MTR Corporation Limited
香港鐵路有限公司
www.mtr.com.hk

EIAO Register Office
Environmental Protection Department
27/F, Southorn Centre,
130 Hennessy Road,
Wan Chai, Hong Kong

Your ref :

Our ref: C912A-COR-ENVM-ENV-013676

Attn: Mr. Richard Wong

21 July, 2016

BY HAND

Dear Mr. Wong,

South Island Line (East)
Condition 2.30 of Environmental Permit No. EP-407/2010/E
Operational Air-borne Noise Performance Test Report

As per Condition 2.30 of the captioned EP, please find enclosed herewith four hard copies and one electronic copy of the Operational air-borne noise performance test report to confirm the compliance of the operational air-borne levels in accordance with the approved EIA report for deposit with EPD.

With reference to the submission of operational ground-borne noise performance test report submitted on 12 April, 2016, Condition 2.30 of the captioned EP is fulfilled.

Should you have any queries, please feel free to contact our Environmental Engineer, Mr MK Cheung, at tel. no. 2206 8628.

Yours sincerely,

Richard Kwan
Environment Manager

Encls.

c.c. Ove Arup & Partners HK Ltd. - Attn: Sam Tsoi (by fax: 2268-3950)

RK/MKC/ZY/bl

MTR Headquarters Building, Telford Plaza, Kowloon Bay,
Kowloon, Hong Kong. GPO Box 9916, Hong Kong
Tel (852) 2993 2111 Fax (852) 2798 8822

香港九龍灣德福廣場港鐵總部大樓
香港郵政總局信箱9916號
電話 (852) 2993 2111 傳真 (852) 2798 8822

Direct Tel: 2688-1283
Direct Fax: 2993-7577

b.c.c.	GM-SIL Civil	-	Ken Wong
	SCONE-SIL Civil	-	Thomas Li

Direct Tel: 2688-1283
Direct Fax: 2993-7577

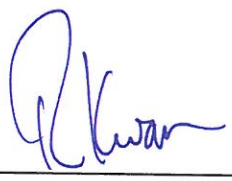
MTR Corporation Limited

South Island Line (East)

Operational Airborne Noise Performance Test Report

July 2016

Certified by:



Richard Kwan

Environmental Team Leader

Date: 21 July, 2016

MTR Corporation Limited

South Island Line (East)

Operational Airborne Noise Performance Test Report

July 2016

Verified by:

Sam Tsoi

Independent Environmental Checker

Date:

21.7.2016

REPORT

MTR Corporation Limited

MTR South Island Line (East) – Operational Air-borne Noise Performance Test

Noise Performance Test Report for Southern Loop and Northern Loop

June 2016

Environmental Resources Management
16/F Berkshire House
25 Westlands Road
Quarry Bay,
Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660
E-mail: post.hk@erm.com
http://www.erm.com

REPORT

MTR Corporation Limited

MTR South Island Line (East) – Operational Air-borne Noise Performance Test

Noise Performance Test Report for Southern Loop and Northern Loop

June 2016
Reference 0199368

For and on behalf of
ERM-Hong Kong, Limited

Approved by: Frank Wan

Signed:

Position: Partner

Date: 23 June 2016

CONTENTS

LIST OF ANNEXES

1 INTRODUCTION

1.1 BACKGROUND

Following the approval of the South Island Line (East) (SIL(E)) Environmental Impact Assessment (EIA) Report [1] on 26 October 2010, an Environmental Permit (EP-407/2010) was granted for the SIL(E) on 8 December 2010 and further amendments to the EP were approved in December 2011, December 2012, April 2013, November 2013 and August 2014. The construction of SIL(E) (hereafter referred to as the Project) is now progressing under various works contracts led by the MTR Corporation Limited (MTRCL).

In accordance with Condition 2.30 of the EP, "*At least one month before commencement of operation of the Project, the Permit Holder shall carry out noise performance test and deposit with the Director four hard copies and one electronic copy of a Noise Performance Test Report to confirm the compliance of the operational air-borne and ground-noise levels in accordance with the approved EIA Report. Before submission to the Director, the Noise Performance Test Report shall be certified by the ET Leader and verified by the IEC as conforming to the information and recommendations contained in the approved EIA Report. Any necessary measure(s) as recommended in the Noise Performance Test Report shall be fully and properly implemented.*"

ERM-Hong Kong, Limited (ERM) was commissioned by MTRCL to carry out the operational air-borne noise performance test. ERM was supported by Wilson Acoustics Limited (WAL) who acts as the railway noise specialist.

1.2 PURPOSE OF THIS REPORT

According to the submitted *MTR SIL(E) Air-borne Noise Performance Test Measurement Methodology* (dated October 2015) (see *Annex E*), operational air-borne noise performance tests for railway noise are proposed to be conducted at 22 nos. of representative Noise Sensitive Receivers (NSR). In accordance with the previous construction work progress, the noise performance tests for section between Wong Chuk Hang Station (WCH) and South Horizons Station (SOH), hereafter referred as the Southern Loop, were conducted in late 2015, while the tests for the section between Admiralty Station (ADM) and WCH (the Northern Loop) were conducted in mid of 2016. This report presents the results of the operational air-borne noise performance tests for both the Southern Loop and the Northern Loop.

[1] South Island Line (East) Environmental Impact Assessment Report (Register No.: AEIAR-155/2010) (SIL(E) EIA Report)

2 NOISE CRITERIA

In accordance with Annex 5 of the *Technical Memorandum on Environmental Impact Assessment Process* (*EIAO-TM*), the operational air-borne noise from railway shall be within the acceptable noise level (ANL) given in the *Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites* (*IND-TM*) issued under the *Noise Control Ordinance* (*NCO*). The ANL is determined from *Table 2.1*, having regard to the appropriate Area Sensitivity Rating (ASR) and the time period.

In addition, railway noise shall comply with L_{max} 85dB(A) at NSR during night time (2300 to 0700 hrs) as stipulated in Annex 5 of the *EIAO-TM*.

Table 2.1 Acceptable Noise Levels (ANLs), in dB(A)

Time Period	**Area Sensitivity Rating (ASR)**		
	A	**B**	**C**
Day-time (0700 to 1900 hrs) & Evening (1900 to 2300 hrs)	60	65	70
Night-time (2300 to 0700 hrs)	50	55	60

3 TESTING CONDITIONS

3.1 NOISE MITIGATION MEASURES

To mitigate the operational air-borne noise from the viaduct section, noise mitigation measures was proposed in Section 3.5.1.1 of the approved SIL(E) EIA report. Enhancement of the noise mitigation measures along the viaduct section was proposed to further alleviate the railway noise impact on the concerned local parties and the corresponding variation of Environmental Permit (VEP) (Application no.: VEP-419/2013) was approved on 15 November 2013.

Further enhancement of the noise mitigation measures is proposed by MTRCL. The semi-enclosures originally proposed at Chainage 14830 – 14870 and 14970 – 15010 have been upgraded to full enclosure. Due to the fact that the noise mitigation measures have been enhanced, the airborne operational noise impact is expected to be the same or reduced comparing with that presented in the approved SIL(E) EIA Report and the subsequent VEP application supporting documents.

The noise mitigation measures for SIL(E) as recommended in the approved EIA Report, the subsequent VEP application supporting documents and the above-mentioned enhancement had been fully and properly implemented (See *Annex A*) before the operational air-borne noise performance test was conducted.

3.2 TESTING LOCATIONS

Table 3.1 presents the 22 nos. of representative NSRs selected for the operational air-borne noise performance test, including 13 and 9 NSRs for the Southern Loop and Northern Loop, respectively. Locations of the representative NSRs are shown in *Annex A*.

Table 3.1 Representative NSRs for Operational Air-borne Performance Test for SIL(E)

Northern/ Southern Loop	NSR ID	Description	Use	ASR	Assessment Period		
					Day-time	Evening	Night-time
Northern Loop	BC	Beaconsfield Court	Residential	C	✓	✓	✓
	SW4	Wong Chuk Hang San Wai	Residential	C	✓	✓	✓
	YSM1	TWGHs Yeung Shing Memorial Long Stay Care Home	Convalescent Home	C	✓	✓	✓
	WCHH2	Wong Chuk Hang Hospital Staff Quarter	Residential	C	✓	✓	✓
	OCP2	OCP G/IC Zone	G/IC (Planned)	C	✓	✓	✓

Northern/ Southern Loop	NSR ID	Description	Use	ASR	Assessment Period		
					Day-time	Evening	Night-time
	OCP3	OCP G/IC Zone	G/IC (Planned)	B	✓	✓	✓
	PC3	Police College – Barrack Block J	Residential	B	✓	✓	✓
	PC4	Police College – Barrack Block J	Residential	B	✓	✓	✓
	WCH1	WCH Residential Zone	Residential (Planned)	B	✓	✓	✓
Southern Loop	WCH2	WCH Residential Zone	Residential (Planned)	B	✓	✓	✓
	TWY	Tai Wong Ye Temple	Place of Worship	B	✓	-	-
	SMH1	Little Sisters of the Poor St. Mary's Home for the Aged	Home for the Elderly	B	✓	✓	✓
	TWGH1	TWGHs Jockey Club Rehabilitation Complex Block A	Convalescent Home	B	✓	✓	✓
	TWGH2	TWGHs Jockey Club Rehabilitation Complex Block D	Convalescent Home	B	✓	✓	✓
	HSS3	Holy Spirit Seminary – Chapel	Place of Worship	B	✓	✓	-
	HSS2	Holy Spirit Seminary	Educational	B	✓	✓	-
	HSS1	Holy Spirit Seminary	Educational	C	✓	✓	-
	HSS4	Holy Spirit Seminary	Educational	C	✓	✓	-
	OC1	Ocean Court – Tower 3	Residential	C	✓	✓	✓
	OC2	Ocean Court – Tower 3	Residential	C	✓	✓	✓
	SWT3	Sham Wan Towers – Tower 3	Residential	C	✓	✓	✓
	SWT2	Sham Wan Towers – Tower 3	Residential	C	✓	✓	✓

Note:

(a) In any event, the ASR assumed in this report are only indicative and they are used for assessment only. It should be noted that rail noise is controlled under section 13 of the *NCO*. Therefore, the Noise Control Authority shall determine rail noise impact on the basis of prevailing legislation and practices being in force, and taking account of contemporary conditions / situations of adjoining land uses. The assessment of rail noise in this report shall not bind the Noise Control Authority in the context of law enforcement against any of the rail noise being assessed.

3.3 TRAIN OPERATION PARAMETERS

The operation parameters for future operation and for the noise performance tests, including train configuration, train frequency, and train speed, are the same as those presented in Section 3.5.1.1 of the approved SIL(E) EIA report.

4 TESTING ARRANGEMENT

4.1 MEASUREMENT SCHEDULE

In accordance with the submitted *MTR SIL(E) Air-borne Noise Performance Test Measurement Methodology,* the noise performance tests were conducted at Sunday nights to minimise as far as practicable the influence of background noise and any extraneous noise that may affect the test results. Reference was made to "*The Annual Traffic Census 2014*" prepared by the Transport Department for the road traffic data along the nearby main roads (see *Annex D).*

The noise performance tests for the Southern Loop were conducted from 8 November (Sunday) to 9 November 2015 (Monday) and from 27 December (Sunday) to 28 December 2015 (Monday). The tests for Northern Loop were conducted from 15 May (Sunday) to 16 May 2016 (Monday), from 22 May (Sunday) to 23 May 2016 (Monday) and from 12 June (Sunday) to 13 June 2016 (Monday). The measurement schedule is shown in *Table 4.1.* Photos showing the measurement setup are shown in *Annex B.*

Table 4.1 Measurement Schedule

Date and Time	Measurement Locations
Southern Loop	
From 2300 hr, 8 Nov 2015 (Sun) to 0055 hr, 9 Nov 2015 (Mon)	HSS3, HSS2, HSS1, HSS4, OC1, OC2, SWT3 and SWT2 (8 NSRs)
From 2200 hr, 27 Dec 2015 (Sun) to 0045 hr, 28 Dec 2015 (Mon)	WCH2, TWY, SMH1, TWGH1 and TWGH2 (5 NSRs)
Northern Loop	
From 2130 hr, 15 May 2016 (Sun) To 0045 hr, 16 May 2016 (Mon)	BC, SW4, OCP2, PC4 and PC3 (5 NSRs)
From 2130 hr, 22 May 2016 (Sun) to 0045 hr, 23 May 2016 (Mon)	YSM1 and WCHH2 (2 NSRs)
From 2130 hr, 12 Jun 2016 (Sun) to 0045 hr, 13 Jun 2016 (Mon)	OCP3 and WCH1 (2 NSRs)

4.2 TEST TRAIN ARRANGEMENT

3–car S-Stock trains were arranged for the noise performance test. The test trains were running at normal operational speed in Fully Automatic Operation (FAO) mode with air-conditioning units manually set at full load, i.e. maximum power corresponding to cooling and ventilation capacity for crush loading. During the noise performance tests for the Southern Loop, the test trains were running between Wong Chuk Hang (WCH) and South Horizons (SOH) via Lei Tung (LET). During the tests for the Northern Loop, the test trains were running along the entire SIL(E) between Admiralty (ADM) and SOH via Ocean Park (OCP), WCH and LET. Up track (UT) refers to the line on which the trains running in the direction from ADM towards SOH.

Down track (DT) refers to the line on which trains running in the direction from SOH towards ADM.

4.3 MEASUREMENT INSTRUMENT

In accordance with the *IND-TM*, the sound level meters and microphones used for the performance tests complied with the International Electrotechnical Commission (IEC) Publications 60651 (Type 1) and 60804 (Type 1). Measurement instrument is listed in *Table 4.2* with their calibration certificates given in *Annex F*.

Table 4.2 Measurement Instrument

Instrument	Model No.	Quantity
4-channel Sound Analyser	Svantek SVAN 958 (Serial No. 14210, 28422 & 34507)	2
1-channel Sound Analyser	Svantek SVAN 959 (Serial No. 11228)	1
1-channel Sound Analyser	Svantek SVAN 955 (Serial No. 15234)	1
1-channel Sound Analyser	Brüel & Kjær Type 2250L (Serial No. 2828706 & 3003992 & 3004555)	3
Microphone	PCB 377B02	4
Microphone	G.R.A.S Type 40AE	2
Microphone	Brüel & Kjær Type 4950	3
Microphone Preamplifier	PCB 426E01	4
Microphone Preamplifier	Svantek SV12L	2
Microphone Preamplifier	Brüel & Kjær ZC-0032	3
Acoustic Calibrator	Larson Davis CAL200 (Serial No. 10478)	1
Acoustic Calibrator	Svantek SV30A (Serial No. 10814 & 29088)	2
Acoustic Calibrator	Svantek SV35 (Serial No. 44797)	1

Immediately prior to and following each noise measurement the accuracy of sound level meters was checked using an acoustic calibrator. The deviations of calibration levels before and after the measurements at all measurement locations were not more than 1.0 dB, which complied with the requirement set out in the *IND-TM*.

5 ASSESSMENT METHODOLOGY

5.1 SITE VISIT AND LIAISON WITH PREMISES MANAGEMENT

Through site visit and liaison with management officer of the premises, representative and accessible measurement locations at the NSRs were identified.

5.2 NOISE MEASUREMENT AT NSRS

Measurements were conducted at the representative NSRs with the test trains running at normal operation speed. The actual speed of the test trains near the measurement locations should not be deviated from the target train speed by more than 10%. Train speed of each train event is extracted from the record of the test trains which is provided by MTRCL.

No less than 5 passbys were measured for UT and DT respectively. At each NSR, L_{max} and L_{eq} were logged continuously in one second (1s) interval in A-weighting and fast response.

5.3 TRAIN PASSBY NOISE DATA

Based on the recorded train passby time with audible noise at each NSR, the train passby noise data were extracted for further analysis.

5.4 BACKGROUND NOISE EVALUATION

Measurements were conducted during late night time periods with relatively low background noise. Passby noise that was affected by extraneous noise (e.g. road traffic) was disregarded in the analysis.

Background noise levels for at least 60 seconds were extracted for the evaluation of background noise level $L_{eq,BG}$ of each passby event. To avoid head-tail effect of train passby from affecting the background noise measurement, measurement data of at least 30 seconds ahead of each passby were adopted.

5.5 BACKGROUND-CORRECTED NOISE

The background-corrected event noise level for each event is calculated by the equation shown below:

$$L_{eq,event} = 10 \log\left(10^{L_{eq,raw}/10} - 10^{L_{eq,BG}/10}\right)$$

where $L_{eq,raw}$ is the measured event noise level during train passby with audible noise;

$L_{eq,BG}$ is the background noise level; and

$L_{eq,event}$ is the background-corrected event noise level.

5.6 SOUND EXPOSURE LEVEL (SEL) AND $L_{eq,30MIN}$ CALCULATION

According to the train operation headway during the worst case 30-minute operation, the Sound Exposure Level (SEL) arising from UT and DT train operation in 30 minutes are determined by the following equations:

$$(SEL)_{UT} = Average\ SEL_{event,UT} + 10\log(N_{UT})$$

$$(SEL)_{DT} = Average\ SEL_{event,DT} + 10\log(N_{DT})$$

where N is number of passbys in 30 minutes, and subscripts UT and DT denote Up Track and Down Track, respectively.

Averaged noise level in 30 minutes, $L_{eq,30min}$ is calculated by:

$$L_{eq,30min} = 10\log\left(10^{(SEL)_{UT}/10} + 10^{(SEL)_{DT}/10}\right) - 10\log(1800)$$

5.7 FAÇADE CORRECTION

Measurements at 18 NSRs, out of the total of 22 representative NSRs, were conducted at 1 m from building façade. Façade correction is therefore not required. The noise levels of the remaining 4 NSRs, OCP2, OCP3, WCH1 and WCH2 (planned NSRs), were measured under free-field condition. A correction factor of +2.5 dB(A) for façade reflection is therefore applied to the measured noise level for this NSR in accordance with Section 3.5.1.1 of the approved SIL(E) EIA report.

Free-field measurement at TWGH2 originally proposed in the submitted *MTR SIL(E) Air-borne Noise Performance Test Measurement Methodology* (See *Annex E*) has been replaced by measurement at 1m from building façade to improve the accuracy of the assessment.

5.8 PROJECTION TO WORST AFFECTED FLOOR

Among the 22 representative NSRs, measurements were conducted at the worst affected floors at 18 representative NSRs. For the remaining 4 NSRs, measurements were conducted at the nearest accessible floors/levels, due to the difficulties in conducting measurement at the level of worst affected floor (approximately +60mPD) for WCH1 (a planned NSR) and permission cannot be obtained to access the worst affected floors of HSS4, SWT3 and SWT2. In order to project the railway noise at worst affected floors for comparison with the statutory requirements, distance corrections were applied to the measured noise levels in accordance with the prediction methodology adopted in the approved SIL(E) EIA Report. The corrections applied are summarised in *Table 5.1*.

Table 5.1 Distance Corrections Applied for Projection to the Worst Affected Floors

NSR ID	Measurement Floor	Worst Affected Floors Identified in the Approved SIL(E) Report	Correction Factor [a]
WCH1	At approximate height of 1/F of planned NSR	7/F-12/F	+1dB(A)
HSS4	1/F	3/F	+2dB(A)
SWT3	Refuge Floor	5/F-11/F	+1dB(A)
SWT2	Refuge Floor	1/F	+2dB(A)

Note:

(a) The correction factor is based on EIA predicted noise level difference between the measurement floor and the worst affected floor.

6 ASSESSMENT RESULTS

Noise levels at all 22 representative NSRs complied with the *NCO* criteria during all assessment periods. The assessment results are summarised in *Table 6.1*. Detailed calculations are provided in *Annex C*.

Table 6.1 Assessment Results of Air-borne Noise Performance Test for SIL(E)

NSR ID	NSR Description	ASR	Predicted Noise Level / Noise Criteria during Specified Assessment Period, dB(A)			Compliance of Noise Criteria
			$L_{eq,30min}$		L_{max}	
			Day-time and Evening	Night-time	Night-time	
BC	Beaconsfield Court	C	53 / 70	50 / 60	67 / 85	Yes
SW4	Wong Chuk Hang San Wai	C	55 / 70	52 / 60	67 / 85	Yes
YSM1	TWGHs Yeung Shing Memorial Long Stay Care Home	C	62 / 70	59 / 60	73 / 85	Yes
WCHH2	Wong Chuk Hang Hospital Staff Quarter	C	56 / 70	53 / 60	70 / 85	Yes
OCP2	OCP G/IC Zone	C	63 / 70	60 / 60	80 / 85	Yes
OCP3	OCP G/IC Zone	B	57 / 65	54 / 55	65 / 85	Yes
PC4	Police College – Barrack Block J	B	53 / 65	50 / 55	63 / 85	Yes
PC3	Police College – Barrack Block J	B	51 / 65	49 / 55	65 / 85	Yes
WCH1	WCH Residential Zone	B	58 / 65	55 / 55	72 / 85	Yes
WCH2	WCH Residential Zone	B	54 / 65	51 / 55	66 / 85	Yes
TWY	Tai Wong Ye Temple	B	56 / 65	-	-	Yes
SMH1	Little Sisters of the Poor St. Mary's Home for the Aged	B	50 / 65	47 / 55	63 / 85	Yes
TWGH1	TWGHs Jockey Club Rehabilitation Complex Block A	B	51 / 65	48 / 55	69 / 85	Yes
TWGH2	TWGHs Jockey Club Rehabilitation Complex Block D	B	54 / 65	51 / 55	69 / 85	Yes
HSS3	Holy Spirit Seminary – Chapel	B	57 / 65	-	-	Yes
HSS2	Holy Spirit Seminary	B	60 / 65	-	-	Yes

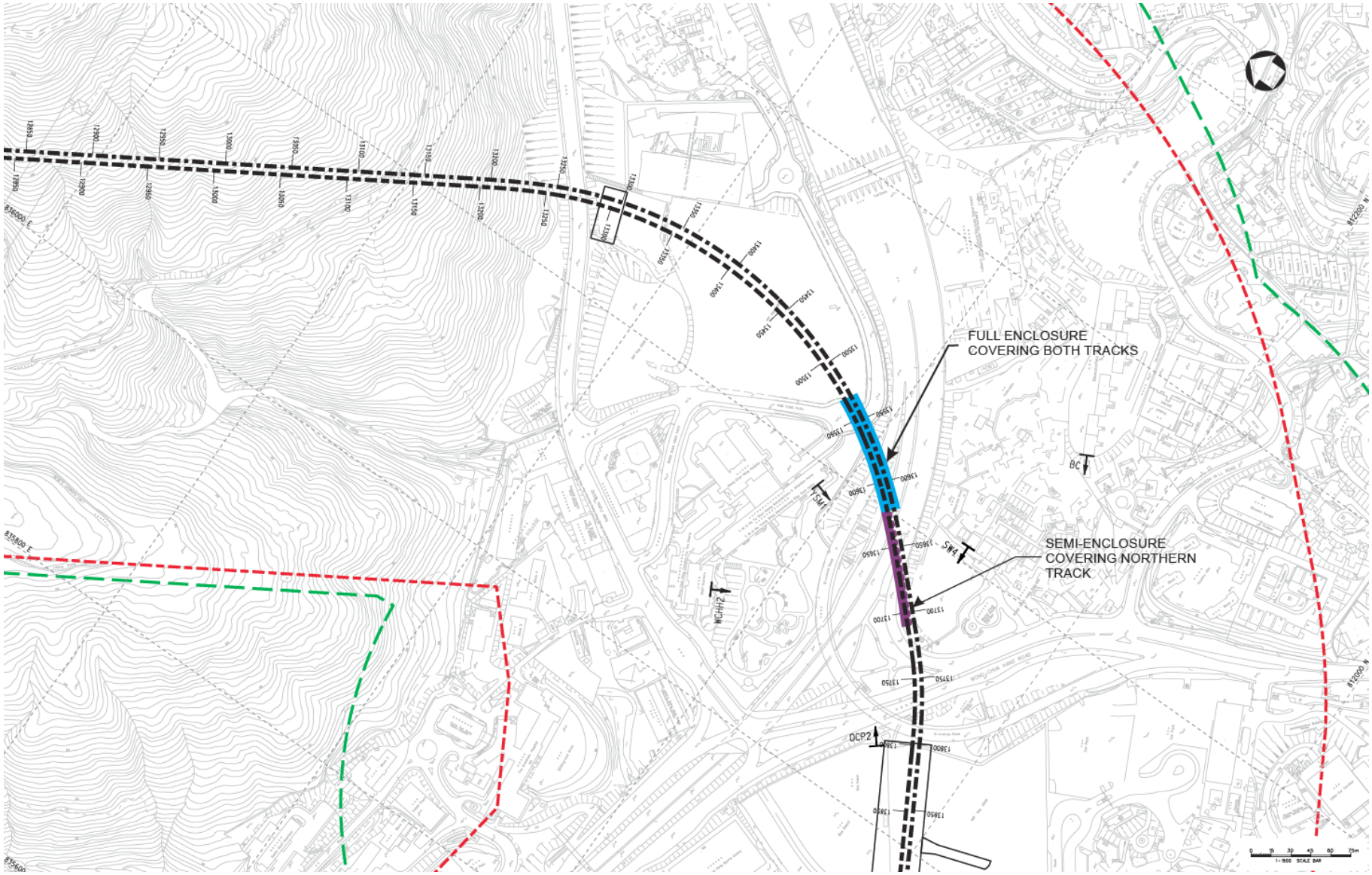
NSR ID	NSR Description	ASR	Predicted Noise Level / Noise Criteria during Specified Assessment Period, dB(A)			Compliance of Noise Criteria
			$L_{eq,30min}$		L_{max}	
			Day-time and Evening	Night-time	Night-time	
HSS1	Holy Spirit Seminary	C	60 / 70	-	-	Yes
HSS4	Holy Spirit Seminary	C	52 / 70	-	-	Yes
OC1	Ocean Court – Tower 3	C	61 / 70	58 / 60	70 / 85	Yes
OC2	Ocean Court – Tower 3	C	59 / 70	56 / 60	69 / 85	Yes
SWT3	Sham Wan Towers – Tower 3	C	59 / 70	56 / 60	71 / 85	Yes
SWT2	Sham Wan Towers – Tower 3	C	59 / 70	57 / 60	71 / 85	Yes

7 CONCLUSION

Operational air-borne noise performance tests of SIL(E) were conducted at 22 nos. of representative NSRs at five Sunday nights from 8 to 9 November 2015, from 27 to 28 December 2015, from 15 to 16 May 2016, from 22 to 23 May 2016 and from 12 to 13 June 2016. The assessment results show that the railway noise levels at all 22 representative NSRs complied with the noise criteria as per the *EIAO* and *NCO*. Based on the findings of the operational air-borne noise performance tests, further measures are considered not necessary for SIL(E).

