Kwun Tong Line Extension

Fixed Plant Noise Audit report

(Batch 2 – Ho Man Tin Station (HOM))

(April 2019)

Certified by:	Jacky Chan	<u> </u>
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Date:	15 Apr 2019	

Kwun Tong Line Extension

Fixed Plant Noise Audit report

(Batch 2 – Ho Man Tin Station (HOM))

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Data	15 April 2019		

Consultancy Agreement No. C11033

Kwun Tong Line Extension (KTE)

Fixed Plant Noise Audit Report (Batch 2 – Ho Man Tin Station (HOM))

April 2019

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(Batch 2 - HOM)

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1 INTRODUCTION

1.1 Background

- 1.1.1 Ho Man Tin Station (HOM) is the interchange station for Kwun Tong Line Extension (KTE) and Shatin to Central Link Tai Wai to Hung Hom Section [SCL (TAW-HUH)] (hereinafter referred to as "the SCL project")). During the design process after the issuance of EIA Study Briefs of both Projects, engineering and programme considerations have supported the construction and operation of HOM to be implemented, under the KTE. Environmental impacts arising from the construction and operation of the HOM had hence been assessed in the KTE EIA Report.
- 1.1.2 Following the approval of the KTE EIA Report (Register No.: AEIAR-154/2010) under the Environmental Impact Assessment Ordinance (EIAO), the Environmental Permit (EP) (EP No: EP-399/2010), covering the construction and operation of KTE (hereinafter referred to as "the KTE project"), was granted on 27 September 2010. Variations of Environmental Permit (VEP) were subsequently applied for EP-399/2010 and the latest Environmental Permit (EP No: EP-399/2010/E) was issued by Director of Environmental Protection (DEP) on 4 October 2018.
- 1.1.3 Pursuant to EP Condition 4.6, at least one month before the commencement of operation of the KTE project, the Permit Holder shall carry out audit and confirm in writing to the Director that the design of the fixed plant noise sources associated with the KTE project complies with the maximum sound power levels determined in the EIA Report (Register No. AEIAR-154/2010) and all relevant documents in the Register, or otherwise approved by the Director in compliance with the requirements in the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) having due regard to the characteristics of tonality, impulsiveness and intermittency. The audit report shall be certified by the ET Leader and verified by the IEC.
- 1.1.4 Fixed noise audit for the noise sources related to the operation of KTE project was conducted and the Fixed Plant Noise Audit Report for KTE (September 2016) (FRNAR-KTE) was accepted by DEP in October 2016. However, some of the fixed plant sources, which supports the operation of SCL(TAW-HUH), in HOM were excluded in the fixed plant noise audit report (2016) and the associated fixed plant noise audit will be conducted after the installation of these sources. As discussed in Section 4.3 of FRNAR-KTE, fixed plant noise audit for SCL fixed plant will be conducted before the commencement of SCL project under KTE EP condition 4.6 to confirm the compliance of fixed plant operation for SCL.
- 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 operation of SCL.
- 1.1.6 Based on the latest design information of SCL, the maximum allowable SWLs of fixed plant items has been updated to reflect the latest design of the SCL at HOM, and therefore The Proposal for Updating Maximum Allowable Sound Power Levels of Louvers (Batch 2 Ho Man Tai Station (HOM)) (hereinafter referred to as "the Proposal (Batch 2 HOM)") (Appendix A refers) was prepared to present the updated maximum allowable sound power levels (SWLs) of the fixed plant items at HOM. The Proposal (Batch 2 HOM) was approved by DEP on 15 April 2019.
- 1.1.7 This Fixed Plant Noise Audit Report (Batch 2 Ho Man Tin Station (HOM)) (hereinafter referred to as "the FPNAR (Batch 2 HOM") presents the noise measurement methodology and measurement results at the SCL fixed plant noise sources of HOM and at the representative NSRs near HOM, for checking compliance with the maximum allowable sound power levels (SWLs) determined in the Proposal (Batch 2 HOM).

1.2 Purpose of This Report

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

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- 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 under SCL at HOM are extracted from the Proposal (Batch 2 – HOM) and are summarised in **Table 2.1**. The updated SCL fixed plant noise sources locations at HOM are shown in **Figure No. C1103/C/SCL/ACM/M52/045**. 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 under SCL at HOM

Lasatian	Fired Blood ID	Fire d Blant Course	Maximum Allowab	ole SWL, dB(A)
Location	Fixed Plant ID.	Fixed Plant Source	Daytime/Evening (1)	Night-time (1)
	A1	Tunnel Ventilation Louver	98	87
	A2	Tunnel Ventilation Louver	105	93
	A3	Tunnel Ventilation Louver	96	87
	A4	Tunnel Ventilation Louver	98	86
	A5	Tunnel Ventilation Louver	97	86
	A6	Tunnel Ventilation Louver	97	86
	B1	Tunnel Ventilation Louver	99	89
HOM	B2	Tunnel Ventilation Louver	104	94
	E5-3	Tunnel Ventilation Louver	96	85
	F2	Tunnel Ventilation Louver	100	82
	G1	Tunnel Ventilation Louver	89	86
	G2	Tunnel Ventilation Louver	87	84
	G3	Tunnel Ventilation Louver	88	83
	G4	Tunnel Ventilation Louver	84	74
	G5	Tunnel Ventilation Louver	89	77

Note:

⁽¹⁾ Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.

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 Acoustics 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
	SVANTEK 958	20890
	SVANTEK 958	28422
Sound Level Meter	SVANTEK 958A	59120
	SVANTEK 958A	69082
	SVANTEK 955	15234
Lland hald Assustin Calibratas	SVANTEK SV30A	29088
Hand-held Acoustic Calibrator	SVANTEK SV30A	10814

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 The noise measurements at HOM were all conducted during night-time periods at the fixed plant noise sources. Details of the noise measurement schedule are shown in **Table 3.2**.

Table 3.2 Measurement Schedule

Location	Date	
НОМ	29 Nov, 15 Dec, 20 Dec 2018 & 29 Jan 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 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.

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
	B&K 2250L	2681366
Cound Lovel Mater	B&K 2270	3007965
Sound Level Meter	B&K 2270	2644597
	B&K 2250	3001291
Calibratar	B&K 4231	3006428
Calibrator	Rion NC-74	34246490

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/M52/046**. Photographs of measurement locations are shown in **Appendix C2**.

Table 3.4 Noise Measurement Locations

Measurement Location ID	Representative NSR		Measurement Height
NSR 18	Yee Fu Building	Residential	~10m above ground level (free field condition)
NSR 21	Lok Ka House	Residential	~ 6m above ground level (free field condition)
NSR 40b	Residential Building, Ho Man Tin Station Development (Planned	Residential	~10m above ground level (free field condition)
NSR 40c	Future NSR) Residential Building, Ho Man Tin Station Development (Planned Future NSR)	Residential	~5m above station roof (free field condition)

Measurement Date and Time

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

Table 3.5 Measurement Schedule

Location	Date
NSR 18, NSR 21, NSR 40b, NSR40c	26 Feb 2019

4 MEASUREMENT RESULTS

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

4.1.1 The measured SWLs under conservative approach during daytime and evening, and night-time periods are presented in **Table 4.1**. Details of the measurement results are shown in **Appendix B4**.

Table 4.1 Summary of Measured SWLs for Fixed Plants

	Measured S	WL, dB(A)		allowable dB(A)	Complia	nce (Y/N)
Plant Item	Day/Eveni ng- time ⁽¹⁾	Night- time ⁽¹⁾	Day/Eve ning - time ⁽¹⁾	Night- time ⁽¹⁾	Day/Eveni ng - time ⁽¹⁾	Night- time ⁽¹⁾
A1	77	77	97	87	Y	Υ
A2	77	77	105	93	Υ	Υ
A3	72	72	97	87	Υ	Υ
A4	86	86	97	86	Υ	Υ
A5	76	76	97	86	Y	Υ
A6	75	75	97	86	Y	Υ
B1	86	86	99	89	Y	Υ
B2	87	87	104	94	Υ	Υ
E5-3	72	72	95	85	Υ	Υ
F2	82	82	93	82	Y	Υ
G1	86	86	96	86	Y	Υ
G2	84	84	94	84	Υ	Υ
G3	83	83	93	83	Y	Υ
G4	77	73	85	74	Y	Υ
G5	81	74	88	77	Υ	Υ

Note:

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 night-time period. Measurement results are summarised in **Table 4.2** below. No characteristics of tonality, impulsiveness and intermittency was observed at the selected NSR. 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**.

⁽¹⁾ Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.

Table 4.2 Noise Measurement Result at Representative NSRs

			l l	Measurement Re	sult		Characteristics of Tonality, Impulsiveness and Intermittency at NSRs (Y/N)
	Representing NSRs	Operation Scenario ⁽¹⁾⁽²⁾	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)	Site Observation	
	Yee Fu Building	Daytime & Evening	58.9	58.1	0.8		N
		Night-time	59.2	57.6	1.6		N
	Lok Ka House	Daytime & Evening	71.5	70.5	1.0		N
		Night-time	71.9	70.6	1.3	Noise environment was dominated by traffic noise	N
Tin Station Development (Planned Futur	Building, Ho Man	Daytime & Evening	56.8	55.4	1.4	and human activities. Noise from SCL fixed plant was not noticeable at	N
	Development (Planned Future NSR)	Night-time	57.9	55.8	2.1	measurement locations.	N
	Residential Building, Ho Man Tin Station	Daytime & Evening	67.9	66.3	1.6		N
	Development (Planned Future NSR)	Night-time	67.6	66.7	0.9		N

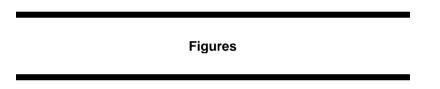
Notes:

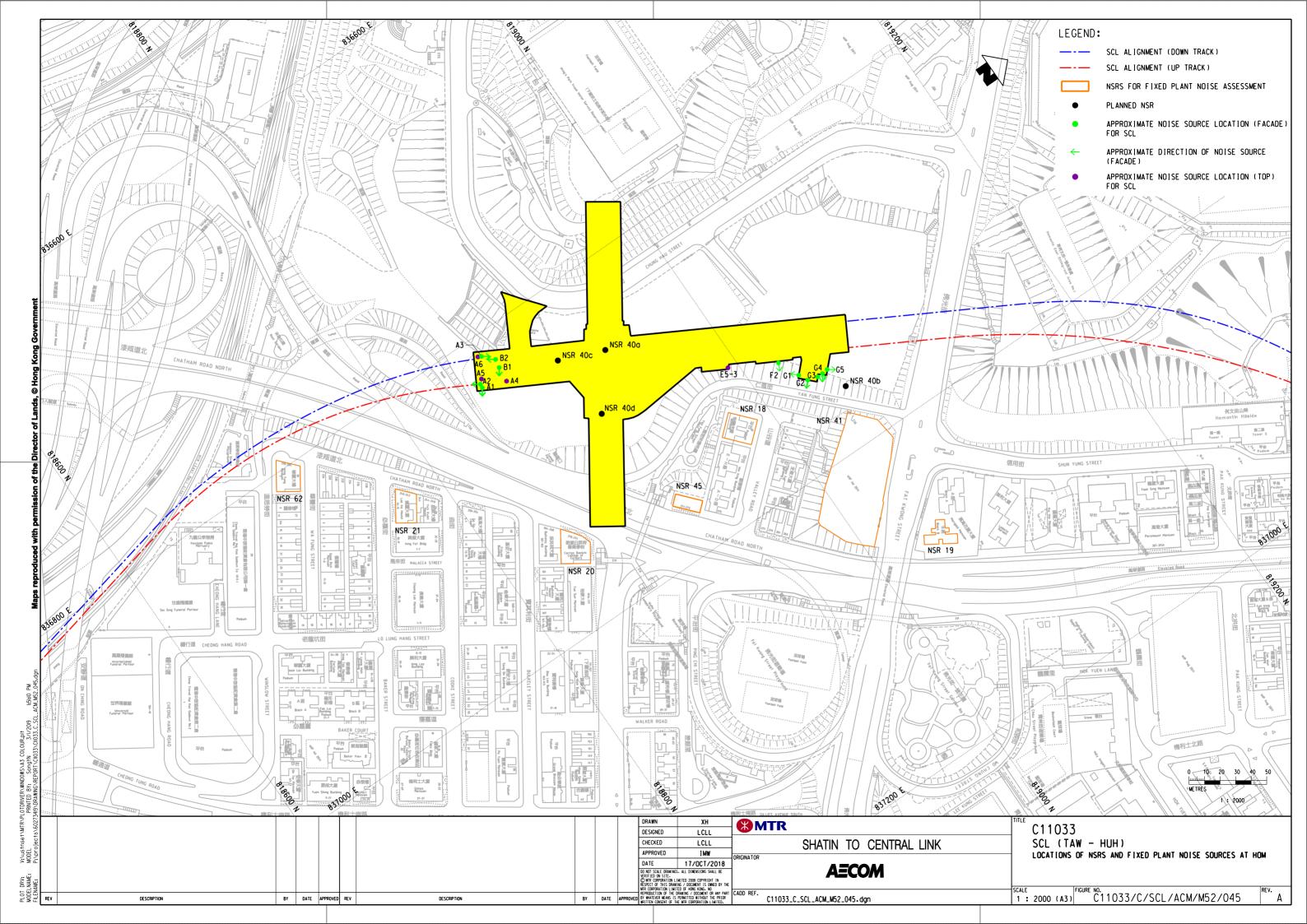
⁽¹⁾ Daytime and evening period (i.e 0700 to 2300 hours) and night-time period (i.e. Night: 2300 to 0700 hours).

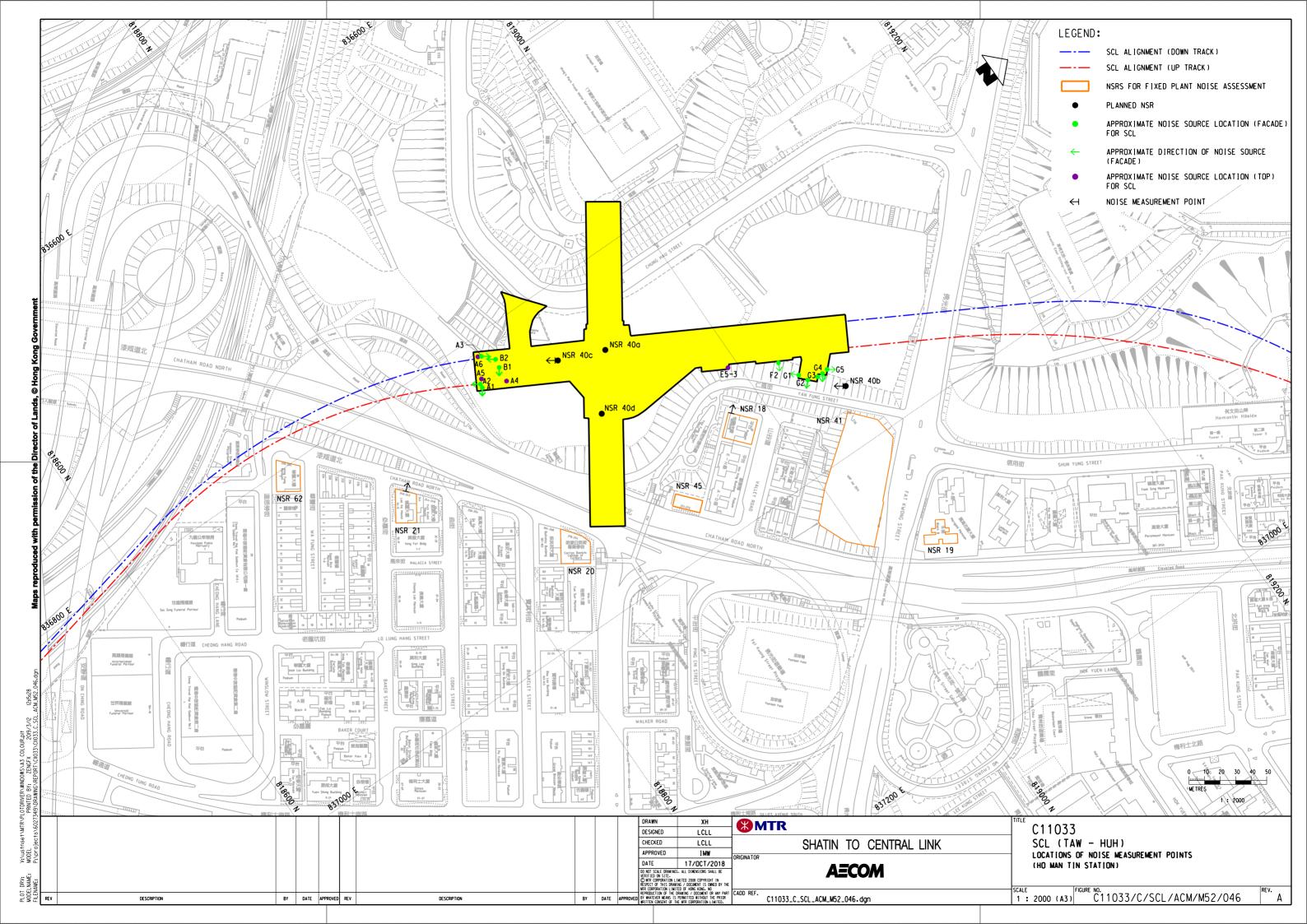
⁽²⁾ KTÉ Fixed plant noise operation during daytime/evening and nigth-time periods have been included according to corresponding fixed plant noise measurement.

