

MTR Corporation Limited

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

Fixed Plant Noise Audit Report

(Batch 4 – To Kwa Wan Ancillary Building (TKA))

(June 2019)

Certified by: Fredrick Leong 

Position: Independent Environmental Checker

Date: 21 June 2019

MTR Corporation Limited

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

Fixed Plant Noise Audit Report

(Batch 4 – To Kwa Wan Ancillary Building (TKA))

(June 2019)

Certified by:           Lisa Poon           

Position:           Environmental Team Leader          




Date:                           21 June 2019

**MTR Corporation Limited**

Consultancy Agreement No. C11033

**Shatin to Central Link - Tai Wai to  
Hung Hom Section [SCL(TAW – HUH)]  
and Stabling Sidings at Hung Hom  
Freight Yard [SCL(HHS)]****Fixed Plant Noise Audit Report  
(Batch 4 – To Kwa Wan Ancillary Building  
(TKA))**

June 2019

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

Version: A Date: 20 June 2019

This Report is prepared for MTR Corporation Limited and is given for its sole benefit in relation to and pursuant to Consultancy Agreement No. C11033 and may not be disclosed to, quoted to or relied upon by any person other than MTR Corporation Limited without our prior written consent. No person (other than MTR Corporation Limited) into whose possession a copy of this Report comes may rely on this Report without our express written consent and MTR Corporation Limited may not rely on it for any purpose other than as described above.

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

**Table of Content**

	Page
<b>1 INTRODUCTION.....</b>	<b>1</b>
1.1 Background .....	1
1.2 Purpose of This Report .....	1
<b>2 UPDATED SOUND POWER LEVELS OF FIXED PLANT NOISE SOURCES .....</b>	<b>3</b>
<b>3 MEASUREMENT METHODOLOGY .....</b>	<b>4</b>
3.1 Noise Measurement to obtain the SWLs of Fixed Plant Noise Sources.....	4
3.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Noise Sources at Representative NSRs .....	4
<b>4 MEASUREMENT RESULTS .....</b>	<b>6</b>
4.1 Noise Measurement to obtain the SWLs of Fixed Plant Noise Sources.....	6
4.2 Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Noise Sources at NSRs.....	6
<b>5 CONCLUSION .....</b>	<b>8</b>

**List of Tables**

Table 2.1	Summary of Updated Maximum Allowable SWLs for Fixed Plant Noise Sources at TKA
Table 3.1	Noise Measurement Equipment
Table 3.2	Measurement Schedule
Table 3.3	Noise Measurement Equipment
Table 3.4	Noise Measurement Location
Table 3.5	Measurement Schedule
Table 4.1	Summary of Measured SWLs for Fixed Plants
Table 4.2	Noise Measurement Result at Measurement Location

**List of Figures**

C1103/C/SCL/ACM/M52/047	Locations of NSR and Fixed Noise Sources at TKA
C1103/C/SCL/ACM/M52/048	Location of Noise Measurement Point (To Kwa Wan Ancillary Building)

**List of Appendices**

Appendix A	Proposal for Updating Maximum Allowable Sound Power Levels of Fixed Plant Sources (Batch 4 – To Kwa Wan Ancillary Building (TKA))
Appendix B	Noise Measurement to obtain the SWLs of Fixed Plant Noise Sources
Appendix B1	Measurement Methodology
Appendix B2	Calibration Certificates – Noise Measurement for Fixed Plant Noise
Appendix B3	Photographs showing the Examples of Noise Measurement for Fixed Plant Noise
Appendix B4	Noise Measurement Results

Appendix C	Noise Measurement to Confirm any Tonal, Impulsive and Intermittent Characteristics from the Fixed Plant Noise Sources at Representative NSR
Appendix C1	Calibration Certificates – Noise Measurement at Representative NSR
Appendix C2	Photographs – Noise Measurement at Representative NSR
Appendix C3	Noise Measurement Results at Measurement Location

## 1 INTRODUCTION

### 1.1 Background

- 1.1.1 The Shatin to Central Link (SCL) is a 17km extension of the existing Ma On Shan Line (MOL) and East Rail Line (EAL) comprising (i) The East-West Corridor which extends the MOL from Tai Wai to Hung Hom via East Kowloon to connect with the West Rail Line (WRL) at Hung Hom Station (HUH) and Stabling Sidings at Hung Hom Freight Yard (HHS); and (ii) The North-South Corridor which is an extension of the EAL at Hung Hom across the harbour to Admiralty Station (ADM).
- 1.1.2 Environmental Impact Assessment (EIA) Reports for SCL – Tai Wai to Hung Hom Section [SCL (TAW-HUH)] (Register No. AEIAR-167/2012) and SCL Stabling Sidings at Hung Hom Freight Yard [SCL (HHS)] (Register No. AEIAR-164/2012) (hereinafter referred to as “the EIA Reports”) were approved on 17 February 2012 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Reports, the Environmental Permit (EP) (EP No: EP-438/2012), covering the construction of both SCL (TAW-HUH) and SCL (HHS) (hereinafter referred to as “the Project”), was granted on 22 March 2012. Variations of Environmental Permit (VEP) were subsequently applied for EP-438/2012 and the latest Environmental Permit (EP No: EP-438/2012/K) was issued by Director of Environmental Protection (DEP) on 4 October 2016.
- 1.1.3 Pursuant to EP Condition 2.32, at least one month before commencement of operation of the Project, the Permit Holder, MTR Corporation Ltd (MTR), shall carry out fixed plant noise audit and deposit with the Director four hardcopies and one electronic copy of an audit report showing the design of the fixed plant noise sources associated with the Project complies with the maximum sound power levels determined in the approved SCL(TAW-HUH) EIA Report (Register No. AEIAR-167/2012) and SCL(HHS) EIA Report (Register No. AEIAR-164/2012) and all relevant documents in the Register, or otherwise approved by the Director in compliance with the requirements in Technical Memorandum on Environmental Impact Assessment Process having due regard to the characteristics of tonality, impulsiveness and intermittency.
- 1.1.4 Since the installation of fixed plant along the SCL (TAW-HUH) and SCL (HHS) would be completed in stages, the fixed plant noise audit will be conducted in stages according to the testing and commissioning programmes in each area.
- 1.1.5 AECOM Asia Co. Ltd was commissioned by the MTR to prepare the fixed plant noise audit report to check the compliance of the maximum sound power levels (SWLs) and any characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources associated with the Project.
- 1.1.6 Based on the latest design information, the maximum allowable SWLs of fixed plant items have been updated to reflect the latest design of the Project, and therefore Proposals were prepared to present the updated maximum allowable sound power levels (SWLs) of the fixed plant items at different stations of the Project. The Proposal for Updating Maximum Allowable Sound Power Levels of Fixed Plant Sources (Batch 4 – To Kwa Wan Ancillary Building (TKA)) (hereinafter referred to as “the Proposal (Batch 4 – TKA)”) (**Appendix A** refers) was approved by DEP on 11 June 2019.
- 1.1.7 This Fixed Plant Noise Audit Report (Batch 4 – To Kwa Wan Ancillary Building (TKA)) (hereinafter referred to as “the FPNAR (Batch 4 – TKA)”) presents the noise measurement methodology and measurement results at the fixed plant noise sources of TKA and at the representative NSR near TKA, for checking compliance with the maximum allowable sound power levels (SWLs) determined in the Proposal (Batch 4 – TKA).

### 1.2 Purpose of This Report

- 1.2.1 This Report presents the noise measurement methodology and measurement results at the fixed plant noise sources of TKA and at the representative NSR near TKA.

1.2.2 This Report comprises the following sections:

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

## 2 UPDATED SOUND POWER LEVELS OF FIXED PLANT NOISE SOURCES

2.1.1 The updated maximum allowable SWL of fixed plant noise sources at TKA are extracted from the Proposal (Batch 4 – TKA) and are summarised in **Table 2.1**. The updated fixed plant noise sources locations at TKA are shown in **Figure No. C1103/C/SCL/ACM/M52/047**. 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 NSR.

