MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section and
Stabling Sidings at Hung Hom Freight Yard

Fixed Plant Noise Audit Report

(Batch 3 – Diamond Hill Station (DIH))

(June 2019)

Certified by: Fredrick Leong

Position: Independent Environmental Checker

Date: 21 June 2019

MTR Corporation Limited

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Fixed Plant Noise Audit Report

(Batch 3 – Diamond Hill Station (DIH))

(June 2019)

Certified by: Lisa Poon

Position: Environmental Team Leader

Date: 21 June 2019

AECOM

MTR Corporation Limited

Consultancy Agreement No. C11033

Shatin to Central Link - Tai Wai to Hung Hom Section [SCL(TAW – HUH)] and Stabling Sidings at Hung Hom Freight Yard [SCL(HHS)]

Fixed Plant Noise Audit Report (Batch 3 – Diamond Hill Station (DIH))

June 2019

	Name	Signature
Prepared & Checked:	Isaac Chu	
Reviewed & Approved:	Josh Lam	

Version:	A	Date: 20 June 2019

AECOM Asia Co. Ltd.
8/F, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong
Tel: (852) 3922 9000 Fax: (852) 3922 9797 www.aecom.com

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1 INTRODUCTION

1.1 Background

1.1.1 The Shatin to Central Link (SCL) is a 17km extension of the existing Ma On Shan Line (MOL) and East Rail Line (EAL) comprising (i) The East-West Corridor which extends the MOL from Tai Wai to Hung Hom via East Kowloon to connect with the West Rail Line (WRL) at Hung Hom Station (HUH) and Stabling Sidings at Hung Hom Freight Yard (HHS); and (ii) The North-South Corridor which is an extension of the EAL at Hung Hom across the harbour to Admiralty Station (ADM).

1.1.2 Environmental Impact Assessment (EIA) Reports for SCL – Tai Wai to Hung Hom Section [SCL (TAW-HUH)] (Register No. AEIAR-167/2012) and SCL Stabling Sidings at Hung Hom Freight Yard [SCL (HHS)] (Register No. AEIAR-164/2012) (hereinafter referred to as "the EIA Reports") were approved on 17 February 2012 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Reports, the Environmental Permit (EP) (EP No: EP-438/2012), covering the construction of both SCL (TAW-HUH) and SCL (HHS) (hereinafter referred to as "the Project"), was granted on 22 March 2012. Variations of Environmental Permit (VEP) were subsequently applied for EP-438/2012 and the latest Environmental Permit (EP No: EP-438/2012/K) was issued by Director of Environmental Protection (DEP) on 4 October 2016.

1.1.3 Pursuant to EP Condition 2.32, at least one month before commencement of operation of the Project, the Permit Holder, MTR Corporation Ltd (MTR), shall carry out fixed plant noise audit and deposit with the Director four hardcopies and one electronic copy of an audit report showing the design of the fixed plant noise sources associated with the Project complies with the maximum sound power levels determined in the approved SCL(TAW-HUH) EIA Report (Register No. AEIAR-167/2012) and SCL(HHS) EIA Report (Register No. AEIAR-164/2012) and all relevant documents in the Register, or otherwise approved by the Director in compliance with the requirements in Technical Memorandum on Environmental Impact Assessment Process having due regard to the characteristics of tonality, impulsiveness and intermittency.

1.1.4 Since the installation of fixed plant along the SCL (TAW-HUH) and SCL (HHS) would be completed in stages, the fixed plant noise audit will be conducted in stages according to the testing and commissioning programmes in each area.

1.1.5 AECOM Asia Co. Ltd was commissioned by the MTR to prepare the fixed plant noise audit report to check the compliance of the maximum sound power levels (SWLs) and to undertake noise measurement at the representative Noise Sensitive Receivers (NSRs) for investigation of any characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources associated with the Project.

1.1.6 Based on the latest design information, the maximum allowable SWLs of fixed plant items has been updated to reflect the latest design of the Project, and therefore Proposals were prepared to present the updated maximum allowable sound power levels (SWLs) of the fixed plant items at different stations of the Project. The Proposal for Updating Maximum Allowable Sound Power Levels of Fixed Plant Sources (Batch 3 – Diamond Hill Station (DIH)) (hereinafter referred to as "the Proposal (Batch 3 – DIH)") (**Appendix A** refers) was approved by DEP on 11 June 2019.

1.1.7 This Fixed Plant Noise Audit Report (Batch 3 – Diamond Hill Station (DIH)) (hereinafter referred to as "the FPNAR (Batch 3 - DIH") presents the noise measurement methodology and measurement results at the fixed plant noise sources of DIH and at the representative NSRs near DIH, for checking compliance with the maximum allowable sound power levels (SWLs) determined in the Proposal (Batch 3 – DIH).

1.2 Purpose of This Report

1.2.1 This Report presents the noise measurement methodology and measurement results at the fixed plant noise sources of DIH and at the representative NSRs near DIH.

1.2.2 This Report comprises the following sections:

- Section 1 presents the background information.
- Section 2 presents the Updated SWL of fixed plant noise sources.
- Section 3 presents the noise measurement methodology.
- Section 4 presents the noise measurement results.
- Section 5 presents the conclusions.

2 UPDATED SOUND POWER LEVELS OF FIXED PLANT NOISE SOURCES

2.1.1 The updated maximum allowable SWL of fixed plant noise sources at DIH are extracted from the Proposal (Batch 3 – DIH) and are summarised in **Table 2.1**. The updated fixed plant noise sources locations at DIH are shown in **Figure No. C1103/C/SCL/ACM/M52/049**. The measured noise level of fixed plant noise sources during the commissioning test shall comply with the maximum allowable SWLs as summarised in **Table 2.1**. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied, where applicable, in accordance with the IND-TM during the commissioning test conducted at the representative NSRs.

Table 2.1 Summary of Updated Maximum Allowable SWLs for Fixed Plant Noise Sources at DIH

Location	Fixed Plant ID.	Fixed Plant Source	Maximum Allowable SWL, dB(A)[1] [2]	
			Daytime & Evening[3]	Night-time[3]
DIH	VS-DIH-21	Station Ventilation Louver	81	-
	VS-DIH-22	Station Ventilation Louver	91	-
	VS-DIH-23	Station Ventilation Louver	85	81
	VS-DIH-24	Station Ventilation Louver	85	81
	VS-DIH-25	Station Ventilation Louver	86	82
	VS-DIH-26	Station Ventilation Louver	85	81
	VS-DIH-27	Station Ventilation Louver	85	81
	VS-DIH-31	Station Ventilation Louver	79	-
	VS-DIH-33	Station Ventilation Louver	78	74
	VS-DIH-34	Station Ventilation Louver	76	72
	VS-DIH-37	Station Ventilation Louver	83	79
	VS-DIH-39	Station Ventilation Louver	83	79
	VS-DIH-40	Station Ventilation Louver	84	80
	VS-DIH-43	Station Ventilation Louver	84	80
	VS-DIH-47A	Station Ventilation Louver	80	70
	VS-DIH-47C	Station Ventilation Louver	80	69
	VS-DIH-48A,B,C	Tunnel Ventilation Louver	82	79
	VS-DIH-48D	Tunnel Ventilation Louver	77	74
	VS-DIH-49	Station Ventilation Louver	78	74
	VS-DIH-49A	Station Ventilation Louver	83	-
	VS-DIH-50,51	Tunnel Ventilation Louver	85	82
	VS-DIH-52	Tunnel Ventilation Louver	92	85
	VS-DIH-53,54B	Tunnel Ventilation Louver	87	82
	VS-DIH-55	Tunnel Ventilation Louver	91	83
	VS-DIH-56	Tunnel Ventilation Louver	92	85
	VS-DIH-57	Station Ventilation Louver	86	-
	VS-DIH-58	Station Ventilation Louver	87	-
	VS-DIH-59	Station Ventilation Louver	89	-
	VS-DIH-60	Tunnel Ventilation Louver	80	78
	VS-DIH-61	Tunnel Ventilation Louver	79	76
	VS-DIH-62	Tunnel Ventilation Louver	80	77
	VS-DIH-63	Station Ventilation Louver	86	77

Location	Fixed Plant ID.	Fixed Plant Source	Maximum Allowable SWL, dB(A)[1] [2]	
			Daytime & Evening[3]	Night-time[3]
	VS-DIH-64A	Station Ventilation Louver	85	-
	VS-DIH-64B	Station Ventilation Louver	82	77
	VS-DIH-71	Station Ventilation Louver	80	-
	VS-DIH-80	Tunnel Ventilation Louver	100	84
	VS-DIH-81	Tunnel Ventilation Louver	87	81
	VS-DIH-82	Tunnel Ventilation Louver	86	80
	VS-DIH-83	Tunnel Ventilation Louver	73	70
	VS-DIH-84	Station Ventilation Louver	84	80
	VS-DIH-85	Station Ventilation Louver	82	78
	VS-DIH-86	Station Ventilation Louver	81	77
	VS-DIH-87	Station Ventilation Louver	79	70
	VS-DIH-88	Station Ventilation Louver	75	66
	CT- DIH-001	Cooling Tower	103	94
	CT- DIH-002	Cooling Tower	104	95
	CT- DIH-003 [4]	Cooling Tower	103	94
	CT- DIH-004 [4]	Cooling Tower	103	94
	VCU-001	Outdoor Unit	79	70
	VCU-002	Outdoor Unit	84	77

Notes:
(1) The maximum allowable sound power levels have due regard to the characteristics of tonality, intermittency and impulsiveness.
(2) For those louvres that will not be under operation during night-time period, their maximum allowable SWL is presented as "-".
(3) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(4) It should be noted that the installation of CT-DIH-003 & 004 will not be carried out under SCL project but have been considered in the assessment for conservative purpose.

3 MEASUREMENT METHODOLOGY

3.1 Noise Measurement to obtain the SWLs of Fixed Plant Noise Sources

Measurement Methodology

3.1.1 Details of measurement methodology for SCL are presented in **Appendix B1**. Noise measurements to obtain the SWLs of the fixed plant noise sources followed Appendix B1 and were conducted by Wilson Acoustic Limited and Gammon Construction Limited under supervision by Beexergy Consulting Limited.

Measurement Equipment

3.1.2 The sound level meters and calibrators used for noise measurements are listed in the **Table 3.1**. The instruments used for the noise measurements complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The calibration certificates of equipment are provided in **Appendix B2**.

Table 3.1 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	SVANTEK SVAN 958	20890
	SVANTEK SVAN 955	15234
	SVANTEK SVAN 979	46199
	NTi M2211	7684
	NTi M2211	8047
	Rion NL-52	00564841
Calibrator	SVANTEK SV30A	10814
	SVANTEK SV35A	58708
	CASELLA CEL-120	4478630
	CASELLA CEL-120	4884553

3.1.3 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.

Measurement Date and Time

3.1.4 There will be daytime/evening and night-time operation modes for fixed plant sources at DIH. Nevertheless, the noise measurements at DIH were all conducted during night-time period at the fixed plant noise sources in order to minimise influence from background noise on measurement data. Details of the noise measurement schedule are shown in **Table 3.2**.

Table 3.2 Measurement Schedule

Location	Date
DIH	7, 15, 18 & 19 September 2018
	24 & 25 October 2018
	7, 21, 23 November 2018
	12 December 2018

Location	Date
	16 & 24 January 2019
	27 March 2019

3.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at Representative NSRs

Measurement Parameters

3.2.1 L_{Aeq} (30min) was measured at each designated measurement location. 1/3 octave band spectrum and time history over the measurement period was also be logged for determination of tonal, impulsiveness and intermittency characteristic.

3.2.2 Background noise level was measured at the same measurement location in term of L_{Aeq} (5 min) immediate before or after the noise measurement when all Project's fixed plant equipment shut down. To minimise the measurement data being influenced by background noise, noise data obtained at an instance of minimal or no traffic on the road was used to evaluate the tonal characteristic. The corrections for tonality, impulsiveness or intermittency at the representative NSRs was determined in accordance with IND-TM. In addition, any noticeable characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources was recorded during the measurement. For the measurement was under unmanned condition, the investigator conducted visit in the vicinity of the measurement location to record any noticeable characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources during the measurement.

Measurement Equipment

3.2.3 The sound level meters and calibrators used for noise measurements at representative NSRs are listed in **Table 3.3**. The instruments used for the noise measurements complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The calibration certificates of equipment are shown in **Appendix C1**.

Table 3.3 Noise Measurement Equipment

Equipment	Model	Serial Number
Sound Level Meter	B&K 2250	3001291
	B&K 2250L	2681366
	B&K 2270	2644597
	B&K 2270	3007965
Calibrator	B&K 4231	3006428
	B&K 4231	3014024

3.2.4 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.

Measurement Locations

3.2.5 The proposed noise measurement locations were selected at the representative NSRs where have direct line of sight to the noise sources and were accessible for noise measurement. These measurement locations were agreed with EPD prior to noise measurement. The

measurement locations are summarised in **Table 3.4** and shown in **Figure No. C1103/C/SCL/ACM/M52/050**. Photographs of measurement locations are shown in **Appendix C2**.

Table 3.4 Noise Measurement Locations

Measurement Location ID	Representative NSR (NSR ID)	Type	Measurement Height
DIH-FN1	Lung Wan House & Tower E, Galaxia (DIH-11-1 & DIH-12-2)	Residential	1st floor of the Lung Wan House (approx. 4m above ground level & 1m from building facade)
DIH-FN2	Planned NSR in the CDA Site (DIH-P3-1A, DIH-P3-1B & DIH-P3-3)	Residential	Near the location of planned NSR DIH-P3-1B (approx. 1.2m above ground level in free-field condition)
DIH-FN3	Planned NSR in the CDA Site (DIH-P3-3, DIH-P3-2A & DIH-P3-2B)	Residential	Near the location of planned NSR DIH-P3-2A (approx. 1.2m above ground level in free-field condition)
DIH-FN4	Planned NSR in the CDA Site (DIH-P3-3, DIH-P3-5 & DIH-P3-6)	Residential & Performing arts centre	Near the location of planned pavilion (approx. 1.2m above ground level in free-field condition)
DIH-FN5	Planned NSR in the CDA Site (DIH-P3-4)	Place of Worship	Near the location of planned NSR DIH-P3-4 (approx. 1.2m above ground level in free-field condition)
DIH-FN6	Tower B, Galaxia (DIH12-1)	Residential	Podium of Galaxia near Tower B, Galaxia (approx. 1.2m above podium level in free-field condition)

Measurement Date and Time

3.2.6 For daytime/evening and night-time operation modes, noise measurement at representative NSRs was conducted during evening and night-time periods. The measurement schedule is presented in **Table 3.5.**

Table 3.5 Measurement Schedule

Measurement Location ID	Date
DIH-FN1, DIH-FN2, DIH-FN3, DIH-FN4, DIH-FN5 & DIH-FN6	8 & 9 April 2019

4 MEASUREMENT RESULTS

4.1 Noise Measurement to obtain the SWLs of Fixed Plant Noise Sources

4.1.1 The measured SWLs for daytime and evening, and night-time periods are presented in **Table 4.1**. Photographs showing the examples of noise measurement for fixed plant noise are shown in **Appendix B3**. Details of the measurement results are shown in **Appendix B4**.

Table 4.1 Summary of Measured SWLs for Fixed Plants

Plant Item	Measured SWL[(1) (2)], dB(A)		Maximum allowable SWL[(1)(2)], dB(A)		Compliance (Y/N)	
	Day / Evening-time[(3)]	Night-time[(3)]	Day / Evening - time[(3)]	Night-time[(3)]	Day / Evening - time[(3)]	Night-time[(3)]
VS-DIH-21	72	-	81	-	Y	-
VS-DIH-22	82	-	91	-	Y	-
VS-DIH-23	76	76	85	81	Y	Y
VS-DIH-24	76	76	85	81	Y	Y
VS-DIH-25	77	77	86	82	Y	Y
VS-DIH-26	76	76	85	81	Y	Y
VS-DIH-27	76	76	85	81	Y	Y
VS-DIH-31	70	-	79	-	Y	-
VS-DIH-33	69	69	78	74	Y	Y
VS-DIH-34	67	67	76	72	Y	Y
VS-DIH-37	74	74	83	79	Y	Y
VS-DIH-39	74	74	83	79	Y	Y
VS-DIH-40	75	75	84	80	Y	Y
VS-DIH-43	75	75	84	80	Y	Y
VS-DIH-47A	71	70	80	70	Y	Y
VS-DIH-47C	71	69	80	69	Y	Y
VS-DIH-48A,B,C	79	79	82	79	Y	Y
VS-DIH-48D	74	74	77	74	Y	Y
VS-DIH-49	69	69	78	74	Y	Y
VS-DIH-49A	74	-	83	-	Y	-
VS-DIH-50,51	82	77	85	82	Y	Y
VS-DIH-52	89	85	92	85	Y	Y
VS-DIH-53,54B	84	82	87	82	Y	Y
VS-DIH-55	88	83	91	83	Y	Y
VS-DIH-56	91	85	92	85	Y	Y
VS-DIH-57	81	-	86	-	Y	-
VS-DIH-58	85	-	87	-	Y	-
VS-DIH-59	80	-	89	-	Y	-
VS-DIH-60	73	73	80	78	Y	Y
VS-DIH-61	76	76	79	76	Y	Y
VS-DIH-62	77	77	80	77	Y	Y
VS-DIH-63	77	77	86	77	Y	Y
VS-DIH-64A	76	-	85	-	Y	-
VS-DIH-64B	73	73	82	77	Y	Y
VS-DIH-71	71	-	80	-	Y	-
VS-DIH-80	99	84	100	84	Y	Y

Plant Item	Measured SWL[(1) (2)], dB(A)		Maximum allowable SWL[(1)(2)], dB(A)		Compliance (Y/N)	
	Day / Evening-time[(3)]	Night-time[(3)]	Day / Evening - time[(3)]	Night-time[(3)]	Day / Evening - time[(3)]	Night-time[(3)]
VS-DIH-81	84	81	87	81	Y	Y
VS-DIH-82	76	73	86	80	Y	Y
VS-DIH-83	70	70	73	70	Y	Y
VS-DIH-84	75	75	84	80	Y	Y
VS-DIH-85	73	73	82	78	Y	Y
VS-DIH-86	72	72	81	77	Y	Y
VS-DIH-87	70	70	79	70	Y	Y
VS-DIH-88	66	66	75	66	Y	Y
CT- DIH-001	93	93	103	94	Y	Y
CT- DIH-002	94	94	104	95	Y	Y
VCU-001	70	70	79	70	Y	Y
VCU-002	75	75	84	77	Y	Y

Notes:
(1) As discussed in S3.1.4, some plants would be operated in different modes, namely daytime/evening and night-time operation modes. For those plants operating in the same mode during daytime/evening and night-time periods, the measured SWL is same for both daytime/evening and night-time periods.
(2) For those louvres that will not be under operation during night-time period, their maximum allowable SWL is presented as "-".
(3) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours

4.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at NSRs

4.2.1 Noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the representative NSRs were conducted during both evening and night-time periods. Measurement results are summarised in **Table 4.2** below. No characteristics of tonality, impulsiveness and intermittency was observed at the selected NSRs. Data analysis has been carried out to determine the characteristics of tonality, impulsiveness and intermittency by assessing the logged 1/3 octave band spectra and time history profile. Result of data analysis also indicated no characteristics of tonality, impulsiveness and intermittency is found at the representative NSRs. Detailed noise measurements results are presented in **Appendix C3**.

Table 4.2 Noise Measurement Results at Measurement Locations

Measurement Location ID	Representing NSRs (NSR ID.)	Time Period[1]&[2]	Measurement Results			Site Observation	Characteristics of Tonality, Impulsiveness and Intermittency at NSRs (Y/N)
			Measured Noise Level $L_{Aeq(30mins)}$, dB(A)	Background Noise Level $L_{Aeq(5mins)}$, dB(A)	Difference between Measured Noise Level and Background Level, dB(A)		
DIH-FN1	Lung Wan House & Tower E, Galaxia (DIH-11-1 & DIH-12-2)	Daytime & Evening	69.4	70.4	-1.0	Noise environment was dominated by traffic noise. Noise from SCL fixed plant was not noticeable at measurement locations.	N
		Night-time	66.6	65.6	1.0		N
DIH-FN2	Planned NSR in the CDA Site (DIH-P3-1A, DIH-P3-1B & DIH-P3-3) [3]	Daytime & Evening	54.6	57.1	-2.5		N
		Night-time	52.8	51.0	1.8		N
DIH-FN3	Planned NSR in the CDA Site (DIH-P3-3, DIH-P3-2A & DIH-P3-2B) [3]	Daytime & Evening	54.9	54.8	0.1		N
		Night-time	51.5	49.8	1.7		N
DIH-FN4	Planned NSR in the CDA Site (DIH-P3-3, DIH-P3-5 & DIH-P3-6) [3]	Daytime & Evening	61.1	62.0	-0.9		N
		Night-time	58.5	55.8	2.7		N [4]
DIH-FN5	Planned NSR in the CDA Site (DIH-P3-4) [3]	Daytime & Evening	58.2	60.3	-2.1		N
DIH-FN6	Tower B, Galaxia	Daytime & Evening	55.1	57.0	-1.9		N

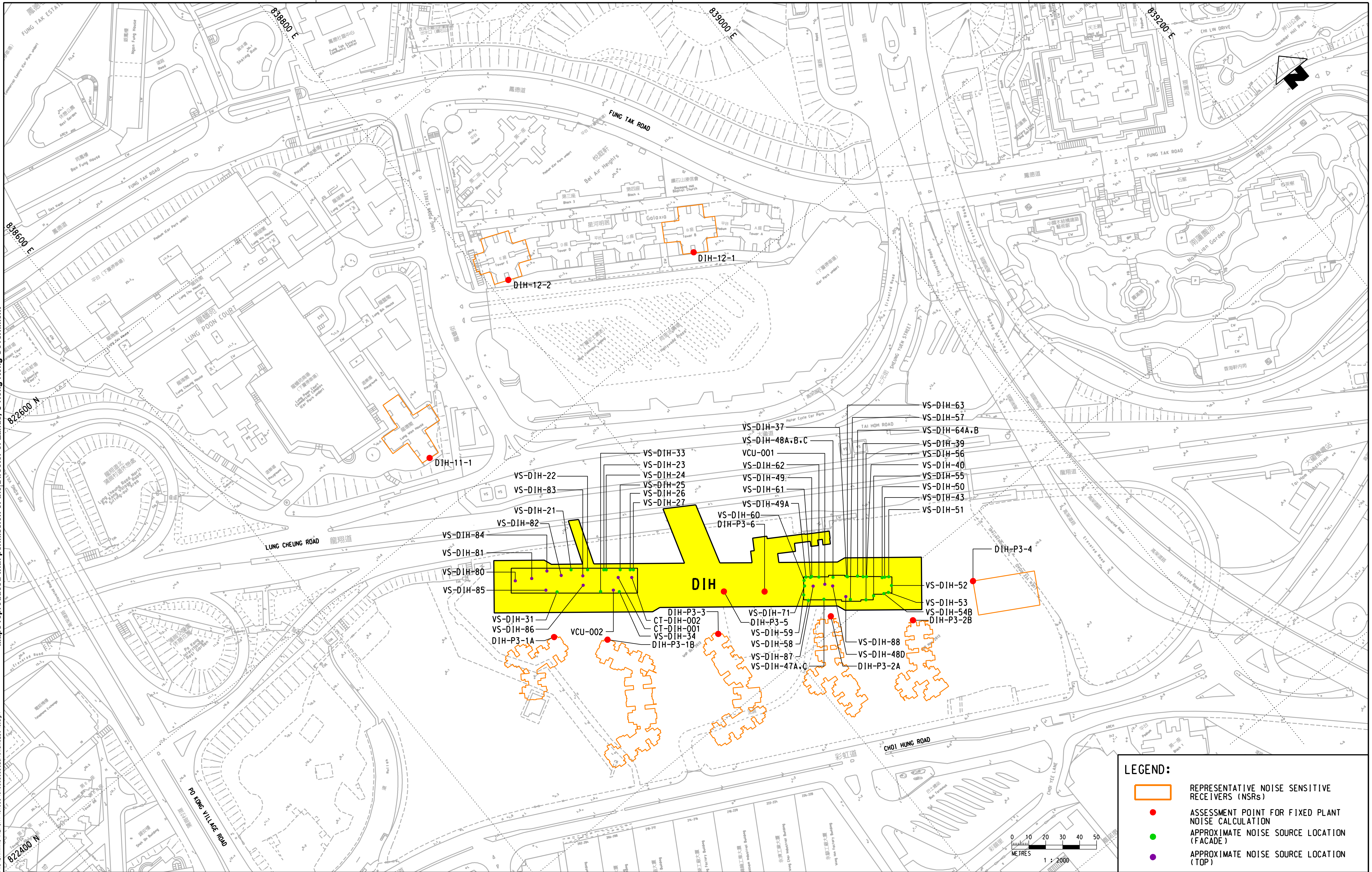
Measurement Location ID	Representing NSRs (NSR ID.)	Time Period[(1)&(2)]	Measurement Results			Site Observation	Characteristics of Tonality, Impulsiveness and Intermittency at NSRs (Y/N)
			Measured Noise Level $L_{Aeq(30mins)}$, dB(A)	Background Noise Level $L_{Aeq(5mins)}$, dB(A)	Difference between Measured Noise Level and Background Level, dB(A)		
	(DIH12-1)	Night-time	53.0	50.9	2.1		N

Note:
(1) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours
(2) Fixed plant noise operation during daytime/evening and nigth-time periods have been included according to corresponding fixed plant noise measurement.
(3) For information regarding the planned NSRs within the CDA Site, reference is made to the approved *Environmental Review Report for Update of Fixed Plant Noise Sources at Diamond Hill Station (DIH) and Hin Keng Station (HIK), and Minor Update of HIK Footprint* dated August 2016. For DIH-P3-4, where is a place of worship, ritual activity will only be conducted during daytime.
(4) Tonal peak at 6.3K Hz was found during night-time impact and background measurement periods when traffic noise influence was low. Crickets chirp was heard throughout night-time measurement. This tonal peak is expected to be related to crickets chirp. No characteristics of tonality, impulsiveness and intermittency from the fixed plant sources was observed during the measurement.

5 CONCLUSION

5.1.1 The fixed plant noise verification was undertaken and the measurement results indicated all the fixed plant noise levels in DIH comply with the updated maximum allowable SWLs. No characteristics of tonality, impulsiveness and intermittency was observed at the measurement locations. Result of data analysis also indicated no characteristics of tonality, impulsiveness and intermittency were found at the measurement locations.