5 CONCLUSION

5.1.1 The fixed plant noise verification were undertaken and the measurement results indicated all the fixed plant noise sources under SCL comply with the updated maximum allowable SWLs. No characteristics of tonality, impulsiveness and intermittency was also observed at the representative NSRs. Result of data analysis also indicated no characteristics of tonality, impulsiveness and intermittency is found at the representative NSRs.







Appendix A

Proposal for Updating Maximum Allowable Sound Power Levels of Louvers (Batch 2 – Ho Man Tin Station (HOM))

Kwun Tong Line Extension

Proposal for Updating Maximum Allowable Sound Power

Levels of Fixed Plant Sources

(Batch 2 – Ho Man Tin Station (HOM))

(April 2019)

Certified by:	J	acky C	han	
Position: Indep	ende	ent En	vironn	nental Checker
Date:	R	Apr	2019	

Kwun Tong Line Extension

Proposal for Updating Maximum Allowable Sound Power

Levels of Fixed Plant Sources

(Batch 2 – Ho Man Tin Station (HOM))

(April 2019)

Certified by	:Lisa Poon
Position: <u>Er</u>	nvironmental Team Leader
Date.	8 April 2019

Consultancy Agreement No. C11033

Kwun Tong Line Extension (KTE)

Proposal for Updating Maximum Allowable Sound Power Levels of Fixed Plant Sources (Batch 2 - Ho Man Tin Station (HOM))

April 2019

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Annex A Detail Calculation of Fixed Plant Noise Assessment

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1 INTRODUCTION

1.1 Background

- 1.1.1 Ho Man Tin Station (HOM) is the interchange station for Kwun Tong Line Extension (KTE) and Shatin to Central Link Tai Wai to Hung Hom Section [SCL (TAW-HUH)] (hereinafter referred to as "the SCL project")). During the design process after the issuance of EIA Study Briefs of both Projects, engineering and programme considerations have supported the construction and operation of HOM to be implemented, under the KTE. Environmental impacts arising from the construction and operation of the HOM had hence been assessed in the KTE EIA Report.
- 1.1.2 Following the approval of the KTE EIA Report (Register No.: AEIAR-154/2010) under the Environmental Impact Assessment Ordinance (EIAO), the Environmental Permit (EP) (EP No: EP-399/2010), covering the construction and operation of KTE (hereinafter referred to as "the KTE project"), was granted on 27 September 2010. Variations of Environmental Permit (VEP) were subsequently applied for EP-399/2010 and the latest Environmental Permit (EP No: EP-399/2010/E) was issued by Director of Environmental Protection (DEP) on 4 October 2018.
- 1.1.3 Pursuant to EP Condition 4.6, at least one month before the commencement of operation of the KTE project, the Permit Holder shall carry out audit and confirm in writing to the Director that the design of the fixed plant noise sources associated with the KTE project complies with the maximum sound power levels determined in the EIA Report (Register No. AEIAR-154/2010) and all relevant documents in the Register, or otherwise approved by the Director in compliance with the requirements in the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) having due regard to the characteristics of tonality, impulsiveness and intermittency. The audit report shall be certified by the ET Leader and verified by the IEC.
- 1.1.4 Fixed noise audit for the noise sources related to the operation of KTE project was conducted and the Fixed Plant Noise Audit Report for KTE (September 2016) (FRNAR-KTE) was accepted by DEP in October 2016. However, some of the fixed plant sources, which supports the operation of SCL(TAW-HUH) in HOM were excluded in the fixed plant noise audit report (2016) and the associated fixed plant noise audit will be conducted after the installation of these sources. As discussed in Section 4.3 of FRNAR-KTE, fixed plant noise audit for SCL fixed plant will be conducted before the commencement of SCL project under KTE EP condition 4.6 to confirm the compliance of fixed plant operation for SCL.
- 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 identified Noise Sensitive Receivers (NSRs) for investigation of any characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources associated with the operation of SCL.
- 1.1.6 Based on the latest design information of SCL, the maximum allowable SWLs of fixed plant items has been updated to reflect the latest design of the SCL at HOM, and therefore a Proposal will be prepared to present the updated maximum allowable sound power levels (SWLs) of the fixed plant items at HOM for supporting the operation of SCL.

1.2 Purpose of This Proposal

1.2.1 As discussed in **Section 1.1.6**, the maximum allowable SWLs of fixed plant items has been updated to reflect the latest design of the Project. This Proposal (Batch 2 – Ho Man Tin Station (HOM)) presents the updated maximum allowable SWLs of the fixed plant noise sources under SCL at HOM.

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)					
Time Period	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 2.3 of the approved Proposal for Updating the Maximum Sound Power Level for Fixed Plant Noise Sources for KTE (KTE Proposal for Updating SWLs) dated on 26 August 2016 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 HOM are summarised in **Table 2.2**.

Table 2.2 Summary of noise criteria at representative NSRs for fixed noise sources (Reference from Table 2.3 of the approved KTE Proposal for Updating SWLs)

Area (NSR No.)	Time Period (1)	ASR	ANL-5, dB(A) ⁽²⁾	Criteria, dB(A) (3)
Ho Man Tin				
Vac Eu Building (NCD 40)	Day & evening	С	65	65
Yee Fu Building (NSR 18)	Night	С	55	55
Marinald Maraina (NOD 40)	Day & evening	С	65	65
Marigold Mansion (NSR 19)	Night	С	55	55
Chinachem (Hung Hom)	Day & evening	С	65	65
Commercial Centre (NSR 20) (4)	Night	С	55	55
1 1 K 11 (NOD 04)	Day & evening	С	65	65
Lok Ka House (NSR 21)	Night	С	55	55
Residential Building, Ho Man Tin	Day & evening	С	65	65
Station Development (Planned Future NSR) (NSR 40a)	Night	С	55	55
	Day & evening	В	60	60

Area (NSR No.)	Time Period (1)	ASR	ANL-5, dB(A) ⁽²⁾	Criteria, dB(A) (3)
Residential Building, Ho Man Tin Station Development (Planned Future NSR) (NSR 40b)	Night	В	50	50
Residential Building, Ho Man Tin	Day & evening	С	65	65
Station Development (Planned Future NSR) (NSR 40c)	Night	С	55	55
Residential Building, Ho Man Tin	Day & evening	С	65	65
Station Development (Planned Future NSR) (NSR 40d)	Night	С	55	55
Residential Building, Dormitory for	Day & evening	С	65	65
The Hong Kong Polytechnics University (NSR 41)	Night	С	55	55
271-273 Chatham Road North (NSR	Day & evening	С	65	65
45)	Night	С	55	55
Wing Fung Building (NCD 62)	Day & evening	С	65	65
Wing Fung Building (NSR 62)	Night	С	55	55

Notes:

- (1) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
- (2) A 5 dB(A) has been deducted from ANL as specified in requirement of TM-EIAO.
- (3) As mentioned in KTE EIA, the Project areas are densely populated areas strongly influenced by traffic, the prevailing noise levels are unlikely to be 5dB(A) lower than the appropriate ANL. Thus ANL-5 is adopted for this urban Study Area.
- (4) Caritas Bianchi College of Careers (NSR 20) was named as Chinachem (Hung Hom) Commercial Centre and was occupied as office use since Year 2016. In January 2018, an application was submitted to change the use of the building to "Hotel" and was approved by Town Planning Board in May 2018.

2.3 Review of Area Sensitivity Rating

- 2.3.1 Area Sensitive Ratings (ASR) as defined in the approved Table 2.3 of Proposal for Updating SWLs 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 Annual Traffic Census 2017, Chatham Road North, has been identified in the vicinity of NSRs in Ho Man Tin area, and the details are listed in **Table 2.3** below.

Table 2.3 Major road in the Vicinity of HOM

Area	Road Name	From	То	A.A.D.T. ⁽¹⁾ (2017)
Ho Man Tin	Chatham Road North	Wuhu Street	Chatham Road North (GL)	109,170

Note:

- (1) Annual average daily traffic (A.A.D.T.) as extracted from The Annual Traffic Census 2017 (https://www.td.gov.hk/filemanager/en/content_4915/annual%20traffic%20census%202017.pdf).
- 2.3.3 According to Annual Traffic Census 2017, Chatham Road North, with annual average daily traffic (A.A.D.T.) greater than 30,000, remains as Influencing Factor (IF) located in the vicinity of NSRs in Ho Man Tin area, and thus the ASRs of NSRs in this area as defined in **Table 2.2** remains unchanged, except NSR40b. Site inspection has been conducted recently to determine the degree to which NSR 40b is affected by the IF. Site observation revealed that NSR 40b has direct line of sight to Chatham Road North, and traffic noise from Chatham Road North was noticeable, but was not a dominant feature of the noise climate of the NSR. As

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NSR 40b is located in urban area, the ASR for NSR 40b should be revised as ASR "C" in accordance with the IND-TM. Details of ASR for NSR 40b is presented in **Table 2.4** below.

Table 2.4 Review of ASRs

Area (NSR No.)	Type of Area ⁽¹⁾	Influencing Factor (IF)	Degree to which NSR is affected by IF	ASR	Time Period ⁽²⁾	ANL-5, dB(A)	Criteria, dB(A)
Ho Man Tin							
Residential Building, Ho Man Tin Station	Urban	Chatham	Indirectly		Day & evening	65	65
Development (Planned Future NSR) (NSR 40b)	Area	Road North	Affected	С	Night	55	55

Notes:

- (1) Reference is made from Appendix 7.1 of the approved KTE EIA report.
- (2) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
- (3) A 5 dB(A) has been deducted from ANL as specified in requirement of TM-EIAO.
- (4) As mentioned in KTE EIA report, the Project areas are densely populated areas strongly influenced by traffic, the prevailing noise levels are unlikely to be 5dB(A) lower than the appropriate ANL. Thus ANL-5 is adopted for this urban Study Area.

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 under SCL at HOM are shown in **Figure No.** C1103/C/SCL/ACM/M52/045. Based on latest design information, the maximum allowable SWLs for ventilation louvers are updated and summarized in **Table 3.1**.

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

Location	Fixed Plant ID.	Fixed Plant Source	Maximum Allowable SWL, dB(A) ⁽¹⁾		
			Daytime & Evening ⁽²⁾	Night-time ⁽²⁾	
	A1	Tunnel Ventilation Louver	97	87	
	A2	Tunnel Ventilation Louver	105	93	
	A3	Tunnel Ventilation Louver	97	87	
	A4	Tunnel Ventilation Louver	97	86	
	A5	Tunnel Ventilation Louver	97	86	
	A6	Tunnel Ventilation Louver	97	86	
	B1	Tunnel Ventilation Louver	99	89	
НОМ	B2	Tunnel Ventilation Louver	104	94	
	E5-3	Tunnel Ventilation Louver	95	85	
	F2	Tunnel Ventilation Louver	93	82	
	G1	Tunnel Ventilation Louver	96	86	
	G2	Tunnel Ventilation Louver	94	84	
	G3	Tunnel Ventilation Louver	93	83	
	G4	Tunnel Ventilation Louver	85	74	
	G5	Tunnel Ventilation Louver	88	77	

Notes:

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	Criteri	a, dB(A)	Predicted Sound Pressure Level, Leq,30mins, dB(A) ⁽¹⁾			
NOK ID	Description	Daytime & Evening ⁽²⁾	Night-time ⁽²⁾	Daytime & Evening ⁽²⁾	Night-time ⁽²⁾		
NSR 18	Yee Fu Building	65	55	64	55		
NSR 19	Marigold Mansion	65	55	47	37		
NSR 20	Chinachem (Hung Hom) Commercial Centre ⁽¹⁾	65	55	62	54		
NSR 21	Lok Ka House	65	55	65	55		

⁽¹⁾ The maximum allowable sound power 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.

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NSR ID	Decarintian	Criteri	a, dB(A)	Predicted Sound Pressure Level, Leq,30mins, dB(A) ⁽¹⁾			
NSK ID	Description	Daytime & Evening ⁽²⁾	Night-time ⁽²⁾	Daytime & Evening ⁽²⁾	Night-time ⁽²⁾		
NSR 40a	Residential Building, Ho Man Tin Station Development (Planned Future NSR)	65	55	62	50		
NSR 40b	Residential Building, Ho Man Tin Station Development (Planned Future NSR)	65	55	65	55		
NSR 40c	Residential Building, Ho Man Tin Station Development (Planned Future NSR)	65	55	65	55		
NSR 40d	Residential Building, Ho Man Tin Station Development (Planned Future NSR)	65	55	64	55		
NSR 41	Residential Building, Dormitory for The Hong Kong Polytechnics University	65	55	60	51		
NSR 45	271-273 Chatham Road North	65	55	60	53		
NSR 62	Wing Fung Building	65	55	62	52		

Notes:

⁽¹⁾ Cumulative fixed plant noise levels from the fixed plant under KTE have been considered according to the measured SWLs for the operation during daytime/evening periods and the operation during night-time period as specified in FRNAR-KTE. The predicted cumulative fixed plant noise levels have due regard to the characteristics of tonality, intermittency and impulsiveness.

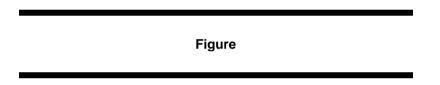
⁽²⁾ Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.

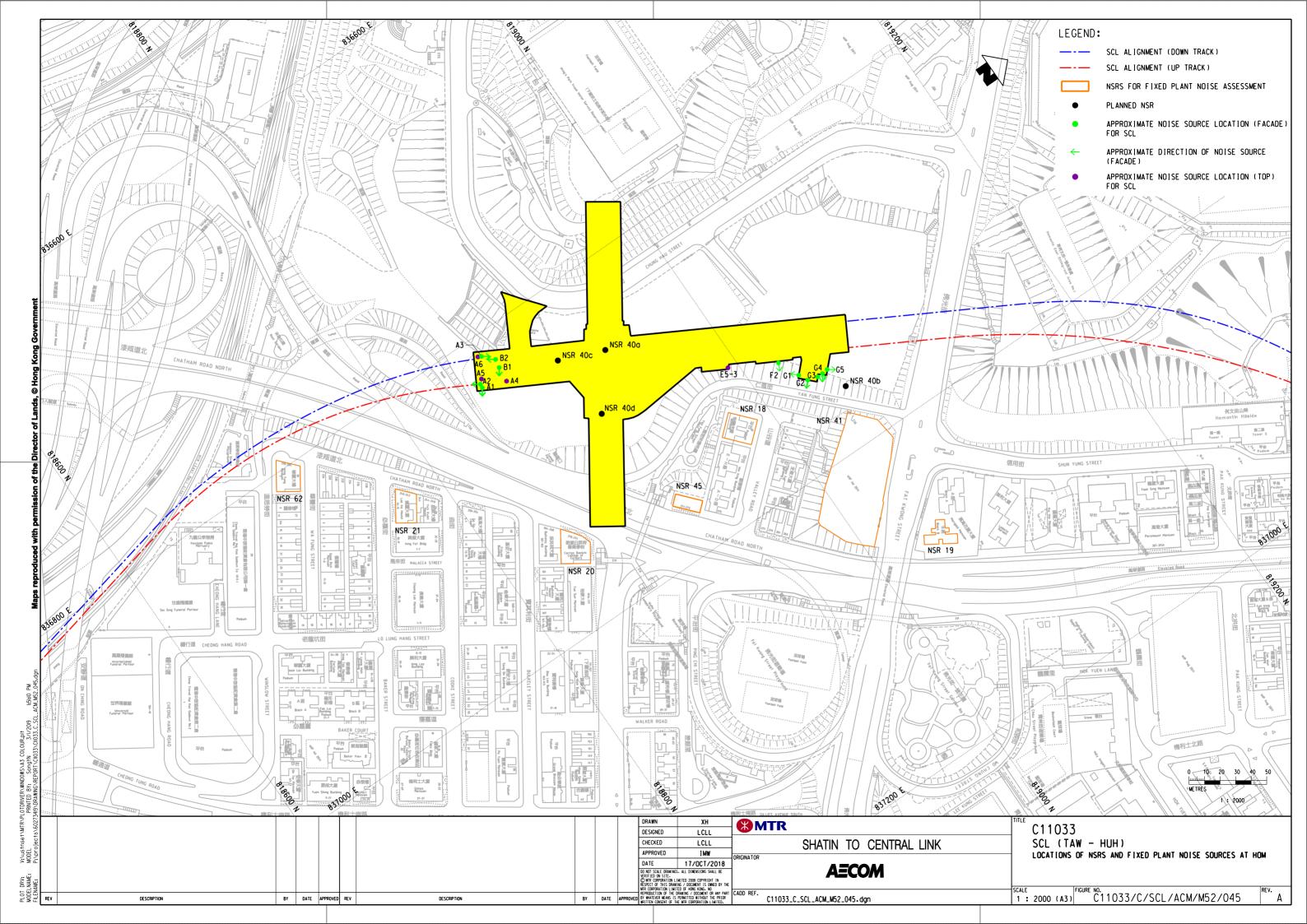
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4 CONCLUSION

- 4.1.1 The maximum allowable SWLs of fixed plant noise sources under SCL at HOM 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 louver under SCL 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.