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

Location	Fixed Plant ID. <sup>(1)</sup>	Fixed Plant Source	Maximum Allowable SWL, dB(A)	
			Daytime/Evening <sup>(2)</sup>	Night-time <sup>(2)</sup>
TKA	VS-TKW-72	Ventilation Louver	93	83
	VS-TKW-73	Ventilation Louver	93	83

Notes:

- (1) Ma Tau Wai Station as named in the EIA Reports have been recently renamed as To Kwa Wan Station (TKW). The fixed plant ID. are therefore updated from VS-MTW-XX to VS-TKW-XX to match with existing naming.
- (2) 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
Sound Level Meter	SVAN958A	59120
Calibrator	SV30A	29088

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 TKA 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
TKA	10 January 2019

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

##### Measurement Parameters

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

3.2.2 Background noise level was measured at the same measurement location in term of  $L_{Aeq}$  (5 min) immediate before or after the noise measurement when all Project's fixed plant equipment shut down. To minimise the measurement data being influenced by background noise, noise data obtained at an instance of minimal or no traffic on the road was used to evaluate the tonal characteristic. The corrections for tonality, impulsiveness or intermittency at the representative NSR were 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 meter and calibrator used for noise measurement at representative NSR are listed in the **Table 3.3**. The instruments used for the noise measurement complied with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). The calibration certificates of equipment are shown in **Appendix C1**.

**Table 3.3 Noise Measurement Equipment**

Equipment	Model	Serial Number
Sound Level Meter	SVAN958A	59121
Calibrator	SV30A	29088

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

Measurement Location

3.2.5 The proposed noise measurement location was selected at the representative NSR where have direct line of sight to the noise sources and was accessible for noise measurement. This measurement location was agreed with EPD prior to noise measurement. The measurement location is summarised in **Table 3.4** and shown in **Figure No. C1103/C/SCL/ACM/M52/048**. Photograph of measurement location is shown in **Appendix C2**.

**Table 3.4 Noise Measurement Location**

Measurement Location ID	Representative NSR (NSR ID)	Type	Measurement Height
TKA-FN1	Great Wall Building (TKW-12-6) <sup>(1)</sup>	Residential	Pedestrian road adjacent to Great Wall Building (10m above ground)

Note:

(1) Ma Tau Wai Station as named in the EIA Reports have been recently renamed as To Kwa Wan Station (TKW). The NSR Nos. are therefore updated from MTW-XX-X to TKW-XX-X to match with existing naming.

Measurement Date and Time

3.2.6 The operation of fixed plant sources at TKA is identical for both daytime and night-time, noise measurement at representative NSR was therefore only conducted during night-time period. The measurement schedule is presented in **Table 3.5**.

**Table 3.5 Measurement Schedule**

Measurement Location ID	Date
TKA-FN1	9 April 2019

#### 4 MEASUREMENT RESULTS

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

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

**Table 4.1 Summary of Measured SWLs for Fixed Plants**

Plant Item <sup>(1)</sup>	Measured SWL, dB(A)		Maximum allowable SWL, dB(A)		Compliance (Y/N)	
	Day/Evening-time <sup>(2)</sup>	Night-time <sup>(2)</sup>	Day/Evening-time <sup>(2)</sup>	Night-time <sup>(2)</sup>	Day/Evening-time <sup>(2)</sup>	Night-time <sup>(2)</sup>
VS-TKW-72	65	65	93	83	Y	Y
VS-TKW-73	62	62	93	83	Y	Y

Notes:

- (1) Ma Tau Wai Station as named in the EIA Reports have been recently renamed as To Kwa Wan Station (TKW). The plant item are therefore updated from VS-MTW-XX to VS-TKW-XX to match with existing naming.  
(2) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours

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

4.2.1 Noise measurement to confirm any characteristics of tonality, impulsiveness and intermittency at the representative NSR was 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 NSR. Detailed noise measurement results are presented in **Appendix C3**.

**Table 4.2 Noise Measurement Result at Measurement Location**

Measurement Location ID	Representing NSR (NSR ID)	Time Period <sup>(2)</sup>	Measurement Result			Site Observation	Characteristics of Tonality, Impulsiveness and Intermittency at NSR (Y/N)
			Measured Noise Level $L_{Aeq(30mins)}$ , dB(A)	Background Noise Level $L_{Aeq(5mins)}$ , dB(A)	Difference between Measured Noise Level and Background Level, dB(A)		
TKA-FN1	Great Wall Building (TKW-12-6) <sup>(1)</sup>	Night-time	62.8	62.5	0.3	Noise environment was dominated by traffic noise. Noise from SCL fixed plant was not noticeable at the measurement location.	N

Notes:

- (1) Ma Tau Wai Station as named in the EIA Reports have been recently renamed as To Kwa Wan Station (TKW). The NSR Nos. are therefore updated from MTW-XX-X to TKW-XX-X to match with existing naming.
- (2) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours

## **5 CONCLUSION**

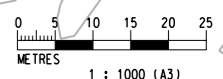
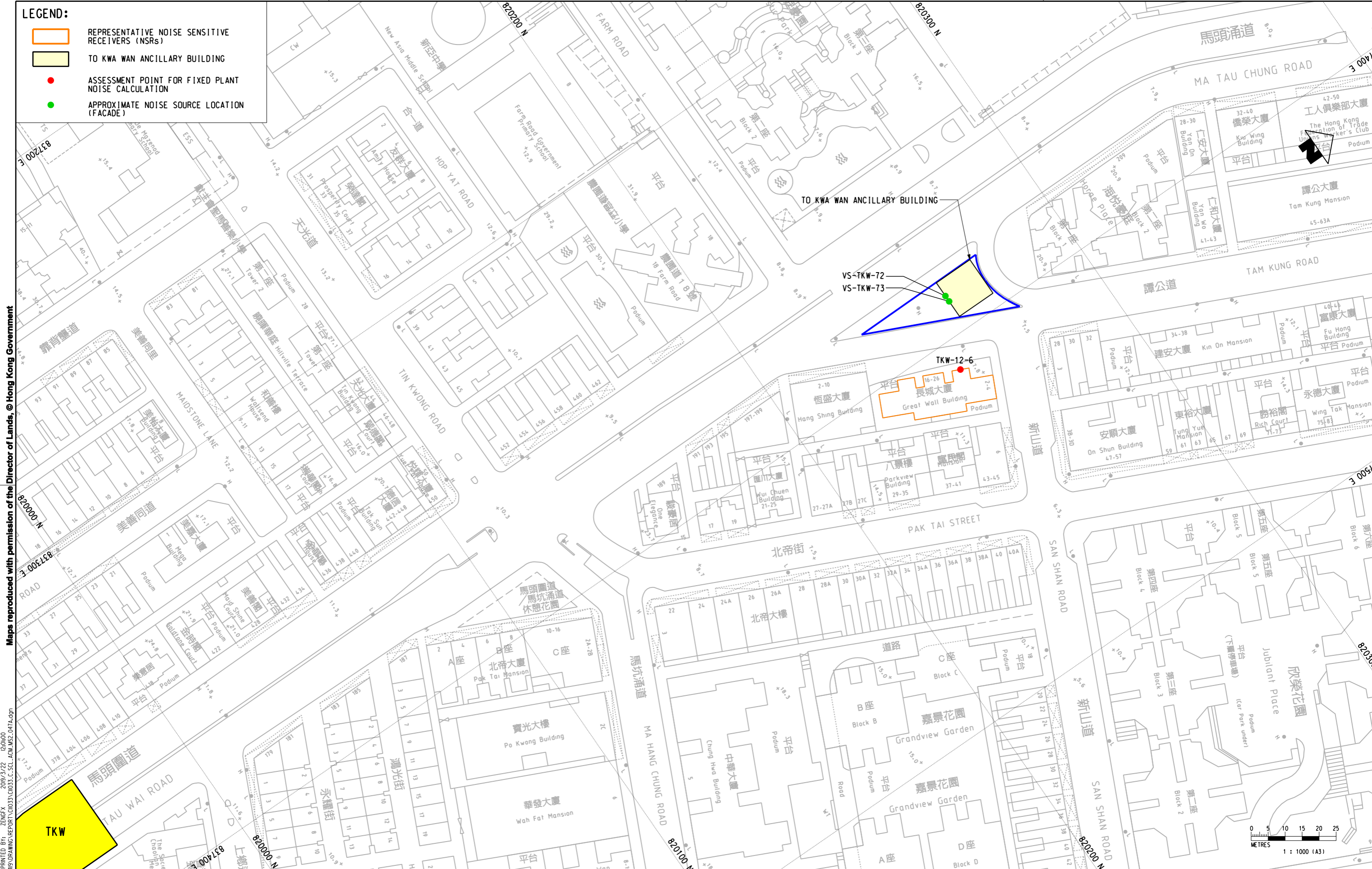
- 5.1.1 The fixed plant noise verification was undertaken and the measurement results indicated all the fixed plant noise levels in TKA comply with the updated maximum allowable SWLs. No characteristics of tonality, impulsiveness and intermittency was also observed at the representative NSR. Result of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

