.0	91.0	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
		2	**Indication [dB]**	112.0	111.9	111.0	109.4	107.2	103.7	100.8	97.9	94.0	90.9	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		3	**Indication [dB]**	112.0	111.9	111.0	109.4	107.1	103.7	100.8	97.9	93.9	90.9	87.9	84.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		4	**Indication [dB]**	112.0	111.9	111.0	109.4	107.2	103.7	100.9	97.9	94.0	91.0	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	1	**Indication [dB]**	109.9	108.0	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	**Indication [dB]**	109.9	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	**Indication [dB]**	109.9	107.9	104.5	101.7	98.8	94.9	91.9	88.9	84.9	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	**Indication [dB]**	109.9	108.0	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	**Indication [dB]**	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		2	**Indication [dB]**	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	81.9	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		3	**Indication [dB]**	111.8	108.9	105.0	102.0	98.9	95.0	92.0	88.9	84.9	81.9	78.9	75.8
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		4	**Indication [dB]**	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1

Range: **105dB**; Equivalent input steady level = 52dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	**Indication [dB]**	52.0	51.9	51.0	49.4	47.2	43.7	40.8	37.9
			Error [dB]	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	0.0
		2	**Indication [dB]**	52.0	51.9	51.0	49.4	47.1	43.7	40.8	37.9
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
		3	**Indication [dB]**	51.9	51.9	51.0	49.3	47.1	43.6	40.8	37.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0
		4	**Indication [dB]**	52.0	51.9	51.0	49.4	47.2	43.7	40.8	37.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	0.0	-0.1	-0.0
	Slow	1	**Indication [dB]**	49.9	47.9	44.6	41.8	38.9	35.0	32.0	29.0
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
		2	**Indication [dB]**	49.9	47.9	44.6	41.8	38.9	34.9	31.9	29.1
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.1
		3	**Indication [dB]**	49.9	47.9	44.5	41.7	38.8	34.9	31.9	29.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.1
		4	**Indication [dB]**	49.9	47.9	44.6	41.8	38.9	35.0	32.1	29.0
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	0.0	0.1	0.0
SEL	-	1	**Indication [dB]**	51.8	49.0	45.0	42.0	39.0	35.1	32.1	29.2
			Error [dB]	-0.2	-0.0	0.0	0.0	0.0	0.1	0.1	0.2
		2	**Indication [dB]**	51.8	49.0	45.0	42.0	39.0	35.0	32.0	29.2
			Error [dB]	-0.2	-0.0	0.0	0.0	0.0	0.1	0.1	0.2
		3	**Indication [dB]**	51.8	48.9	45.0	41.9	38.9	35.0	32.0	29.1
			Error [dB]	-0.2	-0.0	0.0	0.0	0.0	0.1	0.1	0.1
		4	**Indication [dB]**	51.8	49.0	45.0	42.0	39.0	35.1	32.1	29.1
			Error [dB]	-0.2	0.0	0.0	-0.0	0.0	0.1	0.1	0.1

Range: **105dB**; Equivalent input steady level = 34dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	**Indication [dB]**	34.1	34.0
			Error [dB]	0.0	0.0
		2	**Indication [dB]**	34.1	33.9
			Error [dB]	0.0	-0.0
		3	**Indication [dB]**	34.0	33.9
			Error [dB]	0.0	0.0
		4	**Indication [dB]**	34.0	33.9
			Error [dB]	-0.0	-0.1
	Slow	1	**Indication [dB]**	32.0	30.1
			Error [dB]	-0.1	0.1
		2	**Indication [dB]**	32.0	30.0
			Error [dB]	-0.1	0.1
		3	**Indication [dB]**	31.9	29.9
			Error [dB]	-0.1	0.1
		4	**Indication [dB]**	31.9	30.0
			Error [dB]	-0.1	0.0
SEL	-	1	**Indication [dB]**	33.9	31.2
			Error [dB]	-0.1	0.1
		2	**Indication [dB]**	33.9	31.1
			Error [dB]	-0.1	0.1
		3	**Indication [dB]**	33.8	31.1
			Error [dB]	-0.2	0.1
		4	**Indication [dB]**	33.8	31.1
			Error [dB]	-0.2	0.0

Range: **130dB**; Equivalent input steady level = 134dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	**Indication [dB]**	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		3	**Indication [dB]**	134.0	133.9	133.0	131.4	129.1	125.7	122.8	119.9	115.9	112.9	109.9	106.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		4	**Indication [dB]**	134.0	133.9	133.0	131.4	129.2	125.7	122.9	119.9	116.0	113.0	109.9	106.9
			Error [dB]	-0.0	0.0	0.0	0.0	129.2	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
	Slow	1	**Indication [dB]**	131.9	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	**Indication [dB]**	131.9	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	**Indication [dB]**	131.9	129.9	126.5	123.8	120.8	116.9	113.9	110.9	106.9	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	**Indication [dB]**	131.9	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	**Indication [dB]**	133.8	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	104.0	100.9	97.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		2	**Indication [dB]**	133.8	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	103.9	100.9	97.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		3	**Indication [dB]**	133.8	130.9	127.0	124.0	121.0	117.0	114.0	110.9	107.0	103.9	100.9	97.8
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		4	**Indication [dB]**	133.8	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	104.0	100.9	97.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1

Range: **130dB**; Equivalent input steady level = 74dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.8	59.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.0
		2	Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.8	59.9
			Error [dB]	0.0	0.0	73.0	0.0	-0.0	-0.0	-0.0	0.0
		3	Indication [dB]	73.9	73.9	73.0	71.3	69.1	65.6	62.8	59.9
			Error [dB]	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0
		4	Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.8	59.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
	Slow	1	Indication [dB]	71.9	69.9	66.6	63.8	60.9	57.0	54.0	51.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
		2	Indication [dB]	71.9	69.9	66.5	63.8	60.9	56.9	54.0	51.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.0
		3	Indication [dB]	71.9	69.9	66.5	63.7	60.8	56.9	54.0	51.0
			Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.1
		4	Indication [dB]	71.9	69.9	66.6	63.8	60.9	57.0	54.0	51.0
			Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	0.1
SEL	-	1	Indication [dB]	73.8	71.0	67.0	64.0	61.0	57.0	54.1	51.1
			Error [dB]	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1
		2	Indication [dB]	73.8	71.0	67.0	64.0	61.0	57.0	54.0	51.1
			Error [dB]	-0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1
		3	Indication [dB]	73.8	70.9	67.0	63.9	61.0	57.0	54.0	51.0
			Error [dB]	-0.2	-0.0	0.0	-0.0	0.0	0.0	0.0	0.0
		4	Indication [dB]	73.8	71.0	67.0	64.0	61.0	57.0	54.0	51.1
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	0.1

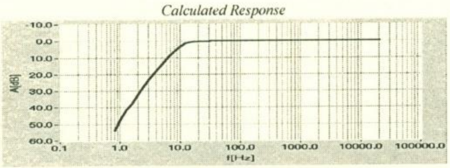
Range: **130dB**; Equivalent input steady level = 54dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	Indication [dB]	54.1	53.9
			Error [dB]	0.0	-0.0
		2	Indication [dB]	54.0	53.9
			Error [dB]	-0.0	-0.0
		3	Indication [dB]	54.0	53.9
			Error [dB]	0.1	0.1
		4	Indication [dB]	54.0	54.0
			Error [dB]	0.0	0.1
	Slow	1	Indication [dB]	52.0	50.0
			Error [dB]	-0.1	0.1
		2	Indication [dB]	51.9	50.0
			Error [dB]	-0.1	0.1
		3	Indication [dB]	51.9	49.9
			Error [dB]	-0.0	0.1
		4	Indication [dB]	51.9	50.0
			Error [dB]	-0.1	0.1
SEL	-	1	Indication [dB]	53.9	51.1
			Error [dB]	-0.1	0.1
		2	Indication [dB]	53.9	51.1
			Error [dB]	-0.2	0.1
		3	Indication [dB]	53.8	51.0
			Error [dB]	-0.1	0.1
		4	Indication [dB]	53.9	51.1
			Error [dB]	-0.1	0.1

6. FREQUENCY RESPONSE (electrical)

LEVEL METER; Filter: Z; Range: 130 dB; Input signal =135 dB;

Calculated Response



Measured Response with Preamplifier SV12 (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
10	3.2	3.2	3.2	3.2	250	0.0	0.0	-0.0	0.0
12.5	1.4	1.4	1.4	1.4	500	0.0	0.0	-0.0	0.0
16	0.5	0.5	0.5	0.5	1000	0.0	0.0	-0.0	0.0
20	0.1	0.1	0.1	0.1	2000	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	4000	0.0	0.0	0.0	0.0
31.5	-0.0	-0.0	-0.0	-0.0	8000	0.0	0.0	0.0	0.0
63	-0.0	-0.0	-0.0	-0.0	16000	0.0	0.0	0.0	-0.0
125	0.0	0.0	-0.0	0.0	20000	-0.0	0.0	0.0	-0.1

All frequencies are nominal center values for the 1/3 octave bands

7. INTERNAL NOISE LEVEL* (electrical)

LEVEL METER; Range: 105 dB, Back-light – off; Calibration factor: 0dB

	Filter	Z	A	C
Channel 1	Level [dB]	14.7	13.3	12.6
Channel 2	Level [dB]	17.4	13.0	12.3
Channel 3	Level [dB]	17.8	11.7	11.1
Channel 4	Level [dB]	14.9	11.8	12.4

* measured with preamplifier SVANTEK type SV12 No. 1771.

VIBRATION LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: HP10; Input signal =140.0dB (10.0 m/s^2), f_{sin}=79,6Hz

	Range 145dB		Range 170dB	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	139.98	-0.02	140.03	0.03
Channel 2	139.99	-0.01	140.04	0.04
Channel 3	139.98	-0.02	140.04	0.04
Channel 4	139.98	-0.02	140.03	0.03

2. CALIBRATION (vibrational)

LEVEL METER; Range: 145dB; Input signal: 120dB;

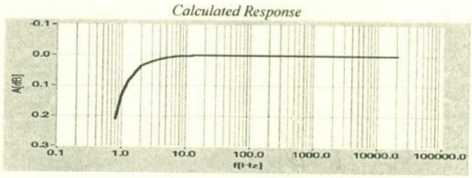
Filter	HP1		HP10		Wd		Wm		Wh	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.2	0.1	110.7	0.1
Channel 2	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.2	0.1	110.7	0.1
Channel 3	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.1	0.1	110.7	0.1
Channel 4	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.2	0.1	110.7	0.1

Calibration measured with the accelerometer DYTRAN type 3185D No. 2975. Calibration factor: -0.3dB

3. FREQUENCY RESPONSE (electrical)

1/3 OCTAVE; Filter: HP; Range: 170 dB; input=175 dB;

Calculated Response



Measured Response (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2 [dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
0.8	0.21	0.21	0.20	0.21	5	0.01	0.01	0.01	0.02	500	0.00	0.00	0.00	0.00
1	0.12	0.12	0.12	0.12	6.3	0.01	0.01	0.01	0.01	1000	0.00	0.00	0.00	0.00
1.25	0.09	0.09	0.09	0.09	8	0.01	0.01	0.01	0.01	2000	0.00	0.00	0.00	0.00
1.6	0.04	0.04	0.04	0.05	16	0.00	0.00	0.00	0.00	4000	0.01	0.02	0.02	0.01
2	0.04	0.04	0.03	0.04	31.5	-0.01	0.00	-0.01	0.00	8000	0.04	0.04	0.05	0.02
2.5	0.02	0.02	0.02	0.03	63	0.00	0.00	0.00	0.00	16000	0.02	0.02	0.04	-0.04
3.15	0.03	0.03	0.03	0.03	125	0.00	0.00	0.00	0.00	20000	-0.01	0.00	0.02	-0.07
4	0.03	0.03	0.03	0.03	250	0.00	0.00	-0.01	0.00					

All frequencies are nominal center values for the 1/3 octave bands

4. INTERNAL NOISE LEVEL (electrical)

LEVEL METER func.; Range: 145 dB; Back-light – off

	Filter	HP1	HP10	Wd	Wm	Wh
Channel 1	**Indication [dB]**	54.4	52.1	42.2	39.0	36.5
Channel 2	**Indication [dB]**	55.0	52.5	42.5	39.0	36.5
Channel 3	**Indication [dB]**	53.2	50.2	42.7	38.8	36.8
Channel 4	**Indication [dB]**	54.9	52.7	42.9	39.4	37.1

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
22 °C	31 %	1004 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	100	Signal generator
2.	SVANTEK	SVAN 912A	15900	Sound &Vibration Analyser
3.	KEITHLEY	2000	0910165	Digital multimeter
4.	SVANTEK	SV30A	24563	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	747	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.

2. Tracebility of the calibration is guarantied by the above mentioned ISO9001 procedures.

3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.

4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Paweł Bednarczyk P.Be .... Test date: 2016-09-20

Sound & Vibration Analyzer SVAN958A (Serial No. 59121)

SVANTEK ISO9001 certified

FACTORY CALIBRATION DATA OF THE SVAN 958 *No. 59121*

SOUND LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: LIN; Input signal =114.0dB, f_{sin}=1kHz

	Range 105dB		Range 130dB	
	Indication [dB]	**Error [dB]**	**Indication [dB]**	**Error [dB]**
Channel 1	113.98	-0.02	114.02	0.02
Channel 2	113.97	-0.03	114.02	0.02
Channel 3	113.97	-0.03	114.02	0.02
Channel 4	113.97	-0.03	114.02	0.02

2. CALIBRATION* (acoustical)

LEVEL METER; Range: 130 dB; Reference frequency: 1000Hz;

Filter	LIN		A		C	
	Indication [dB]	**Error [dB]**	**Indication [dB]**	**Error [dB]**	**Indication [dB]**	**Error [dB]**
Channel 1	114.0	0.0	114.0	0.0	114.0	0.0
Channel 2	114.0	0.0	114.0	0.0	114.0	0.0
Channel 3	114.0	0.0	114.0	0.0	114.0	0.0
Channel 4	114.0	0.0	114.0	0.0	114.0	0.0

Calibration measured with the microphone SVANTEK type SV22 No. 4013604. Calibration factor: -0.4dB

3. LINEARITY TEST* (electrical)

LEVEL METER; Range: 105 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	24.0	30.0	40.0	60.0	80.0	100.0	114.0
Channel 1	**Error [dB]**	0.32	0.13	0.04	-0.01	0.00	0.01	0.01
Channel 2	**Error [dB]**	0.29	0.11	0.04	-0.01	0.00	0.01	0.01
Channel 3	**Error [dB]**	0.25	0.09	0.04	-0.01	0.00	0.01	0.01
Channel 4	**Error [dB]**	0.35	0.11	0.03	-0.01	-0.00	0.01	0.01

LEVEL METER; Range: 130 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	45.0	50.0	60.0	80.0	100.0	120.0	135.0
Channel 1	**Error [dB]**	0.07	0.09	0.04	0.01	0.01	0.00	0.01
Channel 2	**Error [dB]**	0.09	0.10	0.04	0.01	0.01	0.00	0.01
Channel 3	**Error [dB]**	0.00	0.01	0.00	0.01	0.01	0.00	0.01
Channel 4	**Error [dB]**	-0.02	0.00	0.01	0.01	0.01	0.00	0.01

1/3 OCTAVE (1kHz); Range: 130 dB; Filter: A; f_{sin}= 1000 Hz

	Input [dB]	35.0	40.0	60.0	80.0	100.0	120.0	135.0
Channel 1	**Error [dB]**	0.32	0.11	0.03	0.00	0.00	-0.01	0.00
Channel 2	**Error [dB]**	0.34	0.11	0.03	0.00	0.01	0.00	0.01
Channel 3	**Error [dB]**	0.30	0.07	0.03	0.00	0.01	0.00	0.01
Channel 4	**Error [dB]**	0.28	0.08	0.04	0.00	0.01	-0.01	-0.00

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4. TONEBURST RESPONSE* (electrical)

LEVEL METER; Characteristic: A; f_{sin}= 4000 Hz; Burst duration: 2s;

Range: **105dB**; Equivalent input steady level = 112dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	**Indication [dB]**	111.9	111.9	111.0	109.3	107.1	103.6	100.8	97.9	93.9	90.9	87.8	84.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	111.9	111.8	110.9	109.3	107.1	103.6	100.8	97.8	93.9	90.9	87.8	84.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		3	**Indication [dB]**	112.0	111.9	111.0	109.4	107.2	103.7	100.8	97.9	94.0	90.9	87.9	84.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		4	**Indication [dB]**	111.9	111.9	111.0	109.3	107.1	103.6	100.8	97.9	93.9	90.9	87.8	84.8
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	1	**Indication [dB]**	109.9	107.9	104.5	101.7	98.8	94.9	91.9	88.9	84.9	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	**Indication [dB]**	109.9	107.9	104.5	101.7	98.8	94.9	91.9	88.9	84.9	-	-	-
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	**Indication [dB]**	110.0	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	**Indication [dB]**	109.9	107.9	104.5	101.7	98.8	94.9	91.9	88.9	84.9	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	**Indication [dB]**	111.9	108.9	104.9	101.9	98.9	94.9	91.9	88.9	84.9	81.9	78.8	75.8
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	111.9	108.9	104.9	101.9	98.9	94.9	91.9	88.9	84.9	81.9	78.8	75.8
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		3	**Indication [dB]**	112.0	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	81.9	78.9	75.9
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		4	**Indication [dB]**	111.9	108.9	105.0	101.9	98.9	94.9	91.9	88.9	84.9	81.9	78.8	75.8
			Error [dB]	0.0	-0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1