Annex A

Detail Calculation of Fixed Plant Noise Assessment

Fixed P	lant No	ise Calcu	lation - HC	JIVI NSKS		Dusting (b) Night							
NSR	Louver	Distance from Louver, m	Distance Attenuation, dB(A)	Barrier Correction ^(a) , dB	Façade Effect, dB(A)	Louver SWL, dB(A)	Daytime Individual SPL, dB(A)	Total SPL, dB(A)	Noise Criterion under the EIAO-TM, dB(A)	Louver SWL, dB(A)	Night Individual SPL, dB(A)		Noise Criterion under the EIAO- TM, dB(A)
HOM NSR 18	lno.	137.5	-50.8	0		85.0	27.2		4 65			55	
NSK 18	B8 B9	74.0	-50.8	-10	3	72.0				72.0	19.6		- 55
	B10	72.5	-45.2	-10	3	69.0		-					
	B11 D8	75.2 62.0	-45.5 -43.9	-10 -10	3	68.0 79.0					-		_
	D9	54.0	-42.7	0	3	77.0	37.3			77.0	37.3	-	-
	D10 D11	50.0 46.0	-42.0 -41.3	0		80.0 77.0				77.0 77.0		-	-
	E1	48.1	-41.6	0		76.0				76.0			-
	E2	42.1	-40.5	0	3	74.0	36.5			74.0	36.5	-	-
	E3 E4	35.3 32.4	-38.9 -38.2	0	3	76.0 76.0				76.0 76.0			-
	E5-1	30.8	-37.8	0		76.0				76.0			_
	E5-3	30.8	-37.8	0	3	95.0				85.0	50.2		
	F1 F1a	40.5 31.5	-40.2 -38.0	0	3	80.0 68.0				73.0 68.0			-
	F1b	32.6	-38.3	0	3	66.0				66.0		-	-
	F1c	33.5	-38.5	0	3	68.0				68.0	32.5		-
	F1d F2	35.5 49.3	-39.0 -41.9	0	3	73.0 93.0				82.0	43.1		-
	F3a	56.4	-43.0	0	3	69.0				69.0			-
	F3b	55.4	-42.9	0	3	70.0				70.0			-
	F3d F4a	53.5 74.3	-42.6 -45.4	0	3	68.0 80.0			-	68.0	28.4		_
	F4b	80.2	-46.1	0	3				-	69.0			
	G1	48.2	-41.7	0	3	96.0				86.0	47.3		
	G2 G3	49.2 53.3	-41.8 -42.5	-10	3	94.0				84.0 83.0			_
	G4	62.9	-44.0	0	3	85.0	44.0			74.0	33.0		-
	G5	64.9	-44.2	-10	3	88.0	36.8			77.0	25.8		-
	J3 J4	46.0 39.0	-41.3 -39.8	0	3	75.0 75.0				75.0 75.0			_
	J5	40.0	-39.8	0		74.0			-	74.0		-	-
	J6	51.0	-42.2	0	3	74.0	34.8			74.0	34.8		-
NSR 19	F1	163.5	-52.3 -52.6	0		80.0		4	7 65	73.0		37	55
	F1a F1b	169.7 167.7	-52.6 -52.5	0	3	68.0 66.0			-	68.0 66.0			-
	F1c	166.6	-52.4	0	3	68.0	18.6			68.0			-
	F1d F2	161.5 146.1	-52.2 -51.3	0	3	73.0 93.0	23.8			 82.0			-
	F2 F3a	146.1	-51.3 -51.1	0	3	93.0				82.0 69.0			_
	F3b	141.9	-51.0	0	3	70.0				70.0			-
	F3d	139.9	-50.9	0	3	68.0				68.0	20.1		-
	F4a F4b	138.9 136.8	-50.9 -50.7	0	3	80.0	32.1			69.0	21.3		_
	G1	142.0	-51.0	-10	3	96.0	38.0			86.0			_
	G2	149.2	-51.5	-10	3	94.0			-	84.0			-
	G3	147.2	-51.4	-10	3	93.0				83.0			-
	G4 G5	138.9 136.9	-50.9 -50.7	-10 -10	3	85.0 88.0				74.0 77.0			-
	J3	166.8	-52.4	-10	3	75.0	15.6			75.0	15.6		
	J4 J5	170.9 169.8	-52.7 -52.6	0	3	75.0 74.0				75.0 74.0			-
	16	167.8	-52.5	0	3	74.0			-	74.0			-
NSR 20	A1	106.3	-48.5	0	3	97.0		6:	2 65	87.0	41.5	54	55
(with	A2	110.3	-48.8	-10	3	105.0				93.0			
operation of	A3 A4	123.2 125.4	-49.8 -50.0	0	3	97.0 97.0			-	87.0 86.0	40.2 39.0		
tunnel ventilation	A5	112.5	-49.0	0	3	97.0				86.0			-
shaft H)	A6	104.5	-48.4	0	3	97.0				86.0		-	
	B1 B2	111.8 121.7	-49.0 -49.7	-10	3	99.0				89.0 94.0			_
	B3a	111.4	-48.9	0	3	82.0	36.1			82.0	36.1		-
	B3b	110.4	-48.9	0		82.0				70.0	24.1		-
	B4 B4a	95.0 94.8	-47.6 -47.5	0		96.0 81.0				81.0	36.5		_
	B5	107.2	-48.6	0		82.0	36.4			82.0			-
	B6	123.5 121.5	-49.8 -49.7	-10 -10	3	86.0 85.0							-
	B7 B8	119.6	-49.6	-10	3	85.0					-		-
	B9	118.9	-49.5	-10	3	72.0	15.5			72.0	15.5		-
	B10 B11	120.3 120.3	-49.6 -49.6	-10 -10	3	69.0 68.0					-		_
	C1a	120.3	-49.b -48.1	-10	3	77.0			-	77.0	31.9		-
	C1b	100.1	-48.0	0	3	80.0	35.0			80.0	35.0		
	C2a C2b	97.1 92.1	-47.7 -47.3	0		80.0 82.0				80.0 82.0			
	C2c	91.6	-47.2	0		76.0	31.8	-	-				
	C2d	91.6	-47.2	0	3	83.0	38.8			83.0			-
	C2e C3	91.1 95.1	-47.2 -47.6	0	3	83.0 81.0				83.0 81.0			_
	C4	95.0	-47.6	0		80.0	35.4			80.0	35.4		-
	C4a	96.0	-47.6	0	3	86.0				86.0			-
	C5 C6	97.0 93.0	-47.7 -47.4	0	3	80.0				80.0 78.0			_
	C7c	81.1	-46.2	0	3	78.0	34.8		-				
	D1	93.3	-47.4	0		89.0	44.6			89.0			-
	D2 D3	86.4 104.2	-46.7 -48.4	0		87.0 85.0				87.0 84.0			_
	D5	80.5	-46.1	0		83.0		-	-	83.0			
	D6	81.5	-46.2	0			41.8		-	85.0			-
	D7 D8	85.4 89.3	-46.6 -47.0	0		82.0 79.0				82.0	38.4		
	D8 D9	98.2	-47.0 -47.8	0		79.0			-	77.0	32.2	-	-
	D10	106.1	-48.5	0	3	80.0	34.5			77.0	31.5		-
	D11 E1	108.1 125.1	-48.7 -49.9	0	3	77.0 76.0				77.0 76.0			-
	E2	130.1	-49.9	0		74.0		-	-	74.0			-
	E3	141.1	-51.0	0	3	76.0	28.0			76.0	28.0		-
	E4 E5-1	146.2 140.3	-51.3 -50.9	0		76.0 76.0				76.0 76.0			_
	E5-1 E5-3	140.3	-50.9 -51.1	0		76.0 95.0			-	76.0 85.0			
	H1	75.1	-45.5	0	3	91.0	48.5			-			-
	H2 H3	76.0 78.0	-45.6	0	3								-
	H3	78.0 77.0	-45.8 -45.7	-10 0	3	91.0 88.0			-				
	11	65.2	-44.3	0	3	-	-						-
	12	67.2	-44.5	0	3	-	-				-		-
	13	68.2 65.2	-44.7 -44.3	-10 -10	3	_	-		-		-		_
	K1b	114.7	-49.2	0	3	84.0				84.0	37.8		-
ļ	K3	103.1	-48.3	0	3	79.0			-	-	-	-	
 	K4 K5	103.0 110.9	-48.3 -48.9	-10 -10	3	75.0 74.0					-		-
l l	K6	122.2	-40.5	-10	3	74.0					-		-

Distance Distance Barrier Facade Total Control of	ixeu P	iant NO	ise Calcu	lation - HC	JIVI INSINS		Postine (b)					Night-time			
March 1982	NSR	Louver	from Louver,	Attenuation,	Correction (a),	Façade Effect, dB(A)		Individual SPL,	Total SPL,	Criterion under the EIAO-TM,		Individual SPL,	Total SPL,	Noise Criterion under the EIAO- TM, dB(A)	
A	NSR 20								6:	2 65			54	55	
Section (A. 1955 - 1960) 1 1 1 1 1 1 1 1 1 1														-	
March Marc		A4	125.4	-50.0	0	3	97.0	50.0			86.0	39.0			
10.														-	
Store 111 46 77 10 10 10 10 10 10 10	shaft I)	B1	111.8	-49.0	0	3	99.0	53.0			89.0	43.0		-	
SEC 1950 440 75 76 76 76 76 76 76 77 76 77 76 77														-	
Section Sect														-	
S						3					01.0	26 5		-	
P						3								-	
Bit												-		-	
Section 1985 1985 493 300 30 30 30 30 30 30												-		-	
Main 1903		B9	118.9	-49.5	-10		72.0	15.5			72.0	15.5		-	
C13														-	
C22		C1a	101.1	-48.1	0	3	77.0	31.9							
C C C C C C C C C C C C C														-	
C24		C2b	92.1	-47.3	0		82.0	37.7						-	
Cre											83.0	38.8		-	
Ca			91.1	-47.2	0	3	83.0	38.8			83.0	38.8		-	
Color															
CS		C4a	96.0	-47.6	0	3	86.0	41.4		-	86.0	41.4			
Cre		C5	97.0	-47.7	0	3	80.0	35.3			80.0	35.3		-	
D2											78.0	33.6		-	
03		D1	93.3	-47.4	0	3	89.0	44.6						-	
D														-	
07		D5	80.5	-46.1	0	3	83.0	39.9			83.0	39.9		-	
OS														-	
030 1964		D8	89.3	-47.0	0	3	79.0	35.0							
011 1961 447 0 3 770 313														-	
Section Sect														-	
14 14.1														-	
64										-				-	
S-3		E4	146.2	-51.3	0	3	76.0	27.7			76.0	27.7		-	
HI						3								-	
H3		H1	75.1	-45.5	0		-	-				-		-	
Hef								-						-	
12		H4	77.0	-45.7	0	3		-						-	
Second Color Seco														-	
RID												-		-	
K3									-			27.0			
KS										-	84.0	37.8		-	
NR 21														-	
NSR 21						3						-		-	
(with personal of	NSR 21	A1	82.5	-46.3	0		97.0	53.7	6	5 65			55	55	
Mathematics						3								-	
Ventration A6 98.7 47.9 0 3 97.0 52.1 86.0 41.1 11.		A4	98.7	-47.9	0		97.0	52.1			86.0	41.1		-	
10 10 10 10 10 10 10 10														-	
S33	shaft H)	B1	101.2	-48.1	0	3	99.0	53.9			89.0	43.9		-	
83b 99.1														-	
B44										-				-	
BS	-									-				-	
B6														-	
B8		B6	122.7	-49.8	-10	3	86.0	29.2			-	-		-	
B9												-		-	
B11		B9	168.7	-52.5	-10	3	72.0	12.5			72.0	12.5		-	
Cla										-	-	-		-	
C2a		C1a	88.2	-46.9	0	3	77.0	33.1							
C2b														-	
C2d		C2b	98.2	-47.8	0	3	82.0	37.2						-	
C2e											92 ^	20 0		-	
C3		C2e	104.2	-48.4	0	3	83.0	37.6			83.0	37.6			
C4a		C3	107.1	-48.6	0	3	81.0	35.4			81.0	35.4		-	
CS														-	
C7c		C5	132.1	-50.4	0	3	80.0	32.6			80.0	32.6		-	
D1 1311 5-04 0 3 89.0 41.6 89.0 41.6 89.0 14.6 87.0 39.5											78.0	30.4		-	
D3		D1	131.1	-50.4	0	3	89.0	41.6							
DS														-	
07		D5	132.1	-50.4	0	3	83.0	35.6			83.0	35.6		-	
D8										-				-	
H1 1297 5-03 0 3 91.0 437		D8	156.9	-51.9	0	3	79.0	30.1				33.4		-	
H3 1307 503 10 3 91.0 33.7		H1	129.7	-50.3	0		91.0	43.7		-	-	-		-	
H4 1327 -50.5 0 3 88.0 40.5												-		-	
12		H4	132.7	-50.5	0	3					-	-		-	
13 1377 50.8 -10 3							-	-				-		-	
K1b 1160 49.3 0 3 84.0 37.7		13	137.7	-50.8	-10	3		-				-		-	
K3 83.1 46.4 0 3 79.0 35.6 K4 85.0 46.6 -10 3 75.0 21.4								277				277		-	
		K3	83.1	-46.4	0	3	79.0	35.6							
103.4 -40.0 0 3 74.0 20.2											_	-		-	
K6 103.9 -48.3 0 3 76.0 30.7												-		-	