---

## Figures

---

- LEGEND:**
- REPRESENTATIVE NOISE SENSITIVE RECEIVERS (NSRs)
  - TO KWA WAN ANCILLARY BUILDING
  - ASSESSMENT POINT FOR FIXED PLANT NOISE CALCULATION
  - APPROXIMATE NOISE SOURCE LOCATION (FACADE)



Maps reproduced with permission of the Director of Lands, © Hong Kong Government





PLOT DRW: V:\us\inset\MTR\PI\DRIVER\WINDOWS\_X3\_C0C009.dwg 12/20/09  
 MODEL: PRINTED BY: ZENPEX 2009/3/22  
 FILENAME: P:\projects\13.602749\DRAWING\REPORT\C11033\_C\_SCL\_ACM\_M52\_047A.dgn

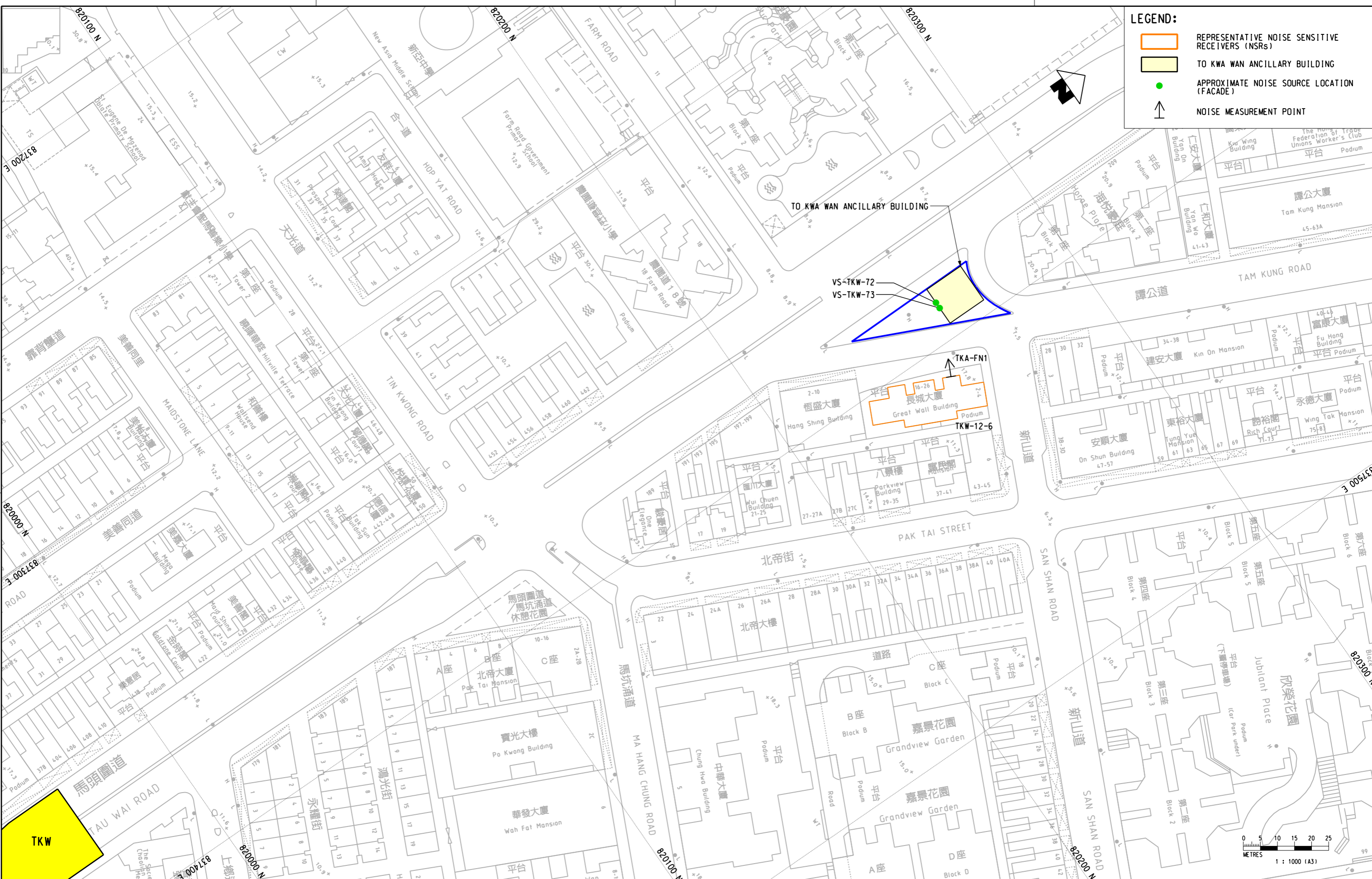
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">DRAWN</td><td>ZFX</td></tr> <tr> <td>DESIGNED</td><td>GL</td></tr> <tr> <td>CHECKED</td><td>ST</td></tr> <tr> <td>APPROVED</td><td>ST</td></tr> <tr> <td>DATE</td><td>20/MAR/2019</td></tr> </table>				DRAWN	ZFX	DESIGNED	GL	CHECKED	ST	APPROVED	ST	DATE	20/MAR/2019	<p style="margin: 0;"><b>SHATIN TO CENTRAL LINK</b></p> <p style="margin: 0; font-size: 1.2em; font-weight: bold;">AECOM</p>				<p style="margin: 0;"><b>TITLE</b></p> <p style="margin: 0;">C11033</p> <p style="margin: 0;">SCL (TAW-HUH)</p> <p style="margin: 0;">LOCATIONS OF NSR AND FIXED PLANT NOISE SOURCES AT TKA</p>															
DRAWN	ZFX																																
DESIGNED	GL																																
CHECKED	ST																																
APPROVED	ST																																
DATE	20/MAR/2019																																
				<p style="margin: 0;">ORIGINATOR</p> <p style="margin: 0; font-size: 1.2em; font-weight: bold;">AECOM</p>				<p style="margin: 0;"><b>SCALE</b></p> <p style="margin: 0;">1 : 1000 (A3)</p>																									
				<p style="margin: 0;">CADD REF. C11033_C_SCL_ACM_M52_047A.dgn</p>				<p style="margin: 0;"><b>FIGURE NO.</b></p> <p style="margin: 0;">C11033/C/SCL/ACM/M52/047</p>																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">A</td><td style="width: 50%;">FIRST ISSUE</td></tr> </table>		A	FIRST ISSUE	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">GL</td><td style="width: 50%;">20MAR19</td></tr> <tr> <td>ST</td><td></td></tr> </table>		GL	20MAR19	ST		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">GL</td><td style="width: 50%;">20MAR19</td></tr> <tr> <td>ST</td><td></td></tr> </table>		GL	20MAR19	ST		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">GL</td><td style="width: 50%;">20MAR19</td></tr> <tr> <td>ST</td><td></td></tr> </table>		GL	20MAR19	ST		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">GL</td><td style="width: 50%;">20MAR19</td></tr> <tr> <td>ST</td><td></td></tr> </table>		GL	20MAR19	ST		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">GL</td><td style="width: 50%;">20MAR19</td></tr> <tr> <td>ST</td><td></td></tr> </table>		GL	20MAR19	ST	
A	FIRST ISSUE																																
GL	20MAR19																																
ST																																	
GL	20MAR19																																
ST																																	
GL	20MAR19																																
ST																																	
GL	20MAR19																																
ST																																	
GL	20MAR19																																
ST																																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">REV</td><td style="width: 50%;">DESCRIPTION</td></tr> </table>		REV	DESCRIPTION	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">BY</td><td style="width: 50%;">DATE</td></tr> </table>		BY	DATE	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">APPROVED</td><td style="width: 50%;">REV</td></tr> </table>		APPROVED	REV	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">BY</td><td style="width: 50%;">DATE</td></tr> </table>		BY	DATE	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">APPROVED</td><td style="width: 50%;">REV</td></tr> </table>		APPROVED	REV	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">BY</td><td style="width: 50%;">DATE</td></tr> </table>		BY	DATE	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">APPROVED</td><td style="width: 50%;">REV</td></tr> </table>		APPROVED	REV						
REV	DESCRIPTION																																
BY	DATE																																
APPROVED	REV																																
BY	DATE																																
APPROVED	REV																																
BY	DATE																																
APPROVED	REV																																