Range: **105dB**; Equivalent input steady level = 52dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	**Indication [dB]**	51.9	51.8	50.9	49.3	47.1	43.6	40.8	37.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	0.0
		2	**Indication [dB]**	51.9	51.8	50.9	49.3	47.1	43.6	40.7	37.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0
		3	**Indication [dB]**	52.0	51.9	51.0	49.4	47.1	43.7	40.8	37.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	0.0	-0.1	0.0
		4	**Indication [dB]**	51.9	51.8	50.9	49.3	47.1	43.6	40.8	37.9
			Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	0.0
	Slow	1	**Indication [dB]**	49.9	47.9	44.5	41.7	38.8	34.9	31.9	28.9
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	0.0	-0.0	0.0
		2	**Indication [dB]**	49.9	47.9	44.5	41.7	38.8	34.9	31.9	28.9
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	0.0	-0.0	-0.0
		3	**Indication [dB]**	50.0	47.9	44.6	41.8	38.8	35.0	31.9	29.0
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	0.0	-0.0	0.0
		4	**Indication [dB]**	49.9	47.9	44.5	41.7	38.8	34.9	31.9	29.2
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	0.3
SEL	-	1	**Indication [dB]**	51.9	48.9	44.9	41.9	38.9	35.0	32.0	29.1
			Error [dB]	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
		2	**Indication [dB]**	51.9	48.9	44.9	41.9	38.9	35.0	32.0	29.0
			Error [dB]	0.0	-0.0	0.0	0.0	0.0	0.1	0.1	0.1
		3	**Indication [dB]**	52.0	49.0	45.0	42.0	39.0	35.0	32.0	29.1
			Error [dB]	0.0	-0.0	0.0	0.0	0.0	0.1	0.1	0.2
		4	**Indication [dB]**	51.9	48.9	44.9	41.9	38.9	35.0	32.0	29.1
			Error [dB]	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2

Range: **105dB**; Equivalent input steady level = 34dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	**Indication [dB]**	34.0	33.9
			Error [dB]	0.0	-0.0
		2	**Indication [dB]**	34.0	33.9
			Error [dB]	-0.0	0.0
		3	**Indication [dB]**	34.0	33.9
			Error [dB]	0.0	0.0
		4	**Indication [dB]**	34.0	33.9
			Error [dB]	0.0	0.0
	Slow	1	**Indication [dB]**	32.0	30.0
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	32.0	30.0
			Error [dB]	0.0	0.1
		3	**Indication [dB]**	32.0	29.9
			Error [dB]	0.0	0.1
		4	**Indication [dB]**	31.9	30.1
			Error [dB]	0.0	0.3
SEL	-	1	**Indication [dB]**	34.0	31.1
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	34.0	31.1
			Error [dB]	0.0	0.1
		3	**Indication [dB]**	34.0	31.1
			Error [dB]	0.0	0.1
		4	**Indication [dB]**	34.0	31.0
			Error [dB]	0.0	0.1

Range: **130dB**; Equivalent input steady level = 134dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
MAX	Fast	1	**Indication [dB]**	133.9	133.8	132.9	131.3	129.1	125.6	122.8	119.8	115.9	112.9	109.8	106.8
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	133.9	133.8	132.9	131.3	129.1	125.6	122.8	119.8	115.9	112.9	109.8	106.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		3	**Indication [dB]**	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
		4	**Indication [dB]**	133.9	133.9	133.0	131.3	129.1	125.6	122.8	119.9	115.9	112.9	109.8	106.8
			Error [dB]	0.0	0.0	0.0	0.0	129.1	-0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
	Slow	1	**Indication [dB]**	131.9	129.9	126.5	123.7	120.8	116.9	113.9	110.9	106.9	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		2	**Indication [dB]**	131.9	129.9	126.5	123.7	120.8	116.9	113.9	110.9	106.9	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		3	**Indication [dB]**	132.0	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
		4	**Indication [dB]**	131.9	129.9	126.5	123.7	120.8	116.9	113.9	110.9	106.9	-	-	-
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
SEL	-	1	**Indication [dB]**	133.9	130.9	126.9	123.9	120.9	116.9	113.9	110.9	106.9	103.9	100.8	97.8
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		2	**Indication [dB]**	133.9	130.9	126.9	123.9	120.9	116.9	113.9	110.9	106.9	103.9	100.8	97.8
			Error [dB]	0.0	-0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		3	**Indication [dB]**	134.0	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	103.9	100.9	97.9
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
		4	**Indication [dB]**	133.9	130.9	127.0	123.9	120.9	116.9	113.9	110.9	106.9	103.9	100.8	97.8
			Error [dB]	0.0	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1

Range: **130dB**; Equivalent input steady level = 74dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
MAX	Fast	1	**Indication [dB]**	73.9	73.8	72.9	71.3	69.1	65.6	62.8	59.8
			Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
		2	**Indication [dB]**	73.9	73.8	72.9	71.3	69.1	65.6	62.8	59.8
			Error [dB]	-0.0	0.0	72.9	0.0	-0.0	-0.0	-0.0	0.0
		3	**Indication [dB]**	74.0	73.9	73.0	71.4	69.1	65.7	62.8	59.9
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0
		4	**Indication [dB]**	73.9	73.9	72.9	71.3	69.1	65.6	62.8	59.8
			Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
	Slow	1	**Indication [dB]**	71.9	69.9	66.5	63.7	60.8	56.9	54.0	50.9
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0
		2	**Indication [dB]**	71.9	69.9	66.5	63.7	60.8	56.9	53.9	51.0
			Error [dB]	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.1
		3	**Indication [dB]**	72.0	69.9	66.5	63.8	60.9	56.9	54.0	50.9
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
		4	**Indication [dB]**	71.9	69.9	66.5	63.7	60.8	56.9	53.9	50.9
			Error [dB]	0.0	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
SEL	-	1	**Indication [dB]**	73.9	70.9	66.9	63.9	60.9	56.9	54.0	51.0
			Error [dB]	-0.0	-0.0	0.0	0.0	-0.0	0.0	0.0	0.1
		2	**Indication [dB]**	73.9	70.9	66.9	63.9	60.9	56.9	54.0	51.0
			Error [dB]	0.0	-0.0	0.0	-0.0	-0.0	0.0	0.0	0.1
		3	**Indication [dB]**	74.0	71.0	67.0	64.0	61.0	57.0	54.0	51.0
			Error [dB]	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.1
		4	**Indication [dB]**	73.9	70.9	66.9	63.9	60.9	56.9	54.0	51.0
			Error [dB]	0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.1

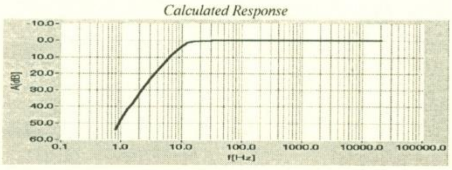
Range: **130dB**; Equivalent input steady level = 54dB

Result	Detector	Ch.	Duration [ms]	1000	500
MAX	Fast	1	**Indication [dB]**	54.0	53.9
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	54.0	53.8
			Error [dB]	0.1	-0.0
		3	**Indication [dB]**	54.0	53.9
			Error [dB]	0.0	-0.0
		4	**Indication [dB]**	53.9	53.9
			Error [dB]	-0.0	0.0
	Slow	1	**Indication [dB]**	52.0	49.9
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	52.0	49.9
			Error [dB]	0.0	0.1
		3	**Indication [dB]**	52.0	50.0
			Error [dB]	0.0	0.1
		4	**Indication [dB]**	51.9	50.0
			Error [dB]	-0.0	0.1
SEL	-	1	**Indication [dB]**	54.0	51.0
			Error [dB]	0.0	0.1
		2	**Indication [dB]**	54.0	51.0
			Error [dB]	0.0	0.0
		3	**Indication [dB]**	54.0	51.0
			Error [dB]	0.0	0.0
		4	**Indication [dB]**	54.0	51.0
			Error [dB]	-0.0	0.0

6. FREQUENCY RESPONSE (electrical)

LEVEL METER; Filter: Z; Range: 130 dB; Input signal =135 dB;

Calculated Response



Measured Response with Preamplifier SV12 (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
10	3.2	3.2	3.2	3.2	250	0.0	-0.0	-0.0	0.0
12.5	1.4	1.4	1.4	1.4	500	0.0	-0.0	0.0	0.0
16	0.5	0.5	0.5	0.5	1000	0.0	0.0	0.0	0.0
20	0.1	0.1	0.1	0.1	2000	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0	4000	0.0	0.0	0.0	0.0
31.5	-0.0	-0.0	-0.0	-0.0	8000	0.0	0.0	0.0	0.0
63	-0.0	-0.0	-0.0	-0.0	16000	0.0	0.0	0.0	0.0
125	0.0	-0.0	-0.0	-0.0	20000	0.0	0.0	0.1	0.0

All frequencies are nominal center values for the 1/3 octave bands

7. INTERNAL NOISE LEVEL* (electrical)

LEVEL METER; Range: 105 dB; Back-light – off; Calibration factor: 0dB

	Filter	Z	A	C
Channel 1	Level [dB]	14.2	11.6	11.8
Channel 2	Level [dB]	13.2	10.7	10.8
Channel 3	Level [dB]	13.9	11.2	11.8
Channel 4	Level [dB]	14.0	11.4	11.3

* measured with preamplifier SVANTEK type SV12 No. 1771.

VIBRATION LEVEL METER

1. CALIBRATION (electrical)

LEVEL METER; Filter: HP10; Input signal =140.0dB (10.0 m/s^2), f_{sin}=79,6Hz

	Range 145dB		Range 170dB	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	139.99	-0.01	140.03	0.03
Channel 2	139.98	-0.02	140.02	0.02
Channel 3	139.98	-0.02	140.03	0.03
Channel 4	139.98	-0.02	140.02	0.02

2. CALIBRATION (vibrational)

LEVEL METER; Range: 145dB; Input signal: 120dB;

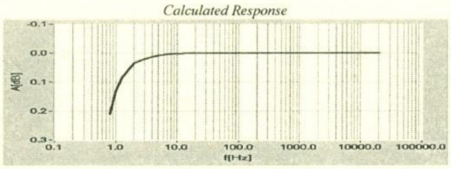
Filter	HP1		HP10		Wd		Wm		Wh	
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	119.8	-0.2	119.8	-0.2	106.0	-0.2	102.2	0.1	110.7	0.1
Channel 2	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.1	0.1	110.7	0.1
Channel 3	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.1	0.1	110.6	0.1
Channel 4	119.8	-0.2	119.8	-0.2	105.9	-0.2	102.1	0.1	110.7	0.1

Calibration measured with the accelerometer DYTRAN type 3185D No. 2975. Calibration factor: -0.3dB

3. FREQUENCY RESPONSE (electrical)

1/3 OCTAVE; Filter: HP; Range: 170 dB; input=175 dB;

Calculated Response



Measured Response (f-frequency, An-attenuation in channel n)

f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2 [dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
0.8	0.18	0.19	0.18	0.18	5	0.01	0.01	0.01	0.01	500	-0.01	-0.01	-0.01	-0.01
1	0.13	0.13	0.13	0.13	6.3	-0.00	-0.00	-0.00	-0.00	1000	-0.01	-0.00	-0.01	-0.00
1.25	0.08	0.08	0.07	0.08	8	-0.00	-0.00	-0.00	-0.00	2000	-0.01	-0.00	-0.01	-0.00
1.6	0.06	0.07	0.06	0.06	16	-0.01	-0.00	-0.01	-0.00	4000	-0.00	0.01	-0.00	0.01
2	0.04	0.05	0.04	0.05	31.5	-0.01	-0.01	-0.01	-0.01	8000	0.03	0.04	0.03	0.03
2.5	0.01	0.02	0.01	0.02	63	-0.01	-0.00	-0.01	-0.00	16000	0.01	0.02	0.03	0.02
3.15	-0.00	-0.00	-0.00	-0.00	125	-0.01	-0.01	-0.01	-0.01	20000	0.01	0.02	0.04	0.03
4	-0.00	0.01	-0.00	0.01	250	-0.01	-0.01	-0.01	-0.01					

All frequencies are nominal center values for the 1/3 octave bands

4. INTERNAL NOISE LEVEL (electrical)

LEVEL METER func.; Range: 145 dB; Back-light – off

	Filter	HP1	HP10	Wd	Wm	Wh
Channel 1	**Indication [dB]**	53.7	51.0	42.4	39.4	36.2
Channel 2	**Indication [dB]**	54.8	52.5	42.5	38.5	36.3
Channel 3	**Indication [dB]**	53.0	50.3	42.7	39.4	36.9
Channel 4	**Indication [dB]**	54.8	52.6	42.7	39.1	36.7

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
22 °C	31 %	1004 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	100	Signal generator
2.	SVANTEK	SVAN 912A	15900	Sound & Vibration Analyser
3.	KEITHLEY	2000	0910165	Digital multimeter
4.	SVANTEK	SV30A	24563	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	747	Reference accelerometer

CONFORMITY & TEST DECLARATION

1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.

2. Tracebility of the calibration is guarantied by the above mentioned ISO9001 procedures.

3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.

4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Paweł Bednarczyk P.B. .... Test date: 2016-09-20

Vibration Calibrator

深圳市计量质量检测研究院
Shenzhen Academy of Metrology & Quality Inspection
国家高新技术计量站
National Hi-tech Metrology Station

中国认可
国际互认
校准
CALIBRATION
CNAS L0579

校 准 报 告
CALIBRATION REPORT

报告编号：173604733

第 1 页，共 5 页
Page 1 of 5 Pages

客户名称 Name of Customer	：	威信声学顾问有限公司
客户地址 Address of Customer	：	香港新界沙田工业中心A座601
计量器具名称 Name of Instrument	：	振动校准器
器具用途 Use of Instrument	：	--------
型号/规格 Type/Specification	：	699A02
出厂编号 Serial №	：	989
资产编号 Asset №	：	--------
制造单位 Manufacturer	：	IMI
校准依据 Calibrated in Accordance to	：	JJG 1062-2010 便携式振动校准器

合 格
报告编号：173604733 (C/N)
出厂编号：989 (S/N)
资产编号：——
校准员 (BY)：邓世彬
校准日期 (DATE)：2017/10/27
复校日期 (DUE)：2018/10/26
深圳市计量质量检测研究院 国家高新技术计量站

(校准专用章)
Stamp

深圳市计量质量检测研究院 (2) 校准专用章

批准人 Authorized by：张国庆(副所长)

签名 Signature：张国庆

核验员 Checked by：李孟

校准员 Calibrated by：邓世彬

校准日期 Operation Date：2017 年 Year 10 月 Month 27 日 Day

建议复校日期 Suggested Recal.Date：2018 年 Year 10 月 Month 26 日 Day

校准机构备案号：[2012]粤量校F002号
地址：深圳市南山区龙珠大道中段计量质检大楼
电话：0086-755-26941696 0086-755-26941546
传真：0086-755-26941615 0086-755-26941547
邮编：518055 网址：www.smq.com.cn
电子邮件：kfzx@smq.com.cn

Register No.: [2012]粤量校F002号
Add:Metrology and Quality Inspection Building,Central Section of Longzhu Road, Nanshan District,Shenzhen
Tel:0086-755-26941696 0086-755-26941546
Fax:0086-755-26941615 0086-755-26941547
Post Code:518055 http://www.smq.com.cn
E-mail:kfzx@smq.com.cn

SMQ2008-1

深圳市计量质量检测研究院
Shenzhen Academy of Metrology & Quality Inspection
国家高新技术计量站
National Hi-tech Metrology Station

校准报告
CALIBRATION REPORT

校准用主要计量标准装置信息
Main Standard Devices Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/最大允许误差 Uncertainty/Accuracy Class/Maximum Permissible Error	计量标准考核证书号 Certificate №	有效期至 Due Date
--------	--------	--------	--------	--------

校准用主要标准器信息
Main Standards of Measurement Used

名称 Equipment Name	测量范围 Measuring Range	不确定度/准确度等级/最大允许误差 Uncertainty/Accuracy Class/Maximum Permissible Error	设备编号 Equipment №	证书号 Certificate №	有效期至 Due Date
振动仪标准传感器	0.2 Hz ～ 4000 Hz (±1%)	Urel = 0.5 %, k = 2	SB0424/02	LSzd2017-0638	2018-05-14

附加说明
Appended Directions

委托日期：
Application Date
2017 年 10 月 23 日

校准地点：
Operation Location
本院声学振动实验室

环境条件：
Operation Environment
温度 25 ℃　相对湿度 50 %

符合性及限制使用说明：
Statement of Compliance and Limitation
所校准项目（或量值）合格

SMQ3010-1

校准报告
CALIBRATION REPORT

校准结果
Results of Calibration

1 外观检查： 正常

Appearance Check: Pass

2 振动幅值：

Amplitude

2.1 加速度：见表1

Acceleration: See Table 1

表1 Table 1

加速度标称值 Nominal SPL (m/s^2)	加速度实测值 Measured SPL (m/s^2)	误差 Error (%)	最大允许误差 M.P.E. (%)
9.8	9.75	+0.5	±3.0