				M NSRs			Daytime	(b)			Night	-time	
NSR	Louver	Distance from Louver, m	Distance Attenuation, dB(A)	Barrier Correction ^(a) , dB	Façade Effect, dB(A)	Louver SWL, dB(A)	Individual SPL,	Total SPL, dB(A)	Noise Criterion under the EIAO-TM, dB(A)	Louver SWL, dB(A)	Individual SPL,		Noise Criterion under the EIAO- TM, dB(A)
NSR 21	A1 A2	82.5	-46.3	0		97.0	53.7	65	65	87.0	43.7	55	55
(with operation of	AZ A3	85.5 98.4	-46.6 -47.9	-10	3	105.0 97.0	61.4 42.1			93.0 87.0	49.4 32.1		-
tunnel	A4 A5	98.7 87.8	-47.9 -46.9	0	3	97.0 97.0	52.1 53.1		-	86.0 86.0	41.1 42.1		-
ventilation shaft I)	A6	98.7	-47.9	0	3	97.0	52.1			86.0	41.1		-
	B1 B2	101.2 104.2	-48.1 -48.4	0		99.0 104.0	53.9 58.6			89.0 94.0	43.9 48.6		-
	B3a	98.6	-48.4	0		82.0	37.1			82.0	37.1		-
	B3b B4	99.1 110.1	-47.9 -48.8	0		82.0 96.0	37.1 50.2			70.0	25.1		-
	B4a	108.3	-48.7	0	3	81.0	35.3			81.0	35.3		-
	B5 B6	138.0 122.7	-50.8 -49.8	-10		82.0 86.0	34.2 29.2			82.0	34.2		-
	B7	115.0	-49.2	0	3	85.0	38.8			-	-	-	-
	B8 B9	125.7 168.7	-50.0 -52.5	-10 -10	3	85.0 72.0				72.0	12.5		-
	B10	170.7	-52.6	-10	3	69.0	9.4				-		-
	B11 C1a	167.2 88.2	-52.5 -46.9	-10 0	3	68.0 77.0	8.5 33.1			77.0	33.1		-
	C1b	93.2	-47.4	0	3	80.0	35.6			80.0	35.6		-
	C2a C2b	97.2 98.2	-47.7 -47.8	0		80.0 82.0	35.3 37.2			80.0 82.0	35.3 37.2		-
	C2c	99.2	-47.9	0	3	76.0	31.1						-
	C2d C2e	100.2 104.2	-48.0 -48.4	0		83.0 83.0	38.0 37.6			83.0 83.0	38.0 37.6		-
	C3	107.1	-48.6	0	3	81.0	35.4			81.0	35.4		-
	C4 C4a	122.0 125.1	-49.7 -49.9	0	3	80.0 86.0	33.3 39.1			80.0 86.0	33.3 39.1		-
	C5	132.1	-50.4	0	3	80.0	32.6			80.0	32.6		-
	C6 C7c	135.0 123.1	-50.6 -49.8	0		83.0 78.0	35.4 31.2			78.0	30.4		-
	D1	131.1	-50.4	0	3	89.0	41.6			89.0	41.6		-
	D2 D3	134.1 126.1	-50.5 -50.0	0		87.0 85.0	39.5 38.0			87.0 84.0	39.5 37.0		-
	D5	132.1	-50.4	0	3	83.0	35.6			83.0	35.6		-
	D6 D7	141.0 150.9	-51.0 -51.6	0		85.0 82.0	37.0 33.4			85.0 82.0	37.0 33.4		-
	D8	156.9	-51.9	0	3	79.0							-
	H1 H2	129.7 127.7	-50.3 -50.1	-10	3		-				-		-
	H3	130.7	-50.3	-10	3	-							-
	H4	132.7 134.7	-50.5 -50.6	0	3	92.0	44.4				-		-
	12	134.7	-50.6	-10	3	91.0	33.4						-
	13	137.7 136.7	-50.8 -50.7	-10 0	3	89.0 90.0	31.2 42.3				-		-
	K1b	116.0	-49.3	0	3	84.0	37.7			84.0	37.7		-
	K3 K4	83.1 85.0	-46.4 -46.6	-10	3	79.0 75.0	35.6 21.4						-
	K5	109.4	-48.8	0	3	74.0	28.2						-
	K6 A1	103.9 88.4	-48.3 -46.9	-10	3	76.0 97.0	30.7 43.1	62	65	87.0	- 33.1	50	- 55
(with	A3	85.7	-46.7	-10	3	97.0	43.3			87.0	33.3		-
operation of	A4 A5	86.6 85.7	-46.8 -46.7	0	3	97.0 97.0	53.2 53.3			86.0 86.0	42.2 42.3		-
tunnel ventilation	A6	70.8	-45.0	0	3	97.0	55.0			86.0	44.0	-	-
chaft HI	B1 B3a	70.5 72.4	-45.0 -45.2	-10 -10	3	99.0 82.0	47.0 29.8			89.0 82.0	37.0 29.8		-
	B3b	70.1	-44.9	-10	3	82.0	30.1			70.0	18.1		-
	B4 B4a	59.1 54.9	-43.4 -42.8	0		96.0 81.0	55.6 41.2			81.0	41.2		-
	B5	31.0	-37.8	-10	3	82.0	37.2			82.0	37.2		-
	B8 C1a	50.0 77.9	-42.0 -45.8	-10	3	85.0 77.0	46.0 24.2			77.0	24.2		-
	C1b	73.4	-45.3	-10	3	80.0	27.7			80.0	27.7		-
	C2a C2b	69.0 66.4	-44.8 -44.4	-10 -10	3	80.0 82.0				80.0 82.0	28.2 30.6		-
	C2c	64.7	-44.2	-10	3	76.0	24.8				-		-
	C2d C2e	63.0	-44.0 -43.6	-10 -10	3	83.0 83.0	32.0 32.4			83.0 83.0	32.0 32.4		-
	C3	56.5	-43.0	-10	3	81.0	31.0			81.0	31.0		-
	C4 C4a	51.0 43.6	-42.1 -40.8	-10 -10	3	80.0 86.0	30.9 38.2			80.0 86.0	30.9 38.2		-
	C5	42.4	-40.6	-10	3	80.0	32.4			80.0			-
	H1 H2	47.7 46.8	-41.6 -41.4	-10 0		91.0 91.0	42.4 52.6				-		-
	H3	44.3	-40.9	0	3	91.0	53.1			-			-
	H4 I1	45.2 63.5	-41.1 -44.1	-10 -10	3	88.0	39.9				-		-
	12	63.8	-44.1	-10	3		-				-		-
	13 14	60.7 60.4	-43.7 -43.6	0									-
	K1b	52.1	-42.3	-10	3	84.0	34.7			84.0	34.7		-
	K3 A1	83.7 88.4	-46.5 -46.9	-10 -10	3	79.0 97.0	25.5 43.1	62	65	87.0	33.1	50	- 55
(with	A3	85.7	-46.7	-10	3	97.0	43.3			87.0	33.3		-
operation of	A4 A5	86.6 85.7	-46.8 -46.7	0		97.0 97.0	53.2 53.3			86.0 86.0	42.2 42.3		-
ventilation	A6	70.8	-45.0	0	3	97.0	55.0			86.0	44.0		-
chaft I)	B1 B3a	70.5 72.4	-45.0 -45.2	-10 -10		99.0 82.0	47.0 29.8			89.0 82.0	37.0 29.8		-
	B3b	70.1	-44.9	-10	3	82.0	30.1			70.0	18.1		-
	B4 B4a	59.1 54.9	-43.4 -42.8	0		96.0 81.0				81.0	41.2		-
	B5	31.0	-37.8	-10	3	82.0	37.2			82.0	37.2		-
	B8 C1a	50.0 77.9	-42.0 -45.8	-10	3	85.0 77.0	46.0 24.2			77.0	24.2		-
	C1b	73.4	-45.3	-10	3	80.0	27.7			80.0	27.7		-
	C2a C2b	69.0 66.4	-44.8 -44.4	-10 -10	3	80.0 82.0	28.2 30.6			80.0 82.0	28.2 30.6		-
	C2c	64.7	-44.2	-10	3	76.0	24.8						-
	C2d C2e	63.0 60.5	-44.0 -43.6	-10 -10	3	83.0 83.0	32.0 32.4			83.0 83.0	32.0 32.4		-
	C3	56.5	-43.0	-10	3	81.0	31.0			81.0	31.0		-
	C4 C4a	51.0 43.6	-42.1 -40.8	-10 -10	3	80.0 86.0				80.0 86.0	30.9 38.2		-
	C5	42.4	-40.6	-10	3	80.0	32.4			80.0	32.4		-
	H1 H2	47.7 46.8	-41.6 -41.4	-10 0		-	-			-	-		-
	H3	44.3	-40.9	0	3	-	-		-	-	-		-
	H4 I1	45.2 63.5	-41.1 -44.1	-10 -10		92.0	40.9						-
	12	63.8	-44.1	-10	3	91.0	39.9		-	-	-		-
	13	60.7 60.4	-43.7 -43.6	0		89.0 90.0							-
	K1b	52.1	-42.3	-10	3	84.0	34.7			84.0	34.7		-
	К3	83.7	-46.5	-10		79.0	25.5		-	-			-

							Daytime	(b)			Night	-time	
NSR	Louver	Distance from Louver, m	Distance Attenuation, dB(A)	Barrier Correction ^(a) , dB	Façade Effect, dB(A)	Louver SWL, dB(A)	Individual SPL, dB(A)	Total SPL, dB(A)	Noise Criterion under the EIAO-TM, dB(A)	Louver SWL, dB(A)	Individual SPL, dB(A)	Total SPL, dB(A)	Noise Criterion under the EIAO- TM, dB(A)
NSR 40b	D7	136.0	-50.7	0	3	82.0	34.3	6		82.0	34.3	55	55
	D8	132.0	-50.4	0			31.6				-		-
	D9 D10	125.1 118.3	-49.9 -49.5	0		77.0 80.0			-	77.0 77.0			-
	D11	115.3	-49.2	0		77.0				77.0			-
	E1 E2	111.1 102.3	-48.9 -48.2	0		76.0 74.0			-	76.0 74.0		-	-
	E3	87.5	-46.8	0		76.0				76.0			-
	E4 E5-1	79.6 86.1	-46.0 -46.7	0		76.0 76.0				76.0 76.0			-
	E5-3 F1	84.2 53.2	-46.5 -42.5	0		95.0 80.0				85.0 73.0			-
	F1a	69.7	-44.9	0		68.0			-	68.0			-
	F1b F1c	68.7 67.8	-44.7 -44.6	0		66.0 68.0				66.0 68.0			-
	F1d	61.1	-43.7	0	3	73.0	32.3						-
	F2 F3a	42.5 32.5	-40.6 -38.2	-10		93.0 69.0			-	82.0 69.0			-
	F3b	31.7	-38.0	-10	3	70.0				70.0			-
	F3d F4a	30.7 26.0	-37.7 -36.3	-10 0		68.0 80.0	23.3 46.7			68.0	23.3		-
	F4b	26.0	-36.3	0	3		-			69.0			-
	G1 G2	31.3 28.7	-37.9 -37.1	-10 0		96.0 94.0	51.1 59.9		-	86.0 84.0			-
	G3	25.7	-36.2	0	3	93.0	59.8			83.0	49.8		
	G4 G5	18.6 18.0	-33.4 -33.1	0		85.0 88.0			-	74.0 77.0			-
	13	60.3	-43.6	0	3	75.0	34.4	-		75.0	34.4		-
ļ	J4 J5	56.6 55.7	-43.1 -42.9	0		75.0 74.0				75.0 74.0			-
	J6	51.3	-42.2	0	3	74.0	34.8		-	74.0	34.8		_
NSR 40c	A1 A3	61.2 58.6	-43.7 -43.4	-10 -10	3	97.0 97.0			5 65	87.0 87.0		55	- 55
	A4	59.0	-43.4	0	3	97.0	56.6		-	86.0	45.6		-
	A5 A6	58.2 44.8	-43.3 -41.0	0		97.0 97.0	56.7 59.0			86.0 86.0			-
	B1	42.3	-40.5	-10	3	99.0	51.5			89.0	41.5		-
	B3a B3b	46.4 44.5	-41.3 -41.0	-10 -10		82.0 82.0	33.7 34.0			82.0 70.0			-
	B4	33.9	-38.6	0	3	96.0	60.4						-
	B4a B8	36.2 22.7	-39.2 -35.1	-10 0		81.0 85.0				81.0	34.8		-
	C1a	53.3	-42.5	-10	3	77.0	27.5			77.0			-
	C1b C2a	48.9 46.1	-41.8 -41.3	-10 -10		80.0 80.0			-	80.0 80.0			-
	C2b	44.1	-40.9	-10	3	82.0	34.1			82.0			-
	C2c C2d	43.5 42.3	-40.8 -40.5	-10 -10		76.0 83.0				83.0	35.5		-
	C2e	40.6	-40.2	-10	3	83.0	35.8			83.0	35.8		-
	C3 C4	39.0 40.2	-39.8 -40.1	-10 -10		81.0 80.0				81.0 80.0			-
	C4a	38.7	-39.8	-10	3	86.0	39.2			86.0	39.2		
	C5 K1b	39.1 22.2	-39.8 -34.9	-10 0	3	80.0 84.0			-	80.0 84.0			-
	К3	57.8	-43.2	-10		79.0	28.8						-
NSR 40d	A1 A3	82.7 86.3	-46.4 -46.7	-10	3	97.0 97.0			4 65	87.0 87.0			- 55
(with operation of	f A4	67.1	-44.5	0		97.0	55.5			86.0	44.5		
tunnel	A5 A6	82.1 87.7	-46.3 -46.9	0	3	97.0 97.0				86.0 86.0			-
ventilation shaft H)	B1	70.0	-44.9	-10		99.0	47.1			89.0	37.1		
	B3a B3b	73.3 73.3	-45.3 -45.3	-10 -10	3	82.0 82.0				82.0 70.0			-
	B4	52.1	-42.3	-10		96.0	46.7						-
	B4a B5	50.9 42.8	-42.1 -40.6	-10		81.0 82.0				81.0 82.0			-
	B8	55.8	-42.9	0	3	85.0	45.1						-
	C1a C1b	73.4 70.9	-45.3 -45.0	0		77.0 80.0				77.0 80.0			-
	C2a	63.1	-44.0	0	3	80.0	39.0			80.0	39.0		-
	C2b C2c	57.7 57.7	-43.2 -43.2	0		82.0 76.0				82.0			
	C2d	57.7	-43.2	0	3	83.0	42.8			83.0			-
	C2e C3	57.7 52.6	-43.2 -42.4	0	3	81.0	41.6			83.0 81.0	41.6		-
	C4	48.2	-41.7	-10	3	80.0	31.3			80.0	31.3		-
	C4a C5	44.3 42.5	-40.9 -40.6	-10 -10		86.0 80.0				86.0 80.0			-
	C6	41.4	-40.3	-10	3	83.0	35.7			78.0			-
	C7c D1	36.5 29.7	-39.2 -37.4	-10 -10	3					89.0	44.6		-
	D2 D3	25.3 33.0	-36.1 -38.4	-10 -10	3		43.9			87.0 84.0	43.9		-
	D5	23.3	-35.3	-10	3	83.0	40.7		-	83.0	40.7		
	D6	24.8	-35.9	-10 -10		85.0				85.0			-
	D7 D8	29.0 33.4	-37.3 -38.5	-10 -10	3		33.5			82.0			-
	D9	39.4	-39.9	-10	3	77.0	30.1			77.0			-
	D10 D11	44.9 47.1	-41.0 -41.5	-10 -10						77.0 77.0			-
	H1	29.0	-37.3	-10	3	91.0	46.7			-			-
	H2 H3	27.9 28.5	-36.9 -37.1	0						-	-		-
	H4	29.7	-37.5	-10	3	88.0							-
	I1 I2	31.9 32.2	-38.1 -38.2	-10 -10			-						-
	13	30.3	-37.6	0	3		-			-			-
	K1b	30.0 53.8	-37.5 -42.6	0		84.0	44.4			84.0	44.4		-
	K3	78.8	-45.9	-10		79.0							-

Annex A Detail Calculation of Fixed Plant Noise Assessment

Fixed Plant Noise Calculation - HOM NSRs

							Daytime	(b)			Night-time			
NSR	Louver	Distance from Louver, m	Distance Attenuation, dB(A)	Barrier Correction ^(a) , dB	Façade Effect, dB(A)	dB(A)	Individual SPL, dB(A)	Total SPL, dB(A)	Noise Criterion under the EIAO-TM, dB(A)	Louver SWL, dB(A)	dB(A)	dB(A)	Noise Criterion under the EIAO- TM, dB(A)	
NSR 40d	A1 A3	82.7 86.3	-46.4 -46.7	-10		97.0 97.0	53.6 43.3	63	65	87.0 87.0	43.6 33.3	55	- 55	
(with	A3 A4	67.1	-46.7	-10		97.0	43.3 55.5			86.0	44.5			
operation of	A5	82.1	-46.3	0		97.0	53.7			86.0	44.3		_	
tunnel	A6	87.7	-46.9	0		97.0	53.1			86.0	42.1		-	
ventilation	B1	70.0	-44.9	-10	3	99.0	47.1			89.0	37.1		-	
shaft I)	B3a	73.3	-45.3	-10	3	82.0	29.7			82.0	29.7			
	B3b	73.3	-45.3	-10	3	82.0	29.7			70.0	17.7			
	B4	52.1	-42.3	-10	3	96.0	46.7						-	
	B4a	50.9	-42.1	0	3	81.0	41.9			81.0	41.9	-	-	
	B5	42.8	-40.6	-10		82.0	34.4			82.0	34.4		-	
	B8	55.8	-42.9	0		85.0								
	C1a	73.4	-45.3	0		77.0	34.7			77.0	34.7		-	
	C1b	70.9	-45.0	0		80.0				80.0	38.0		-	
	C2a	63.1	-44.0	0		80.0	39.0			80.0	39.0			
	C2b	57.7	-43.2	0		82.0	41.8			82.0	41.8		-	
	C2c C2d	57.7 57.7	-43.2 -43.2	0		76.0 83.0	35.8 42.8			83.0	42.8		-	
	C2e	57.7	-43.2 -43.2	0		83.0	42.8			83.0	42.8			
	C2e	52.6	-43.2 -42.4	0		81.0	42.8			81.0	42.8		-	
	C4	48.2	-41.7	-10		80.0	31.3			80.0	31.3		_	
	C4a	44.3	-40.9	-10		86.0				86.0			-	
	C5	42.5	-40.6	-10	3	80.0	32.4			80.0	32.4		-	
	C6	41.4	-40.3	-10		83.0				78.0	30.7		-	
	C7c	36.5	-39.2	-10		78.0	31.8						-	
	D1	29.7	-37.4	-10	3	89.0	44.6			89.0	44.6		-	
	D2	25.3	-36.1	-10		87.0	43.9			87.0	43.9		-	
	D3	33.0	-38.4	-10		85.0	39.6			84.0	38.6	-	-	
	D5	23.3	-35.3	-10		83.0				83.0	40.7			
	D6	24.8	-35.9	-10	3	85.0	42.1			85.0	42.1			
	D7	29.0	-37.3	-10		82.0				82.0	37.7		-	
	D8	33.4	-38.5	-10	3	79.0	33.5							
	D9	39.4	-39.9	-10	3	77.0	30.1			77.0	30.1		-	
	D10 D11	44.9 47.1	-41.0 -41.5	-10 -10	3	80.0 77.0	32.0 28.5			77.0 77.0	29.0 28.5		-	
	H1	29.0	-41.5	-10		77.0	28.5		-	77.0	28.5	**	-	
	H2	27.9	-37.3	-10		-	-				-		-	
	H3	28.5	-37.1	0			_				_			
	H4	29.7	-37.5	-10		_	-			_			-	
	11	31.9	-38.1	-10		92.0	46.9							
	12	32.2	-38.2	-10		91.0	45.8							
	13	30.3	-37.6	0		89.0	54.4						-	
	14	30.0	-37.5	0		90.0	55.5				-		-	
	K1b	53.8	-42.6	0		84.0	44.4			84.0	44.4	-	-	
	К3	78.8	-45.9	-10		79.0	26.1						-	
NSR 41	E1	131.3	-50.4	0		76.0		60	65	76.0	28.6	51	55	
	E2	122.4	-49.8	0		74.0	27.2			74.0	27.2		-	
	E3	109.5	-48.8	0	3	76.0				76.0	30.2			
	E4	101.5	-48.1	0		76.0	30.9			76.0	30.9			
	E5-1 E5-3	106.3 104.4	-48.5 -48.4	0		76.0 95.0				76.0 85.0	30.5 39.6		-	
	E5-3	76.6	-48.4 -45.7	0		95.0	49.b 37.3			73.0	39.6			
	F1a	91.5	-47.2	0		68.0	23.8			68.0	23.8		-	
	F1b	90.4	-47.1	0		66.0	21.9		-	66.0	21.9		-	
	F1c	89.5	-47.0	0		68.0				68.0	24.0		-	
	F1d	83.6	-46.4	0		73.0	29.6						-	
	F2	66.0	-44.4	0		93.0	51.6			82.0	40.6		-	
	F3a	59.0	-43.4	-10	3	69.0	18.6			69.0	18.6		-	
	F3b	58.1	-43.3	-10		70.0	19.7			70.0	19.7		-	
	F3d	56.1	-43.0	-10		68.0	18.0		-	68.0	18.0		-	
	F4a	45.9	-41.2	0		80.0	41.8			-				
	F4b	45.9	-41.2	0		-				69.0	30.8		-	
	G1	53.2	-42.5	-10		96.0				86.0	36.5		-	
	G2	49.3	-41.9	0		94.0	55.1			84.0	45.1		-	
	G3 G4	48.2	-41.7 -40.2	0	3	93.0 85.0			-	83.0 74.0	44.3 36.8		-	
	G5	40.6	-40.2	0		85.0	47.8 50.8			74.0	36.8			
	J3	82.9	-40.2 -46.4	0	3	75.0		-	-	75.0			-	
	J4	79.1	-46.0	0		75.0	32.0			75.0	32.0			
	J5	78.1	-45.9	0		74.0				74.0	31.1		-	
	J6	74.3	-45.4	0	3	74.0	31.6			74.0	31.6		-	