Maps reproduced with permission of the Director of Lands, © Hong Kong Government

PLOT DRW: V:\ustinet\NTR\PI\DRIVER\WINDOWS\33\COL009.dwg 16:45:49  
 MODEL: C:\PROGRAMS\AUTOCAD\2009\328  
 FILENAME: P:\projects\13\6027485\DRAWING\REPORT\C11033\_C\_SCL\_ACM\_M52\_048A.dgn

**LEGEND:**

-  REPRESENTATIVE NOISE SENSITIVE RECEIVERS (NSRs)
-  TO KWA WAN ANCILLARY BUILDING
-  APPROXIMATE NOISE SOURCE LOCATION (FACADE)
-  NOISE MEASUREMENT POINT



DRAWN	ZFX
DESIGNED	GL
CHECKED	ST
APPROVED	ST
DATE	20/MAR/2019

**MTR**

SHATIN TO CENTRAL LINK

**AECOM**

ORIGINATOR

CADD REF. C11033\_C\_SCL\_ACM\_M52\_048A.dgn

TITLE		C11033	
		SCL (TAW-HUH)	
		LOCATION OF NOISE MEASUREMENT POINT	
		(TO KWA WAN ANCILLARY BUILDING)	
SCALE	1 : 1000 (A3)	FIGURE NO.	C11033/C/SCL/ACM/M52/048
REV.	A		

REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED
A	FIRST ISSUE	GL	20MAR19	ST					



---

**Appendix A**

**Proposal for Updating Maximum Allowable Sound Power  
Levels of Fixed Plant Sources (Batch 4 – To Kwa Wan  
Ancillary Building (TKA))**

---

MTR Corporation Limited

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

Proposal for Updating Maximum Allowable  
Sound Power Levels of Fixed Plant Sources  
(Batch 4 – To Kwa Wan Ancillary Building (TKA))

(April 2019)

Certified by: Fredrick Leong 

Position: Independent Environmental Checker

Date: 16 April 2019

MTR Corporation Limited

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

Proposal for Updating Maximum Allowable  
Sound Power Levels of Fixed Plant Sources  
(Batch 4 – To Kwa Wan Ancillary Building (TKA))

(April 2019)

Certified by:           Lisa Poon           

Position:           Environmental Team Leader          




Date:           15 April 2019

**MTR Corporation Limited**

Consultancy Agreement No. C11033

**Shatin to Central Link - Tai Wai to  
Hung Hom Section [SCL(TAW – HUH)]  
and Stabling Sidings at Hung Hom  
Freight Yard [SCL(HHS)]****Proposal for Updating Maximum Allowable  
Sound Power Levels of Fixed Plant Sources  
(Batch 4 – To Kwa Wan Ancillary Building  
(TKA))**

March 2019

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

Version:	A	Date: 29 March 2019
----------	---	---------------------

This Report is prepared for MTR Corporation Limited and is given for its sole benefit in relation to and pursuant to Consultancy Agreement No. C11033 and may not be disclosed to, quoted to or relied upon by any person other than MTR Corporation Limited without our prior written consent. No person (other than MTR Corporation Limited) into whose possession a copy of this Report comes may rely on this Report without our express written consent and MTR Corporation Limited may not rely on it for any purpose other than as described above.

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

## Table of Content

	Page
<b>1 INTRODUCTION.....</b>	<b>1</b>
1.1 Background .....	1
1.2 Purpose of This Proposal.....	1
<b>2 NOISE CRITERIA AND NOISE SENSITIVE RECEIVERS .....</b>	<b>2</b>
2.1 Environmental Legislation, Standard and Guidelines .....	2
2.2 Assessment Criteria and Representative Noise Sensitive Receivers .....	2
<b>3 UPDATE OF FIXED PLANT SOURCES AND PREDICTION OF FIXED PLANT NOISE LEVELS .....</b>	<b>4</b>
3.1 Update of Fixed Plant Sources .....	4
3.2 Prediction of Fixed Plant Noise .....	4
<b>4 CONCLUSION .....</b>	<b>5</b>

### List of Tables

Table 2.1	ANLs for Assessment of Noise from Fixed Sources
Table 2.2	Major Roads in the Vicinity of TKA
Table 2.3	Summary of Noise Criteria at Representative NSR for Fixed Noise Sources
Table 3.1	Summary of Updated Maximum Allowable SWLs for Fixed Plant Sources
Table 3.2	Predicted Fixed Plant Noise Levels at Representative NSR

### List of Figure

C1103/C/SCL/ACM/M52/047	Locations of NSR and Fixed Plant Noise Sources at TKA
-------------------------	---

### List of Appendices

Annex A	Detail Calculation of Fixed Plant Noise Assessment
---------	--

## 1 INTRODUCTION

### 1.1 Background

- 1.1.1 The Shatin to Central Link (SCL) is a 17km extension of the existing Ma On Shan Line (MOL) and East Rail Line (EAL) comprising (i) The East-West Corridor which extends the MOL from Tai Wai to Hung Hom via East Kowloon to connect with the West Rail Line (WRL) at Hung Hom Station (HUH) and Stabling Sidings at Hung Hom Freight Yard (HHS); and (ii) The North-South Corridor which is an extension of the EAL at Hung Hom across the harbour to Admiralty Station (ADM).
- 1.1.2 Environmental Impact Assessment (EIA) Reports for SCL – Tai Wai to Hung Hom Section [SCL (TAW-HUH)] (Register No. AEIAR-167/2012) and SCL Stabling Sidings at Hung Hom Freight Yard [SCL (HHS)] (Register No. AEIAR-164/2012) (hereinafter referred to as “the EIA Reports”) were approved on 17 February 2012 under the Environmental Impact Assessment Ordinance (EIAO). Following the approval of the EIA Reports, the Environmental Permit (EP) (EP No: EP-438/2012), covering the construction of both SCL (TAW-HUH) and SCL (HHS) (hereinafter referred to as “the Project”), was granted on 22 March 2012. Variations of Environmental Permit (VEP) were subsequently applied for EP-438/2012 and the latest Environmental Permit (EP No: EP-438/2012/K) was issued by Director of Environmental Protection (DEP) on 4 October 2016.
- 1.1.3 Pursuant to EP Condition 2.32, at least one month before commencement of operation of the Project, the Permit Holder, MTR Corporation Ltd (MTR), shall carry out fixed plant noise audit and deposit with the Director four hardcopies and one electronic copy of an audit report showing the design of the fixed plant noise sources associated with the Project complies with the maximum sound power levels determined in the approved SCL(TAW-HUH) EIA Report (Register No. AEIAR-167/2012) and SCL(HHS) EIA Report (Register No. AEIAR-164/2012) and all relevant documents in the Register, or otherwise approved by the Director in compliance with the requirements in Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO) having due regard to the characteristics of tonality, impulsiveness and intermittency.
- 1.1.4 AECOM Asia Co. Ltd was commissioned by the MTR to prepare the fixed plant noise audit report to check the compliance of the maximum sound power levels (SWLs) and any characteristics of tonality, impulsiveness and intermittency from the fixed plant noise sources associated with the Project.
- 1.1.5 Based on the latest design information, the maximum allowable SWLs of fixed plant items have been updated to reflect the latest design of the Project, and therefore Proposal(s) will be prepared to present the updated maximum allowable sound power levels (SWLs) of the fixed plant items at different stations of the Project.