2.2 等效速度：见表2

Equivalent Velocity: See Table 2

表2 Table 2

速度标称值 Nominal SPL (mm/s)	速度实测值 Measured SPL (mm/s)	误差 Error (%)	最大允许误差 M.P.E. (%)

SMQ0810-1

校准报告
CALIBRATION REPORT

校准结果
Results of Calibration

9.8	9.75	+0.5	±3.0

2.3 等效位移：见表3

Equivalent Displacement: See Table 3

表3 Table 3

位移标称值 Nominal SPL	位移实测值 Measured SPL	误差 Error	最大允许误差 M.P.E.
(um)	(um)	(%)	(%)
9.8	9.75	+0.5	±3.0

3 频率：见表4

Frequency: see Table 4

表4 Table 4

频率标称值 Nominal Freq.	频率实测值 Measured Freq.	误差 Error	最大允许误差 M.P.E.
(Hz)	(Hz)	(%)	(%)
159.2	159.2	0.0	±1.0

4 加速度波形失真度：见表5

SMQ8010-1

校准报告
CALIBRATION REPORT

校准结果
Results of Calibration

ACC.Distortion: See Table 5

表5　Table 5

标称频率 Nominal Freq.	标称幅值 Nominal Amplitude	失真度 Distortion	允许范围 Limit
(Hz)	(m/s^2)	(%)	(%)
159.2	9.8	0.62	≤5.0

附注(Note)：

1）等效速度和等效位移由参考频率加速度换算得出。

2）加速度测量结果相对扩展不确定度：U_{rel} = 1.4 %，k = 2

(依据JJF1059.1-2012测量不确定度评定及表示)

Related Expanded Uncertainty of Acceleration: U_{rel} = 1.4 %, k = 2

(By JJF1059.1-2012 Evaluation and Expression of Uncertainty in Measurement)

以　下　空　白

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SMQ/Z010-1

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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Tel: (852) 2873 6860
Fax: (852) 2555 7533

ilac-MRA HKAS HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 17CA1006 01 Page 1 of 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250	4189	ZC0032
Serial/Equipment No.:	3001291	3005374	23853
Adaptors used:	-	-	-

Item submitted by

Customer Name: AECOM ASIA CO LIMITED
Address of Customer: -
Request No.: -
Date of receipt: 06-Oct-2017

Date of test: 06-Oct-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	08-Sep-2018	CIGISMEC
Signal generator	DS 360	33873	25-Apr-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI

Ambient conditions

Temperature: 22 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1010 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 06-Oct-2017 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

𡇶合試驗有限公司
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HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA1006 01

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Lai Sheng Jie
Date: 06-Oct-2017

Checked by: Fung Chi Yip
Date: 06-Oct-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Form No.CARP152-2/Issue 1/Rev.C/01/02/2007

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ilac-MRA HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0303 01-02

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone	Pream
Manufacturer:	B & K	,	B & K	B & K
Type/Model No.:	2270	,	4189	ZC0032
Serial/Equipment No.:	2644597 N.012.01	,	2846461	17965
Adaptors used:	-	,	-	-

Item submitted by

Customer Name: AECOM ASIA CO LTD
Address of Customer: -
Request No.: -
Date of receipt: 03-Mar-2017

Date of test: 07-Mar-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	18-Jun-2017	CIGISMEC
Signal generator	DS 360	33873	18-Apr-2017	CEPREI
Signal generator	DS 360	61227	18-Apr-2017	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 60 ± 10 %
Air pressure: 1010 ± 5 hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 08-Mar-2017 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Form No.CARP152-1/Issue 1/Rev.C/01/02/2007

綜合試驗有限公司
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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA0303 01-02

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Uncertainty (dB) / Coverage Factor	
Self-generated noise	A	Pass	0.3	
	C	Pass	1.0	2.1
	Lin	Pass	2.0	2.2
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Uncertainty (dB) / Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3
	Weighting A at 8000 Hz	Pass	0.5

3, Response to associated sound calibrator

N/A

The uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95 %. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Fung Chi Yip **Checked by:** Lam Tze Wai

Date: 07-Mar-2017 **Date:** 08-Mar-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

 Form No.CARP152-2/Issue 1/Rev.C/01/02/2007

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CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0922 03-01 **Page:** 1 of 2

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	B & K
Type/Model No.:	4231
Serial/Equipment No.:	3014024 / N004.04
Adaptors used:	-

Item submitted by

Curstomer:	AECOM ASIA CO LIMITED
Address of Customer:	-
Request No.:	-
Date of receipt:	22-Sep-2017

Date of test: 28-Sep-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	11-Apr-2018	SCL
Preamplifier	B&K 2673	2743150	05-May-2018	CEPREI
Measuring amplifier	B&K 2610	2346941	03-May-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI
Digital multi-meter	34401A	US36087050	25-Apr-2018	CEPREI
Audio analyzer	8903B	GB41300350	21-Apr-2018	CEPREI
Universal counter	53132A	MY40003662	22-Apr-2018	CEPREI

Ambient conditions

Temperature:	23 ± 1 °C
Relative humidity:	55 ± 10 %
Air pressure:	1000 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: ~~Huang Jian Min~~/Feng Jun Qi **Date:** 28-Sep-2017 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Form No.CARP156-1/Issue 1/Rev.D/01/03/2007

Hong Kong Accreditation Service (HKAS) has accredited this laboratory (Reg. No. HOKLAS 028 - CAL) under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific calibration activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation. Such terms of accreditation stipulate that the results shall be traceable to the International System of Units (S.I.) or recognised measurement standards. This certificate shall not be reproduced except in full.

綜合試驗有限公司
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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA0922 03-01

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	94.16	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.007 dB**

Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 1000.0 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.4 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Lai Sheng Jie **Checked by:** Fung Chi Yip

Date: 28-Sep-2017 **Date:** 28-Sep-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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12/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel: (852) 2873 6860
Fax: (852) 2555 7533

ilac-MRA HKAS HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0309 01

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	B & K
Type/Model No.:	4231
Serial/Equipment No.:	3006428 / N004.03
Adaptors used:	-

Item submitted by

Curstomer:	AECOM ASIA CO LIMITED
Address of Customer:	-
Request No.:	-
Date of receipt:	09-Mar-2017

Date of test: 13-Mar-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	14-Apr-2017	SCL
Preamplifier	B&K 2673	2743150	28-Apr-2017	CEPREI
Measuring amplifier	B&K 2610	2346941	26-Apr-2017	CEPREI
Signal generator	DS 360	61227	18-Apr-2017	CEPREI
Digital multi-meter	34401A	US36087050	18-Apr-2017	CEPREI
Audio analyzer	8903B	GB41300350	19-Apr-2017	CEPREI
Universal counter	53132A	MY40003662	19-Apr-2017	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	50 ± 10 %
Air pressure:	1010 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: ~~Huang Jian Min~~/Feng Jun Qi **Date:** 15-Mar-2017 **Company Chop:**

SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

Form No.CARP156-1/Issue 1/Rev.D/01/03/2007

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
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ilac-MRA HKAS HOKLAS 028 CAL

CERTIFICATE OF CALIBRATION

(Continuation Page)

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Expanded Uncertainty dB
1000	94.00	94.27	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.002 dB**

Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 1000.0 Hz**

Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.5 %**

Estimated expanded uncertainty 0.7 %

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: Lai Sheng Jie **Date:** 13-Mar-2017

Checked by: Fung Chi Yip **Date:** 15-Mar-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

Form No.CARP156-2/Issue 1/Rev.C/01/05/2005

Appendix D1

Ground-borne Noise Measurement – Photograph of Typical Measurement Setup

Appendix D1 Ground-borne Noise Measurement - Photograph of Typical Measurement Setup

Appendix D2

Photographs of Selected ABNSRs

Appendix D2 Photographs of Selected ABNSRs

Plate 1 – Leung Uk Tsuen, Wang Toi Shan (SS7)

Plate 2A - DD110 LOT 482, Wang Toi Shan (SS10)

Plate 2B - DD110 LOT 482, Wang Toi Shan (SS10)

Plate 3 - Abandoned village house in Shek Kong (SS15)

Appendix D3

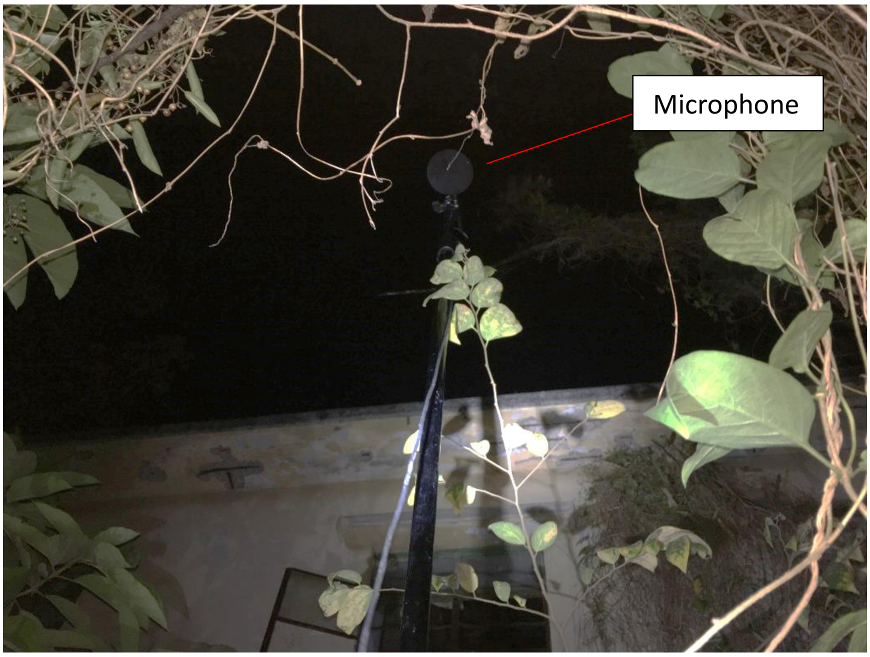
Airborne Noise Measurement – Photographs of Measurement Setup

Appendix D3 Airborne Noise Measurement - Photographs of Measurement Setup

SS7 – Leung Uk Tsuen Village House

SS7 – Leung Uk Tsuen Village House - Surrounding environment


SS15 – Leung Uk Tsuen Squats



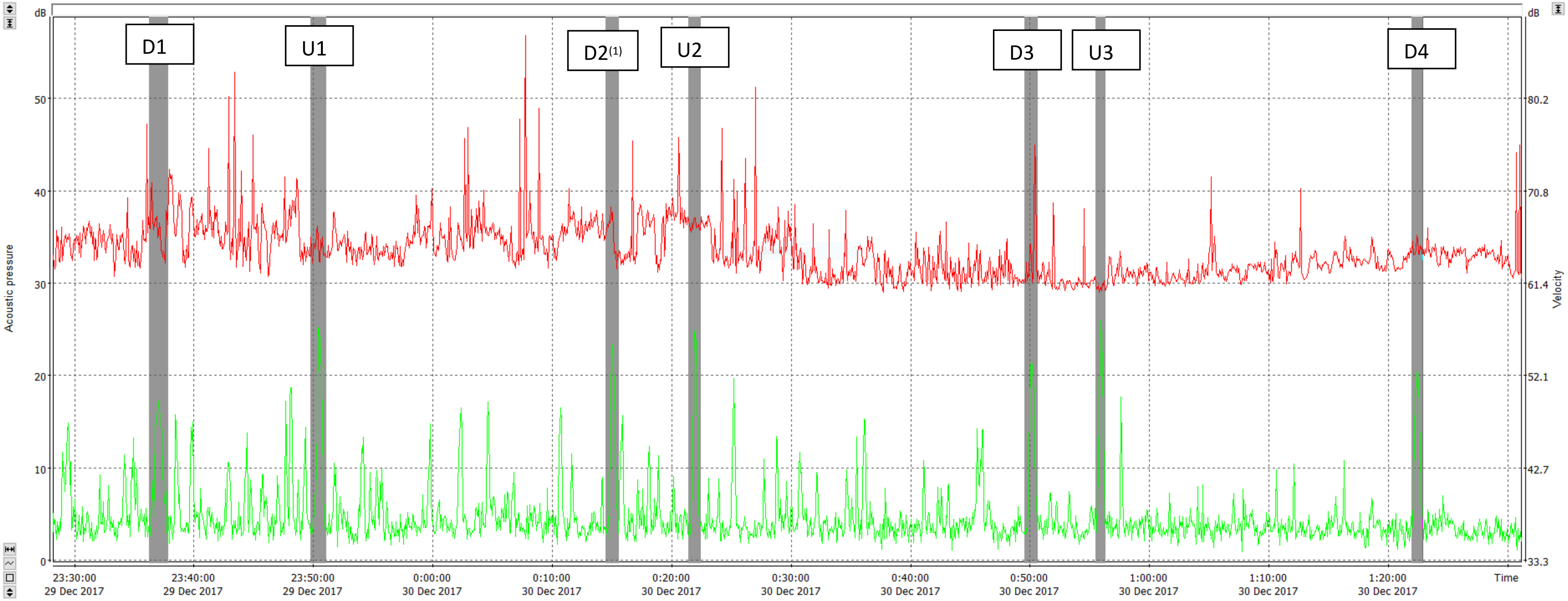
SS15 – Leung Uk Tsuen Squats - Surrounding environment

Appendix E

Ground-borne Noise Measurement Results and Detailed Calculation

Noise and Vibration Time History of Train Passby

Measurement Location: GN3, 1/F



Note:

(1) Event passby D2 was affected by extraneous noise including traffic noise and thus the result was discarded.

Legend:

: Vibration level at 40Hz, dB re 1nm/s

: Overall noise level, dB(A)

Typical Train Passby

Measurement Location: GN3, 1/F

Legend:

________: Vibration level at 40Hz, dB re 1nm/s

________: Overall noise level, dB(A)

: Train Passby

Appendix E1 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Train Operation Scenario in EP Condition 2.27)

Measurement Location: **GN3, 1/F**

Measurement Date and Time: **29/12/2017 23:30 to 30/12/2017 01:30**

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event[1] Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)[2]	Event Duration, s	Correction for Event Duration, dB(A)	SEL[3], dB(A)	Averaged SEL, dB(A)
GN3	Short Train (Northbound)	214	U1	33.9	34.9	-1.0	-	22	13.4	47.3	47.6
		214	U2	36.5	35.8	0.7	-	22	13.4	49.9	
		214	U3	29.4	31.7	-2.3	-	22	13.4	42.8	
	Short Train (Southbound)	214	D1	36.1	33.5	2.6	-	22	13.4	49.5	48.1
		214	D3	33.4	30.9	2.5	-	22	13.4	46.8	
		214	D4	34.0	33.7	0.3	-	22	13.4	47.4	

Notes:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL[1], dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[2]	Att_{floor} Correction[3]	LAeq 30mins, dB(A)
GN3[4]	Short Train (Northbound)	214	47.6	Daytime & Evening (0700-2300)	7	8.5	-32.6	0.0	0.0	23.5
	Short Train (Southbound)	214	48.1		6	7.8	-32.6	0.0	0.0	23.3
	Long Train (Northbound)	427	50.6		2	3.0	-32.6	0.0	0.0	21.0
	Long Train (Southbound)	427	51.1		2	3.0	-32.6	0.0	0.0	21.5
Predicted Noise Level, LAeq 30mins, dB(A)										**<28**
GBN Criteria, dB(A)										**55**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 1/F of GN3 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

(4) As there is no sensitive use at school during night-time period, only daytime predicted noise level is presented.