Figures



838800 E
839000 E
839200 E
838600 E
822600 N
822400 N
FUNG TAK ROAD
LUNG POON STREET
LUNG POON COURT
Bel Air Heights
Galaxia
DIH-12-1
DIH-12-2
DIH-11-1
LUNG CHEUNG ROAD
PO KONG VILLAGE ROAD
SHEUNG YUEN STREET
TAI HOM ROAD
CHOI HUNG ROAD
CHI LIN DRIVE
Nam Lian Garden
DIH
VS-DIH-33
VS-DIH-23
VS-DIH-24
VS-DIH-25
VS-DIH-26
VS-DIH-27
VS-DIH-22
VS-DIH-83
VS-DIH-21
VS-DIH-82
VS-DIH-84
VS-DIH-81
VS-DIH-80
VS-DIH-85
VS-DIH-31
VS-DIH-86
DIH-P3-1A
VCU-002
DIH-P3-1B
DIH-P3-3
CT-DIH-002
CT-DIH-001
VS-DIH-34
VS-DIH-37
VS-DIH-48A,B,C
VCU-001
VS-DIH-62
VS-DIH-49
VS-DIH-61
VS-DIH-49A
VS-DIH-60
DIH-P3-6
VS-DIH-71
DIH-P3-5
VS-DIH-59
VS-DIH-58
VS-DIH-87
VS-DIH-47A,C
VS-DIH-88
VS-DIH-48D
DIH-P3-2A
VS-DIH-63
VS-DIH-57
VS-DIH-64A,B
VS-DIH-39
VS-DIH-56
VS-DIH-40
VS-DIH-55
VS-DIH-50
VS-DIH-43
VS-DIH-51
VS-DIH-52
VS-DIH-53
VS-DIH-54B
DIH-P3-2B
DIH-P3-4
0 10 20 30 40 50
METRES
1 : 2000

LEGEND:

- REPRESENTATIVE NOISE SENSITIVE RECEIVERS (NSRs)
- ASSESSMENT POINT FOR FIXED PLANT NOISE CALCULATION
- APPROXIMATE NOISE SOURCE LOCATION (FACADE)
- APPROXIMATE NOISE SOURCE LOCATION (TOP)

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	XH
DESIGNED	LCLL
CHECKED	LCLL
APPROVED	IMW
DATE	25/AUG/2015

MTR

SHATIN TO CENTRAL LINK

ORIGINATOR

AECOM

CADD REF. C11033_C_SCL_ACM_M52_049.dgn

TITLE
C11033
SCL (TAW - HUH)
LOCATIONS OF NSRs AND FIXED NOISE SOURCES (DIAMOND HILL STATION)

SCALE 1 : 2000 (A3) | FIGURE NO. C11033/C/SCL/ACM/M52/049 | REV. A

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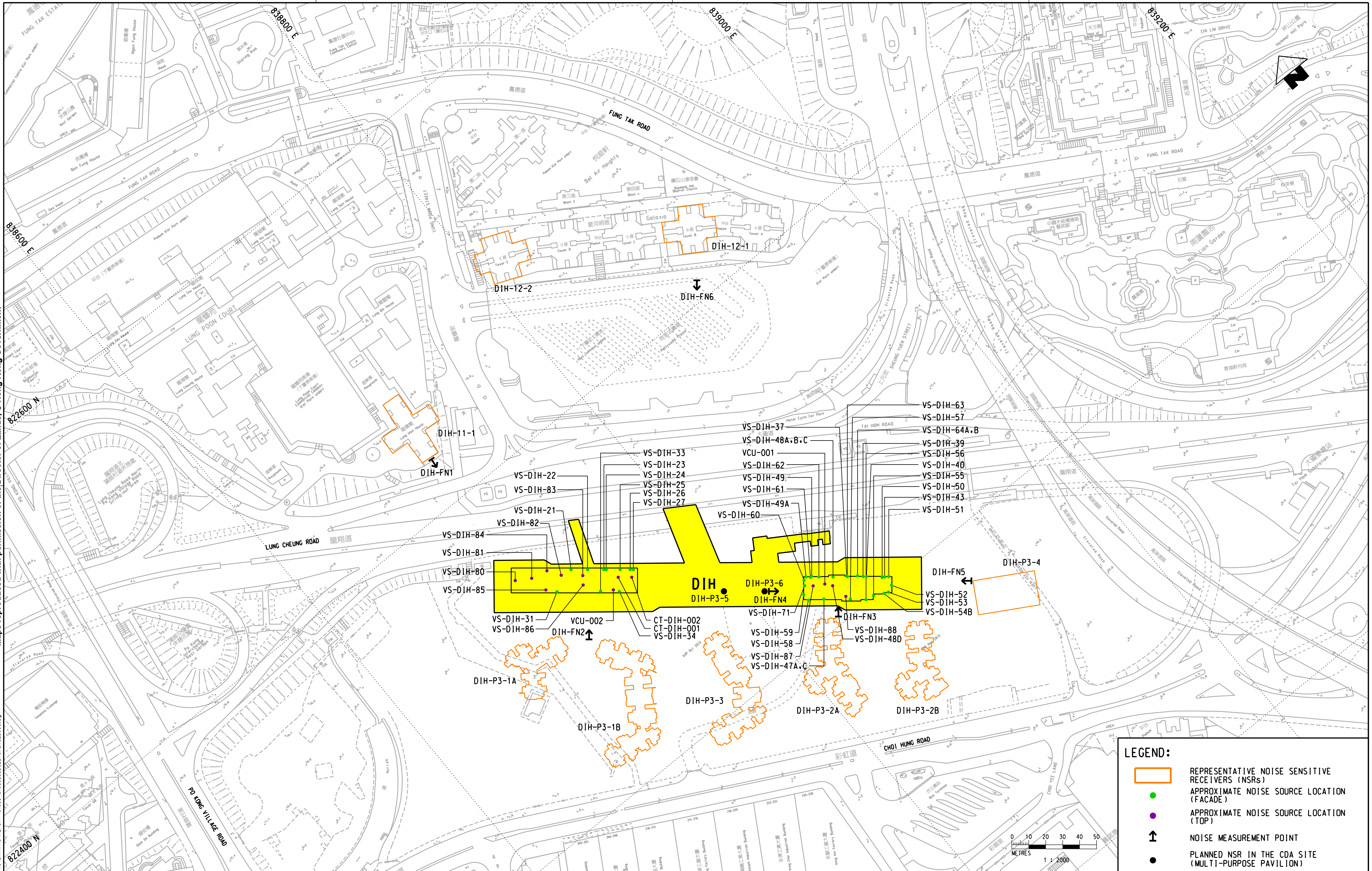

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TITLE

C11033

SCL (TAW - HUH)

LOCATIONS OF NOISE MEASUREMENT POINTS

(DIAMOND HILL STATION)

SCALE 1 : 2000 (A3)

FIGURE NO. C11033/C/SCL/ACM/M52/050

REV. A

Appendix A

Proposal for Updating Maximum Allowable Sound Power Levels of Fixed Plant Sources (Batch 3 – Diamond Hill Station (DIH))

MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section and
Stabling Sidings at Hung Hom Freight Yard

Proposal for Updating Maximum Allowable

Sound Power Levels of Fixed Plant Sources

(Batch 3 – Diamond Hill Station (DIH))

(May 2019)

Certified by: Fredrick Leong

Position: Independent Environmental Checker

Date: 16 May 2019

MTR Corporation Limited

Shatin to Central Link –
Tai Wai to Hung Hom Section and
Stabling Sidings at Hung Hom Freight Yard

Proposal for Updating Maximum Allowable Sound Power Levels of Fixed Plant Sources (Batch 3 – Diamond Hill Station (DIH))

(May 2019)

Certified by: Lisa Poon

Position: Environmental Team Leader

Date: 16 May 2019

AECOM

MTR Corporation Limited

Consultancy Agreement No. C11033

Shatin to Central Link - Tai Wai to Hung Hom Section [SCL(TAW – HUH)] and Stabling Sidings at Hung Hom Freight Yard [SCL(HHS)]

Proposal for Updating Maximum Allowable Sound Power Levels of Fixed Plant Sources (Batch 3 – Diamond Hill Station (DIH))

May 2019

	Name	Signature
Prepared & Checked:	Isaac Chu	
Reviewed & Approved:	Josh Lam	

Version:	B	Date: 15 May 2019

AECOM Asia Co. Ltd.
8/F, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong
Tel: (852) 3922 9000 Fax: (852) 3922 9797 www.aecom.com

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1 INTRODUCTION

1.1 Background

1.1.1 The Shatin to Central Link (SCL) is a 17km extension of the existing Ma On Shan Line (MOL) and East Rail Line (EAL) comprising (i) The East-West Corridor which extends the MOL from Tai Wai to Hung Hom via East Kowloon to connect with the West Rail Line (WRL) at Hung Hom Station (HUH) and Stabling Sidings at Hung Hom Freight Yard (HHS); and (ii) The North-South Corridor which is an extension of the EAL at Hung Hom across the harbour to Admiralty Station (ADM).

1.1.2 Environmental Impact Assessment (EIA) Reports for SCL – Tai Wai to Hung Hom Section [SCL (TAW-HUH)] (Register No. AEIAR-167/2012) and SCL Stabling Sidings at Hung Hom Freight Yard [SCL (HHS)] (Register No. AEIAR-164/2012) (hereinafter referred to as "the EIA Reports") were approved on 17 February 2012 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Reports, the Environmental Permit (EP) (EP No: EP-438/2012), covering the construction of both SCL (TAW-HUH) and SCL (HHS) (hereinafter referred to as "the Project"), was granted on 22 March 2012. Variations of Environmental Permit (VEP) were subsequently applied for EP-438/2012 and the latest Environmental Permit (EP No: EP-438/2012/K) was issued by Director of Environmental Protection (DEP) on 4 October 2016.

1.1.3 Pursuant to EP Condition 2.32, at least one month before commencement of operation of the Project, the Permit Holder, MTR Corporation Ltd (MTR), shall carry out fixed plant noise audit and deposit with the Director four hardcopies and one electronic copy of an audit report showing the design of the fixed plant noise sources associated with the Project complies with the maximum sound power levels determined in the approved SCL(TAW-HUH) EIA Report (Register No. AEIAR-167/2012) and SCL(HHS) EIA Report (Register No. AEIAR-164/2012) and all relevant documents in the Register, or otherwise approved by the Director in compliance with the requirements in Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO) having due regard to the characteristics of tonality, impulsiveness and intermittency.

1.1.4 AECOM Asia Co. Ltd was commissioned by the MTR to prepare the fixed plant noise audit report to check the compliance of the maximum sound power levels (SWLs) and to undertake noise measurement at the identified Noise Sensitive Receivers (NSRs) for investigation of any characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources associated with the Project.

1.1.5 Based on the latest design information, the maximum allowable SWLs of fixed plant items has been updated to reflect the latest design of the Project, and therefore Proposal(s) will be prepared to present the updated maximum allowable sound power levels (SWLs) of the fixed plant items at different stations of the Project.

1.2 Purpose of This Proposal

1.2.1 As discussed in **Section 1.1.5**, the maximum allowable SWLs of fixed plant items has been updated to reflect the latest design of the Project. This Proposal (Batch 3 – Diamond Hill Station (DIH)) presents the updated maximum allowable SWLs of the fixed plant noise sources at DIH.

2 NOISE CRITERIA AND NOISE SENSITIVE RECEIVERS

2.1 Environmental Legislation, Standard and Guidelines

2.1.1 The Noise Control Ordinance, Cap. 400 (NCO) and Environmental Impact Assessment Ordinance, Cap. 499 (EIAO) provide the statutory framework for noise control. Operational noise from fixed noise sources is controlled by Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites (IND-TM) under NCO. To plan for a better environment, the Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO) under EIAO has specified the following requirements:

- 5 dB below the appropriate ANLs in the IND-TM; or
- the prevailing background noise levels (For quiet areas with level 5dB or more below the ANL).

2.1.2 The Acceptable Noise Levels (ANLs) for different Area Sensitivity Ratings (ASRs) during different periods are summarized in the **Table 2.1**.

Table 2.1 ANLs for Assessment of Noise from Fixed Sources

Time Period	ANL, dB(A)		
	ASR "A"	ASR "B"	ASR "C"
Day (0700 to 1900 hours)	60	65	70
Evening (1900 to 2300 hours)	60	65	70
Night (2300 to 0700 hours)	50	55	60

2.2 Assessment Criteria and Representative Noise Sensitive Receivers

2.2.1 Table 8.8 of the approved SCL (HHS) EIA Report presents the identified Noise Sensitive Receivers (NSRs) and the adopted noise assessment criteria for fixed plant noise assessment. The assessment criteria at the NSRs selected for assessing the fixed plant noise impact from DIH are summarised in **Table 2.2**.

Table 2.2 Summary of noise criteria at representative NSRs for fixed noise sources (Reference from Table 8.8 of the approved EIA Reports)

Area (NSR No.)	Time Period (1)	Prevailing Background Noise Levels, dB(A) (2)	ASR	ANL-5, dB(A) (3)	Criteria, dB(A) (4)
Diamond Hill Station(5)					
Galaxia (DIH-12-1 & DIH-12-2), Lung Wan House (DIH-11-1)	Day & evening	69	C	65	65
	Night	62	C	55	55
Planned NSR (DIH-P3-1A to DIH-P3-6)(6)	Day & evening	72	C	65	65
	Night	63	C	55	55

Notes:
(1) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(2) Prevailing background noise levels are extracted from Table 8.8 of approved EIA Reports.
(3) A 5 dB(A) has been deducted from ANL as specified in requirement of TM-EIAO.
(4) The minimum of prevailing background noise level & ANL-5 is adopted.
(5) NSRs DIH-9-1 (Shek On Building), DIH-10-1 (Hong Kong Sheung Keung Hui Nursing Home), DIH-14-4 (Canossa Primary School (San Po Kong)) and DIH-14-5 (Rhythm Garden Block 1) identified in the SCL (HHS) EIA report are not included in this assessment as these NSRs are further away from DIH as compared with planned NSRs DIH-P3-1A to DIH-P3-3. The selected NSRs in this Table would represent the worst case scenario.
(6) For information regarding the planned NSRs within the CDA Site, reference is made to the approved *Environmental Review Report for Update of Fixed Plant Noise Sources at Diamond Hill Station (DIH) and Hin*

Keng Station (HIK), and Minor Update of HIK Footprint dated August 2016. For DIH-P3-4, where is a place of worship, ritual activity will only be conducted during daytime.

2.3 Review of Area Sensitivity Rating

2.3.1 Area Sensitive Ratings (ASR) as defined in the approved EIA Reports were determined by the existence of any influencing factors (IFs) (e.g. major road, industrial area) according to IND-TM at the time of preparation of the EIA Reports. During the preparation of this Proposal, it is revealed that there was no major change on the land use in the vicinity of representative NSRs, and thus only the existence of any major road (i.e. annual average daily traffic flow in excess of 30,000) has been reviewed.

2.3.2 Based on best available information (i.e. The Annual Traffic Census 2017) during the preparation of this Proposal, Lung Cheung Road remains as an IF and thus the ASR defined in **Table 2.2** remains unchanged.

3 UPDATE OF FIXED PLANT SOURCES AND PREDICTION OF FIXED PLANT NOISE LEVELS

3.1 Update of Fixed Plant Sources

3.1.1 The locations of updated fixed plant noise sources at DIH are shown in **Figure No. C1103/C/SCL/ACM/M52/049**. Based on latest design information, the maximum allowable SWLs for ventilation louvers and cooling towers are updated and summarized in **Table 3.1**.

Table 3.1 Summary of Updated Maximum Allowable SWLs for Fixed Plant Sources

Location	Fixed Plant ID.	Fixed Plant Source	Maximum Allowable SWL, dB(A)[1] [2]	
			Daytime & Evening[3]	Night-time[3]
DIH	VS-DIH-21	Station Ventilation Louver	81	-
	VS-DIH-22	Station Ventilation Louver	91	-
	VS-DIH-23	Station Ventilation Louver	85	81
	VS-DIH-24	Station Ventilation Louver	85	81
	VS-DIH-25	Station Ventilation Louver	86	82
	VS-DIH-26	Station Ventilation Louver	85	81
	VS-DIH-27	Station Ventilation Louver	85	81
	VS-DIH-31	Station Ventilation Louver	79	-
	VS-DIH-33	Station Ventilation Louver	78	74
	VS-DIH-34	Station Ventilation Louver	76	72
	VS-DIH-37	Station Ventilation Louver	83	79
	VS-DIH-39	Station Ventilation Louver	83	79
	VS-DIH-40	Station Ventilation Louver	84	80
	VS-DIH-43	Station Ventilation Louver	84	80
	VS-DIH-47A	Station Ventilation Louver	80	70
	VS-DIH-47C	Station Ventilation Louver	80	69
	VS-DIH-48A,B,C	Tunnel Ventilation Louver	82	79
	VS-DIH-48D	Tunnel Ventilation Louver	77	74
	VS-DIH-49	Station Ventilation Louver	78	74
	VS-DIH-49A	Station Ventilation Louver	83	-
	VS-DIH-50,51	Tunnel Ventilation Louver	85	82
	VS-DIH-52	Tunnel Ventilation Louver	92	85
	VS-DIH-53,54B	Tunnel Ventilation Louver	87	82
	VS-DIH-55	Tunnel Ventilation Louver	91	83
	VS-DIH-56	Tunnel Ventilation Louver	92	85
	VS-DIH-57	Station Ventilation Louver	86	-
	VS-DIH-58	Station Ventilation Louver	87	-
	VS-DIH-59	Station Ventilation Louver	89	-
	VS-DIH-60	Tunnel Ventilation Louver	80	78
	VS-DIH-61	Tunnel Ventilation Louver	79	76
	VS-DIH-62	Tunnel Ventilation Louver	80	77
	VS-DIH-63	Station Ventilation Louver	86	77
	VS-DIH-64A	Station Ventilation Louver	85	-
	VS-DIH-64B	Station Ventilation Louver	82	77

Location	Fixed Plant ID.	Fixed Plant Source	Maximum Allowable SWL, dB(A)[1] [2]	
			Daytime & Evening[3]	Night-time[3]
	VS-DIH-71	Station Ventilation Louver	80	-
	VS-DIH-80	Tunnel Ventilation Louver	100	84
	VS-DIH-81	Tunnel Ventilation Louver	87	81
	VS-DIH-82	Tunnel Ventilation Louver	86	80
	VS-DIH-83	Tunnel Ventilation Louver	73	70
	VS-DIH-84	Station Ventilation Louver	84	80
	VS-DIH-85	Station Ventilation Louver	82	78
	VS-DIH-86	Station Ventilation Louver	81	77
	VS-DIH-87	Station Ventilation Louver	79	70
	VS-DIH-88	Station Ventilation Louver	75	66
	CT- DIH-001	Cooling Tower	103	94
	CT- DIH-002	Cooling Tower	104	95
	CT- DIH-003 [4]	Cooling Tower	103	94
	CT- DIH-004 [4]	Cooling Tower	103	94
	VCU-001	Outdoor Unit	79	70
	VCU-002	Outdoor Unit	84	77

Notes:
(1) The maximum allowable sound power levels have due regard to the characteristics of tonality, intermittency and impulsiveness.
(2) For those louvres that will not be under operation during night-time period, their maximum allowable SWL is presented as "-".
(3) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(4) It should be noted that the installation of CT-DIH-003 & CT-DIH-004 will not be carried out under SCL project but have been considered in the assessment for conservative purpose.

3.2 Prediction of Fixed Plant Noise

3.2.1 With the updated maximum allowable SWLs presented in **Table 3.1**, the predicted noise levels at the representative NSRs comply with both daytime/evening and night-time criteria as presented in **Table 2.2**. The predicted noise levels are summarised in **Table 3.2** with details of calculation shown in **Annex A**.

Table 3.2 Predicted Fixed Plant Noise Levels at Representative NSRs

NSR ID	Description	Criteria, dB(A)		Predicted Sound Pressure Level, $L_{eq,30mins}$, dB(A)[1]	
		Daytime & Evening[2]	Night-time[2]	Daytime & Evening[2]	Night-time[2][3]
DIH-11-1	Lung Poon Court – Lung Wan House	65	55	63	54
DIH-12-1	Galaxia Tower B	65	55	59	50
DIH-12-2	Galaxia Tower E	65	55	60	51
DIH-P3-1A	Planned receivers in the CDA Site	65	55	65	54
DIH-P3-1B	Planned receivers in the CDA Site	65	55	65	55
DIH-P3-2A	Planned receivers in the CDA Site	65	55	65	55
DIH-P3-2B	Planned receivers in the CDA Site	65	55	64	55
DIH-P3-3	Planned receivers in the CDA Site	65	55	61	51

NSR ID	Description	Criteria, dB(A)		Predicted Sound Pressure Level, $L_{eq,30mins}$, dB(A)(1)	
		Daytime & Evening(2)	Night-time(2)	Daytime & Evening(2)	Night-time(2)(3)
DIH-P3-4	Planned receivers in the CDA site(4)	65	N/A (4)	61	N/A (4)
DIH-P3-5	Planned receivers in the CDA site	65	55	61	51
DIH-P3-6	Planned receivers in the CDA site	65	55	61	51

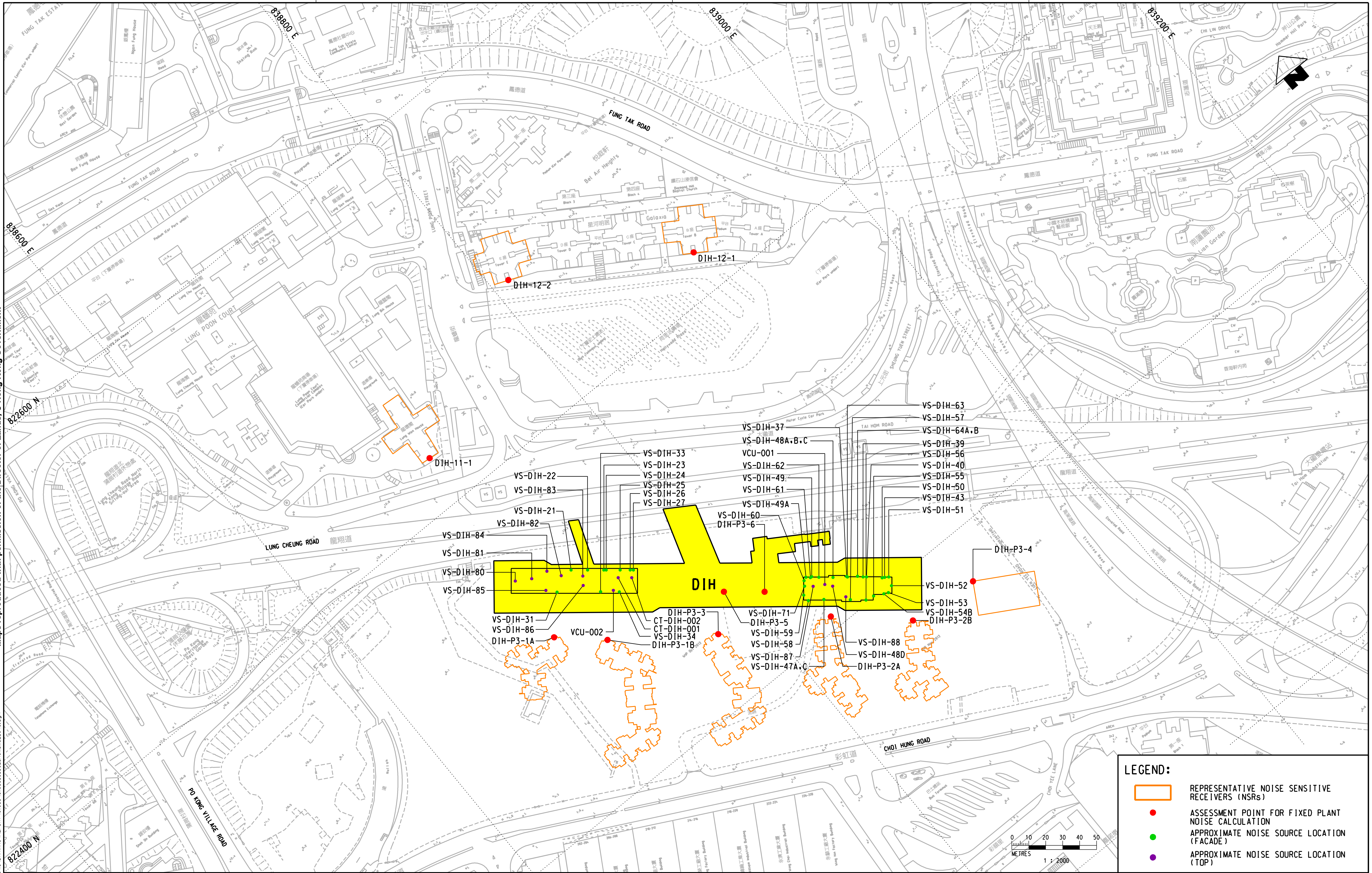
Notes:
(1) The predicted fixed plant noise levels have due regard to the characteristics of tonality, intermittency and impulsiveness.
(2) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
(3) Maximum of the predicted SPL of each NSR in Annex A is presented.
(4) Reference is made to the approved *Environmental Review Report for Update of Fixed Plant Noise Sources at Diamond Hill Station (DIH) and Hin Keng Station (HIK), and Minor Update of HIK Footprint* dated August 2016. For DIH-P3-4, where is a place of worship, ritual activity will only be conducted during daytime.

4 CONCLUSION

4.1.1 The maximum allowable SWLs of fixed plant noise sources at DIH has been updated based on the latest design information. The predicted noise levels at representative NSRs comply with the noise criteria based on the updated maximum allowable SWLs of fixed plant noise sources.

4.1.2 The measured SWLs at each fixed plant noise source during the fixed plant noise audit shall comply with the maximum allowable SWLs as stated in the **Table 3.1**. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied, where applicable, in accordance with the IND-TM during the commissioning test.