### 1.2 Purpose of This Proposal

- 1.2.1 As discussed in **Section 1.1.5**, the maximum allowable SWLs of fixed plant items has been updated to reflect the latest design of the Project. This Proposal (Batch 4 – To Kwa Wan Ancillary Building (TKA)) presents the updated maximum allowable SWLs of the fixed plant noise sources at TKA.

## 2 NOISE CRITERIA AND NOISE SENSITIVE RECEIVERS

### 2.1 Environmental Legislation, Standard and Guidelines

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

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

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

**Table 2.1 ANLs for Assessment of Noise from Fixed Sources**

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

### 2.2 Assessment Criteria and Representative Noise Sensitive Receivers

2.2.1 During the EIA stage, there was no fixed plant to be installed at TKA but based on latest design information, fixed plant noise sources are required to be provided at TKA, the nearest NSR, Great Wall Building (TKW-12-6) as shown in **Figure No. C1103/C/SCL/ACM/M52/047**, is therefore selected for assessment.

2.2.2 Based on the best available information during the preparation of this Proposal, i.e. The Annual Traffic Census 2017, two major roads have been identified in the vicinity of the NSR near TKA and are listed in **Table 2.2** below.

**Table 2.2 Major Roads in the Vicinity of TKA**

Area	Road Name	From	To	A.A.D.T. <sup>(1)</sup> (2017)
To Kwa Wan Ancillary Building	Ma Tau Wai Road & Ma Tau Chung Road	Farm Road	Ma Tau Kok Road	31,120
	Ma Tau Wai Road	Tin Kwong Road	Farm Road	34,990

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](https://www.td.gov.hk/filemanager/en/content_4915/annual%20traffic%20census%202017.pdf)).

2.2.3 Site inspection has also been conducted to determine the degree to which NSR is affected by the major road (i.e. Influencing Factor). Based on site observation, it was revealed that TKW-12-6 is directly affected by the major roads as listed in **Table 2.2**. As TKW-12-6 is located in "Urban Area", the ASR for this NSR is identified as ASR "C" in accordance with the IND-TM. Therefore, the noise criteria for TKW-12-6 are 65 dB(A) and 55 dB(A) for Day & Evening period and night-time period respectively. The assessment criteria at the NSR selected for assessing the fixed plant noise impact from TKA are summarised in **Table 2.3**.

**Table 2.3 Summary of Noise Criteria at Representative NSR for Fixed Noise Sources**

Area (NSR No.) <sup>(1)</sup>	Time Period <sup>(2)</sup>	ASR	Prevailing Background Noise <sup>(3)</sup> , dB(A)	ANL-5 <sup>(4)</sup> , dB(A)	Criteria <sup>(5)</sup> , dB(A)
<b>To Kwa Wan Ancillary Building (TKA)</b>					
Great Wall Building (TKW-12-6)	Day & evening	C	69	65	65
	Night	C	56	55	55

Notes:

- (1) Ma Tau Wai Station as named in the EIA Reports has been recently renamed as To Kwa Wan Station (TKW). The NSR No. is therefore updated from MTW-XX-X to TKW-XX-X to match with existing naming of both stations.
- (2) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.
- (3) Given that TKW-12-6 shares similar noise climate with NSRs in To Kwa Wan (e.g TKW-12-3, TKW12-4, TKW-12-10, and TKW-16-1), prevailing background noise levels as reported in Table 8.8 of the approved SCL (TAW-HUH) EIA Report for NSRs in To Kwa Wan have been adopted.
- (4) A 5 dB(A) has been deducted from ANL as specified in requirement of TM-EIAO.
- (5) The minimum of prevailing background noise level & ANL-5 is adopted.



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

#### 3.1 Update of Fixed Plant Sources

3.1.1 The locations of updated fixed plant noise sources at TKA are shown in **Figure No. C1103/C/SCL/ACM/M52/047**. 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**

Location	Fixed Plant ID. <sup>(1)</sup>	Fixed Plant Source	Maximum Allowable SWL, dB(A) <sup>(2)</sup>	
			Daytime & Evening <sup>(3)</sup>	Night-time <sup>(3)</sup>
TKA	VS-TKW-72	Ventilation Louver	93	83
	VS-TKW-73	Ventilation Louver	93	83

Notes:

- (1) Ma Tau Wai Station as named in the EIA Reports have been recently renamed as To Kwa Wan Station (TKW). The fixed plant ID. are therefore updated from VS-MTW-XX to VS-TKW-XX to match with existing naming.
- (2) The maximum allowable sound power levels have due regard to the characteristics of tonality, intermittency and impulsiveness.
- (3) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.

#### 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 NSR comply with both daytime/evening and night-time criteria as presented in **Table 2.3**. 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 NSR**

NSR ID <sup>(1)</sup>	Description	Criteria, dB(A)		Predicted Sound Pressure Level, $L_{eq,30mins}$ , dB(A) <sup>(2)</sup>	
		Daytime & Evening <sup>(3)</sup>	Night-time <sup>(3)</sup>	Daytime & Evening <sup>(3)</sup>	Night-time <sup>(3)</sup>
TKW-12-6	Great Wall Building	65	55	64	54

Notes:

- (1) Ma Tau Wai Station as named in the EIA Reports have been recently renamed as To Kwa Wan Station (TKW). The NSR No. is therefore updated from MTW-XX-X to TKW-XX-X to match with existing naming.
- (2) The predicted fixed plant noise levels have due regard to the characteristics of tonality, intermittency and impulsiveness.
- (3) Day: 0700 to 1900 hours, Evening: 1900 to 2300 hours, Night: 2300 to 0700 hours.

#### **4 CONCLUSION**

- 4.1.1 The maximum allowable SWLs of fixed plant noise sources at TKA have been updated based on the latest design information. The predicted noise levels at the representative NSR 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 during the fixed plant noise audit shall comply with the maximum allowable SWLs as stated in the **Table 3.1**. Appropriate corrections in tonal, impulsive or intermittent characteristics should be applied, where applicable, in accordance with the IND-TM during the commissioning test.