Annex A

Locations of NSRs



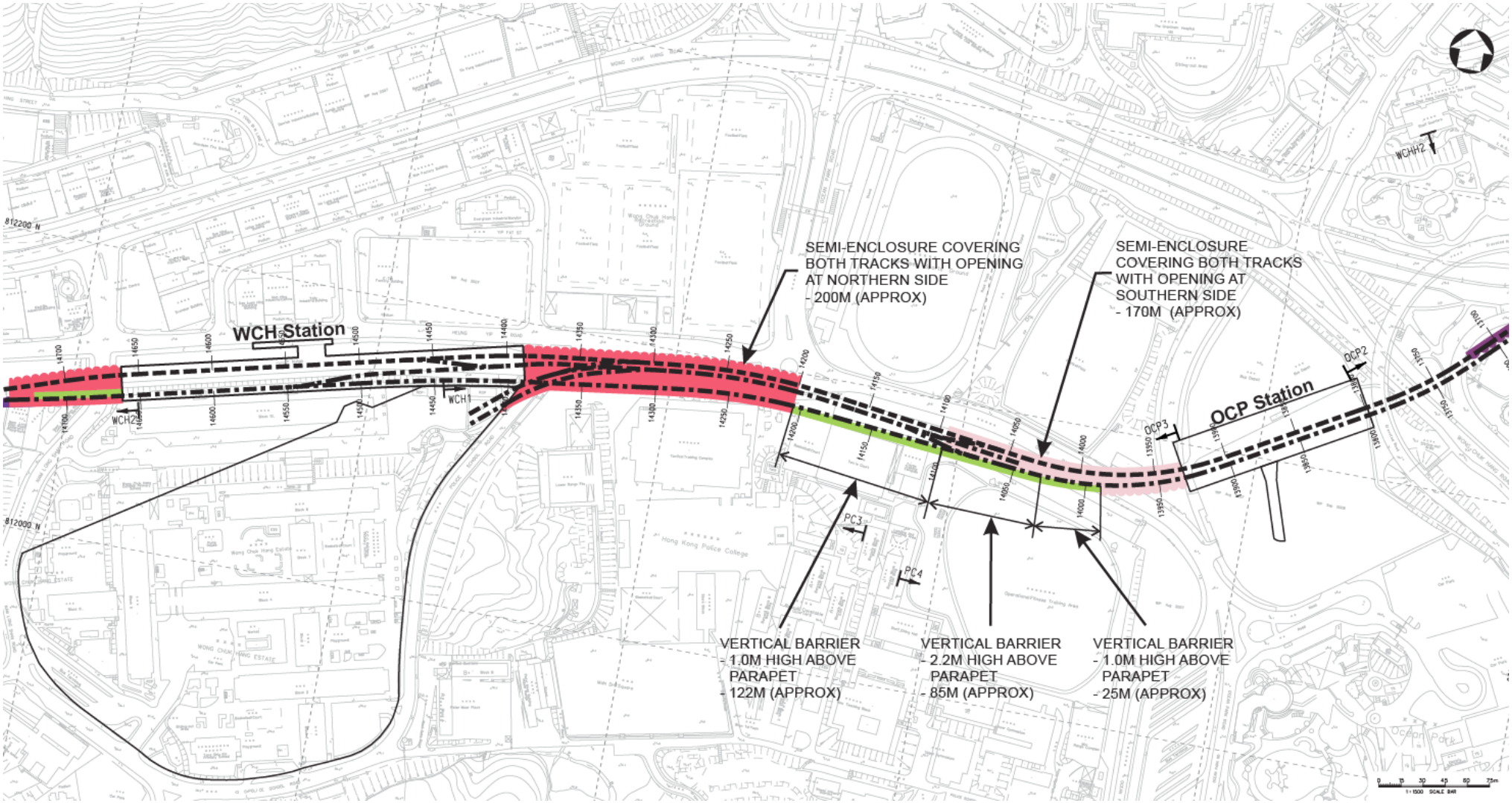
Annex A1

Locations of NSRs from Nam Fung Portal to Ocean Park (OCP) Station

DATE: 22/06/2016

Environmental Resources Management

ERM



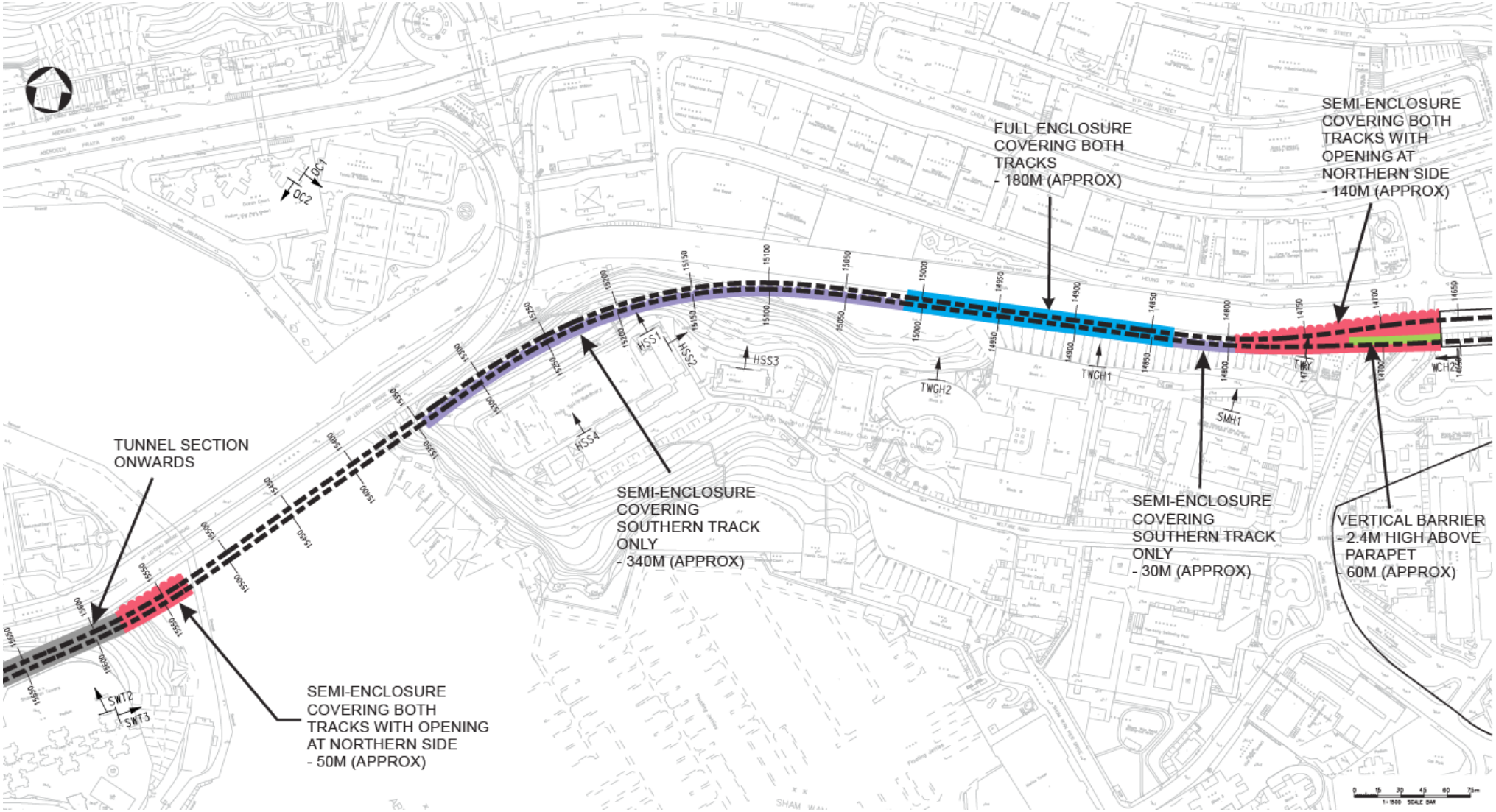
Annex A2

Locations of NSRs from OCP to Wong Chuk Hang (WCH)

DATE: 22/06/2016

Environmental Resources Management

ERM



Annex A3

Locations of NSRs from WCH to Aberdeen Channel Bridge

DATE: 22/06/2016

Environmental Resources Management

ERM

Annex B

Photographs of Measurement Setup

Photo B.1 Measurement Setup at BC (Beaconsfield Court) at Block H Roof Top

Photo B.2 Measurement Setup at SW4 (Wong Chuk Hang San Wai)

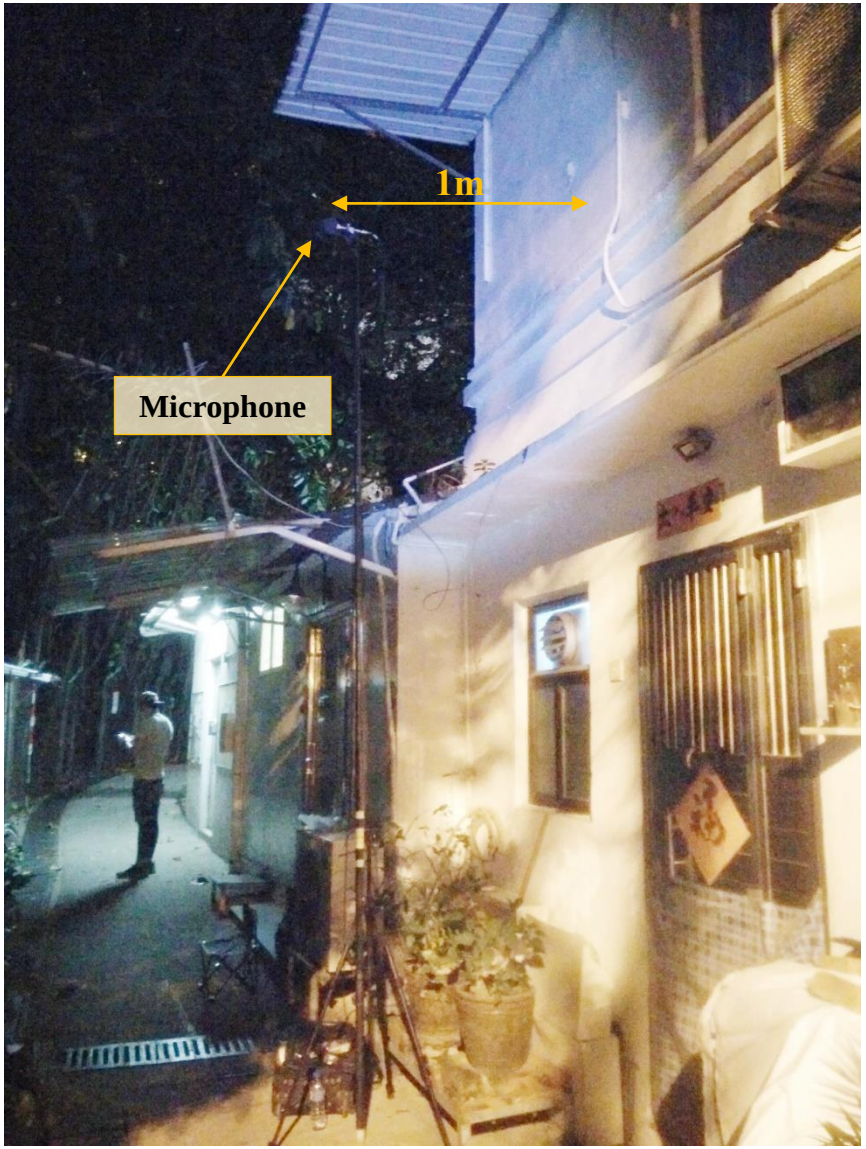


Photo B.3 Measurement Setup at YSM1 (TWGHs Yeung Shing Memorial Long Stay Care Home) at Roof Top

Photo B.4 Measurement Setup at WCHH2 (Wong Chuk Hang Hospital Staff Quarter) at Roof Top

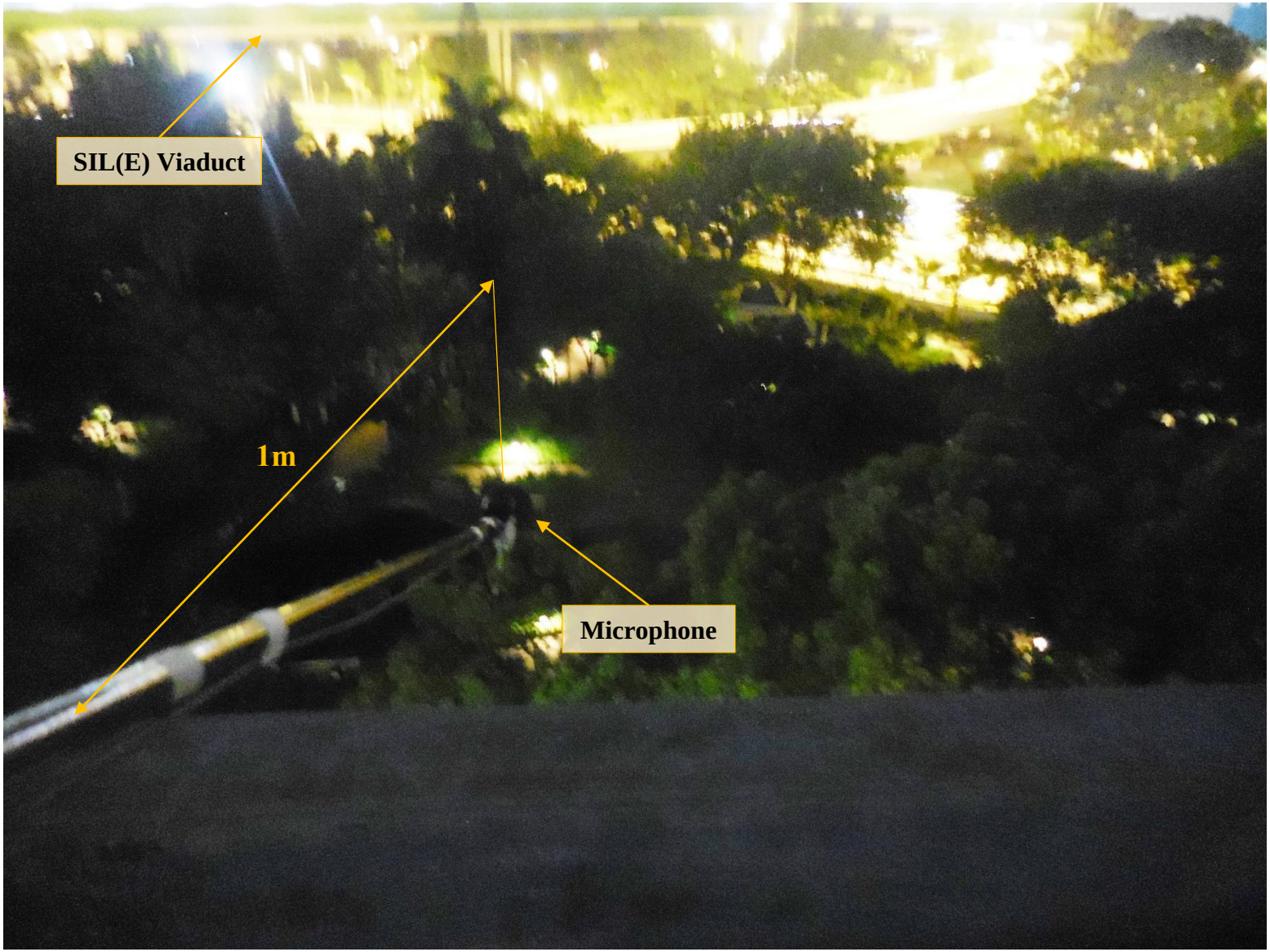


Photo B.5 Measurement Setup at OCP2 (Planned OCP G/IC Zone)

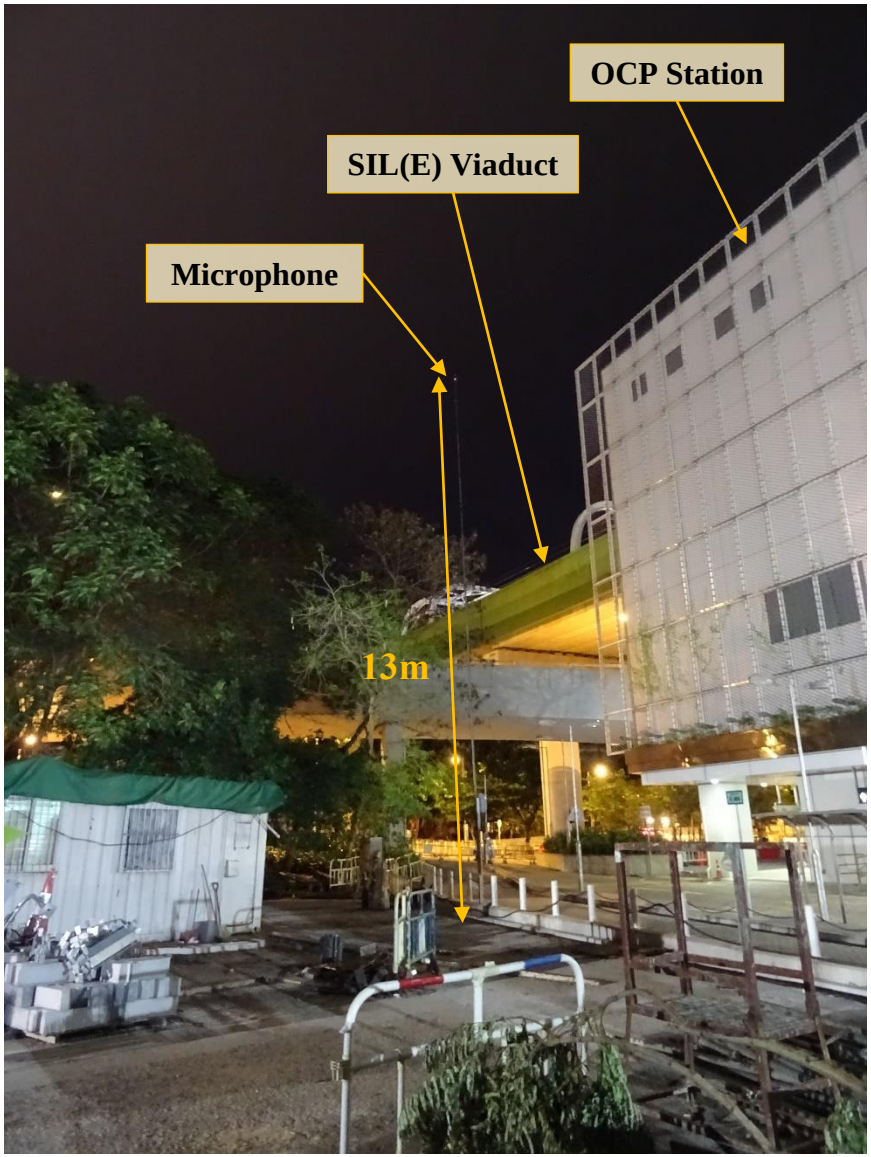


Photo B.6 Measurement Setup at OCP3 (Planned OCP G/IC Zone)

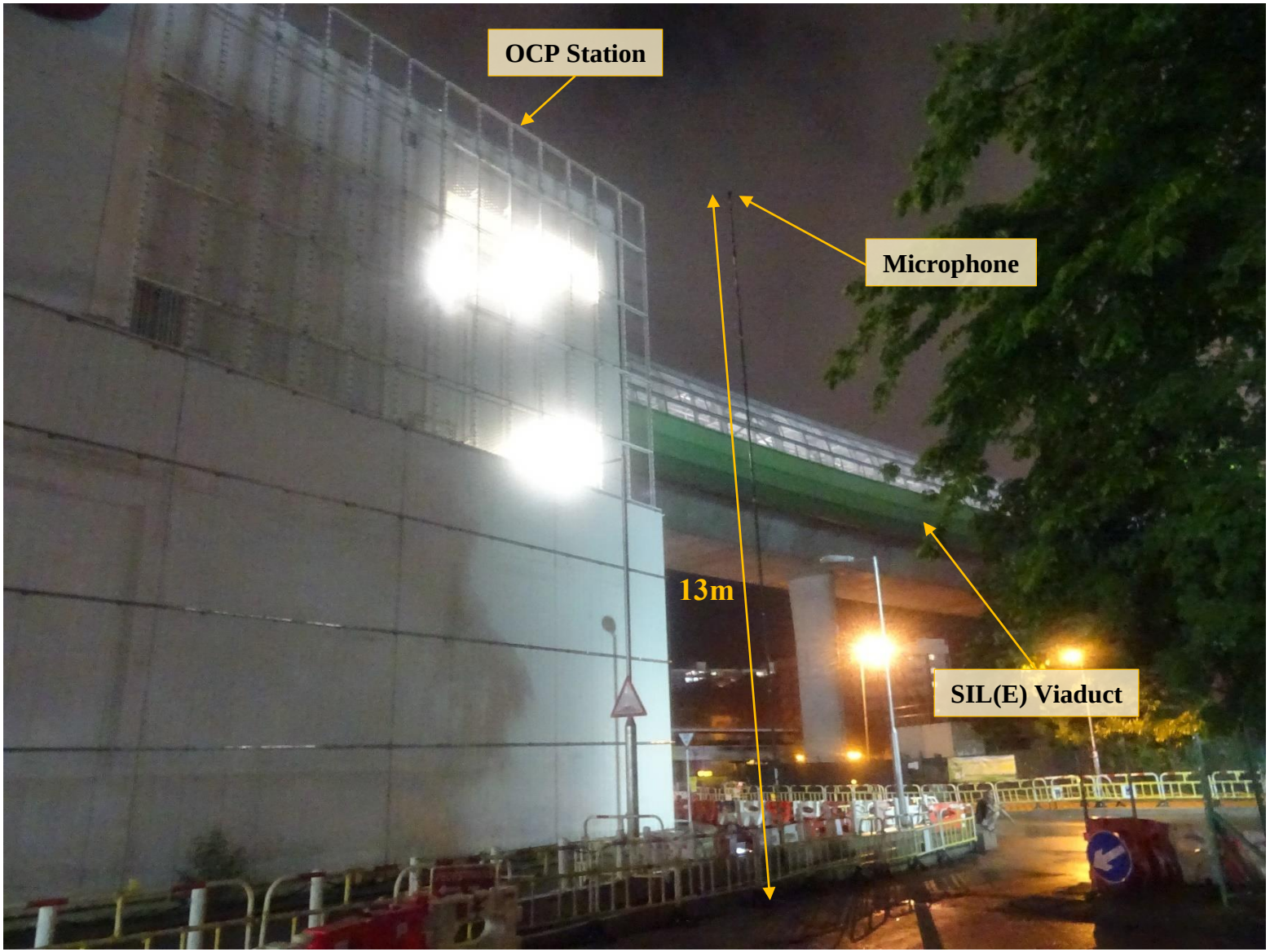


Photo B.7 Measurement Setup at PC4 (Police College – Barrack Block J) at Roof Top

Photo B.8 Measurement Setup at PC3 (Police College – Barrack Block J) at Roof Top

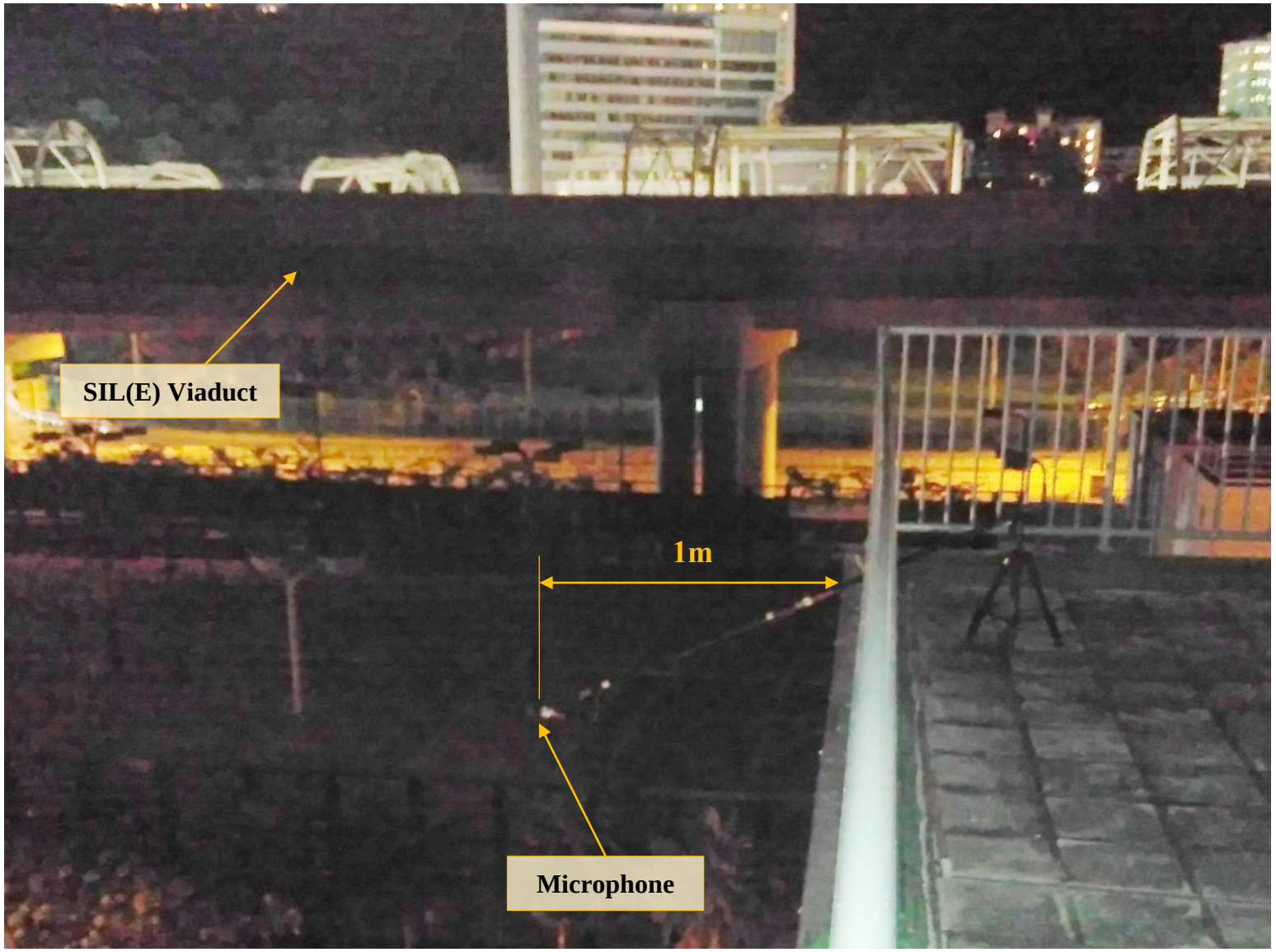


Photo B.9 Measurement Setup at WCH1 (Planned WCH Residential Zone) at WCH Station Roof Top

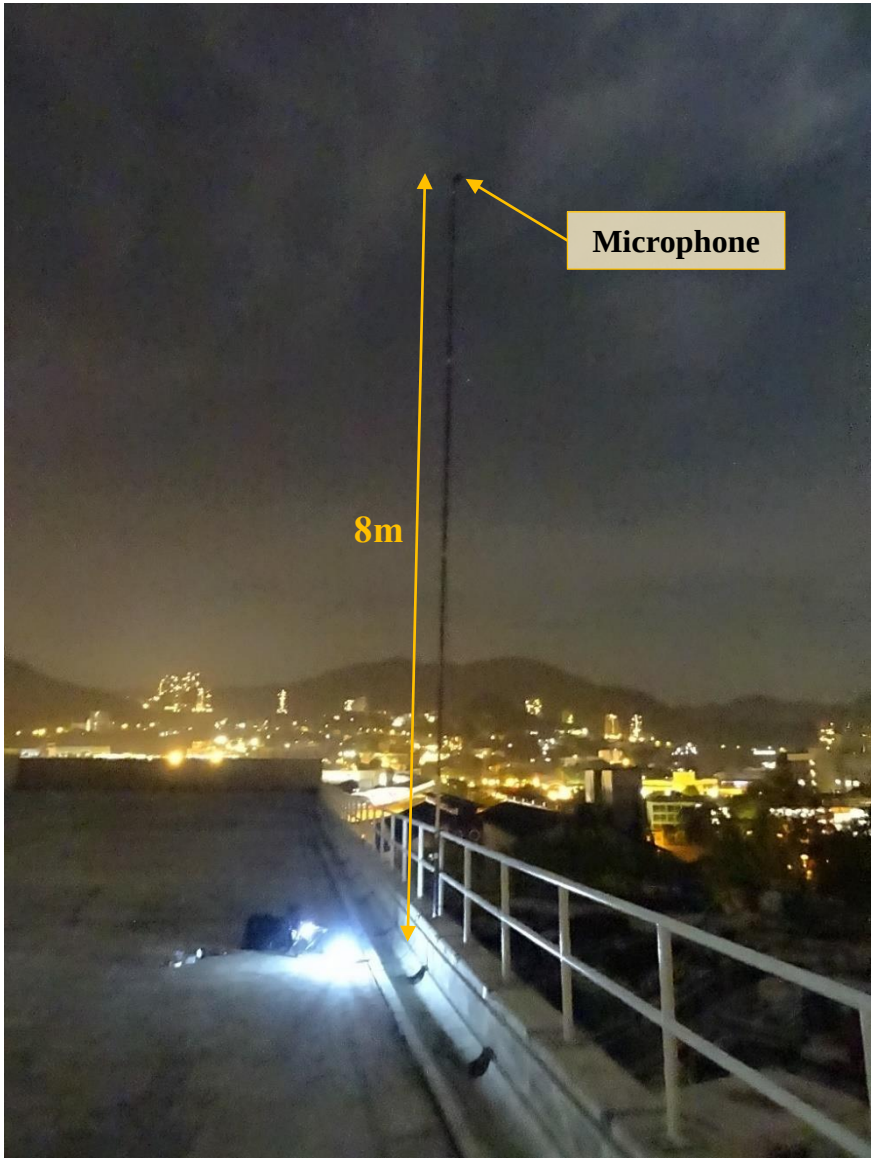


Photo B.10 Measurement Setup at WCH2 (Planned WCH Residential Zone) at WCH Station Roof Top