Fixed Plant Noise Calculation - HOM NSRs

							Daytime		1		Night		1
NSR	Louver	Distance from Louver, m	Distance Attenuation, dB(A)	Barrier Correction ^(a) , dB	Façade Effect, dB(A)	Louver SWL, dB(A)	Individual SPL, dB(A)	Total SPL, dB(A)	Noise Criterion under the EIAO-TM, dB(A)	Louver SWL, dB(A)	Individual SPL, dB(A)	Total SPL, dB(A)	Noise Criterion under the EIAO- TM, dB(A)
NSR 45	A1	144.1	-51.2	0		97.0	48.8	6	0 65	87.0	38.8	53	55
	A2	146.1	-51.3	-10 -10						93.0	34.7		-
	A3 A4	153.1 156.2	-51.7 -51.9	-10		97.0 97.0				87.0 86.0	28.3 37.1		-
	A5	146.2	-51.3	0	3	97.0	48.7			86.0	37.7		-
	A6	132.3	-50.4	0		97.0				86.0	38.6		-
	B1	140.1	-50.9	0		99.0				89.0	41.1		-
	B2 B3a	143.1 139.2	-51.1 -50.9	-10 0		104.0 82.0			-	94.0 82.0	35.9 34.1		-
	B3b	136.7	-50.7	0		82.0				70.0	22.3		-
	B4	128.6	-50.2	0		96.0							-
	B4a	113.1	-49.1	0		81.0				81.0	34.9		-
	B5 B6	108.8 140.8	-48.7 -51.0	-10 -10		82.0 86.0				82.0	26.3		-
	B7	140.8	-51.0	-10		85.0							-
	B8	133.9	-50.5	0		85.0							-
	B9	77.0	-45.7	-10		72.0	19.3			72.0	19.3		-
	B10	76.9	-45.7	-10		69.0							-
	B11 C1a	95.2 132.0	-47.6 -50.4	-10 0		68.0 77.0				77.0	29.6		-
	C1b	129.0		0		80.0				80.0	32.8		-
	C2a	125.0		0		80.0				80.0	33.1		-
	C2b	122.0		0		82.0				82.0	35.3		-
	C2c	121.0	-49.7	0		76.0	29.3						-
	C2d C2e	119.0 118.0		0		83.0 83.0			-	83.0 83.0	36.5 36.6		-
	C2e	114.0		0						81.0	34.9		-
	C4	106.0	-48.5	0	3	80.0	34.5			80.0	34.5		-
	C4a	100.0	-48.0	0		86.0				86.0	41.0		-
	C5 C6	99.0 93.0	-47.9 -47.4	0		80.0 83.0				80.0 78.0	35.1 33.6		-
	C7c	93.0 85.0	-47.4 -46.6	0		78.0				/8.0	33.b		-
	D1	96.9	-47.7	0	3	89.0				89.0	44.3		-
	D2	85.1	-46.6	0	3	87.0	43.4			87.0	43.4		-
	D3	107.8	-48.7	0		85.0				84.0	38.3		-
	D5 D6	77.2 66.3	-45.7 -44.4	0		83.0 85.0				83.0 85.0	40.3 43.6		-
	D7	61.5	-43.8	0		82.0				82.0	41.2		-
	D8	61.5	-43.8	0		79.0					-		-
	D9	63.4	-44.0	0		77.0				77.0	36.0		-
	D10	68.3	-44.7	0		80.0				77.0	35.3		-
	D11 E1	69.3 83.3	-44.8 -46.4	0		77.0 76.0				77.0 76.0	35.2 32.6		_
	E2	86.3	-46.7	0		74.0				74.0	30.3		-
	E3	90.4	-47.1	0		76.0				76.0	31.9		-
	E4	83.6	-46.4	0		76.0				76.0	32.6		-
	H1 H2	76.7 79.7	-45.7 -46.0	0		91.0 91.0							
	H3	79.7	-46.0	-10		91.0							_
	H4	76.7	-45.7	-10		88.0				-			-
	11	60.9	-43.7	-10									
	12	63.9	-44.1	0									
	14	58.9	-43.7 -43.4	-10		-	-						-
	K1b	133.3	-50.5	0		84.0	36.5			84.0	36.5		-
	К3	83.0	-46.4	0		79.0				-			-
	K4 K5	85.0 144.0	-46.6 -51.2	-10 -10		75.0 74.0							-
	K6	148.4	-51.4	-10		74.0							_
NSR 62	A1	128.1		0		97.0		6	2 65	87.0	39.9	52	55
	A2	129.0	-50.2	0	3	105.0	57.8			93.0	45.8		-
	A3	138.0	-50.8	-10		97.0				87.0	29.2		
	A4 A5	136.1 131.2	-50.7 -50.4	0		97.0 97.0				86.0 86.0	38.3 38.6		-
	A6	146.1	-51.3	0		97.0				86.0	37.7		-
	B1	145.8	-51.3	0	3	99.0	50.7			89.0	40.7		-
	B2	144.9	-51.2	0		104.0			-	94.0	45.8	-	-
	B3a B3b	144.6 147.1	-51.2 -51.4	0		82.0 82.0				82.0 70.0	33.8 21.6		
	B30 B4	158.3	-51.4	0	3	96.0	17.0			70.0	21.0		-
	B4a	164.0	-52.3	0		81.0	31.7			81.0	31.7		-
	B5	190.4	-53.6	0		82.0				82.0	31.4		
	B6 B7	165.3 156.4		-10 0		86.0 85.0			-		-		-
	B8	170.2		-10		85.0			-		-	-	-
	B9	181.3	-53.2	-10	3	72.0	11.8		-	72.0	11.8		-
	B10	184.2		-10		69.0				-	-	-	-
	B11	227.0		-10					-	77.0	20.4		-
	C1a C1b	139.0 145.0		0		77.0 80.0				77.0 80.0	29.1 31.8		
	C2a	150.0		0		80.0				80.0	31.5		-
	C2b	153.0	-51.7	0	3	82.0	33.3			82.0	33.3		-
	C2c	155.0		0		76.0							
	C2d C2e	157.0 161.0		0		83.0 83.0				83.0 83.0	34.1 33.9		-
	C3	164.0		0					-	81.0	31.7		-
	C4	177.0	-53.0	0	3	80.0	30.0			80.0	30.0		-
	C4a	184.0	-53.3	0		86.0				86.0	35.7		-
	C5	189.0		0		80.0			-	80.0	29.5		-
	C6 C7c	192.0 186.5		0		83.0 78.0				78.0	27.3		-
	D1	187.3	-53.5	0		89.0				89.0	38.5		-
	D2	192.3	-53.7	0	3	87.0	36.3			87.0	36.3		-
	D3	181.4	-53.2	0	3	85.0	34.8		-	84.0	33.8	-	-
	D5 D6	197.3 207.3	-53.9 -54.3	0		83.0 85.0				83.0 85.0	32.1 33.7		-
	D6 D7	207.3	-54.3 -54.7	0		85.0 82.0				85.0 82.0	33.7		
	D8	233.3		0	3					52.0			-
	K1b	161.1	-52.1	0	3	84.0	34.9			84.0	34.9		-
	K3	133.0		0		79.0			-		-		-
	K4 K5	136.0 152.3		0		75.0 74.0			-				-

Note:

(a) A negative 10 dB correction was applied if the fixed plant noise is considered screened by substantial barrier (ie. building/station structure) such that the fixed plant will not be visible when viewed from any window, door or other opening in any façade of the NSR.

⁽b) Tunnel ventilation shaft H and I under KTE will not be operated concurrently as only one of them will be operated at a time.

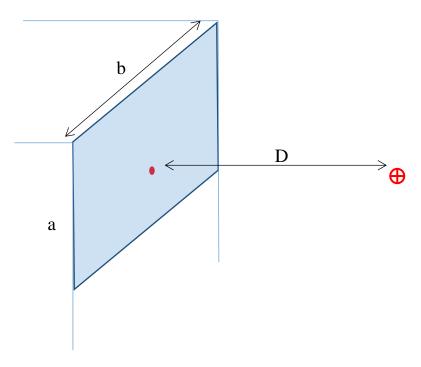
Appendix B

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)

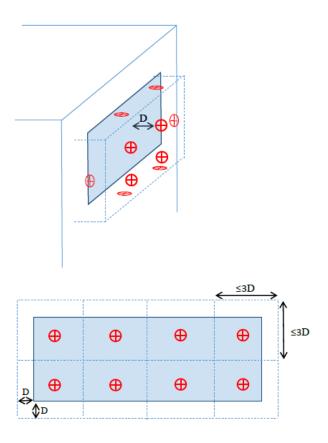
For method 1,

- "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.

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

Shatin to Central Link Proposal of Measurement methodology for Fixed Plant Noise Measurement

Method 2: Near-Field Testing Method for Louver



D: Measurement distance

Louver opening

Measurement box

Proposed measurement point (microphone pointing perpendicular to the louvre)

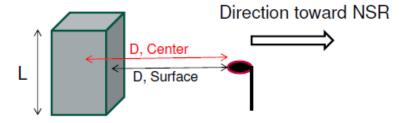
For method 2 (developed based on the principle of ISO3746:2010),

- 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

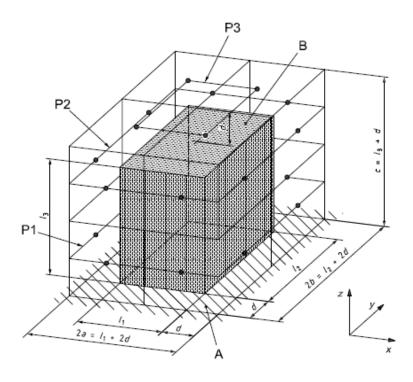


- "L" is the longest side of the plant item
- "D, Center" is the separation between center of the plant item and microphone
- "D, Surface" is the separation between surface of the plant item and microphone

- "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 $L_{\text{Aeq, 1}}$ 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



Kev

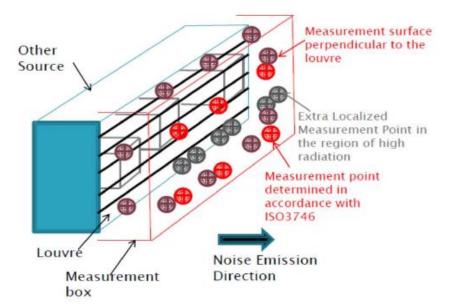
For Method 4 (based on ISO3746:2010),

- 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

Cert B1: Calibration Certificate of Sound Level Meter SVANTEK 958 (SN: 20890)



CALIBRATION CERTIFICATE

Certificate Informati	on	PRODUCTION OF THE PERSON	
Date of Issue	23-Jun-2017	Certificate Number	MLCN171137S
Customer Information	on	ESPACE PARTIE	Laboration
Company Name Address	Wilson Accoustics Limited Unit 601, Block A, Shatin Industrial C Yuen Shun Circuit, Shatin, N. T., Hong Kong	Centre,	
Equipment-under-Te	est (EUT)		
Description Manufacturer Model Number Serial Number Equipment Number	Sound & Vibration Analyser Svantek SVAN 958 20890		
Calibration Particula	ar Stale And Control	PHILIP SHOP SHOW	Ser British
Date of Calibration Calibration Equipment	23-Jun-2017 4231(MLTE008) / PA160059 / 20-M	ay-2018	
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory Temperature Relative Humidity EUT Stabilizing Time Warm-up Time Power Supply	23 °C ± 5 °C 55% ± 25% Over 3 hours 10 minutes Internal battery	
Calibration Results	Calibration data were detailed in the o	continuation pages.	
Approved By & Date	: //	K.O. Lo	23-Jun-2017
The results on this Calibrat not include allowance for th overloading, mishandling, r MaxLab Calibration Centre The copy of this Certificate	d for this calibration are traceable to national / tion Certificate only relate to the values measus the EUT long term drift, variation with environ misuse, and the capacity of any other laborator e Limited shall not be liable for any loss or dan is owned by MaxLab Calibration Centre Limi faxLab Calibration Centre Limited.	red at the time of the calibration and the mental changes, vibration and shock dur y to repeat the measurement. hage resulting from the use of the EUT.	ing transportation,

Page 1 of 2



Certificate No.MLCN171137S

Calibration	Dutu	NAME OF	N. S. II.	P. Company		(No. of Lot		200
Channel / Mode	Filter / Detector	Rang	ge	EU7 Readi		Stand Read		EUT Err	or	Calibrat Uncertai	
CH4 / Sound	A / FAST	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	d
	(1 kHz Input)	130	dB	94.1	dB	94.0	dB	0.1	dB	0.2	d
				114.1	dB	114.0	dB	0.1	dB	0.2	d
	C / FAST	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	C
	(1 kHz Input)	130	dB	94.1	dB	94.0	dB	0.1	dB	0.2	(
				114.1	dB	114.0	dB	0.1	dB	0.2	(
	LIN / FAST	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	(
	(1 kHz Input)	130	dB	94.1	dB	94.0	dB	0.1	dB	0.2	-
				114.1	dB	114.0	dB	0.1	dB	0.2	
	A / SLOW	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	- 1
	(1 kHz Input)	130	dB	114.1	dB	114.0	dB	0.1	dB	0.2	-
	C / SLOW	105	dB	94.0	dB	94.0	dB	0.0	dB		
	(1 kHz Input)	130	dB	114.1	dB	114.0	dB	0.1	dB		
	LIN / SLOW	105	dB	94.0	dB	94.0	dB	0.0	dB		
	(1 kHz Input)	130	dB	114.1	dB	114.0	dB	0.1	dB		
	A / IMPULSE	105	dB	94.0	dB	94.0	dB	0.0	dB		
	(1 kHz Input)	130	dB	114.1	dB	114.0	dB	0.1	dB	-	
	C / IMPULSE	105	dB	94.0	dB	94.0	dB	0.0	dB		
	(1 kHz Input)	130	dB	114.1	dB	114.0	dB	0.1	dB		
	LIN / IMPULSE	105	dB	94.0	dB	94.0	dB	0.0	dB		
	(1 kHz Input)	130	dB	114.1	dB	114.0	dB	0.1	dB	0.2	- 1

- END -

Calibrated By: Date:

Patrick 23-Jun-2017 Checked By: Date:

K.O. Lo 23-Jun-2017

Page 2 of 2



CALIBRATION CERTIFICATE

Certificate Informatio	n			SECTION AND ADDRESS OF THE PARTY OF THE PART
Date of Issue	7-May-2018		Certificate Number	MLCN180788S
Customer Information			250000000000000000000000000000000000000	建
Company Name Address	Wilson Accoustic Unit 601, Block A Yuen Shun Circu Shatin, N. T., Hong Kong	A, Shatin Industrial Ce	ntre,	
Equipment-under-Tes	t (EUT)		建	ROTAL MARKET
Description Manufacturer Model Number Serial Number Equipment Number	Sound & Vibration Svantek SVAN 958 28422	on Analyser		
Calibration Particular	1. 11.		CHILDRE MARK	(Alexander)
Date of Calibration Calibration Equipment	7-May-2018 4231(MLTE008)) / PA160059 / 20-May	-2018	
Calibration Procedure Calibration Conditions	Laboratory EUT	Temperature Relative Humidity Stabilizing Time Warm-up Time Power Supply	23 °C ± 5 °C 55% ± 25% Over 3 hours 10 minutes Internal battery	
Calibration Results	Calibration data	were detailed in the co	ntinuation pages.	
Approved By & Date		~	lo K.O. Lo	7-May-2018
include allowance for the EU mishandling, misuse, and the * MaxLab Calibration Centre I	in Certificate only rela T long term drift, vari e capacity of any other Limited shall not be list s owned by MaxLab C	te to the values measured a lation with environmental c laboratory to repeat the me laber for any loss or damage Calibration Centre Limited.	t the time of the calibration and the uncerta hanges, vibration and shock during transpo	ortation, overloading,