---

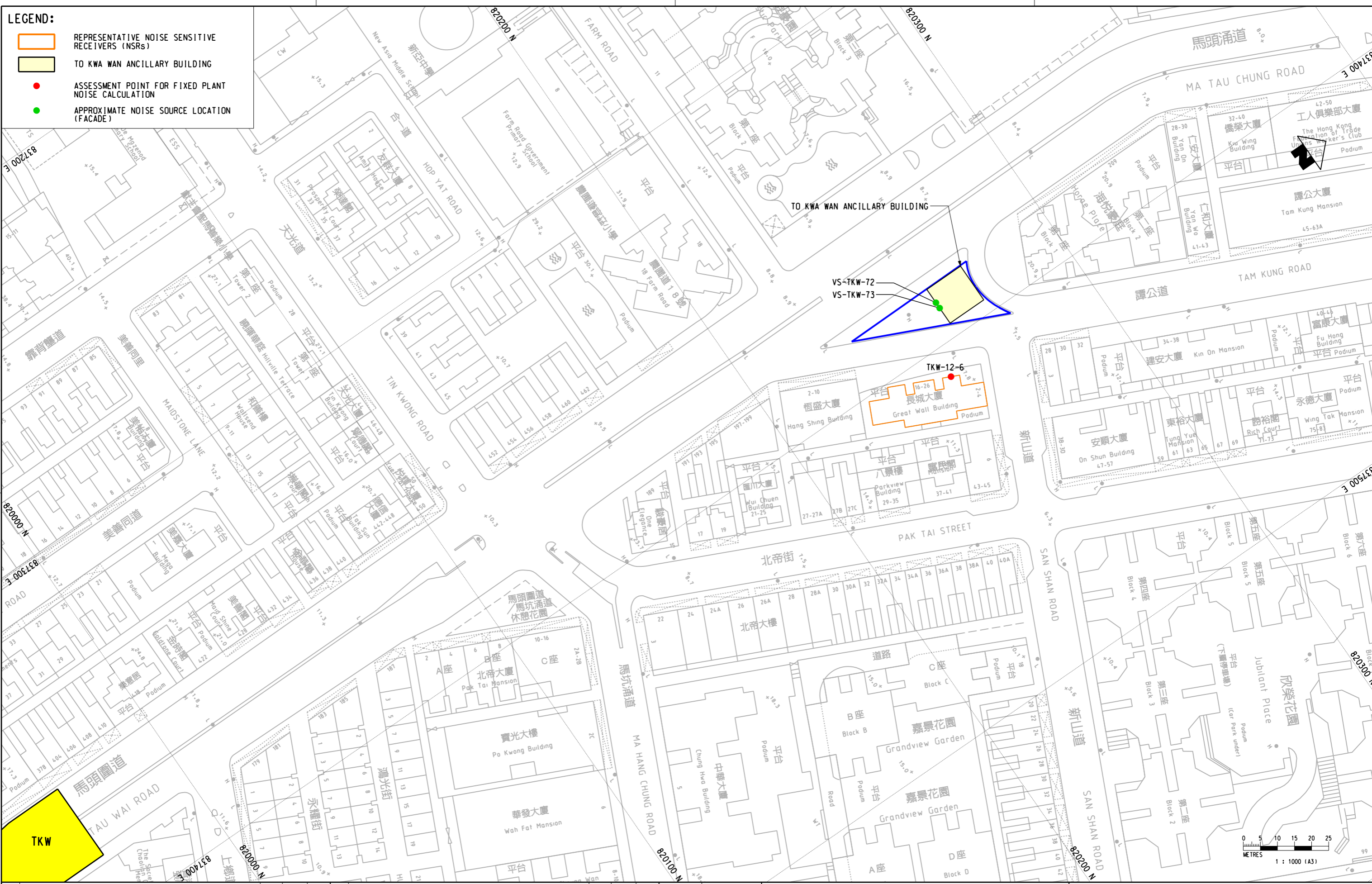
**Figure**

---

- LEGEND:**
- REPRESENTATIVE NOISE SENSITIVE RECEIVERS (NSRs)
  - TO KWA WAN ANCILLARY BUILDING
  - ASSESSMENT POINT FOR FIXED PLANT NOISE CALCULATION
  - APPROXIMATE NOISE SOURCE LOCATION (FACADE)

Maps reproduced with permission of the Director of Lands, © Hong Kong Government

PLOT DRW: V:\us\inset\MTR\PI\DRIVER\WINDOWS\_X3\_C0C009.dwg 12/20/09  
 MODEL: C:\GENERA\209\1322  
 FILENAME: P:\proj\1322\1322\DRAWING\REPORT\C11033\_C\_SCL\_ACM\_M52\_047A.dgn



REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED
A	FIRST ISSUE	GL	20MAR19	ST					

DRAWN	ZFX
DESIGNED	GL
CHECKED	ST
APPROVED	ST
DATE	20/MAR/2019

**MTR**

**SHATIN TO CENTRAL LINK**

**AECOM**

CADD REF. C11033\_C\_SCL\_ACM\_M52\_047A.dgn

TITLE		<b>C11033</b>	
		<b>SCL (TAW-HUH)</b>	
		<b>LOCATIONS OF NSR AND FIXED PLANT NOISE SOURCES AT TKA</b>	
SCALE	1 : 1000 (A3)	FIGURE NO.	C11033/C/SCL/ACM/M52/047
REV.	A		

---

**Annex A**

**Detail Calculation of Fixed Plant Noise Assessment**

---

# Annex A Detail Calculation of Fixed Plant Noise Assessment

## Fixed Plant Noise Calculation - TKA NSR (Day-time & Evening Period)

Noise Assessment Point	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight, dB(A)	Distance Correction, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	Daytime and Evening Noise Criteria, dB(A)
To Kwa Wan Ancillary Building											
TKW-12-6	Great Wall Building	VS-TKW-72	South	22	93	0	-35	3	61	64	65
		VS-TKW-73	South	20	93	0	-34	3	62		

# Annex A Detail Calculation of Fixed Plant Noise Assessment

## Fixed Plant Noise Calculation - TKA NSR (Night-time Period)

Noise Assessment Point	Description	Plant item	Direction Facing	Horizontal Distance , m	SWL, dB(A)	Correction for line of sight, dB(A)	Distance Correction, dB(A)	Façade Correction, dB(A)	Predicted SPL, dB(A)	Total SPL, dB(A)	Night-time Noise Criteria, dB(A)
To Kwa Wan Ancillary Building											
TKW-12-6	Great Wall Building	VS-TKW-72	South	22	83	0	-35	3	51	54	55
		VS-TKW-73	South	20	83	0	-34	3	52		

---

**Appendix B**

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

---

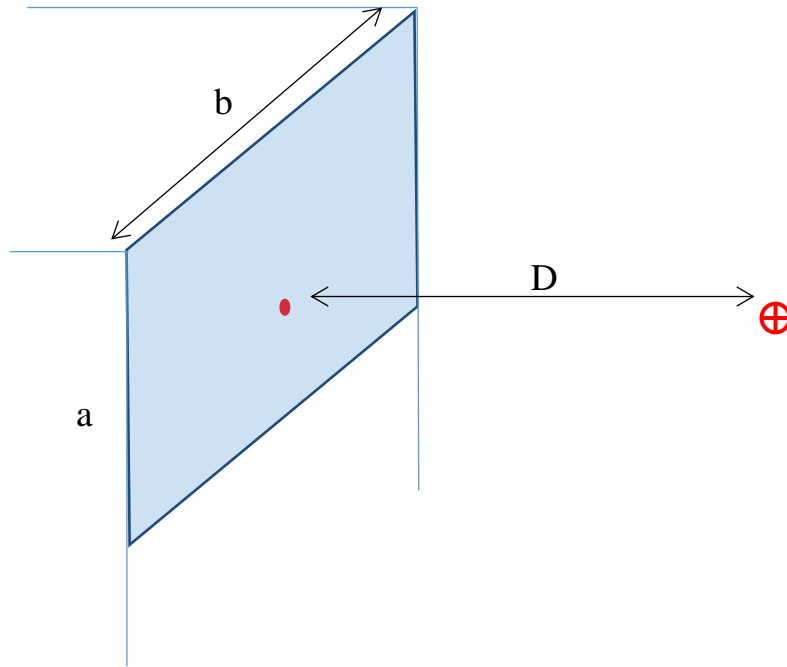


---

**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

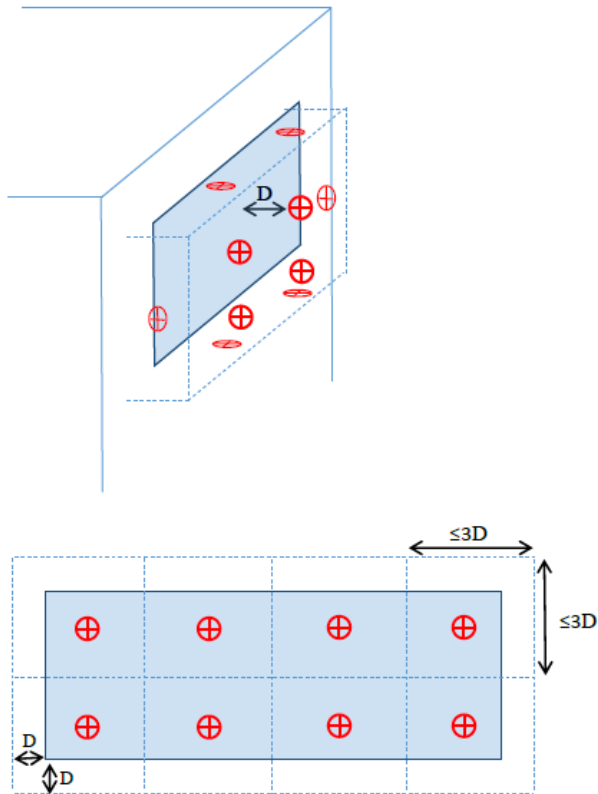
⊕ Proposed measurement point (microphone pointing perpendicular to the center of the louvre)

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  $L_{Aeq, 1 \text{ min}}$  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 characteristics at representative NSRs.