Figure



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838800 E
839000 E
839200 E
822600 N
822400 N
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LUNG CHEUNG ROAD
龍翔道
PO KONG VILLAGE ROAD
CHOI HUNG ROAD
彩虹道
SHEUNG YUEN STREET
LUNG POON STREET
TAI HOM ROAD
CHI LIN DRIVE
LUNG POON COURT
龍蟠苑
Galaxia
Bel Air Heights
Nan Lian Garden
Hammer Hill Park
Tai Hom Substation
DIH
DIH-12-1
DIH-12-2
DIH-11-1
VS-DIH-63
VS-DIH-57
VS-DIH-64A,B
VS-DIH-39
VS-DIH-56
VS-DIH-40
VS-DIH-55
VS-DIH-50
VS-DIH-43
VS-DIH-51
VS-DIH-37
VS-DIH-48A,B,C
VCU-001
VS-DIH-62
VS-DIH-49
VS-DIH-61
VS-DIH-49A
VS-DIH-60
DIH-P3-6
VS-DIH-33
VS-DIH-23
VS-DIH-24
VS-DIH-25
VS-DIH-26
VS-DIH-27
VS-DIH-22
VS-DIH-83
VS-DIH-21
VS-DIH-82
VS-DIH-84
VS-DIH-81
VS-DIH-80
VS-DIH-85
VS-DIH-31
VS-DIH-86
DIH-P3-1A
VCU-002
DIH-P3-3
CT-DIH-002
CT-DIH-001
VS-DIH-34
DIH-P3-1B
VS-DIH-71
DIH-P3-5
VS-DIH-59
VS-DIH-58
VS-DIH-87
VS-DIH-47A,C
VS-DIH-88
VS-DIH-48D
DIH-P3-2A
DIH-P3-4
VS-DIH-52
VS-DIH-53
VS-DIH-54B
DIH-P3-2B
LEGEND:
REPRESENTATIVE NOISE SENSITIVE RECEIVERS (NSRs)
ASSESSMENT POINT FOR FIXED PLANT NOISE CALCULATION
APPROXIMATE NOISE SOURCE LOCATION (FACADE)
APPROXIMATE NOISE SOURCE LOCATION (TOP)
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DATE	25/AUG/2015

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TITLE

C11033
SCL (TAW - HUH)
LOCATIONS OF NSRs AND FIXED NOISE SOURCES
(DIAMOND HILL STATION)

SCALE 1 : 2000 (A3)
FIGURE NO. C11033/C/SCL/ACM/M52/049
REV. A

Annex A

Detail Calculation of Fixed Plant Noise Assessment

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Day-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Daytime Noise Criteria, $Leq_{(30min)}$, dB(A)
Diamond Hill Station											
DIH-11-1											
DIH-11-1	Lung Poon Court - Lung Wan House	VS-DIH-21	North	106	81	0	-49	3	35		
		VS-DIH-22	North	114	91	0	-49	3	45		
		VS-DIH-23	North	122	85	0	-50	3	38		
		VS-DIH-24	North	123	85	0	-50	3	38		
		VS-DIH-25	North	129	86	0	-50	3	39		
		VS-DIH-26	North	135	85	0	-51	3	37		
		VS-DIH-27	North	137	85	0	-51	3	37		
		VS-DIH-31	South	109	79	-10	-49	3	23		
		VS-DIH-33	South	128	78	-10	-50	3	21		
		VS-DIH-34	South	137	76	-10	-51	3	18		
		VS-DIH-37	North	256	83	0	-56	3	30		
		VS-DIH-39	North	265	83	0	-56	3	30		
		VS-DIH-40	North	267	84	0	-57	3	30		
		VS-DIH-43	North	277	84	0	-57	3	30		
		VS-DIH-47A	South	247	80	-10	-56	3	17		
		VS-DIH-47C	South	247	80	-10	-56	3	17		
		VS-DIH-48A,B,C	North	248	82	0	-56	3	29		
		VS-DIH-48D	Top	249	77	0	-56	3	24		
		VS-DIH-49	North	234	78	0	-55	3	26		
		VS-DIH-49A	North	233	83	0	-55	3	31		
		VS-DIH-50,51	North	276	85	0	-57	3	31		
		VS-DIH-52	East	283	92	-10	-57	3	28		
		VS-DIH-53,54B	South	282	87	-10	-57	3	23		
		VS-DIH-55	East	274	91	-10	-57	3	27		
		VS-DIH-56	South	271	92	-10	-57	3	28		
		VS-DIH-57	South	262	86	-10	-56	3	23		
		VS-DIH-58	South	239	87	-10	-56	3	24		
		VS-DIH-59	West	235	89	0	-55	3	37		
		VS-DIH-60	West	232	80	0	-55	3	28		
		VS-DIH-61	North	235	79	0	-55	3	27		
		VS-DIH-62	North	240	80	0	-56	3	27		
		VS-DIH-63	North	256	86	0	-56	3	33		
		VS-DIH-64A	North	262	85	0	-56	3	32		
		VS-DIH-64B	North	262	82	0	-56	3	29		
		VS-DIH-71	West	234	80	0	-55	3	28		
		VS-DIH-80	Top	88	100	0	-47	3	56		
		VS-DIH-81	Top	93	87	0	-47	3	43		
		VS-DIH-82	Top	104	86	0	-48	3	41		
		VS-DIH-83	Top	114	73	0	-49	3	27		
		VS-DIH-84	Top	96	84	0	-48	3	39		
		VS-DIH-85	Top	104	82	0	-48	3	37		
		VS-DIH-86	Top	118	81	0	-49	3	35		
		VS-DIH-87	Top	239	79	0	-56	3	26		
		VS-DIH-88	Top	259	75	0	-56	3	22		
		CT- DIH-001	Top	132	103	0	-50	3	56		
		CT- DIH-002	Top	138	104	0	-51	3	56		
		CT- DIH-003[2]	Top	128	103	0	-50	3	56		
		CT- DIH-004[2]	Top	135	103	0	-51	3	55		
		VCU-001	Top	245	79	0	-56	3	26		
		VCU-002	Top	133	84	0	-51	3	36	**63**	**65**
DIH-12-1											
DIH-12-1	Galaxia Tower B	VS-DIH-21	North	201	81	0	-54	3	30		
		VS-DIH-22	North	197	91	0	-54	3	40		
		VS-DIH-23	North	195	85	0	-54	3	34		
		VS-DIH-24	North	194	85	0	-54	3	34		
		VS-DIH-25	North	192	86	0	-54	3	35		
		VS-DIH-26	North	191	85	0	-54	3	34		
		VS-DIH-27	North	191	85	0	-54	3	34		
		VS-DIH-31	South	216	79	-10	-55	3	17		
		VS-DIH-33	South	208	78	-10	-54	3	17		
		VS-DIH-34	South	205	76	-10	-54	3	15		
		VS-DIH-37	North	211	83	0	-54	3	32		
		VS-DIH-39	North	216	83	0	-55	3	31		
		VS-DIH-40	North	217	84	0	-55	3	32		
		VS-DIH-43	North	222	84	0	-55	3	32		
		VS-DIH-47A	South	219	80	-10	-55	3	18		
		VS-DIH-47C	South	219	80	-10	-55	3	18		
		VS-DIH-48A,B,C	North	209	82	0	-54	3	31		
		VS-DIH-48D	Top	213	77	0	-55	3	25		
		VS-DIH-49	North	203	78	0	-54	3	27		
		VS-DIH-49A	North	203	83	0	-54	3	32		
		VS-DIH-50,51	North	222	85	0	-55	3	33		
		VS-DIH-52	East	229	92	-10	-55	3	30		
		VS-DIH-53,54B	South	231	87	-10	-55	3	25		
		VS-DIH-55	East	229	91	-10	-55	3	29		
		VS-DIH-56	South	229	92	-10	-55	3	30		
		VS-DIH-57	South	225	86	-10	-55	3	24		
		VS-DIH-58	South	216	87	-10	-55	3	25		
		VS-DIH-59	West	212	89	0	-55	3	37		
		VS-DIH-60	West	204	80	0	-54	3	29		
		VS-DIH-61	North	204	79	0	-54	3	28		
		VS-DIH-62	North	205	80	0	-54	3	29		
		VS-DIH-63	North	212	86	0	-55	3	34		
		VS-DIH-64A	North	214	85	0	-55	3	33		
		VS-DIH-64B	North	214	82	0	-55	3	30		
		VS-DIH-71	West	208	80	0	-54	3	29		
		VS-DIH-80	Top	221	100	0	-55	3	48		
		VS-DIH-81	Top	215	87	0	-55	3	35		
		VS-DIH-82	Top	206	86	0	-54	3	35		
		VS-DIH-83	Top	202	73	0	-54	3	22		
		VS-DIH-84	Top	207	84	0	-54	3	33		
		VS-DIH-85	Top	218	82	0	-55	3	30		
		VS-DIH-86	Top	207	81	0	-54	3	30		
		VS-DIH-87	Top	209	79	0	-54	3	28		
		VS-DIH-88	Top	222	75	0	-55	3	23		
		CT- DIH-001	Top	197	103	0	-54	3	52		
		CT- DIH-002	Top	195	104	0	-54	3	53		
		CT- DIH-003[2]	Top	198	103	0	-54	3	52		
		CT- DIH-004[2]	Top	196	103	0	-54	3	52		
		VCU-001	Top	211	79	0	-54	3	28		
		VCU-002	Top	205	84	0	-54	3	33	**59**	**65**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Day-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Daytime Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-12-2											
DIH-12-2	Galaxia Tower E	VS-DIH-21	North	175	81	0	-53	3	31		
		VS-DIH-22	North	177	91	0	-53	3	41		
		VS-DIH-23	North	180	85	0	-53	3	35		
		VS-DIH-24	North	180	85	0	-53	3	35		
		VS-DIH-25	North	183	86	0	-53	3	36		
		VS-DIH-26	North	185	85	0	-53	3	35		
		VS-DIH-27	North	186	85	0	-53	3	35		
		VS-DIH-31	South	186	79	-10	-53	3	19		
		VS-DIH-33	South	192	78	-10	-54	3	17		
		VS-DIH-34	South	195	76	-10	-54	3	15		
		VS-DIH-37	North	265	83	0	-56	3	30		
		VS-DIH-39	North	273	83	0	-57	3	29		
		VS-DIH-40	North	274	84	0	-57	3	30		
		VS-DIH-43	North	283	84	0	-57	3	30		
		VS-DIH-47A	South	265	80	-10	-56	3	17		
		VS-DIH-47C	South	265	80	-10	-56	3	17		
		VS-DIH-48A,B,C	North	260	82	0	-56	3	29		
		VS-DIH-48D	Top	263	77	0	-56	3	24		
		VS-DIH-49	North	249	78	0	-56	3	25		
		VS-DIH-49A	North	248	83	0	-56	3	30		
		VS-DIH-50,51	North	282	85	0	-57	3	31		
		VS-DIH-52	East	289	92	-10	-57	3	28		
		VS-DIH-53,54B	South	290	87	-10	-57	3	23		
		VS-DIH-55	East	285	91	-10	-57	3	27		
		VS-DIH-56	South	283	92	-10	-57	3	28		
		VS-DIH-57	South	276	86	-10	-57	3	22		
		VS-DIH-58	South	259	87	-10	-56	3	24		
		VS-DIH-59	West	255	89	0	-56	3	36		
		VS-DIH-60	West	249	80	0	-56	3	27		
		VS-DIH-61	North	250	79	0	-56	3	26		
		VS-DIH-62	North	253	80	0	-56	3	27		
		VS-DIH-63	North	266	86	0	-56	3	33		
		VS-DIH-64A	North	270	85	0	-57	3	31		
		VS-DIH-64B	North	270	82	0	-57	3	28		
		VS-DIH-71	West	251	80	0	-56	3	27		
		VS-DIH-80	Top	178	100	0	-53	3	50		
		VS-DIH-81	Top	177	87	0	-53	3	37		
		VS-DIH-82	Top	177	86	0	-53	3	36		
		VS-DIH-83	Top	180	73	0	-53	3	23		
		VS-DIH-84	Top	173	84	0	-53	3	34		
		VS-DIH-85	Top	184	82	0	-53	3	32		
		VS-DIH-86	Top	185	81	0	-53	3	31		
		VS-DIH-87	Top	255	79	0	-56	3	26		
		VS-DIH-88	Top	273	75	0	-57	3	21		
		CT- DIH-001	Top	187	103	0	-53	3	53		
		CT- DIH-002	Top	190	104	0	-54	3	53		
		CT- DIH-003[2]	Top	186	103	0	-53	3	53		
		CT- DIH-004[2]	Top	188	103	0	-54	3	52		
		VCU-001	Top	259	79	0	-56	3	26		
		VCU-002	Top	193	84	0	-54	3	33	**60**	**65**
DIH-P3-1A											
DIH-P3-1A	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	41	81	-10	-40	3	34		
		VS-DIH-22	North	44	91	-10	-41	3	43		
		VS-DIH-23	North	49	85	-10	-42	3	36		
		VS-DIH-24	North	50	85	-10	-42	3	36		
		VS-DIH-25	North	55	86	-10	-43	3	36		
		VS-DIH-26	North	60	85	-10	-44	3	34		
		VS-DIH-27	North	61	85	-10	-44	3	34		
		VS-DIH-31	South	27	79	0	-37	3	45		
		VS-DIH-33	South	38	78	0	-40	3	41		
		VS-DIH-34	South	47	76	0	-41	3	38		
		VS-DIH-37	North	176	83	-10	-53	3	23		
		VS-DIH-39	North	186	83	-10	-53	3	23		
		VS-DIH-40	North	188	84	-10	-53	3	24		
		VS-DIH-43	North	198	84	-10	-54	3	23		
		VS-DIH-47A	South	161	80	0	-52	3	31		
		VS-DIH-47C	South	161	80	0	-52	3	31		
		VS-DIH-48A,B,C	North	168	82	-10	-53	3	22		
		VS-DIH-48D	Top	167	77	0	-52	3	28		
		VS-DIH-49	North	154	78	-10	-52	3	19		
		VS-DIH-49A	North	153	83	-10	-52	3	24		
		VS-DIH-50,51	North	197	85	-10	-54	3	24		
		VS-DIH-52	East	201	92	-10	-54	3	31		
		VS-DIH-53,54B	South	199	87	-10	-54	3	26		
		VS-DIH-55	East	190	91	-10	-54	3	30		
		VS-DIH-56	South	185	92	0	-53	3	42		
		VS-DIH-57	South	176	86	0	-53	3	36		
		VS-DIH-58	South	152	87	0	-52	3	38		
		VS-DIH-59	West	149	89	0	-51	3	41		
		VS-DIH-60	West	151	80	0	-52	3	31		
		VS-DIH-61	North	155	79	-10	-52	3	20		
		VS-DIH-62	North	160	80	-10	-52	3	21		
		VS-DIH-63	North	177	86	-10	-53	3	26		
		VS-DIH-64A	North	183	85	-10	-53	3	25		
		VS-DIH-64B	North	183	82	-10	-53	3	22		
		VS-DIH-71	West	151	80	0	-52	3	31		
		VS-DIH-80	Top	40	100	0	-40	3	63		
		VS-DIH-81	Top	37	87	0	-39	3	51		
		VS-DIH-82	Top	37	86	0	-39	3	50		
		VS-DIH-83	Top	40	73	0	-40	3	36		
		VS-DIH-84	Top	39	84	0	-40	3	47		
		VS-DIH-85	Top	28	82	0	-37	3	48		
		VS-DIH-86	Top	35	81	0	-39	3	45		
		VS-DIH-87	Top	156	79	0	-52	3	30		
		VS-DIH-88	Top	174	75	0	-53	3	25		
		CT- DIH-001	Top	52	103	-10	-42	3	54		
		CT- DIH-002	Top	58	104	-10	-43	3	54		
		CT- DIH-003[2]	Top	49	103	-10	-42	3	54		
		CT- DIH-004[2]	Top	55	103	-10	-43	3	53		
		VCU-001	Top	163	79	0	-52	3	30		
		VCU-002	Top	45	84	0	-41	3	46	**65**	**65**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Day-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Daytime Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-1B											
DIH-P3-1B	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	47	81	-10	-41	3	33		
		VS-DIH-22	North	43	91	-10	-41	3	43		
		VS-DIH-23	North	41	85	-10	-40	3	38		
		VS-DIH-24	North	41	85	-10	-40	3	38		
		VS-DIH-25	North	42	86	-10	-40	3	39		
		VS-DIH-26	North	43	85	-10	-41	3	37		
		VS-DIH-27	North	44	85	-10	-41	3	37		
		VS-DIH-31	South	41	79	0	-40	3	42		
		VS-DIH-33	South	29	78	0	-37	3	44		
		VS-DIH-34	South	29	76	0	-37	3	42		
		VS-DIH-37	North	146	83	-10	-51	3	25		
		VS-DIH-39	North	155	83	-10	-52	3	24		
		VS-DIH-40	North	157	84	-10	-52	3	25		
		VS-DIH-43	North	168	84	-10	-52	3	25		
		VS-DIH-47A	South	130	80	0	-50	3	33		
		VS-DIH-47C	South	130	80	0	-50	3	33		
		VS-DIH-48A,B,C	North	138	82	-10	-51	3	24		
		VS-DIH-48D	Top	136	77	0	-51	3	29		
		VS-DIH-49	North	124	78	-10	-50	3	21		
		VS-DIH-49A	North	123	83	-10	-50	3	26		
		VS-DIH-50,51	North	166	85	-10	-52	3	26		
		VS-DIH-52	East	170	92	-10	-53	3	32		
		VS-DIH-53,54B	South	168	87	-5	-53	3	32		
		VS-DIH-55	East	159	91	-10	-52	3	32		
		VS-DIH-56	South	154	92	0	-52	3	43		
		VS-DIH-57	South	145	86	0	-51	3	38		
		VS-DIH-58	South	121	87	0	-50	3	40		
		VS-DIH-59	West	119	89	0	-49	3	43		
		VS-DIH-60	West	121	80	0	-50	3	33		
		VS-DIH-61	North	125	79	-10	-50	3	22		
		VS-DIH-62	North	130	80	-10	-50	3	23		
		VS-DIH-63	North	146	86	-10	-51	3	28		
		VS-DIH-64A	North	152	85	-10	-52	3	26		
		VS-DIH-64B	North	152	82	-10	-52	3	23		
		VS-DIH-71	West	120	80	0	-50	3	33		
		VS-DIH-80	Top	65	100	0	-44	3	59		
		VS-DIH-81	Top	57	87	0	-43	3	47		
		VS-DIH-82	Top	47	86	0	-41	3	48		
		VS-DIH-83	Top	40	73	0	-40	3	36		
		VS-DIH-84	Top	54	84	0	-43	3	44		
		VS-DIH-85	Top	47	82	0	-41	3	44		
		VS-DIH-86	Top	35	81	0	-39	3	45		
		VS-DIH-87	Top	125	79	0	-50	3	32		
		VS-DIH-88	Top	143	75	0	-51	3	27		
		CT- DIH-001	Top	37	103	-10	-39	3	57		
		CT- DIH-002	Top	39	104	-10	-40	3	57		
		CT- DIH-003[2]	Top	37	103	-10	-39	3	57		
		CT- DIH-004[2]	Top	38	103	-10	-40	3	56		
		VCU-001	Top	132	79	0	-50	3	32		
		VCU-002	Top	29	84	0	-37	3	50	**65**	**65**
DIH-P3-2A											
DIH-P3-2A	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	156	81	-10	-52	3	22		
		VS-DIH-22	North	146	91	-10	-51	3	33		
		VS-DIH-23	North	137	85	-10	-51	3	27		
		VS-DIH-24	North	135	85	-10	-51	3	27		
		VS-DIH-25	North	128	86	-10	-50	3	29		
		VS-DIH-26	North	122	85	-10	-50	3	28		
		VS-DIH-27	North	120	85	-10	-50	3	28		
		VS-DIH-31	South	162	79	0	-52	3	30		
		VS-DIH-33	South	137	78	0	-51	3	30		
		VS-DIH-34	South	126	76	0	-50	3	29		
		VS-DIH-37	North	25	83	-10	-36	3	40		
		VS-DIH-39	North	30	83	-10	-38	3	38		
		VS-DIH-40	North	31	84	-10	-38	3	39		
		VS-DIH-43	North	39	84	-10	-40	3	37		
		VS-DIH-47A	South	11	80	0	-29	3	54		
		VS-DIH-47C	South	11	80	0	-29	3	54		
		VS-DIH-48A,B,C	North	23	82	-10	-35	3	40		
		VS-DIH-48D	Top	18	77	0	-33	3	47		
		VS-DIH-49	North	27	78	-10	-36	3	35		
		VS-DIH-49A	North	27	83	-10	-37	3	39		
		VS-DIH-50,51	North	38	85	-10	-40	3	38		
		VS-DIH-52	East	40	92	-10	-40	3	45		
		VS-DIH-53,54B	South	37	87	0	-39	3	51		
		VS-DIH-55	East	28	91	-10	-37	3	47		
		VS-DIH-56	South	23	92	0	-35	3	60		
		VS-DIH-57	South	15	86	0	-32	3	57		
		VS-DIH-58	South	16	87	0	-32	3	58		
		VS-DIH-59	West	20	89	-10	-34	3	48		
		VS-DIH-60	West	26	80	-10	-36	3	37		
		VS-DIH-61	North	26	79	-10	-36	3	36		
		VS-DIH-62	North	24	80	-10	-36	3	37		
		VS-DIH-63	North	25	86	-10	-36	3	43		
		VS-DIH-64A	North	28	85	-10	-37	3	41		
		VS-DIH-64B	North	28	82	-10	-37	3	38		
		VS-DIH-71	West	23	80	-10	-35	3	38		
		VS-DIH-80	Top	187	100	0	-53	3	50		
		VS-DIH-81	Top	178	87	0	-53	3	37		
		VS-DIH-82	Top	161	86	0	-52	3	37		
		VS-DIH-83	Top	148	73	0	-51	3	25		
		VS-DIH-84	Top	170	84	0	-53	3	34		
		VS-DIH-85	Top	169	82	0	-53	3	32		
		VS-DIH-86	Top	147	81	0	-51	3	33		
		VS-DIH-87	Top	21	79	0	-34	3	48		
		VS-DIH-88	Top	15	75	0	-31	3	47		
		CT- DIH-001	Top	128	103	-10	-50	3	46		
		CT- DIH-002	Top	120	104	-10	-50	3	47		
		CT- DIH-003[2]	Top	131	103	-10	-50	3	46		
		CT- DIH-004[2]	Top	124	103	-10	-50	3	46		
		VCU-001	Top	19	79	0	-34	3	48		
		VCU-002	Top	129	84	0	-50	3	37	**65**	**65**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Day-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Daytime Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-2B											
DIH-P3-2B	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	204	81	-10	-54	3	20		
		VS-DIH-22	North	194	91	-10	-54	3	30		
		VS-DIH-23	North	185	85	-10	-53	3	25		
		VS-DIH-24	North	183	85	-10	-53	3	25		
		VS-DIH-25	North	176	86	-10	-53	3	26		
		VS-DIH-26	North	169	85	-10	-53	3	25		
		VS-DIH-27	North	168	85	-10	-52	3	26		
		VS-DIH-31	South	211	79	0	-54	3	28		
		VS-DIH-33	South	185	78	0	-53	3	28		
		VS-DIH-34	South	174	76	0	-53	3	26		
		VS-DIH-37	North	47	83	-10	-41	3	35		
		VS-DIH-39	North	39	83	-10	-40	3	36		
		VS-DIH-40	North	38	84	-10	-39	3	38		
		VS-DIH-43	North	30	84	-10	-38	3	39		
		VS-DIH-47A	South	54	80	0	-43	3	40		
		VS-DIH-47C	South	54	80	0	-43	3	40		
		VS-DIH-48A,B,C	North	54	82	-10	-43	3	32		
		VS-DIH-48D	Top	52	77	0	-42	3	38		
		VS-DIH-49	North	66	78	-10	-44	3	27		
		VS-DIH-49A	North	68	83	-10	-45	3	31		
		VS-DIH-50,51	North	31	85	-10	-38	3	40		
		VS-DIH-52	East	24	92	0	-36	3	59		
		VS-DIH-53,54B	South	22	87	0	-35	3	55		
		VS-DIH-55	East	27	91	0	-37	3	57		
		VS-DIH-56	South	30	92	0	-38	3	57		
		VS-DIH-57	South	39	86	0	-40	3	49		
		VS-DIH-58	South	63	87	0	-44	3	46		
		VS-DIH-59	West	66	89	-10	-44	3	38		
		VS-DIH-60	West	68	80	-10	-45	3	28		
		VS-DIH-61	North	66	79	-10	-44	3	28		
		VS-DIH-62	North	61	80	-10	-44	3	29		
		VS-DIH-63	North	46	86	-10	-41	3	38		
		VS-DIH-64A	North	42	85	-10	-40	3	38		
		VS-DIH-64B	North	42	82	-10	-40	3	35		
		VS-DIH-71	West	67	80	-10	-45	3	28		
		VS-DIH-80	Top	236	100	0	-55	3	48		
		VS-DIH-81	Top	226	87	0	-55	3	35		
		VS-DIH-82	Top	209	86	0	-54	3	35		
		VS-DIH-83	Top	197	73	0	-54	3	22		
		VS-DIH-84	Top	218	84	0	-55	3	32		
		VS-DIH-85	Top	217	82	0	-55	3	30		
		VS-DIH-86	Top	196	81	0	-54	3	30		
		VS-DIH-87	Top	62	79	0	-44	3	38		
		VS-DIH-88	Top	42	75	0	-40	3	38		
		CT- DIH-001	Top	176	103	-10	-53	3	43		
		CT- DIH-002	Top	168	104	-10	-52	3	45		
		CT- DIH-003[2]	Top	180	103	-10	-53	3	43		
		CT- DIH-004[2]	Top	172	103	-10	-53	3	43		
		VCU-001	Top	56	79	0	-43	3	39		
		VCU-002	Top	178	84	0	-53	3	34	**64**	**65**
DIH-P3-3											
DIH-P3-3	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	95	81	-10	-48	3	26		
		VS-DIH-22	North	86	91	-10	-47	3	37		
		VS-DIH-23	North	77	85	-10	-46	3	32		
		VS-DIH-24	North	76	85	-10	-46	3	32		
		VS-DIH-25	North	70	86	-10	-45	3	34		
		VS-DIH-26	North	64	85	-10	-44	3	34		
		VS-DIH-27	North	63	85	-10	-44	3	34		
		VS-DIH-31	South	98	79	0	-48	3	34		
		VS-DIH-33	South	74	78	0	-45	3	36		
		VS-DIH-34	South	63	76	0	-44	3	35		
		VS-DIH-37	North	83	83	-10	-46	3	30		
		VS-DIH-39	North	92	83	-10	-47	3	29		
		VS-DIH-40	North	94	84	-10	-47	3	30		
		VS-DIH-43	North	104	84	-10	-48	3	29		
		VS-DIH-47A	South	66	80	0	-44	3	39		
		VS-DIH-47C	South	66	80	0	-44	3	39		
		VS-DIH-48A,B,C	North	76	82	-10	-46	3	29		
		VS-DIH-48D	Top	73	77	0	-45	3	35		
		VS-DIH-49	North	63	78	-10	-44	3	27		
		VS-DIH-49A	North	62	83	-10	-44	3	32		
		VS-DIH-50,51	North	102	85	-10	-48	3	30		
		VS-DIH-52	East	106	92	-10	-49	3	36		
		VS-DIH-53,54B	South	103	87	-10	-48	3	32		
		VS-DIH-55	East	94	91	-10	-48	3	36		
		VS-DIH-56	South	89	92	0	-47	3	48		
		VS-DIH-57	South	81	86	0	-46	3	43		
		VS-DIH-58	South	57	87	0	-43	3	47		
		VS-DIH-59	West	55	89	0	-43	3	49		
		VS-DIH-60	West	60	80	0	-44	3	39		
		VS-DIH-61	North	64	79	-10	-44	3	28		
		VS-DIH-62	North	68	80	-10	-45	3	28		
		VS-DIH-63	North	83	86	-10	-46	3	33		
		VS-DIH-64A	North	89	85	-10	-47	3	31		
		VS-DIH-64B	North	89	82	-10	-47	3	28		
		VS-DIH-71	West	58	80	0	-43	3	40		
		VS-DIH-80	Top	124	100	0	-50	3	53		
		VS-DIH-81	Top	115	87	0	-49	3	41		
		VS-DIH-82	Top	99	86	0	-48	3	41		
		VS-DIH-83	Top	87	73	0	-47	3	29		
		VS-DIH-84	Top	108	84	0	-49	3	38		
		VS-DIH-85	Top	105	82	0	-48	3	37		
		VS-DIH-86	Top	85	81	0	-47	3	37		
		VS-DIH-87	Top	63	79	0	-44	3	38		
		VS-DIH-88	Top	78	75	0	-46	3	32		
		CT- DIH-001	Top	68	103	-10	-45	3	51		
		CT- DIH-002	Top	61	104	-10	-44	3	53		
		CT- DIH-003[2]	Top	71	103	-10	-45	3	51		
		CT- DIH-004[2]	Top	64	103	-10	-44	3	52		
		VCU-001	Top	69	79	0	-45	3	37		
		VCU-002	Top	67	84	0	-45	3	42	**61**	**65**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Day-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Daytime Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-4											
DIH-P3-4	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	237	81	-5	-56	3	23		
		VS-DIH-22	North	227	91	-5	-55	3	34		
		VS-DIH-23	North	218	85	-5	-55	3	28		
		VS-DIH-24	North	216	85	-5	-55	3	28		
		VS-DIH-25	North	209	86	-5	-54	3	30		
		VS-DIH-26	North	202	85	-5	-54	3	29		
		VS-DIH-27	North	200	85	-5	-54	3	29		
		VS-DIH-31	South	245	79	-5	-56	3	21		
		VS-DIH-33	South	220	78	-5	-55	3	21		
		VS-DIH-34	South	209	76	-5	-54	3	20		
		VS-DIH-37	North	75	83	-5	-45	3	36		
		VS-DIH-39	North	65	83	-5	-44	3	37		
		VS-DIH-40	North	63	84	-5	-44	3	38		
		VS-DIH-43	North	52	84	-5	-42	3	40		
		VS-DIH-47A	South	89	80	-5	-47	3	31		
		VS-DIH-47C	South	89	80	-5	-47	3	31		
		VS-DIH-48A,B,C	North	83	82	-5	-46	3	34		
		VS-DIH-48D	Top	83	77	0	-46	3	34		
		VS-DIH-49	North	97	78	-5	-48	3	28		
		VS-DIH-49A	North	99	83	-5	-48	3	33		
		VS-DIH-50,51	North	54	85	-5	-43	3	40		
		VS-DIH-52	East	48	92	0	-42	3	53		
		VS-DIH-53,54B	South	50	87	-5	-42	3	43		
		VS-DIH-55	East	59	91	0	-43	3	51		
		VS-DIH-56	South	64	92	-5	-44	3	46		
		VS-DIH-57	South	73	86	-5	-45	3	39		
		VS-DIH-58	South	98	87	-5	-48	3	37		
		VS-DIH-59	West	100	89	-10	-48	3	34		
		VS-DIH-60	West	100	80	-10	-48	3	25		
		VS-DIH-61	North	96	79	-5	-48	3	29		
		VS-DIH-62	North	91	80	-5	-47	3	31		
		VS-DIH-63	North	74	86	-5	-45	3	39		
		VS-DIH-64A	North	68	85	-5	-45	3	38		
		VS-DIH-64B	North	68	82	-5	-45	3	35		
		VS-DIH-71	West	99	80	-10	-48	3	25		
		VS-DIH-80	Top	270	100	0	-57	3	46		
		VS-DIH-81	Top	260	87	0	-56	3	34		
		VS-DIH-82	Top	243	86	0	-56	3	33		
		VS-DIH-83	Top	230	73	0	-55	3	21		
		VS-DIH-84	Top	251	84	0	-56	3	31		
		VS-DIH-85	Top	252	82	0	-56	3	29		
		VS-DIH-86	Top	230	81	0	-55	3	29		
		VS-DIH-87	Top	94	79	0	-47	3	35		
		VS-DIH-88	Top	76	75	0	-46	3	32		
		CT- DIH-001	Top	209	103	0	-54	3	52		
		CT- DIH-002	Top	201	104	0	-54	3	53		
		CT- DIH-003[2]	Top	213	103	0	-55	3	51		
		CT- DIH-004[2]	Top	205	103	0	-54	3	52		
		VCU-001	Top	87	79	0	-47	3	35		
		VCU-002	Top	212	84	0	-55	3	32	**61**	**65**
DIH-P3-5											
DIH-P3-5 (West façade of Pavilion)	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	91	81	-5	-47	3	32		
		VS-DIH-22	North	81	91	-5	-46	3	43		
		VS-DIH-23	North	72	85	-5	-45	3	38		
		VS-DIH-24	North	71	85	-5	-45	3	38		
		VS-DIH-25	North	64	86	-5	-44	3	40		
		VS-DIH-26	North	57	85	-5	-43	3	40		
		VS-DIH-27	North	55	85	-5	-43	3	40		
		VS-DIH-31	South	99	79	-5	-48	3	29		
		VS-DIH-33	South	73	78	-5	-45	3	31		
		VS-DIH-34	South	62	76	-5	-44	3	30		
		VS-DIH-37	North	73	83	-10	-45	3	31		
		VS-DIH-39	North	83	83	-10	-46	3	30		
		VS-DIH-40	North	85	84	-10	-47	3	30		
		VS-DIH-43	North	95	84	-10	-48	3	29		
		VS-DIH-47A	South	59	80	-10	-43	3	30		
		VS-DIH-47C	South	59	80	-10	-43	3	30		
		VS-DIH-48A,B,C	North	65	82	-10	-44	3	31		
		VS-DIH-48D	Top	64	77	-10	-44	3	26		
		VS-DIH-49	North	51	78	-10	-42	3	29		
		VS-DIH-49A	North	49	83	-10	-42	3	34		
		VS-DIH-50,51	North	94	85	-10	-47	3	31		
		VS-DIH-52	East	99	92	-10	-48	3	37		
		VS-DIH-53,54B	South	97	87	-10	-48	3	32		
		VS-DIH-55	East	88	91	-10	-47	3	37		
		VS-DIH-56	South	84	92	-10	-46	3	39		
		VS-DIH-57	South	75	86	-10	-45	3	34		
		VS-DIH-58	South	50	87	-10	-42	3	38		
		VS-DIH-59	West	47	89	-10	-41	3	41		
		VS-DIH-60	West	48	80	-10	-42	3	31		
		VS-DIH-61	North	52	79	-10	-42	3	30		
		VS-DIH-62	North	57	80	-10	-43	3	30		
		VS-DIH-63	North	73	86	-10	-45	3	34		
		VS-DIH-64A	North	79	85	-10	-46	3	32		
		VS-DIH-64B	North	79	82	-10	-46	3	29		
		VS-DIH-71	West	48	80	-10	-42	3	31		
		VS-DIH-80	Top	123	100	0	-50	3	53		
		VS-DIH-81	Top	114	87	0	-49	3	41		
		VS-DIH-82	Top	96	86	0	-48	3	41		
		VS-DIH-83	Top	84	73	0	-46	3	30		
		VS-DIH-84	Top	105	84	0	-48	3	39		
		VS-DIH-85	Top	105	82	0	-48	3	37		
		VS-DIH-86	Top	83	81	0	-46	3	38		
		VS-DIH-87	Top	53	79	-10	-42	3	30		
		VS-DIH-88	Top	72	75	-10	-45	3	23		
		CT- DIH-001	Top	63	103	-10	-44	3	52		
		CT- DIH-002	Top	55	104	-10	-43	3	54		
		CT- DIH-003[2]	Top	67	103	-10	-45	3	51		
		CT- DIH-004[2]	Top	59	103	-10	-43	3	53		
		VCU-001	Top	60	79	-10	-44	3	28		
		VCU-002	Top	65	84	0	-44	3	43	**61**	**65**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Day-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Daytime Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-6											
DIH-P3-6 (East façade of Pavilion)	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	115	81	-10	-49	3	25		
		VS-DIH-22	North	105	91	-10	-48	3	36		
		VS-DIH-23	North	96	85	-10	-48	3	30		
		VS-DIH-24	North	94	85	-10	-47	3	31		
		VS-DIH-25	North	87	86	-10	-47	3	32		
		VS-DIH-26	North	80	85	-10	-46	3	32		
		VS-DIH-27	North	78	85	-10	-46	3	32		
		VS-DIH-31	South	122	79	-10	-50	3	22		
		VS-DIH-33	South	97	78	-10	-48	3	23		
		VS-DIH-34	South	86	76	-10	-47	3	22		
		VS-DIH-37	North	49	83	-5	-42	3	39		
		VS-DIH-39	North	59	83	-5	-43	3	38		
		VS-DIH-40	North	61	84	-5	-44	3	38		
		VS-DIH-43	North	71	84	-5	-45	3	37		
		VS-DIH-47A	South	35	80	-5	-39	3	39		
		VS-DIH-47C	South	35	80	-5	-39	3	39		
		VS-DIH-48A,B,C	North	41	82	-5	-40	3	40		
		VS-DIH-48D	Top	40	77	0	-40	3	40		
		VS-DIH-49	North	28	78	-5	-37	3	39		
		VS-DIH-49A	North	26	83	-5	-36	3	45		
		VS-DIH-50,51	North	70	85	-5	-45	3	38		
		VS-DIH-52	East	75	92	-10	-45	3	40		
		VS-DIH-53,54B	South	73	87	-5	-45	3	40		
		VS-DIH-55	East	64	91	-10	-44	3	40		
		VS-DIH-56	South	60	92	-5	-44	3	46		
		VS-DIH-57	South	51	86	-5	-42	3	42		
		VS-DIH-58	South	26	87	-5	-36	3	49		
		VS-DIH-59	West	23	89	0	-35	3	57		
		VS-DIH-60	West	24	80	0	-36	3	47		
		VS-DIH-61	North	28	79	-5	-37	3	40		
		VS-DIH-62	North	33	80	-5	-38	3	40		
		VS-DIH-63	North	50	86	-5	-42	3	42		
		VS-DIH-64A	North	56	85	-5	-43	3	40		
		VS-DIH-64B	North	56	82	-5	-43	3	37		
		VS-DIH-71	West	24	80	0	-36	3	47		
		VS-DIH-80	Top	147	100	-10	-51	3	42		
		VS-DIH-81	Top	138	87	-10	-51	3	29		
		VS-DIH-82	Top	120	86	-10	-50	3	29		
		VS-DIH-83	Top	108	73	-10	-49	3	17		
		VS-DIH-84	Top	129	84	-10	-50	3	27		
		VS-DIH-85	Top	129	82	-10	-50	3	25		
		VS-DIH-86	Top	107	81	-10	-49	3	25		
		VS-DIH-87	Top	29	79	0	-37	3	45		
		VS-DIH-88	Top	48	75	0	-42	3	36		
		CT- DIH-001	Top	87	103	-10	-47	3	49		
		CT- DIH-002	Top	79	104	-10	-46	3	51		
		CT- DIH-003[2]	Top	91	103	-10	-47	3	49		
		CT- DIH-004[2]	Top	83	103	-10	-46	3	50		
		VCU-001	Top	36	79	0	-39	3	43		
		VCU-002	Top	89	84	-10	-47	3	30	**61**	**65**