Page 1 of 2



Certificate No. MLCN180788S

Channel / Mode	Filter / Detector	Rang	e	EUT Readi		Stand Read		EUT Err	or	Calibrati Uncertai	
CH4 / Sound	A / FAST	105	dB	93.9	dB	94.0	dB	-0.1	dB	0.2	dI
	(1 kHz Input)	130	dB	94.0	dB	94.0	dB	0.0	dB	0.2	dl
				114.0	dB	114.0	dB	0.0	dB	0.2	dl
	C / FAST	105	dB	93.9	dB	94.0	dB	-0.1	dB	0.2	d
	(1 kHz Input)	130	dB	94.0	dB	94.0	dB	0.0	dB	0.2	d
				114.0	dB	114.0	dB	0.0	dB	0.2	d
	LIN / FAST	105	dB	93.9	dB	94.0	dB	-0.1	dB	0.2	d
	(1 kHz Input)	130	dB	94.0	dB	94.0	dB	0.0	dB	0.2	d
				114.0	dB	114.0	dB	0.0	dB	0.2	d
	A / SLOW	105	dB	93.9	dB	94.0	dB	-0.1	dB	0.2	d
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	d
	C / SLOW	105	dB	93.9	dB	94.0	dB	-0.1	dB	0.2	d
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	d
	LIN / SLOW	105	dB	93.9	dB	94.0	dB	-0.1	dB	0.2	d
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	d
	A / IMPULSE	105	dB	93.9	dB	94.0	dB	-0.1	dB	0.2	d
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	Ċ
	C / IMPULSE	105	dB	93.9	dB	94.0	dB	-0.1	dB	0.2	Ċ
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	C
	LIN / IMPULSE	105	dB	93.9	dB	94.0	dB	-0.1	dB	0.2	C
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	d

- END -

Calibrated By:

Date:

Dan

7-May-2018

Checked By: Date:

K.O. Lo 7-May-2018

Page 2 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



CALIBRATION CERTIFICATE

Company Name Address Wilson Accoustics Limited Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong Equipment-under-Test (EUT) Description Manufacturer Model Number Serial Number Sequipment Number Equipment Number Calibration Particular Date of Calibration Calibration Equipment Calibration Procedure Calibration Procedure Calibration Conditions Laboratory EUT Stabilizing Time Warm-up Time Warm-up Time Power Supply Calibration Results Calibration Results Calibration data were detailed in the continuation pages. K.O. Lo 7-Nov-2018 K.O. Lo 7-Nov-2018 K.O. Lo 7-Nov-2019 K.O. Lo 7-Nov-2019 Calibration Results	Certificate Information Date of Issue	7-Nov-2018		Certificate Number	MLCN182746S
Wilson Accoustics Limited Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong Equipment-under-Text (EUT) Description Manufacturer Svantek Wodel Number SVAN 958A Serial Number Spi20 Equipment Number Calibration Particular Date of Calibration Calibration Equipment MLCG00, MLCG15 Calibration Procedure Calibration Conditions MLCG00, MLCG15 Laboratory Relative Humidity Sy% ± 25% EUT Stabilizing Time Warm-up Time Power Supply Calibration Results Calibration Results Calibration data were detailed in the continuation pages. Statements **Calibration equipment used for this calibration are traceable to national / international standards. **Calibration equipment used for this calibration are traceable to national / internal battery Statements **Calibration equipment used for this calibration are traceable to national / internal battery Statements **Calibration equipment used for this calibration are traceable to national / internal battery Statements **Calibration equipment used for this calibration can 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. **Mat.lab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. **Mat.lab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. **Mat.lab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. **Mat.lab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. **Mat.lab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.					
Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong Equipment-under-Text (EUT) Description Manufacturer Wodel Number Svantek Sv					
Yuen Shun Circuit, Shatin, N. T., Hong Kong Equipment-under-Test (EUT) Description Sound & Vibration Analyser Svantck Model Number Svantck Model Number Sy AN 958A Serial Number 59120 Equipment Number Calibration Particular Date of Calibration Calibration Equipment All CG00, MLCG15 Calibration Conditions Laboratory Temperature 23 °C ± 5 °C Relative Humidity EUT Stabilizing Time Warm-up Time Warm-up Time Power Supply Internal battery Calibration Results Calibration Results Calibration odata were detailed in the continuation pages. Statements **Calibration equipment used for this calibration are traceable to national / internal battery 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 ofher laboratory to repeat the measurement. **Maxi.ab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. **Maxi.ab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. **Maxi.ab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT. **Maxi.ab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.		1			
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Sound & Vibration Analyser		Hong Kong			
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Manufacturer Model Number SVAN 958A Serial Number Equipment Number Calibration Particular Date of Calibration Equipment Calibration Equipment Calibration Procedure Calibration Conditions Laboratory Temperature Relative Humidity S5% ± 25% EUT Stabilizing Time Warm-up Time Power Supply Internal battery Calibration Results Calibration Results Calibration data were detailed in the continuation pages. **Calibration conditions Condition are traceable to national / international standards.** **Calibration condition data were detailed in the continuation pages. **Calibration conditions Condition data were detailed in the continuation pages. **Calibration condition data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages. **Calibration conditions data were detailed in the continuation pages.	Description	Sound & Vibratio	n Analyser		
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Power Supply Internal battery Calibration Results Calibration data were detailed in the continuation pages. Approved By & Date K.O. Lo 7-Nov-201 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		EUT	Stabilizing Time	Over 3 hours	
Calibration Results Calibration data were detailed in the continuation pages. Approved By & Date K.O. Lo 7-Nov-201 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			Warm-up Time	10 minutes	
Approved By & Date K.O. Lo 7-Nov-201 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			Power Supply	Internal battery	
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written approval of maximum confidences				•	

Page 1 of 2



Certificate No. MLCN182746S

Channel / Mode	Filter / Detector	Rang	e	EUT Readin		Stand Read		EUT Err	or	Calibrati Uncertai	
CH4 / Sound	A / FAST	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	dl
	(1 kHz Input)	130	dB	94.0	dB	94.0	dB	0.0	dB	0.2	d
	25. 7			114.0	dB	114.0	dB	0.0	dB	0.2	d
	C / FAST	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	d
	(1 kHz Input)	130	dB	94.0	dB	94.0	dB	0.0	dB	0.2	d
				114.0	dB	114.0	dB	0.0	dB	0.2	d
	LIN / FAST	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	C
	(1 kHz Input)	130	dB	94.0	dB	94.0	dB	0.0	dB	0.2	Ċ
				114.0	dB	114.0	dB	0.0	dB	0.2	Ċ
	A / SLOW	105 dB 94.0 dB 94.0 dB	0.0	dB	0.2	d					
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	d
	C / SLOW	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	C
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	Ċ
	LIN / SLOW	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	C
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	C
	A / IMPULSE	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	C
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	(
	C / IMPULSE	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	(
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	
	LIN / IMPULSE	105	dB	94.0	dB	94.0	dB	0.0	dB	0.2	_
	(1 kHz Input)	130	dB	114.0	dB	114.0	dB	0.0	dB	0.2	(

- END -

Calibrated By:

Dan

Checked By:

K.O. Lo 7-Nov-2018

Date:

7-Nov-2018

Date:

Page 2 of 2



ISO9001 certified

FACTORY CALIBRATION DATA OF THE SVAN 958 No. 69082

SOUND LEVEL METER

1. CALIBRATION

(electrical)

LEVEL METER; Filter: LIN; Input signal =114.0dB, fsin=1kHz

	Range 1	05dB	Range 1	30dB
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	113.98	-0.02	114.03	0.03
Channel 2	113.98	-0.02	114.02	0.02
Channel 3	113.98	-0.02	114.02	0.02
Channel 4	113.98	-0.02	114.02	0.02

2. CALIBRATION'

(acoustical)

LEVEL METER; Range: 130 dB; Reference frequency: 1000Hz;

Filter	LIN		A		C		
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]	
Channel 1	113.8	-0.2	113.8	-0.2	113.8	-0.2	
Channel 2	113.8	-0.2	113.8	-0.2	113.8	-0.2	
Channel 3	113.8	-0.2	113.8	-0.2	113.8	-0.2	
Channel 4	113.8	-0.2	113.8	-0.2	113.8	-0.2	

Calibration measured with the microphone SVANTEK type SV 22 No. 4010479. Calibration factor: 0.6dB

3. LINEARITY TEST* (electrical)

LEVEL METER; Range: 105 dB; Filter: A; f sin= 1000 Hz

	Input [dB]	24.0	30.0	40.0	60.0	80.0	100.0	114.0
Channel 1	Error.[dB]	0.19	0.10	0.05	0.00	0.00	0.00	0.00
Channel 2	Error [dB]	0.21	0.11	0.04	-0.01	0.00	0.00	0.00
Channel 3	Error [dB]	0.14	0.08	0.03	0.00	0.00	0.01	0.01
Channel 4	Error [dB]	0.11	0.07	0.03	0.00	0.00	0.00	0.01

LEVEL METER; Range: 130 dB; Filter: A; f sin= 1000 Hz

	Input [dB]	45.0	50.0	60.0	80.0	100.0	120.0	135.0
Channel 1	Error [dB]	0.11	0.15	0.06	0.00	0.00	0.00	0.01
Channel 2	Error [dB]	0.13	0.14	0.05	0.00	0.00	-0.01	0.01
Channel 3	Error [dB]	0.07	0.07	0.04	-0.00	0.01	-0.00	0.02
Channel 4	Error [dB]	0.08	0.07	0.03	-0.00	-0.00	-0.01	0.01

1/3 OCTAVE (1kHz); Range: 130 dB; Filter: A; f sin= 1000 Hz

	Input [dB]	35.0	40.0	60.0	80.0	100.0	120.0	135.0
Channel 1	Error [dB]	0.44	0.11	0.07	0.00	0.00	-0.01	0.01
Channel 2	Error [dB]	0.42	0.12	0.07	-0.00	-0.00	-0.00	0.01
Channel 3	Error [dB]	0.34	0.11	0.04	-0.00	-0.00	-0.01	0.01
Channel 4	Error [dB]	0.35	0.12	0.04	0.00	0.01	0.00	0.01

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4. TONEBURST RESPONSE

(electrical)

LEVEL METER; Characteristic: A; f sin= 4000 Hz; Burst duration: 2s;

Range: 105dB; Equivalent input steady level = 112dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
		,	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.8	97.9	94.0	91.0	87.9	84.9
	Fast	1	Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
		107.2	103.7	100.8	97.9	94.0	91.0	87.9	84.9						
	Foot	2	Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
	rast	2	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.9	97.9	94.0	91.0	87.9	84.9
		3	Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
		4	Indication [dB]	112.0	111.9	111.0	109.4	107.2	103.7	100.8	97.9	94.0	90.9	87.9	84.9
MAX		4	Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.1	-0.1
MAA		,	Indication [dB]	109.9	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	-
		· ·	Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	(*)	-	-
		2	Indication [dB]	109.9	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0		-	-
	Slow	2	Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
	Siow	2	Indication [dB]	109.9	108.0	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-		
		3	Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0		-	
		4	Indication [dB]	109.9	107.9	104.6	101.8	98.9	95.0	92.0	89.0	85.0	-	-	
		7.	Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	
		1	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		2	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
SEL			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
SLL		3	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	82.0	78.9	75.9
			Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1
		4	Indication [dB]	111.8	109.0	105.0	102.0	99.0	95.0	92.0	89.0	85.0	81.9	78.9	75.9
		4	Error [dB]	-0.2	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1

Range: 105dB; Equivalent input steady level = 52dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5
		1	Indication [dB]	52.0	51.9	51.0	49.4	47.2	43.7	40.9	37.9
		-1	Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0
		2	Indication [dB]	52.0	51.9	51.0	49.4	47.2	43.7	40.8	37.9
	Fast	2	Error [dB]	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0
	rast	3	Indication [dB]	52.0	51.9	51.0	49.4	47.2	43.7	40.9	38.0
		3	Error [dB]	0.0	0.0	0.0	-0.0	-0.0	0.0	-0.0	0.0
		4	Indication [dB]	52.0	51.9	51.0	49.4	47.1	43.7	40.8	37.9
MAX		4	Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0
MAA		1	Indication [dB]	49.8	47.9	44.6	41.8	38.9	35.0	32.0	29.0
		1	Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
		2	Indication [dB]	49.8	47.9	44.6	41.8	38.9	35.0	32.0	29.0
	Slow		Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0
	Slow	3	Indication [dB]	49.9	48.0	44.6	41.8	38.9	35.0	32.0	29.0
	Slow		Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.0
		4	Indication [dB]	49.8	47.9	44.6	41.8	38.9	34.9	32.0	29.0
		4	Error [dB]	-0.2	0.1	-0.0	-0.0	-0.0	-0.0	0.0	0.0
		1	Indication [dB]	51.7	49.0	45.0	42.0	39.0	35.0	32.1	29.1
		1	Error [dB]	-0.3	-0.0	0.0	0.0	0.0	0.0	0.1	0.1
		2	Indication [dB]	51.7	49.0	45.0	42.0	39.0	35.0	32.0	29.1
CEL			Error [dB]	-0.3	-0.0	0.0	-0.0	0.0	0.0	0.1	0.1
SEL		3	Indication [dB]	51.7	49.0	45.0	42.0	39.0	35.1	32.1	29.1
		3	Error [dB]	-0.3	0.0	0.0	0.0	0.0	0.1	0.1	0.1
		4	Indication [dB]	51.7	49.0	45.0	42.0	39.0	35.0	32.0	29.1
		4	Error [dB]	-0.3	-0.0	0.0	0.0	0.0	0.0	0.1	0.1

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Range: 105dB; Equivalent input steady level = 34dB

Result	Detector	Ch.	Duration [ms]	1000	500
		1	Indication [dB]	34.1	34.0
		1	Error [dB]	0.0	0.1
		2	Indication [dB]	34.0	34.0
	Fast	2	Error [dB]	0.0	0.0
	rast	3	Indication [dB]	34.0	34.0
		3	Error [dB]	-0.0	0.0
		4	Indication [dB]	34.0	33.9
MAX		4	Error [dB]	0.0	0.1
MAX		1	Indication [dB]	31.9	30.1
		1	Error [dB]	-0.1	0.1
	2		Indication [dB]	31.9	30.0
	Slow	2	Error [dB]	-0.1	0.1
	Slow	3	Indication [dB]	31.9	30.1
		3	Error [dB]	-0.1	0.1
		4	Indication [dB]	31.8	30.0
		4	Error [dB]	-0.1	0.1
			Indication [dB]	33.8	31.1
		-1	Error [dB]	-0.2	0.1
		2	Indication [dB]	33.8	31.1
CEI		2	Error [dB]	-0.2	0.1
SEL	-	3	Indication [dB]	33.8	31.1
		3	Error [dB]	-0.2	0.0
		4	Indication [dB]	33.8	31.1
		4	Error [dB]	-0.2	0.1

Range: 130dB; Equivalent input steady level = 134dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20	10	5	2	1	0.5	0.25
			Indication [dB]	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	113.0	109.9	106.9
		1	Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.0	-0.1	-0.1
	Fast		Indication [dB]	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
		2	Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
	Fast	3	Indication [dB]	134.0	133.9	133.1	131.4	129.2	125.7	122.9	119.9	116.0	113.0	109.9	106.9
		3	Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
			Indication [dB]	134.0	133.9	133.0	131.4	129.2	125.7	122.8	119.9	116.0	112.9	109.9	106.9
		4	Error [dB]	0.0	0.0	0.0	0.0	129.2	-0.0	-0.1	0.0	-0.0	-0.1	-0.1	-0.1
MAX			Indication [dB]	131.8	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-		-
		1	Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-		-
			Indication [dB]	131.8	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
	CI.	2	Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
	Slow	3	Indication [dB]	131.9	130.0	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
		3	Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-		
			Indication [dB]	131.8	129.9	126.6	123.8	120.9	117.0	114.0	111.0	107.0	-	-	-
		4	Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-	-	-
			Indication [dB]	133.7	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	104.0	100.9	97.9
		1	Error [dB]	-0.3	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
			Indication [dB]	133.7	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	103.9	100.9	97.5
		2	Error [dB]	-0.3	-0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1
SEL			Indication [dB]	133.8	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	104.0	100.9	97.5
		3	Error [dB]	-0.3	-0.0	0.0	0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1
			Indication [dB]	133.7	131.0	127.0	124.0	121.0	117.0	114.0	111.0	107.0	103.9	100.9	97.9
		4	Error [dB]	-0.3	-0.0	0.0	-0.0	-0.0	0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1

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Range: 130dB; Equivalent input steady level = 74dB