Appendix E2 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Additional Train Operation Scenarios)

Measurement Location: **GN3, 1/F**
Measurement Date and Time: **29/12/2017 23:30 to 30/12/2017 01:30**

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event(1) Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Event Duration, s	Correction for Event Duration, dB(A)	SEL(3), dB(A)	Averaged SEL, dB(A)
GN3	Short Train (Northbound)	214	U1	33.9	34.9	-1.0	-	22	13.4	47.3	47.6
		214	U2	36.5	35.8	0.7	-	22	13.4	49.9	
		214	U3	29.4	31.7	-2.3	-	22	13.4	42.8	
	Short Train (Southbound)	214	D1	36.1	33.5	2.6	-	22	13.4	49.5	48.1
		214	D3	33.4	30.9	2.5	-	22	13.4	46.8	
		214	D4	34.0	33.7	0.3	-	22	13.4	47.4	

Notes:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN3(4)	Short Train (Northbound)	214	47.6	Daytime & Evening (0700-2300)	5	7.0	-32.6	0.0	0.0	22.0
	Short Train (Southbound)	214	48.1		3	4.8	-32.6	0.0	0.0	20.3
	Long Train (Northbound)	430	50.6		3	4.8	-32.6	0.0	0.0	22.8
	Long Train (Southbound)	430	51.1		3	4.8	-32.6	0.0	0.0	23.3
Predicted Noise Level, LAeq 30mins, dB(A)										**<28**
GBN Criteria, dB(A)										**55**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

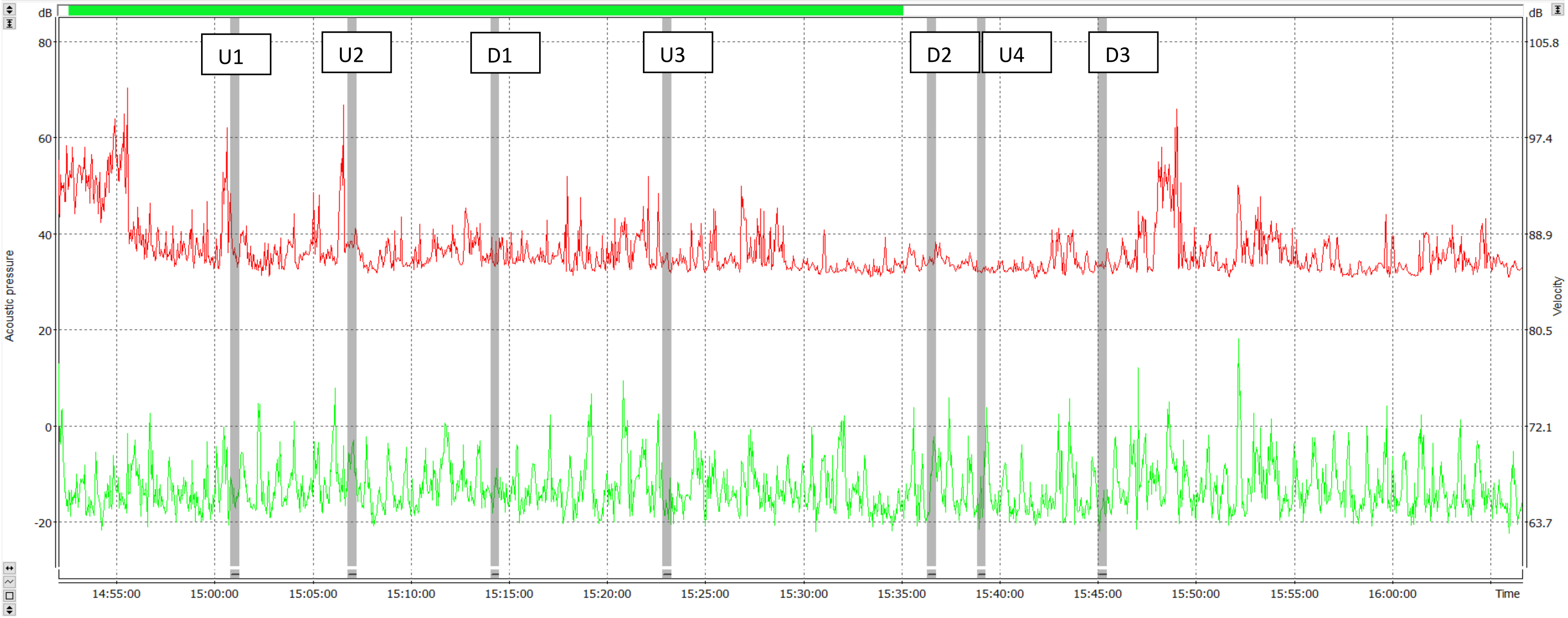
(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 1/F of GN3 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

(4) As there is no sensitive use at school during night-time period, only daytime predicted noise level is presented.

Noise and Vibration Time History of Train Passby

Measurement Location: GN5, 2/F



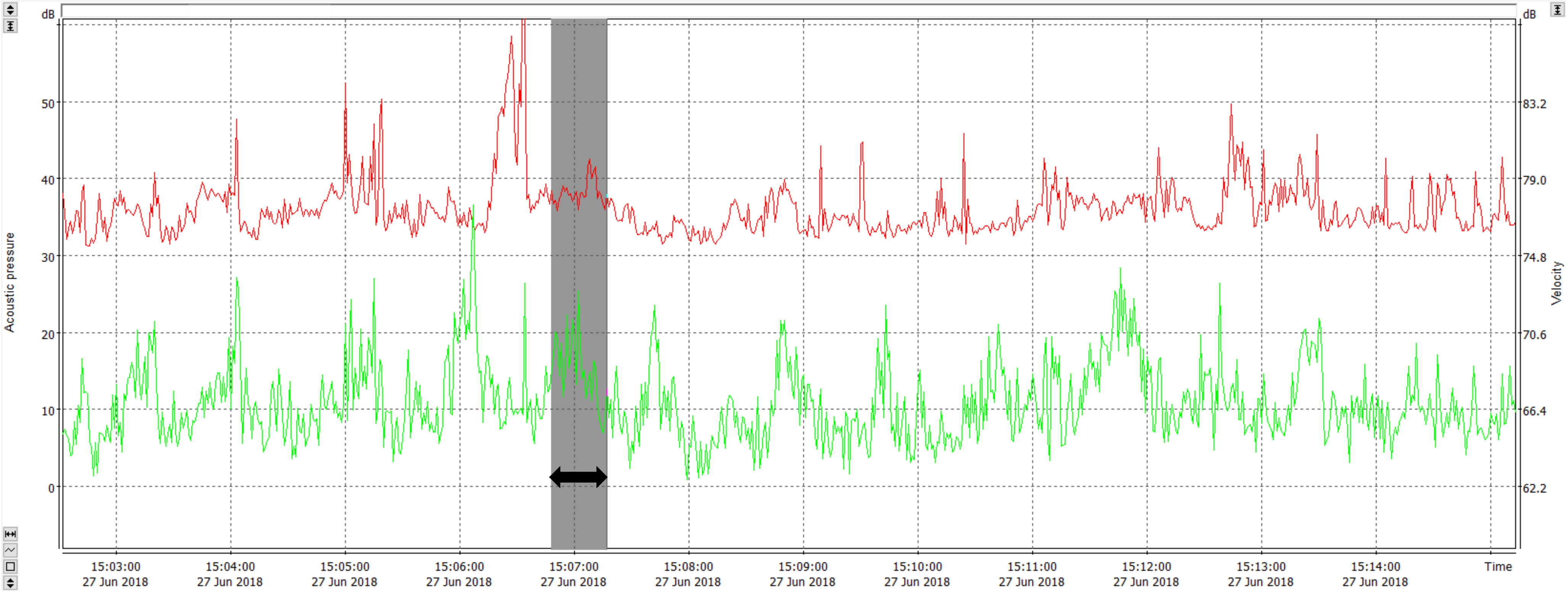
Legend:

_________: Overall vibration level, dB re 1nm/s

_________: Overall noise level, dB(A)

Typical Train Passby

Measurement Location: GN5, 2/F



Legend:

: Overall vibration level, dB re 1nm/s

: Overall noise level, dB(A)

: Train Passby

Appendix E1 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Train Operation Scenario in EP Condition 2.27)

Measurement Location: GN5, 2/F
Measurement Date and Time: 27/6/2018 15:00 to 27/6/2018 16:00

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event(1) Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Corrected Event Noise Level, dB(A)(2)	Event Duration, s	Correction for Event Duration, dB(A)	SEL(3), dB(A)	Averaged SEL, dB(A)
GN5	Short Train (Northbound)	214	U1	35.8	37.5	-1.7	-	22	13.4	49.2	49.4
		214	U2	38.8	38.5	0.3	-	22	13.4	52.2	
		214	U3	34.4	41.2	-6.8	-	22	13.4	47.8	
		214	U4	32.5	33.8	-1.3	-	22	13.4	45.9	
	Short Train (Southbound)	214	D1	35.1	37.6	-2.5	-	22	13.4	48.5	48.1
		214	D2	35.1	40.0	-4.9	-	22	13.4	48.5	
		214	D3	33.6	34.3		-	22	13.4	47.0	

Note:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN5	Short Train (Northbound)	214	49.4	Daytime & Evening (0700-2300)	7	8.5	-32.6	0.0	0.0	25.3
	Short Train (Southbound)	214	48.1		6	7.8	-32.6	0.0	0.0	23.3
	Long Train (Northbound)	427	52.4		2	3.0	-32.6	0.0	0.0	22.9
	Long Train (Southbound)	427	51.1		2	3.0	-32.6	0.0	0.0	21.5
Predicted Noise Level, LAeq 30mins, dB(A)										**<30**
GBN Criteria, dB(A)										**55**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 2/F of GN5 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL, dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(1)	Att_{floor} Correction(2)	LAeq 30mins, dB(A)
GN5	Short Train (Northbound)	214	49.4	Night-time (2300-0700)	3	4.8	-32.6	0.0	0.0	21.6
	Short Train (Southbound)	214	48.1		3	4.8	-32.6	0.0	0.0	20.3
Predicted Noise Level, LAeq 30mins, dB(A)										**<24**
GBN Criteria, dB(A)										**45**
Compliance										**Yes**

Notes:

(1) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(2) 2/F of GN5 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Appendix E2 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Additional Train Operation Scenarios)

Measurement Location: **GN5, 2/F**
Measurement Date and Time: **27/6/2018 15:00 to 27/6/2018 16:00**

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event[1] Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Corrected Event Noise Level, dB(A)[2]	Event Duration, s	Correction for Event Duration, dB(A)	SEL[3], dB(A)	Averaged SEL, dB(A)
GN5	Short Train (Northbound)	214	U1	35.8	37.5	-1.7	-	22	13.4	49.2	49.4
		214	U2	38.8	38.5	0.3	-	22	13.4	52.2	
		214	U3	34.4	41.2	-6.8	-	22	13.4	47.8	
		214	U4	32.5	33.8	-1.3	-	22	13.4	45.9	
	Short Train (Southbound)	214	D1	35.1	37.6	-2.5	-	22	13.4	48.5	48.1
		214	D2	35.1	40.0	-4.9	-	22	13.4	48.5	
		214	D3	33.6	34.3		-	22	13.4	47.0	

Note:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL[1], dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[2]	Att_{floor} Correction[3]	LAeq 30mins, dB(A)
GN5	Short Train (Northbound)	214	49.4	Daytime & Evening (0700-2300)	5	7.0	-32.6	0.0	0.0	23.9
	Short Train (Southbound)	214	48.1		3	4.8	-32.6	0.0	0.0	20.3
	Long Train (Northbound)	430	52.5		3	4.8	-32.6	0.0	0.0	24.7
	Long Train (Southbound)	430	51.1		3	4.8	-32.6	0.0	0.0	23.3
									Predicted Noise Level, LAeq 30mins, dB(A)	**<29**
									GBN Criteria, dB(A)	**55**
									Compliance	**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 2/F of GN5 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1A)

GBNSR	Train & Direction	Train Length, m	Averaged SEL[1], dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[2]	Att_{floor} Correction[3]	LAeq 30mins, dB(A)
GN5	Short Train (Northbound)	214	49.4	Night-time (2300-0700)	2	3.0	-32.6	0.0	0.0	19.9
	Short Train (Southbound)	214	48.1		2	3.0	-32.6	0.0	0.0	18.5
	Long Train (Northbound)	430	52.5		1	0.0	-32.6	0.0	0.0	19.9
	Long Train (Southbound)	430	51.1		1	0.0	-32.6	0.0	0.0	18.6
									Predicted Noise Level, LAeq 30mins, dB(A)	**<25**
									GBN Criteria, dB(A)	**45**
									Compliance	**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 2/F of GN5 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1B)

GBNSR	Train & Direction	Train Length, m	Averaged SEL[1], dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[2]	Att_{floor} Correction[3]	LAeq 30mins, dB(A)
GN5	Short Train (Northbound)	214	49.4	Night-time (2300-0700)	1	0.0	-32.6	0.0	0.0	16.9
	Short Train (Southbound)	214	48.1		1	0.0	-32.6	0.0	0.0	15.5
	Long Train (Northbound)	430	52.5		0	-	-32.6	0.0	0.0	-
	Long Train (Southbound)	430	51.1		2	3.0	-32.6	0.0	0.0	21.6
									Predicted Noise Level, LAeq 30mins, dB(A)	**<24**
									GBN Criteria, dB(A)	**45**
									Compliance	**Yes**

Notes:

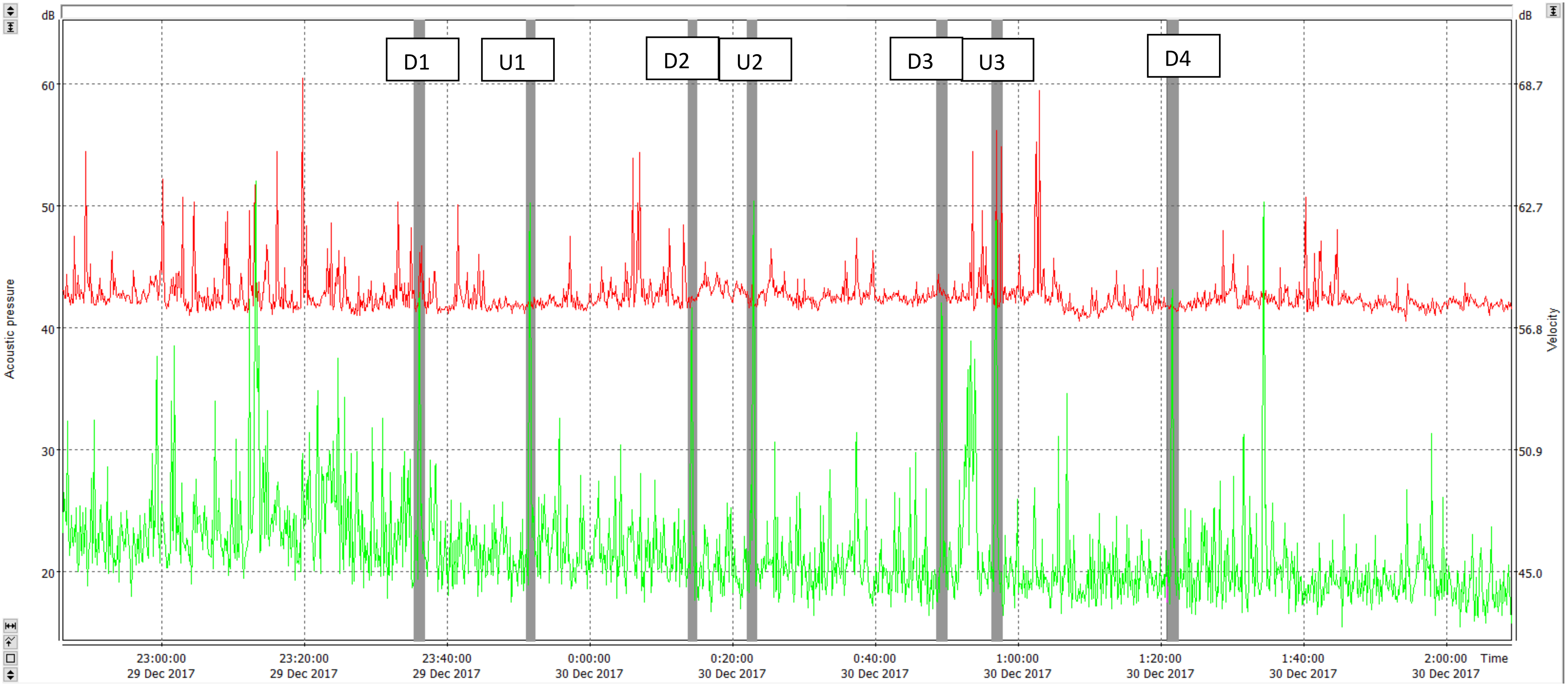
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 2/F of GN5 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Noise and Vibration Time History of Train Passby

Measurement Location: GN7, 1/F



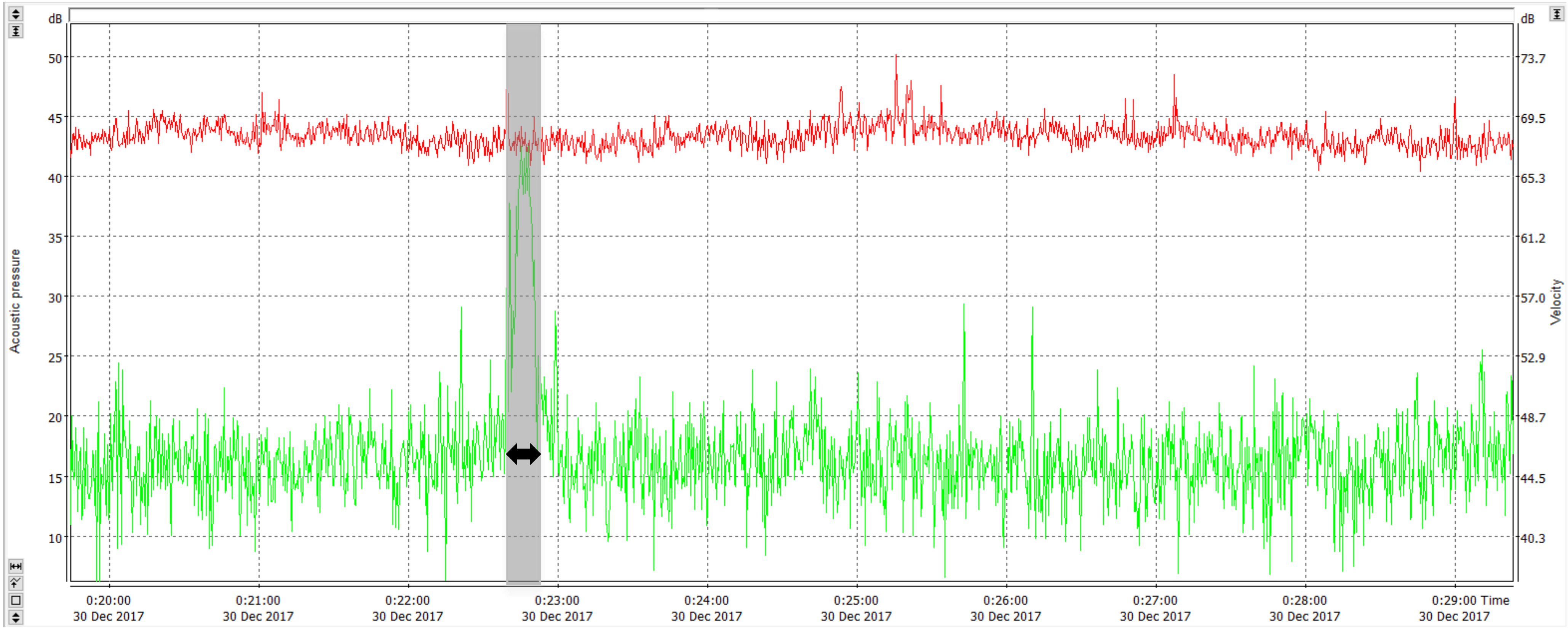
Legend:

______: Vibration level at 40Hz, dB re 1nm/s

______: Overall noise level, dB(A)

Typical Train Passby

Measurement Location: GN7, 1/F



Legend:

______: Vibration level at 40Hz, dB re 1nm/s

______: Overall noise level, dB(A)

⟷: Train Passby

Appendix E1 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Train Operation Scenario in EP Condition 2.27)

Measurement Location: GN7, 1/F
Measurement Date and Time: 29/12/2017 23:30 to 30/12/2017 01:30

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event[1] Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)[2]	Event Duration[3], s	Correction for Event Duration, dB(A)	SEL[4], dB(A)	Averaged SEL, dB(A)
GN7	Short Train (Northbound)	214	U1	41.1	41.5	-0.4	-	22	13.4	54.5	55.0
		214	U2	41.7	42.2	-0.5	-	22	13.4	55.1	
		214	U3	41.9	43.1	-1.2	-	22	13.4	55.3	
	Short Train (Southbound)	214	D1	41.7	41.3	0.4	-	22	13.4	55.1	55.3
		214	D2	42.1	42.5	-0.4	-	22	13.4	55.5	
		214	D3	42.4	41.9	0.5	-	22	13.4	55.8	
		214	D4	41.1	41.3		-	22	13.4	54.5	

Notes:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) Based on the vibration levels recorded at GN7, the period of increased vibration levels during train passby is about 10 second, while the period of increased vibration levels recorded at nearby measurement location (e.g. GN5) is 22 sec. The different in time duration is expected to be related to site specific geological profile and building structure/foundation. As a conservative approach, event duration of 22s has been adopted for determination of the SEL.

(4) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL[1], dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[2]	Att_{floor} Correction[3]	LAeq 30mins, dB(A)
GN7	Short Train (Northbound)	214	55.0	Daytime & Evening (0700-2300)	7	8.5	-32.6	0.0	0.0	30.9
	Short Train (Southbound)	214	55.3		6	7.8	-32.6	0.0	0.0	30.5
	Long Train (Northbound)	427	58.0		2	3.0	-32.6	0.0	0.0	28.5
	Long Train (Southbound)	427	58.3		2	3.0	-32.6	0.0	0.0	28.7
Predicted Noise Level, LAeq 30mins, dB(A)										**<36**
GBN Criteria, dB(A)										**55**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 1/F of Tai Shing Shopping Centre is equivalent to the lowest sensitive floor of Tai Fung Building. Therefore, no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL, dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[1]	Att_{floor} Correction[2]	LAeq 30mins, dB(A)
GN7	Short Train (Northbound)	214	55.0	Night-time (2300-0700)	3	4.8	-32.6	0.0	0.0	27.2
	Short Train (Southbound)	214	55.3		3	4.8	-32.6	0.0	0.0	27.5
Predicted Noise Level, LAeq 30mins, dB(A)										**<30**
GBN Criteria, dB(A)										**45**
Compliance										**Yes**

Notes:

(1) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(2) 2/F of GN5 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

(3) 1/F of Tai Shing Shopping Centre is equivalent to the lowest sensitive floor of Tai Fung Building. Therefore, no floor-to-floor attenuation was applied to the measurement result.

Appendix E2 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Additional Train Operation Scenarios)

Measurement Location: **GN7, 1/F**
Measurement Date and Time: **29/12/2017 23:30 to 30/12/2017 01:30**

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event(1) Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Corrected Event Noise Level, dB(A)(2)	Event Duration(3), s	Correction for Event Duration, dB(A)	SEL(4), dB(A)	Averaged SEL, dB(A)
GN7	Short Train (Northbound)	214	U1	41.1	41.5	-0.4	-	22	13.4	54.5	55.0
		214	U2	41.7	42.2	-0.5	-	22	13.4	55.1	
		214	U3	41.9	43.1	-1.2	-	22	13.4	55.3	
	Short Train (Southbound)	214	D1	41.7	41.3	0.4	-	22	13.4	55.1	55.3
		214	D2	42.1	42.5	-0.4	-	22	13.4	55.5	
		214	D3	42.4	41.9	0.5	-	22	13.4	55.8	
		214	D4	41.1	41.3		-	22	13.4	54.5	

Notes:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) Based on the vibration levels recorded at GN7, the period of increased vibration levels during train passby is about 10 second, while the period of increased vibration levels recorded at nearby measurement location (e.g. GN5) is 22 sec. The different in time duration is expected to be related to site specific geological profile and building structure/foundation. As a conservative approach, event duration of 22s has been adopted for determination of the SEL.

(4) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN7	Short Train (Northbound)	214	55.0	Daytime & Evening (0700-2300)	5	7.0	-32.6	0.0	0.0	29.4
	Short Train (Southbound)	214	55.3		3	4.8	-32.6	0.0	0.0	27.5
	Long Train (Northbound)	430	58.0		3	4.8	-32.6	0.0	0.0	30.3
	Long Train (Southbound)	430	58.3		3	4.8	-32.6	0.0	0.0	30.5
Predicted Noise Level, LAeq 30mins, dB(A)										**<36**
GBN Criteria, dB(A)										**55**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 1/F of Tai Shing Shopping Centre is equivalent to the lowest sensitive floor of Tai Fung Building. Therefore, no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1A)

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN7	Short Train (Northbound)	214	55.0	Night-time (2300-0700)	2	3.0	-32.6	0.0	0.0	25.5
	Short Train (Southbound)	214	55.3		2	3.0	-32.6	0.0	0.0	25.7
	Long Train (Northbound)	430	58.0		1	0.0	-32.6	0.0	0.0	25.5
	Long Train (Southbound)	430	58.3		1	0.0	-32.6	0.0	0.0	25.8
Predicted Noise Level, LAeq 30mins, dB(A)										**<32**
GBN Criteria, dB(A)										**45**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 1/F of Tai Shing Shopping Centre is equivalent to the lowest sensitive floor of Tai Fung Building. Therefore, no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1B)

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN7	Short Train (Northbound)	214	55.0	Night-time (2300-0700)	1	0.0	-32.6	0.0	0.0	22.5
	Short Train (Southbound)	214	55.3		1	0.0	-32.6	0.0	0.0	22.7
	Long Train (Northbound)	430	58.0		0	-	-32.6	0.0	0.0	-
	Long Train (Southbound)	430	58.3		2	3.0	-32.6	0.0	0.0	28.8
Predicted Noise Level, LAeq 30mins, dB(A)										**<30**
GBN Criteria, dB(A)										**45**
Compliance										**Yes**

Notes:

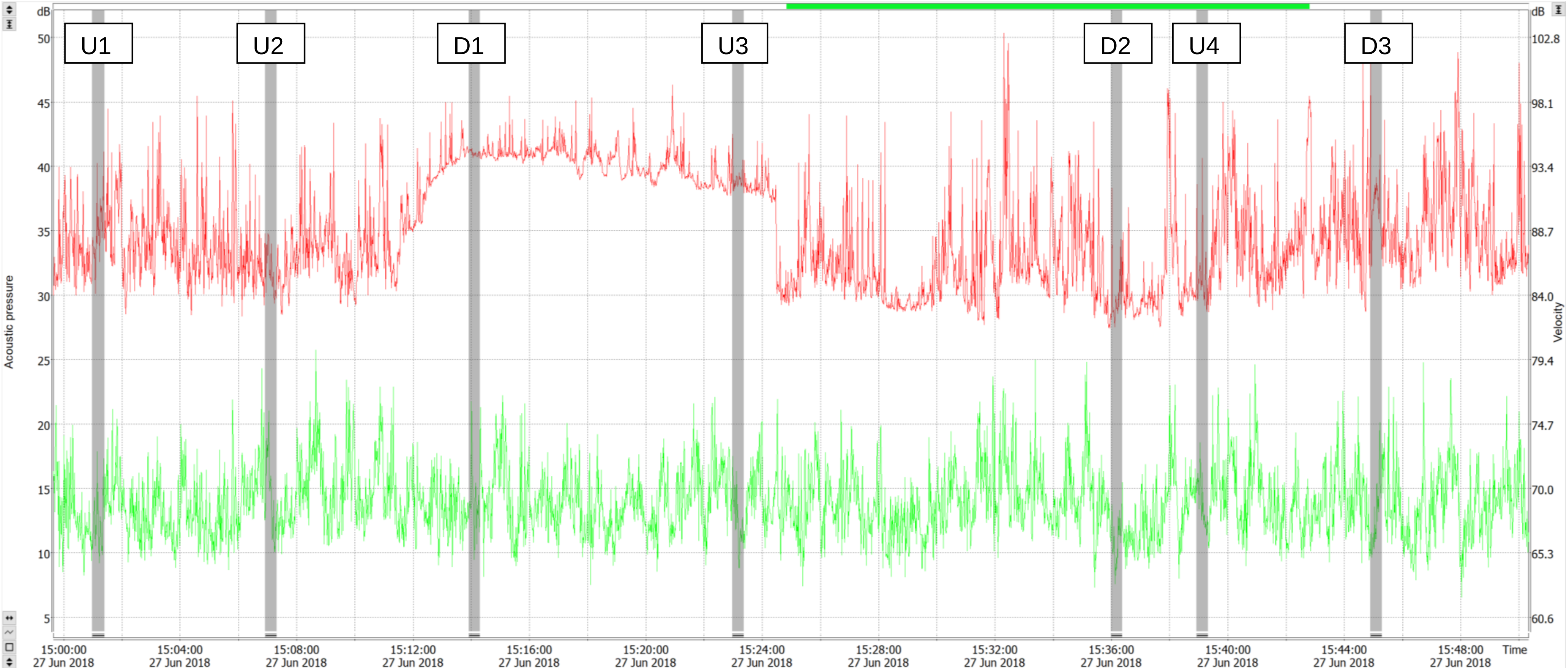
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 1/F of Tai Shing Shopping Centre is equivalent to the lowest sensitive floor of Tai Fung Building. Therefore, no floor-to-floor attenuation was applied to the measurement result.

Noise and Vibration Time History of Train Passby

Measurement Location: GN8, G/F



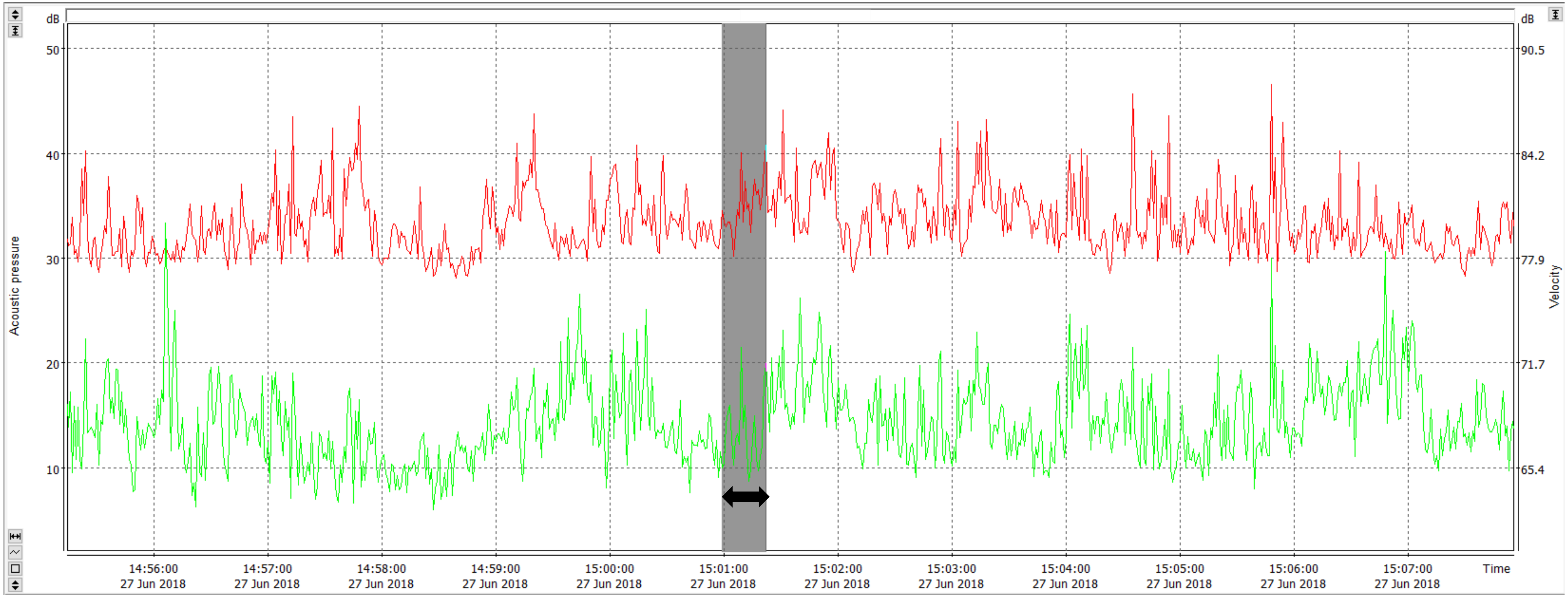
Legend:

________: Overall vibration level, dB re 1nm/s

________: Overall noise level, dB(A)

Typical Train Passby

Measurement Location: GN8, G/F



Legend:

_______: Overall vibration level, dB re 1nm/s

_______: Overall noise level, dB(A)

⟷: Train Passby

Appendix E1 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Train Operation Scenario in EP Condition 2.27)

Measurement Location: GN8, G/F
Measurement Date and Time: 27/6/2018 15:00 to 27/6/2018 16:00

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event(1) Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Event Duration, s	Correction for Event Duration, dB(A)	SEL(3), dB(A)	Averaged SEL, dB(A)
GN8	Short Train (Northbound)	214	U1	35.7	34.5	1.2	-	22	13.4	49.1	49.0
		214	U2	31.9	35.2	-3.3	-	22	13.4	45.3	
		214	U3	38.8	38.9	-0.1	-	22	13.4	52.2	
		214	U4	32.2	36.9	-4.7	-	22	13.4	45.6	
	Short Train (Southbound)	214	D1	40.9	40.3	0.6	-	22	13.4	54.3	51.4
		214	D2	31.1	35.9	-4.8	-	22	13.4	44.5	
		214	D3	37.3	36.8		-	22	13.4	50.7	

Notes:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN8	Short Train (Northbound)	214	49.0	Daytime & Evening (0700-2300)	7	8.5	-32.6	0.0	-2.0	22.9
	Short Train (Southbound)	214	51.4		6	7.8	-32.6	0.0	-2.0	24.7
	Long Train (Northbound)	427	52.0		2	3.0	-32.6	0.0	-2.0	20.5
	Long Train (Southbound)	427	54.4		2	3.0	-32.6	0.0	-2.0	22.9
Predicted Noise Level, LAeq 30mins, dB(A)										**<29**
GBN Criteria, dB(A)										**55**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) 1/F of GN8 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. -2dB(A)) was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL, dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(1)	Att_{floor} Correction(2)	LAeq 30mins, dB(A)
GN8	Short Train (Northbound)	214	49.0	Night-time (2300-0700)	3	4.8	-32.6	0.0	-2.0	19.2
	Short Train (Southbound)	214	51.4		3	4.8	-32.6	0.0	-2.0	21.7
Predicted Noise Level, LAeq 30mins, dB(A)										**<24**
GBN Criteria, dB(A)										**45**
Compliance										**Yes**

Notes:

(1) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(2) 1/F of GN8 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. -2dB(A)) was applied to the measurement result.