Remark:

[1] A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings or with proper design incorporated and negative correction of 5 dB(A) for NSR do not have direct line of sight to the ventilation shaft.

[2] It should be noted that the installation of CT-DIH-003 and CT-DIH-004 will not be carried out under SCL project but have been considered in the assessment for conservative purpose. Mitigation measures such as provision of screening panel or equivalent will be provided for the plant such that there would be no direct line of sight for the planned NSRs in the CDA site at SCL DIH.

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
Diamond Hill Station											
DIH-11-1											
DIH-11-1 (Scenario 1) [3]	Lung Poon Court - Lung Wan House	VS-DIH-21	North	106	-	0	-49	3	-		
		VS-DIH-22	North	114	-	0	-49	3	-		
		VS-DIH-23	North	122	81	0	-50	3	34		
		VS-DIH-24	North	123	81	0	-50	3	34		
		VS-DIH-25	North	129	82	0	-50	3	35		
		VS-DIH-26	North	135	81	0	-51	3	33		
		VS-DIH-27	North	137	81	0	-51	3	33		
		VS-DIH-31	South	109	-	-10	-49	3	-		
		VS-DIH-33	South	128	74	-10	-50	3	17		
		VS-DIH-34	South	137	72	-10	-51	3	14		
		VS-DIH-37	North	256	79	0	-56	3	26		
		VS-DIH-39	North	265	79	0	-56	3	26		
		VS-DIH-40	North	267	80	0	-57	3	26		
		VS-DIH-43	North	277	80	0	-57	3	26		
		VS-DIH-47A	South	247	70	-10	-56	3	7		
		VS-DIH-47C	South	247	69	-10	-56	3	6		
		VS-DIH-48A,B,C	North	248	79	0	-56	3	26		
		VS-DIH-48D	Top	249	74	0	-56	3	21		
		VS-DIH-49	North	234	74	0	-55	3	22		
		VS-DIH-49A	North	233	-	0	-55	3	-		
		VS-DIH-50,51	North	276	82	0	-57	3	28		
		VS-DIH-52	East	283	85	-10	-57	3	21		
		VS-DIH-53,54B	South	282	82	-10	-57	3	18		
		VS-DIH-55	East	274	-	-10	-57	3	-		
		VS-DIH-56	South	271	-	-10	-57	3	-		
		VS-DIH-57	South	262	-	-10	-56	3	-		
		VS-DIH-58	South	239	-	-10	-56	3	-		
		VS-DIH-59	West	235	-	0	-55	3	-		
		VS-DIH-60	West	232	78	0	-55	3	26		
		VS-DIH-61	North	235	76	0	-55	3	24		
		VS-DIH-62	North	240	77	0	-56	3	24		
		VS-DIH-63	North	256	77	0	-56	3	24		
		VS-DIH-64A	North	262	-	0	-56	3	-		
		VS-DIH-64B	North	262	77	0	-56	3	24		
		VS-DIH-71	West	234	-	0	-55	3	-		
		VS-DIH-80	Top	88	84	0	-47	3	40		
		VS-DIH-81	Top	93	-	0	-47	3	-		
		VS-DIH-82	Top	104	80	0	-48	3	35		
		VS-DIH-83	Top	114	70	0	-49	3	24		
		VS-DIH-84	Top	96	80	0	-48	3	35		
		VS-DIH-85	Top	104	78	0	-48	3	33		
		VS-DIH-86	Top	118	77	0	-49	3	31		
		VS-DIH-87	Top	239	70	0	-56	3	17		
		VS-DIH-88	Top	259	66	0	-56	3	13		
		CT- DIH-001	Top	132	94	0	-50	3	47		
		CT- DIH-002	Top	138	95	0	-51	3	47		
		CT- DIH-003 [2]	Top	128	94	0	-50	3	47		
		CT- DIH-004 [2]	Top	135	94	0	-51	3	46		
		VCU-001	Top	245	70	0	-56	3	17		
		VCU-002	Top	133	77	0	-51	3	29	**54**	**55**
DIH-11-1 (Scenario 2) [3]	Lung Poon Court - Lung Wan House	VS-DIH-21	North	106	-	0	-49	3	-		
		VS-DIH-22	North	114	-	0	-49	3	-		
		VS-DIH-23	North	122	81	0	-50	3	34		
		VS-DIH-24	North	123	81	0	-50	3	34		
		VS-DIH-25	North	129	82	0	-50	3	35		
		VS-DIH-26	North	135	81	0	-51	3	33		
		VS-DIH-27	North	137	81	0	-51	3	33		
		VS-DIH-31	South	109	-	-10	-49	3	-		
		VS-DIH-33	South	128	74	-10	-50	3	17		
		VS-DIH-34	South	137	72	-10	-51	3	14		
		VS-DIH-37	North	256	79	0	-56	3	26		
		VS-DIH-39	North	265	79	0	-56	3	26		
		VS-DIH-40	North	267	80	0	-57	3	26		
		VS-DIH-43	North	277	80	0	-57	3	26		
		VS-DIH-47A	South	247	70	-10	-56	3	7		
		VS-DIH-47C	South	247	69	-10	-56	3	6		
		VS-DIH-48A,B,C	North	248	79	0	-56	3	26		
		VS-DIH-48D	Top	249	74	0	-56	3	21		
		VS-DIH-49	North	234	74	0	-55	3	22		
		VS-DIH-49A	North	233	-	0	-55	3	-		
		VS-DIH-50,51	North	276	-	0	-57	3	-		
		VS-DIH-52	East	283	-	-10	-57	3	-		
		VS-DIH-53,54B	South	282	-	-10	-57	3	-		
		VS-DIH-55	East	274	83	-10	-57	3	19		
		VS-DIH-56	South	271	85	-10	-57	3	21		
		VS-DIH-57	South	262	-	-10	-56	3	-		
		VS-DIH-58	South	239	-	-10	-56	3	-		
		VS-DIH-59	West	235	-	0	-55	3	-		
		VS-DIH-60	West	232	78	0	-55	3	26		
		VS-DIH-61	North	235	76	0	-55	3	24		
		VS-DIH-62	North	240	77	0	-56	3	24		
		VS-DIH-63	North	256	77	0	-56	3	24		
		VS-DIH-64A	North	262	-	0	-56	3	-		
		VS-DIH-64B	North	262	77	0	-56	3	24		
		VS-DIH-71	West	234	-	0	-55	3	-		
		VS-DIH-80	Top	88	-	0	-47	3	-		
		VS-DIH-81	Top	93	81	0	-47	3	37		
		VS-DIH-82	Top	104	80	0	-48	3	35		
		VS-DIH-83	Top	114	70	0	-49	3	24		
		VS-DIH-84	Top	96	80	0	-48	3	35		
		VS-DIH-85	Top	104	78	0	-48	3	33		
		VS-DIH-86	Top	118	77	0	-49	3	31		
		VS-DIH-87	Top	239	70	0	-56	3	17		
		VS-DIH-88	Top	259	66	0	-56	3	13		
		CT- DIH-001	Top	132	94	0	-50	3	47		
		CT- DIH-002	Top	138	95	0	-51	3	47		
		CT- DIH-003 [2]	Top	128	94	0	-50	3	47		
		CT- DIH-004 [2]	Top	135	94	0	-51	3	46		
		VCU-001	Top	245	70	0	-56	3	17		
		VCU-002	Top	133	77	0	-51	3	29	**53**	**55**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-12-1											
DIH-12-1 (Scenario 1)[3]	Galaxia Tower B	VS-DIH-21	North	201	-	0	-54	3	-		
		VS-DIH-22	North	197	-	0	-54	3	-		
		VS-DIH-23	North	195	81	0	-54	3	30		
		VS-DIH-24	North	194	81	0	-54	3	30		
		VS-DIH-25	North	192	82	0	-54	3	31		
		VS-DIH-26	North	191	81	0	-54	3	30		
		VS-DIH-27	North	191	81	0	-54	3	30		
		VS-DIH-31	South	216	-	-10	-55	3	-		
		VS-DIH-33	South	208	74	-10	-54	3	13		
		VS-DIH-34	South	205	72	-10	-54	3	11		
		VS-DIH-37	North	211	79	0	-54	3	28		
		VS-DIH-39	North	216	79	0	-55	3	27		
		VS-DIH-40	North	217	80	0	-55	3	28		
		VS-DIH-43	North	222	80	0	-55	3	28		
		VS-DIH-47A	South	219	70	-10	-55	3	8		
		VS-DIH-47C	South	219	69	-10	-55	3	7		
		VS-DIH-48A,B,C	North	209	79	0	-54	3	28		
		VS-DIH-48D	Top	213	74	0	-55	3	22		
		VS-DIH-49	North	203	74	0	-54	3	23		
		VS-DIH-49A	North	203	-	0	-54	3	-		
		VS-DIH-50,51	North	222	82	0	-55	3	30		
		VS-DIH-52	East	229	85	-10	-55	3	23		
		VS-DIH-53,54B	South	231	82	-10	-55	3	20		
		VS-DIH-55	East	229	-	-10	-55	3	-		
		VS-DIH-56	South	229	-	-10	-55	3	-		
		VS-DIH-57	South	225	-	-10	-55	3	-		
		VS-DIH-58	South	216	-	-10	-55	3	-		
		VS-DIH-59	West	212	-	0	-55	3	-		
		VS-DIH-60	West	204	78	0	-54	3	27		
		VS-DIH-61	North	204	76	0	-54	3	25		
		VS-DIH-62	North	205	77	0	-54	3	26		
		VS-DIH-63	North	212	77	0	-55	3	25		
		VS-DIH-64A	North	214	-	0	-55	3	-		
		VS-DIH-64B	North	214	77	0	-55	3	25		
		VS-DIH-71	West	208	-	0	-54	3	-		
		VS-DIH-80	Top	221	84	0	-55	3	32		
		VS-DIH-81	Top	215	-	0	-55	3	-		
		VS-DIH-82	Top	206	80	0	-54	3	29		
		VS-DIH-83	Top	202	70	0	-54	3	19		
		VS-DIH-84	Top	207	80	0	-54	3	29		
		VS-DIH-85	Top	218	78	0	-55	3	26		
		VS-DIH-86	Top	207	77	0	-54	3	26		
		VS-DIH-87	Top	209	70	0	-54	3	19		
		VS-DIH-88	Top	222	66	0	-55	3	14		
		CT- DIH-001	Top	197	94	0	-54	3	43		
		CT- DIH-002	Top	195	95	0	-54	3	44		
		CT- DIH-003[2]	Top	198	94	0	-54	3	43		
		CT- DIH-004[2]	Top	196	94	0	-54	3	43		
		VCU-001	Top	211	70	0	-54	3	19		
		VCU-002	Top	205	77	0	-54	3	26	**50**	**55**
DIH-12-1 (Scenario 2)[3]	Galaxia Tower B	VS-DIH-21	North	201	-	0	-54	3	-		
		VS-DIH-22	North	197	-	0	-54	3	-		
		VS-DIH-23	North	195	81	0	-54	3	30		
		VS-DIH-24	North	194	81	0	-54	3	30		
		VS-DIH-25	North	192	82	0	-54	3	31		
		VS-DIH-26	North	191	81	0	-54	3	30		
		VS-DIH-27	North	191	81	0	-54	3	30		
		VS-DIH-31	South	216	-	-10	-55	3	-		
		VS-DIH-33	South	208	74	-10	-54	3	13		
		VS-DIH-34	South	205	72	-10	-54	3	11		
		VS-DIH-37	North	211	79	0	-54	3	28		
		VS-DIH-39	North	216	79	0	-55	3	27		
		VS-DIH-40	North	217	80	0	-55	3	28		
		VS-DIH-43	North	222	80	0	-55	3	28		
		VS-DIH-47A	South	219	70	-10	-55	3	8		
		VS-DIH-47C	South	219	69	-10	-55	3	7		
		VS-DIH-48A,B,C	North	209	79	0	-54	3	28		
		VS-DIH-48D	Top	213	74	0	-55	3	22		
		VS-DIH-49	North	203	74	0	-54	3	23		
		VS-DIH-49A	North	203	-	0	-54	3	-		
		VS-DIH-50,51	North	222	-	0	-55	3	-		
		VS-DIH-52	East	229	-	-10	-55	3	-		
		VS-DIH-53,54B	South	231	-	-10	-55	3	-		
		VS-DIH-55	East	229	83	-10	-55	3	21		
		VS-DIH-56	South	229	85	-10	-55	3	23		
		VS-DIH-57	South	225	-	-10	-55	3	-		
		VS-DIH-58	South	216	-	-10	-55	3	-		
		VS-DIH-59	West	212	-	0	-55	3	-		
		VS-DIH-60	West	204	78	0	-54	3	27		
		VS-DIH-61	North	204	76	0	-54	3	25		
		VS-DIH-62	North	205	77	0	-54	3	26		
		VS-DIH-63	North	212	77	0	-55	3	25		
		VS-DIH-64A	North	214	-	0	-55	3	-		
		VS-DIH-64B	North	214	77	0	-55	3	25		
		VS-DIH-71	West	208	-	0	-54	3	-		
		VS-DIH-80	Top	221	-	0	-55	3	-		
		VS-DIH-81	Top	215	81	0	-55	3	29		
		VS-DIH-82	Top	206	80	0	-54	3	29		
		VS-DIH-83	Top	202	70	0	-54	3	19		
		VS-DIH-84	Top	207	80	0	-54	3	29		
		VS-DIH-85	Top	218	78	0	-55	3	26		
		VS-DIH-86	Top	207	77	0	-54	3	26		
		VS-DIH-87	Top	209	70	0	-54	3	19		
		VS-DIH-88	Top	222	66	0	-55	3	14		
		CT- DIH-001	Top	197	94	0	-54	3	43		
		CT- DIH-002	Top	195	95	0	-54	3	44		
		CT- DIH-003[2]	Top	198	94	0	-54	3	43		
		CT- DIH-004[2]	Top	196	94	0	-54	3	43		
		VCU-001	Top	211	70	0	-54	3	19		
		VCU-002	Top	205	77	0	-54	3	26	**50**	**55**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-12-2											
DIH-12-2 (Scenario 1)[3]	Galaxia Tower E	VS-DIH-21	North	175	-	0	-53	3	-		
		VS-DIH-22	North	177	-	0	-53	3	-		
		VS-DIH-23	North	180	81	0	-53	3	31		
		VS-DIH-24	North	180	81	0	-53	3	31		
		VS-DIH-25	North	183	82	0	-53	3	32		
		VS-DIH-26	North	185	81	0	-53	3	31		
		VS-DIH-27	North	186	81	0	-53	3	31		
		VS-DIH-31	South	186	-	-10	-53	3	-		
		VS-DIH-33	South	192	74	-10	-54	3	13		
		VS-DIH-34	South	195	72	-10	-54	3	11		
		VS-DIH-37	North	265	79	0	-56	3	26		
		VS-DIH-39	North	273	79	0	-57	3	25		
		VS-DIH-40	North	274	80	0	-57	3	26		
		VS-DIH-43	North	283	80	0	-57	3	26		
		VS-DIH-47A	South	265	70	-10	-56	3	7		
		VS-DIH-47C	South	265	69	-10	-56	3	6		
		VS-DIH-48A,B,C	North	260	79	0	-56	3	26		
		VS-DIH-48D	Top	263	74	0	-56	3	21		
		VS-DIH-49	North	249	74	0	-56	3	21		
		VS-DIH-49A	North	248	-	0	-56	3	-		
		VS-DIH-50,51	North	282	82	0	-57	3	28		
		VS-DIH-52	East	289	85	-10	-57	3	21		
		VS-DIH-53,54B	South	290	82	-10	-57	3	18		
		VS-DIH-55	East	285	-	-10	-57	3	-		
		VS-DIH-56	South	283	-	-10	-57	3	-		
		VS-DIH-57	South	276	-	-10	-57	3	-		
		VS-DIH-58	South	259	-	-10	-56	3	-		
		VS-DIH-59	West	255	-	0	-56	3	-		
		VS-DIH-60	West	249	78	0	-56	3	25		
		VS-DIH-61	North	250	76	0	-56	3	23		
		VS-DIH-62	North	253	77	0	-56	3	24		
		VS-DIH-63	North	266	77	0	-56	3	24		
		VS-DIH-64A	North	270	-	0	-57	3	-		
		VS-DIH-64B	North	270	77	0	-57	3	23		
		VS-DIH-71	West	251	-	0	-56	3	-		
		VS-DIH-80	Top	178	84	0	-53	3	34		
		VS-DIH-81	Top	177	-	0	-53	3	-		
		VS-DIH-82	Top	177	80	0	-53	3	30		
		VS-DIH-83	Top	180	70	0	-53	3	20		
		VS-DIH-84	Top	173	80	0	-53	3	30		
		VS-DIH-85	Top	184	78	0	-53	3	28		
		VS-DIH-86	Top	185	77	0	-53	3	27		
		VS-DIH-87	Top	255	70	0	-56	3	17		
		VS-DIH-88	Top	273	66	0	-57	3	12		
		CT- DIH-001	Top	187	94	0	-53	3	44		
		CT- DIH-002	Top	190	95	0	-54	3	44		
		CT- DIH-003[2]	Top	186	94	0	-53	3	44		
		CT- DIH-004[2]	Top	188	94	0	-54	3	43		
		VCU-001	Top	259	70	0	-56	3	17		
		VCU-002	Top	193	77	0	-54	3	26	**51**	**55**
DIH-12-2 (Scenario 2)[3]	Galaxia Tower E	VS-DIH-21	North	175	-	0	-53	3	-		
		VS-DIH-22	North	177	-	0	-53	3	-		
		VS-DIH-23	North	180	81	0	-53	3	31		
		VS-DIH-24	North	180	81	0	-53	3	31		
		VS-DIH-25	North	183	82	0	-53	3	32		
		VS-DIH-26	North	185	81	0	-53	3	31		
		VS-DIH-27	North	186	81	0	-53	3	31		
		VS-DIH-31	South	186	-	-10	-53	3	-		
		VS-DIH-33	South	192	74	-10	-54	3	13		
		VS-DIH-34	South	195	72	-10	-54	3	11		
		VS-DIH-37	North	265	79	0	-56	3	26		
		VS-DIH-39	North	273	79	0	-57	3	25		
		VS-DIH-40	North	274	80	0	-57	3	26		
		VS-DIH-43	North	283	80	0	-57	3	26		
		VS-DIH-47A	South	265	70	-10	-56	3	7		
		VS-DIH-47C	South	265	69	-10	-56	3	6		
		VS-DIH-48A,B,C	North	260	79	0	-56	3	26		
		VS-DIH-48D	Top	263	74	0	-56	3	21		
		VS-DIH-49	North	249	74	0	-56	3	21		
		VS-DIH-49A	North	248	-	0	-56	3	-		
		VS-DIH-50,51	North	282	-	0	-57	3	-		
		VS-DIH-52	East	289	-	-10	-57	3	-		
		VS-DIH-53,54B	South	290	-	-10	-57	3	-		
		VS-DIH-55	East	285	83	-10	-57	3	19		
		VS-DIH-56	South	283	85	-10	-57	3	21		
		VS-DIH-57	South	276	-	-10	-57	3	-		
		VS-DIH-58	South	259	-	-10	-56	3	-		
		VS-DIH-59	West	255	-	0	-56	3	-		
		VS-DIH-60	West	249	78	0	-56	3	25		
		VS-DIH-61	North	250	76	0	-56	3	23		
		VS-DIH-62	North	253	77	0	-56	3	24		
		VS-DIH-63	North	266	77	0	-56	3	24		
		VS-DIH-64A	North	270	-	0	-57	3	-		
		VS-DIH-64B	North	270	77	0	-57	3	23		
		VS-DIH-71	West	251	-	0	-56	3	-		
		VS-DIH-80	Top	178	-	0	-53	3	-		
		VS-DIH-81	Top	177	81	0	-53	3	31		
		VS-DIH-82	Top	177	80	0	-53	3	30		
		VS-DIH-83	Top	180	70	0	-53	3	20		
		VS-DIH-84	Top	173	80	0	-53	3	30		
		VS-DIH-85	Top	184	78	0	-53	3	28		
		VS-DIH-86	Top	185	77	0	-53	3	27		
		VS-DIH-87	Top	255	70	0	-56	3	17		
		VS-DIH-88	Top	273	66	0	-57	3	12		
		CT- DIH-001	Top	187	94	0	-53	3	44		
		CT- DIH-002	Top	190	95	0	-54	3	44		
		CT- DIH-003[2]	Top	186	94	0	-53	3	44		
		CT- DIH-004[2]	Top	188	94	0	-54	3	43		
		VCU-001	Top	259	70	0	-56	3	17		
		VCU-002	Top	193	77	0	-54	3	26	**50**	**55**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-1A											
DIH-P3-1A (Scenario 1)[3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	41	-	-10	-40	3	-		
		VS-DIH-22	North	44	-	-10	-41	3	-		
		VS-DIH-23	North	49	81	-10	-42	3	32		
		VS-DIH-24	North	50	81	-10	-42	3	32		
		VS-DIH-25	North	55	82	-10	-43	3	32		
		VS-DIH-26	North	60	81	-10	-44	3	30		
		VS-DIH-27	North	61	81	-10	-44	3	30		
		VS-DIH-31	South	27	-	0	-37	3	-		
		VS-DIH-33	South	38	74	0	-40	3	37		
		VS-DIH-34	South	47	72	0	-41	3	34		
		VS-DIH-37	North	176	79	-10	-53	3	19		
		VS-DIH-39	North	186	79	-10	-53	3	19		
		VS-DIH-40	North	188	80	-10	-53	3	20		
		VS-DIH-43	North	198	80	-10	-54	3	19		
		VS-DIH-47A	South	161	70	0	-52	3	21		
		VS-DIH-47C	South	161	69	0	-52	3	20		
		VS-DIH-48A,B,C	North	168	79	-10	-53	3	19		
		VS-DIH-48D	Top	167	74	0	-52	3	25		
		VS-DIH-49	North	154	74	-10	-52	3	15		
		VS-DIH-49A	North	153	-	-10	-52	3	-		
		VS-DIH-50,51	North	197	82	-10	-54	3	21		
		VS-DIH-52	East	201	85	-10	-54	3	24		
		VS-DIH-53,54B	South	199	82	-10	-54	3	21		
		VS-DIH-55	East	190	-	-10	-54	3	-		
		VS-DIH-56	South	185	-	0	-53	3	-		
		VS-DIH-57	South	176	-	0	-53	3	-		
		VS-DIH-58	South	152	-	0	-52	3	-		
		VS-DIH-59	West	149	-	0	-51	3	-		
		VS-DIH-60	West	151	78	0	-52	3	29		
		VS-DIH-61	North	155	76	-10	-52	3	17		
		VS-DIH-62	North	160	77	-10	-52	3	18		
		VS-DIH-63	North	177	77	-10	-53	3	17		
		VS-DIH-64A	North	183	-	-10	-53	3	-		
		VS-DIH-64B	North	183	77	-10	-53	3	17		
		VS-DIH-71	West	151	-	0	-52	3	-		
		VS-DIH-80	Top	40	84	0	-40	3	47		
		VS-DIH-81	Top	37	-	0	-39	3	-		
		VS-DIH-82	Top	37	80	0	-39	3	44		
		VS-DIH-83	Top	40	70	0	-40	3	33		
		VS-DIH-84	Top	39	80	0	-40	3	43		
		VS-DIH-85	Top	28	78	0	-37	3	44		
		VS-DIH-86	Top	35	77	0	-39	3	41		
		VS-DIH-87	Top	156	70	0	-52	3	21		
		VS-DIH-88	Top	174	66	0	-53	3	16		
		CT- DIH-001	Top	52	94	-10	-42	3	45		
		CT- DIH-002	Top	58	95	-10	-43	3	45		
		CT- DIH-003[2]	Top	49	94	-10	-42	3	45		
		CT- DIH-004[2]	Top	55	94	-10	-43	3	44		
		VCU-001	Top	163	70	0	-52	3	21		
		VCU-002	Top	45	77	0	-41	3	39	**54**	**55**
DIH-P3-1A (Scenario 2)[3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	41	-	-10	-40	3	-		
		VS-DIH-22	North	44	-	-10	-41	3	-		
		VS-DIH-23	North	49	81	-10	-42	3	32		
		VS-DIH-24	North	50	81	-10	-42	3	32		
		VS-DIH-25	North	55	82	-10	-43	3	32		
		VS-DIH-26	North	60	81	-10	-44	3	30		
		VS-DIH-27	North	61	81	-10	-44	3	30		
		VS-DIH-31	South	27	-	0	-37	3	-		
		VS-DIH-33	South	38	74	0	-40	3	37		
		VS-DIH-34	South	47	72	0	-41	3	34		
		VS-DIH-37	North	176	79	-10	-53	3	19		
		VS-DIH-39	North	186	79	-10	-53	3	19		
		VS-DIH-40	North	188	80	-10	-53	3	20		
		VS-DIH-43	North	198	80	-10	-54	3	19		
		VS-DIH-47A	South	161	70	0	-52	3	21		
		VS-DIH-47C	South	161	69	0	-52	3	20		
		VS-DIH-48A,B,C	North	168	79	-10	-53	3	19		
		VS-DIH-48D	Top	167	74	0	-52	3	25		
		VS-DIH-49	North	154	74	-10	-52	3	15		
		VS-DIH-49A	North	153	-	-10	-52	3	-		
		VS-DIH-50,51	North	197	-	-10	-54	3	-		
		VS-DIH-52	East	201	-	-10	-54	3	-		
		VS-DIH-53,54B	South	199	-	-10	-54	3	-		
		VS-DIH-55	East	190	83	-10	-54	3	22		
		VS-DIH-56	South	185	85	0	-53	3	35		
		VS-DIH-57	South	176	-	0	-53	3	-		
		VS-DIH-58	South	152	-	0	-52	3	-		
		VS-DIH-59	West	149	-	0	-51	3	-		
		VS-DIH-60	West	151	78	0	-52	3	29		
		VS-DIH-61	North	155	76	-10	-52	3	17		
		VS-DIH-62	North	160	77	-10	-52	3	18		
		VS-DIH-63	North	177	77	-10	-53	3	17		
		VS-DIH-64A	North	183	-	-10	-53	3	-		
		VS-DIH-64B	North	183	77	-10	-53	3	17		
		VS-DIH-71	West	151	-	0	-52	3	-		
		VS-DIH-80	Top	40	-	0	-40	3	-		
		VS-DIH-81	Top	37	81	0	-39	3	45		
		VS-DIH-82	Top	37	80	0	-39	3	44		
		VS-DIH-83	Top	40	70	0	-40	3	33		
		VS-DIH-84	Top	39	80	0	-40	3	43		
		VS-DIH-85	Top	28	78	0	-37	3	44		
		VS-DIH-86	Top	35	77	0	-39	3	41		
		VS-DIH-87	Top	156	70	0	-52	3	21		
		VS-DIH-88	Top	174	66	0	-53	3	16		
		CT- DIH-001	Top	52	94	-10	-42	3	45		
		CT- DIH-002	Top	58	95	-10	-43	3	45		
		CT- DIH-003[2]	Top	49	94	-10	-42	3	45		
		CT- DIH-004[2]	Top	55	94	-10	-43	3	44		
		VCU-001	Top	163	70	0	-52	3	21		
		VCU-002	Top	45	77	0	-41	3	39	**54**	**55**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-1B											
DIH-P3-1B (Scenario 1)[3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	47	-	-10	-41	3	-		
		VS-DIH-22	North	43	-	-10	-41	3	-		
		VS-DIH-23	North	41	81	-10	-40	3	34		
		VS-DIH-24	North	41	81	-10	-40	3	34		
		VS-DIH-25	North	42	82	-10	-40	3	35		
		VS-DIH-26	North	43	81	-10	-41	3	33		
		VS-DIH-27	North	44	81	-10	-41	3	33		
		VS-DIH-31	South	41	-	0	-40	3	-		
		VS-DIH-33	South	29	74	0	-37	3	40		
		VS-DIH-34	South	29	72	0	-37	3	38		
		VS-DIH-37	North	146	79	-10	-51	3	21		
		VS-DIH-39	North	155	79	-10	-52	3	20		
		VS-DIH-40	North	157	80	-10	-52	3	21		
		VS-DIH-43	North	168	80	-10	-52	3	21		
		VS-DIH-47A	South	130	70	0	-50	3	23		
		VS-DIH-47C	South	130	69	0	-50	3	22		
		VS-DIH-48A,B,C	North	138	79	-10	-51	3	21		
		VS-DIH-48D	Top	136	74	0	-51	3	26		
		VS-DIH-49	North	124	74	-10	-50	3	17		
		VS-DIH-49A	North	123	-	-10	-50	3	-		
		VS-DIH-50,51	North	166	82	-10	-52	3	23		
		VS-DIH-52	East	170	85	-10	-53	3	25		
		VS-DIH-53,54B	South	168	82	-5	-53	3	27		
		VS-DIH-55	East	159	-	-10	-52	3	-		
		VS-DIH-56	South	154	-	0	-52	3	-		
		VS-DIH-57	South	145	-	0	-51	3	-		
		VS-DIH-58	South	121	-	0	-50	3	-		
		VS-DIH-59	West	119	-	0	-49	3	-		
		VS-DIH-60	West	121	78	0	-50	3	31		
		VS-DIH-61	North	125	76	-10	-50	3	19		
		VS-DIH-62	North	130	77	-10	-50	3	20		
		VS-DIH-63	North	146	77	-10	-51	3	19		
		VS-DIH-64A	North	152	-	-10	-52	3	-		
		VS-DIH-64B	North	152	77	-10	-52	3	18		
		VS-DIH-71	West	120	-	0	-50	3	-		
		VS-DIH-80	Top	65	84	0	-44	3	43		
		VS-DIH-81	Top	57	-	0	-43	3	-		
		VS-DIH-82	Top	47	80	0	-41	3	42		
		VS-DIH-83	Top	40	70	0	-40	3	33		
		VS-DIH-84	Top	54	80	0	-43	3	40		
		VS-DIH-85	Top	47	78	0	-41	3	40		
		VS-DIH-86	Top	35	77	0	-39	3	41		
		VS-DIH-87	Top	125	70	0	-50	3	23		