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

## Method 2: Near-Field Testing Method for Louvre



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),

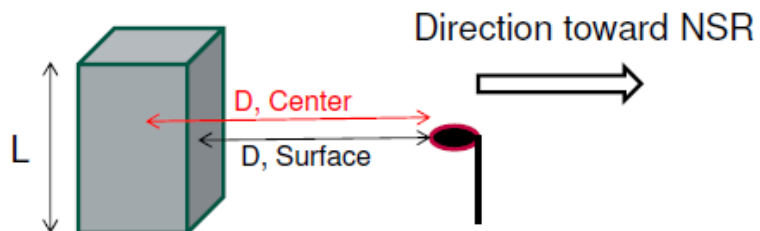
- First step is to determine a hypothetical measurement surfaces with at least 1m separation (D, measured from the centre of the louvre or its nearest edges as appropriate) from the louvre.
- For louvre with largest dimension  $\leq 3D$ , at least one measurement at the centre of the measurement surface 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 louvre 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 characteristics at representative NSRs.

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

K1A refers to background noise correction factor

K2A refers to environmental correction for sound absorption and reflection

### Method 3 – Far Field Testing Method for Plant Item



“L” is the longest side of the plant item

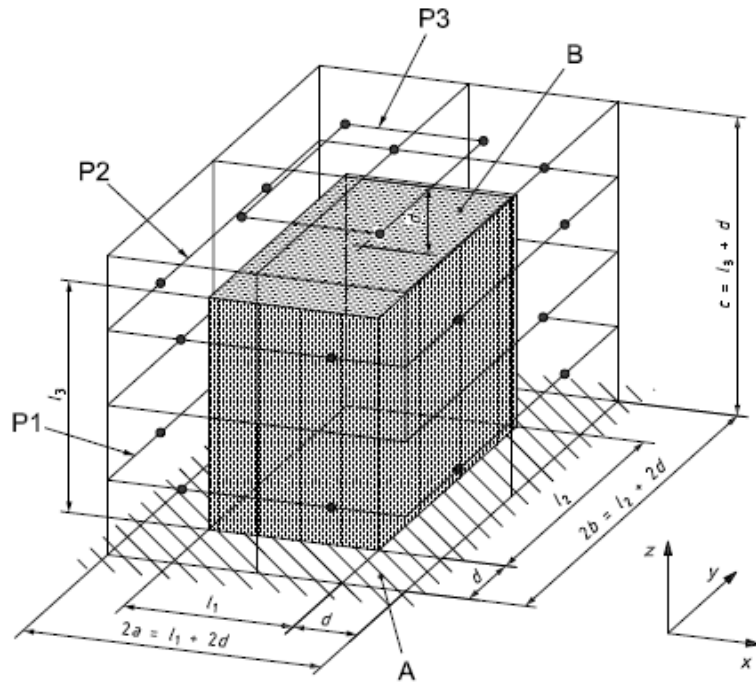
“D, Center” is the separation between center of the plant item and microphone

“D, Surface” is the separation between surface of the plant item and microphone

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

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

**Method 4 – Near Field Testing Method for Plant Item**



For Method 4 (based on ISO3746:2010),

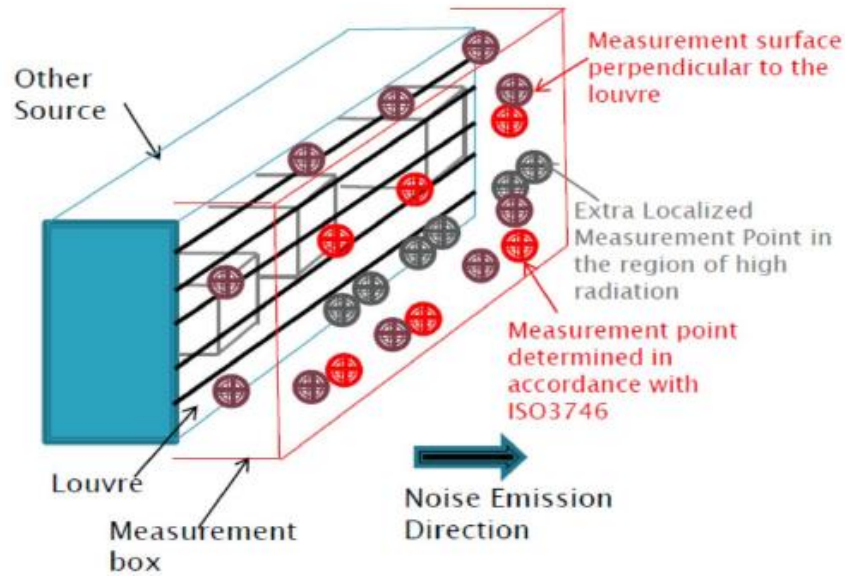
- Please refer to latest edition of ISO3746 for measurement requirement.
- The locations of measurement points are depended on the size of the plant, which cannot be easily generalized (see figure for example)
- Background noise measurement should be obtained for determination of background correction 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 characteristics at representative NSRs.

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

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 louvre.
- 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 characteristics at representative NSRs.

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

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**

---



# MAXLAB

## CALIBRATION CERTIFICATE

<i>Certificate Information</i>		
<b>Date of Issue</b>	7-Nov-2018	<b>Certificate Number</b> MLCN182746S
<i>Customer Information</i>		
<b>Company Name</b>	Wilson Acoustics Limited	
<b>Address</b>	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong	
<i>Equipment-under-Test (EUT)</i>		
<b>Description</b>	Sound & Vibration Analyser	
<b>Manufacturer</b>	Svantek	
<b>Model Number</b>	SVAN 958A	
<b>Serial Number</b>	59120	
<b>Equipment Number</b>	--	
<i>Calibration Particular</i>		
<b>Date of Calibration</b>	7-Nov-2018	
<b>Calibration Equipment</b>	4231(MLTE008) / AV180068 / 13-May-2020	
<b>Calibration Procedure</b>	MLCG00, MLCG15	
<b>Calibration Conditions</b>	Laboratory	Temperature 23 °C ± 5 °C
		Relative Humidity 55% ± 25%
	EUT	Stabilizing Time Over 3 hours
		Warm-up Time 10 minutes
		Power Supply Internal battery
<b>Calibration Results</b>	Calibration data were detailed in the continuation pages.	
<i>Approved By &amp; Date</i>		
		K.O. Lo 7-Nov-2018
<i>Statements</i>		
<ul style="list-style-type: none"> <li>* Calibration equipment used for this calibration are traceable to national / international standards.</li> <li>* 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.</li> <li>* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.</li> <li>* The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited.</li> </ul>		





Certificate No. MLCN182746S

<b>Calibration Data</b>						
<b>Channel / Mode</b>	<b>Filter / Detector</b>	<b>Range</b>	<b>EUT Reading</b>	<b>Standard Reading</b>	<b>EUT Error</b>	<b>Calibration Uncertainty</b>
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
130 dB		114.0 dB	114.0 dB	0.0 dB	0.2 dB	
LIN / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB	
	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB	

- END -

Calibrated By :  
Date :

Dan  
7-Nov-2018

Checked By :  
Date :