Appendix E2 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Additional Train Operation Scenarios)

Measurement Location: GN8, G/F
Measurement Date and Time: 27/6/2018 15:00 to 27/6/2018 16:00

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event(1) Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Event Duration, s	Correction for Event Duration, dB(A)	SEL(3), dB(A)	Averaged SEL, dB(A)
GN8	Short Train (Northbound)	214	U1	35.7	34.5	1.2	-	22	13.4	49.1	49.0
		214	U2	31.9	35.2	-3.3	-	22	13.4	45.3	
		214	U3	38.8	38.9	-0.1	-	22	13.4	52.2	
		214	U4	32.2	36.9	-4.7	-	22	13.4	45.6	
	Short Train (Southbound)	214	D1	40.9	40.3	0.6	-	22	13.4	54.3	51.4
		214	D2	31.1	35.9	-4.8	-	22	13.4	44.5	
		214	D3	37.3	36.8		-	22	13.4	50.7	

Notes:
(1) Event duration includes the head-tail time period.
(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.
(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN8	Short Train (Northbound)	214	49.0	Daytime & Evening (0700-2300)	5	7.0	-32.6	0.0	-2.0	21.5
	Short Train (Southbound)	214	51.4		3	4.8	-32.6	0.0	-2.0	21.7
	Long Train (Northbound)	430	52.1		3	4.8	-32.6	0.0	-2.0	22.3
	Long Train (Southbound)	430	54.5		3	4.8	-32.6	0.0	-2.0	24.7
Predicted Noise Level, LAeq 30mins, dB(A)										**<29**
GBN Criteria, dB(A)										**55**
Compliance										**Yes**

Notes:
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).
(3) 1/F of GN8 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. -2dB(A)) was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1A)

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN8	Short Train (Northbound)	214	49.0	Night-time (2300-0700)	2	3.0	-32.6	0.0	-2.0	17.5
	Short Train (Southbound)	214	51.4		2	3.0	-32.6	0.0	-2.0	19.9
	Long Train (Northbound)	430	52.1		1	0.0	-32.6	0.0	-2.0	17.5
	Long Train (Southbound)	430	54.5		1	0.0	-32.6	0.0	-2.0	19.9
Predicted Noise Level, LAeq 30mins, dB(A)										**<25**
GBN Criteria, dB(A)										**45**
Compliance										**Yes**

Notes:
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).
(3) 1/F of GN8 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. -2dB(A)) was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1B)

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN8	Short Train (Northbound)	214	49.0	Night-time (2300-0700)	1	0.0	-32.6	0.0	-2.0	14.5
	Short Train (Southbound)	214	51.4		1	0.0	-32.6	0.0	-2.0	16.9
	Long Train (Northbound)	430	52.1		0	-	-32.6	0.0	-2.0	-
	Long Train (Southbound)	430	54.5		2	3.0	-32.6	0.0	-2.0	22.9
Predicted Noise Level, LAeq 30mins, dB(A)										**<24**
GBN Criteria, dB(A)										**45**
Compliance										**Yes**

Notes:
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).
(3) 1/F of GN8 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. -2dB(A)) was applied to the measurement result.

Noise and Vibration Time History of Train Passby

Measurement Location: GN31, G/F

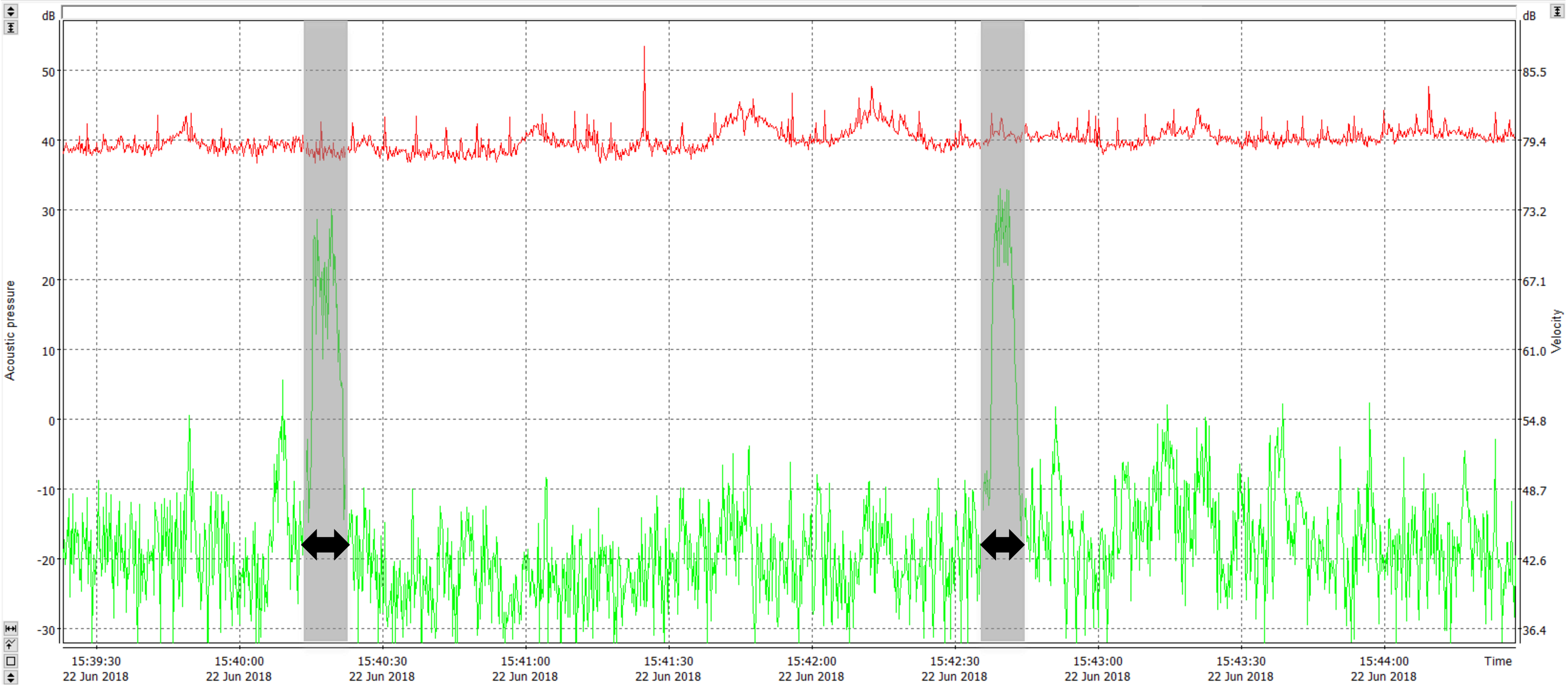
Legend:

______: Vibration level at 40Hz, dB re 1nm/s

______: Overall noise level, dB(A)

Typical Train Passby

Measurement Location: GN31, G/F



Legend:

: Vibration level at 40Hz, dB re 1nm/s

: Overall noise level, dB(A)

: Train Passby

Appendix E1 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Train Operation Scenario in EP Condition 2.27)

Measurement Location: **GN31, G/F**
Measurement Date and Time: **22/6/2018 15:20 to 22/6/2018 16:00**

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event(1) Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Corrected Event Noise Level, dB(A)(2)	Event Duration, s	Correction for Event Duration, dB(A)	SEL(3), dB(A)	Averaged SEL, dB(A)
GN31	Short Train (Northbound)	214	U1	40.7	37.9	2.8	-	12	10.8	51.5	52.6
		214	U2	40.4	41.5	-1.1	-	12	10.8	51.2	
		214	U3	43.5	42.9	0.6	-	12	10.8	54.3	
	Short Train (Southbound)	214	D1	37.6	39.9	-2.3	-	12	10.8	48.4	50.4
		214	D2	38.6	38.7	-0.1	-	12	10.8	49.4	
		214	D3	41.6	39.8	1.8	-	12	10.8	52.4	

Notes:
(1) Event duration includes the head-tail time period.
(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.
(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN31	Short Train (Northbound)	214	52.6	Daytime & Evening (0700-2300)	7	8.5	-32.6	0.0	0.0	28.5
	Short Train (Southbound)	214	50.4		6	7.8	-32.6	0.0	0.0	25.6
	Long Train (Northbound)	427	55.6		2	3.0	-32.6	0.0	0.0	26.0
	Long Train (Southbound)	427	53.4		2	3.0	-32.6	0.0	0.0	23.9
									Predicted Noise Level, LAeq 30mins, dB(A)	**<32**
									GBN Criterion, dB(A)	**55**
									Compliance	**Yes**

Notes:
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).
(3) G/F of GN31 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL, dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(1)	Att_{floor} Correction(2)	LAeq 30mins, dB(A)
GN38	Short Train (Northbound)	214	52.6	Night-time (2300-0700)	3	4.8	-32.6	0.0	0.0	24.8
	Short Train (Southbound)	214	50.4		3	4.8	-32.6	0.0	0.0	22.6
									GN38	**<27**
									GBN Criterion, dB(A)	**45**
									Compliance	**Yes**

Notes:
(1) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).
(2) G/F of GN31 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Appendix E2 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Additional Train Operation Scenarios)

Measurement Location: **GN31, G/F**
Measurement Date and Time: **22/6/2018 15:20 to 22/6/2018 16:00**

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event(1) Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Event Duration, s	Correction for Event Duration, dB(A)	SEL(3), dB(A)	Averaged SEL, dB(A)
GN31	Short Train (Northbound)	214	U1	40.7	37.9	2.8	-	12	10.8	51.5	52.6
		214	U2	40.4	41.5	-1.1	-	12	10.8	51.2	
		214	U3	43.5	42.9	0.6	-	12	10.8	54.3	
	Short Train (Southbound)	214	D1	37.6	39.9	-2.3	-	12	10.8	48.4	50.4
		214	D2	38.6	38.7	-0.1	-	12	10.8	49.4	
		214	D3	41.6	39.8	1.8	-	12	10.8	52.4	

Notes:
(1) Event duration includes the head-tail time period.
(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.
(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN31	Short Train (Northbound)	214	52.6	Daytime & Evening (0700-2300)	5	7.0	-32.6	0.0	0.0	27.0
	Short Train (Southbound)	214	50.4		3	4.8	-32.6	0.0	0.0	22.6
	Long Train (Northbound)	430	55.6		3	4.8	-32.6	0.0	0.0	27.8
	Long Train (Southbound)	430	53.4		3	4.8	-32.6	0.0	0.0	25.7
									Predicted Noise Level, LAeq 30mins, dB(A)	**<32**
									GBN Criterion, dB(A)	**55**
									Compliance	**Yes**

Notes:
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).
(3) G/F of GN31 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1A)

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN31	Short Train (Northbound)	214	52.6	Night-time (2300-0700)	2	3.0	-32.6	0.0	0.0	23.0
	Short Train (Southbound)	214	50.4		2	3.0	-32.6	0.0	0.0	20.9
	Long Train (Northbound)	430	55.6		1	0.0	-32.6	0.0	0.0	23.0
	Long Train (Southbound)	430	53.4		1	0.0	-32.6	0.0	0.0	20.9
									Predicted Noise Level, LAeq 30mins, dB(A)	**<28**
									GBN Criteria, dB(A)	**45**
									Compliance	**Yes**

Notes:
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).
(3) G/F of GN31 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

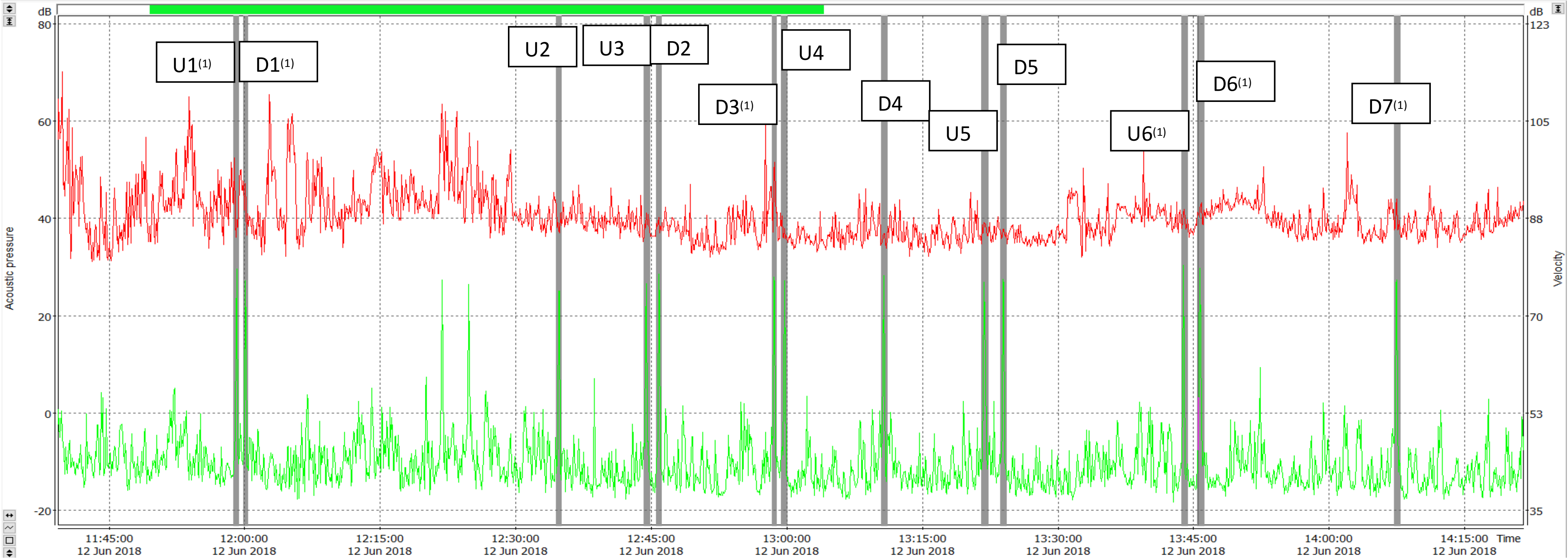
Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1B)

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN31	Short Train (Northbound)	214	52.6	Night-time (2300-0700)	1	0.0	-32.6	0.0	0.0	20.0
	Short Train (Southbound)	214	50.4		1	0.0	-32.6	0.0	0.0	17.9
	Long Train (Northbound)	430	55.6		0	-	-32.6	0.0	0.0	-
	Long Train (Southbound)	430	53.4		2	3.0	-32.6	0.0	0.0	23.9
									Predicted Noise Level, LAeq 30mins, dB(A)	**<26**
									GBN Criteria, dB(A)	**45**
									Compliance	**Yes**

Notes:
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).
(3) G/F of GN31 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Noise and Vibration Time History of Train Passby

Measurement Location: GN38, G/F



Note:

(1) Event passbys U1, D1, D3, D6, U6 and D7 were affected by extraneous noise related to human activities and thus the results were discarded.

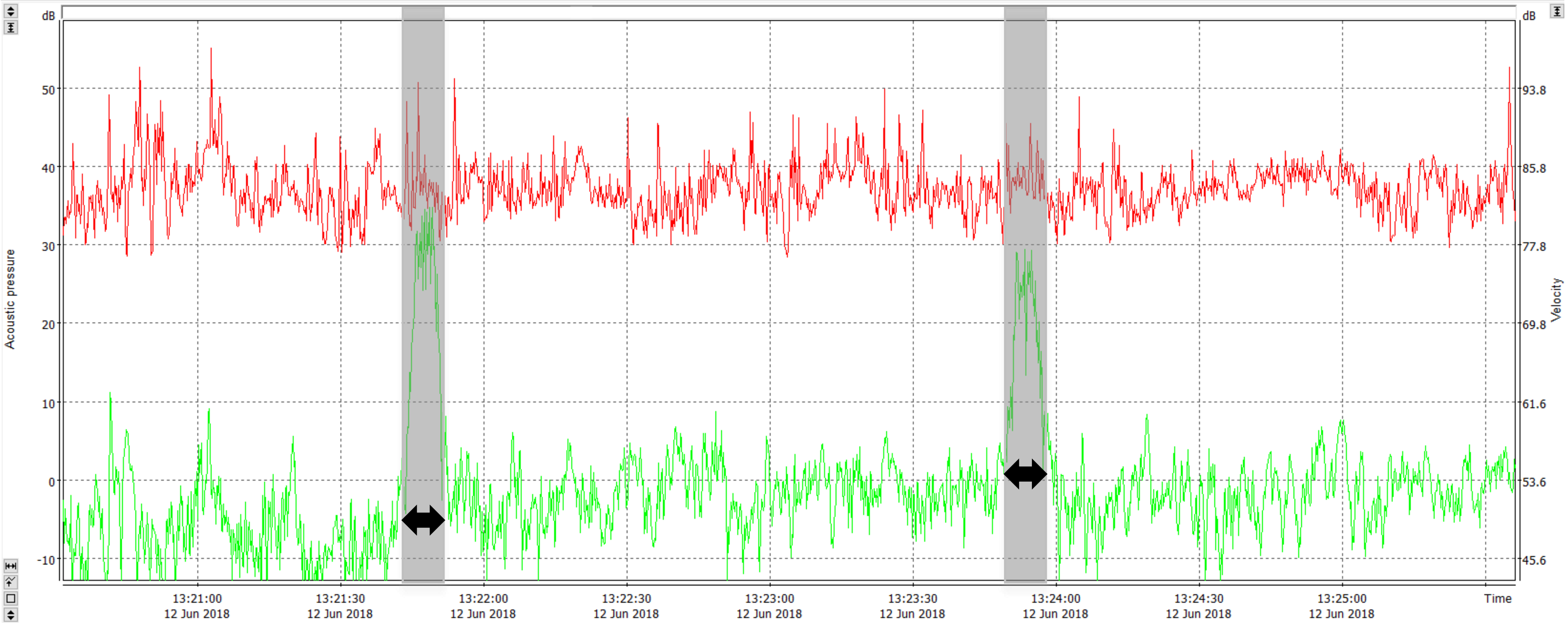
Legend:

_______: Vibration level at 40Hz, dB re 1nm/s

_______: Overall noise level, dB(A)

Typical Train Passby

Measurement Location: GN38, G/F



Legend:

: Vibration level at 40Hz, dB re 1nm/s

: Overall noise level, dB(A)