		VS-DIH-88	Top	143	66	0	-51	3	18		
		CT- DIH-001	Top	37	94	-10	-39	3	48		
		CT- DIH-002	Top	39	95	-10	-40	3	48		
		CT- DIH-003[2]	Top	37	94	-10	-39	3	48		
		CT- DIH-004[2]	Top	38	94	-10	-40	3	47		
		VCU-001	Top	132	70	0	-50	3	23		
		VCU-002	Top	29	77	0	-37	3	43	**55**	**55**
DIH-P3-1B (Scenario 2)[3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	47	-	-10	-41	3	-		
		VS-DIH-22	North	43	-	-10	-41	3	-		
		VS-DIH-23	North	41	81	-10	-40	3	34		
		VS-DIH-24	North	41	81	-10	-40	3	34		
		VS-DIH-25	North	42	82	-10	-40	3	35		
		VS-DIH-26	North	43	81	-10	-41	3	33		
		VS-DIH-27	North	44	81	-10	-41	3	33		
		VS-DIH-31	South	41	-	0	-40	3	-		
		VS-DIH-33	South	29	74	0	-37	3	40		
		VS-DIH-34	South	29	72	0	-37	3	38		
		VS-DIH-37	North	146	79	-10	-51	3	21		
		VS-DIH-39	North	155	79	-10	-52	3	20		
		VS-DIH-40	North	157	80	-10	-52	3	21		
		VS-DIH-43	North	168	80	-10	-52	3	21		
		VS-DIH-47A	South	130	70	0	-50	3	23		
		VS-DIH-47C	South	130	69	0	-50	3	22		
		VS-DIH-48A,B,C	North	138	79	-10	-51	3	21		
		VS-DIH-48D	Top	136	74	0	-51	3	26		
		VS-DIH-49	North	124	74	-10	-50	3	17		
		VS-DIH-49A	North	123	-	-10	-50	3	-		
		VS-DIH-50,51	North	166	-	-10	-52	3	-		
		VS-DIH-52	East	170	-	-10	-53	3	-		
		VS-DIH-53,54B	South	168	-	-5	-53	3	-		
		VS-DIH-55	East	159	83	-10	-52	3	24		
		VS-DIH-56	South	154	85	0	-52	3	36		
		VS-DIH-57	South	145	-	0	-51	3	-		
		VS-DIH-58	South	121	-	0	-50	3	-		
		VS-DIH-59	West	119	-	0	-49	3	-		
		VS-DIH-60	West	121	78	0	-50	3	31		
		VS-DIH-61	North	125	76	-10	-50	3	19		
		VS-DIH-62	North	130	77	-10	-50	3	20		
		VS-DIH-63	North	146	77	-10	-51	3	19		
		VS-DIH-64A	North	152	-	-10	-52	3	-		
		VS-DIH-64B	North	152	77	-10	-52	3	18		
		VS-DIH-71	West	120	-	0	-50	3	-		
		VS-DIH-80	Top	65	-	0	-44	3	-		
		VS-DIH-81	Top	57	81	0	-43	3	41		
		VS-DIH-82	Top	47	80	0	-41	3	42		
		VS-DIH-83	Top	40	70	0	-40	3	33		
		VS-DIH-84	Top	54	80	0	-43	3	40		
		VS-DIH-85	Top	47	78	0	-41	3	40		
		VS-DIH-86	Top	35	77	0	-39	3	41		
		VS-DIH-87	Top	125	70	0	-50	3	23		
		VS-DIH-88	Top	143	66	0	-51	3	18		
		CT- DIH-001	Top	37	94	-10	-39	3	48		
		CT- DIH-002	Top	39	95	-10	-40	3	48		
		CT- DIH-003[2]	Top	37	94	-10	-39	3	48		
		CT- DIH-004[2]	Top	38	94	-10	-40	3	47		
		VCU-001	Top	132	70	0	-50	3	23		
		VCU-002	Top	29	77	0	-37	3	43	**55**	**55**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-2A											
DIH-P3-2A (Scenario 1) [3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	156	-	-10	-52	3	-		
		VS-DIH-22	North	146	-	-10	-51	3	-		
		VS-DIH-23	North	137	81	-10	-51	3	23		
		VS-DIH-24	North	135	81	-10	-51	3	23		
		VS-DIH-25	North	128	82	-10	-50	3	25		
		VS-DIH-26	North	122	81	-10	-50	3	24		
		VS-DIH-27	North	120	81	-10	-50	3	24		
		VS-DIH-31	South	162	-	0	-52	3	-		
		VS-DIH-33	South	137	74	0	-51	3	26		
		VS-DIH-34	South	126	72	0	-50	3	25		
		VS-DIH-37	North	25	79	-10	-36	3	36		
		VS-DIH-39	North	30	79	-10	-38	3	34		
		VS-DIH-40	North	31	80	-10	-38	3	35		
		VS-DIH-43	North	39	80	-10	-40	3	33		
		VS-DIH-47A	South	11	70	0	-29	3	44		
		VS-DIH-47C	South	11	69	0	-29	3	43		
		VS-DIH-48A,B,C	North	23	79	-10	-35	3	37		
		VS-DIH-48D	Top	18	74	0	-33	3	44		
		VS-DIH-49	North	27	74	-10	-36	3	31		
		VS-DIH-49A	North	27	-	-10	-37	3	-		
		VS-DIH-50,51	North	38	82	-10	-40	3	35		
		VS-DIH-52	East	40	85	-10	-40	3	38		
		VS-DIH-53,54B	South	37	82	0	-39	3	46		
		VS-DIH-55	East	28	-	-10	-37	3	-		
		VS-DIH-56	South	23	-	0	-35	3	-		
		VS-DIH-57	South	15	-	0	-32	3	-		
		VS-DIH-58	South	16	-	0	-32	3	-		
		VS-DIH-59	West	20	-	-10	-34	3	-		
		VS-DIH-60	West	26	78	-10	-36	3	35		
		VS-DIH-61	North	26	76	-10	-36	3	33		
		VS-DIH-62	North	24	77	-10	-36	3	34		
		VS-DIH-63	North	25	77	-10	-36	3	34		
		VS-DIH-64A	North	28	-	-10	-37	3	-		
		VS-DIH-64B	North	28	77	-10	-37	3	33		
		VS-DIH-71	West	23	-	-10	-35	3	-		
		VS-DIH-80	Top	187	84	0	-53	3	34		
		VS-DIH-81	Top	178	-	0	-53	3	-		
		VS-DIH-82	Top	161	80	0	-52	3	31		
		VS-DIH-83	Top	148	70	0	-51	3	22		
		VS-DIH-84	Top	170	80	0	-53	3	30		
		VS-DIH-85	Top	169	78	0	-53	3	28		
		VS-DIH-86	Top	147	77	0	-51	3	29		
		VS-DIH-87	Top	21	70	0	-34	3	39		
		VS-DIH-88	Top	15	66	0	-31	3	38		
		CT- DIH-001	Top	128	94	-10	-50	3	37		
		CT- DIH-002	Top	120	95	-10	-50	3	38		
		CT- DIH-003 [2]	Top	131	94	-10	-50	3	37		
		CT- DIH-004 [2]	Top	124	94	-10	-50	3	37		
		VCU-001	Top	19	70	0	-34	3	39		
		VCU-002	Top	129	77	0	-50	3	30	**53**	**55**
DIH-P3-2A (Scenario 2) [3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	156	-	-10	-52	3	-		
		VS-DIH-22	North	146	-	-10	-51	3	-		
		VS-DIH-23	North	137	81	-10	-51	3	23		
		VS-DIH-24	North	135	81	-10	-51	3	23		
		VS-DIH-25	North	128	82	-10	-50	3	25		
		VS-DIH-26	North	122	81	-10	-50	3	24		
		VS-DIH-27	North	120	81	-10	-50	3	24		
		VS-DIH-31	South	162	-	0	-52	3	-		
		VS-DIH-33	South	137	74	0	-51	3	26		
		VS-DIH-34	South	126	72	0	-50	3	25		
		VS-DIH-37	North	25	79	-10	-36	3	36		
		VS-DIH-39	North	30	79	-10	-38	3	34		
		VS-DIH-40	North	31	80	-10	-38	3	35		
		VS-DIH-43	North	39	80	-10	-40	3	33		
		VS-DIH-47A	South	11	70	0	-29	3	44		
		VS-DIH-47C	South	11	69	0	-29	3	43		
		VS-DIH-48A,B,C	North	23	79	-10	-35	3	37		
		VS-DIH-48D	Top	18	74	0	-33	3	44		
		VS-DIH-49	North	27	74	-10	-36	3	31		
		VS-DIH-49A	North	27	-	-10	-37	3	-		
		VS-DIH-50,51	North	38	-	-10	-40	3	-		
		VS-DIH-52	East	40	-	-10	-40	3	-		
		VS-DIH-53,54B	South	37	-	0	-39	3	-		
		VS-DIH-55	East	28	83	-10	-37	3	39		
		VS-DIH-56	South	23	85	0	-35	3	53		
		VS-DIH-57	South	15	-	0	-32	3	-		
		VS-DIH-58	South	16	-	0	-32	3	-		
		VS-DIH-59	West	20	-	-10	-34	3	-		
		VS-DIH-60	West	26	78	-10	-36	3	35		
		VS-DIH-61	North	26	76	-10	-36	3	33		
		VS-DIH-62	North	24	77	-10	-36	3	34		
		VS-DIH-63	North	25	77	-10	-36	3	34		
		VS-DIH-64A	North	28	-	-10	-37	3	-		
		VS-DIH-64B	North	28	77	-10	-37	3	33		
		VS-DIH-71	West	23	-	-10	-35	3	-		
		VS-DIH-80	Top	187	-	0	-53	3	-		
		VS-DIH-81	Top	178	81	0	-53	3	31		
		VS-DIH-82	Top	161	80	0	-52	3	31		
		VS-DIH-83	Top	148	70	0	-51	3	22		
		VS-DIH-84	Top	170	80	0	-53	3	30		
		VS-DIH-85	Top	169	78	0	-53	3	28		
		VS-DIH-86	Top	147	77	0	-51	3	29		
		VS-DIH-87	Top	21	70	0	-34	3	39		
		VS-DIH-88	Top	15	66	0	-31	3	38		
		CT- DIH-001	Top	128	94	-10	-50	3	37		
		CT- DIH-002	Top	120	95	-10	-50	3	38		
		CT- DIH-003 [2]	Top	131	94	-10	-50	3	37		
		CT- DIH-004 [2]	Top	124	94	-10	-50	3	37		
		VCU-001	Top	19	70	0	-34	3	39		
		VCU-002	Top	129	77	0	-50	3	30	**55**	**55**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-2B											
DIH-P3-2B (Scenario 1)[3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	204	-	-10	-54	3	-		
		VS-DIH-22	North	194	-	-10	-54	3	-		
		VS-DIH-23	North	185	81	-10	-53	3	21		
		VS-DIH-24	North	183	81	-10	-53	3	21		
		VS-DIH-25	North	176	82	-10	-53	3	22		
		VS-DIH-26	North	169	81	-10	-53	3	21		
		VS-DIH-27	North	168	81	-10	-52	3	22		
		VS-DIH-31	South	211	-	0	-54	3	-		
		VS-DIH-33	South	185	74	0	-53	3	24		
		VS-DIH-34	South	174	72	0	-53	3	22		
		VS-DIH-37	North	47	79	-10	-41	3	31		
		VS-DIH-39	North	39	79	-10	-40	3	32		
		VS-DIH-40	North	38	80	-10	-39	3	34		
		VS-DIH-43	North	30	80	-10	-38	3	35		
		VS-DIH-47A	South	54	70	0	-43	3	30		
		VS-DIH-47C	South	54	69	0	-43	3	29		
		VS-DIH-48A,B,C	North	54	79	-10	-43	3	29		
		VS-DIH-48D	Top	52	74	0	-42	3	35		
		VS-DIH-49	North	66	74	-10	-44	3	23		
		VS-DIH-49A	North	68	-	-10	-45	3	-		
		VS-DIH-50,51	North	31	82	-10	-38	3	37		
		VS-DIH-52	East	24	85	0	-36	3	52		
		VS-DIH-53,54B	South	22	82	0	-35	3	50		
		VS-DIH-55	East	27	-	0	-37	3	-		
		VS-DIH-56	South	30	-	0	-38	3	-		
		VS-DIH-57	South	39	-	0	-40	3	-		
		VS-DIH-58	South	63	-	0	-44	3	-		
		VS-DIH-59	West	66	-	-10	-44	3	-		
		VS-DIH-60	West	68	78	-10	-45	3	26		
		VS-DIH-61	North	66	76	-10	-44	3	25		
		VS-DIH-62	North	61	77	-10	-44	3	26		
		VS-DIH-63	North	46	77	-10	-41	3	29		
		VS-DIH-64A	North	42	-	-10	-40	3	-		
		VS-DIH-64B	North	42	77	-10	-40	3	30		
		VS-DIH-71	West	67	-	-10	-45	3	-		
		VS-DIH-80	Top	236	84	0	-55	3	32		
		VS-DIH-81	Top	226	-	0	-55	3	-		
		VS-DIH-82	Top	209	80	0	-54	3	29		
		VS-DIH-83	Top	197	70	0	-54	3	19		
		VS-DIH-84	Top	218	80	0	-55	3	28		
		VS-DIH-85	Top	217	78	0	-55	3	26		
		VS-DIH-86	Top	196	77	0	-54	3	26		
		VS-DIH-87	Top	62	70	0	-44	3	29		
		VS-DIH-88	Top	42	66	0	-40	3	29		
		CT- DIH-001	Top	176	94	-10	-53	3	34		
		CT- DIH-002	Top	168	95	-10	-52	3	36		
		CT- DIH-003[2]	Top	180	94	-10	-53	3	34		
		CT- DIH-004[2]	Top	172	94	-10	-53	3	34		
		VCU-001	Top	56	70	0	-43	3	30		
		VCU-002	Top	178	77	0	-53	3	27	**55**	**55**
DIH-P3-2B (Scenario 2)[3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	204	-	-10	-54	3	-		
		VS-DIH-22	North	194	-	-10	-54	3	-		
		VS-DIH-23	North	185	81	-10	-53	3	21		
		VS-DIH-24	North	183	81	-10	-53	3	21		
		VS-DIH-25	North	176	82	-10	-53	3	22		
		VS-DIH-26	North	169	81	-10	-53	3	21		
		VS-DIH-27	North	168	81	-10	-52	3	22		
		VS-DIH-31	South	211	-	0	-54	3	-		
		VS-DIH-33	South	185	74	0	-53	3	24		
		VS-DIH-34	South	174	72	0	-53	3	22		
		VS-DIH-37	North	47	79	-10	-41	3	31		
		VS-DIH-39	North	39	79	-10	-40	3	32		
		VS-DIH-40	North	38	80	-10	-39	3	34		
		VS-DIH-43	North	30	80	-10	-38	3	35		
		VS-DIH-47A	South	54	70	0	-43	3	30		
		VS-DIH-47C	South	54	69	0	-43	3	29		
		VS-DIH-48A,B,C	North	54	79	-10	-43	3	29		
		VS-DIH-48D	Top	52	74	0	-42	3	35		
		VS-DIH-49	North	66	74	-10	-44	3	23		
		VS-DIH-49A	North	68	-	-10	-45	3	-		
		VS-DIH-50,51	North	31	-	-10	-38	3	-		
		VS-DIH-52	East	24	-	0	-36	3	-		
		VS-DIH-53,54B	South	22	-	0	-35	3	-		
		VS-DIH-55	East	27	83	0	-37	3	49		
		VS-DIH-56	South	30	85	0	-38	3	50		
		VS-DIH-57	South	39	-	0	-40	3	-		
		VS-DIH-58	South	63	-	0	-44	3	-		
		VS-DIH-59	West	66	-	-10	-44	3	-		
		VS-DIH-60	West	68	78	-10	-45	3	26		
		VS-DIH-61	North	66	76	-10	-44	3	25		
		VS-DIH-62	North	61	77	-10	-44	3	26		
		VS-DIH-63	North	46	77	-10	-41	3	29		
		VS-DIH-64A	North	42	-	-10	-40	3	-		
		VS-DIH-64B	North	42	77	-10	-40	3	30		
		VS-DIH-71	West	67	-	-10	-45	3	-		
		VS-DIH-80	Top	236	-	0	-55	3	-		
		VS-DIH-81	Top	226	81	0	-55	3	29		
		VS-DIH-82	Top	209	80	0	-54	3	29		
		VS-DIH-83	Top	197	70	0	-54	3	19		
		VS-DIH-84	Top	218	80	0	-55	3	28		
		VS-DIH-85	Top	217	78	0	-55	3	26		
		VS-DIH-86	Top	196	77	0	-54	3	26		
		VS-DIH-87	Top	62	70	0	-44	3	29		
		VS-DIH-88	Top	42	66	0	-40	3	29		
		CT- DIH-001	Top	176	94	-10	-53	3	34		
		CT- DIH-002	Top	168	95	-10	-52	3	36		
		CT- DIH-003[2]	Top	180	94	-10	-53	3	34		
		CT- DIH-004[2]	Top	172	94	-10	-53	3	34		
		VCU-001	Top	56	70	0	-43	3	30		
		VCU-002	Top	178	77	0	-53	3	27	**54**	**55**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-3											
DIH-P3-3 (Scenario 1)[3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	95	-	-10	-48	3	-		
		VS-DIH-22	North	86	-	-10	-47	3	-		
		VS-DIH-23	North	77	81	-10	-46	3	28		
		VS-DIH-24	North	76	81	-10	-46	3	28		
		VS-DIH-25	North	70	82	-10	-45	3	30		
		VS-DIH-26	North	64	81	-10	-44	3	30		
		VS-DIH-27	North	63	81	-10	-44	3	30		
		VS-DIH-31	South	98	-	0	-48	3	-		
		VS-DIH-33	South	74	74	0	-45	3	32		
		VS-DIH-34	South	63	72	0	-44	3	31		
		VS-DIH-37	North	83	79	-10	-46	3	26		
		VS-DIH-39	North	92	79	-10	-47	3	25		
		VS-DIH-40	North	94	80	-10	-47	3	26		
		VS-DIH-43	North	104	80	-10	-48	3	25		
		VS-DIH-47A	South	66	70	0	-44	3	29		
		VS-DIH-47C	South	66	69	0	-44	3	28		
		VS-DIH-48A,B,C	North	76	79	-10	-46	3	26		
		VS-DIH-48D	Top	73	74	0	-45	3	32		
		VS-DIH-49	North	63	74	-10	-44	3	23		
		VS-DIH-49A	North	62	-	-10	-44	3	-		
		VS-DIH-50,51	North	102	82	-10	-48	3	27		
		VS-DIH-52	East	106	85	-10	-49	3	29		
		VS-DIH-53,54B	South	103	82	-10	-48	3	27		
		VS-DIH-55	East	94	-	-10	-48	3	-		
		VS-DIH-56	South	89	-	0	-47	3	-		
		VS-DIH-57	South	81	-	0	-46	3	-		
		VS-DIH-58	South	57	-	0	-43	3	-		
		VS-DIH-59	West	55	-	0	-43	3	-		
		VS-DIH-60	West	60	78	0	-44	3	37		
		VS-DIH-61	North	64	76	-10	-44	3	25		
		VS-DIH-62	North	68	77	-10	-45	3	25		
		VS-DIH-63	North	83	77	-10	-46	3	24		
		VS-DIH-64A	North	89	-	-10	-47	3	-		
		VS-DIH-64B	North	89	77	-10	-47	3	23		
		VS-DIH-71	West	58	-	0	-43	3	-		
		VS-DIH-80	Top	124	84	0	-50	3	37		
		VS-DIH-81	Top	115	-	0	-49	3	-		
		VS-DIH-82	Top	99	80	0	-48	3	35		
		VS-DIH-83	Top	87	70	0	-47	3	26		
		VS-DIH-84	Top	108	80	0	-49	3	34		
		VS-DIH-85	Top	105	78	0	-48	3	33		
		VS-DIH-86	Top	85	77	0	-47	3	33		
		VS-DIH-87	Top	63	70	0	-44	3	29		
		VS-DIH-88	Top	78	66	0	-46	3	23		
		CT- DIH-001	Top	68	94	-10	-45	3	42		
		CT- DIH-002	Top	61	95	-10	-44	3	44		
		CT- DIH-003[2]	Top	71	94	-10	-45	3	42		
		CT- DIH-004[2]	Top	64	94	-10	-44	3	43		
		VCU-001	Top	69	70	0	-45	3	28		
		VCU-002	Top	67	77	0	-45	3	35	**51**	**55**
DIH-P3-3 (Scenario 2)[3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	95	-	-10	-48	3	-		
		VS-DIH-22	North	86	-	-10	-47	3	-		
		VS-DIH-23	North	77	81	-10	-46	3	28		
		VS-DIH-24	North	76	81	-10	-46	3	28		
		VS-DIH-25	North	70	82	-10	-45	3	30		
		VS-DIH-26	North	64	81	-10	-44	3	30		
		VS-DIH-27	North	63	81	-10	-44	3	30		
		VS-DIH-31	South	98	-	0	-48	3	-		
		VS-DIH-33	South	74	74	0	-45	3	32		
		VS-DIH-34	South	63	72	0	-44	3	31		
		VS-DIH-37	North	83	79	-10	-46	3	26		
		VS-DIH-39	North	92	79	-10	-47	3	25		
		VS-DIH-40	North	94	80	-10	-47	3	26		
		VS-DIH-43	North	104	80	-10	-48	3	25		
		VS-DIH-47A	South	66	70	0	-44	3	29		
		VS-DIH-47C	South	66	69	0	-44	3	28		
		VS-DIH-48A,B,C	North	76	79	-10	-46	3	26		
		VS-DIH-48D	Top	73	74	0	-45	3	32		
		VS-DIH-49	North	63	74	-10	-44	3	23		
		VS-DIH-49A	North	62	-	-10	-44	3	-		
		VS-DIH-50,51	North	102	-	-10	-48	3	-		
		VS-DIH-52	East	106	-	-10	-49	3	-		
		VS-DIH-53,54B	South	103	-	-10	-48	3	-		
		VS-DIH-55	East	94	83	-10	-48	3	28		
		VS-DIH-56	South	89	85	0	-47	3	41		
		VS-DIH-57	South	81	-	0	-46	3	-		
		VS-DIH-58	South	57	-	0	-43	3	-		
		VS-DIH-59	West	55	-	0	-43	3	-		
		VS-DIH-60	West	60	78	0	-44	3	37		
		VS-DIH-61	North	64	76	-10	-44	3	25		
		VS-DIH-62	North	68	77	-10	-45	3	25		
		VS-DIH-63	North	83	77	-10	-46	3	24		
		VS-DIH-64A	North	89	-	-10	-47	3	-		
		VS-DIH-64B	North	89	77	-10	-47	3	23		
		VS-DIH-71	West	58	-	0	-43	3	-		
		VS-DIH-80	Top	124	-	0	-50	3	-		
		VS-DIH-81	Top	115	81	0	-49	3	35		
		VS-DIH-82	Top	99	80	0	-48	3	35		
		VS-DIH-83	Top	87	70	0	-47	3	26		
		VS-DIH-84	Top	108	80	0	-49	3	34		
		VS-DIH-85	Top	105	78	0	-48	3	33		
		VS-DIH-86	Top	85	77	0	-47	3	33		
		VS-DIH-87	Top	63	70	0	-44	3	29		
		VS-DIH-88	Top	78	66	0	-46	3	23		
		CT- DIH-001	Top	68	94	-10	-45	3	42		
		CT- DIH-002	Top	61	95	-10	-44	3	44		
		CT- DIH-003[2]	Top	71	94	-10	-45	3	42		
		CT- DIH-004[2]	Top	64	94	-10	-44	3	43		
		VCU-001	Top	69	70	0	-45	3	28		
		VCU-002	Top	67	77	0	-45	3	35	**51**	**55**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-5											
DIH-P3-5 (West façade of Pavilion) (Scenario 1) [3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	91	-	-5	-47	3	-		
		VS-DIH-22	North	81	-	-5	-46	3	-		
		VS-DIH-23	North	72	81	-5	-45	3	34		
		VS-DIH-24	North	71	81	-5	-45	3	34		
		VS-DIH-25	North	64	82	-5	-44	3	36		
		VS-DIH-26	North	57	81	-5	-43	3	36		
		VS-DIH-27	North	55	81	-5	-43	3	36		
		VS-DIH-31	South	99	-	-5	-48	3	-		
		VS-DIH-33	South	73	74	-5	-45	3	27		
		VS-DIH-34	South	62	72	-5	-44	3	26		
		VS-DIH-37	North	73	79	-10	-45	3	27		
		VS-DIH-39	North	83	79	-10	-46	3	26		
		VS-DIH-40	North	85	80	-10	-47	3	26		
		VS-DIH-43	North	95	80	-10	-48	3	25		
		VS-DIH-47A	South	59	70	-10	-43	3	20		
		VS-DIH-47C	South	59	69	-10	-43	3	19		
		VS-DIH-48A,B,C	North	65	79	-10	-44	3	28		
		VS-DIH-48D	Top	64	74	-10	-44	3	23		
		VS-DIH-49	North	51	74	-10	-42	3	25		
		VS-DIH-49A	North	49	-	-10	-42	3	-		
		VS-DIH-50,51	North	94	82	-10	-47	3	28		
		VS-DIH-52	East	99	85	-10	-48	3	30		
		VS-DIH-53,54B	South	97	82	-10	-48	3	27		
		VS-DIH-55	East	88	-	-10	-47	3	-		
		VS-DIH-56	South	84	-	-10	-46	3	-		
		VS-DIH-57	South	75	-	-10	-45	3	-		
		VS-DIH-58	South	50	-	-10	-42	3	-		
		VS-DIH-59	West	47	-	-10	-41	3	-		
		VS-DIH-60	West	48	78	-10	-42	3	29		
		VS-DIH-61	North	52	76	-10	-42	3	27		
		VS-DIH-62	North	57	77	-10	-43	3	27		
		VS-DIH-63	North	73	77	-10	-45	3	25		
		VS-DIH-64A	North	79	-	-10	-46	3	-		
		VS-DIH-64B	North	79	77	-10	-46	3	24		
		VS-DIH-71	West	48	-	-10	-42	3	-		
		VS-DIH-80	Top	123	84	0	-50	3	37		
		VS-DIH-81	Top	114	-	0	-49	3	-		
		VS-DIH-82	Top	96	80	0	-48	3	35		
		VS-DIH-83	Top	84	70	0	-46	3	27		
		VS-DIH-84	Top	105	80	0	-48	3	35		
		VS-DIH-85	Top	105	78	0	-48	3	33		
		VS-DIH-86	Top	83	77	0	-46	3	34		
		VS-DIH-87	Top	53	70	-10	-42	3	21		
		VS-DIH-88	Top	72	66	-10	-45	3	14		
		CT- DIH-001	Top	63	94	-10	-44	3	43		
		CT- DIH-002	Top	55	95	-10	-43	3	45		
		CT- DIH-003 [2]	Top	67	94	-10	-45	3	42		
		CT- DIH-004 [2]	Top	59	94	-10	-43	3	44		
		VCU-001	Top	60	70	-10	-44	3	19		
		VCU-002	Top	65	77	0	-44	3	36	**51**	**55**
DIH-P3-5 (West façade of Pavilion) (Scenario 2) [3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	91	-	-5	-47	3	-		
		VS-DIH-22	North	81	-	-5	-46	3	-		
		VS-DIH-23	North	72	81	-5	-45	3	34		
		VS-DIH-24	North	71	81	-5	-45	3	34		
		VS-DIH-25	North	64	82	-5	-44	3	36		
		VS-DIH-26	North	57	81	-5	-43	3	36		
		VS-DIH-27	North	55	81	-5	-43	3	36		
		VS-DIH-31	South	99	-	-5	-48	3	-		
		VS-DIH-33	South	73	74	-5	-45	3	27		
		VS-DIH-34	South	62	72	-5	-44	3	26		
		VS-DIH-37	North	73	79	-10	-45	3	27		
		VS-DIH-39	North	83	79	-10	-46	3	26		
		VS-DIH-40	North	85	80	-10	-47	3	26		
		VS-DIH-43	North	95	80	-10	-48	3	25		
		VS-DIH-47A	South	59	70	-10	-43	3	20		
		VS-DIH-47C	South	59	69	-10	-43	3	19		
		VS-DIH-48A,B,C	North	65	79	-10	-44	3	28		
		VS-DIH-48D	Top	64	74	-10	-44	3	23		
		VS-DIH-49	North	51	74	-10	-42	3	25		
		VS-DIH-49A	North	49	-	-10	-42	3	-		
		VS-DIH-50,51	North	94	-	-10	-47	3	-		
		VS-DIH-52	East	99	-	-10	-48	3	-		
		VS-DIH-53,54B	South	97	-	-10	-48	3	-		
		VS-DIH-55	East	88	83	-10	-47	3	29		
		VS-DIH-56	South	84	85	-10	-46	3	32		
		VS-DIH-57	South	75	-	-10	-45	3	-		
		VS-DIH-58	South	50	-	-10	-42	3	-		
		VS-DIH-59	West	47	-	-10	-41	3	-		
		VS-DIH-60	West	48	78	-10	-42	3	29		
		VS-DIH-61	North	52	76	-10	-42	3	27		
		VS-DIH-62	North	57	77	-10	-43	3	27		
		VS-DIH-63	North	73	77	-10	-45	3	25		
		VS-DIH-64A	North	79	-	-10	-46	3	-		
		VS-DIH-64B	North	79	77	-10	-46	3	24		
		VS-DIH-71	West	48	-	-10	-42	3	-		
		VS-DIH-80	Top	123	-	0	-50	3	-		
		VS-DIH-81	Top	114	81	0	-49	3	35		
		VS-DIH-82	Top	96	80	0	-48	3	35		
		VS-DIH-83	Top	84	70	0	-46	3	27		
		VS-DIH-84	Top	105	80	0	-48	3	35		
		VS-DIH-85	Top	105	78	0	-48	3	33		
		VS-DIH-86	Top	83	77	0	-46	3	34		
		VS-DIH-87	Top	53	70	-10	-42	3	21		
		VS-DIH-88	Top	72	66	-10	-45	3	14		
		CT- DIH-001	Top	63	94	-10	-44	3	43		
		CT- DIH-002	Top	55	95	-10	-43	3	45		
		CT- DIH-003 [2]	Top	67	94	-10	-45	3	42		
		CT- DIH-004 [2]	Top	59	94	-10	-43	3	44		
		VCU-001	Top	60	70	-10	-44	3	19		
		VCU-002	Top	65	77	0	-44	3	36	**51**	**55**