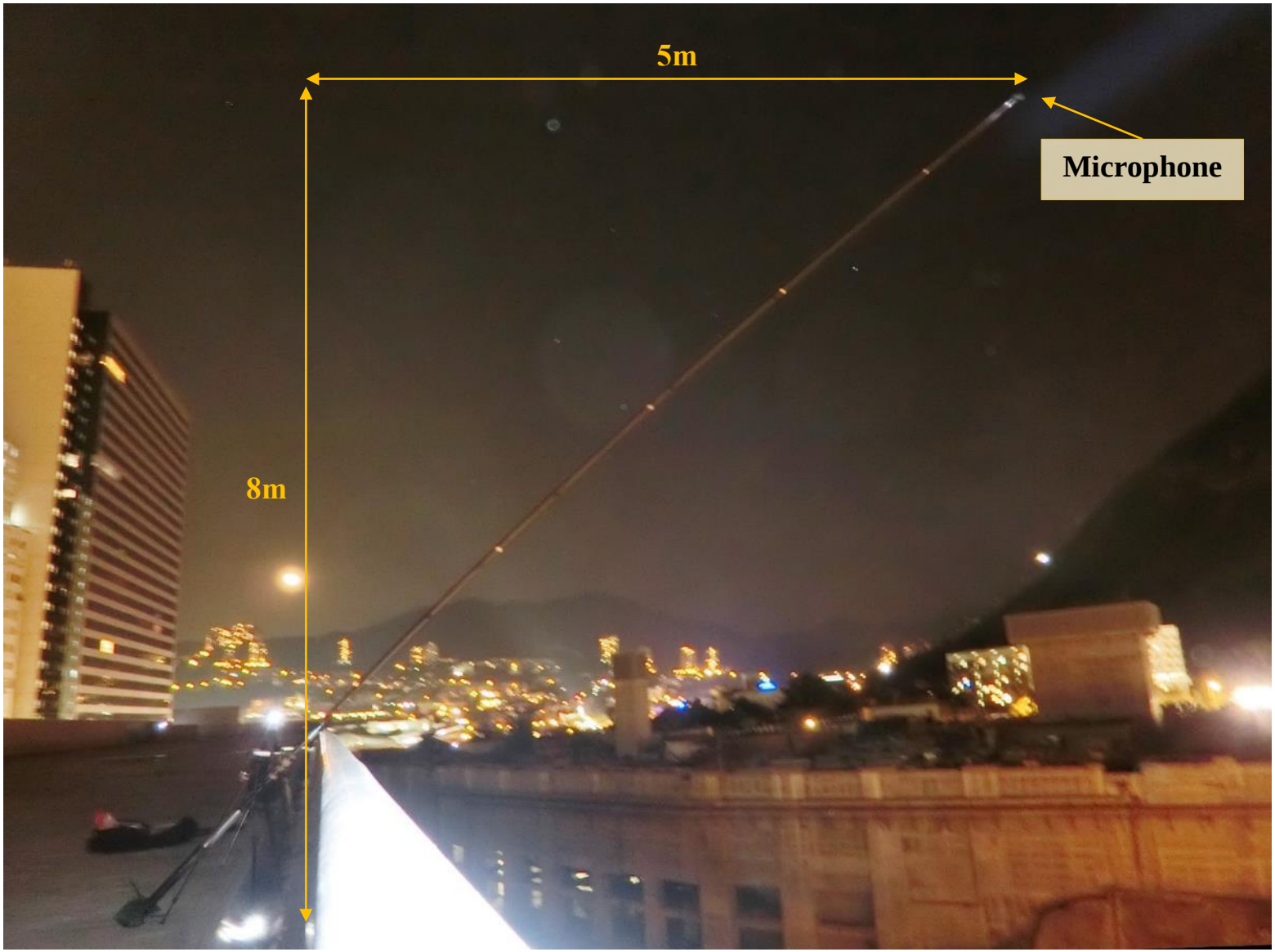


Photo B.11 Measurement Setup at TWY (Tai Wong Ye Temple)

Photo B.12 Measurement Setup at SMH1 (Little Sisters of the Poor St. Mary's Home for the Aged) at 1/F Corridor

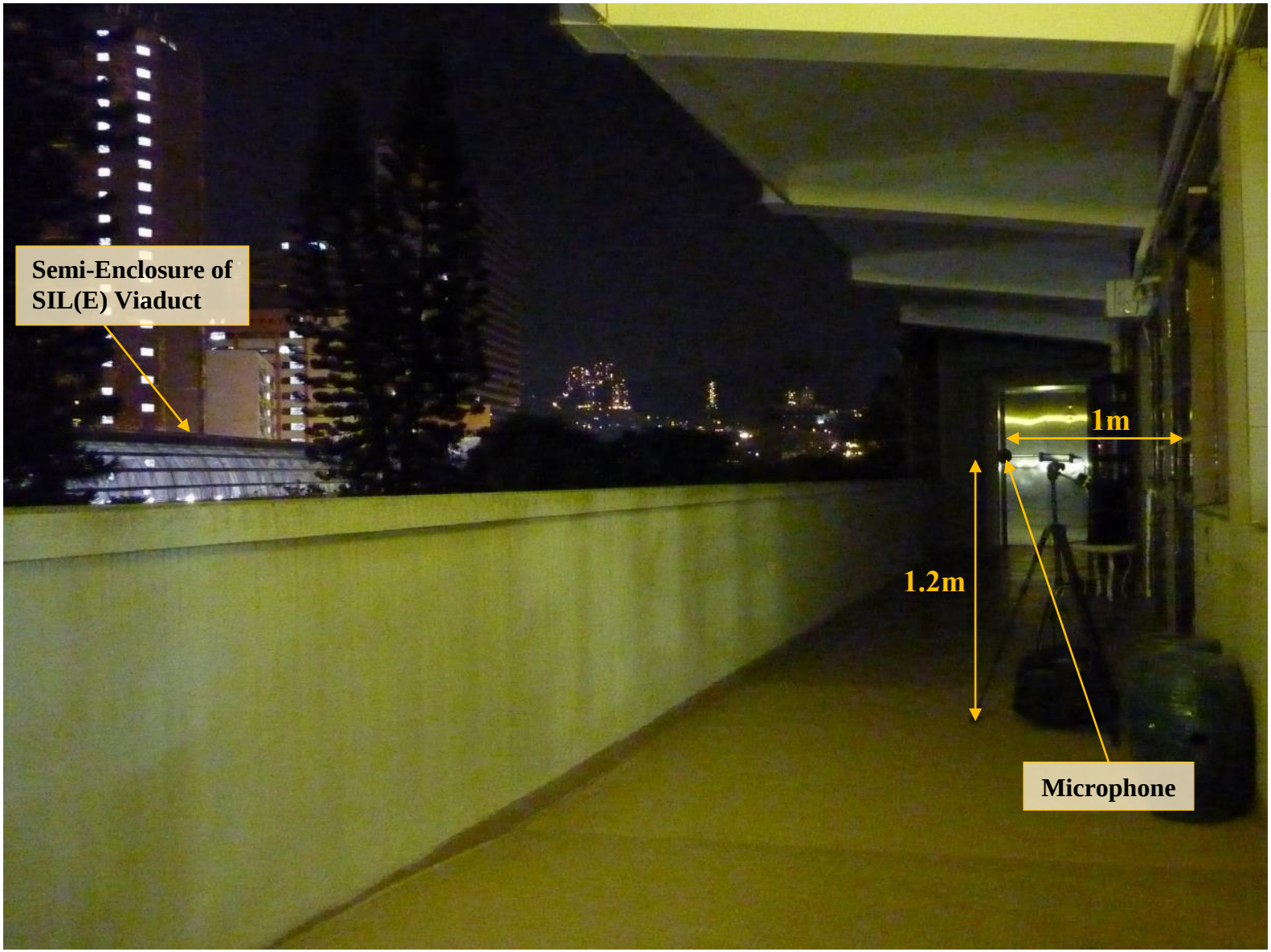
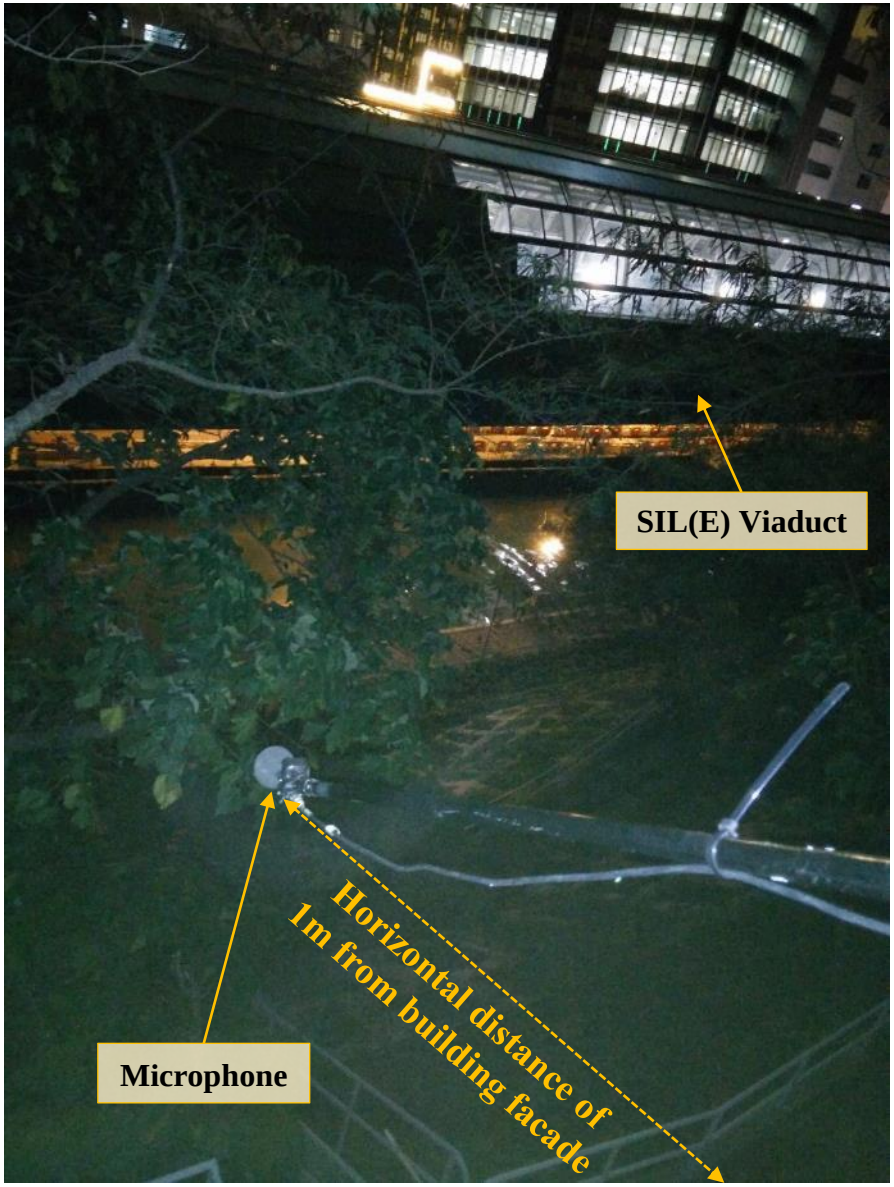


Photo B.13 Measurement Setup at TWGH1 (TWGHs Jockey Club Rehabilitation Complex Block A) at Ground Level



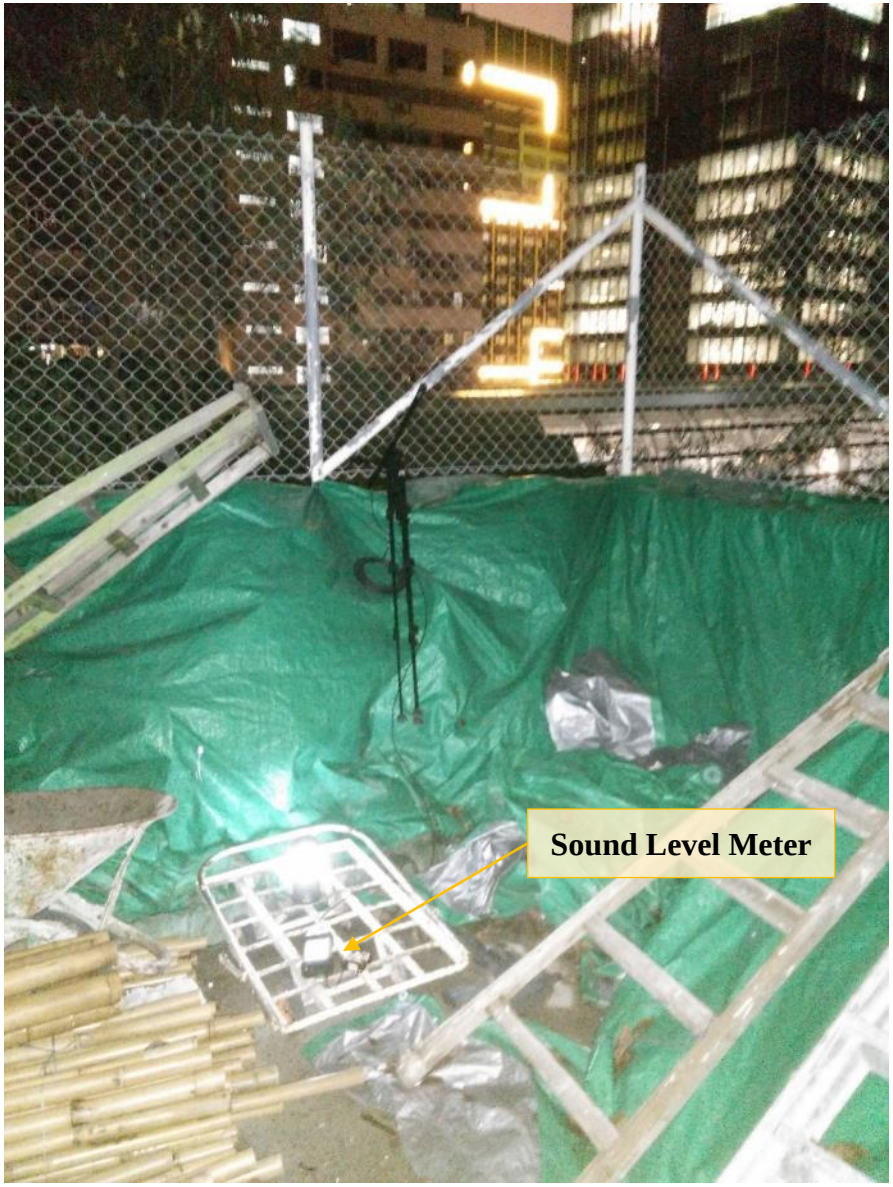
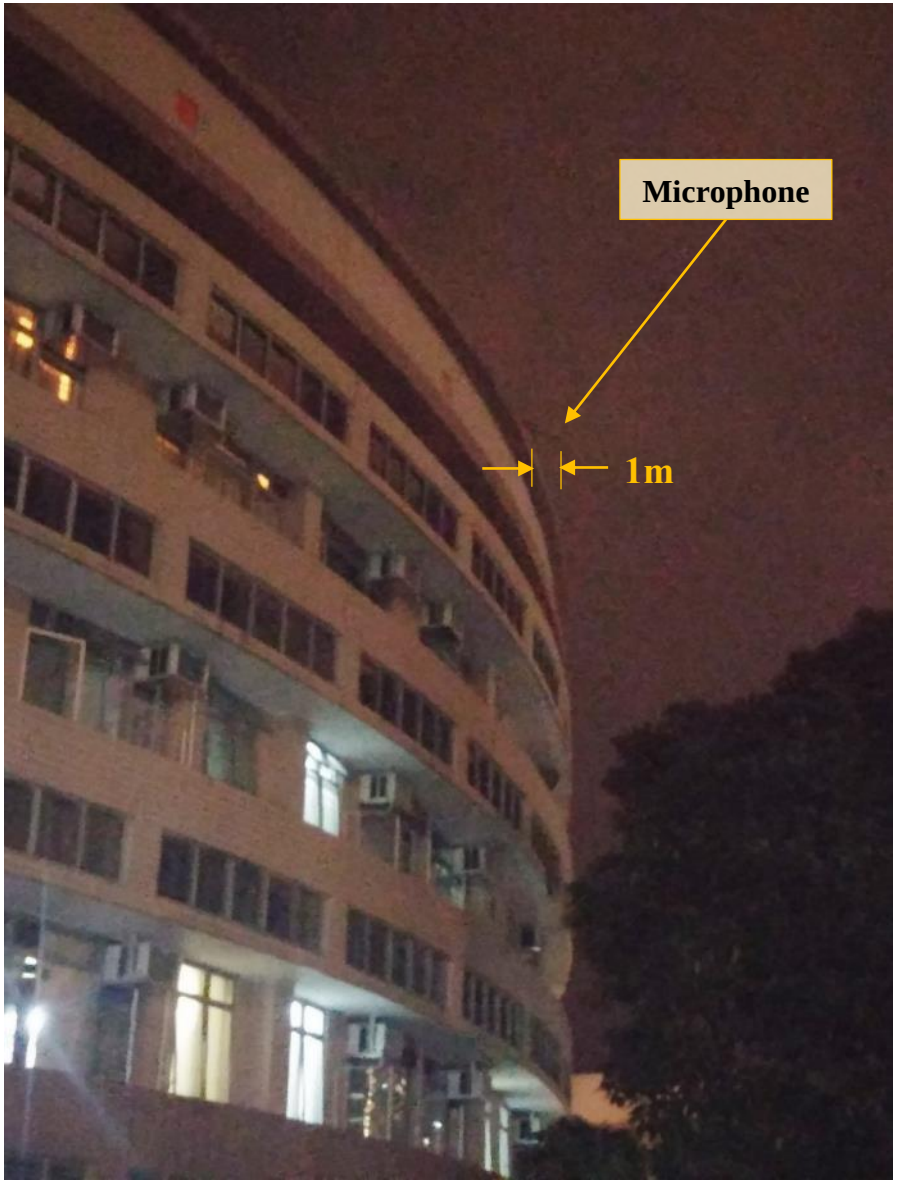


Photo B.14 Measurement Setup at TWGH2 (TWGHs Jockey Club Rehabilitation Complex Block D) at Roof Top



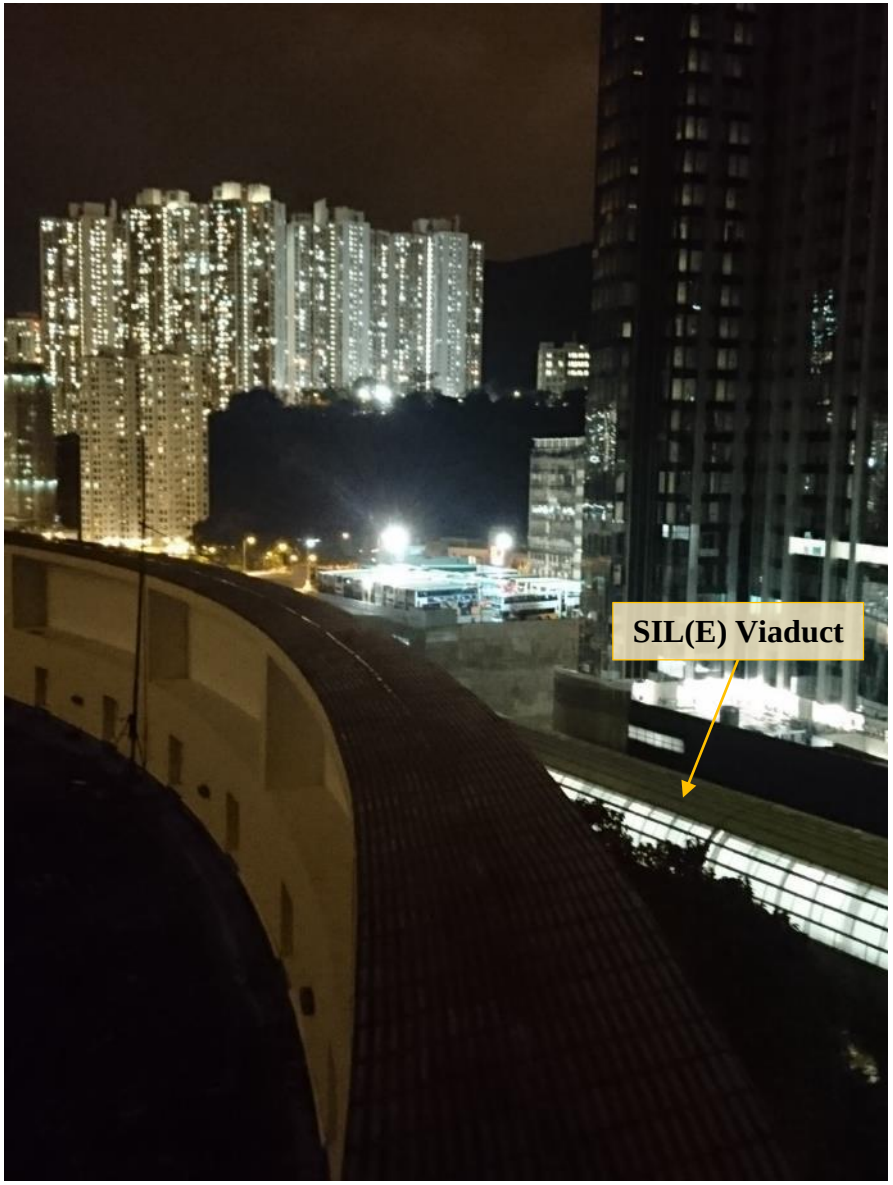


Photo B.15 Measurement Setup at HSS3 (Holy Spirit Seminary Chapel)

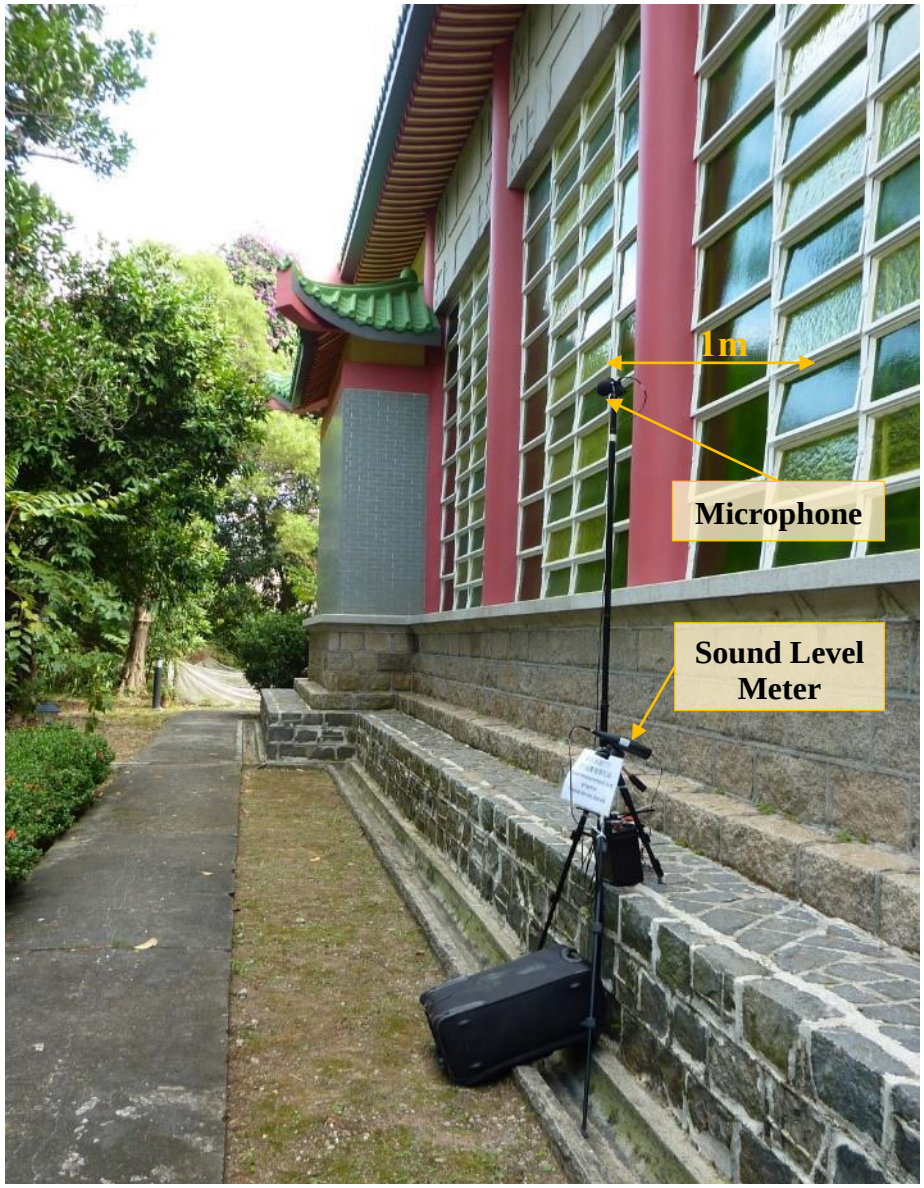


Photo B.16 Measurement Setup at HSS2 (Holy Spirit Seminary) at 3/F

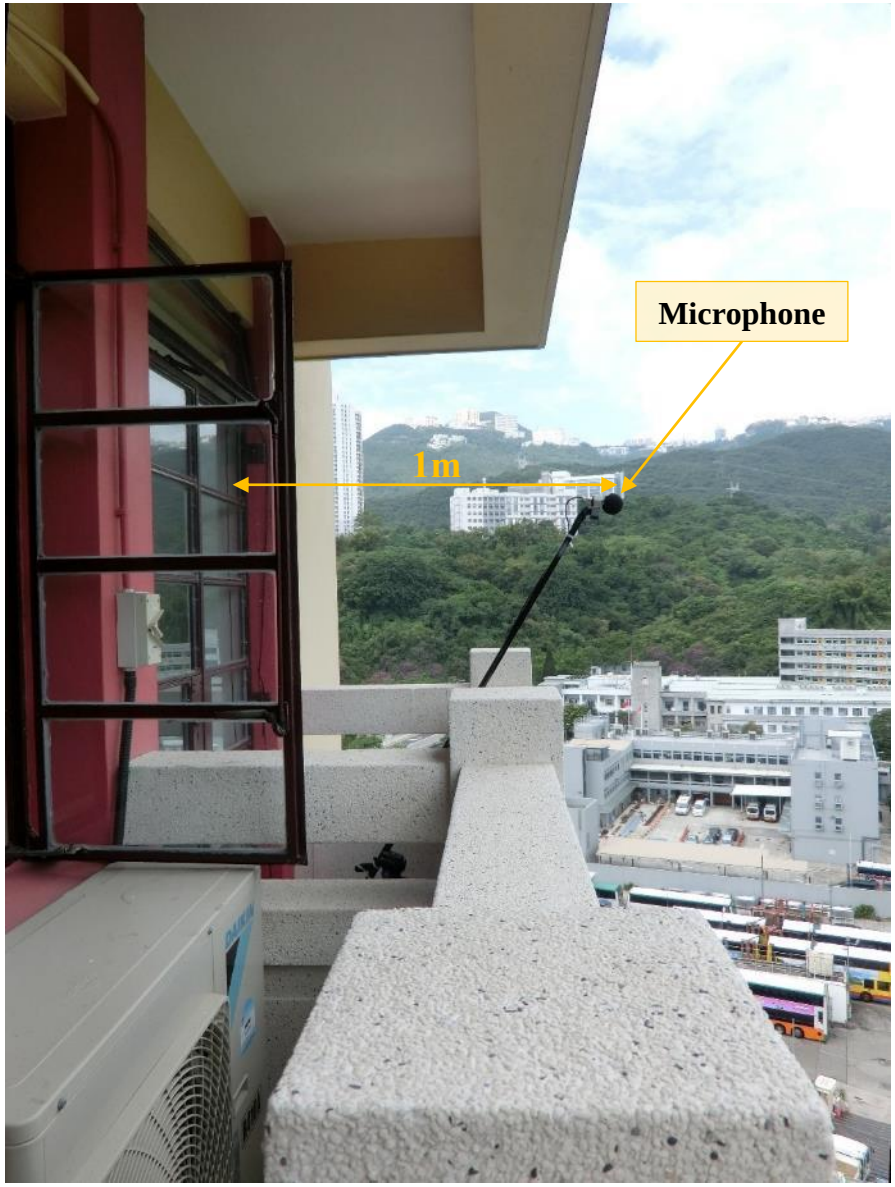


Photo B.17 Measurement Setup at HSS1 (Holy Spirit Seminary) at 3/F

Photo B.18 Measurement Setup at HSS4 (Holy Spirit Seminary) at 1/F

Photo B.19 Measurement Setup at OC1 (Ocean Court Tower 3) at Roof Top

Photo B.20 Measurement Setup at OC2 (Ocean Court Tower 3) at Roof Top

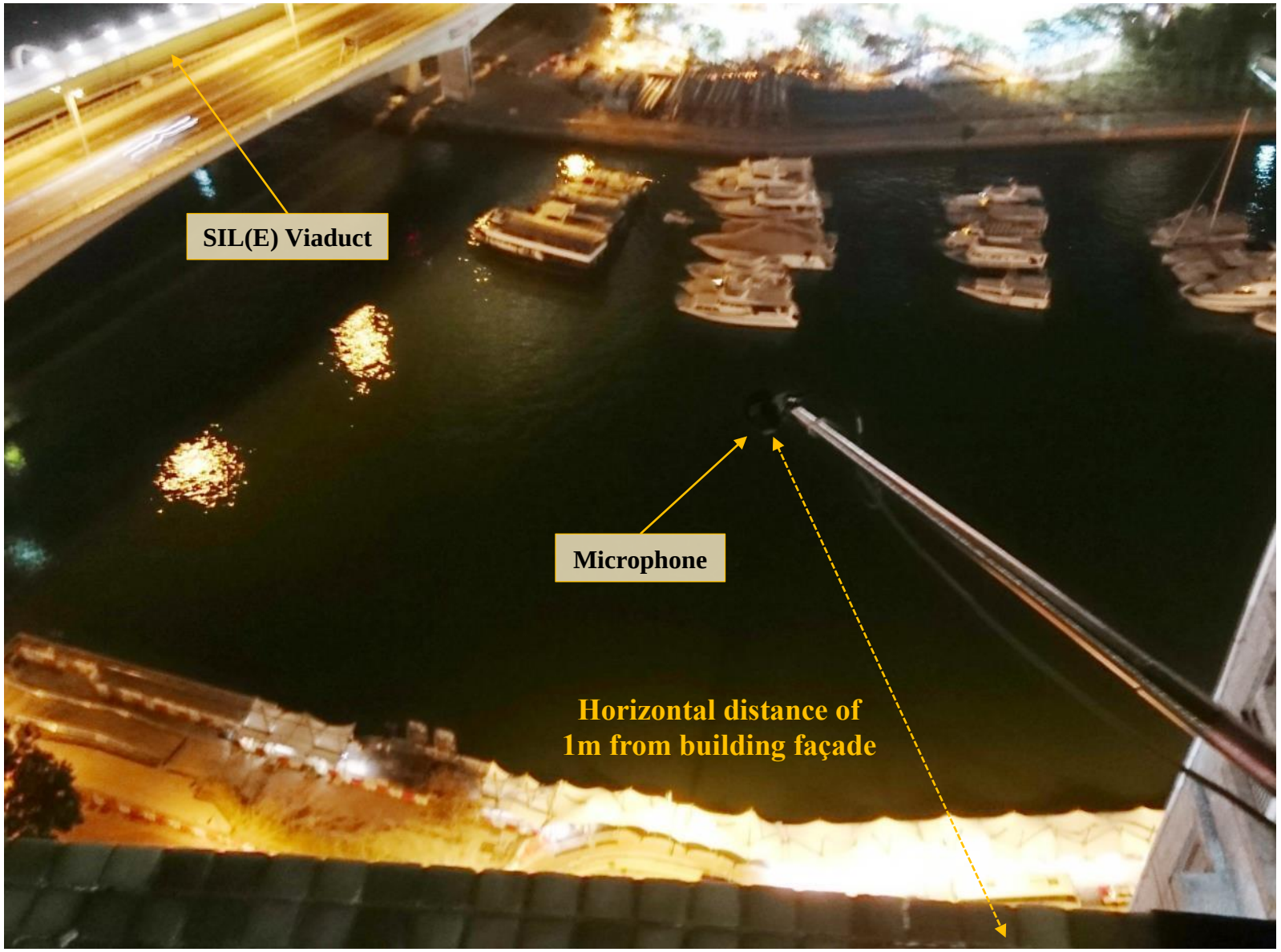


Photo B.21 Measurement Setup at SWT3 (Sham Wan Towers Tower 3) at Refuge Floor (26R/F)