K.O. Lo  
7-Nov-2018


Page 2 of 2

萬儀校正中心有限公司  
MaxLab Calibration Centre Limited



# MAXLAB

## CALIBRATION CERTIFICATE

<i>Certificate Information</i>																
<b>Date of Issue</b>	5-Mar-2018															
<b>Certificate Number</b>	MLCN180297S															
<i>Customer Information</i>																
<b>Company Name</b>	Wilson Accoustics Limited															
<b>Address</b>	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong															
<i>Equipment-under-Test (EUT)</i>																
<b>Description</b>	Acoustic Calibrator															
<b>Manufacturer</b>	Svantek															
<b>Model Number</b>	SV 30A															
<b>Serial Number</b>	29088															
<b>Equipment Number</b>	--															
<i>Calibration Particular</i>																
<b>Date of Calibration</b>	5-Mar-2018															
<b>Calibration Equipment</b>	4231(MLTE008) / PA160059 / 20-May-18 1351(MLTE049) / MLEC17/06/02 / 6-Jun-18															
<b>Calibration Procedure</b>	MLCG00, MLCG15															
<b>Calibration Conditions</b>	<table border="1"> <tr> <td>Laboratory</td> <td>Temperature</td> <td>23 °C ± 5 °C</td> </tr> <tr> <td></td> <td>Relative Humidity</td> <td>55% ± 25%</td> </tr> <tr> <td>EUT</td> <td>Stabilizing Time</td> <td>Over 3 hours</td> </tr> <tr> <td></td> <td>Warm-up Time</td> <td>Not applicable</td> </tr> <tr> <td></td> <td>Power Supply</td> <td>Internal battery</td> </tr> </table>	Laboratory	Temperature	23 °C ± 5 °C		Relative Humidity	55% ± 25%	EUT	Stabilizing Time	Over 3 hours		Warm-up Time	Not applicable		Power Supply	Internal battery
Laboratory	Temperature	23 °C ± 5 °C														
	Relative Humidity	55% ± 25%														
EUT	Stabilizing Time	Over 3 hours														
	Warm-up Time	Not applicable														
	Power Supply	Internal battery														
<b>Calibration Results</b>	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.															
<i>Approved By &amp; Date</i>																
	 K.O. Lo <span style="float: right;">5-Mar-2018</span>															
<i>Statements</i>																
<ul style="list-style-type: none"> <li>* Calibration equipment used for this calibration are traceable to national / international standards.</li> <li>* 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.</li> <li>* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.</li> <li>* The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited.</li> </ul>																



# MAXLAB

Certificate No. MLCN180297S

<i>Calibration Data</i>					
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 :  
Date :

Patrick  
5-Mar-18

Checked By :  
Date :

K.O. Lo  
5-Mar-18

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

---

**Appendix B3**

**Photographs showing the Examples of Noise Measurement  
for Fixed Plant Noise**

---

**Appendix B3 Photographs – Noise Measurement for Fixed Plant Noise**



**SWL Measurement for Louver VS-TKW-72**



**SWL Measurement for VS-TKW-73**

---

**Appendix B4**

**Noise Measurement Results**

---

**Appendix B4 Noise Measurement Results**

Fixed Plant Source ID	Plant Type	Method	Louvre Size (mm)		Measurement Distance (m) D <sup>(a)</sup>	Averaged Measured L <sub>Aeq</sub> , dB(A) <sup>(b)</sup>	Background L <sub>Aeq</sub> , dB(A)	Difference L <sub>Aeq</sub> , dB(A)	Background Corrected L <sub>Aeq</sub> , dB(A) <sup>(c)</sup>	Calculated SWL, dB(A)
			Height	Width						
VS-TKW-72	Louvre	2	1000	300	0.5	59.7	55.5	4.2	57.6	65
VS-TKW-73	Louvre	2	1000	300	0.5	57.1	54.0	3.1	54.2	62

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.

---

**Appendix C**

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

---



---

**Appendix C1**  
**Calibration Certificates –**  
**Noise Measurement at Representative NSR**

---



# MAXLAB

## CALIBRATION CERTIFICATE

Certificate Information	
Date of Issue	4-Oct-2018
Certificate Number	MLCN182370S

Customer Information	
Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

Equipment-under-Test (EUT)	
Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958A
Serial Number	59121
Equipment Number	--

Calibration Particular																
Date of Calibration	4-Oct-2018															
Calibration Equipment	4231(MLTE008) / AV180068 / 13-May-2020															
Calibration Procedure	MLCG00, MLCG15															
Calibration Conditions	<table border="1"> <tr> <td>Laboratory</td> <td>Temperature</td> <td>23 °C ± 5 °C</td> </tr> <tr> <td></td> <td>Relative Humidity</td> <td>55% ± 25%</td> </tr> <tr> <td>EUT</td> <td>Stabilizing Time</td> <td>Over 3 hours</td> </tr> <tr> <td></td> <td>Warm-up Time</td> <td>10 minutes</td> </tr> <tr> <td></td> <td>Power Supply</td> <td>Internal battery</td> </tr> </table>	Laboratory	Temperature	23 °C ± 5 °C		Relative Humidity	55% ± 25%	EUT	Stabilizing Time	Over 3 hours		Warm-up Time	10 minutes		Power Supply	Internal battery
Laboratory	Temperature	23 °C ± 5 °C														
	Relative Humidity	55% ± 25%														
EUT	Stabilizing Time	Over 3 hours														
	Warm-up Time	10 minutes														
	Power Supply	Internal battery														
Calibration Results	Calibration data were detailed in the continuation pages.															

Approved By & Date	
	K.O. Lo
	4-Oct-2018

Statements	
<ul style="list-style-type: none"> <li>* Calibration equipment used for this calibration are traceable to national / international standards.</li> <li>* 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.</li> <li>* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.</li> <li>* The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited.</li> </ul>	



# MAXLAB

Certificate No. MLCN182370S

<b>Calibration Data</b>						
<b>Channel / Mode</b>	<b>Filter / Detector</b>	<b>Range</b>	<b>EUT Reading</b>	<b>Standard Reading</b>	<b>EUT Error</b>	<b>Calibration Uncertainty</b>
CH4 / Sound	A / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / FAST (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	LIN / SLOW (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	A / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB
	C / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
130 dB		114.0 dB	114.0 dB	0.0 dB	0.2 dB	
LIN / IMPULSE (1 kHz Input)	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB	
	130 dB	114.0 dB	114.0 dB	0.0 dB	0.2 dB	

- END -

Calibrated By :  
Date :

Dan  
4-Oct-2018

Checked By :  
Date :

K.O. Lo  
4-Oct-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



# MAXLAB

## CALIBRATION CERTIFICATE

### Certificate Information

Date of Issue	18-Mar-2019	Certificate Number	MLCN190639S
---------------	-------------	--------------------	-------------

### Customer Information

Company Name	Wilson Accoustics Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T., Hong Kong

### Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	29088
Equipment Number	--

### Calibration Particular

Date of Calibration	18-Mar-2019		
Calibration Equipment	4231(MLTE008) / AV180068 / 13-May-20 1351(MLTE049) / MLEC18/06/02 / 6-Jun-19		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results exceeded the EUT error limit.		

### Approved By & Date

K.O. Lo	18-Mar-2019
---------	-------------

### Statements

- \* Calibration equipment used for this calibration are traceable to national / international standards.
- \* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
- \* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.
- \* The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited.



# MAXLAB

Certificate No. MLCN190639S

<b>Calibration Data</b>					
<b>EUT Setting</b>		<b>Standard Reading</b>	<b>EUT Error</b>	<b>Calibration Uncertainty</b>	<b>EUT Specification</b>
94	dB	93.5 dB	0.5 dB *	0.15 dB	± 0.3 dB
114	dB	113.6 dB	0.4 dB *	0.15 dB	± 0.3 dB

- END -

Calibrated By :  
Date :

Dan  
18-Mar-19

Checked By :  
Date :

K.O. Lo  
18-Mar-19

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., Baldwin 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 C2**

**Photographs – Noise Measurement at Representative NSR**

---

Appendix C2 Photographs – Noise Measurement at Representative NSR



NSR Measurement Location at Great Wall Building

---

**Appendix C3**

**Measurement Results at Measurement Location**

---



### Appendix C3 Noise Measurement Results at Representative NSRs

Measurement Location ID	Measurement Date	Fixed Plant Noise		Background Noise		Difference, dB(A)
		Measurement Time	Measured Noise Level, $L_{Aeq\ 30mins}$ dB(A)	Measurement Time	Background Level, $L_{Aeq\ 5mins}$ dB(A)	
TKA-FN1	4/9/2019	03:25-03:55	62.8	02:51-02:56	62.5	0.3