Result	Detector	Ch.	Duration [ms]	1000	500	200	100	50	20 -	10	5
			Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.9	59.9
		1	Error [dB]	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	0.0
			Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.9	59.9
		2	Error [dB]	0.0	0.0	73.0	0.0	-0.0	-0.0	-0.0	-0.0
	Fast	3	Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.9	60.0
		3	Error [dB]	-0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	0.0
			Indication [dB]	74.0	73.9	73.0	71.4	69.2	65.7	62.8	59.9
		4	Error [dB]	-0.0	0.0	0.0	0.0	-0.0	-0.0	-0.1	0.0
MAX			Indication [dB]	71.9	70.0	66.6	63.8	60.9	57.0	54.0	51.0
		1	Error [dB]	-0.1	0.1	-0.0	-0.0	-0.0	-0.0	0.0	-0.0
			Indication [dB]	71.8	69.9	66.6	63.8	60.9	57.0	54.0	51.0
		2	Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	0.0	-0.0
	Slow		Indication [dB]	71.9	70.0	66.6	63.8	60.9	57.0	54.0	51.0
		3	Error [dB]	-0.2	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0
		-	Indication [dB]	71.8	69.9	66.6	63.8	60.9	56.9	54.0	51.0
		4	Error [dB]	-0.1	0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0
			Indication [dB]	73.8	71.0	67.0	64.0	61.0	57.0	54.0	51.1
		1	Error [dB]	-0.2	-0.0	0.0	0.0	0.0	0.0	0.0	0.1
			Indication [dB]	73.7	71.0	67.0	64.0	61.0	57.0	54.1	51.0
		2	Error [dB]	-0.3	-0.0	0.0	0.0	-0.0	0.0	0.1	0.0
SEL	-		Indication [dB]	73.8	71.0	67.0	64.0	61.0	57.0	54.1	51.1
		3	Error [dB]	-0.3	-0.0	0.0	0.0	-0.0	0.0	0.0	0.1
			Indication [dB]	73.7	71.0	67.0	64.0	61.0	57.0	54.0	51.1
		4	Error [dB]	-0.3	-0.0	0.0	0.0	0.0	0.0	0.0	0.1

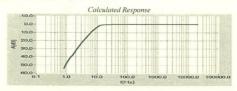
Range: 130dB; Equivalent input steady level = 54dB

Result	Detector	Ch.	Duration [ms]	1000	500
		1	Indication [dB]	54.1	54.0
		1	Error [dB]	0.0	0.0
		2	Indication [dB]	54.1	54.0
	Fast	2	Error [dB]	0.0	0.0
	rast	3	Indication [dB]	54.1	54.0
		3	Error [dB]	0.0	0.1
		4	Indication [dB]	54.0	53.9
MAY		4	Error [dB]	0.0	0.0
MAA		1	Indication [dB]	52.0	50.1
		1	Error [dB]	-0.1	0.1
		2	Indication [dB]	51.9	50.0
MAX	Slow	Error [dB]		-0.1	0.1
	Slow	3	Indication [dB]	51.9	50.0
		3	Error [dB]	-0.1	0.1
		4	Indication [dB]	51.9	50.0
		4	Error [dB]	-0.1	0.1
		1	Indication [dB]	53.9	51.1
	1	1	Error [dB]	-0.2	0.1
		2	Indication [dB]	53.8	51.1
CEI			Error [dB]	-0.2	0.1
SEL		3	Indication [dB]	53.8	51.1
		3	Error [dB]	-0.2	0.1
		4	Indication [dB]	53.8	51.0
		4	Error [dB]	-0.2	0.0

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6. FREQUENCY RESPONSE (electrical)

LEVEL METER; Filter: Z; Range: 130 dB; Input signal =135 dB;



Measured Response with Preamplifier SV12 (f-frequency, An-attenuation in channel n)

f[Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
10	3.2	3.2	3.2	3.2	250	-0.0	0.0	0.0	-0.0
12.5	1.4	1.4	1.4	1.4	500	-0.0	0.0	0.0	0.0
16	0.5	0.5	0.5	0.5	1000	0.0	0.0	0.0	0.0
20	0.1	0.1	0.1	0.1	2000	0.0	0.0	0.0	0.0
25	-0.0	0.0	0.0	-0.0	4000	0.0	0.0	0.0	0.0
31.5	-0.0	-0.0	-0.0	-0.0	8000	0.0	0.0	0.0	0.0
63	-0.0	-0.0	-0.0	-0.0	16000	0.0	0.0	0.0	-0.0
125	-0.0	0.0	0.0	-0.0	20000	0.0	0.0	0.0	-0.0

All frequencies are nominal center values for the 1/3 octave bands

7. INTERNAL NOISE LEVEL' (electrical)

LEVEL METER; Range: 105 dB; Back-light - off; Calibration factor: 0dB

	Filter	Z	A	C
Channel 1	Level [dB]	14.4	11.2	12.0
Channel 2	Level [dB]	15.0	10.9	11.1
Channel 3	Level [dB]	13.9	10.6	11.2
Channel 4	Level [dB]	13.3	10.2	11.3

^{*} measured with preamplifier SVANTEK type SV 12L No. 17701.

VIBRATION LEVEL METER

1. CALIBRATION

(electrical)

LEVEL METER; Filter: HP10; Input signal =140.0dB (10.0 m/s 2), f_{sin} =79,6Hz

	Range 1	45dB	Range 1	70dB
	Indication [dB]	Error [dB]	Indication [dB]	Error [dB]
Channel 1	139.98	-0.02	140.04	0.04
Channel 2	139.98	-0.02	140.03	0.03
Channel 3	139.98	-0.02	140.03	0.03
Channel 4	139.98	-0.02	140.03	0.03

2. CALIBRATION (vibrational)

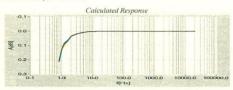
LEVEL METER; Range: 145dB; Input signal: 120dB;

Filter	HPI		HPI	0	Wd		Wm		Wh	
	Indication [dB]	Error [dB]								
Channel I	120.0	0.0	120.0	0.0	106.1	0.0	102.0	-0.0	110.5	-0.0
Channel 2	120.0	0.0	120.0	0.0	106.1	0.0	102.0	-0.0	110.5	-0.0
Channel 3	120.0	0.0	120.0	0.0	106.1	0.0	102.0	-0.0	110.5	-0.0
Channel 4	120.0	0.0	120.0	0.0	106.2	0.0	102.0	-0.0	110.5	-0.0

Calibration measured with the accelerometer SVANTEK type SV80 No. H0413. Calibration factor: -0.56dB

3. FREQUENCY RESPONSE (electrical)

1/3 OCTAVE; Filter: HP; Range: 170 dB; input=175 dB;



Measured Response (f-frequency, An-attenuation in channel n)

					- ttopo	0)	4				/			
f[Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2 [dB]	A3[dB]	A4[dB]	f [Hz]	A1[dB]	A2[dB]	A3[dB]	A4[dB]
0.8	0.19	0.19	0.19	0.19	5	0.02	0.01	0.01	0.01	500	-0.01	-0.01	-0.01	-0.01
1	0.10	0.10	0.10	0.10	6.3	0.00	-0.00	-0.00	-0.00	1000	0.00	-0.00	-0.00	-0.01
1.25	0.08	0.08	0.08	0.08	8	-0.01	-0.01	-0.01	-0.01	2000	0.00	-0.00	-0.00	-0.00
1.6	0.06	0.06	0.06	0.06	16	-0.02	-0.02	-0.02	-0.02	4000	0.01	0.01	-0.00	-0.00
2	0.02	0.02	0.02	0.02	31.5	0.00	-0.00	-0.00	-0.00	8000	0.03	0.04	0.02	0.02
2.5	0.01	0.01	0.01	0.01	63	-0.01	-0.01	-0.01	-0.01	16000	0.02	0.02	-0.01	-0.02
3.15	-0.01	-0.01	-0.01	-0.01	125	-0.01	-0.01	-0.01	-0.01	20000	0.02	0.01	0.01	-0.01
4	0.02	0.02	0.02	0.02	250	-0.01	-0.01	-0.01	-0.01					

All frequencies are nominal center values for the 1/3 octave bands

4. INTERNAL NOISE LEVEL

(electrical)

LEVEL METER func.; Range: 145 dB; Back-light - off

	Filter	HP1	HP10	Wd	Wm	Wh
Channel 1	Indication [dB]	54.8	52.0	42.6	38.8	36.2
Channel 2	Indication [dB]	55.0	52.4	42.6	39.0	36.8
Channel 3	Indication [dB]	55.5	53.3	42.8	39.1	36.1
Channel 4	Indication [dB]	54.8	52.4	42.4	39.0	36.2

ENVIRONMENTAL CONDITIONS

Temperature	Relative humidity	Ambient pressure
26 °C	47 %	1000 hPa

TEST EQUIPMENT

Item	Manufacturer	Model	Serial no.	Description
1.	SVANTEK	SVAN 401	127	Signal generator
2.	SVANTEK	SVAN 912A	4369	Sound & Vibration Analyser
3.	KEITHLEY	2000	0910165	Digital multimeter
4.	SVANTEK	SV33	48878	Acoustic calibrator
5.	SVANTEK	ST02	-	Microphone equivalent electrical impedance (18pF)
6.	DYTRAN	3233A	1376	Reference accelerometer

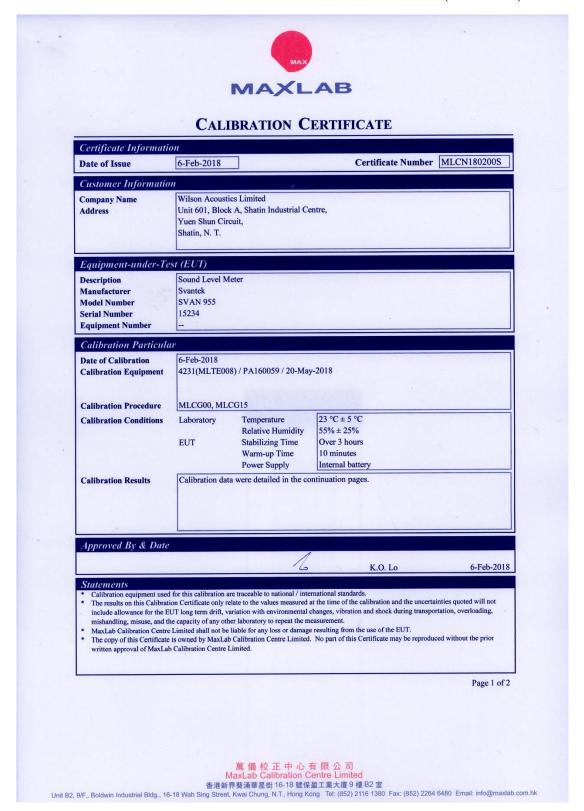
CONFORMITY & TEST DECLARATION

- 1. Herewith Svantek company declares that this instrument has been calibrated and tested in compliance with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass them.
- 2. Traceability of the calibration is guaranteed by the above mentioned ISO9001 procedures.
- 3. The information appearing on this sheet has been compiled specifically for this instrument. This form is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- 4. This calibration sheet shall not be reproduced except in full, without written permission of the SVANTEK Ltd.

Calibration specialist: Krzysztof Kubeł

Test date: 2018-08-13

Cert B5: Calibration Certificate of Sound Level Meter SVANTEK 955 (SN: 15234)





Certificate No. MLCN180200S

Calibration Data											
Parameter	meter				Standard Reading		EUT Error		Calibration Uncertainty		
SPL	A	25 - 130	F	94	dB	94.0	dB	0.0	dB	0.2	ď
	(1 kHz Input)		S	94	dB	94.0	dB	0.0	dB	0.2	d
			I	94	dB	94.0	dB	0.0	dB	0.2	d
	C	25 - 130	F	94	dB	94.0	dB	0.0	dB	0.2	d
	(1 kHz Input)		S	94	dB	94.0	dB	0.0	dB	0.2	d
			I	94	dB	94.0	dB	0.0	dB	0.2	d
	Z	25 - 130	F	94	dB	94.0	dB	0.0	dB	0.2	d
	(1 kHz Input)		S	94	dB	94.0	dB	0.0	dB	0.2	d
			I	94	dB	94.0	dB	0.0	dB	0.2	d
	A	25 - 130	F	114	dB	114.0	dB	0.0	dB	0.2	d
	(1 kHz Input)		S	114	dB	114.0	dB	0.0	dB	0.2	d
			I	114	dB	114.0	dB	0.0	dB	0.2	d
	C	25 - 130	F	114	dB	114.0	dB	0.0	dB	0.2	d
	(1 kHz Input)		S	114	dB	114.0	dB	0.0	dB	0.2	d
			I	114	dB	114.0	dB	0.0	dB	0.2	d
	Z	25 - 130	F	114	dB	114.0	dB	0.0	dB	0.2	d
	(1 kHz Input)		S	114	dB	114.0	dB	0.0	dB	0.2	d
			I	114	dB	114.0	dB	0.0	dB	0.2	d

- END -

Calibrated By:

Patrick

Checked By:

K.O. Lo 6-Feb-2018

Date:

6-Feb-2018

Date:

Page 2 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



CALIBRATION CERTIFICATE

Certificate Information	on			De 表现为1000000	No. of Market Street
Date of Issue	5-Mar-2018			Certificate Number	MLCN180297S
Customer Informatio	n				
Company Name Address	Wilson Accousti Unit 601, Block Yuen Shun Circo Shatin, N. T., Hong Kong	A, Shatin Industrial Ce	entre,		
Equipment-under-Te	st (EUT)			4 (2 4)	
Description Manufacturer Model Number Serial Number Equipment Number	Acoustic Calibra Svantek SV 30A 29088	tor		,	
Calibration Particula	r				
Date of Calibration Calibration Equipment) / PA160059 / 20-May) / MLEC17/06/02 / 6-:		**************************************	4
Calibration Procedure	MLCG00, MLC	G15			
Calibration Conditions	Laboratory	Temperature Relative Humidity Stabilizing Time Warm-up Time Power Supply	23 °C ± 5 °C 55% ± 25% Over 3 hou Not applic Internal ba	% urs able	a 2
Calibration Results		were detailed in the coresults were within EUT			
Approved By & Date		建 物体设置的			
			10	K.O. Lo	5-Mar-2018
Statements Calibration equipment used The results on this Calibratic include allowance for the Et mishandling, misuse, and th MaxLab Calibration Centre The copy of this Certificate written approval of MaxLab	on Certificate only rela JT long term drift, var e capacity of any other Limited shall not be li is owned by MaxLab (ate to the values measured a iation with environmental c laboratory to repeat the me able for any loss or damage Calibration Centre Limited.	t the time of the hanges, vibration easurement. resulting from	e calibration and the uncerta on and shock during transpo- the use of the EUT.	rtation, overloading,

Page 1 of 2



Certificate No.

MLCN180297S

Calibration Data				
EUT Setting	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
94 dB	93.7 dB	0.3 dB	0.15 dB	± 0.3 dB
114 dB	113.7 dB	0.3 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By:

Patrick

Checked By:

K.O. Lo 5-Mar-18

Date:

5-Mar-18

Date:

Page 2 of 2



CALIBRATION CERTIFICATE

Certificate Informati	on	in the Paris	10.12 10.26					
Date of Issue	21-Jul-2018		Certificate Number	MLCN181526S				
Customer Informatio	п		CAN COLOR DE SERVICIO E MESTICA	的复数形式				
Company Name	Wilson Accousti	cs Limited						
Address	The state of the s	A, Shatin Industrial Co	entre,					
	Yuen Shun Circi	uit,						
	Shatin, N. T.,							
	Hong Kong							
Equipment-under-Te		发展 。						
Description	Acoustic Calibra	itor						
Manufacturer	Svantek SV 30A							
Model Number Serial Number	10814	NAME OF THE PARTY						
Equipment Number								
Andrews and the same of the same	ALEXA NO.							
Calibration Particula			Carlos de la Carlo	CONTRACTOR OF STREET				
Date of Calibration	21-Jul-2018) / AV180068 / 13-Ma	20					
Calibration Equipment) / MLEC18/06/02 / 6-						
	1331(WIE1E04)) / WILLE 16/00/02 / 0-	Juli-19					
Calibration Procedure	MLCG00, MLC	G15						
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C					
		Relative Humidity	55% ± 25%					
	EUT	Stabilizing Time	Over 3 hours					
		Warm-up Time Power Supply	Not applicable Internal battery					
Calibration Results	Calibration data	were detailed in the co	•					
Calibration Results		esults were within EUT						
Approved By & Date		经验的 经行政	and the state of the state of					
		1						
		160	K.O. Lo	21-Jul-2018				
Statements								
 Calibration equipment used The results on this Calibrati 			rnational standards. If the time of the calibration and the uncertaintie	es quoted will not				
			changes, vibration and shock during transportation	on, overloading,				
mishandling, misuse, and th			easurement. 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 Li	mited.						
				Page 1 of 2				

Page 1 of 2



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:

Date:

Dan 21-Jul-18 Checked By:

Date:

K.O. Lo 21-Jul-18

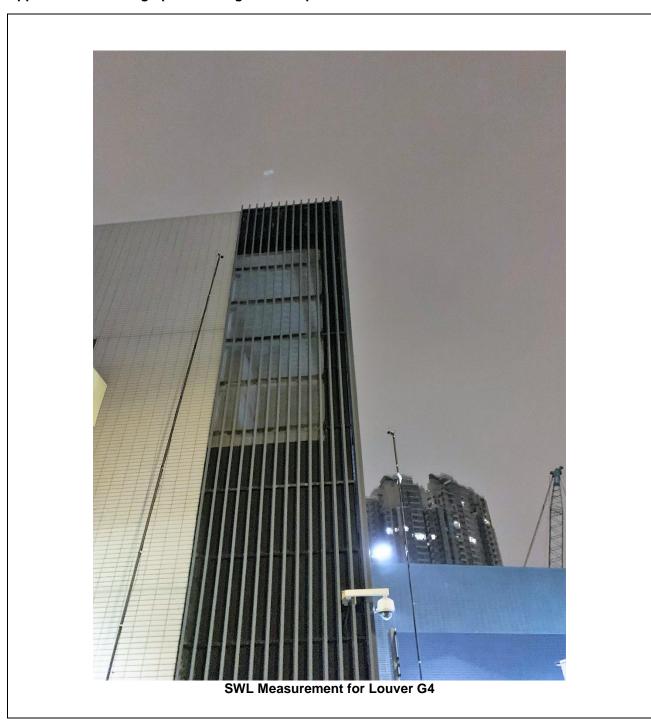
Page 2 of 2

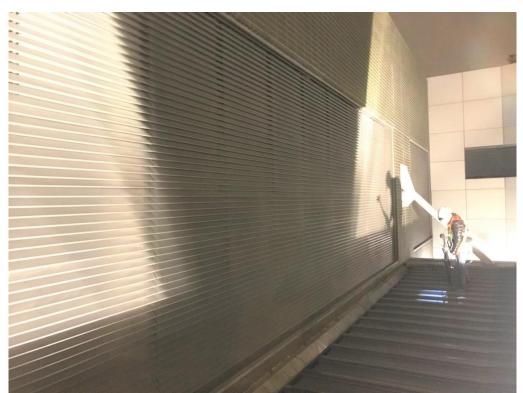
萬 儀 校 正 中 心 有 限 公 司 MaxLab Calibration Centre Limited 香港新界獎涌華星街 16-18 號保盈工業大廈 9 樓 B2 室 Unit B2, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk

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

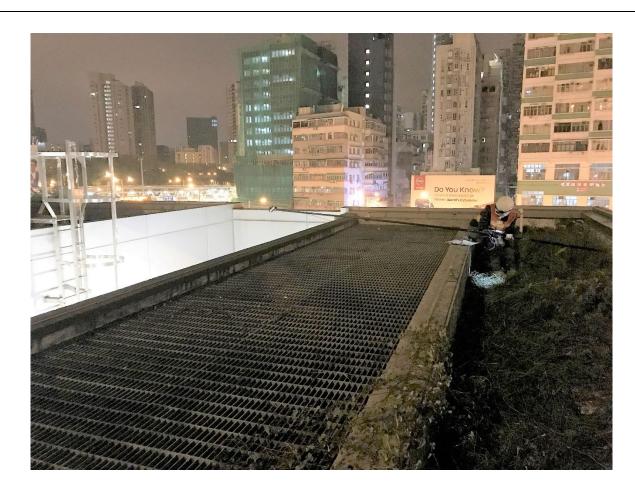




SWL Measurement for Louver F2



SWL Measurement for Louver A2



SWL Measurement for Louver A5

Appendix B4

Noise Measurement Results

Appendix B4 Noise Measurement Results

	Louvre Size (ize (mm)							
Fixed Plant Source ID	Plant Type	Method	Height	Width	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)
A1	Louvre	2	3000	2600	1.0	63.3	61.7	1.6	60.3	77
A2	Louvre	2	3500	6300	0.5	63.7	61.0	2.7	60.7	77
A3	Louvre	2	2000	7000	0.5	60.4	59.1	1.3	57.4	72
A4	Louvre	2	5050	11700	1.0	65.6	60.0	5.6	64.1	86
A5	Louvre	2	2100	5000	1.0	61.9	59.7	2.2	58.9	76
A6	Louvre	2	4000	7000	1.0	58.6	57.8	0.8	55.6	75
B1	Louvre	2	3150	5965	1.0	71.1	69.1	2.0	68.1	86
B2	Louvre	2	3130	10890	1.0	69.6	65.8	3.8	67.3	87
E5-3	Louvre	2	2600	5800	0.5	59.3	58.0	1.3	56.3	72
F2	Louvre	2	3100	8000	1.0	67.0	63.3	3.7	64.6	82
G1	Louvre	2	5200	3400	1.0	69.2	62.8	6.4	68.1	86
G2	Louvre	2	5200	4500	1.0	67.2	61.9	5.3	65.7	84
G3	Louvre	2	3650	4507	1.0	67.7	62.1	5.6	66.4	83
G4 ^(d)	Louvre	2	5200	2141	1.0	61.8	57.9	3.9	59.6	77
G4	Louvre	2	5200	2141	1.0	58.4	56.2	2.2	55.4	73
G5 ^(d)	Louvre	2	5200	5540	1.0	62.6	55.5	7.1	61.7	81
G5	Louvre	2	5200	5540	1.0	57.8	55.0	2.8	54.8	74

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 to check against the noise criterion during daytime/evening period only.

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



港 黄 竹 坑 道 3 7 號 利 達 中 心 1 2 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

Page

2 ...

Item tested

Description: Manufacturer:

Sound Level Meter (Type 1) **B&K**

B&K 4950

Preamp **B&K** ZC0032

Type/Model No.: Serial/Equipment No.: 2250-L 2681366

2665582

Microphone

17190

Adaptors used:

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: Multi function sound calibrator Signal generator Signal generator

Model: B&K 4226 DS 360

DS 360

Serial No. 2288444 33873 61227

(N. DIT 01)

Expiry Date: 08-Sep-2018 25-Apr-2018 01-Apr-2018

Traceable to: CIGISMEC CEPREI CEPREI

Ambient conditions

Temperature:

Air pressure:

Relative humidity:

21 ± 1 °C 50 ± 10 % 1000 ± 5 hPa

Test specifications

- 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.

Jun Qi

Actual Measurement data are documented on worksheets.

Fena

Approved Signatory:

24-Mar-2018

Company Chop:

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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Form No.CARP152-1/Issue 1/Rev C/01/02/2007



香港黄竹坑道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)

Certificate No.:

18CA0321 01-02

Page

2

1, Electrical Tests

The electrical tests were performed 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.

			Expanded	Coverage
Test:	Subtest:	Status:	Uncertanity (dB)	Factor
Self-generated noise	A	Pass	0.3	- 3
Sell-generated noise	Ĉ –	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	-0.3	
Lineality larige for Leq	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
			0.3	
Nine with severe for CDI	2 dB above lower limit of each range	Pass		
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	С ,	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	SPĽ	Pass	0.3	
	Leq	Pass	0.4	

2, // Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz Weighting A at 8000 Hz	Pass Pass	0.3 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.

Calibrated by:

Checked by:

1

Date:

Fung Chi Yip 23-Mar-2018

Date:

Lam Tze Wai 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.

End

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Form No.CARP152-2/Issue 1/Rev.C/01/02/2007



香港黄竹坑道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.:

18CA0920 02

Page

of

2

Item tested

Description:

Sound Level Meter (Type 1)

Microphone

Pream

Manufacturer: Type/Model No.:

Adaptors used:

B & K 2270 B & K 4189 B & K ZC0032

Serial/Equipment No.:

3007965 (N.OLZ.O)

284646

17965

Item submitted by

Customer Name:

AECOM ASIA CO. LTD.

Address of Customer:

1

Request No.: Date of receipt:

20-Sep-2018

Date of test:

22-Sep-2018

Reference equipment used in the calibration

Description:

Multi function sound calibrator

Model: B&K 4226 Serial No. 2288444

Expiry Date: 23-Aug-2019

Traceable to:

Signal generator
Signal generator

DS 360 DS 360 2288444 33873 61227

24-Apr-2019 23-Apr-2019 CEPREI CEPREI

Ambient conditions

Temperature:

21 ± 1 °C

Relative humidity: Air pressure: 55 ± 10 % 1005 ± 5 hPa

Test specifications

 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.

 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%.

 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

Feng Junq

Approved Signatory:

Date:

22-Sep-2018

Company Chop:

SENGINEGER SENGLAND SENGLAND

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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Form No.CARP152-1/Issue 1/Rev.C/01/02/2007



香港黄竹坑道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)

Certificate No.:

18CA0920 02

Page

2

2

1, Electrical Tests

The electrical tests were performed 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:	Uncertanity (dB) / Coverage Factor
Self-generated noise Linearity range for Leq	A C Lin At reference range, Step 5 dB at 4 kHz Reference SPL on all other ranges 2 dB below upper limit of each range	Pass Pass Pass Pass Pass	0.3 1.0 2.1 2.0 2.2 0.3 0.3 0.3
Linearity range for SPL Frequency weightings	2 dB above lower limit of each range At reference range , Step 5 dB at 4 kHz A C Lin	Pass Pass Pass Pass	0.3 0.3 0.3 0.3
Time weightings	Single Burst Fast	Pass Pass	0.3 0.3
Peak response R.M.S. accuracy Fime weighting I	Single Burst Slow Single 100µs rectangular pulse Crest factor of 3 Single burst 5 ms at 2000 Hz	Pass Pass Pass Pass	0.3 0.3 0.3 0.3
Fime averaging	Repeated at frequency of 100 Hz 1 ms burst duty factor 1/10 ³ at 4kHz	Pass Pass	0.3 0.3
Pulse range Sound exposure level Overload indication	1 ms burst duty factor 1/10 ⁴ at 4kHz Single burst 10 ms at 4 kHz Single burst 10 ms at 4 kHz SPL Leq	Pass Pass Pass Pass Pass	0.3 0.4 0.4 0.3 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	Uncertanity (dB) / Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3
	Weighting A at 8000 Hz	Pass	0.5

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

Calibrated by:

Date:

Fung Chi Yip 22-Sep-2018 End

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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Tel: (852) 2873 6860 Fax: (852) 2555 7533





CERTIFICATE OF CALIBRATION

Certificate No.:

18CA0321 01-01

Page

2 4

Item tested

Description: Manufacturer: Sound Level Meter (Type 1)

B&K

B&K

Pream **B&K**

Type/Model No.: Serial/Equipment No.: 2270 2644597

4950 2879980

Microphone

700032 19428

Adaptors used:

Item submitted by

Customer Name:

AECOM ASIA COLTD

Address of Customer:

Request No.:

Date of receipt:

21-Mar-2018

Date of test:

24-Mar-2018

Reference equipment used in the calibration

Description:

Model:

Serial No.

Expiry Date:

Traceable to:

Multi function sound calibrator Signal generator

B&K 4226

2288444

08-Sep-2018 25-Apr-2018 CIGISMEC

Signal generator

D\$ 360 DS 360 33873 61227

01-Apr-2018

CEPREI CEPREI

Ambient conditions

Temperature:

21 ± 1 °C

Relative humidity:

50 ± 10 %

Air pressure:

1005 ± 5 hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580; Part 1: 1997 1, 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%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference 3, 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.

Jun Qi

Actual Measurement data are documented on worksheets

Fend

Approved Signatory:

Date:

24-Mar-2018

Company Chop:

The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA0321 01-01

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1, Electrical Tests

The electrical tests were performed 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:	Uncertanity (dB) / Coverage F	actor
Self-generated noise	Α	Pass	0.3	
	С	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	Α	Pass	0.3	
	С	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 1/104 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	SPĹ	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	Uncertanity (dB) / Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3
	Weighting A at 8000 Hz	Pass	0.5

3, Response to associated sound calibrator

N/A

The 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.

Calibrated by:

End

Calibrated by:

ang Chi Yip

Checked by:

Lam Tze Wai

Date: 24-Mar-2018

Dat

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.

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CERTIFICATE OF CALIBRATION

Certificate No.:

18CA1019 01-01

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of

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Item tested

Description: Manufacturer: Sound Level Meter (Type 1) B & K

Microphone B & K 4950 Preamp B & K

Type/Model No.: Serial/Equipment No.: 2250 3001291

2665582

ZC0032 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:

Multi function sound calibrator

Signal generator Signal generator Model:

DS 360 DS 360 Serial No. 2288444

33873 61227 Expiry Date:

23-Aug-2019 24-Apr-2019 23-Apr-2019 Traceable to:

CIGISMEC CEPREI CEPREI

Ambient conditions

Temperature: Relative humidity:

Air pressure:

20 ± 1 °C 50 ± 10 %

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%.

 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.

Juna

Actual Measurement data are documented on worksheets

Approved Signatory:

Date:

20-Oct-2018

Company Chop:

SENGINEGA 综合試驗 解合試驗 有限公司 8700% QT

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA1019 01-01

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1, **Electrical Tests**

> The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertanity (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
den generated noise	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Ellicanty range for Ecq	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	Α	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 1/103 at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/104 at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertanity (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

Date:

Fung Chi Yip 19-Oct-2018

Checked by:

Date:

shek Kwong Tal 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.

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CERTIFICATE OF CALIBRATION

Certificate No.:

18CA0406 02-02

Page:

Item tested

Description: Manufacturer: Acoustical Calibrator (Class 1)

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:

Relative humidity:

21 ± 1 °C 50 ± 10 %

Air pressure:

1005 ± 5 hPa

Test specifications

- 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

Jun d

Approved Signatory:

Date:

11-Apr-2018

Company Chop:

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.

Soils & Materials Engineering Co., Ltd

Form No CARP156-1/Issue 1/Rev D/01/03/2007



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CERTIFICATE OF CALIBRATION

(Continuation Page)

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.

Calibrated by:

End

cambracou 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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Form No CARP156-2/Issue 1/Rev C/01/05/2005



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Tel: (852) 2873 6860 Fax: (852) 2555 7533



CERTIFICATE OF CALIBRATION

Certificate No.:

18CA1008 02

Page:

2

Item tested

Description: Manufacturer: Acoustical Calibrator (Class 1)

Type/Model No.:

Rion Co., Ltd.

NC-74

Serial/Equipment No.:

34246490 / N.004.10

Adaptors used:

Item submitted by

Curstomer

AECOM ASIA CO LIMITED

Address of Customer:

Request No.: Date of receipt:

08-Oct-2018

Date of test:

10-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:

21 ± 1 °C 50 ± 10 %

Relative humidity: Air pressure:

1005 ± 5 hPa

Test specifications

- The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B 1, 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.

Feng Jungi

Approved Signatory:

Date:

10-Oct-2018

Company Chop:

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

18CA1008 02

Page:

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 uPa)

of

Frequency	Output Sound Pressure	Measured Output	Estimated Expanded Uncertainty dB
Shown	Level Setting	Sound Pressure Level	
Hz	dB	dB	
1000	94.00	93.89	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 = 0.030 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 = 1002.0 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 = 2.3 %

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.

Calibrated by:

End

Date:

Fung Chi Yip

10-Oct-2018

Checked by:

Date:

10-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.

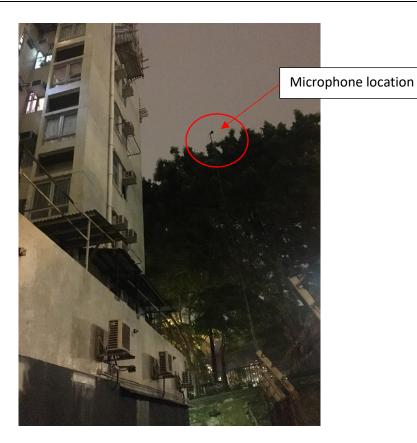
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Form No.CARP156-2/Issue 1/Rev C/01/05/2005

Appendix C2

Photographs – Noise Measurement at Representative NSRs

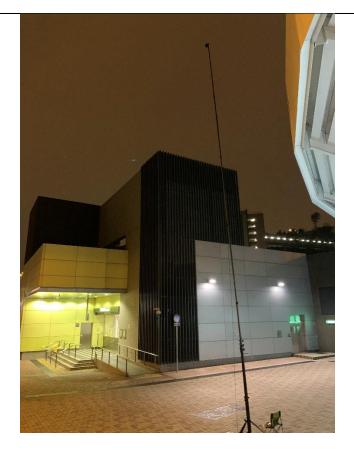
Appendix C2 Photographs – Noise Measurement at Representative NSRs



NSR Measurement Location at NSR 18



NSR Measurement Location at NSR 21



NSR Measurement Location at NSR 40b



NSR Measurement Location at NSR 40c

Appendix C3

Measurement Results at Representative NSRs

Appendix C3 Noise Measurement Results at Representative NSRs

			Fixed Plant Noise		Background Noise		
NSR ID	Measurement Date	Operation Scenario (1)(2)	Measurement Time	Measured Noise Level,L _{Aeq}	Measurement Time	Background Level, L _{Aeq 5mins} , dB(A)	Difference, dB(A)
			03:00:00 - 03:29:59		03:50:00 - 03:54:59	58.1	0.8
NSR 18	26/2/2019	Night-time	02:13:00 - 02:42:59	59.2	03:55:00 - 03:59:59	57.6	1.6
		Daytime and Evening	03:00:00 - 03:29:59	71.5	03:50:00 - 03:54:59	70.5	1.0
NSR 21	26/2/2019	Night-time	02:13:00 - 02:42:59	71.9	03:55:00 - 03:59:59	70.6	1.3
		Daytime and Evening	03:00:00 - 03:29:59	56.8	03:50:00 - 03:54:59	55.4	1.4
NSR 40b	26/2/2019	Night-time	02:13:00 - 02:42:59	57.9	03:53:00 - 03:57:59	55.8	2.1
		Daytime and Evening	03:00:00 - 03:29:59	67.9	03:50:00 - 03:54:59	66.3	1.6
NSR 40c	26/2/2019	Night-time	02:13:00 - 02:42:59	67.6	03:55:00 - 03:59:59	66.7	0.9

Note:

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

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