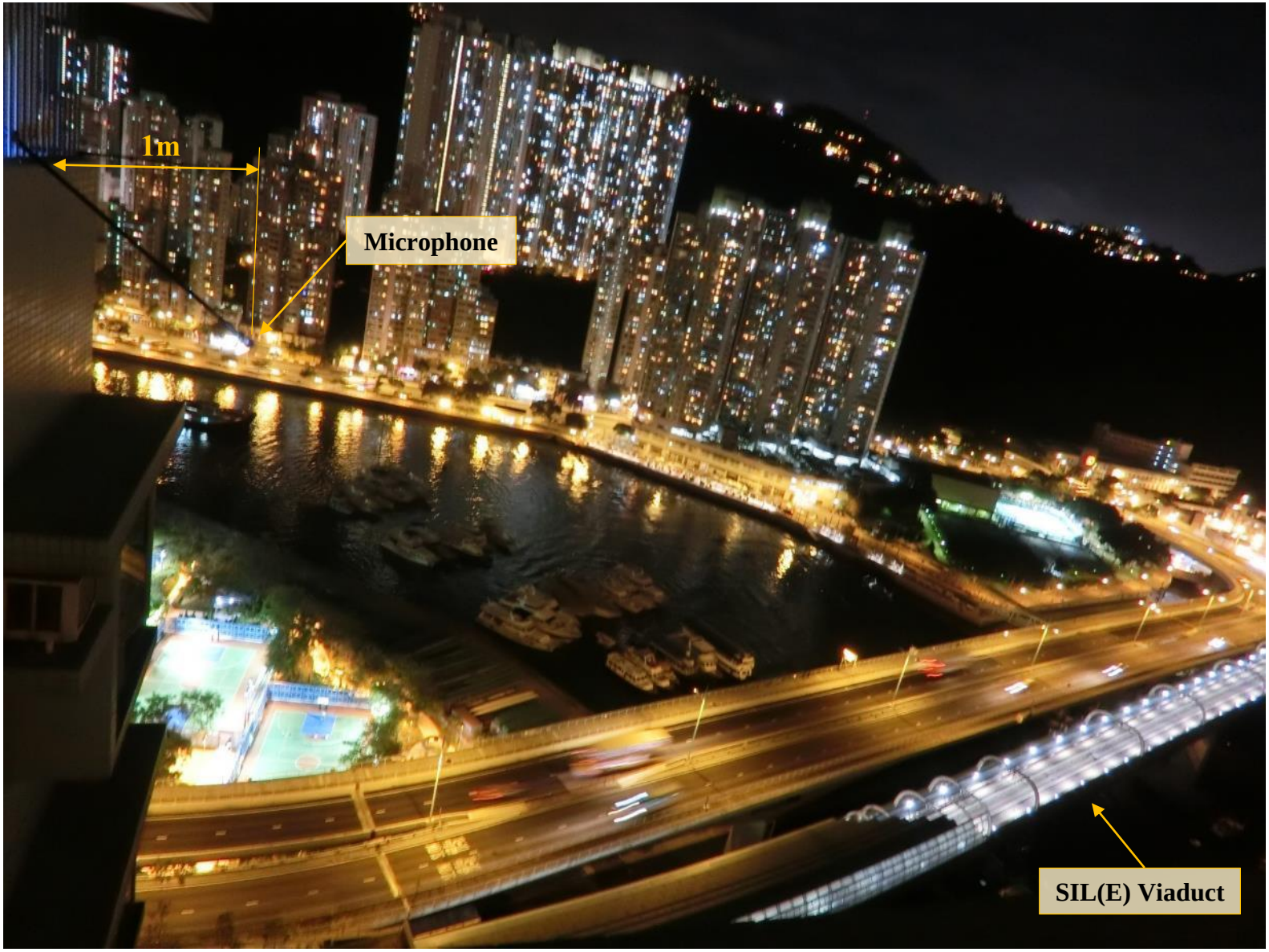


Photo B.22 Measurement Setup at SWT2 (Sham Wan Towers Tower 3) at Refuge Floor (26R/F)

Annex C

Measurement Data and Calculations

Table C.1 *Measurement Data at BC on 15 and 16 May 2016 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	46	22:34:07	22:34:22	15	64.5	61.7	58.9	58.7	70.5
UT2	UT	47	23:02:58	23:03:13	15	64.5	61.5	59.4	58.5	70.3
UT3	UT	46	23:29:36	23:29:51	15	63.7	61.7	58.4	59.0	70.8
UT4	UT	46	23:55:34	23:55:50	16	60.7	59.0	54.8	56.9	68.9
UT5	UT	46	00:08:24	00:08:40	16	66.5	62.6	55.8	61.6	73.6
DT1	DT	50	22:18:37	22:18:51	14	64.1	61.6	59.3	58.6	70.1
DT2	DT	50	23:51:02	23:51:16	14	62.8	61.0	58.2	58.0	69.4
DT3	DT	50	00:03:22	00:03:36	14	61.9	59.4	55.3	57.3	68.7
DT4	DT	50	00:16:47	00:17:00	13	64.2	61.7	56.3	60.3	71.4
DT5	DT	50	00:29:48	00:30:02	14	63.3	60.6	56.7	58.3	69.7
DT6	DT	50	00:42:52	00:43:05	13	60.3	58.5	54.6	56.2	67.4
UT Target Speed		46			**Max $L_{max,fast}$**	**66.5**			Average $SEL_{event,UT}$	71.1
DT Target Speed		50							Average $SEL_{event,DT}$	69.6
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	82.9
									Total SEL_{DT} in 30min	81.4
									$L_{eq,30min}$ (Day & Evening)	**52.7**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	80.1
									Total SEL_{DT} in 30min	78.7
									$L_{eq,30min}$ (Night)	**49.9**
Corrrection										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**53**
									Corrected $L_{eq,30min}$ (Night)	**50**
									Corrected $L_{max,fast}$ (Night)	**67**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.2 *Measurement Data at SW4 on 15 and 16 May 2016 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	46	21:45:43	21:46:02	19	64.7	62.9	59.9	59.9	72.7
UT2	UT	47	23:42:29	23:42:48	19	64.5	62.5	58.9	60.1	72.9
UT3	UT	46	23:55:35	23:55:54	19	63.9	60.8	54.9	59.5	72.3
UT4	UT	46	00:08:22	00:08:41	19	67.4	63.7	56.7	62.8	75.6
UT5	UT	47	00:20:38	00:20:57	19	64.9	61.6	58.2	59.0	71.7
DT1	DT	50	21:38:51	21:39:05	14	65.0	62.9	59.9	59.9	71.4
DT2	DT	50	21:57:13	21:57:27	14	65.4	63.6	60.1	60.9	72.4
DT3	DT	50	23:51:06	23:51:20	14	64.3	62.5	57.7	60.7	72.2
DT4	DT	50	00:03:23	00:03:37	14	62.5	60.8	57.0	58.5	69.9
DT5	DT	50	00:16:50	00:17:04	14	65.2	63.0	57.2	61.7	73.2
DT6	DT	50	00:29:53	00:30:07	14	64.3	62.2	57.5	60.4	71.9
DT7	DT	50	00:42:55	00:43:08	13	63.2	61.6	54.3	60.7	71.9
UT Target Speed		46			**Max $L_{max,fast}$**	**67.4**			Average $SEL_{event,UT}$	73.4
DT Target Speed		50							Average $SEL_{event,DT}$	71.9
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	85.1
									Total SEL_{DT} in 30min	83.7
									$L_{eq,30min}$ (Day & Evening)	**54.9**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	82.4
									Total SEL_{DT} in 30min	81.0
									$L_{eq,30min}$ (Night)	**52.2**
Correction										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**55**
									Corrected $L_{eq,30min}$ (Night)	**52**
									Corrected $L_{max,fast}$ (Night)	**67**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.3 *Measurement Data at YSM1 on 22 and 23 May 2016 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	50	22:21:32	22:22:03	31	71.8	68.9	66.8	65.9	80.8
UT2	UT	50	22:30:46	22:31:17	31	72.5	69.2	66.5	66.2	81.2
UT3	UT	51	23:06:37	23:07:09	32	71.6	67.7	65.4	64.7	79.7
UT4	UT	51	23:42:13	23:42:45	32	71.0	68.4	65.5	65.4	80.5
UT5	UT	50	00:35:46	00:36:17	31	69.4	66.4	64.2	63.4	78.3
DT1	DT	50	22:56:27	22:56:50	23	71.9	69.0	65.9	66.1	79.7
DT2	DT	50	23:14:33	23:14:56	23	70.2	67.4	65.4	64.4	78.0
DT3	DT	50	23:23:06	23:23:29	23	72.7	68.9	66.7	65.9	79.5
DT4	DT	50	23:40:55	23:41:18	23	70.6	68.3	66.0	65.3	78.9
DT5	DT	50	00:34:31	00:34:55	24	70.1	66.3	62.3	64.1	77.9
UT Target Speed		50			**Max $L_{max,fast}$**	**72.7**			Average $SEL_{event,UT}$	80.2
DT Target Speed		50							Average $SEL_{event,DT}$	78.9
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	92.0
									Total SEL_{DT} in 30min	90.6
									$L_{eq,30min}$ (Day & Evening)	**61.8**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	89.2
									Total SEL_{DT} in 30min	87.9
									$L_{eq,30min}$ (Night)	**59.1**
Corrrection										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**62**
									Corrected $L_{eq,30min}$ (Night)	**59**
									Corrected $L_{max,fast}$ (Night)	**73**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.4 *Measurement Data at WCHH2 on 22 and 23 May 2016 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	50	22:21:43	22:21:58	15	67.6	65.9	63.5	62.9	74.7
UT2	UT	50	22:30:56	22:31:11	15	69.2	66.0	63.1	63.0	74.8
UT3	UT	50	22:58:13	22:58:28	15	69.7	65.6	62.6	62.6	74.4
UT4	UT	51	23:06:48	23:07:04	16	68.3	65.7	62.1	63.1	75.2
UT5	UT	50	00:35:54	00:36:10	16	67.3	65.0	60.7	62.9	75.0
DT1	DT	50	22:10:26	22:10:39	13	68.5	66.1	64.1	63.1	74.2
DT2	DT	50	23:23:11	23:23:24	13	67.5	65.3	62.8	62.3	73.4
DT3	DT	50	23:41:07	23:41:20	13	66.4	64.6	62.4	61.6	72.7
DT4	DT	50	23:58:46	23:58:59	13	66.2	63.8	61.5	60.8	71.9
DT5	DT	50	00:16:41	00:16:54	13	65.4	63.7	61.8	60.7	71.9
DT6	DT	50	00:25:21	00:25:34	13	66.5	64.3	60.8	61.6	72.8
DT7	DT	50	00:34:35	00:34:48	13	64.2	62.6	58.7	60.4	71.5
UT Target Speed		50			**Max $L_{max,fast}$**	**69.7**			Average $SEL_{event,UT}$	74.8
DT Target Speed		50							Average $SEL_{event,DT}$	72.7
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	86.6
									Total SEL_{DT} in 30min	84.5
									$L_{eq,30min}$ (Day & Evening)	**56.1**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	83.8
									Total SEL_{DT} in 30min	81.8
									$L_{eq,30min}$ (Night)	**53.4**
Correction										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**56**
									Corrected $L_{eq,30min}$ (Night)	**53**
									Corrected $L_{max,fast}$ (Night)	**70**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.5 *Measurement Data at OCP2 on 15 and 16 May 2016 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	34	22:05:55	22:06:50	55	73.7	64.3	60.4	61.9	79.3
UT2	UT	34	22:22:26	22:23:20	54	75.9	64.5	61.0	61.8	79.1
UT3	UT	34	23:03:08	23:04:02	54	69.2	63.4	60.3	60.4	77.7
UT4	UT	34	23:17:07	23:18:01	54	76.1	65.0	60.7	63.0	80.3
UT5	UT	34	23:29:59	23:30:53	54	73.1	62.7	59.0	60.4	77.7
UT6	UT	33	00:21:09	00:22:03	54	70.5	62.4	59.0	59.8	77.1
DT1	DT	31	23:37:21	23:38:15	54	77.4	63.1	58.9	61.0	78.3
DT2	DT	31	23:50:32	23:51:27	55	70.1	61.7	58.3	59.1	76.5
DT3	DT	31	00:02:45	00:03:40	55	72.7	62.2	58.2	59.9	77.3
DT4	DT	31	00:16:13	00:17:07	54	68.6	62.0	58.8	59.1	76.4
DT5	DT	31	00:41:58	00:42:53	55	67.6	60.8	57.6	57.9	75.3
UT Target Speed		34			**Max $L_{max,fast}$**	**77.4**			Average $SEL_{event,UT}$	78.7
DT Target Speed		31							Average $SEL_{event,DT}$	76.9
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	90.5
									Total SEL_{DT} in 30min	88.6
									$L_{eq,30min}$ (Day & Evening)	**60.1**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	87.7
									Total SEL_{DT} in 30min	85.9
									$L_{eq,30min}$ (Night)	**57.4**
Correction										
									Façade correction	**2.5**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**63**
									Corrected $L_{eq,30min}$ (Night)	**60**
									Corrected $L_{max,fast}$ (Night)	**80**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.6 *Measurement Data at OCP3 on 12 and 13 Jun 2016 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	39	22:00:45	22:01:09	24	62.5	59.4	56.5	56.4	70.2
UT2	UT	38	22:23:29	22:23:52	23	62.5	60.0	57.3	57.0	70.6
UT3	UT	38	22:33:46	22:34:09	23	61.3	58.9	55.8	55.9	69.5
UT4	UT	39	22:54:30	22:54:53	23	61.0	58.6	56.0	55.6	69.2
UT5	UT	38	00:05:04	00:05:27	23	61.6	59.6	56.0	57.0	70.7
UT6	UT	38	00:15:24	00:15:48	24	62.8	60.4	57.1	57.6	71.4
DT1	DT	39	23:00:25	23:01:42	77	62.0	58.4	56.6	55.4	74.2
DT2	DT	38	23:31:23	23:32:43	80	61.8	57.7	55.0	54.7	73.8
DT3	DT	39	00:01:25	00:02:48	83	61.1	56.4	54.9	53.4	72.6
DT4	DT	40	00:11:15	00:12:38	83	62.5	58.0	55.6	55.0	74.2
DT5	DT	39	00:21:18	00:22:38	80	62.6	58.5	56.2	55.5	74.5
UT Target Speed		38			**Max $L_{max,fast}$**	**62.8**			Average $SEL_{event,UT}$	70.3
DT Target Speed		39							Average $SEL_{event,DT}$	73.9
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	82.1
									Total SEL_{DT} in 30min	85.7
									$L_{eq,30min}$ (Day & Evening)	**54.7**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	79.4
									Total SEL_{DT} in 30min	82.9
									$L_{eq,30min}$ (Night)	**52.0**
Correction										
									Façade correction	**2.5**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**57**
									Corrected $L_{eq,30min}$ (Night)	**54**
									Corrected $L_{max,fast}$ (Night)	**65**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.7 *Measurement Data at PC4 on 15 and 16 May 2016 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	51	21:33:11	21:33:42	31	62.4	59.0	56.3	56.0	70.9
UT2	UT	52	21:46:42	21:47:13	31	62.4	58.8	56.3	55.8	70.7
UT3	UT	51	22:06:42	22:07:12	30	62.0	59.1	56.2	56.1	70.9
UT4	UT	51	23:56:32	23:57:02	30	63.0	59.4	56.2	56.5	71.3
UT5	UT	52	00:09:24	00:09:54	30	62.9	59.0	56.3	56.0	70.8
UT6	UT	52	00:21:39	00:22:09	30	62.6	58.9	55.3	56.4	71.2
UT7	UT	51	00:35:02	00:35:32	30	62.0	58.1	52.9	56.6	71.3
DT1	DT	51	21:37:40	21:38:13	33	62.0	58.7	56.3	55.7	70.9
DT2	DT	51	21:56:02	21:56:35	33	61.2	58.4	56.2	55.4	70.6
DT3	DT	51	22:14:24	22:14:57	33	61.1	58.1	56.2	55.1	70.3
DT4	DT	50	00:02:09	00:02:42	33	61.2	58.5	56.3	55.5	70.7
DT5	DT	50	00:28:33	00:29:06	33	60.5	56.7	53.4	53.9	69.1
DT6	DT	51	00:41:33	00:42:05	32	60.6	56.8	53.2	54.3	69.4
UT Target Speed		51			**Max $L_{max,fast}$**	**63.0**			Average $SEL_{event,UT}$	71.0
DT Target Speed		51							Average $SEL_{event,DT}$	70.2
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	82.8
									Total SEL_{DT} in 30min	82.0
									$L_{eq,30min}$ (Day & Evening)	**52.9**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	80.1
									Total SEL_{DT} in 30min	79.2
									$L_{eq,30min}$ (Night)	**50.1**
Correction										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**53**
									Corrected $L_{eq,30min}$ (Night)	**50**
									Corrected $L_{max,fast}$ (Night)	**63**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.8 *Measurement Data at PC3 on 15 and 16 May 2016 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	51	21:33:19	21:33:43	24	61.3	57.2	52.4	55.5	69.3
UT2	UT	52	21:46:48	21:47:12	24	60.7	56.6	52.2	54.7	68.5
UT3	UT	51	22:06:49	22:07:13	24	61.5	57.4	52.0	55.9	69.7
UT4	UT	51	22:22:45	22:23:10	25	61.7	57.8	52.0	56.4	70.4
UT5	UT	51	22:35:09	22:35:34	25	61.2	56.8	51.6	55.2	69.2
UT6	UT	51	22:49:27	22:49:52	25	61.8	57.5	52.0	56.1	70.1
UT7	UT	52	23:04:04	23:04:28	24	61.1	56.8	51.4	55.3	69.1
UT8	UT	51	23:17:58	23:18:23	25	62.0	58.4	51.1	57.5	71.5
UT9	UT	52	23:30:44	23:31:08	24	64.8	59.6	51.4	58.9	72.7
UT10	UT	52	23:43:44	23:44:09	25	61.3	56.8	51.1	55.5	69.4
UT11	UT	51	23:56:44	23:57:08	24	60.6	56.2	50.9	54.7	68.5
UT12	UT	52	00:09:36	00:10:01	25	60.5	56.3	51.7	54.4	68.4
UT13	UT	52	00:21:52	00:22:17	25	61.5	56.7	51.0	55.4	69.4
DT1	DT	51	21:37:36	21:38:05	29	60.9	56.1	52.6	53.6	68.3
DT2	DT	51	21:55:53	21:56:22	29	59.7	55.3	52.2	52.4	67.0
DT3	DT	51	22:14:17	22:14:47	30	60.3	55.0	51.7	52.3	67.1
DT4	DT	51	22:28:54	22:29:24	30	60.5	56.0	51.9	53.8	68.5
DT5	DT	51	22:42:45	22:43:14	29	60.0	55.2	51.7	52.7	67.3
DT6	DT	51	22:56:26	22:56:56	30	60.0	55.9	51.6	53.9	68.7
DT7	DT	51	23:11:07	23:11:36	29	60.3	55.4	51.3	53.3	67.9
DT8	DT	51	23:36:33	23:37:02	29	59.1	54.6	51.5	51.7	66.3
DT9	DT	51	23:49:48	23:50:17	29	59.5	54.9	50.7	52.8	67.5
DT10	DT	50	00:02:08	00:02:37	29	59.1	55.2	51.4	52.8	67.5
DT11	DT	51	00:15:31	00:16:00	29	59.9	55.0	51.5	52.4	67.0
DT12	DT	50	00:28:31	00:29:01	30	61.2	57.9	51.6	56.7	71.4
DT13	DT	51	00:41:27	00:41:56	29	60.2	55.3	51.0	53.2	67.9
UT Target Speed		51			**Max $L_{max,fast}$**	**64.8**			Average $SEL_{event,UT}$	69.9
DT Target Speed		51							Average $SEL_{event,DT}$	68.1
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	81.6
									Total SEL_{DT} in 30min	79.8
									$L_{eq,30min}$ (Day & Evening)	**51.3**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	78.9
									Total SEL_{DT} in 30min	77.1
									$L_{eq,30min}$ (Night)	**48.6**
Correction										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**51**
									Corrected $L_{eq,30min}$ (Night)	**49**
									Corrected $L_{max,fast}$ (Night)	**65**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.9 *Measurement Data at WCH1 on 12 and 13 Jun 2016 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	41	21:49:14	21:49:46	32	65.5	58.9	53.4	57.5	72.5
UT2	UT	41	22:01:22	22:01:54	32	62.2	57.3	53.2	55.2	70.2
UT3	UT	41	22:12:25	22:12:56	31	62.2	58.8	53.0	57.4	72.3
UT4	UT	41	22:24:04	22:24:36	32	63.2	58.4	52.8	57.0	72.1
UT5	UT	41	22:34:20	22:34:52	32	66.6	58.5	52.7	57.2	72.2
UT6	UT	40	22:44:57	22:45:29	32	61.6	57.1	52.4	55.4	70.4
UT7	UT	41	22:55:06	22:55:38	32	63.2	59.0	52.7	57.9	73.0
UT8	UT	40	23:05:06	23:05:38	32	63.3	57.8	52.5	56.3	71.4
UT9	UT	41	23:15:22	23:15:53	31	68.1	58.5	52.1	57.3	72.3
UT10	UT	41	23:25:31	23:26:02	31	61.5	57.0	52.1	55.3	70.2
UT11	UT	42	23:36:09	23:36:41	32	62.3	57.9	52.5	56.5	71.5
UT12	UT	41	23:46:15	23:46:46	31	62.5	58.0	52.1	56.7	71.6
UT13	UT	41	23:56:02	23:56:33	31	60.8	57.2	52.2	55.6	70.5
UT14	UT	42	00:16:01	00:16:32	31	61.2	57.8	52.4	56.4	71.3
UT15	UT	41	00:25:41	00:26:12	31	64.1	58.0	52.0	56.8	71.7
DT1	DT	61	21:43:29	21:43:49	20	66.0	61.1	53.2	60.3	73.3
DT2	DT	50	21:54:26	21:54:46	20	63.5	59.9	53.4	58.8	71.8
DT3	DT	50	22:06:49	22:07:09	20	63.6	59.7	53.2	58.7	71.7
DT4	DT	50	22:18:00	22:18:20	20	63.5	59.4	52.9	58.4	71.4
DT5	DT	51	22:28:57	22:29:18	21	62.7	59.2	52.7	58.0	71.3
DT6	DT	51	22:39:23	22:39:44	21	63.4	59.7	52.5	58.8	72.0
DT7	DT	59	22:49:59	22:50:19	20	65.7	60.6	52.3	59.9	72.9
DT8	DT	51	22:59:42	23:00:03	21	63.1	59.3	52.7	58.2	71.5
DT9	DT	61	23:10:02	23:10:22	20	65.3	60.6	52.4	59.8	72.9
DT10	DT	50	23:20:01	23:20:22	21	63.6	59.3	52.0	58.4	71.7
DT11	DT	51	23:30:40	23:31:01	21	63.2	59.6	52.5	58.6	71.8
DT12	DT	51	23:40:54	23:41:14	20	63.3	59.6	52.3	58.7	71.7
DT13	DT	50	23:50:56	23:51:17	21	62.9	59.1	52.2	58.1	71.3
DT14	DT	50	00:00:46	00:01:07	21	63.3	59.6	51.9	58.7	72.0
DT15	DT	59	00:10:40	00:11:00	20	65.1	60.5	52.4	59.7	72.8
DT16	DT	60	00:20:43	00:21:03	20	65.5	60.4	52.3	59.7	72.7
UT Target Speed		41			**Max $L_{max,fast}$**	**68.1**			Average $SEL_{event,UT}$	71.6
DT Target Speed		55							Average $SEL_{event,DT}$	72.1
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	83.4
									Total SEL_{DT} in 30min	83.8
									$L_{eq,30min}$ (Day & Evening)	**54.1**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	80.7
									Total SEL_{DT} in 30min	81.1
									$L_{eq,30min}$ (Night)	**51.3**
Correction										
									Façade correction	**2.5**
									Projection to worst affected floor	**1.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**58**
									Corrected $L_{eq,30min}$ (Night)	**55**
									Corrected $L_{max,fast}$ (Night)	**72**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.10 *Measurement Data at WCH2 on 27 and 28 Dec 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	47	22:26:03	22:26:15	12	63.8	62.0	57.3	60.2	71.0
UT2	UT	45	23:13:28	23:13:41	13	63.5	61.2	57.3	59.0	70.1
UT3	UT	47	23:43:36	23:43:49	13	63.2	61.3	56.2	59.7	70.8
UT4	UT	47	00:03:03	00:03:15	12	63.1	61.4	56.8	59.5	70.3
UT5	UT	45	00:10:56	00:11:08	12	63.5	61.2	56.7	59.2	70.0
UT6	UT	45	00:30:03	00:30:15	12	63.0	61.9	57.3	60.0	70.8
DT1	DT	36	22:47:27	22:47:39	12	61.9	59.3	57.4	56.3	67.1
DT2	DT	37	23:17:17	23:17:29	12	62.1	59.3	57.3	56.3	67.1
DT3	DT	37	00:22:43	00:22:53	10	63.3	60.1	57.1	57.1	67.1
DT4	DT	37	00:33:32	00:33:43	11	59.8	57.7	56.6	54.7	65.1
DT5	DT	37	00:43:31	00:43:41	10	58.8	57.5	55.7	54.5	64.5
UT Target Speed		47			**Max $L_{max,fast}$**	**63.8**			Average $SEL_{event,UT}$	70.5
DT Target Speed		37							Average $SEL_{event,DT}$	66.3
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	82.3
									Total SEL_{DT} in 30min	78.1
									$L_{eq,30min}$ (Day & Evening)	**51.1**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	79.6
									Total SEL_{DT} in 30min	75.4
									$L_{eq,30min}$ (Night)	**48.4**
Correction										
									Façade correction	**2.5**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**54**
									Corrected $L_{eq,30min}$ (Night)	**51**
									Corrected $L_{max,fast}$ (Night)	**66**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.11 *Measurement Data at TWY on 27 and 28 Dec 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	55	22:26:02	22:26:14	12	67.7	65.1	59.2	63.9	74.7
UT2	UT	55	22:43:42	22:43:55	13	67.7	64.9	59.0	63.6	74.7
UT3	UT	53	22:55:59	22:56:13	14	69.6	67.0	59.8	66.0	77.5
UT4	UT	53	23:31:20	23:31:33	13	68.4	65.4	61.5	63.1	74.2
UT5	UT	55	23:43:36	23:43:48	12	67.8	65.0	59.8	63.5	74.2
UT6	UT	55	00:03:06	00:03:18	12	67.6	65.2	60.9	63.2	74.0
DT1	DT	42	22:05:50	22:06:15	25	63.4	62.1	58.8	59.4	73.3
DT2	DT	42	22:37:43	22:38:08	25	63.7	61.6	58.6	58.6	72.6
DT3	DT	42	22:47:23	22:47:47	24	63.2	60.5	59.1	57.5	71.3
DT4	DT	42	22:54:30	22:54:55	25	64.1	61.8	58.8	58.9	72.8
DT5	DT	42	23:35:14	23:35:38	24	65.8	62.7	59.6	59.7	73.6
UT Target Speed		55			**Max $L_{max,fast}$**	**69.6**			Average $SEL_{event,UT}$	75.1
DT Target Speed		43							Average $SEL_{event,DT}$	72.8
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	86.8
									Total SEL_{DT} in 30min	84.6
									$L_{eq,30min}$ (Day & Evening)	**56.3**
Correction										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**56**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.12 *Measurement Data at SMH1 on 27 and 28 Dec 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	63	22:26:01	22:26:12	11	61.4	59.6	53.9	58.3	68.7
UT2	UT	61	22:33:46	22:33:57	11	60.5	58.3	54.9	55.6	66.0
UT3	UT	63	22:43:44	22:43:55	11	60.7	58.5	54.6	56.2	66.6
UT4	UT	61	22:56:04	22:56:16	12	60.8	59.0	55.0	56.8	67.6
UT5	UT	63	23:03:07	23:03:19	12	61.6	59.4	54.6	57.7	68.5
UT6	UT	61	23:13:32	23:13:43	11	61.9	60.0	55.0	58.4	68.8
UT7	UT	63	23:25:01	23:25:13	12	61.3	58.9	55.8	55.9	66.7
UT8	UT	63	23:43:36	23:43:49	13	60.8	58.2	55.0	55.4	66.5
UT9	UT	61	23:50:42	23:50:53	11	60.3	58.1	54.9	55.4	65.8
UT10	UT	63	00:03:08	00:03:20	12	61.1	58.8	54.3	56.8	67.6
UT11	UT	61	00:10:59	00:11:11	12	60.6	58.6	54.4	56.5	67.3
UT12	UT	63	00:23:50	00:24:02	12	61.3	59.1	54.5	57.2	68.0
UT13	UT	61	00:30:09	00:30:22	13	60.6	59.1	53.8	57.5	68.7
UT14	UT	63	00:39:57	00:40:09	12	61.4	59.6	54.8	57.8	68.6
DT1	DT	49	22:05:54	22:06:05	11	59.5	58.3	54.3	56.1	66.5
DT2	DT	49	22:54:32	22:54:44	12	59.4	58.4	54.8	55.9	66.7
DT3	DT	49	23:35:17	23:35:29	12	59.0	57.5	54.6	54.5	65.3
DT4	DT	49	23:54:54	23:55:05	11	62.7	59.9	55.7	57.8	68.2
DT5	DT	49	00:22:20	00:22:31	11	61.5	58.9	54.6	56.9	67.3