: Train Passby

Appendix E1 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Train Operation Scenario in EP Condition 2.27)

Measurement Location: **GN38, G/F**
Measurement Date and Time: **12/6/2018 12:00 to 12/6/2018 14:15**

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event(1) Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Event Duration, s	Correction for Event Duration, dB(A)	SEL(3), dB(A)	Averaged SEL, dB(A)
GN38	Short Train (Northbound)	214	U2	39.2	38.6	0.6	-	11	10.4	49.6	49.2
		214	U3	40.0	39.9	0.1	-	11	10.4	50.4	
		214	U4	36.6	37.8	-1.2	-	11	10.4	47.0	
		214	U5	38.6	38.4	0.2	-	11	10.4	49.0	
	Short Train (Southbound)	214	D2	39.3	36.4	2.9	-	11	10.4	49.7	48.4
		214	D4	36.8	40.6	-3.8	-	11	10.4	47.2	
		214	D5	37.6	37.0	0.6	-	11	10.4	48.0	

Notes:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN38	Short Train (Northbound)	214	49.2	Daytime & Evening (0700-2300)	7	8.5	-32.6	0.0	0.0	25.1
	Short Train (Southbound)	214	48.4		6	7.8	-32.6	0.0	0.0	23.7
	Long Train (Northbound)	427	52.2		2	3.0	-32.6	0.0	0.0	22.6
	Long Train (Southbound)	427	51.4		2	3.0	-32.6	0.0	0.0	21.9
Predicted Noise Level, LAeq 30mins, dB(A)										**<30**
GBN Criterion, dB(A)										**50**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) G/F of GN38 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL, dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(1)	Att_{floor} Correction(2)	LAeq 30mins, dB(A)
GN38	Short Train (Northbound)	214	49.2	Night-time (2300-0700)	3	4.8	-32.6	0.0	0.0	21.4
	Short Train (Southbound)	214	48.4		3	4.8	-32.6	0.0	0.0	20.7
Predicted Noise Level, LAeq 30mins, dB(A)										**<24**
GBN Criterion, dB(A)										**40**
Compliance										**Yes**

Notes:

(1) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(2) G/F of GN38 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Appendix E2 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Additional Train Operation Scenarios)

Measurement Location: GN38, G/F
Measurement Date and Time: 12/6/2018 12:00 to 12/6/2018 14:15

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event(1) Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Event Duration, s	Correction for Event Duration, dB(A)	SEL(3), dB(A)	Averaged SEL, dB(A)
GN38	Short Train (Northbound)	214	U2	39.2	38.6	0.6	-	11	10.4	49.6	49.2
		214	U3	40.0	39.9	0.1	-	11	10.4	50.4	
		214	U4	36.6	37.8	-1.2	-	11	10.4	47.0	
		214	U5	38.6	38.4	0.2	-	11	10.4	49.0	
	Short Train (Southbound)	214	D2	39.3	36.4	2.9	-	11	10.4	49.7	48.4
		214	D4	36.8	40.6	-3.8	-	11	10.4	47.2	
		214	D5	37.6	37.0	0.6	-	11	10.4	48.0	

Notes:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN38	Short Train (Northbound)	214	49.2	Daytime & Evening (0700-2300)	5	7.0	-32.6	0.0	0.0	23.6
	Short Train (Southbound)	214	48.4		3	4.8	-32.6	0.0	0.0	20.7
	Long Train (Northbound)	430	52.2		3	4.8	-32.6	0.0	0.0	24.4
	Long Train (Southbound)	430	51.5		3	4.8	-32.6	0.0	0.0	23.7
									Predicted Noise Level, LAeq 30mins, dB(A)	**<29**
									GBN Criterion, dB(A)	**50**
									Compliance	**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) G/F of GN38 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1A)

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN38	Short Train (Northbound)	214	49.2	Night-time (2300-0700)	2	3.0	-32.6	0.0	0.0	19.6
	Short Train (Southbound)	214	48.4		2	3.0	-32.6	0.0	0.0	18.9
	Long Train (Northbound)	430	52.2		1	0.0	-32.6	0.0	0.0	19.7
	Long Train (Southbound)	430	51.5		1	0.0	-32.6	0.0	0.0	18.9
									Predicted Noise Level, LAeq 30mins, dB(A)	**<25**
									GBN Criteria, dB(A)	**40**
									Compliance	**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) G/F of GN38 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1B)

GBNSR	Train & Direction	Train Length, m	Averaged SEL(1), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction(2)	Att_{floor} Correction(3)	LAeq 30mins, dB(A)
GN38	Short Train (Northbound)	214	49.2	Night-time (2300-0700)	1	0.0	-32.6	0.0	0.0	16.6
	Short Train (Southbound)	214	48.4		1	0.0	-32.6	0.0	0.0	15.9
	Long Train (Northbound)	430	52.2		0	-	-32.6	0.0	0.0	-
	Long Train (Southbound)	430	51.5		2	3.0	-32.6	0.0	0.0	21.9
									Predicted Noise Level, LAeq 30mins, dB(A)	**<24**
									GBN Criteria, dB(A)	**40**
									Compliance	**Yes**

Notes:

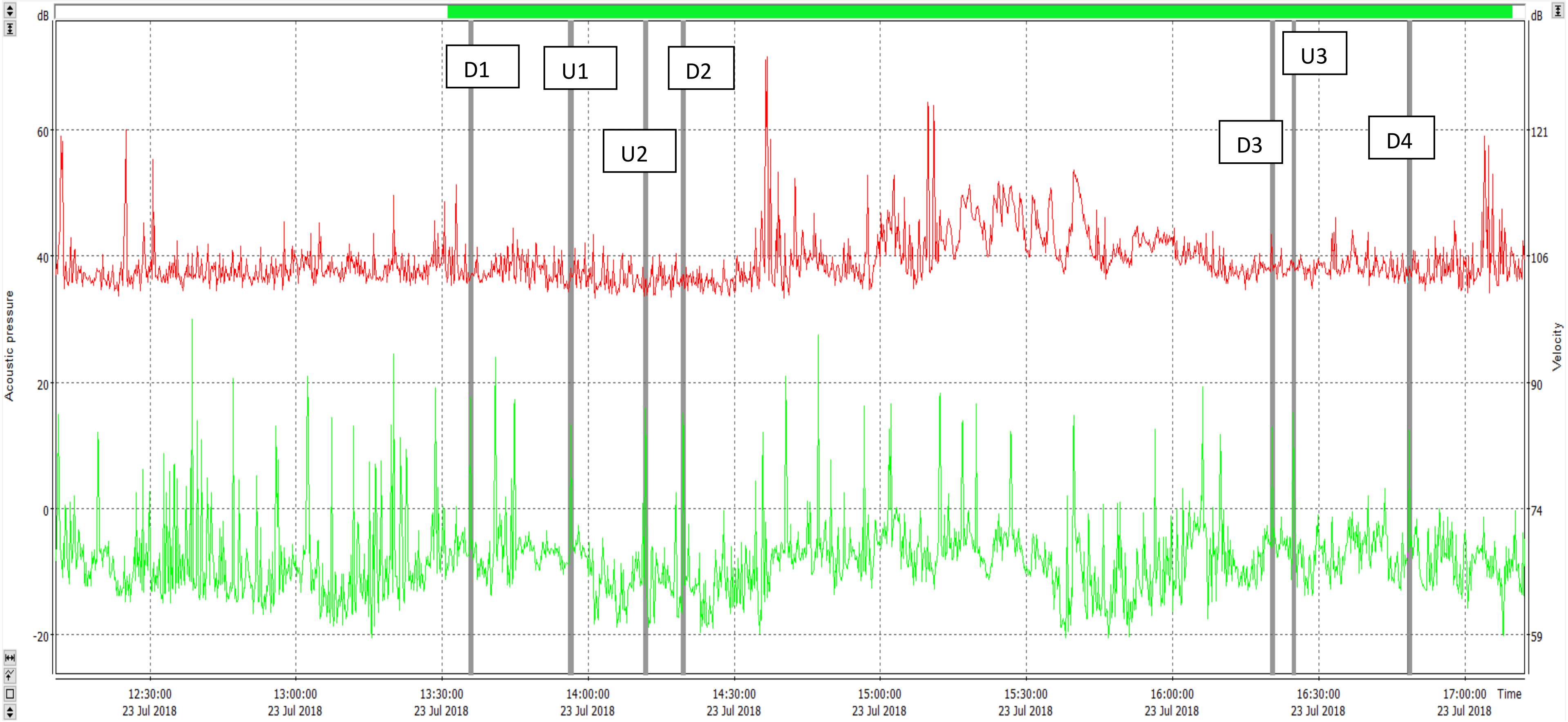
(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) G/F of GN38 is the lowest noise sensitive floor, and thus no floor-to-floor attenuation was applied to the measurement result.

Noise and Vibration Time History of Train Passby

Measurement Location: GN42, 1/F



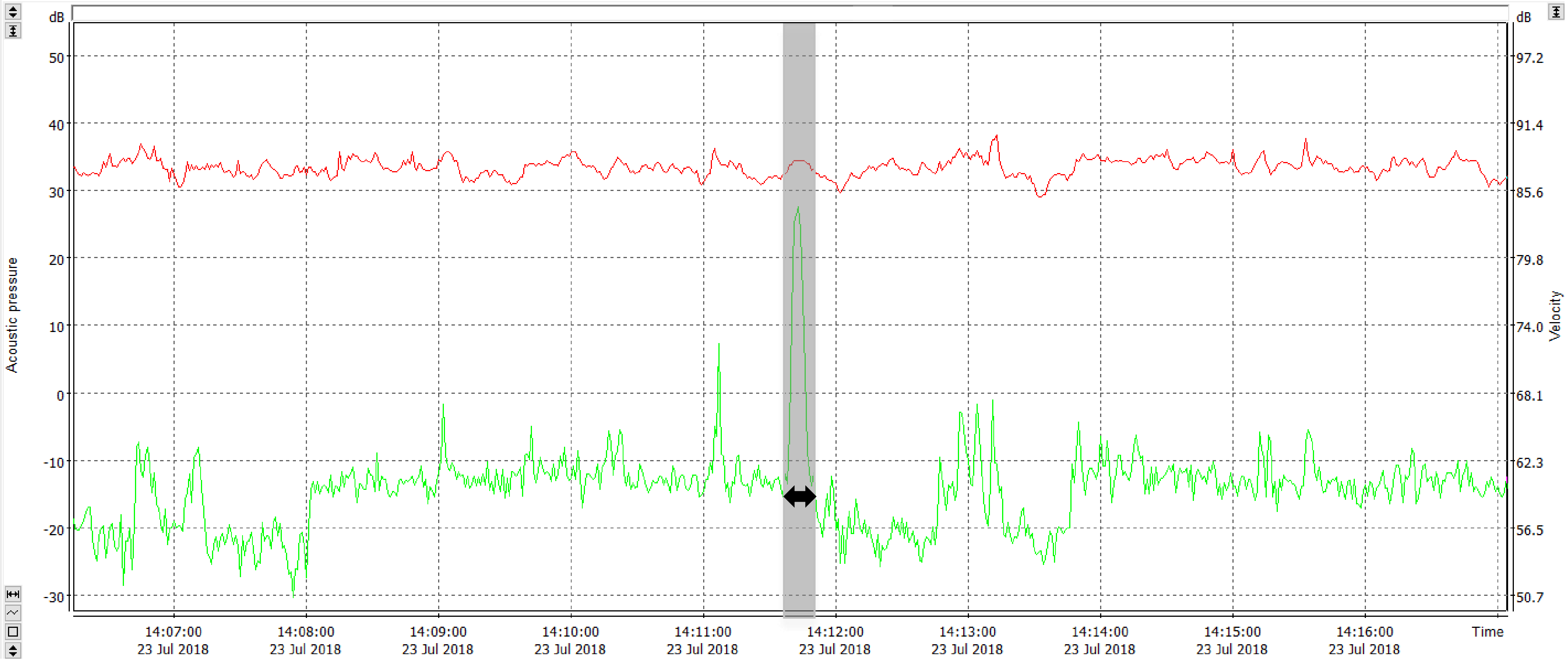
Legend:

______: Vibration level at 50Hz, dB re 1nm/s

______: Overall noise level, dB(A)

Typical Train Passby

Measurement Location: GN42, 1/F



Legend:

______: Vibration level at 50Hz, dB re 1nm/s

______: Overall noise level, dB(A)

⬌: Train Passby

Appendix E1 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Train Operation Scenario in EP Condition 2.27)

Measurement Location: GN42, 1/F
Measurement Date and Time: 23/7/2018 13:30 to 23/7/2018 17:00

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event[1] Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)[2]	Event Duration, s	Correction for Event Duration, dB(A)	SEL[3], dB(A)	Averaged SEL, dB(A)
GN42	Short Train (Northbound)	214	U1	35.1	32.8	2.3	-	11	10.4	45.5	46.1
		214	U2	33.9	33.4	0.5	-	11	10.4	44.3	
		214	U3	37.4	36.1	1.3	-	11	10.4	47.8	
	Short Train (Southbound)	214	D1	34.7	34.9	-0.2	-	11	10.4	45.1	46.1
		214	D2	34.6	34.1	0.5	-	11	10.4	45.0	
		214	D3	37.4	36.8	0.6	-	11	10.4	47.8	
		214	D4	35.4	35.1	0.3	-	11	10.4	45.8	

Notes:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL[1], dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[2]	Att_{floor} Correction[3]	LAeq 30mins, dB(A)
GN42	Short Train (Northbound)	214	46.1	Daytime & Evening (0700-2300)	7	8.5	-32.6	0.0	2.0	24.0
	Short Train (Southbound)	214	46.1		6	7.8	-32.6	0.0	2.0	23.3
	Long Train (Northbound)	427	49.1		2	3.0	-32.6	0.0	2.0	21.6
	Long Train (Southbound)	427	49.1		2	3.0	-32.6	0.0	2.0	21.6
									Predicted Noise Level, LAeq 30mins, dB(A)	**<29**
									GBN Criterion, dB(A)	**50**
									Compliance	**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) G/F of GN42 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. +2dB(A)) was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL, dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[1]	Att_{floor} Correction[2]	LAeq 30mins, dB(A)
GN42	Short Train (Northbound)	214	46.1	Night-time (2300-0700)	3	4.8	-32.6	0.0	2.0	20.3
	Short Train (Southbound)	214	46.1		3	4.8	-32.6	0.0	2.0	20.3
									Predicted Noise Level, LAeq 30mins, dB(A)	**<23**
									GBN Criterion, dB(A)	**40**
									Compliance	**Yes**

Notes:

(1) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(2) G/F of GN42 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. +2dB(A)) was applied to the measurement result.

Appendix E2 Ground-borne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Additional Train Operation Scenarios)

Measurement Location: GN42, 1/F
Measurement Date and Time: 23/7/2018 13:30 to 23/7/2018 17:00

GBNSR	Train&Direction	Train Length, m	Passby No.	Measured Event[1] Leq, dB(A) [A]	Background Noise Level, dB(A) [B]	[A] - [B], dB(A)	Correctced Event Noise Level, dB(A)[2]	Event Duration, s	Correction for Event Duration, dB(A)	SEL[3], dB(A)	Averaged SEL, dB(A)
GN42	Short Train (Northbound)	214	U1	35.1	32.8	2.3	-	11	10.4	45.5	46.1
		214	U2	33.9	33.4	0.5	-	11	10.4	44.3	
		214	U3	37.4	36.1	1.3	-	11	10.4	47.8	
	Short Train (Southbound)	214	D1	34.7	34.9	-0.2	-	11	10.4	45.1	46.1
		214	D2	34.6	34.1	0.5	-	11	10.4	45.0	
		214	D3	37.4	36.8	0.6	-	11	10.4	47.8	
		214	D4	35.4	35.1	0.3	-	11	10.4	45.8	

Notes:

(1) Event duration includes the head-tail time period.

(2) In general, the measured event noise levels during train passby were similar to the background niose levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Groundborne Railway Noise Level During Daytime/Evening Time Period

GBNSR	Train & Direction	Train Length, m	Averaged SEL[1], dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[2]	Att_{floor} Correction[3]	LAeq 30mins, dB(A)
GN42	Short Train (Northbound)	214	46.1	Daytime & Evening (0700-2300)	5	7.0	-32.6	0.0	2.0	22.6
	Short Train (Southbound)	214	46.1		3	4.8	-32.6	0.0	2.0	20.3
	Long Train (Northbound)	430	49.2		3	4.8	-32.6	0.0	2.0	23.4
	Long Train (Southbound)	430	49.1		3	4.8	-32.6	0.0	2.0	23.3
Predicted Noise Level, LAeq 30mins, dB(A)										**<29**
GBN Criterion, dB(A)										**50**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) G/F of GN42 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. +2dB(A)) was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1A)

GBNSR	Train & Direction	Train Length, m	Averaged SEL[1], dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[2]	Att_{floor} Correction[3]	LAeq 30mins, dB(A)
GN42	Short Train (Northbound)	214	46.1	Night-time (2300-0700)	2	3.0	-32.6	0.0	2.0	18.6
	Short Train (Southbound)	214	46.1		2	3.0	-32.6	0.0	2.0	18.6
	Long Train (Northbound)	430	49.2		1	0.0	-32.6	0.0	2.0	18.6
	Long Train (Southbound)	430	49.1		1	0.0	-32.6	0.0	2.0	18.6
Predicted Noise Level, LAeq 30mins, dB(A)										**<25**
GBN Criteria, dB(A)										**40**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) G/F of GN42 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. +2dB(A)) was applied to the measurement result.