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - DIH NSRs (Night-time Period)

Noise Assessment Points	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight [1], dB(A)	Distance Correction of Point Source, dB(A)	Façade Correction, dB(A)	Predicted SPL, $Leq_{(30min)}$, dB(A)	Total SPL, $Leq_{(30min)}$, dB(A)	Night-time Noise Criteria, $Leq_{(30min)}$, dB(A)
DIH-P3-6											
DIH-P3-6 (East façade of Pavilion) (Scenario 1) [3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	115	-	-10	-49	3	-		
		VS-DIH-22	North	105	-	-10	-48	3	-		
		VS-DIH-23	North	96	81	-10	-48	3	26		
		VS-DIH-24	North	94	81	-10	-47	3	27		
		VS-DIH-25	North	87	82	-10	-47	3	28		
		VS-DIH-26	North	80	81	-10	-46	3	28		
		VS-DIH-27	North	78	81	-10	-46	3	28		
		VS-DIH-31	South	122	-	-10	-50	3	-		
		VS-DIH-33	South	97	74	-10	-48	3	19		
		VS-DIH-34	South	86	72	-10	-47	3	18		
		VS-DIH-37	North	49	79	-5	-42	3	35		
		VS-DIH-39	North	59	79	-5	-43	3	34		
		VS-DIH-40	North	61	80	-5	-44	3	34		
		VS-DIH-43	North	71	80	-5	-45	3	33		
		VS-DIH-47A	South	35	70	-5	-39	3	29		
		VS-DIH-47C	South	35	69	-5	-39	3	28		
		VS-DIH-48A,B,C	North	41	79	-5	-40	3	37		
		VS-DIH-48D	Top	40	74	0	-40	3	37		
		VS-DIH-49	North	28	74	-5	-37	3	35		
		VS-DIH-49A	North	26	-	-5	-36	3	-		
		VS-DIH-50,51	North	70	82	-5	-45	3	35		
		VS-DIH-52	East	75	85	-10	-45	3	33		
		VS-DIH-53,54B	South	73	82	-5	-45	3	35		
		VS-DIH-55	East	64	-	-10	-44	3	-		
		VS-DIH-56	South	60	-	-5	-44	3	-		
		VS-DIH-57	South	51	-	-5	-42	3	-		
		VS-DIH-58	South	26	-	-5	-36	3	-		
		VS-DIH-59	West	23	-	0	-35	3	-		
		VS-DIH-60	West	24	78	0	-36	3	45		
		VS-DIH-61	North	28	76	-5	-37	3	37		
		VS-DIH-62	North	33	77	-5	-38	3	37		
		VS-DIH-63	North	50	77	-5	-42	3	33		
		VS-DIH-64A	North	56	-	-5	-43	3	-		
		VS-DIH-64B	North	56	77	-5	-43	3	32		
		VS-DIH-71	West	24	-	0	-36	3	-		
		VS-DIH-80	Top	147	84	-10	-51	3	26		
		VS-DIH-81	Top	138	-	-10	-51	3	-		
		VS-DIH-82	Top	120	80	-10	-50	3	23		
		VS-DIH-83	Top	108	70	-10	-49	3	14		
		VS-DIH-84	Top	129	80	-10	-50	3	23		
		VS-DIH-85	Top	129	78	-10	-50	3	21		
		VS-DIH-86	Top	107	77	-10	-49	3	21		
		VS-DIH-87	Top	29	70	0	-37	3	36		
		VS-DIH-88	Top	48	66	0	-42	3	27		
		CT- DIH-001	Top	87	94	-10	-47	3	40		
		CT- DIH-002	Top	79	95	-10	-46	3	42		
		CT- DIH-003 [2]	Top	91	94	-10	-47	3	40		
		CT- DIH-004 [2]	Top	83	94	-10	-46	3	41		
		VCU-001	Top	36	70	0	-39	3	34		
		VCU-002	Top	89	77	-10	-47	3	23	**51**	**55**
DIH-P3-6 (East façade of Pavilion) (Scenario 2) [3]	Future receivers in the CDA Site at SCL DIH	VS-DIH-21	North	115	-	-10	-49	3	-		
		VS-DIH-22	North	105	-	-10	-48	3	-		
		VS-DIH-23	North	96	81	-10	-48	3	26		
		VS-DIH-24	North	94	81	-10	-47	3	27		
		VS-DIH-25	North	87	82	-10	-47	3	28		
		VS-DIH-26	North	80	81	-10	-46	3	28		
		VS-DIH-27	North	78	81	-10	-46	3	28		
		VS-DIH-31	South	122	-	-10	-50	3	-		
		VS-DIH-33	South	97	74	-10	-48	3	19		
		VS-DIH-34	South	86	72	-10	-47	3	18		
		VS-DIH-37	North	49	79	-5	-42	3	35		
		VS-DIH-39	North	59	79	-5	-43	3	34		
		VS-DIH-40	North	61	80	-5	-44	3	34		
		VS-DIH-43	North	71	80	-5	-45	3	33		
		VS-DIH-47A	South	35	70	-5	-39	3	29		
		VS-DIH-47C	South	35	69	-5	-39	3	28		
		VS-DIH-48A,B,C	North	41	79	-5	-40	3	37		
		VS-DIH-48D	Top	40	74	0	-40	3	37		
		VS-DIH-49	North	28	74	-5	-37	3	35		
		VS-DIH-49A	North	26	-	-5	-36	3	-		
		VS-DIH-50,51	North	70	-	-5	-45	3	-		
		VS-DIH-52	East	75	-	-10	-45	3	-		
		VS-DIH-53,54B	South	73	-	-5	-45	3	-		
		VS-DIH-55	East	64	83	-10	-44	3	32		
		VS-DIH-56	South	60	85	-5	-44	3	39		
		VS-DIH-57	South	51	-	-5	-42	3	-		
		VS-DIH-58	South	26	-	-5	-36	3	-		
		VS-DIH-59	West	23	-	0	-35	3	-		
		VS-DIH-60	West	24	78	0	-36	3	45		
		VS-DIH-61	North	28	76	-5	-37	3	37		
		VS-DIH-62	North	33	77	-5	-38	3	37		
		VS-DIH-63	North	50	77	-5	-42	3	33		
		VS-DIH-64A	North	56	-	-5	-43	3	-		
		VS-DIH-64B	North	56	77	-5	-43	3	32		
		VS-DIH-71	West	24	-	0	-36	3	-		
		VS-DIH-80	Top	147	-	-10	-51	3	-		
		VS-DIH-81	Top	138	81	-10	-51	3	23		
		VS-DIH-82	Top	120	80	-10	-50	3	23		
		VS-DIH-83	Top	108	70	-10	-49	3	14		
		VS-DIH-84	Top	129	80	-10	-50	3	23		
		VS-DIH-85	Top	129	78	-10	-50	3	21		
		VS-DIH-86	Top	107	77	-10	-49	3	21		
		VS-DIH-87	Top	29	70	0	-37	3	36		
		VS-DIH-88	Top	48	66	0	-42	3	27		
		CT- DIH-001	Top	87	94	-10	-47	3	40		
		CT- DIH-002	Top	79	95	-10	-46	3	42		
		CT- DIH-003 [2]	Top	91	94	-10	-47	3	40		
		CT- DIH-004 [2]	Top	83	94	-10	-46	3	41		
		VCU-001	Top	36	70	0	-39	3	34		
		VCU-002	Top	89	77	-10	-47	3	23	**51**	**55**

Remark:

[1] A negative correction of 10 dB(A) has been adopted to the direction facing of the ventilation shaft totally screened by buildings or with proper design incorporated and negative correction of 5 dB(A) for NSR do not have direct line of sight to the ventilation shaft.

[2] It should be noted that the installation of CT-DIH-003 and CT-DIH-004 will not be carried out under SCL project but have been considered in the assessment for conservative purpose. Mitigation measures such as provision of screening panel or equivalent will be provided for the plant such that there would be no direct line of sight for the planned NSRs in the CDA site at SCL DIH.

[3] Some of the fixed plant items, including VS-DIH-50,51, VS-DIH-52, VS-DIH 53,54B, VS-DIH-55, VS-DIH-56, VS-DIH-80 & VS-DIH-81, will not be operated at the same time. VS-DIH-55, VS-DIH-56 and VS-DIH-81 will not be in operation in scenario 1, while VS-DIH-50,51, VS-DIH-52, VS-DIH 53,54B & VS-DIH-80 will not be in operation in scenario 2. Either Scenario 1 or 2 will be operated at a time.

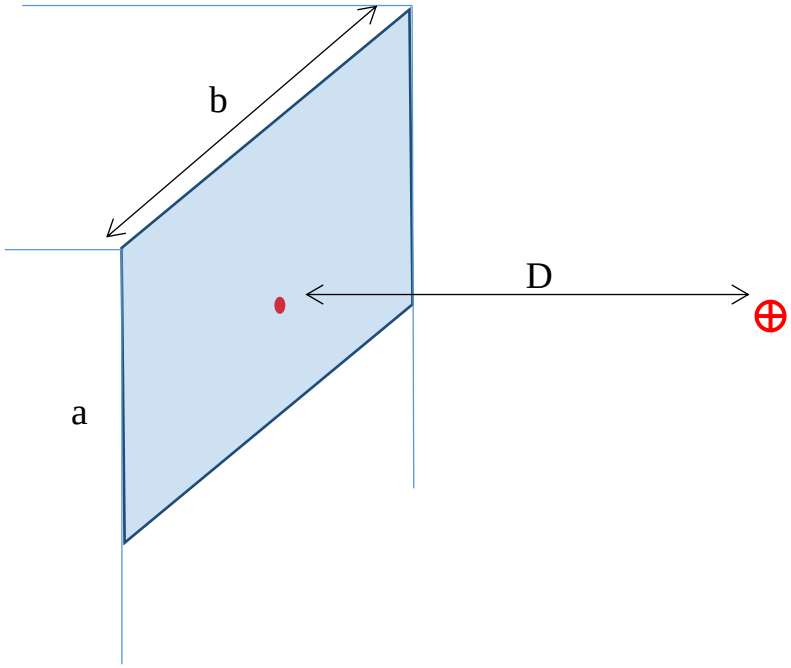
Appendix B

Noise Measurement to obtain the SWLs of Fixed Plant Noise Sources

Appendix B1

Measurement Methodology

Method 1: Far-Field Testing Method for Louver



a: Short side of the louver
b: Long side of the louver
D: Measurement distance (separation between louver and microphone), where D must be greater than (2b) and rounded up to interger.