UT Target Speed	62	**Max $L_{max,fast}$**	**62.7**	Average $SEL_{event,UT}$ 67.6
DT Target Speed	49			Average $SEL_{event,DT}$ 66.9

Daytime & Evening time calculation

Max train freq per 30min per direction	15	Total SEL_{UT} in 30min	79.4
		Total SEL_{DT} in 30min	78.7
		$L_{eq,30min}$ (Day & Evening)	**49.5**

Night time calculation

Max train freq per 30min per direction	8	Total SEL_{UT} in 30min	76.7
		Total SEL_{DT} in 30min	75.9
		$L_{eq,30min}$ (Night)	**46.8**

Correction

Façade correction	**0.0**
Projection to worst affected floor	**0.0**
Corrected $L_{eq,30min}$ (Day & Evening)	**50**
Corrected $L_{eq,30min}$ (Night)	**47**
Corrected $L_{max,fast}$ (Night)	**63**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.13 *Measurement Data at TWGH1 on 27 and 28 Dec 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	72	22:26:04	22:26:18	14	66.5	60.1	55.0	58.5	70.0
UT2	UT	72	22:43:47	22:44:00	13	65.2	59.2	55.3	57.0	68.1
UT3	UT	71	22:56:09	22:56:23	14	64.4	60.0	56.3	57.6	69.1
UT4	UT	72	00:03:13	00:03:26	13	64.8	59.1	55.5	56.7	67.8
UT5	UT	71	00:11:03	00:11:17	14	65.5	60.6	55.3	59.0	70.5
UT6	UT	72	00:23:55	00:24:09	14	64.0	60.0	56.6	57.3	68.8
DT1	DT	58	22:47:19	22:47:36	17	58.4	57.1	54.3	54.1	66.4
DT2	DT	58	23:23:34	23:23:52	18	62.3	58.3	55.2	55.3	67.9
DT3	DT	58	23:42:25	23:42:44	19	60.6	57.2	54.3	54.2	67.0
DT4	DT	58	00:14:31	00:14:50	19	68.9	59.9	56.2	57.4	70.2
DT5	DT	58	00:33:23	00:33:40	17	57.5	55.7	54.6	52.7	65.0
UT Target Speed		72			**Max $L_{max,fast}$**	**68.9**			Average $SEL_{event,UT}$	69.2
DT Target Speed		58							Average $SEL_{event,DT}$	67.7
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	80.9
									Total SEL_{DT} in 30min	79.4
									$L_{eq,30min}$ (Day & Evening)	**50.7**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	78.2
									Total SEL_{DT} in 30min	76.7
									$L_{eq,30min}$ (Night)	**48.0**
Correction										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**51**
									Corrected $L_{eq,30min}$ (Night)	**48**
									Corrected $L_{max,fast}$ (Night)	**69**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.14 *Measurement Data at TWGH2 on 27 and 28 Dec 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	73	22:26:15	22:26:32	17	65.1	61.6	58.3	58.9	71.2
UT2	UT	73	22:34:00	22:34:17	17	64.6	61.2	57.8	58.5	70.8
UT3	UT	73	22:43:55	22:44:12	17	65.0	61.1	57.8	58.5	70.8
UT4	UT	73	23:03:19	23:03:37	18	65.0	61.5	57.1	59.6	72.1
UT5	UT	73	23:25:14	23:25:32	18	66.5	62.3	57.8	60.5	73.0
UT6	UT	73	23:31:34	23:31:51	17	63.8	60.7	56.8	58.4	70.7
UT7	UT	73	00:03:20	00:03:38	18	65.5	61.9	57.1	60.2	72.8
UT8	UT	73	00:40:08	00:40:25	17	64.7	62.2	57.9	60.1	72.4
DT1	DT	66	22:05:29	22:05:46	17	62.5	60.5	56.4	58.4	70.8
DT2	DT	67	22:37:24	22:37:41	17	64.1	61.3	57.8	58.7	71.0
DT3	DT	67	22:54:15	22:54:31	16	63.4	61.5	57.5	59.2	71.3
DT4	DT	67	23:06:15	23:06:31	16	63.6	61.2	56.9	59.2	71.3
DT5	DT	67	23:16:47	23:17:03	16	63.2	60.6	56.4	58.5	70.5
DT6	DT	67	23:42:04	23:42:20	16	62.8	60.3	56.0	58.3	70.3
DT7	DT	67	00:14:11	00:14:28	17	65.2	62.2	58.9	59.5	71.8
DT8	DT	67	00:21:59	00:22:15	16	68.7	63.7	59.5	61.7	73.7
DT9	DT	67	00:33:11	00:33:28	17	68.0	62.9	58.4	61.0	73.3
DT10	DT	66	00:42:53	00:43:11	18	67.7	62.8	58.2	60.9	73.5
UT Target Speed		73			**Max $L_{max,fast}$**	**68.7**			Average $SEL_{event,UT}$	71.8
DT Target Speed		67							Average $SEL_{event,DT}$	71.9
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	83.6
									Total SEL_{DT} in 30min	83.7
									$L_{eq,30min}$ (Day & Evening)	**54.1**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	80.9
									Total SEL_{DT} in 30min	81.0
									$L_{eq,30min}$ (Night)	**51.4**
Corrrection										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**54**
									Corrected $L_{eq,30min}$ (Night)	**51**
									Corrected $L_{max,fast}$ (Night)	**69**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.15 *Measurement Data at HSS3 on 8 and 9 Nov 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	67	23:05:57	23:06:18	21	66.4	62.0	54.6	61.1	74.3
UT2	UT	68	23:14:20	23:14:40	20	66.7	62.2	53.9	61.5	74.5
UT3	UT	68	23:17:51	23:18:12	21	66.6	62.6	54.0	61.9	75.1
UT4	UT	68	23:21:55	23:22:15	20	66.1	62.1	56.7	60.7	73.7
UT5	UT	68	23:25:12	23:25:33	21	66.7	62.5	55.3	61.5	74.8
UT6	UT	68	23:28:39	23:29:00	21	66.3	62.1	55.7	61.0	74.2
UT7	UT	68	23:38:24	23:38:45	21	66.2	62.4	56.9	61.0	74.2
UT8	UT	68	23:41:42	23:42:03	21	66.2	62.4	56.0	61.2	74.4
UT9	UT	68	23:45:29	23:45:50	21	66.2	62.3	56.6	60.9	74.1
UT10	UT	67	23:48:32	23:48:52	20	66.6	63.0	57.2	61.8	74.8
UT11	UT	68	23:57:03	23:57:23	20	66.3	62.7	56.7	61.4	74.4
UT12	UT	68	00:00:03	00:00:23	20	66.0	62.3	56.7	60.9	73.9
UT13	UT	68	00:04:04	00:04:24	20	66.5	62.8	57.1	61.5	74.5
UT14	UT	68	00:06:47	00:07:07	20	66.9	63.0	57.1	61.7	74.8
UT15	UT	68	00:14:12	00:14:33	21	67.3	62.8	57.3	61.4	74.6
UT16	UT	68	00:20:46	00:21:07	21	66.9	62.9	57.2	61.5	74.7
UT17	UT	68	00:30:34	00:30:55	21	66.1	61.8	53.2	61.2	74.4
UT18	UT	68	00:36:50	00:37:10	20	66.3	62.3	56.0	61.1	74.1
UT19	UT	68	00:42:35	00:42:55	20	66.5	62.1	52.2	61.6	74.6
DT1	DT	72	23:05:32	23:05:54	22	66.1	61.9	54.6	61.0	74.5
DT2	DT	71	23:07:49	23:08:11	22	65.5	61.6	54.6	60.6	74.0
DT3	DT	71	23:14:44	23:15:05	21	66.1	62.2	53.9	61.5	74.7
DT4	DT	71	23:18:41	23:19:03	22	66.4	62.7	54.0	62.0	75.4
DT5	DT	69	23:21:13	23:21:35	22	65.4	61.9	56.7	60.4	73.8
DT6	DT	71	23:25:50	23:26:12	22	66.1	62.0	55.3	61.0	74.4
DT7	DT	71	23:29:13	23:29:35	22	65.9	62.5	55.7	61.5	74.9
DT8	DT	71	23:38:57	23:39:19	22	66.0	62.2	56.9	60.7	74.2
DT9	DT	71	23:42:30	23:42:52	22	66.3	62.4	56.0	61.3	74.7
DT10	DT	71	23:46:32	23:46:54	22	66.3	62.6	56.6	61.3	74.7
DT11	DT	71	23:49:08	23:49:30	22	66.1	62.3	57.2	60.7	74.2
DT12	DT	72	23:57:26	23:57:47	21	66.6	62.8	56.7	61.6	74.8
DT13	DT	71	00:00:29	00:00:51	22	66.4	62.7	56.7	61.4	74.8
DT14	DT	71	00:05:44	00:06:06	22	66.3	62.9	57.1	61.6	75.0
DT15	DT	71	00:08:20	00:08:42	22	66.4	62.6	57.1	61.1	74.5
DT16	DT	71	00:14:38	00:15:00	22	66.4	62.7	57.3	61.2	74.6
DT17	DT	71	00:23:20	00:23:42	22	66.3	62.5	53.4	61.9	75.3
DT18	DT	71	00:31:38	00:32:00	22	66.1	61.8	53.2	61.2	74.6
DT19	DT	72	00:36:15	00:36:37	22	66.3	62.7	56.0	61.6	75.0
DT20	DT	71	00:39:05	00:39:27	22	65.6	61.6	52.0	61.1	74.5
DT21	DT	71	00:48:35	00:48:57	22	65.7	61.7	52.6	61.1	74.5
DT22	DT	71	00:53:53	00:54:15	22	66.2	62.4	55.2	61.5	74.9
UT Target Speed		68			**Max $L_{max,fast}$**	**67.3**			Average $SEL_{event,UT}$	74.4
DT Target Speed		71							Average $SEL_{event,DT}$	74.7

Daytime & Evening time calculation

Max train freq per 30min per direction	15	Total SEL_{UT} in 30min	86.2
		Total SEL_{DT} in 30min	86.4
		$L_{eq,30min}$ (Day & Evening)	**56.8**

Correction

Façade correction	**0.0**
Projection to worst affected floor	**0.0**
Corrected $L_{eq,30min}$ (Day & Evening)	**57**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.16 *Measurement Data at HSS2 on 8 and 9 Nov 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	60	23:05:56	23:06:17	21	68.4	64.9	58.0	63.9	77.1
UT2	UT	61	23:14:19	23:14:40	21	68.3	64.8	59.8	63.1	76.4
UT3	UT	61	23:17:46	23:18:08	22	69.2	65.6	60.3	64.1	77.6
UT4	UT	60	23:21:54	23:22:16	22	68.5	65.7	61.7	63.5	76.9
UT5	UT	61	23:25:12	23:25:33	21	68.9	65.5	61.2	63.5	76.7
UT6	UT	61	23:28:38	23:28:59	21	68.5	65.5	60.9	63.7	76.9
UT7	UT	61	23:38:22	23:38:43	21	69.2	65.7	61.9	63.3	76.5
UT8	UT	61	23:41:42	23:42:02	20	68.5	65.5	60.6	63.8	76.8
UT9	UT	61	23:45:29	23:45:49	20	68.8	65.9	60.8	64.2	77.3
UT10	UT	61	23:48:31	23:48:51	20	68.8	65.9	62.0	63.7	76.7
UT11	UT	61	23:57:04	23:57:24	20	70.0	66.1	62.6	63.5	76.5
UT12	UT	61	00:14:11	00:14:31	20	68.6	66.0	63.0	63.1	76.1
UT13	UT	61	00:20:46	00:21:06	20	69.5	66.9	63.1	64.6	77.6
UT14	UT	60	00:30:34	00:30:55	21	70.2	66.6	63.2	63.9	77.2
UT15	UT	60	00:42:33	00:42:53	20	68.6	65.4	60.9	63.4	76.4
DT1	DT	72	23:05:31	23:05:52	21	69.6	65.3	58.0	64.3	77.6
DT2	DT	71	23:07:47	23:08:08	21	69.5	65.3	58.0	64.4	77.7
DT3	DT	71	23:14:41	23:15:02	21	69.7	65.4	59.8	64.0	77.2
DT4	DT	72	23:18:42	23:19:02	20	70.0	65.6	60.3	64.2	77.2
DT5	DT	69	23:21:12	23:21:33	21	69.9	66.1	61.7	64.2	77.4
DT6	DT	72	23:25:47	23:26:08	21	70.2	65.8	61.2	63.9	77.1
DT7	DT	71	23:29:08	23:29:28	20	70.4	66.6	60.9	65.3	78.3
DT8	DT	72	23:38:53	23:39:13	20	69.9	66.1	61.9	64.0	77.0
DT9	DT	71	23:42:29	23:42:50	21	70.5	66.4	60.6	65.0	78.3
DT10	DT	72	23:46:29	23:46:50	21	70.0	66.1	60.8	64.6	77.8
DT11	DT	71	23:49:09	23:49:30	21	70.5	66.2	62.0	64.2	77.4
DT12	DT	72	23:57:25	23:57:46	21	70.6	66.5	62.6	64.2	77.4
DT13	DT	71	00:00:24	00:00:46	22	70.9	68.1	64.6	65.6	79.0
DT14	DT	72	00:05:44	00:06:05	21	70.9	67.2	64.1	64.3	77.5
DT15	DT	71	00:08:16	00:08:37	21	71.5	67.5	64.0	65.0	78.2
DT16	DT	71	00:14:38	00:14:58	20	70.1	66.5	63.0	63.9	76.9
DT17	DT	72	00:23:17	00:23:37	20	70.7	66.9	63.3	64.5	77.5
DT18	DT	71	00:31:38	00:31:59	21	70.9	67.4	63.2	65.4	78.6
DT19	DT	72	00:39:02	00:39:23	21	70.7	66.3	61.4	64.7	77.9
DT20	DT	71	00:48:33	00:48:53	20	70.0	66.1	61.2	64.4	77.4
DT21	DT	72	00:53:50	00:54:11	21	70.0	66.2	61.3	64.4	77.7
UT Target Speed		61			**Max $L_{max,fast}$**	**71.5**			Average $SEL_{event,UT}$	76.9
DT Target Speed		71							Average $SEL_{event,DT}$	77.7
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	88.6
									Total SEL_{DT} in 30min	89.5
									$L_{eq,30min}$ (Day & Evening)	**59.5**
Corrrection										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**60**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.17 *Measurement Data at HSS1 on 8 and 9 Nov 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	60	23:05:57	23:06:17	20	69.2	65.9	60.2	64.5	77.5
UT2	UT	61	23:14:20	23:14:40	20	68.6	65.4	61.6	63.1	76.1
UT3	UT	61	23:17:47	23:18:08	21	69.4	66.8	62.4	64.9	78.1
UT4	UT	61	23:25:13	23:25:32	19	69.4	66.4	63.0	63.8	76.6
UT5	UT	61	23:28:41	23:29:00	19	70.3	66.5	62.5	64.3	77.1
UT6	UT	61	23:38:28	23:38:48	20	69.9	67.3	63.9	64.7	77.7
UT7	UT	61	23:41:42	23:42:01	19	69.1	66.2	62.5	63.8	76.6
UT8	UT	61	23:45:30	23:45:49	19	69.5	67.1	62.3	65.3	78.1
UT9	UT	61	00:20:47	00:21:06	19	70.3	67.7	64.5	64.9	77.7
UT10	UT	60	00:42:38	00:42:57	19	69.4	66.3	62.6	63.8	76.6
DT1	DT	72	23:05:31	23:05:50	19	70.2	66.7	60.2	65.6	78.3
DT2	DT	71	23:07:45	23:08:05	20	70.2	66.5	60.2	65.3	78.3
DT3	DT	71	23:14:40	23:15:00	20	70.5	66.9	61.6	65.3	78.3
DT4	DT	72	23:18:38	23:18:58	20	70.0	66.6	62.4	64.5	77.5
DT5	DT	69	23:21:12	23:21:32	20	70.3	67.5	63.5	65.3	78.4
DT6	DT	72	23:25:48	23:26:08	20	70.6	67.3	63.0	65.3	78.3
DT7	DT	71	23:29:08	23:29:27	19	71.3	68.1	62.5	66.7	79.5
DT8	DT	72	23:38:53	23:39:12	19	71.3	67.7	63.9	65.4	78.2
DT9	DT	71	23:42:28	23:42:47	19	71.1	67.6	62.5	66.0	78.8
DT10	DT	72	23:46:30	23:46:49	19	71.0	67.3	62.3	65.6	78.4
DT11	DT	71	23:49:05	23:49:24	19	72.1	67.5	63.8	65.1	77.9
DT12	DT	72	23:57:24	23:57:43	19	71.3	67.8	64.5	65.0	77.8
DT13	DT	71	00:00:26	00:00:46	20	71.8	69.7	65.8	67.4	80.4
DT14	DT	71	00:31:37	00:31:55	18	71.9	68.8	65.1	66.5	79.0
DT15	DT	72	00:39:02	00:39:20	18	71.6	68.0	63.2	66.2	78.8
DT16	DT	71	00:48:33	00:48:52	19	71.0	67.2	62.9	65.2	78.0
DT17	DT	72	00:53:48	00:54:08	20	70.7	67.3	62.7	65.5	78.5
UT Target Speed		61			**Max $L_{max,fast}$**	**72.1**			Average $SEL_{event,UT}$	77.3
DT Target Speed		71							Average $SEL_{event,DT}$	78.6
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	89.0
									Total SEL_{DT} in 30min	90.3
									$L_{eq,30min}$ (Day & Evening)	**60.2**
Corrrection										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**60**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.18 *Measurement Data at HSS4 on 8 and 9 Nov 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	50	23:45:32	23:45:54	22	58.8	57.2	54.2	54.2	67.6
UT2	UT	50	00:06:52	00:07:15	23	59.9	57.8	54.9	54.8	68.4
UT3	UT	50	00:20:50	00:21:12	22	59.1	57.1	53.8	54.4	67.8
UT4	UT	50	00:30:44	00:31:06	22	58.3	56.9	53.5	54.3	67.7
UT5	UT	51	00:42:39	00:43:00	21	57.5	55.1	52.4	52.1	65.3
DT1	DT	72	23:05:27	23:05:49	22	59.9	57.7	54.0	55.2	68.6
DT2	DT	72	23:07:45	23:08:07	22	59.4	57.4	54.0	54.8	68.2
DT3	DT	72	23:29:09	23:29:30	21	60.5	58.4	53.7	56.6	69.8
DT4	DT	72	23:38:53	23:39:14	21	60.7	58.1	54.7	55.5	68.7
DT5	DT	72	23:46:25	23:46:47	22	59.7	57.5	54.4	54.6	68.0
DT6	DT	72	00:23:12	00:23:33	21	59.6	57.8	54.2	55.2	68.5
DT7	DT	72	00:31:31	00:31:52	21	59.3	57.4	53.9	54.9	68.1
DT8	DT	72	00:36:09	00:36:32	23	59.7	57.8	54.4	55.2	68.8
DT9	DT	72	00:38:58	00:39:21	23	59.4	57.1	52.4	55.3	68.9
DT10	DT	72	00:48:28	00:48:49	21	58.7	56.6	53.1	54.0	67.2
DT11	DT	72	00:53:48	00:54:10	22	59.5	56.1	52.5	53.5	67.0
UT Target Speed		50			**Max $L_{max,fast}$**	**60.7**			Average $SEL_{event,UT}$	67.5
DT Target Speed		72							Average $SEL_{event,DT}$	68.4
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	79.3
									Total SEL_{DT} in 30min	80.2
									$L_{eq,30min}$ (Day & Evening)	**50.2**
Correction										
									Façade correction	**0.0**
									Projection to worst affected floor	**2.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**52**

Remarks:

1. BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).
2. Event that has less than 3.0dB(A) difference between $L_{eq,raw}$ and $L_{eq,BG}$ is highlighted in blue.

Table C.19 *Measurement Data at OC1 on 8 and 9 Nov 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	45	23:06:05	23:06:48	43	67.6	65.2	61.8	62.6	78.9
UT2	UT	45	23:22:05	23:22:47	42	69.7	66.4	62.3	64.2	80.5
UT3	UT	45	23:45:38	23:46:20	42	70.4	65.5	61.5	63.2	79.5
UT4	UT	45	00:06:52	00:07:33	41	68.1	65.3	61.8	62.8	78.9
UT5	UT	45	00:20:51	00:21:34	43	67.5	64.7	61.1	62.3	78.6
UT6	UT	45	00:30:43	00:31:25	42	68.3	65.6	60.1	64.1	80.4
UT7	UT	45	00:37:00	00:37:42	42	66.7	64.5	60.5	62.3	78.6
DT1	DT	73	23:05:25	23:05:51	26	68.6	65.6	61.8	63.3	77.4
DT2	DT	72	23:07:42	23:08:08	26	68.2	65.1	61.8	62.4	76.6
DT3	DT	73	00:05:35	00:06:03	28	68.4	66.1	61.8	64.0	78.5
DT4	DT	72	00:08:10	00:08:38	28	68.3	65.3	61.8	62.7	77.1
DT5	DT	73	00:23:07	00:23:35	28	69.1	65.7	61.1	63.9	78.4
DT6	DT	72	00:31:31	00:31:57	26	68.9	65.6	60.1	64.1	78.2
DT7	DT	73	00:36:08	00:36:34	26	67.9	64.9	60.5	62.9	77.1
DT8	DT	72	00:38:56	00:39:23	27	68.2	65.2	60.5	63.5	77.8
DT9	DT	73	00:53:45	00:54:11	26	67.3	62.8	59.4	60.2	74.4
UT Target Speed		45			**Max $L_{max,fast}$**	**70.4**			Average $SEL_{event,UT}$	79.4
DT Target Speed		73							Average $SEL_{event,DT}$	77.4
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	91.2
									Total SEL_{DT} in 30min	89.2
									$L_{eq,30min}$ (Day & Evening)	**60.7**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	88.4
									Total SEL_{DT} in 30min	86.5
									$L_{eq,30min}$ (Night)	**58.0**
Corrrection										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**61**
									Corrected $L_{eq,30min}$ (Night)	**58**
									Corrected $L_{max,fast}$ (Night)	**70**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.20 *Measurement Data at OC2 on 8 and 9 Nov 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	45	23:06:05	23:06:48	43	68.1	64.5	59.6	62.9	79.2
UT2	UT	45	23:22:05	23:22:47	42	68.6	64.8	60.8	62.7	78.9
UT3	UT	45	23:45:38	23:46:20	42	69.3	64.2	59.1	62.6	78.8
UT4	UT	45	00:04:12	00:04:54	42	66.4	63.0	58.4	61.1	77.3
UT5	UT	45	00:06:55	00:07:38	43	67.2	63.2	58.4	61.5	77.8
UT6	UT	45	00:11:24	00:12:07	43	66.3	63.6	59.2	61.7	78.0
UT7	UT	45	00:20:53	00:21:36	43	66.0	62.4	58.0	60.4	76.7
UT8	UT	45	00:30:43	00:31:25	42	66.7	63.9	56.1	63.1	79.4
UT9	UT	45	00:37:00	00:37:42	42	65.7	62.0	56.7	60.5	76.7
DT1	DT	73	23:05:25	23:05:40	15	67.8	64.7	59.6	63.1	74.8
DT2	DT	72	23:07:41	23:07:56	15	67.6	64.5	59.6	62.8	74.5
DT3	DT	72	23:21:06	23:21:20	14	67.3	64.2	60.8	61.5	73.0
DT4	DT	72	23:46:25	23:46:40	15	67.0	63.8	59.1	62.1	73.8
DT5	DT	49	00:05:37	00:05:53	16	67.5	65.0	58.4	64.0	76.0
DT6	DT	72	00:08:12	00:08:28	16	67.6	64.5	58.4	63.2	75.3
DT7	DT	73	00:10:49	00:11:05	16	67.6	64.5	59.2	63.0	75.0
DT8	DT	61	00:23:12	00:23:28	16	68.1	65.6	58.2	64.7	76.7
DT9	DT	72	00:31:30	00:31:46	16	68.2	64.9	56.1	64.3	76.3
DT10	DT	73	00:36:08	00:36:23	15	67.4	64.0	56.7	63.1	74.9
DT11	DT	61	00:38:56	00:39:11	15	66.9	64.0	56.7	63.1	74.8
DT12	DT	72	00:48:28	00:48:43	15	66.8	63.5	57.1	62.4	74.1
DT13	DT	73	00:53:45	00:54:01	16	67.0	62.6	57.1	61.2	73.2
UT Target Speed		45			**Max $L_{max,fast}$**	**69.3**			Average $SEL_{event,UT}$	78.2
DT Target Speed		73							Average $SEL_{event,DT}$	75.0
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	90.0
									Total SEL_{DT} in 30min	86.7
									$L_{eq,30min}$ (Day & Evening)	**59.1**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	87.2
									Total SEL_{DT} in 30min	84.0
									$L_{eq,30min}$ (Night)	**56.4**
Corrrection										
									Façade correction	**0.0**
									Projection to worst affected floor	**0.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**59**
									Corrected $L_{eq,30min}$ (Night)	**56**
									Corrected $L_{max,fast}$ (Night)	**69**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.21 *Measurement Data at SWT3 on 8 and 9 Nov 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	44	23:06:18	23:06:44	26	67.9	64.3	61.3	61.4	75.5
UT2	UT	44	23:32:41	23:33:08	27	65.4	63.9	59.2	62.1	76.4
UT3	UT	44	23:35:47	23:36:13	26	68.4	65.2	60.6	63.3	77.5
UT4	UT	44	23:57:30	23:57:56	26	65.6	63.6	59.4	61.5	75.6
UT5	UT	44	00:11:44	00:12:10	26	65.0	62.5	59.0	60.0	74.2
UT6	UT	44	00:21:07	00:21:34	27	64.5	61.7	58.5	58.9	73.2
UT7	UT	44	00:43:03	00:43:29	26	66.1	63.5	58.4	61.8	76.0
DT1	DT	62	23:05:22	23:05:36	14	70.4	65.7	61.3	63.7	75.2
DT2	DT	66	23:07:38	23:07:52	14	68.8	66.0	61.3	64.2	75.6
DT3	DT	66	23:11:02	23:11:17	15	69.7	66.5	62.2	64.5	76.3
DT4	DT	66	23:14:30	23:14:44	14	69.5	66.7	62.9	64.3	75.8
DT5	DT	66	23:21:03	23:21:17	14	69.1	66.1	61.6	64.3	75.7
DT6	DT	66	23:32:12	23:32:27	15	68.3	65.6	59.3	64.4	76.2
DT7	DT	66	23:35:28	23:35:43	15	69.2	66.2	60.6	64.7	76.5
DT8	DT	66	23:57:14	23:57:29	15	68.5	65.0	59.4	63.5	75.3
DT9	DT	66	00:00:16	00:00:31	15	67.8	64.0	59.8	62.0	73.7
DT10	DT	66	00:05:34	00:05:48	14	66.7	64.7	59.7	63.1	74.6
DT11	DT	66	00:08:09	00:08:24	15	69.5	65.7	59.7	64.5	76.2
DT12	DT	66	00:10:43	00:10:58	15	69.4	64.3	59.0	62.8	74.6
DT13	DT	66	00:23:06	00:23:21	15	67.6	65.0	58.5	64.0	75.7
DT14	DT	66	00:36:03	00:36:18	15	69.0	65.6	59.4	64.4	76.1
DT15	DT	66	00:38:52	00:39:07	15	68.7	64.3	59.3	62.6	74.4
DT16	DT	66	00:48:21	00:48:36	15	70.4	63.8	58.0	62.5	74.2
DT17	DT	66	00:53:39	00:53:54	15	68.6	64.0	58.0	62.8	74.5
UT Target Speed		44			**Max $L_{max,fast}$**	**70.4**			Average $SEL_{event,UT}$	75.7
DT Target Speed		66							Average $SEL_{event,DT}$	75.4
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	87.4
									Total SEL_{DT} in 30min	87.2
									$L_{eq,30min}$ (Day & Evening)	**57.8**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	84.7
									Total SEL_{DT} in 30min	84.4
									$L_{eq,30min}$ (Night)	**55.0**
Corrrection										
									Façade correction	**0.0**
									Projection to worst affected floor	**1.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**59**
									Corrected $L_{eq,30min}$ (Night)	**56**
									Corrected $L_{max,fast}$ (Night)	**71**

Remarks:

BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Table C.22 *Measurement Data at SWT2 on 8 and 9 Nov 2015 and Calculations*

PB No.	Direction	Train Speed, kph	Event Time		Duration, sec	$L_{max,fast}$, dB(A)	$L_{eq,raw}$, dB(A)	$L_{eq,BG}$, dB(A)	$L_{eq,event}$, dB(A)	SEL, dB(A)
			Start	End						
UT1	UT	44	23:06:23	23:06:49	26	68.1	64.9	61.7	62.0	76.2
UT2	UT	44	23:32:41	23:33:08	27	65.4	64.1	60.6	61.5	75.8
UT3	UT	44	23:35:53	23:36:21	28	66.8	64.5	61.0	61.9	76.4
UT4	UT	44	00:11:44	00:12:10	26	64.3	62.4	59.4	59.5	73.6
UT5	UT	44	00:43:03	00:43:30	27	65.1	63.3	59.4	61.0	75.3
DT1	DT	62	23:05:22	23:05:36	14	67.0	65.4	61.6	63.1	74.6
DT2	DT	66	23:07:38	23:07:52	14	66.8	65.6	61.7	63.3	74.7
DT3	DT	66	23:14:32	23:14:46	14	67.0	65.7	62.7	62.8	74.2
DT4	DT	66	23:32:12	23:32:27	15	65.7	63.8	60.6	61.0	72.8
DT5	DT	66	23:35:28	23:35:43	15	67.0	64.9	61.0	62.6	74.4
DT6	DT	66	00:08:08	00:08:24	16	68.9	66.1	61.1	64.5	76.6
DT7	DT	66	00:23:06	00:23:21	15	65.9	64.1	59.0	62.4	74.2
DT8	DT	66	00:36:03	00:36:18	15	68.3	65.1	60.4	63.3	75.1
DT9	DT	66	00:38:52	00:39:07	15	67.5	63.8	60.4	61.2	72.9
DT10	DT	66	00:48:21	00:48:37	16	66.2	62.6	58.8	60.3	72.3
UT Target Speed		44			**Max $L_{max,fast}$**	**68.9**			Average $SEL_{event,UT}$	75.5
DT Target Speed		66							Average $SEL_{event,DT}$	74.3
Daytime & Evening time calculation										
		Max train freq per 30min per direction			15				Total SEL_{UT} in 30min	87.3
									Total SEL_{DT} in 30min	86.1
									$L_{eq,30min}$ (Day & Evening)	**57.2**
Night time calculation										
		Max train freq per 30min per direction			8				Total SEL_{UT} in 30min	84.6
									Total SEL_{DT} in 30min	83.4
									$L_{eq,30min}$ (Night)	**54.5**
Correction										
									Façade correction	**0.0**
									Projection to worst affected floor	**2.0**
									Corrected $L_{eq,30min}$ (Day & Evening)	**59**
									Corrected $L_{eq,30min}$ (Night)	**57**
									Corrected $L_{max,fast}$ (Night)	**71**

Remarks:

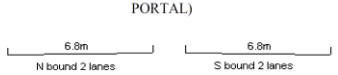
BG correction of $L_{eq,event}$ from $L_{eq,raw}$ is limited to be within 3.0dB(A).