Prediction of Groundborne Railway Noise Level During Night-time Period (Scenario 1B)

GBNSR	Train & Direction	Train Length, m	Averaged SEL[1], dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to LAeq 30mins, dB(A)	BCF Correction[2]	Att_{floor} Correction[3]	LAeq 30mins, dB(A)
GN42	Short Train (Northbound)	214	46.1	Night-time (2300-0700)	1	0.0	-32.6	0.0	2.0	15.6
	Short Train (Southbound)	214	46.1		1	0.0	-32.6	0.0	2.0	15.5
	Long Train (Northbound)	430	49.2		0	-	-32.6	0.0	2.0	-
	Long Train (Southbound)	430	49.1		2	3.0	-32.6	0.0	2.0	21.6
Predicted Noise Level, LAeq 30mins, dB(A)										**<23**
GBN Criteria, dB(A)										**40**
Compliance										**Yes**

Notes:

(1) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(2) Measurement was conducted inside the building and thus there is no correction of buidling coupling factor (BCF).

(3) G/F of GN42 is the lowest noise sensitive floor, and thus floor-to-floor attenuation (i.e. +2dB(A)) was applied to the measurement result.

Appendix F

Airborne Noise Measurement Results and Detailed Calculation

Appendix F1 Airborne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Train Operation Scenario in EP Condition 2.27)

Measurement Location: SS7
Measurement Date and Time 29/12/2017 23:30 to 30/12/2017 01:17
Weather Condition Fine

Calculation of Sound Exposure Level

ABNSR	Direction	Train Length, m	Speed, kph (1)	Measured Event, dB(A)				Background Noise Level, dB(A) [B]	[A]-[B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Passby Duration, sec	Correction for Event Duration, dB(A)	SEL, dB(A) (3)	Averaged SEL, dB(A)
				LAeq [A]	Lmax	L10	L90							
SS7	Short Train (Northbound)	214	200	48.1	52.8	50.5	47.0	43.4	4.7	46.4	9	9.5	57.7	
		214		48.4	50.6	49.4	46.1	49.4	-1.0	-	10	10.0	58.4	
		214		46.6	48.9	48.2	46.5	44.2	2.4	-	10	10.0	56.6	57.6
	Short Train (Southbound)	214	200	48.9	50.4	49.6	46.4	47.2	1.7	-	10	10.0	58.9	
		214		47.4	50.9	49.5	47.8	45.3	2.1	-	9	9.5	56.9	
		214		48.5	49.8	48.6	44.3	47.0	1.5	-	9	9.5	58.1	
		214		47.4	50.9	49.2	45.1	44.2	3.2	44.5	9	9.5	56.9	57.8
				Maximum Lmax	52.8									

Notes:
(1) Train speed passing through ERS.
(2) In general, the measured event noise levels during train passby were similar to the background noise levels and any background correction, if made, should only be regarded as approximate.
(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Airborne Railway Noise Level During Daytime/Evening Period

ABNSR	Train & Direction	Train Length, m	Speed, kph (1)	Averaged SEL(2), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	$L_{Aeq\ 30mins}$ (3), dB(A)
SS7	Short Train (Northbound)	214	200	57.6	Daytime & Evening (0700-2300)	7	8.5	-32.6	33.5
	Short Train (Southbound)	214	200	57.8		6	7.8	-32.6	33.0
	Long Train (Northbound)	427	200	60.6		2	3.0	-32.6	31.1
	Long Train (Southbound)	427	200	60.8		2	3.0	-32.6	31.2
Predicted Noise Level, LAeq 30mins, dB(A)									**<38.4**
Daytime Noise Criterion, dB(A)									**65**
Compliance									**Yes**

Notes:
(1) Train speed passing through ERS.
(2) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(3) Facade noise measurement was conducted at SS7 and thus no facade correction is included in the calculation.

Prediction of Airborne Railway Noise Level During Night-time Period

ABNSR	Direction	Train Length, m	Speed, kph (1)	Averaged SEL, dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	$L_{Aeq\ 30mins}$ (2), dB(A)
SS7	Short Train (Northbound)	214	200	57.6	Night-time (2300-0700)	3	4.8	-32.6	29.8
	Short Train (Southbound)	214	200	57.8		3	4.8	-32.6	30.0
Predicted Noise Level, LAeq 30mins, dB(A)									**<32.9**
Night-time Noise Criterion, dB(A)									**55**
Compliance									**Yes**

Notes:
(1) Train speed passing through ERS.
(2) Facade noise measurement was conducted at SS7 and thus no facade correction is included in the calculation.

Appendix F1 Airborne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Train Operation Scenario in EP Condition 2.27)

Measurement Location: SS15
Measurement Date and Time 29/12/2017 23:30 to 30/12/2017 01:17
Weather Condition Fine

Calculation of Sound Exposure Level

ABNSR	Train&Direction	Train Length, m	Speed, kph (1)	Measured Event , dB(A)				Background Noise Level, dB(A) [B]	[A]-[B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Passby Duration, sec	Correction for Event Duration, dB(A)	SEL, dB(A) (3)	Averaged SEL, dB(A)
				LAeq [A]	Lmax	L10	L90							
SS15	Short Train (Northbound)	214	200	56.8	56.9	56.2	53.5	52.6	4.2	54.8	12	10.8	67.6	
		214		57.3	59.2	58.4	54.2	52.9	4.4	55.4	12	10.8	68.1	
		214		56.8	56.2	55.4	53.8	52.9	3.9	54.5	12	10.8	67.6	67.8
	Short Train (Southbound)	214	200	55.0	59.8	58.9	54.3	52.4	2.6	-	11	10.4	65.4	
		214		54.5	56.5	55.7	54.1	54.7	-0.2	-	12	10.8	65.3	
		214		54.9	59.4	58.7	53.7	52.7	2.2	-	12	10.8	65.7	
		214		55.0	56.2	55.7	54.2	52.2	2.8	-	13	11.1	66.1	65.6
			Maximum Lmax		59.8									

Notes:
(1) Train speed passing through ERS.
(2) In general, the measured event noise levels during train passby were similar to the background noise levels and any background correction, if made, should only be regarded as approximate.
(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Airborne Railway Noise Level During Daytime/Evening Period

ABNSR	Train & Direction	Train Length, m	Speed, kph (1)	Averaged SEL(2), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	Facade Correction, dB(A)	$L_{Aeq\ 30mins}$ (3), dB(A)
SS15	Short Train (Northbound)	214	200	67.8	Daytime & Evening (0700-2300)	7	8.5	-32.6	3.0	46.7
	Short Train (Southbound)	214	200	65.6		6	7.8	-32.6	3.0	43.9
	Long Train (Northbound)	427	200	70.8		2	3.0	-32.6	3.0	44.2
	Long Train (Southbound)	427	200	68.6		2	3.0	-32.6	3.0	42.1
Predicted Noise Level, LAeq 30mins, dB(A)										**<50.6**
ANL, dB(A)										**65**
Compliance										**Yes**

Notes:
(1) Train speed passing through ERS.
(2) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(3) Free field noise measurement was conducted at SS15 and thus facade correction is included in the calculation.

Prediction of Airborne Railway Noise Level During Night-time Period

ABNSR	Train & Direction	Train Length, m	Speed, kph (1)	Averaged SEL, dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	Facade Correction, dB(A)	$L_{Aeq\ 30mins}$ (2), dB(A)
SS15	Short Train (Northbound)	214	200	67.8	Night-time (2300-0700)	3	4.8	-32.6	3.0	43.0
	Short Train (Southbound)	214	200	65.6		3	4.8	-32.6	3.0	40.9
Predicted Noise Level, LAeq 30mins, dB(A)										**<45.1**
ANL, dB(A)										**55**
Compliance										**Yes**

Notes:
(1) Train speed passing through ERS.
(2) Free field noise measurement was conducted at SS15 and thus facade correction is included in the calculation.

Appendix F2 Airborne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Additional Train Operation Scenarios)

Measurement Location: SS7
Measurement Date and Time 29/12/2017 23:30 to 30/12/2017 01:17
Weather Condition Fine

Calculation of Sound Exposure Level

ABNSR	Direction	Train Length, m	Speed, kph (1)	Measured Event, dB(A)				Background Noise Level, dB(A) [B]	[A]-[B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Passby Duration, sec	Correction for Event Duration, dB(A)	SEL, dB(A) (3)	Averaged SEL, dB(A)
				LAeq [A]	Lmax	L10	L90							
SS7	Short Train (Northbound)	214	200	48.1	52.8	50.5	47.0	43.4	4.7	46.4	9	9.5	57.7	
		214		48.4	50.6	49.4	46.1	49.4	-1.0	-	10	10.0	58.4	
		214		46.6	48.9	48.2	46.5	44.2	2.4	-	10	10.0	56.6	57.6
	Short Train (Southbound)	214	200	48.9	50.4	49.6	46.4	47.2	1.7	-	10	10.0	58.9	
		214		47.4	50.9	49.5	47.8	45.3	2.1	-	9	9.5	56.9	
		214		48.5	49.8	48.6	44.3	47.0	1.5	-	9	9.5	58.1	
		214		47.4	50.9	49.2	45.1	44.2	3.2	44.5	9	9.5	56.9	57.8
				Maximum Lmax	52.8									

Notes:

(1) Train speed passing through ERS.

(2) In general, the measured event noise levels during train passby were similar to the background noise levels and any background correction, if made, should only be regarded as approximate.

(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Airborne Railway Noise Level During Daytime/Evening Period

ABNSR	Train & Direction	Train Length, m	Speed, kph (1)	Averaged SEL(2), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	$L_{Aeq\ 30mins}$ (3), dB(A)
SS7	Short Train (Northbound)	214	200	57.6	Daytime & Evening (0700-2300)	5	7.0	-32.6	32.1
	Short Train (Southbound)	214	200	57.8		3	4.8	-32.6	30.0
	Long Train (Northbound)	430	200	60.6		3	4.8	-32.6	32.9
	Long Train (Southbound)	430	200	60.8		3	4.8	-32.6	33.0
Predicted Noise Level, LAeq 30mins, dB(A)									**<38.2**
Daytime Noise Criterion, dB(A)									**65**
Compliance									**Yes**

Notes:

(1) Train speed passing through ERS.

(2) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(3) Facade noise measurement was conducted at SS7 and thus no facade correction is included in the calculation.

Prediction of Airborne Railway Noise Level During Night-time Period (Scenario 1A)

ABNSR	Train & Direction	Train Length, m	Speed, kph (1)	Averaged SEL(2), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	$L_{Aeq\ 30mins}$ (3), dB(A)
SS7	Short Train (Northbound)	214	200	57.6	Night-time (2300-0700)	2	3.0	-32.6	28.1
	Short Train (Southbound)	214	200	57.8		2	3.0	-32.6	28.2
	Long Train (Northbound)	430	200	60.6		1	0.0	-32.6	28.1
	Long Train (Southbound)	430	200	60.8		1	0.0	-32.6	28.3
Predicted Noise Level, LAeq 30mins, dB(A)									**<34.2**
Night-time Noise Criterion, dB(A)									**55**
Compliance									**Yes**

Notes:

(1) Train speed passing through ERS.

(2) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(3) Facade noise measurement was conducted at SS7 and thus no facade correction is included in the calculation.

Prediction of Airborne Railway Noise Level During Night-time Period (Scenario 1B)

ABNSR	Train & Direction	Train Length, m	Speed, kph (1)	Averaged SEL(2), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	$L_{Aeq\ 30mins}$ (3), dB(A)
SS7	Short Train (Northbound)	214	200	57.6	Night-time (2300-0700)	1	0.0	-32.6	25.1
	Short Train (Southbound)	214	200	57.8		1	0.0	-32.6	25.2
	Long Train (Northbound)	430	200	60.6		0	-	-32.6	-
	Long Train (Southbound)	430	200	60.8		2	3.0	-32.6	31.3
Predicted Noise Level, LAeq 30mins, dB(A)									**<33**
Night-time Noise Criterion, dB(A)									**55**
Compliance									**Yes**

Notes:

(1) Train speed passing through ERS.

(2) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).

(3) Facade noise measurement was conducted at SS7 and thus no facade correction is included in the calculation.

Appendix F2 Airborne Noise Measurement Results and Detailed Calculation (Without Background Correction) (Additional Train Operation Scenarios)

Measurement Location: **SS15**
Measurement Date and Time **29/12/2017 23:30 to 30/12/2017 01:17**
Weather Condition **Fine**

Calculation of Sound Exposure Level

ABNSR	Train&Direction	Train Length, m	Speed, kph (1)	Measured Event , dB(A)				Background Noise Level, dB(A) [B]	[A]-[B], dB(A)	Correctced Event Noise Level, dB(A)(2)	Passby Duration, sec	Correction for Event Duration, dB(A)	SEL, dB(A) (3)	Averaged SEL, dB(A)
				LAeq [A]	Lmax	L10	L90							
SS15	Short Train (Northbound)	214	200	56.8	56.9	56.2	53.5	52.6	4.2	54.8	12	10.8	67.6	
		214		57.3	59.2	58.4	54.2	52.9	4.4	55.4	12	10.8	68.1	
		214		56.8	56.2	55.4	53.8	52.9	3.9	54.5	12	10.8	67.6	67.8
	Short Train (Southbound)	214	200	55.0	59.8	58.9	54.3	52.4	2.6	-	11	10.4	65.4	
		214		54.5	56.5	55.7	54.1	54.7	-0.2	-	12	10.8	65.3	
		214		54.9	59.4	58.7	53.7	52.7	2.2	-	12	10.8	65.7	
		214		55.0	56.2	55.7	54.2	52.2	2.8	-	13	11.1	66.1	65.6
			Maximum Lmax		59.8									

Notes:
(1) Train speed passing through ERS.
(2) In general, the measured event noise levels during train passby were similar to the background noise levels and any background correction, if made, should only be regarded as approximate.
(3) As a conservative approach, the measured event noise levels without background correction were adopted to determine the SEL.

Prediction of Airborne Railway Noise Level During Daytime/Evening Period

ABNSR	Train & Direction	Train Length, m	Speed, kph (1)	Averaged SEL(2), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	Facade Correction, dB(A)	$L_{Aeq\ 30mins}$ (3), dB(A)
SS15	Short Train (Northbound)	214	200	67.8	Daytime & Evening (0700-2300)	5	7.0	-32.6	3.0	45.2
	Short Train (Southbound)	214	200	65.6		3	4.8	-32.6	3.0	40.9
	Long Train (Northbound)	430	200	70.8		3	4.8	-32.6	3.0	46.0
	Long Train (Southbound)	430	200	68.7		3	4.8	-32.6	3.0	43.9
Predicted Noise Level, LAeq 30mins, dB(A)										**<50.4**
ANL, dB(A)										**65**
Compliance										**Yes**

Notes:
(1) Train speed passing through ERS.
(2) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(3) Free field noise measurement was conducted at SS15 and thus facade correction is included in the calculation.

Prediction of Airborne Railway Noise Level During Night-time Period (Scenario 1A)

ABNSR	Train & Direction	Train Length, m	Speed, kph (1)	Averaged SEL(2), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	Facade Correction, dB(A)	$L_{Aeq\ 30mins}$ (3), dB(A)
SS15	Short Train (Northbound)	214	200	67.8	Night-time (2300-0700)	2	3.0	-32.6	3.0	41.2
	Short Train (Southbound)	214	200	65.6		2	3.0	-32.6	3.0	39.1
	Long Train (Northbound)	430	200	70.8		1	0.0	-32.6	3.0	41.3
	Long Train (Southbound)	430	200	68.7		1	0.0	-32.6	3.0	39.1
Predicted Noise Level, LAeq 30mins, dB(A)										**<46.3**
ANL, dB(A)										**55**
Compliance										**Yes**

Notes:
(1) Train speed passing through ERS.
(2) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(3) Free field noise measurement was conducted at SS15 and thus facade correction is included in the calculation.

Prediction of Airborne Railway Noise Level During Night-time Period (Scenario 1B)

ABNSR	Train & Direction	Train Length, m	Speed, kph (1)	Averaged SEL(2), dB(A)	Time Period	Train Frequency per 30mins	Correction for Train Frequency, dB(A)	Conversion Factor to $L_{Aeq\ 30mins}$, dB(A)	Facade Correction, dB(A)	$L_{Aeq\ 30mins}$ (3), dB(A)
SS15	Short Train (Northbound)	214	200	67.8	Night-time (2300-0700)	1	0.0	-32.6	3.0	38.2
	Short Train (Southbound)	214	200	65.6		1	0.0	-32.6	3.0	36.1
	Long Train (Northbound)	430	200	70.8		0	-	-	-	-
	Long Train (Southbound)	430	200	68.7		2	3.0	-32.6	3.0	42.1
Predicted Noise Level, LAeq 30mins, dB(A)										**<44.3**
ANL, dB(A)										**55**
Compliance										**Yes**

Notes:
(1) Train speed passing through ERS.
(2) SEL for long train is calculated based on the short train train SEL with correction of train length (i.e. SEL of short train train + 3dB(A)).
(3) Free field noise measurement was conducted at SS15 and thus facade correction is included in the calculation.