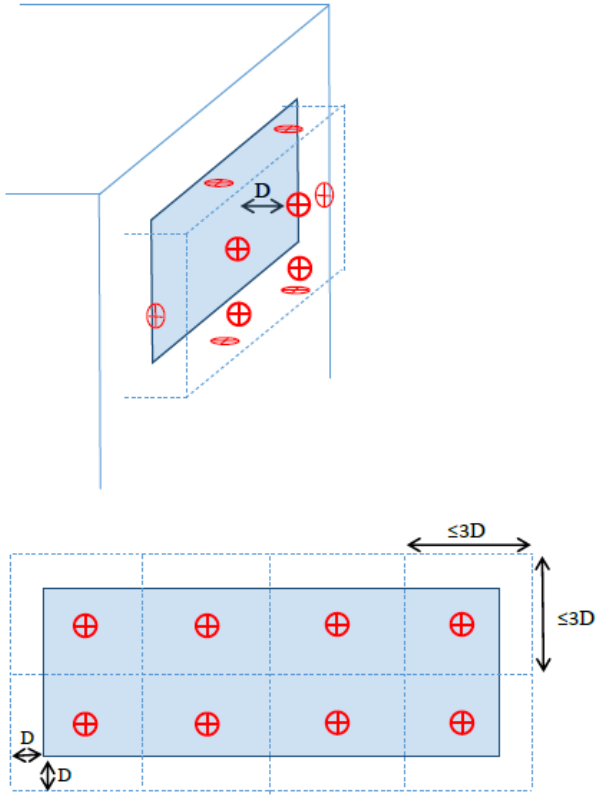
Louver opening
Proposed measurement point (microphone pointing perpendicular to the center of the louvre)

For method 1,

- "D" must be greater than 2b and round up to integer.
- The microphone must point to the center of the louver.
- At least 3 sets of $L_{Aeq,\ 1\ min}$ should be obtained.
- Background noise measurement should be obtained for determination of background correction factor.
- Any reason causing this method cannot be performed, noise measurement should then be conducted at near field in accordance with Method 2.
- If results of measurement reveal that difference in noise levels measured at far field with and without operation of fixed plant item is less than 3.0dB(A), noise measurement should then be conducted at near field in accordance with Method 2.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean measured $L_{Aeq,\ 1\ min}$ + 20log(D) + 8 + background noise correction factor

Method 2: Near-Field Testing Method for Louver



D: Measurement distance

Louver opening
Measurement box
Proposed measurement point (microphone pointing perpendicular to the louvre)

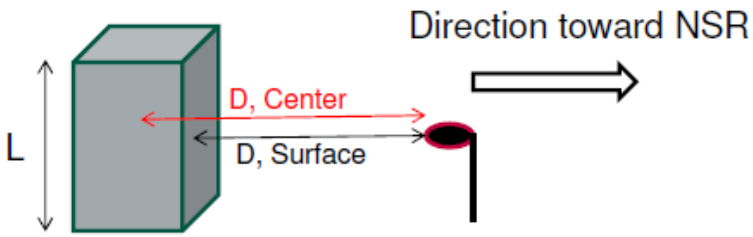
For method 2 (developed based on the principle of ISO3746:2010),

- First step is to determine a hypothetical measurement surfaces with at least 1m separation (D, measured from the centre of the louvre or its nearest edges as appropriate) from the louver.
- For louvre with largest dimension ≤3D, at least one measurement at the centre of the measurement surface parallel to the louvre should be conducted.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- Extra localized microphone positions on the measurement surfaces in the region of high radiation should be considered. In this case follow the procedures of ISO3744.
- For louver with largest dimension > 3D, measurement surface and measurement position should follow ISO3746.
- Background noise level should be taken at each measurement point for determining the background correction (K1A).
- If the difference between the background noise and the measured noise level is less than 3.0dB, K1A should be capped to 3.0dB.
- If necessary to obtain less conservative results, D should be reduced according to ISO3746 to obtain higher measured noise levels.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean LAeq over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

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

Method 3 – Far Field Testing Method for Plant Item



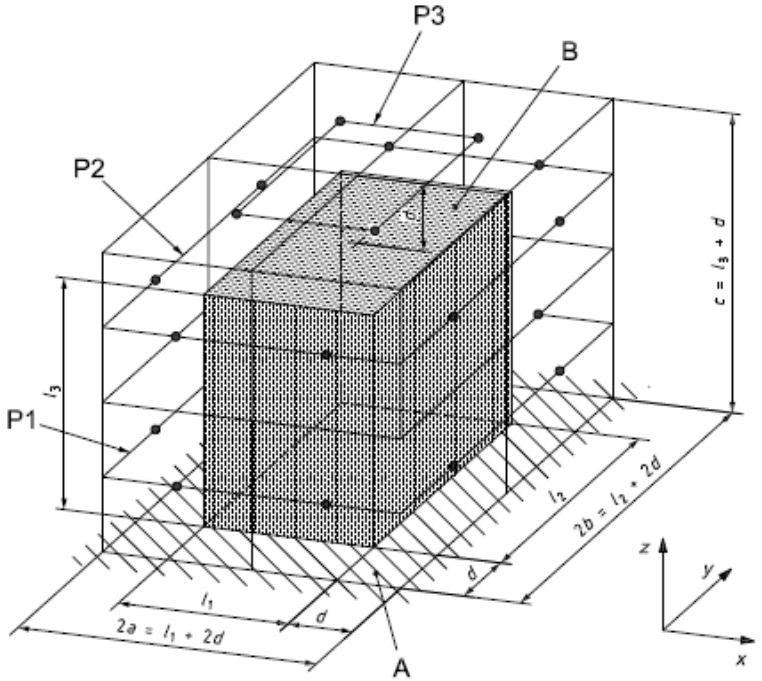
"L" is the longest side of the plant item
"D, Center" is the separation between center of the plant item and microphone
"D, Surface" is the separation between surface of the plant item and microphone

- "D, Surface" must be greater than twice of L (2L) and roundup to integer (e.g 6m ,7m, 8m…).
- The microphone must be pointing to the center of the plant.
- Measurement should be carried out at the direction toward all NSRs.
- At least 3 sets of $L_{Aeq,\ 1\ min}$ should be obtained at each the measurement point.

- Background noise measurement should be obtained for determination of background correction factor.
- Any reason causing this method cannot be performed, noise measurement should then be conducted at near field in accordance with latest edition of ISO3746 (Method 4).
- If results of measurement reveal that difference in noise levels measured at far field with and without operation of fixed plant item is less than 3.0 dB(A), noise measurement should then be conducted at near field in accordance with latest edition of ISO3746 (Method 4).
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean measured $L_{Aeq,\ 1\ min}$ + 20 log (D,Center) + 8 + background noise correction factor

Method 4 – Near Field Testing Method for Plant Item



Key

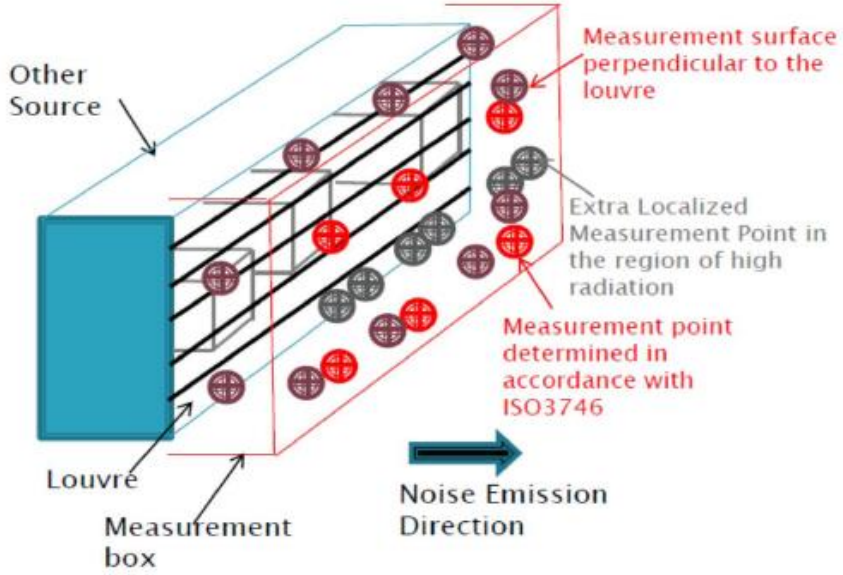
For Method 4 (based on ISO3746:2010),

- Please refer to latest edition of ISO3746 for measurement requirement.
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalized (see figure for example)
- Background noise measurement should be obtained for determination of background correction factor (K1A).According to ISO3746, if the source under test radiates noise predominantly in one direction or if the noise from a large source is emitted only from a small portion of the source, the usage of extra localized microphone positions on the measurement surface in the region of high radiation should be considered. In this case, follow the procedures specified in ISO3744.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- Detail calculation of the SWL should refer to the latest edition of ISO3746.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

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

Method 5 – Near Field Testing Method for Plant Room or other source



For Method 5 (developed based on the principle of ISO3746 -2010),

- First step is to determine a measurement box with at least 1m separation (measured from the centre of the louvre or its nearest edges as appropriate) from the louver.
- Secondly, is to determine the location of measurement points on the measurement surface of the hypothetical box.
- Extra localized microphone positions on the measurement surface in the region of high radiation should be considered. In this case follow the procedures of ISO 3744.
- Background noise level should be taken for determination of background correction (K1A.
- Minimum 10 seconds of measurement interval should be obtained at each measurement point.
- If the difference between the BGL and the measured noise level (MNL) is less than 3.0dB, K1A should be capped to 3.0dB.
- If necessary to obtain less conservative results. D should be reduced according to ISO3746 to obtain higher MNLs.
- Noise measurement to confirm any tonal, impulsive and intermittent characheristics at representative NSRs.

SWL = Mean L_{Aeq} over all measurement points + 10 log (total surface area over the measurement box) + K1A +K2A

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

Appendix B2

Calibration Certificates –
Noise Measurement for Fixed Plant Noise

Appendix B2 Calibration Certificates – Noise Measurement for Fixed Plant Noise

Calibration Certificate of Sound Level Meter SVANTEK 958 (SN: 20890)

MAXLAB

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 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
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

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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香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B2 室
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

Calibration Certificate of Sound Level Meter SVANTEK 955 (SN: 15234)

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.
* 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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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

MAXLAB

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

萬儀校正中心有限公司
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
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

Calibration Certificate of Sound Level Meter SVANTEK 979 (SN: 46199)

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 809677 Page 1 of 3 Pages

Customer : Beexergy Consulting Limited

Address : Unit 2001-05, Apec Plaza, 49 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong

Order No. : Q83884 **Date of receipt :** 27-Sep-18

Item Tested

Description : Sound Level Meter

Manufacturer : SVANTEK **I.D.** : --

Model : SVAN 979 **Serial No.** : 46199

Test Conditions

Date of Test : 2-Oct-18 **Supply Voltage** : --

Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure: Z01, IEC 61672, M41, JJG 676-2000.

Test Results

All results were within the IEC 61672 Type 1 or tolerance(s) or manufacturer's 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: 2-Oct-18

This Certificate is issued by:
Hong Kong Calibration Ltd.
Unit 6B, 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. Sound Level Meter

1.1 Self-generated noise: 17.3 dBA

1.2 Acoustical signal test

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Level Range	Octave Filter	Weight	Response		
Low	OFF	A	Fast	94.0	94.0
			Slow		94.0
		C	Fast		94.0
		Z			94.0
	OFF	A	Fast	114.0	114.0
			Slow		114.0
		C	Fast		114.0
		Z			114.0

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.1 dB

1.3 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	-16.2	- 16.1 dB, ± 1.5 dB
250 Hz	-8.7	- 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	+1.0	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.0	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-6.9	- 6.6 dB, + 3.5 dB ~ - 17.0 dB

Uncertainty : ± 0.1 dB

Calibration Certificate

1.4 Frequency & Time weightings at 1 kHz

1.4.1 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	

1.4.2 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

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 016 hPa.
4. Preamplifier model : SV 17 , S/N : 57845
5. Firmware Version: 3.03.1
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 ----------

NTi AUDIO

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: **M2211 Measurement Microphone**
  consisting of
  MA220 Serial Number: **7684**
  Capsule Serial Number: **72076**

- Certificate Issued: **05 October 2018**
- Certificate Number: **43378-7684-M2211**
- Results: **PASSED**
  (for detailed report see next page)

Tested by: M. Frick

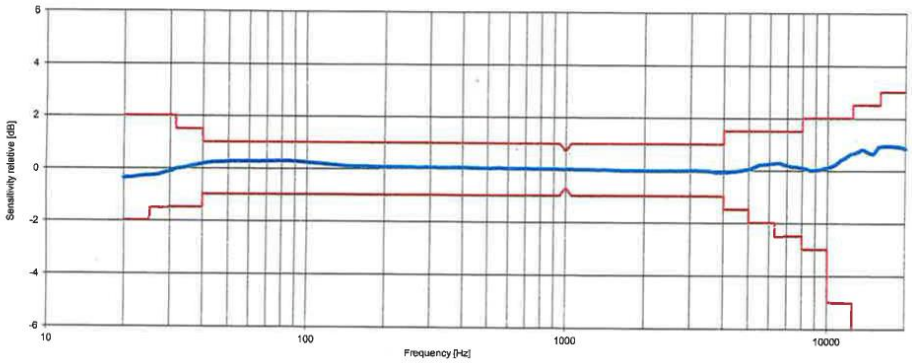
Signature:

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

Date: 05 October 2018
Calibration of: M2211 consisting of
MA220 Serial Number: 7684
Capsule Serial Number: 72076

- Detailed Calibration Test Results:

		actual	tolerance	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL		**22.3 mV/Pa**	14-28 mV/Pa	±2.85%
Frequency response	Class 1	acc. IEC 61672		



- Test Conditions:

Temperature:	**23.5°C**	±0.5 °C
Relative Humidity:	**48.9%**	±2%
Air Pressure:	**96.06 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: 14.08.2018, Next Calibration: 14.08.2019
    Calibrated by NTi Audio meeting product specifications
  - MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
    Last Calibration: 11.12.2017, Next Calibration: 11.12.2019
    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.

NTi AUDIO

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: M2211 Measurement Microphone
  consisting of
  MA220 Serial Number: 8047
  Capsule Serial Number: 56203

- Certificate Issued: 27 February 2019
- Certificate Number: 43523-8047-M2211
- Results: PASSED
  (for detailed report see next page)

Tested by: M. Frick

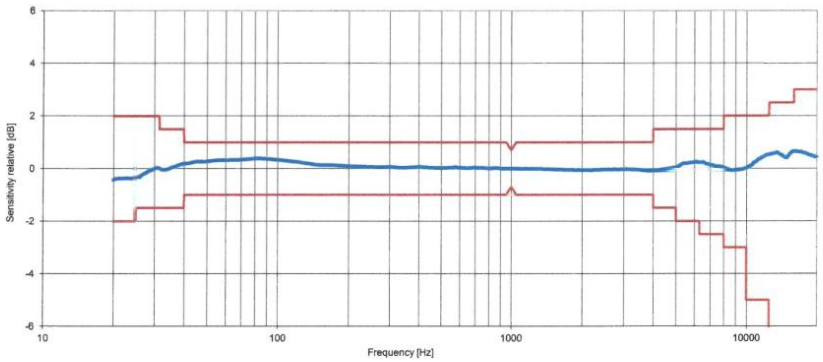
Signature:

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

Date: 27 February 2019
Calibration of: M2211 consisting of
MA220 Serial Number: 8047
Capsule Serial Number: 56203

- Detailed Calibration Test Results:

		actual	tolerance	calibration uncertainty[1]
Sensitivity @ 1 kHz, 114 dBSPL		**21.8 mV/Pa**	14-28 mV/Pa	±2.85%
Frequency response	Class 1	acc. IEC 61672		



- Test Conditions:

Temperature:	**21.8°C**	±0.5 °C
Relative Humidity:	**34.5%**	±2%
Air Pressure:	**96.65 kPa**	±0.25 kPa

- Calibration Equipment Used:
  - Norsonic Sound Calibrator, Type 1251, S/No. 30930
    Last Calibration: 05.12.2018, Next Calibration: 05.12.2020
    Calibrated by Metas, Switzerland
  - NTi Audio FX100, S/No. 11094
    Last Calibration: 14.08.2018, Next Calibration: 14.08.2019
    Calibrated by NTi Audio meeting product specifications
  - MTG MV203, S/No. 0630 / Mic Capsule, MK221 S./No. 16502
    Last Calibration: 11.12.2017, Next Calibration: 11.12.2019
    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 Certificate of Sound Level Meter Rion NL-52 (SN: 00564841)

Hong Kong Calibration Ltd.
香 港 校 正 有限公司

Calibration Certificate

Certificate No. 806605 Page 1 of 3 Pages

Customer : Gammon Construction Limited

Address : 28/F, Devon House, Taikoo Place, 979 King's Road, Quarry Bay, Hong Kong.

Order No. : Q82354 **Date of receipt :** 29-Jun-18

Item Tested

Description : Sound Level Meter
Manufacturer : Rion **I.D.** : --
Model : NL-52 **Serial No.** : 00564841

Test Conditions

Date of Test : 11-Jul-18 **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 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: 11-Jul-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 8601 Fax: 2425 8646

E

Calibration Certificate

Results :

1. **Self-generated noise:** 17.3 dBA

2. **Acoustical signal test**

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Octave Filter		
20 ~ 130	A	F	OFF	94.0	94.0
		S	OFF		94.0
	C	F	OFF		94.1
	Z	F	OFF		94.1
	A	F	OFF	114.0	114.1
		S	OFF		114.1
	C	F	OFF		114.1
	Z	F	OFF		114.1

IEC 61672 Type 1 Spec. : ± 1.1 dB
Uncertainty : ± 0.1 dB

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

Frequency	Attenuation (dB)	IEC 61672 Type 1 Spec.
31.5 Hz	-39.8	- 39.4 dB, ± 2 dB
63 Hz	-26.4	- 26.2 dB, ± 1.5 dB
125 Hz	-16.2	- 16.1 dB, ± 1.5 dB
250 Hz	-8.7	- 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	+0.9	+ 1.0 dB, ± 1.6 dB
8 kHz	-1.1	- 1.1 dB, + 2.1 dB ~ -3.1 dB
16 kHz	-8.1	- 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

Remarks : 1. UUT : Unit-Under-Test
2. The uncertainty claimed is for a confidence probability of not less than 95%.
3. Atmospheric Pressure : 1 000 hPa.
4. Preamplifier model : NH-25 , S/N : 64967
5. Firmware Version: 1.8
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 ----------

Calibration Certificate of Acoustic Calibrator SV30A (SN: 10814)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	21-Jul-2018	**Certificate Number**	MLCN181526S

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	10814
Equipment Number	--

Calibration Particular

Date of Calibration	21-Jul-2018		
Calibration Equipment	4231(MLTE008) / AV180068 / 13-May-20 1351(MLTE049) / MLEC18/06/02 / 6-Jun-19		
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 21-Jul-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.
* 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.

Page 1 of 2

萬儀校正中心有限公司
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
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

MAXLAB

Certificate No. MLCN181526S

Calibration Data

EUT Setting	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
94 dB	94.0 dB	0.0 dB	0.15 dB	± 0.3 dB
114 dB	114.0 dB	0.0 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Dan
Date : 21-Jul-18

Checked By : K.O. Lo
Date : 21-Jul-18

萬儀校正中心有限公司
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
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

Calibration Certificate of Acoustic Calibrator SV35A (SN: 58708)

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

Calibration Certificate

Certificate No. **803296** Page 1 of 2 Pages

Customer : Beexergy Consulting Limited

Address : Unit 2001-05, Apec Plaza, 49 Hoi Yuen Road, Kwun Tong, Kowloon, Hong Kong

Order No. : Q81278 **Date of receipt :** 5-Apr-18

Item Tested

Description : Acoustic Calibrator
Manufacturer : Svantek **I.D.** : 217598
Model : SV35A **Serial No.** : 58708

Test Conditions

Date of Test : 16-Apr-18 **Supply Voltage** : --
Ambient Temperature : (23 ± 3)°C **Relative Humidity :** (50 ± 25) %

Test Specifications

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

Test Results

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

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	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: 16-Apr-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

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 803296

Results :

1. **Generated Sound Pressure Level**

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94.0	94.2	± 0.4 dB
114.0	114.1	

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**

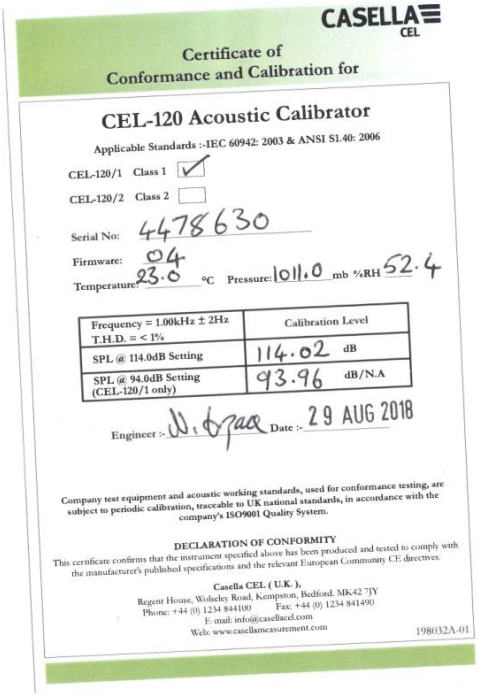
UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	1.000	± 1 %

Uncertainty : $\pm 3.6 \times 10^{-6}$

4. **Total Distortion** : < 0.4 %
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 : 1 019 hPa.

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



CASELLA CEL

Certificate of
Conformance and Calibration for

CEL-120 Acoustic Calibrator

Applicable Standards :-IEC 60942: 2003 & ANSI S1.40: 2006

CEL-120/1 Class 1 ☑

CEL-120/2 Class 2 ☐

Serial No: 4478630

Firmware: 04

Temperature: 23.0 °C Pressure: 1011.0 mb %RH 52.4

Frequency = 1.00kHz ± 2Hz T.H.D. = < 1%	Calibration Level
SPL @ 114.0dB Setting	114.02 dB
SPL @ 94.0dB Setting (CEL-120/1 only)	93.96 dB/N.A

Engineer :- W. Grace Date :- 29 AUG 2018

Company test equipment and acoustic working standards, used for conformance testing, are subject to periodic calibration, traceable to UK national standards, in accordance with the company's ISO9001 Quality System.

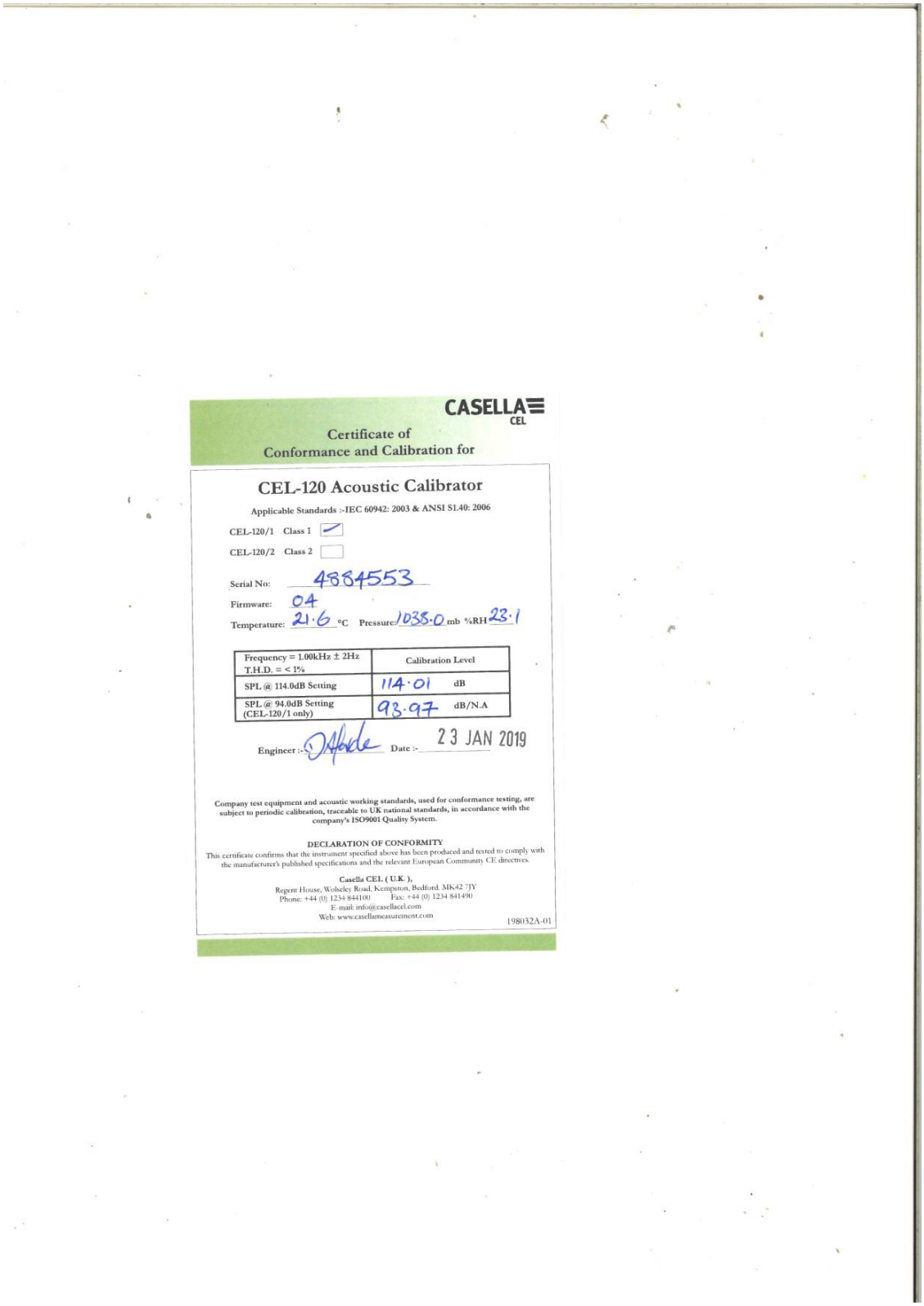
DECLARATION OF CONFORMITY

This certificate confirms that the instrument specified above has been produced and tested to comply with the manufacturer's published specifications and the relevant European Community CE directives.

Casella CEL (U.K.),
Regent House, Wolseley Road, Kempston, Bedford. MK42 7JY
Phone: +44 (0) 1234 844100 Fax: +44 (0) 1234 841490
E-mail: info@casellacel.com
Web: www.casellameasurement.com

198032A-01

Calibration Certificate of Acoustic Calibrator CASELLA CEL-120 (SN: 4884553)



CASELLA CEL

Certificate of
Conformance and Calibration for

CEL-120 Acoustic Calibrator

Applicable Standards :-IEC 60942: 2003 & ANSI S1.40: 2006

CEL-120/1 Class 1 ✓

CEL-120/2 Class 2

Serial No: 4884553

Firmware: 04

Temperature: 21.6 °C Pressure: 1038.0 mb %RH 23.1

Frequency = 1.00kHz ± 2Hz T.H.D. = < 1%	Calibration Level
SPL @ 114.0dB Setting	114.01 dB
SPL @ 94.0dB Setting (CEL-120/1 only)	93.97 dB/N.A

Engineer :- D Hoole Date :- 23 JAN 2019

Company test equipment and acoustic working standards, used for conformance testing, are subject to periodic calibration, traceable to UK national standards, in accordance with the company's ISO9001 Quality System.

DECLARATION OF CONFORMITY

This certificate confirms that the instrument specified above has been produced and tested to comply with the manufacturer's published specifications and the relevant European Community CE directives.