Annex D

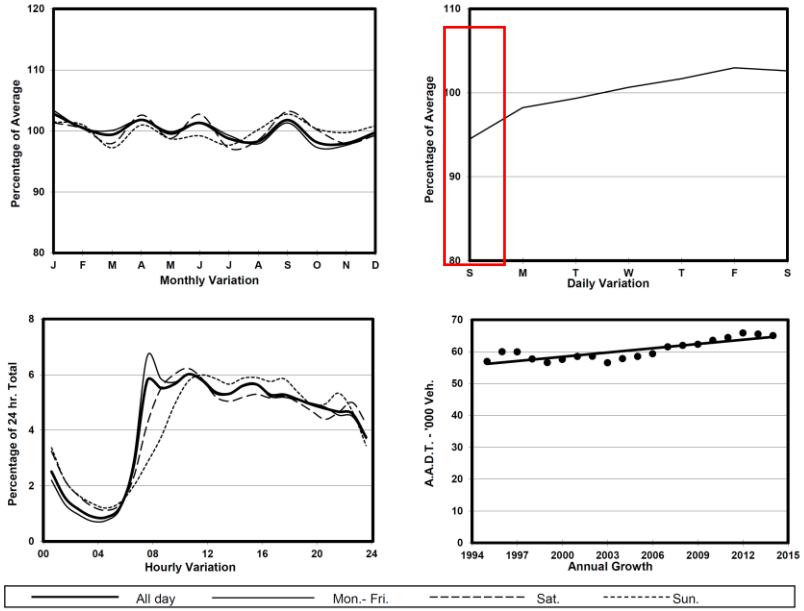
Traffic Data Extracted from "The Annual Traffic Census 2014"

Figure D.1 Traffic data at Aberdeen Tunnel

YEAR	2014	**LINK**	ABERDEEN TUNNEL (from TOLL PLAZA to NORTH PORTAL)
CORE STATION	1004		
ROAD NETWORK	MAJOR		
ROAD TYPE	URBAN TRUNK ROAD		



1. TRAFFIC FLOW VARIATION AND GROWTH

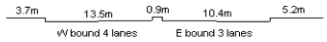


2. TRAFFIC CHARACTERISTICS (BY DIRECTION)

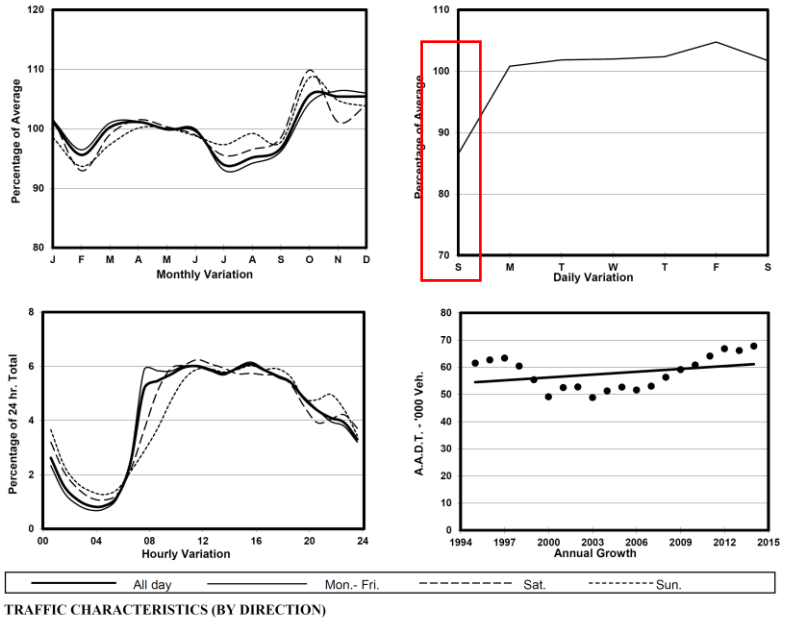
Parameter	All - Day	Mon. - Fri.	Sat.	Sun.
SOUTH BOUND				
A.A.D.T.	35080	35610	36030	32220
R 12 / 24 - %	64.3	65.2	62.5	60.9
R 16 / 24 - %	84.8	85.9	81.8	82
AM Peak Hour	0900-1000	0700-0800	0900-1000	0900-1000
One-way flow at AM peak hour	1960	2140	1990	1420
T - % (AM)	-	17.7	-	-
PM Peak Hour	1800-1900	1800-1900	1600-1700	1600-1700
One-way flow at PM peak hour	1890	1960	1900	1870
T - % (PM)	-	11	-	-
Prop.of commercial vehicles - 16 hr.	-	14.1	-	-
NORTH BOUND				
A.A.D.T.	29960	30020	30770	29480
R 12 / 24 - %	68.9	70.1	65.7	66.4
R 16 / 24 - %	86	86.7	83.8	85
AM Peak Hour	0700-0800	0700-0800	0900-1000	0900-1000
One-way flow at AM peak hour	1920	2240	2030	1620
T - % (AM)	-	14	-	-
PM Peak Hour	1700-1800	1700-1800	1700-1800	1700-1800
One-way flow at PM peak hour	1650	1620	1620	1870
T - % (PM)	-	16.1	-	-
Prop.of commercial vehicles - 16 hr.	-	15.9	-	-

Figure D.2 Traffic data at Wong Chuk Hang Road (between Nam Fung Road and Nam Long Shan Road)

YEAR	2014	**LINK**	WONG CHUK HANG RD (from NAM LONG SHAN RD to NAM FUNG RD)
CORE STATION	1010		
ROAD NETWORK	MAJOR		
ROAD TYPE	PRIMARY DISTRIBUTOR		



1. TRAFFIC FLOW VARIATION AND GROWTH

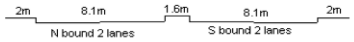


2. TRAFFIC CHARACTERISTICS (BY DIRECTION)

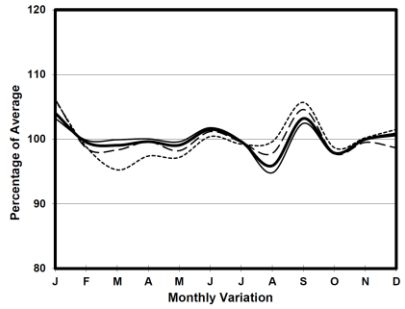
Parameter	All - Day	Mon. - Fri.	Sat.	Sun.
EAST BOUND				
A.A.D.T.	35540	36510	36710	31320
R 12 / 24 - %	71.4	72.6	69.5	66.6
R 16 / 24 - %	87	87.9	85	84
AM Peak Hour	0900-1000	0700-0800	0900-1000	0900-1000
One-way flow at AM peak hour	2110	2440	2410	1640
T - % (AM)	-	-	-	-
PM Peak Hour	1600-1700	1600-1700	1700-1800	1700-1800
One-way flow at PM peak hour	2120	2220	2060	1900
T - % (PM)	-	-	-	-
Prop.of commercial vehicles - 16 hr.	-	-	-	-
WEST BOUND				
A.A.D.T.	32250	33370	32760	27780
R 12 / 24 - %	66	67.3	64.4	60.4
R 16 / 24 - %	85	86.2	82.4	81.1
AM Peak Hour	0900-1000	0900-1000	0900-1000	0900-1000
One-way flow at AM peak hour	1760	1910	1700	1150
T - % (AM)	-	-	-	-
PM Peak Hour	1800-1900	1800-1900	1600-1700	1600-1700
One-way flow at PM peak hour	1870	1960	1900	1660
T - % (PM)	-	-	-	-
Prop.of commercial vehicles - 16 hr.	-	-	-	-

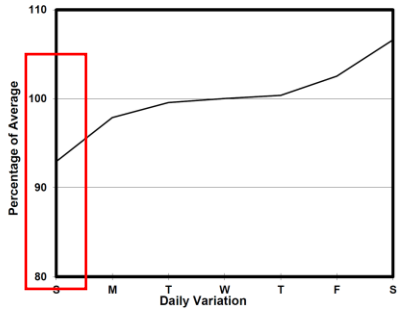
Figure D.3 Traffic data at Ap Lei Chau Bridge

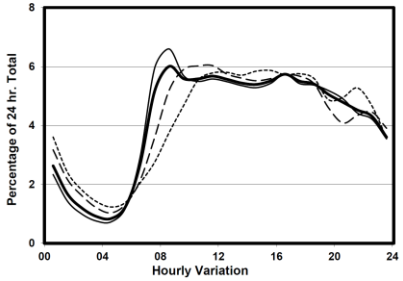
YEAR	2014	**LINK**	AP LEI CHAU BRIDGE & AP LEI CHAU BRIDGE RD (from WONG CHUK HANG RD to AP LEI CHAU EST)
CORE STATION	1017		
ROAD NETWORK	MAJOR		
ROAD TYPE	DISTRICT DISTRIBUTOR		

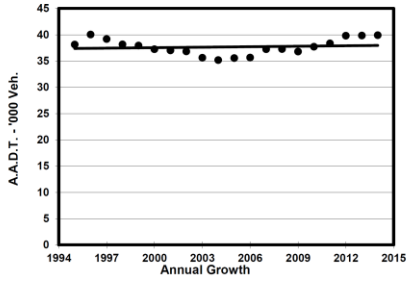


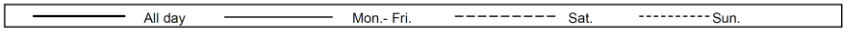
1. TRAFFIC FLOW VARIATION AND GROWTH











2. TRAFFIC CHARACTERISTICS (BY DIRECTION)

Parameter	All - Day	Mon. - Fri.	Sat.	Sun.
SOUTH BOUND				
A.A.D.T.	19670	19740	21040	18490
R 12 / 24 - %	63.9	64.6	63.6	60.3
R 16 / 24 - %	84.8	85.8	82.7	81.9
AM Peak Hour	0800-0900	0800-0900	0900-1000	0900-1000
One-way flow at AM peak hour	1030	1140	1130	750
T - % (AM)	-	-	-	-
PM Peak Hour	1600-1700	1800-1900	1600-1700	1600-1700
One-way flow at PM peak hour	1130	1160	1240	1080
T - % (PM)	-	-	-	-
Prop.of commercial vehicles - 16 hr.	-	-	-	-
NORTH BOUND				
A.A.D.T.	20230	20360	21640	18720
R 12 / 24 - %	69.2	70.1	68.3	65.2
R 16 / 24 - %	85.7	86.4	84.2	83.2
AM Peak Hour	0800-0900	0700-0800	0900-1000	0900-1000
One-way flow at AM peak hour	1360	1530	1390	990
T - % (AM)	-	-	-	-
PM Peak Hour	1600-1700	1600-1700	1700-1800	1700-1800
One-way flow at PM peak hour	1160	1170	1270	1140
T - % (PM)	-	-	-	-
Prop.of commercial vehicles - 16 hr.	-	-	-	-

Annex E

MTR SIL(E) Air-borne Noise Performance Test Measurement Methodology

Wilson Acoustics Limited

Unit 601, Block A, Shatin Industrial Centre,
5 - 7 Yuen Shun Circuit, Shatin, NT
Tel: (852) 3188-1170, Fax: (852) 3422-8117
E-mail: who@wal.hk
Web: www.wal.hk

MTR SIL(E) Air-borne Noise Performance Test Measurement Methodology

Ref No.: 14269-21

For

MTR Corporation Ltd
MTR Tower, Telford Plaza,
Kowloon Bay, Hong Kong.

Approved by:

Wilson Ho
MIOA, MHKIOA, AFCHKRI, MHKIEIA

Prepared by: CC / CY

20 Oct 2015

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1. Introduction

South Island Line (SIL(E)) runs from Admiralty (ADM) to South Horizons (SOH), with three intermediate stations at Ocean Park (OCP), Wong Chuk Hang (WCH) and Lei Tung (LET). Over its entire ~7km railway alignment, SIL(E) comprises viaduct sections from Nam Fung Portal to the southern side of Aberdeen Channel Bridge and underground sections covering the remaining area. Environmental Impact Assessment (EIA-185/2010) has been conducted and approved with conditions on 26 Oct 2010.

According to Environmental Permit (EP) Condition 2.30, "At least one month before commencement of operation of the Project, the Permit Holder shall carry out noise performance test and deposit with the Director four hard copies and one electronic copy of a Noise Performance Test Report to confirm the compliance of the operational air-borne and ground-noise levels in accordance with the approved EIA Report. Before submission to the Director, the Noise Performance Test Report shall be certified by the ET Leader and verified by the IEC as conforming to the information and recommendations contained in the approved EIA Report. Any necessary measure(s) as recommended in the Noise Performance Test Report shall be fully and properly implemented."

Wilson Acoustics Limited (WAL) is commissioned by ERM to conduct air-borne noise performance test for SIL(E) for MTR Corporation Ltd in accordance with EP Conditions mentioned above.

This document presents the measurement methodology for the air-borne noise performance test for agreement with EPD.

2. EP Condition for Operational Noise

According to EP Condition 2.24, "The Permit Holder shall operate 3-car K-Stock train, or other train type with equivalent or better noise performance supported with justifications by the ET Leader and verified by the IEC as conforming to the information, requirements and recommendations as set out in the approved EIA report, of approximately 68m in length for the Project. The maximum train frequency operating in the Project from hours 0700 to 2300 shall not exceed 15 trains per 30 minutes in each direction. The maximum train frequency operating in the Project from hours 2300 to 0700 of the following day shall not exceed 8 trains per 30 minutes in each direction."

3. Noise Control Ordinance (NCO) Criteria

With reference to *Technical Memorandum for Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites* (IND-TM) issued under Noise Control Ordinance (NCO), the air-borne operational noise from rail operation shall be within the acceptable noise level (ANL). ANL is determined from the sensitive time period and the Area Sensitivity Rating (ASR) where the Noise Sensitive Receiver (NSR) is located. ANLs for each ASR are listed in Table 3.1.

Table 3.1 Acceptable Noise Levels (ANLs), in dB(A)

Time Period \ ASR	**A**	**B**	**C**
Day (0700 to 1900 hours) & Evening (1900 to 2300 hours)	60	65	70
Night (2300 to 0700 hours)	50	55	60

4. Proposed Testing Locations

Representative NSRs potentially affected by air-borne train noise during operation phase were identified in SIL(E) EIA report. Those NSRs are listed in **Table 4.1**. Locations of EIA NSR along SIL(E) alignment from Nam Fung Portal to Aberdeen Channel Bridge are shown in Appendix A.

Table 4.1 Representative Noise Sensitive Receivers potentially affected during operation phase

No.	NSR ID	Description	Land Use	Façade Facing	ASR	Assessment Period		
						Day	Evening	Night
L1	BC	Beaconsfield Court	Residential	NW	C	✓	✓	✓
L2	SW4	San Wai No. 4C	Residential	N	C	✓	✓	✓
L3	YSM1	TWGHs Yeung Shing Memorial Long Stay Care Home	Convalescent Home	S	C	✓	✓	✓
L4	WCHH2	Wong Chuk Hang Hospital Staff Quarter	Residential	SE	C	✓	✓	✓
L5	OCP2	OCP G/IC Zone	G/IC (Planned)	NE	C	✓	✓	✓
L6	OCP3	OCP G/IC Zone	G/IC (Planned)	SW	B	✓	✓	✓
L7	PC4	Police College – Barrack Block J	Residential	E	B	✓	✓	✓
L8	PC3	Police College – Barrack Block J	Residential	W	B	✓	✓	✓
L9	WCH1	WCH Residential Zone	Residential (Planned)	E	B	✓	✓	✓
L10	WCH2	WCH Residential Zone	Residential (Planned)	W	B	✓	✓	✓
L11	WCH3	WCH Residential Zone	Residential (Planned)	NW	B	✓	✓	✓
L12	TWY	Tai Wong Ye Temple	Place of Worship	N	B	✓	-	-
L13	SMH1	Little Sisters of the Poor St. Mary's Home for the Aged	Home for the Elderly	N	B	✓	✓	✓
L14	TWGH1	TWGHs Jockey Club Rehabilitation Complex Block A	Convalescent Home	N	B	✓	✓	✓
L15	TWGH2	TWGHs Jockey Club Rehabilitation Complex Block D	Convalescent Home	N	B	✓	✓	✓
L16	HSS3	Holy Spirit Seminary – Chapel	Place of Worship	N	B	✓	✓	-
L17	HSS2	Holy Spirit Seminary	Educational	NE	B	✓	✓	-
L18	HSS1	Holy Spirit Seminary	Educational	NW	C	✓	✓	-
L19	HSS4	Holy Spirit Seminary	Educational	NW	C	✓	✓	-
L20	OC1	Ocean Court – Tower 3	Residential	SE	C	✓	✓	✓
L21	OC2	Ocean Court – Tower 3	Residential	SW	C	✓	✓	✓
L22	SWT3	Sham Wan Towers – Tower 3	Residential	NE	C	✓	✓	✓
L23	SWT2	Sham Wan Towers – Tower 3	Residential	NW	C	✓	✓	✓

Photos of proposed measurement locations are shown in Appendix B. For measurement with façade effect, the microphone will be placed at a horizontal distance of 1m and pointing outwards from the façade. For free-field measurement, the microphone will be pointing towards the track (preferably the open track if applicable).

L1 (BC)

The proposed measurement location L1 (BC) at Beaconsfield Court is the roof top of Block H, which is the closest block among those at Beaconsfield Court. The North-West-facing façade of Beaconsfield Court is indicated in EIA, facing the full enclosure section near Nam Fung Portal. For a greater angle of view to the open track section, it is proposed that L1(BC) to be relocated to the South-West-facing façade of the same residential block. The microphone would be placed at 1m from building façade as illustrated in **Figure B.1**.

L2 (SW4)

In EIA, the North-facing façade of San Wai No. 4C is indicated in EIA. The North-facing façade is indicated in EIA, facing the junction between the full enclosure section and the unprotected side of semi-enclosure. For a greater angle of view to the open track section, it is proposed that L2(SW4) to be relocated to the West-facing façade of San Wan No. 4. The microphone would be placed at 1/F at 1m from building façade as illustrated in **Figure B.2**.

L3 (YSM1)

The proposed measurement location L3 (YSM1) is at the roof top of the TWGHs Yeung Shing Memorial Long Stay Care Home. The microphone would be placed at 1m from building façade as illustrated in **Figure B.3**.

L4 (WCHH2)

The proposed measurement location L4 (WCHH2) is at the roof top of the Wong Chuk Hang Hospital Staff Quarter. The microphone would be placed at 1m from building façade as illustrated in **Figure B.4**.

L5 (OCP2)

According to the latest relevant outline zoning plan (ref: *Approved Aberdeen & Ap Lei Chau Outline Zoning Plan* No. S/H15/29, as gazetted on 21/03/2014), there is no any changes in the zoning plan for the site adjacent to the OCP station (namely OCP G/IC zone, as shown in **Figure C.1** in Appendix C) from that reviewed in SIL(E) EIA. The detailed plan for the development is not available yet, but considering the OCP station area under the management by MTR shown in **Figure C.2**, it is noticed that the planned NSR L5 (OCP2) was marked at location within the OCP station area, where G/IC development is unlikely. The proposed relocated measurement location L5 (OCP2) is at the site boundary of OCP G/IC zone excluding OCP station area as illustrated in **Figure B.5**. The proposed measurement height is 13m from ground, which represents the planned NSR at the 4th floor (the highest allowed height) at OCP G/IC zone. Correction for façade reflection C_R of 3dB would be applied to the calculation of passby noise level.

L6 (OCP3)

Similar to L5 (OCP2), considering the boundary of OCP G/IC zone where the maximum allowed height is 4 storeys shown in **Figure C.1** and the OCP station area shown in **Figure C.2,** relocation of planned NSR L6 (OCP3) is proposed. The proposed relocated measurement location L6 (OCP3) is at the site boundary of OCP G/IC zone excluding OCP station area as illustrated in **Figure B.5**. The proposed measurement height is 13m from ground. Correction for façade reflection C_R of 3dB would be applied to the calculation of passby noise level.

L7 (PC4)
The proposed measurement location L7 (PC4) is at the roof top of Police College Barrack Block J East Wing. The microphone would be placed at 1m from building façade as illustrated in **Figure B.6**.

L8 (PC3)
The proposed measurement location L8 (PC3) is at the roof top of Police College Barrack Block J West Wing. The microphone would be placed at 1m from building façade as illustrated in **Figure B.7**.

L9 (WCH1)
The proposed measurement location L9 (WCH1) is at the roof top of WCH station, which represents the planned NSR at the WCH Residential Zone. According to the "Approved Master Layout Plan of Wong Chuk Hang CDA Site" (**Figure D.1** attached in Appendix D), measurement location L9 (WCH1) would represent the planned residential building T6. The microphone would be set at 8m above the roof top of WCH station as illustrated in **Figure B.8**. Correction for façade reflection (C_R) of 3dB would be applied to the calculation of passby noise level. The measured result would represent noise received at the lower floors of T6.

L10 (WCH2)
The proposed measurement location L10 (WCH2) is at the roof top of WCH station, which represents the planned NSR at the WCH Residential Zone. According to the "Approved Master Layout Plan of Wong Chuk Hang CDA Site" shown in **Figure D.1**, measurement location L10 (WCH2) would represent the planned residential building T3. The microphone would be set at 8m high from the roof top of WCH station, 5m out from the station façade as illustrated in **Figure B.8**. Correction for façade reflection (C_R) of 3dB would be applied to the calculation of passby noise level. The measured result would represent noise received at the lower floors of T3.

L11 (WCH3) – Proposed to be represented by L10 (WCH2) and NOT to be measured
According to the "*Approved Master Layout Plan of Wong Chuk Hang CDA Site*" shown in **Figure D.1**, measurement location L11 (WCH3) is located the site boundary and not represented any planned NSR. Therefore, it is proposed that L11 (WCH3) to be relocated to represent the planned residential building T2. After the proposed relocation of L11 (WCH3), the horizontal distance of the planned NSR is around 50m from the track. It is anticipated that, the noise received at lower floors of the planned residential building T2 would be lower than that of the planned residential building T3. Concerning there are physical constraints of setting up 40m high microphone from the ground level of the WCH CDA construction site and the noise level there is not as representative as that at L10 (WCH2), it is proposed that the noise level at L11 (WCH3) would be represented by that measured at L10 (WCH2) and not to be measured.

L12 (TWY)
The proposed measurement location L12 (TWY) is outside the Tai Wong Ye Temple. The microphone would be placed at 1m from the closed main door of the temple as illustrated in **Figure B.9**.

L13 (SMH1)
The proposed measurement location L13 (SMH1) is at the 1st floor of the elderly's home in the Little Sisters of the Poor St. Mary's Home for the Aged. The microphone would be placed at corridor, at 1m from window as illustrated in **Figure B.10**.

L14 (TWGH1)

The proposed measurement location L14 (TWGH1) is at the ground level of Block A of the TWGHs Jockey Club Rehabilitation Complex. From the site visit and discussion with management officer of the premises, measurement at location originally marked in EIA drawing is not allowed due to potential disturbance brought to the residents. It is proposed the measurement locations to be relocated to the East end of the same North-facing façade, which is the balcony outside security office at the ground level of Block A. The microphone would be placed at 1m from building façade as illustrated in **Figure B.11**.

L15 (TWGH2)

The proposed measurement location L15 (TWGH2) is at the roof top of Block D of the TWGHs Jockey Club Rehabilitation Complex. The microphone would be placed at 2m above the top of wall as illustrated in **Figure B.11**. Correction for façade reflection (C_R) of 3dB would be applied to the calculation of passby noise level.

L16 (HSS3)

The proposed measurement location L16 (HSS3) is outside the chapel of the Holy Spirit Seminary. The microphone would be placed at 1m horizontally from closed window and 2.5m above ground as illustrated in **Figure B.12**.

L17 (HSS2)

The proposed measurement location L17 (HSS2) is at the 3rd floor of the marked building in the Holy Spirit Seminary. The microphone would be placed at 1m from the window as shown in **Figure B.13**.

L18 (HSS1)

The proposed measurement location L18 (HSS1) is at the 3rd floor of the marked building in the Holy Spirit Seminary. The microphone would be placed at 1m from the balcony door as shown in **Figure B.13**.

L19 (HSS4)

The proposed measurement location L19 (HSS4) is at the 1st floor balcony of the marked building in the Holy Spirit Seminary. The microphone would be placed at 1m from the window as shown in **Figure B.14**.

L20 (OC1)

The proposed measurement location L20 (OC1) is at the roof top of the Tower 3 of the Ocean Court. The microphone would be placed at 1m from the South-East-facing façade as shown in **Figure B.15**.

L21 (OC2)

The proposed measurement location L21 (OC2) is at the roof top of the Tower 3 of the Ocean Court. It is proposed the measurement locations to be relocated towards to the adjacent South-West-facing façade as indicated by the blue arrow in **Figure B.15** such that it is closer to the unprotected side of the curved track of radius 300m, where squeal noise may appear. The microphone would be placed at 1m from that South-West-facing façade as illustrated in **Figure B.15**.

L22 (SWT3)

The proposed measurement location L22 (SWT3) is at the Refuge floor (Floor 26R) of the Tower 3 of the Sham Wan Towers. It is proposed the measurement locations to be relocated towards the North-West direction to the next North-East-facing façade as indicated by the blue arrow in **Figure B.16** as there is no opening at the originally marked façade at the Refuge floor, and the microphone would be closer to the SIL(E) track after such relocation. The microphone would be placed at 1m from that North-East-facing façade as shown in **Figure B.16**.

L23 (SWT2)

The proposed measurement location L23 (SWT2) is at the Refuge floor (Floor 26R) of the Tower 3 of the Sham Wan Towers. The microphone would be placed at 1m from the North-West-facing façade as shown in **Figure B.16**.

5. Air-borne Noise Performance Test Plan

5.1. Measurement Instrument

Following IND-TM, measurement instrument is proposed in **Table 5.1**. The sound level meters and microphones are complied with the International Electrotechnical Commission (IEC) Publications 60651 (Type 1) and 60804 (Type 1). The acoustic calibrator, microphones and sound level meters are maintained with regular laboratory calibrations. The calibrations are traceable to international standard. All microphones will be field-calibrated immediately prior to and following the measurement to verify the accuracy of the sound level meters. Measurements will be accepted as valid only as the calibration levels before and after the measurement agrees to within 1.0dB.

Table 5.1 Proposed Measurement Instrument

Instrument	Model No.	Quantity
4-channel Sound Analyzer	Svantek SVAN 958 or equivalent	5
1-channel Sound Analyzer	Brüel & Kjær Type 2250L or equivalent	5
Microphone	Brüel & Kjær Type 4189 or equivalent	12
Microphone Preamplifier	Brüel & Kjær Type 2671 or equivalent	12
Acoustic Calibrator	Svantek SV30A or equivalent	3

5.2. Tentative Test Schedule

Due to the progress of construction works, SIL(E) is divided into Southern Loop (South of OCP station to SOH) and Northern Loop (ADM to South of OCP station). The Noise Performance Tests for Southern Loop and Northern Loop are proposed to be conducted in the 4th quarter of 2015 and in the 2nd quarter of 2016 respectively, subject to the actual construction and train testing schedule of MTR.

Tests would be conducted during night-time to minimize as far as practicable the influence of background noise and any extraneous noise during tests. According to the current plan as listed in **Table 5.2**, 13 NSRs in the Southern Loop region (L10, L12 - L23) would be measured in 2 nights in the 4th quarter of 2015, while 9 NSRs in the Northern Loop region (L1 - L9) would be measured in 1 night in the 2nd quarter of 2016. **Figure F.1** and **Figure F.3** in **Appendix F** show the traffic data along the main roads near the measurement locations, as extracted from "*The Annual Traffic Census 2014*". The statistics show the traffics are generally lower on Sunday night. **Table 5.3** shows the tentative rundown of the test, which would be refined based on the train test schedule available near time.

Table 5.2 Tentative Test Schedule

Track	NSRs to be measured	Measurement Date
Southern Loop (South of OCP station to SOH)	L16 – L23	Sunday night, 4th quarter of 2015
	L10, L12 – L15	
	Contingency	
Northern Loop (ADM to South of OCP station)	L1 – L9	Sunday night, 2nd quarter of 2016
	Contingency	

Table 5.3 Tentative Rundown

Time	**Activity**
2200 hr - 2300 hr	Measurement setup
2300 hr - 0100 hr	Noise performance test
0100 hr - 0200 hr	Collecting Measurement Equipment

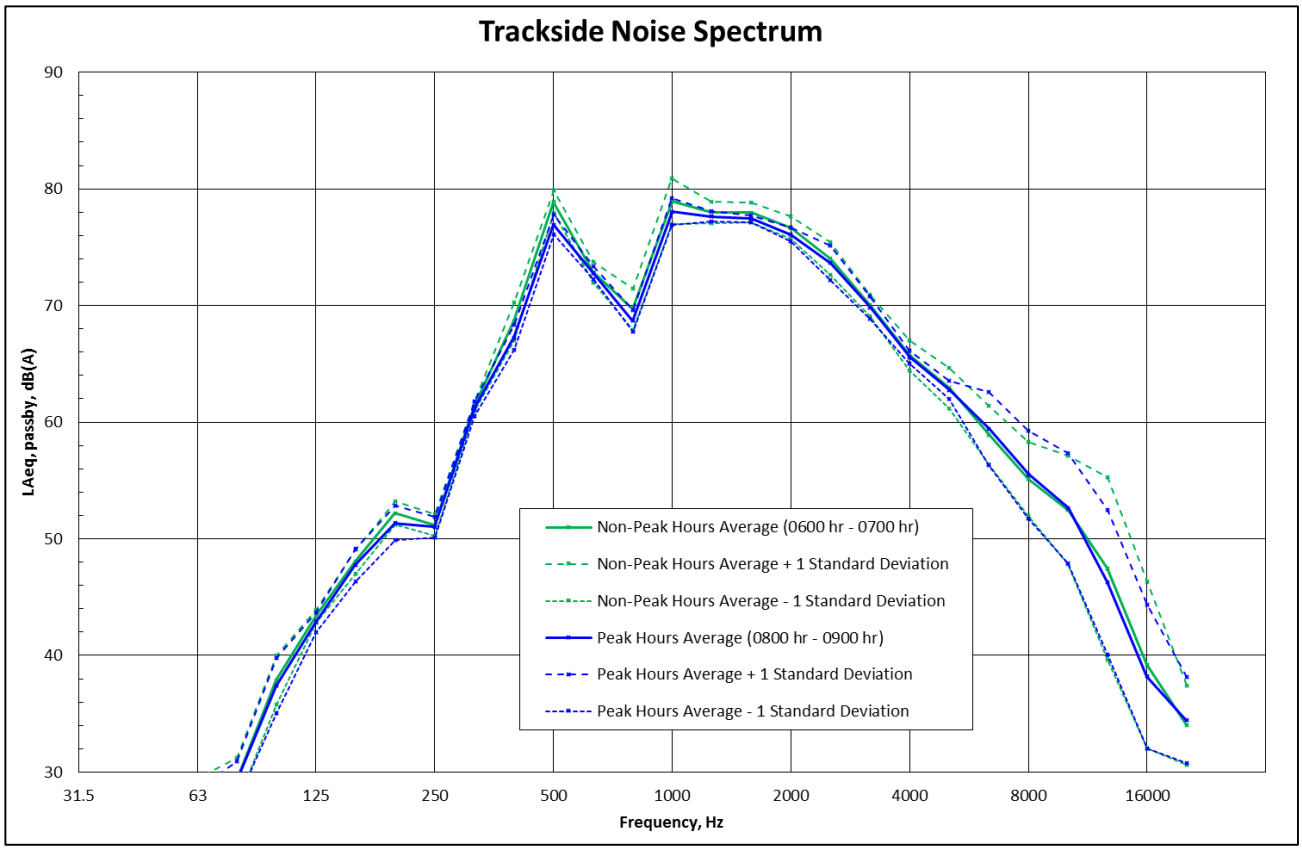
5.3. Test Train Arrangement

S-Stock train (3-car) will be deployed for the operation of SIL(E) instead of K-stock train stipulated in EP condition 2.24. According to the *Noise Performance Report for S-Stock Train (3-Car)* as prepared by ET leader and verified by IEC in January 2015, both the air-borne and ground-borne noise performance of S-Stock train are equivalent or better than the relevant EIA requirement of K-Stock train. Therefore, S-Stock train meets the requirement of EP condition 2.24, and would be arranged for the air-borne noise performance test.

Test trains would be arranged to run at design operational speed according to the target speed profile as shown in **Figure E.1** to **Figure E.6** in Appendix E. The air-conditioning units would be manually set at full load during the test. No less than 5 passbys would be measured for up track and down track respectively.

Various literatures suggested that train loading has no significant effect on air-borne noise of EMU (ref: "*Calculation of Railway Noise 1995*", "*Additional railway noise source terms For 'Calculation of Railway Noise 1995"*", and "*Acoustics – Railway applications – Measurement of noise emitted by railbound vehicles (ISO 3095:2013)*"). Previous measurement data for trains running along existing railway line also indicates that train load has no significant effect on the air-borne noise. The average train passby noise spectra at a viaduct section near Tai Shui Hang station among the SP1950 fleet of Ma On Shan Line are shown in **Figure 5.1**. Green and blue solid line represent the spectra averaged from at least 10 passbys during non-peak hours (0600hr - 0700hr) and peak hours (0800hr - 0900hr) respectively. Green dash lines and blue dash lines are the spectra +/- 1 standard deviation respectively. Taken into account the variations, there is no significant difference for the air-borne noise level during non-peak and peak hours, despite the difference in train loading. Test trains arranged for the noise performance test would be without loading.

Figure 5.1 Train passby Noise Spectra of SP1950 trains during Non-peak and Peak Hours



6. Assessment Procedure

6.1 Conduct site visit and liaise with management officer of the premises to find the most representative and accessible measurement location at the specified NSRs listed in Section 4.

6.2 Conduct measurement with test trains, as arranged by MTR, running at the operational speed. The actual train speed of test train at sections near the measurement locations should not be deviated from the target train speed by more than 10%. At each microphone location, L_{max} and L_{eq} would be logged continuously in one second (1s) interval or shorter for the whole period in A-weighting and fast response. Train speed would be measured by stopwatch near measurement locations.

6.3 Based on the recorded train passby time, extract the train passby noise level data for further analysis.

6.4 Measurement would be conducted during the time period that has relatively lower background noise where practicable. Passby noise that are affected by extraneous noise (e.g. from road traffic) would be disregarded in subsequent analysis.

6.5 Determine the background noise level $L_{eq,BG}$ of each measured event. To avoid head-tail effect of train passby from affecting the background noise measurement, only measurement data of at least 30 seconds ahead of each passby would be adopted. Duration of background noise measurement should be at least 60 seconds.

6.6 Determine the background-corrected event noise level as below:

$$L_{eq,event} = 10\log\left(10^{L_{eq,raw}/10} - 10^{L_{eq,BG}/10}\right) + C_R$$

where $L_{eq,raw}$ is the measured event noise level during train passby with audible noise;
$L_{eq,BG}$ is the background noise level;
C_R is the correction for the façade reflection that
$C_R = 3$ for measurement without façade effect;
$C_R = 0$ for measurement with façade effect; and
$L_{eq,event}$ is the background-corrected event noise level.

6.7 Determine train passby duration from the measured noise time history at the testing locations, making reference to the recorded passby time and the train running schedule provided by MTR.

6.8 Obtain the train operation headway during worst case 30 minute operation. Determine the Sound Exposure Level (SEL) arising from Up Track (UT) and Down Track (DT) train operation in 30 minutes.

$$(SEL)_{UT} = Average\ SEL_{event,UT} + 10\log(N_{UT})$$
$$(SEL)_{DT} = Average\ SEL_{event,DT} + 10\log(N_{DT})$$

where N is number of passbys in 30 minutes, and
subscript UT denotes Up Track and DT denotes Down Track.

6.9 Determine $L_{eq,30min}$ and compare with statutory requirements. A sample calculation sheet is shown in **Table 6.1**.

$$L_{eq,30min} = 10\log\left(10^{(SEL)_{UT}/10} + 10^{(SEL)_{DT}/10}\right) - 10\log(1800)$$

Table 6.1 Sample calculation sheet (for illustration of calculation procedure only, data NOT indicating any actual/predicted SIL noise performance)

PB No.	Direction	Train Speed	Event Time		Duration	$L_{eq,raw}$	$L_{eq,BG}$	$L_{eq,event}$	$L_{max,fast}$	SEL
			Start	End						
1	UT	53	00:20:00	00:20:10	00:00:10	64.7	63.0	59.8	69.5	69.8
2	UT	52	00:48:54	00:49:02	00:00:08	64.4	63.2	58.2	68.5	67.3
3	DT	42	01:02:27	01:02:34	00:00:07	64.0	62.8	58.0	67.1	66.5
4	DT	39	01:16:19	01:16:28	00:00:09	65.0	62.9	60.7	68.2	70.3
5	UT	53	01:41:52	01:42:03	00:00:11	65.2	62.9	61.3	68.9	71.7
6	UT	54	02:02:57	02:03:04	00:00:07	65.8	62.7	62.8	69.9	71.3
7	DT	39	02:30:32	02:30:42	00:00:10	65.0	62.5	61.5	68.4	71.5
8	DT	42	02:51:27	02:51:34	00:00:07	63.9	62.3	58.6	66.5	67.1
9	UT	52	03:04:00	03:04:10	00:00:10	64.1	62.3	59.3	69.0	69.3
10	DT	40	03:20:23	03:20:32	00:00:09	64.5	62.4	60.2	68.7	69.8
UT Target Speed		53						Average $SEL_{event,UT}$		70.1
DT Target Speed		39						Average $SEL_{event,DT}$		69.4
Daytime & Evening time calculation										
					Max train freq per 30min per direction	15		Total SEL_{UT} in 30min		81.9
								Total SEL_{DT} in 30min		81.2
								$L_{eq,30min}$ (Day & Evening)		**52.0**
Night time calculation										
					Max train freq per 30min per direction	8		Total SEL_{UT} in 30min		79.2
								Total SEL_{DT} in 30min		78.5
								$L_{eq,30min}$ (Night)		**49.3**

6.10 For NSRs L9 (WCH1), L19 (HSS4), L22 (SWT3) and L23 (SWT2), measurements at the worst affected floors are not permitted by the premises management. In order to project to the worst affected floor for comparison with statutory requirement, a distance correction is applied to the measured noise level in accordance with EIA prediction. The adopted correction factor is summarized in Table 6.2. For the other NSRs, it is anticipated that the floors of measurement are among the worst affected floors (with insignificant difference of less than 1dB(A)) with the current design of noise mitigation.

Table 6.2 Correction factors adopted for projection to worst affected floor

NSR	Measurement Floor	EIA predicted worst affected floors	Correction Factor *
L9 (WCH1)	At approximate height of 1/F of planned NSR	7/F-12/F	+1dB(A)
L19 (HSS4)	1/F	3/F	+2dB(A)
L22 (SWT3)	Refuge Floor	5/F-11/F	+1dB(A)
L23 (SWT2)	Refuge Floor	1/F	+2dB(A)

*Remark: *The correction factor is based on EIA predicted noise level difference between the measurement floor and the worst affected floor.*

Appendix A

Locations of Noise Sensitive Receivers

Figure A.1 Locations of EIA NSR along SIL(E) alignment from Nam Fung Portal to OCP Station

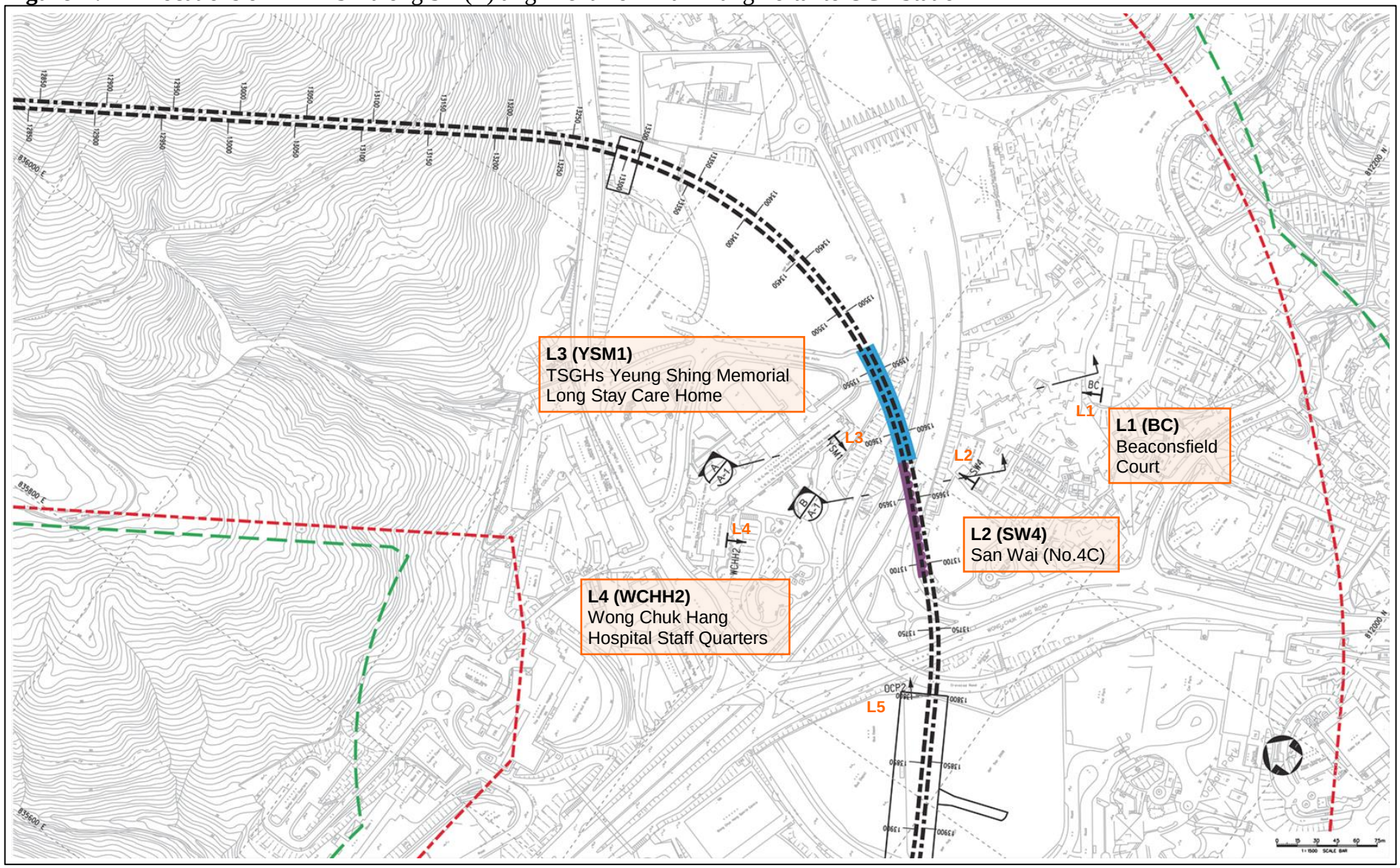


Figure A.2 Locations of EIA NSR along SIL(E) alignment from OCP Station to WCH Station

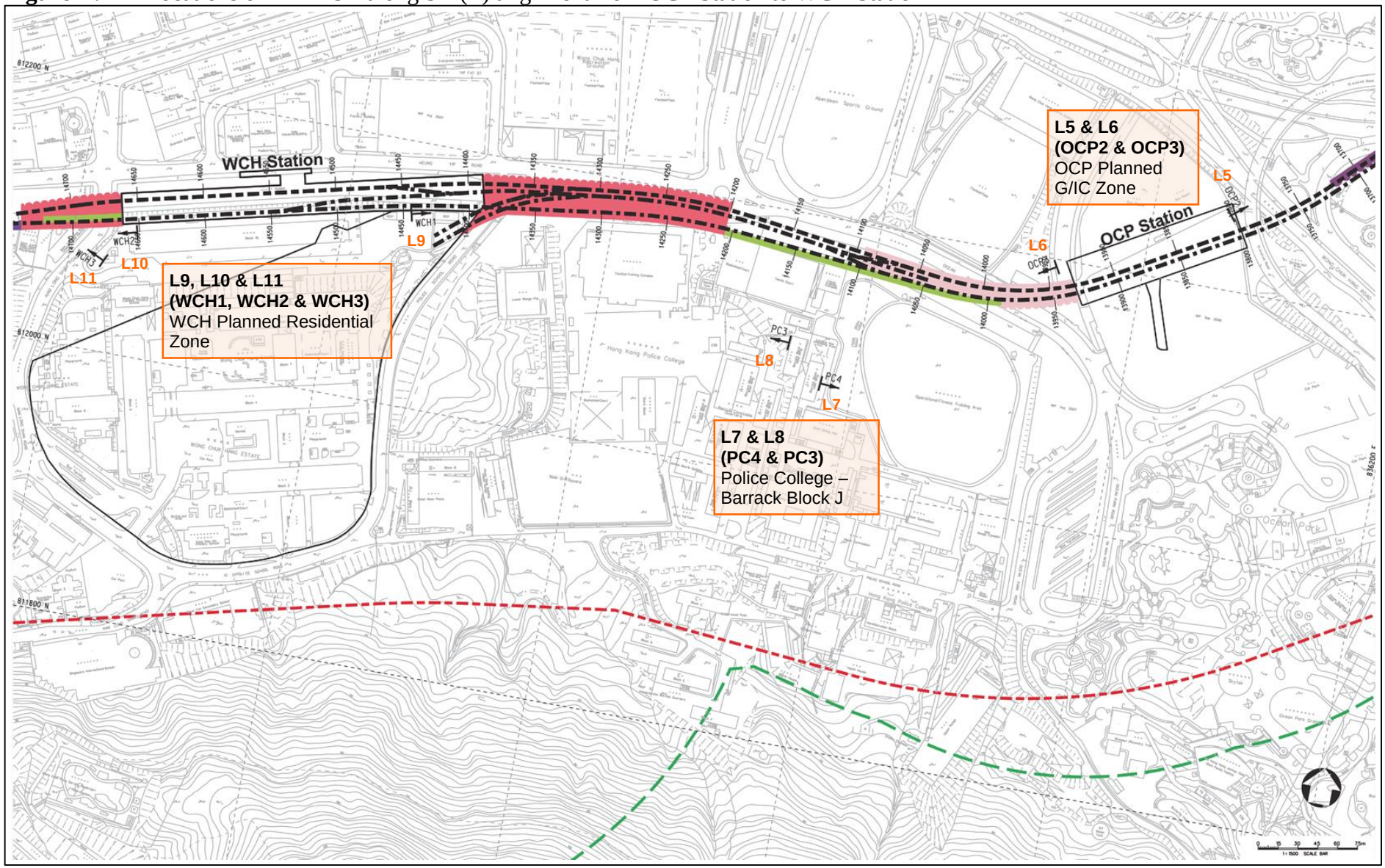
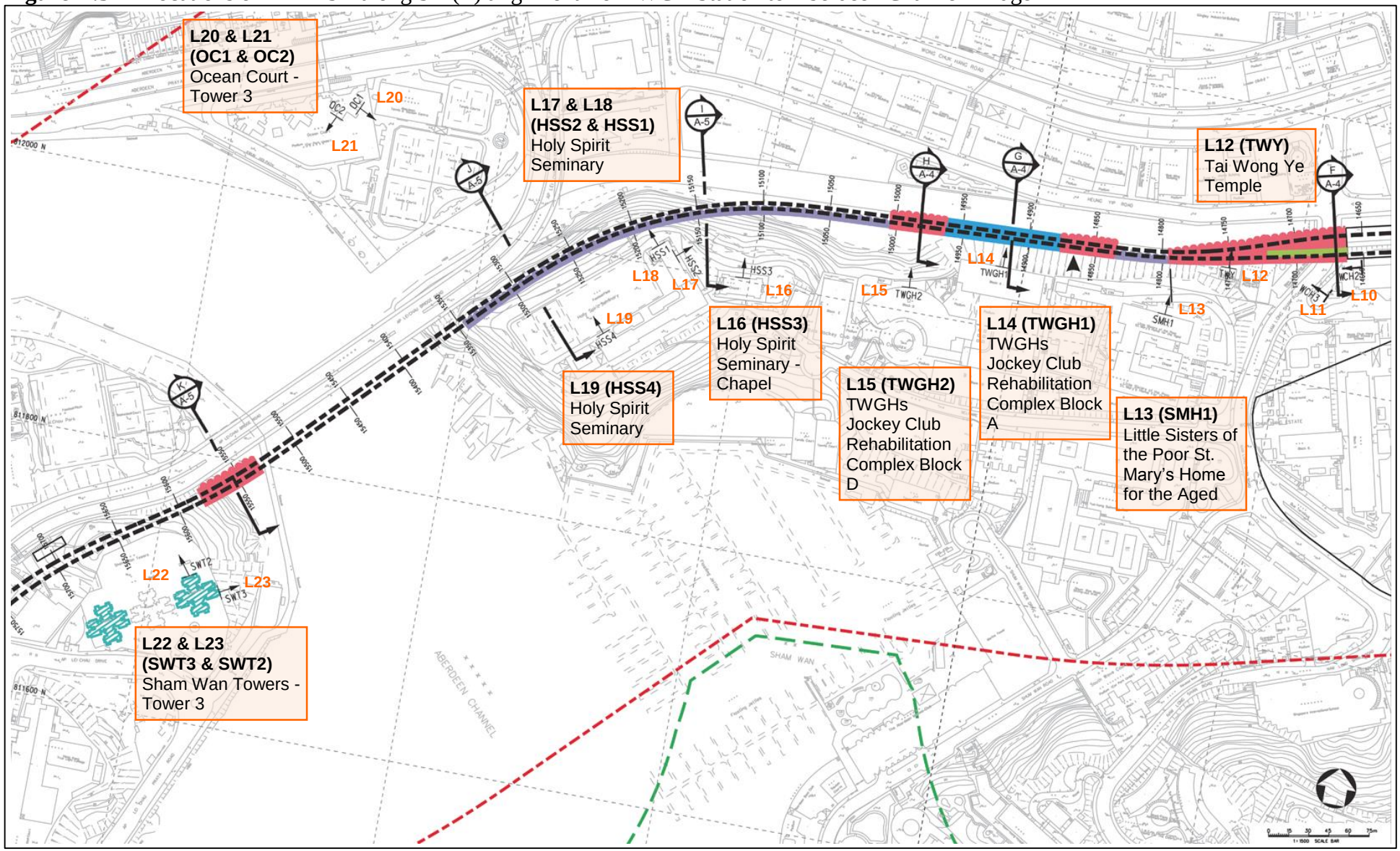


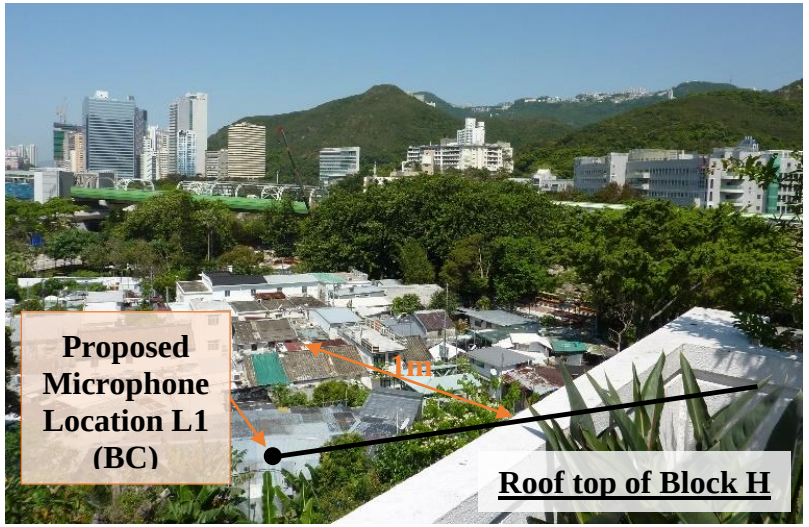
Figure A.3 Locations of EIA NSR along SIL(E) alignment from WCH Station to Aberdeen Channel Bridge