Casella CEL (U.K.),
Regent House, Wolseley Road, Kempston, Bedford. MK42 7JY
Phone: +44 (0) 1234 844100 Fax: +44 (0) 1234 841490
E-mail: info@casellacel.com
Web: www.casellameasurement.com

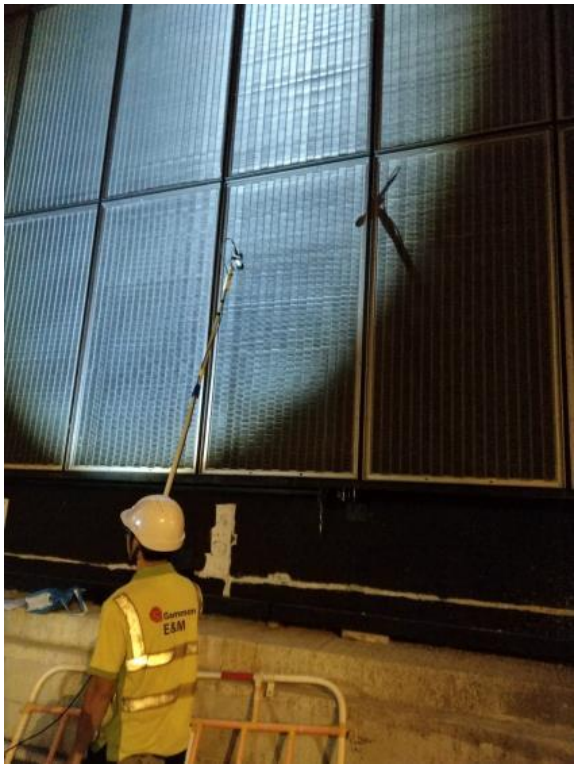
198032A-01

Appendix B3

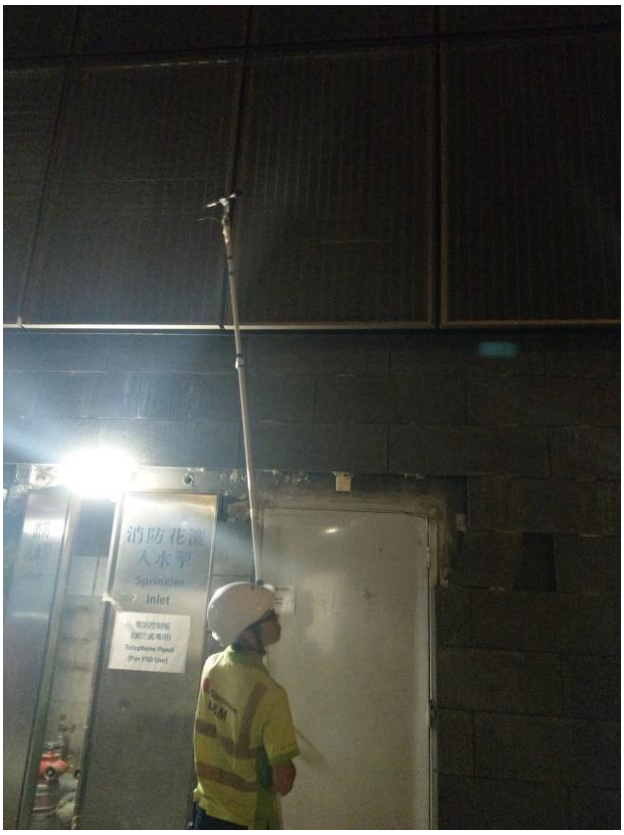
Photographs showing the Examples of Noise Measurement for Fixed Plant Noise

Appendix B3 Photographs showing the Examples of Noise Measurement for Fixed Plant Noise

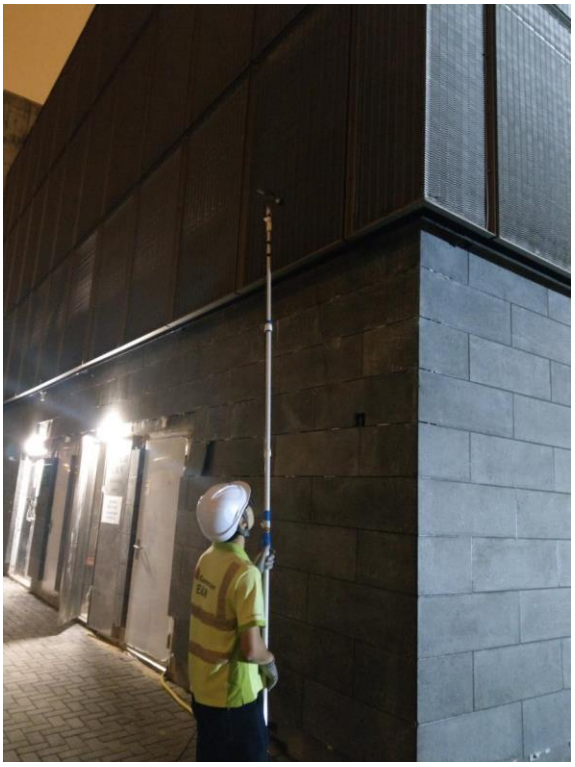
SWL Measurement Location for VS-DIH-21



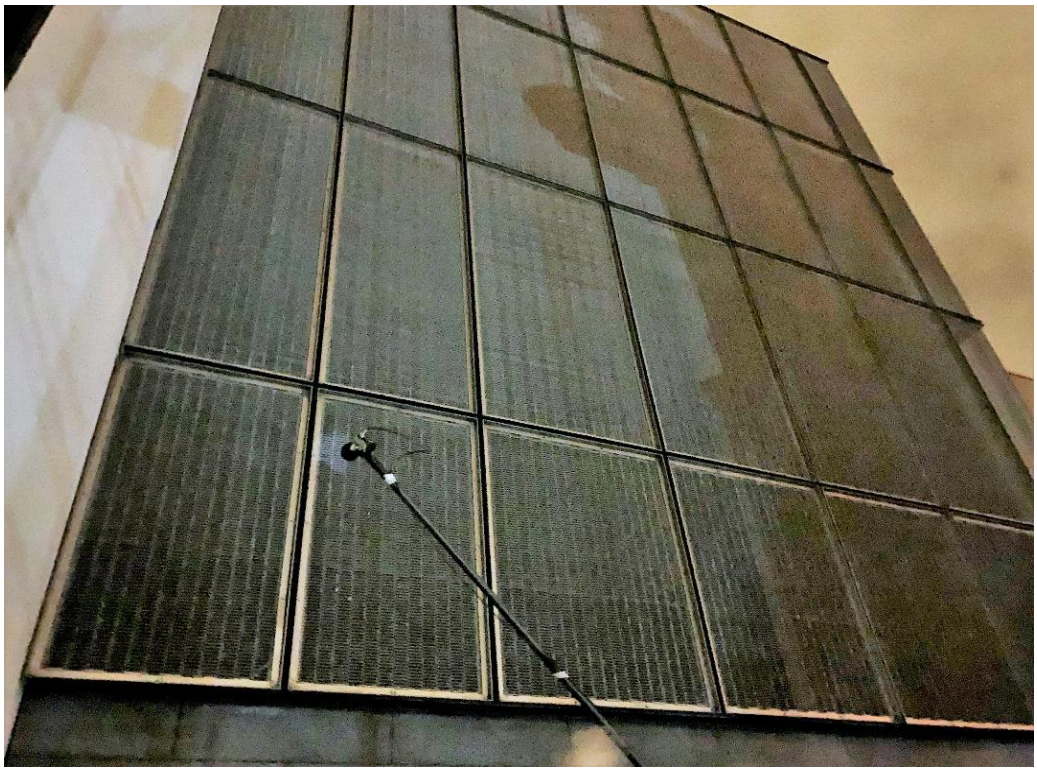
SWL Measurement Location for VS-DIH-22



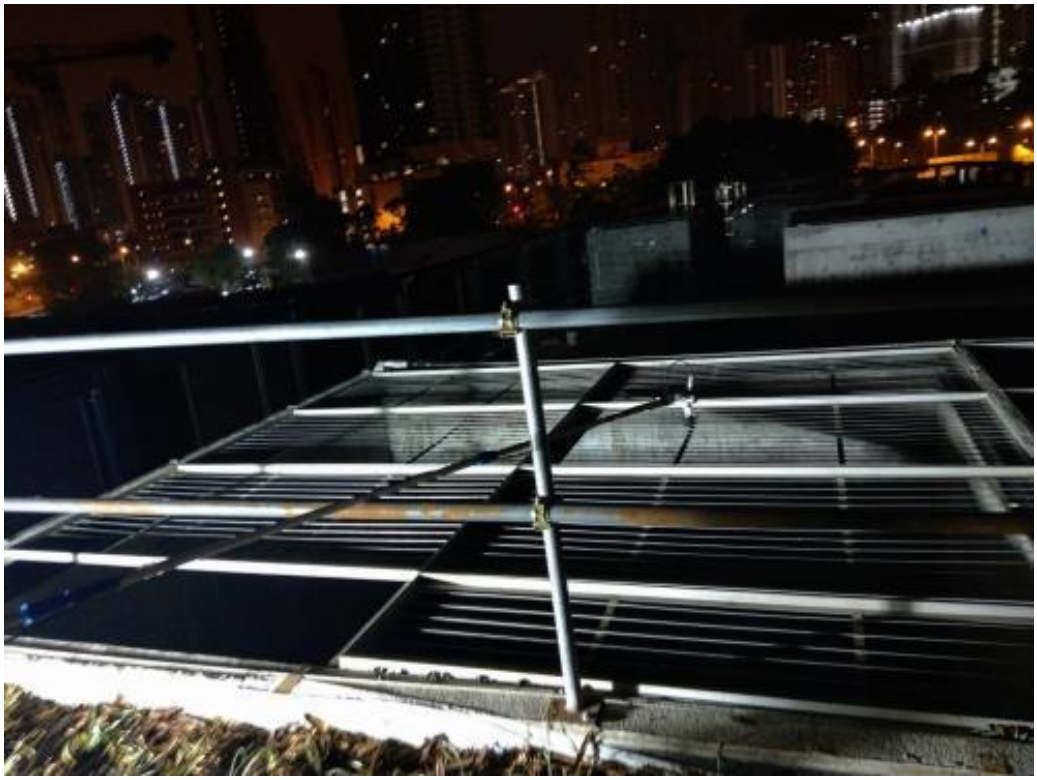
SWL Measurement Location for VS-DIH-49



SWL Measurement Location for VS-DIH-49A



SWL Measurement Location for VS-DIH-56



SWL Measurement Location for VS-DIH-86

Appendix B4

Noise Measurement Results

Appendix B4 Noise Measurement Results

Fixed Plant Source ID	Plant Type	Method	Size of Louvre/Cooling Tower/Outdoor AC unit			Measurement Distance (m) D [a]	Averaged Measured L_{Aeq} ,dB(A) [b]	Background L_{Aeq} ,dB(A)	Difference L_{Aeq} ,dB(A)	Background Corrected L_{Aeq} ,dB(A)[c]	Calculated SWL, dB(A)
			Length	Width	Height						
VS-DIH-21	Louvre	2	1000	3200	N/A	0.5	63.1	61.1	2.0	60.1	72
VS-DIH-22	Louvre	2	2500	3500	N/A	0.5	68.6	61.0	7.6	67.8	82
VS-DIH-23	Louvre	2	800	800	N/A	1.0	65.8	64.6	1.2	62.8	76
VS-DIH-24	Louvre	2	800	800	N/A	1.0	66.4	64.5	1.9	63.4	76
VS-DIH-25	Louvre	2	1100	2800	N/A	1.0	64.6	61.1	3.5	62.1	77
VS-DIH-26	Louvre	2	800	800	N/A	1.0	66.5	64.6	1.9	63.5	76
VS-DIH-27	Louvre	2	800	800	N/A	1.0	66.1	63.0	3.1	63.2	76
VS-DIH-31	Louvre	2	1000	4000	N/A	1.0	57.0	53.8	3.2	54.2	70
VS-DIH-33	Louvre	2	400	400	N/A	1.0	60.4	57.9	2.5	57.4	69
VS-DIH-34	Louvre	2	400	400	N/A	1.0	57.7	55.6	2.1	54.7	67
VS-DIH-37	Louvre	2	800	800	N/A	1.0	64.2	61.0	3.2	61.4	74
VS-DIH-39	Louvre	2	800	800	N/A	1.0	64.7	63.4	1.3	61.7	75
VS-DIH-40	Louvre	2	800	800	N/A	1.0	65.3	62.6	2.7	62.3	75
VS-DIH-43	Louvre	2	800	800	N/A	1.0	65.2	62.3	2.9	62.2	75
VS-DIH-47A[d]	Louvre	2	2000	5880	N/A	1.0	57.0	55.0	2.0	54.0	71
VS-DIH-47A	Louvre	2	2000	5880	N/A	1.0	55.8	55.0	0.8	52.8	70
VS-DIH-47C[d]	Louvre	2	400	5880	N/A	1.0	57.6	55.6	2.0	54.6	71
VS-DIH-47C	Louvre	2	400	5880	N/A	1.0	56.0	55.6	0.4	53.0	69
VS-DIH-48A,B,C	Louvre	2	7000	3200	N/A	0.5	65.4	61.3	4.1	63.2	79
VS-DIH-48D	Louvre	2	2900	2900	N/A	0.5	62.9	60.1	2.8	59.9	74
VS-DIH-49	Louvre	2	650	650	N/A	1.0	59.3	57.6	1.7	56.3	69
VS-DIH-49A	Louvre	2	650	650	N/A	1.0	63.1	57.1	6.0	61.8	74
VS-DIH-50,51[d]	Louvre	2	1200	5000	N/A	1.0	69.1	66.4	2.7	66.1	82
VS-DIH-50,51	Louvre	2	1200	5000	N/A	1.0	63.4	61.6	1.8	60.4	77
VS-DIH-52[d]	Louvre	2	4920	7650	N/A	1.0	70.0	57.9	12.1	70.0	89
VS-DIH-52	Louvre	2	4920	7650	N/A	1.0	68.2	63.9	4.3	66.3	85
VS-DIH-53,54B[d]	Louvre	2	4900	4000	N/A	1.0	66.2	57.6	8.6	65.6	84
VS-DIH-53,54B	Louvre	2	4900	4000	N/A	1.0	64.8	57.6	7.2	63.8	82
VS-DIH-55[d]	Louvre	2	6800	3280	N/A	1.0	70.9	58.5	12.4	70.9	88
VS-DIH-55	Louvre	2	6800	3280	N/A	1.0	66.2	56.3	9.9	65.7	83
VS-DIH-56[d]	Louvre	2	6850	6660	N/A	1.0	71.2	59.4	11.8	71.2	91
VS-DIH-56	Louvre	2	6850	6660	N/A	1.0	66.7	59.4	7.3	65.8	85
VS-DIH-57	Louvre	2	950	950	N/A	1.0	68.1	58.0	10.1	68.1	81
VS-DIH-58	Louvre	2	4700	1700	N/A	1.0	68.9	61.2	7.7	68.1	85
VS-DIH-59	Louvre	2	1650	4700	N/A	1.0	65.2	59.2	6.0	63.9	80
VS-DIH-60	Louvre	2	3100	2430	N/A	1.0	59.3	58.8	0.5	56.3	73
VS-DIH-61	Louvre	2	3100	6580	N/A	1.0	60.6	59.4	1.2	57.6	76
VS-DIH-62	Louvre	2	3100	2770	N/A	1.0	61.4	53.9	7.5	60.6	77
VS-DIH-63	Louvre	2	660	1850	N/A	1.0	65.5	62.1	3.4	62.9	77
VS-DIH-64A	Louvre	2	660	1850	N/A	1.0	64.3	60.7	3.6	61.9	76
VS-DIH-64B	Louvre	2	660	1850	N/A	1.0	62.4	61.0	1.4	59.4	73
VS-DIH-71	Louvre	2	1500	2700	N/A	1.0	58.4	56.7	1.7	55.4	71
VS-DIH-80[d]	Louvre	2	3700	12000	N/A	1.0	78.1	64.9	13.2	78.1	99
VS-DIH-80	Louvre	2	3700	12000	N/A	1.0	66.1	63.4	2.7	63.1	84
VS-DIH-81[d]	Louvre	2	3000	11000	N/A	1.0	66.8	64.3	2.5	63.8	84
VS-DIH-81	Louvre	2	3000	11000	N/A	1.0	64.5	61.7	2.8	61.5	82
VS-DIH-82[d]	Louvre	2	3100	3200	N/A	1.0	69.2	55.9	13.3	69.0	76
VS-DIH-82	Louvre	2	3100	3200	N/A	0.5	68.2	58.9	9.3	67.7	73
VS-DIH-83	Louvre	2	3800	5200	N/A	0.5	57.2	55.9	1.3	54.2	70
VS-DIH-84	Louvre	2	3300	3300	N/A	1.0	61.2	58.1	3.1	58.2	75
VS-DIH-85	Louvre	2	250	4000	N/A	1.0	59.3	57.0	2.3	56.3	73
VS-DIH-86	Louvre	2	4000	4470	N/A	1.0	56.7	53.0	3.7	54.2	72
VS-DIH-87	Louvre	2	3080	9000	N/A	0.5	55.7	52.5	3.2	52.8	70
VS-DIH-88	Louvre	2	3400	3680	N/A	0.5	54.3	52.5	1.8	51.3	66
CT- DIH-001	Cooling Tower	4	6070	3020	8158	1.0	70.0	63.3	6.7	69.0	93
CT- DIH-002	Cooling Tower	4	6070	3020	8158	1.0	70.2	63.3	6.9	69.3	94
VCU-001	Outdoor AC Unit	4	1650	900	1500	1.0	56.9	55.1	1.8	53.9	70
VCU-002	Outdoor AC Unit	4	1650	900	1500	1.0	64.3	61.7	2.6	61.3	75

Remarks:

a) Measurement Distance between louvre and microphone.
b) Results are averaged from number of points in accordance with ISO3746.
c) 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 3.0dB.
d) Operation scenario during daytime/evening period only and the measured SWL will be checked against the respective noise criterion.

Appendix C

Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Nose Sources at Representative NSRs

Appendix C1

Calibration Certificates –
Noise Measurement at Representative 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

HOKLAS 028
CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 18CA1019 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	4950	ZC0032
Serial/Equipment No.:	3001291	2665582	17190
Adaptors used:	-	-	-

Item submitted by

Customer Name:	AECOM ASIA CO LIMITED
Address of Customer:	-
Request No.:	-
Date of receipt:	19-Oct-2018

Date of test: 19-Oct-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2019	CIGISMEC
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Signal generator	DS 360	61227	23-Apr-2019	CEPREI

Ambient conditions

Temperature:	20 ± 1 °C
Relative humidity:	50 ± 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:** 20-Oct-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.

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

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 18CA1019 01-01 **Page** 2 **of** 2

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: Fung Chi Yip Date: 19-Oct-2018

Checked by: shek Kwong Tat Date: 20-Oct-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.

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

CERTIFICATE OF CALIBRATION

Certificate No.: 18CA0321 01-02

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.:	2681366	2665582	17190
Adaptors used:	(N 011 01)		

Item submitted by

Customer Name:	AECOM ASIA CO LTD
Address of Customer:	-
Request No.:	-
Date of receipt:	21-Mar-2018

Date of test: 23-Mar-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	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:	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: Feng Jun Qi **Date:** 24-Mar-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.

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

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 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: Fung Chi Yip **Date:** 23-Mar-2018

Checked by: Lam Tze Wai **Date:** 24-Mar-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.

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

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CAL

CERTIFICATE OF CALIBRATION

Certificate No.: 19CA0228 02 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone	Pream
Manufacturer:	B & K	,	B & K	B & K
Type/Model No.:	2270	,	4950	ZC0032
Serial/Equipment No.:	2644597	,	2879980	19428
Adaptors used:	- (N-012-01)	,	-	-

Item submitted by

Customer Name:	AECOM ASIA CO LTD
Address of Customer:	-
Request No.:	-
Date of receipt:	28-Feb-2019

Date of test: 01-Mar-2019

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2019	CIGISMEC
Signal generator	DS 360	33873	24-Apr-2019	CEPREI
Signal generator	DS 360	61227	26-Dec-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:** 02-Mar-2019 **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
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

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 19CA0228 02 **Page** 2 **of** 2

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: Fong Chun Wai **Date:** 01-Mar-2019

Checked by: Fung Chi Yip **Date:** 02-Mar-2019

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.
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.: 18CA0920 02 **Page** 1 **of** 2

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.:	3007965 (CN.012.02)	,	284646	17965
Adaptors used:	-	,	-	-

Item submitted by

Customer Name:	AECOM ASIA CO. LTD.
Address of Customer:	-
Request No.:	-
Date of receipt:	20-Sep-2018

Date of test: 22-Sep-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	23-Aug-2019	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:** 22-Sep-2018 **Company Chop:** SOILS & 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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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 **Date:** 22-Sep-2018

Checked by: Shek Kwong Tat **Date:** 22-Sep-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.: 18CA0406 02-02 **Page:** 1 of 2

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:	06-Apr-2018

Date of test: 09-Apr-2018

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	33873	25-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:	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:** 11-Apr-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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CAL

CERTIFICATE OF CALIBRATION

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Certificate No.: 18CA0406 02-02 Page: 2 of 2

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	94.20	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 = 999.96 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: Fung Chi Yip **Checked by:** Lam Tze Wai

Date: 09-Apr-2018 **Date:** 11-Apr-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.: 18CA1019 01-02 **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:	19-Oct-2018

Date of test: 19-Oct-2018

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	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	61227	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:	20 ± 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 Junqi **Date:** 20-Oct-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.: 18CA1019 01-02 **Page:** 2 **of** 2

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	94.22	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 = 0.2 %**

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

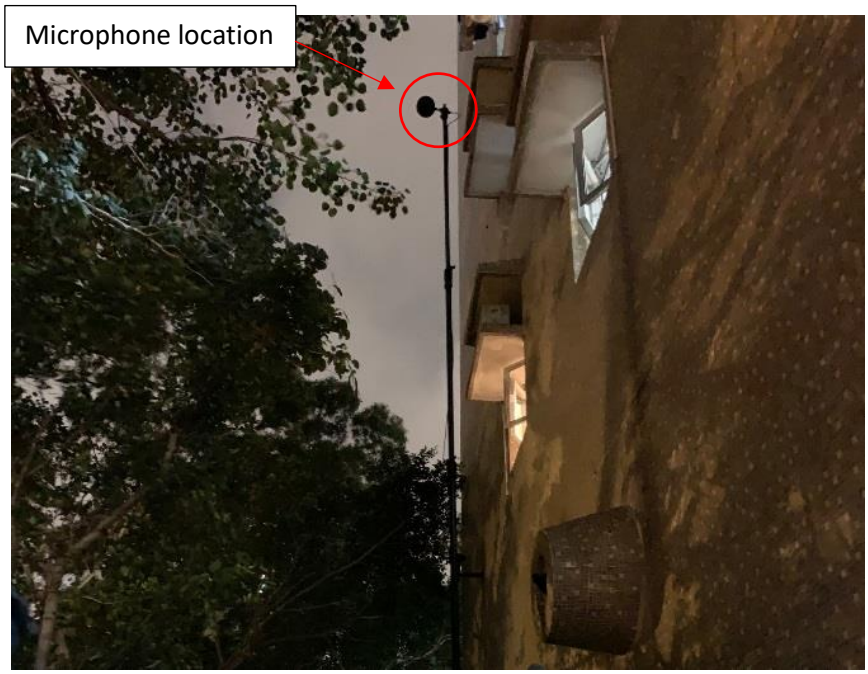
Date: 19-Oct-2018 **Date:** 20-Oct-2018

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.

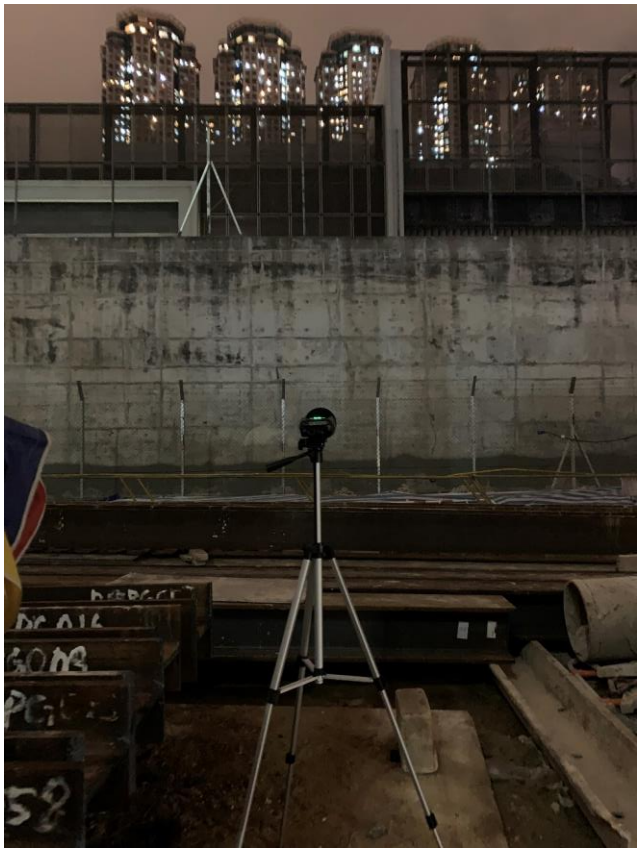
Appendix C2

Photographs – Noise Measurement at Representative NSRs

Appendix C2 Photographs – Noise Measurement at Representative NSRs



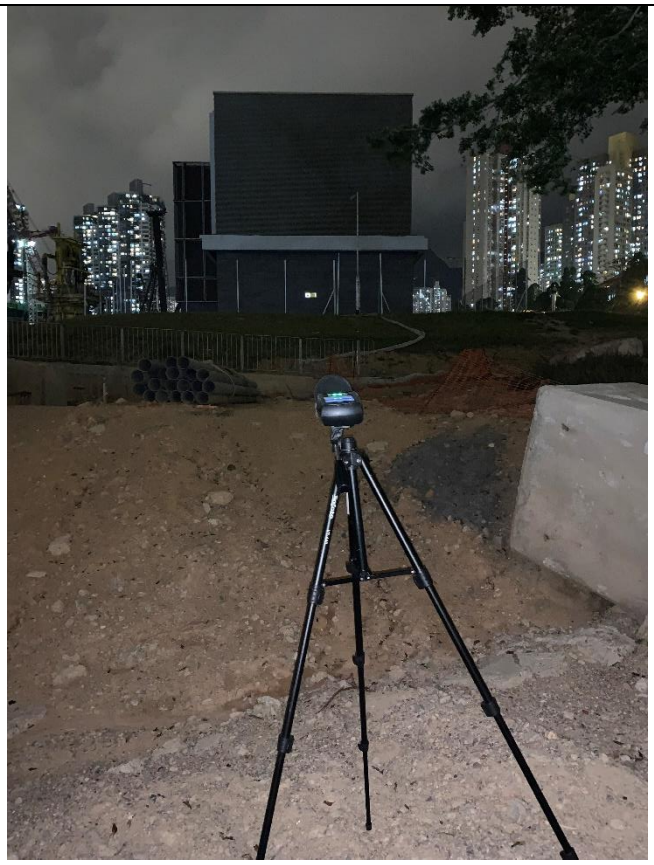
NSR Measurement Location at DIH-FN1



NSR Measurement Location at DIH-FN2

NSR Measurement Location at DIH-FN3

NSR Measurement Location at DIH-FN4



NSR Measurement Location at DIH-FN5

NSR Measurement Location at DIH-FN6

Appendix C3

Measurement Results at Representative NSRs

Appendix C3 Noise Measurement Results at Measurement Locations

Measurement Location ID	Measurement Date	Operation Scenario [1][2]	Fixed Plant Noise		Background Noise		Difference between Measured Noise Level and Background Level, dB(A)
			Measurement Time	Measured Noise Level, $L_{Aeq\ 30mins}$, dB(A)	Measurement Time	Background Noise Level, $L_{Aeq\ 5mins}$, dB(A)	
DIH-FN1	8/4/2019 - 9/4/2019	Daytime and Evening	23:20:00 - 23:49:59	69.4	21:38:00 - 21:42:59	70.4	-1.0
		Night-time	01:00:00 - 01:29:59	66.6	02:08:00 - 02:12:59	65.6	1.0
DIH-FN2	8/4/2019 - 9/4/2019	Daytime and Evening	23:50:00 - 00:19:59	54.6	21:52:00 - 21:56:59	57.1	-2.5
		Night-time	00:45:00 - 01:14:59	52.8	02:19:00 - 02:23:59	51.0	1.8
DIH-FN3	8/4/2019 - 9/4/2019	Daytime and Evening	23:15:00 - 23:44:59	54.9	22:11:00 - 22:15:59	54.8	0.1
		Night-time	01:20:00 - 01:49:59	51.5	02:04:00 - 02:08:59	49.8	1.7
DIH-FN4	8/4/2019 - 9/4/2019	Daytime and Evening	23:15:00 - 23:44:59	61.1	22:11:00 - 22:15:59	62.0	-0.9
		Night-time	00:45:00 - 01:14:59	58.5	02:17:00 - 02:21:59	55.8	2.7
DIH-FN5 [3]	8/4/2019 - 9/4/2019	Daytime and Evening	23:50:00 - 00:19:59	58.2	21:52:00 - 21:56:59	60.3	-2.1
DIH-FN6	8/4/2019 - 9/4/2019	Daytime and Evening	23:29:00 - 23:58:59	55.1	22:05:00 - 22:09:59	57.0	-1.9
		Night-time	01:00:00 - 01:29:59	53.0	02:08:00 - 02:12:59	50.9	2.1

Notes:

(1) Daytime and evening period (i.e 0700 to 2300 hours) and night-time period (i.e. Night: 2300 to 0700 hours).

(2) Fixed plant noise operation during daytime/evening and nigth-time periods have been included according to corresponding fixed plant noise measurement.

(3) For DIH-P3-4 (i.e DIH-FN5), where is a place of worship, ritual activity will only be conducted during daytime.