Appendix B

Photos of Proposed Measurement Locations

Figure B.1 L1 (BC) – Beaconsfield Court



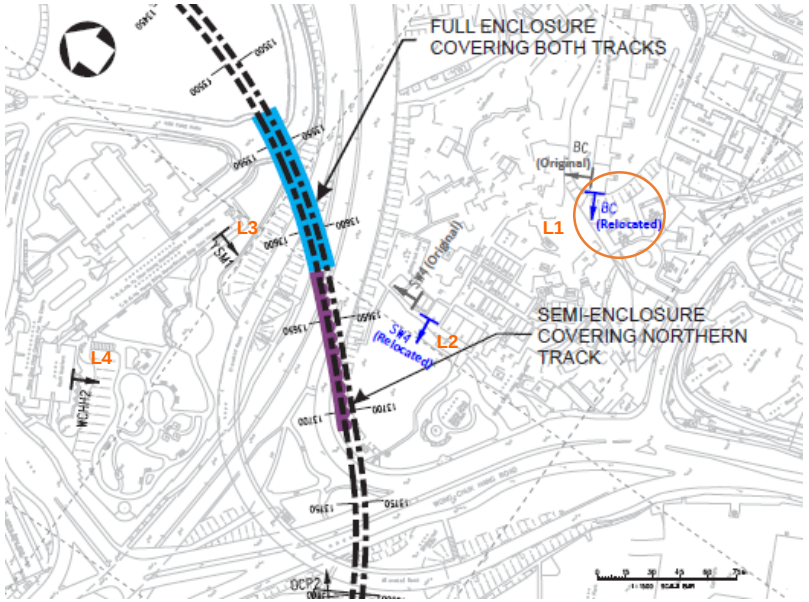


Figure B.2 L2 (SW4) - Wong Chuk Hang San Wai No. 4C

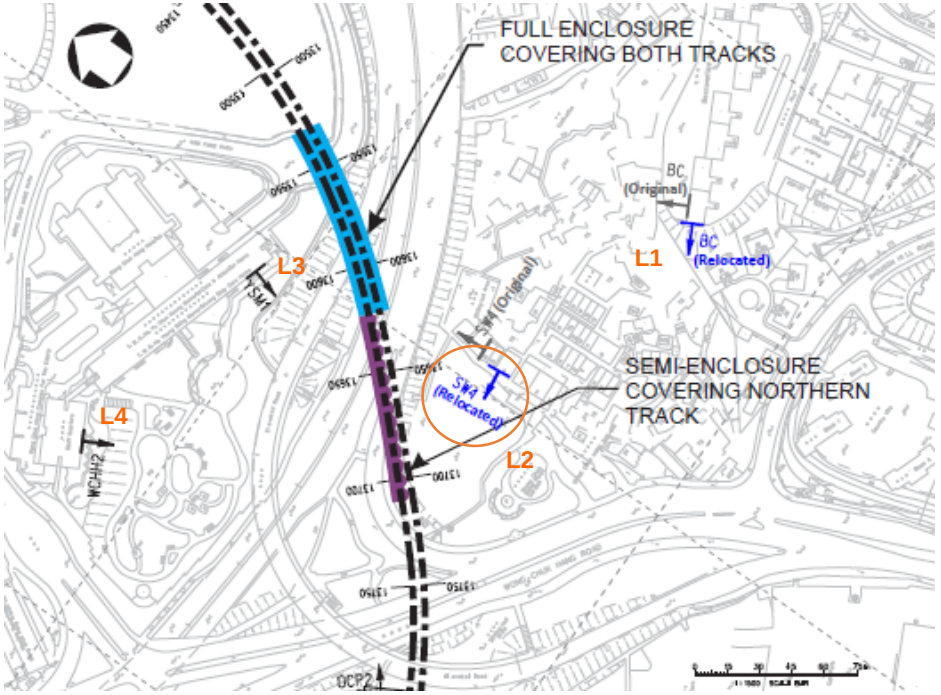
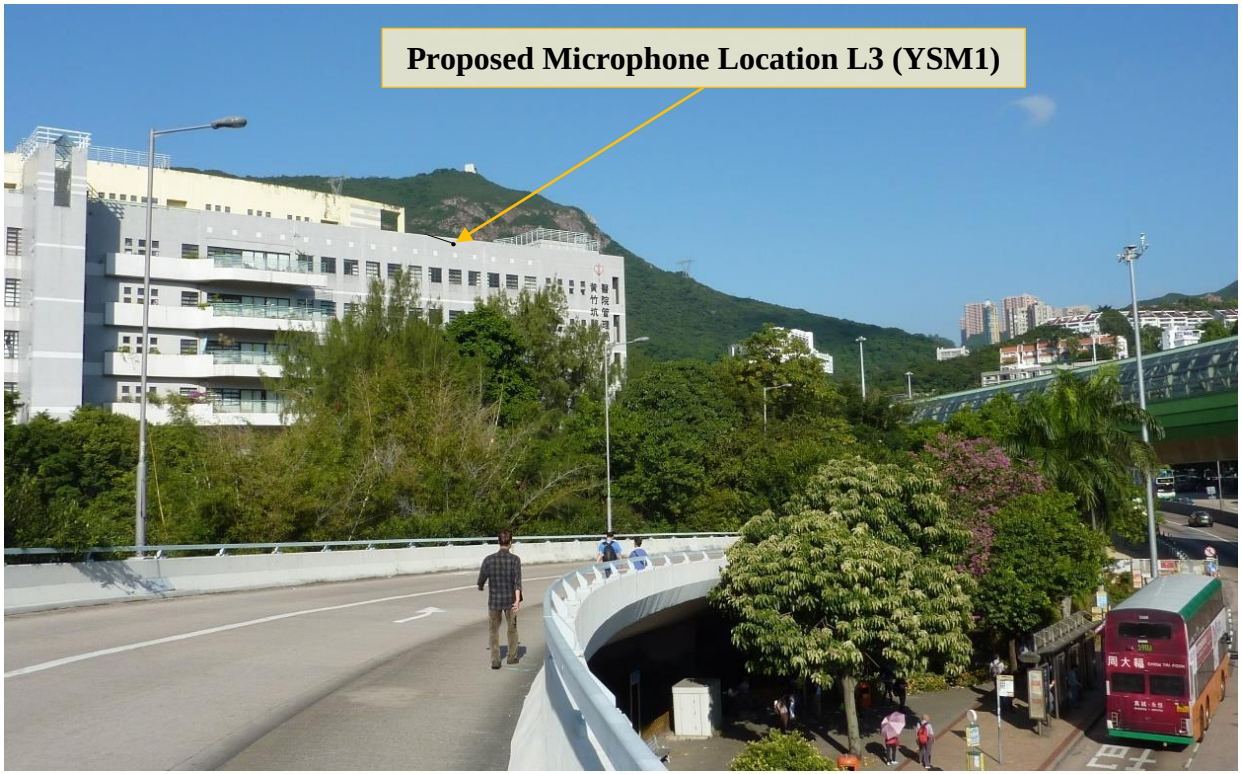


Figure B.3 L3 (YSM1) - TWGHs Yeung Shing Memorial Long Stay Care Home



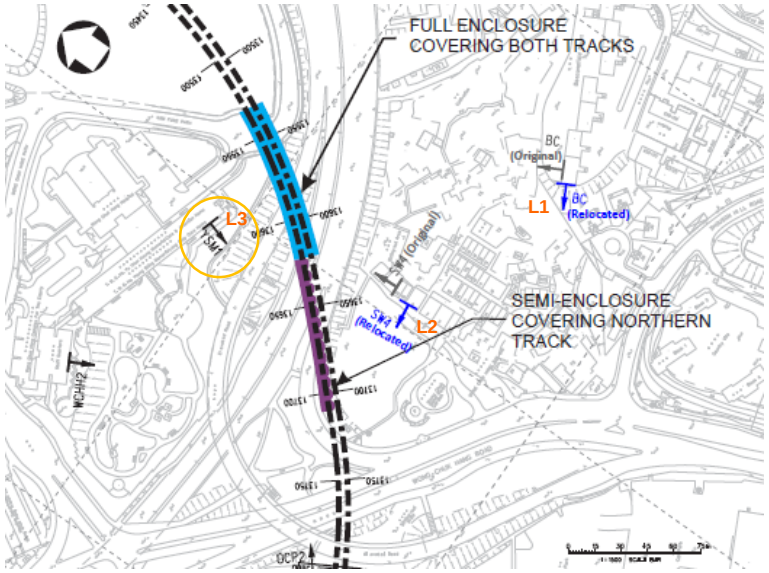


Figure B.4 L4 (WCHH2) - Wong Chuk Hang Hospital Staff Quarter

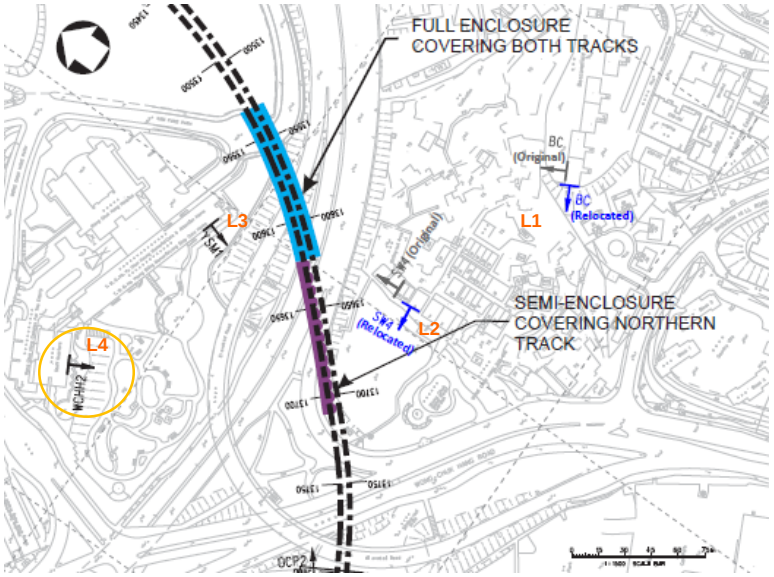


Figure B.5 L5 (OCP2) & L6 (OCP3) - OCP G/IC Zone

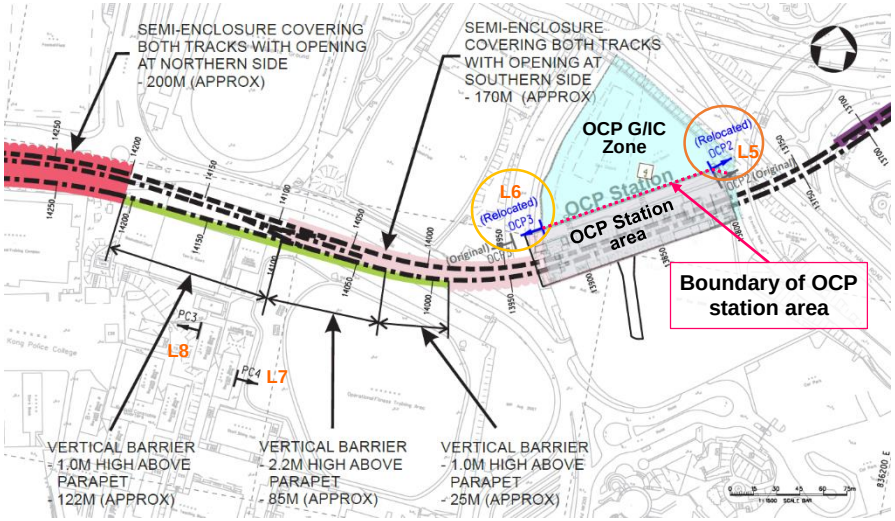
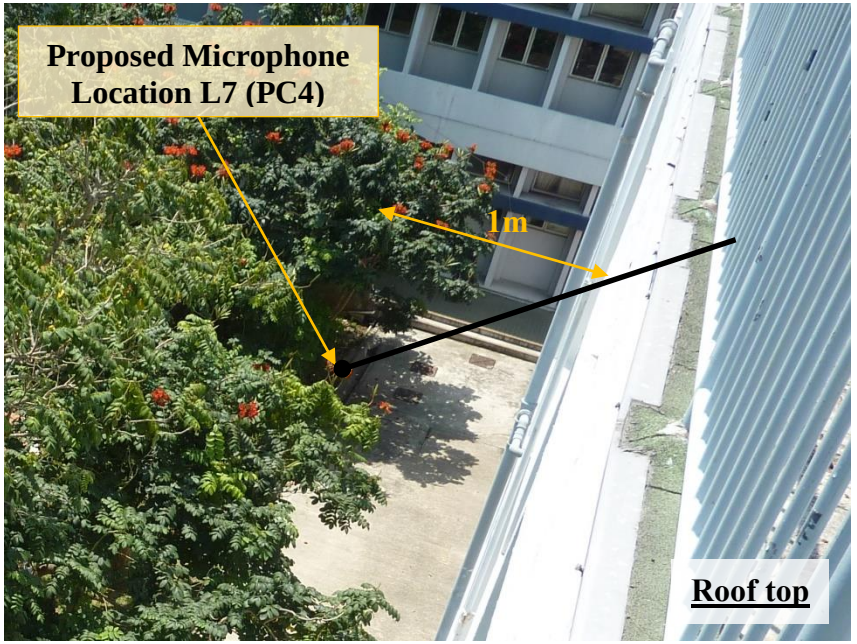


Figure B.6 L7 (PC4) - Police College Barrack Block J East Wing



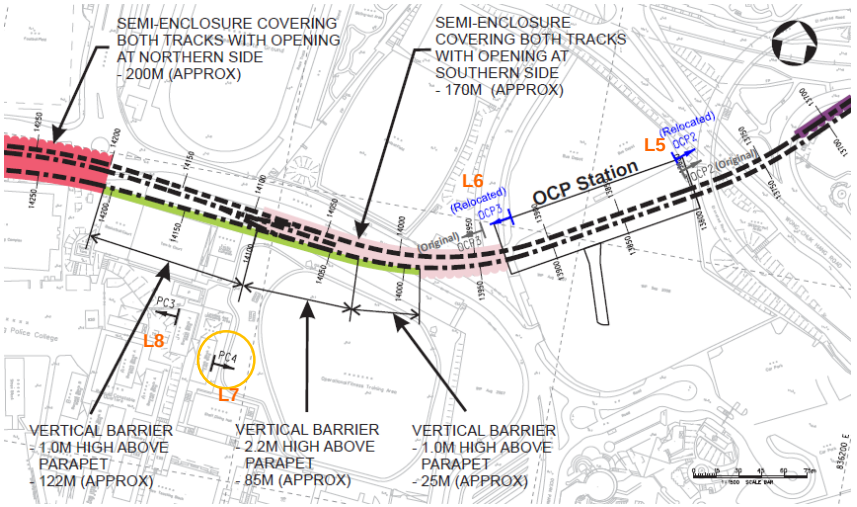
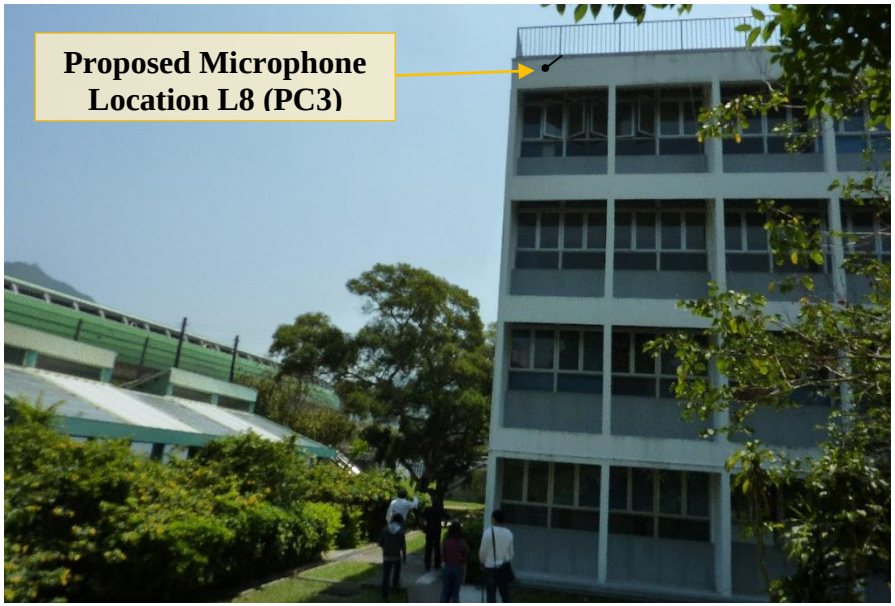


Figure B.7 L8 (PC3) - Police College Barrack Block J West Wing



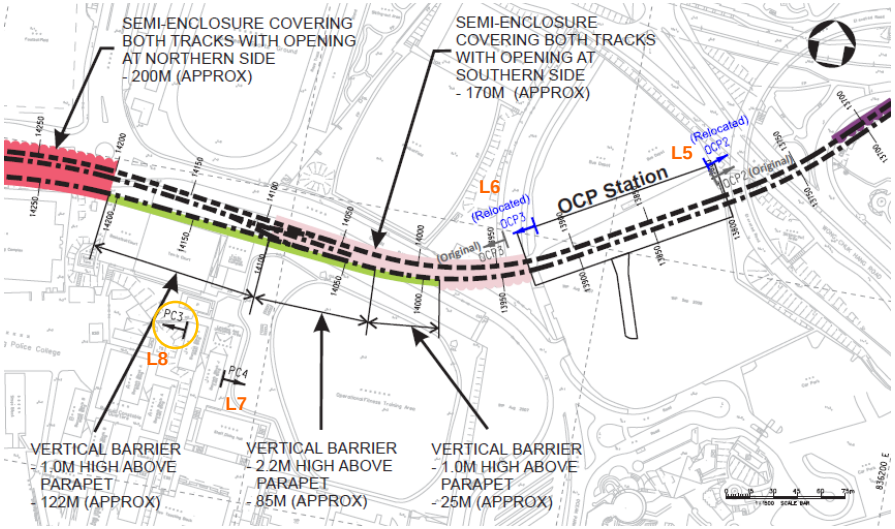
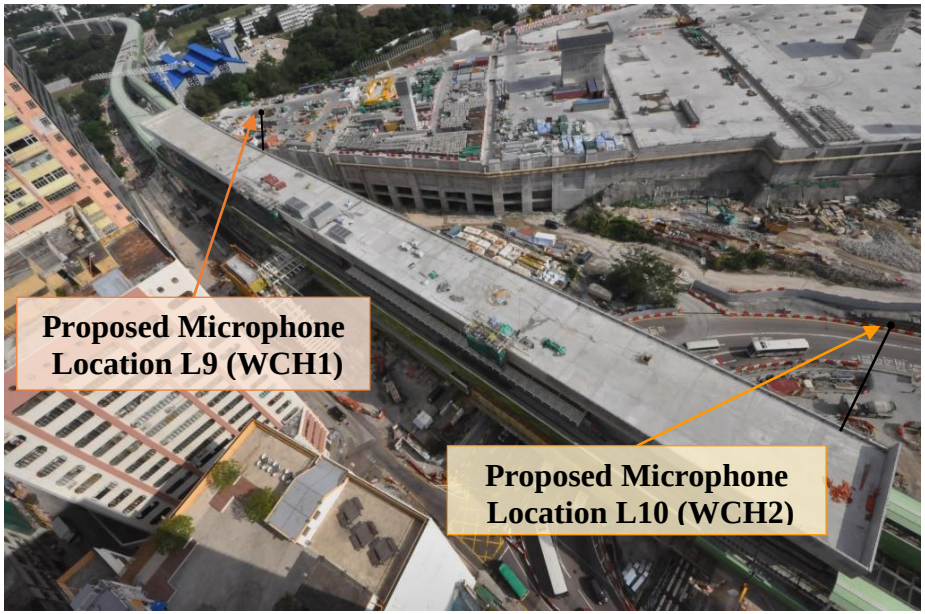
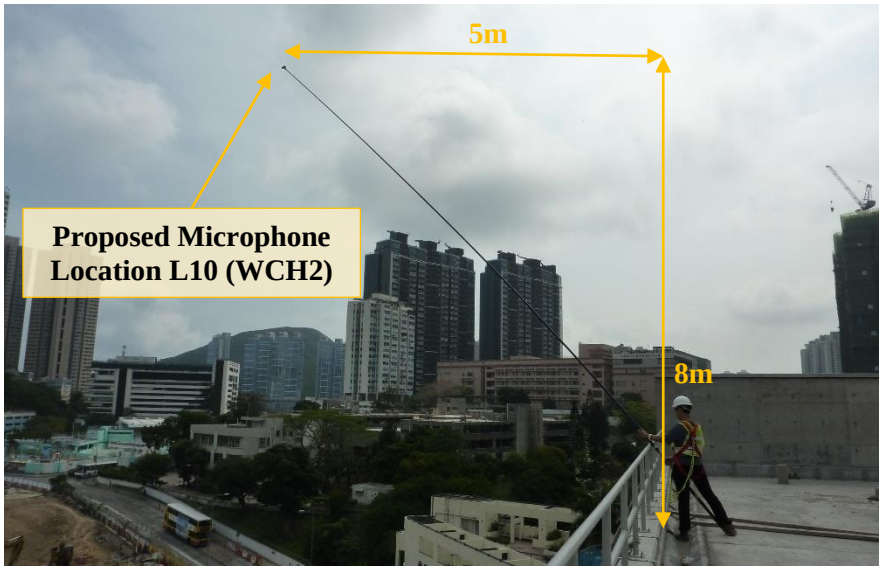


Figure B.8 L9 (WCH1), L10 (WCH2) & L11 (WCH3) - WCH Residential Zone





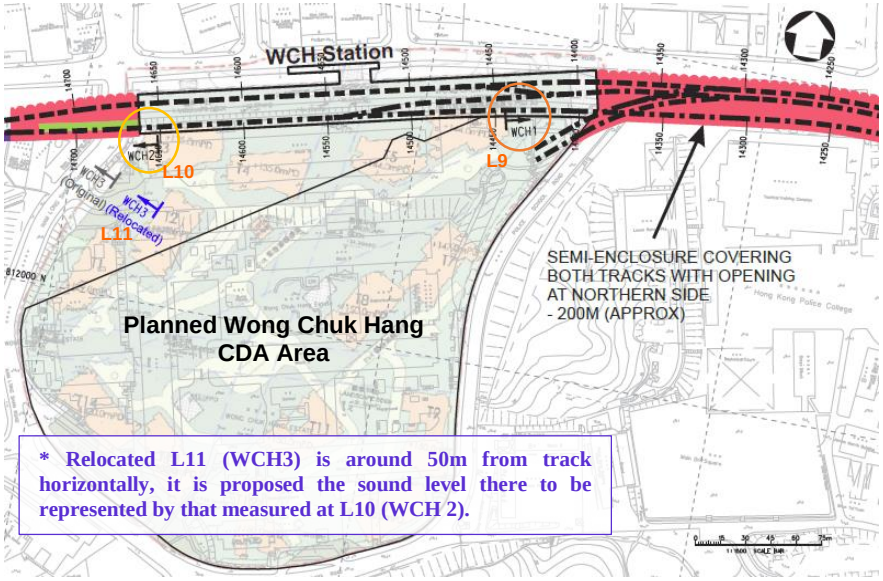


Figure B.9 L12 (TWY) – Tai Wong Ye Temple

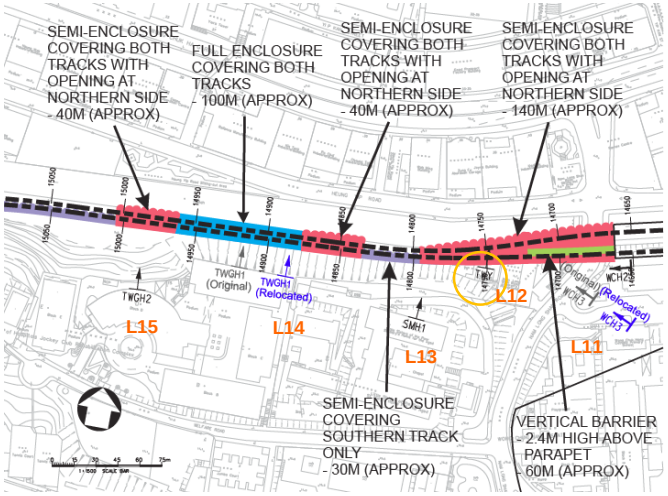
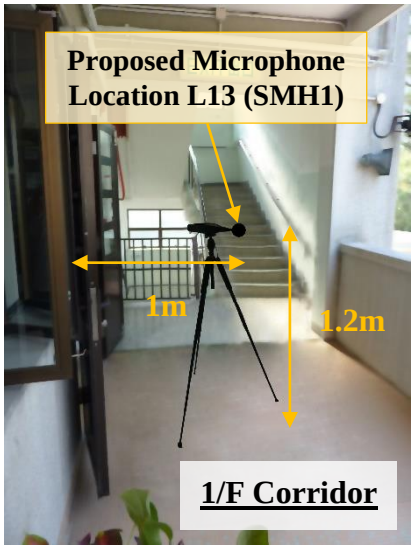


Figure B.10 L13 (SMH1) - Little Sisters of the Poor St. Mary's Home for the Aged



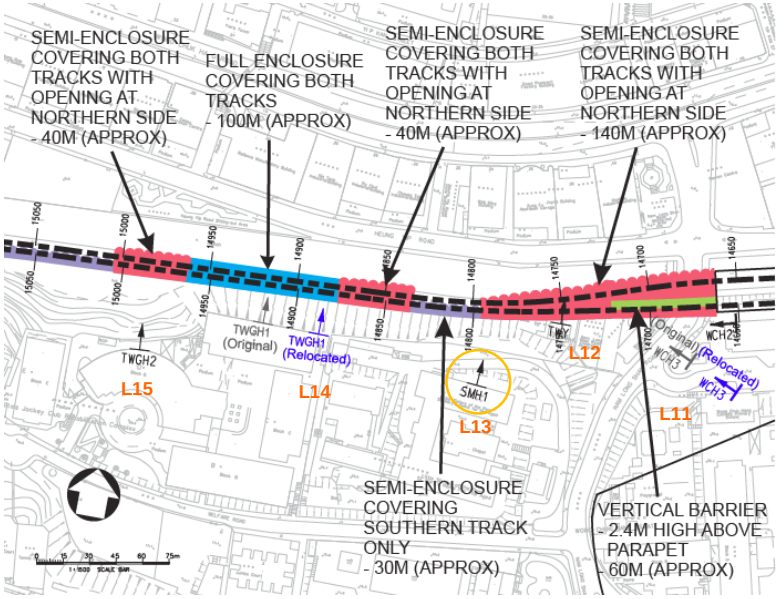
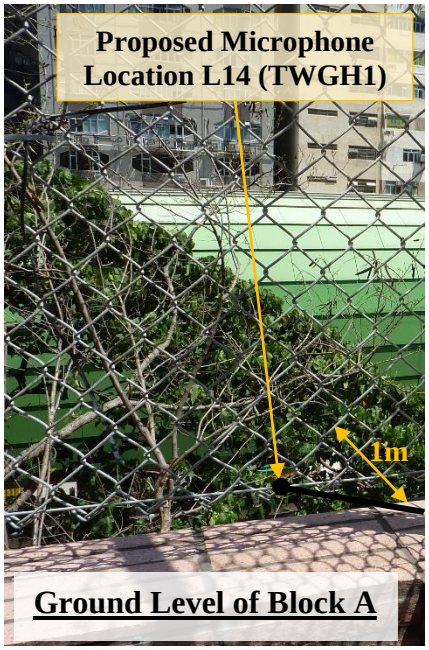
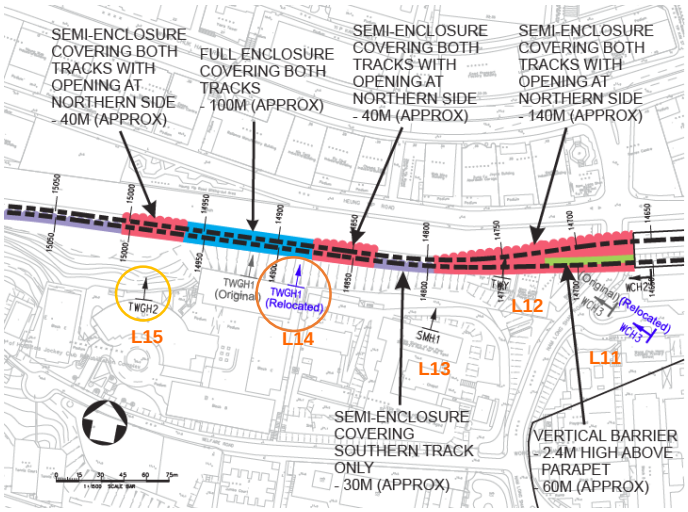


Figure B.11 L14 (TWGH1) and L15 (TWGH2) - TWGHs Jockey Club Rehabilitation Complex Block A & Block D





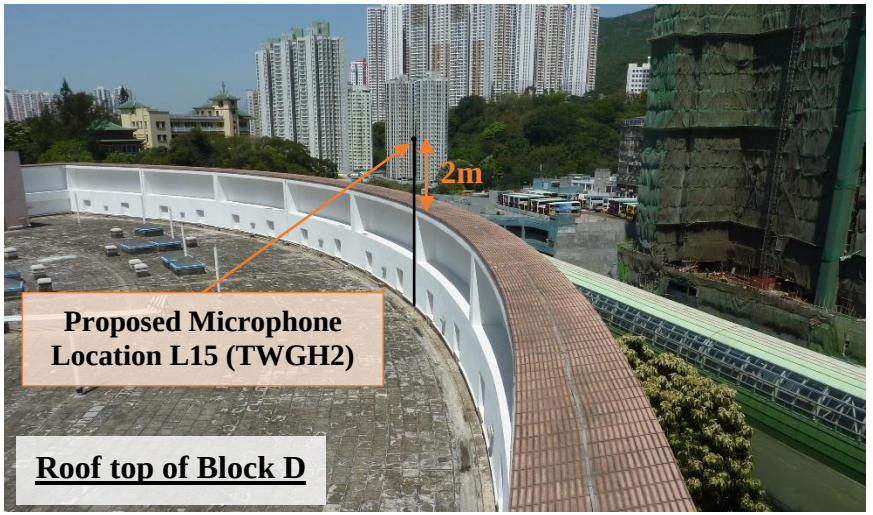
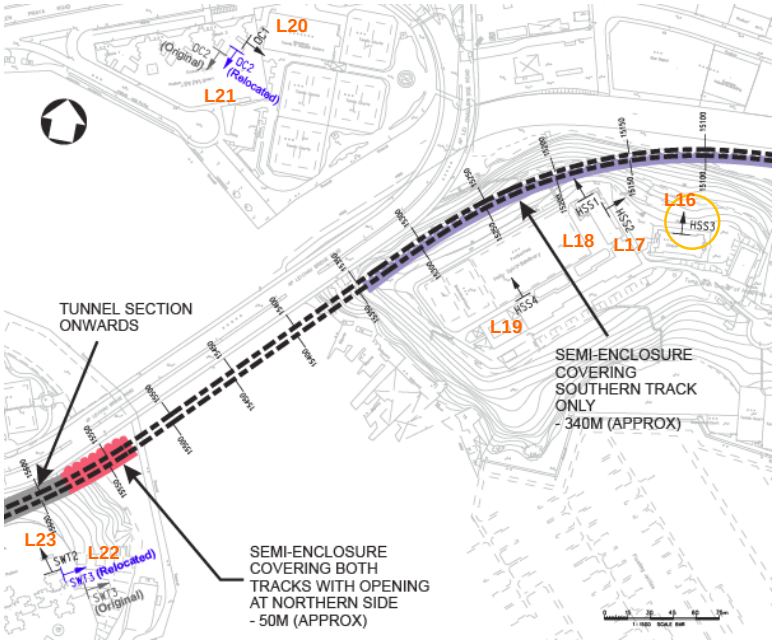


Figure B.12 L16 (HSS3) - Holy Spirit Seminary Chapel



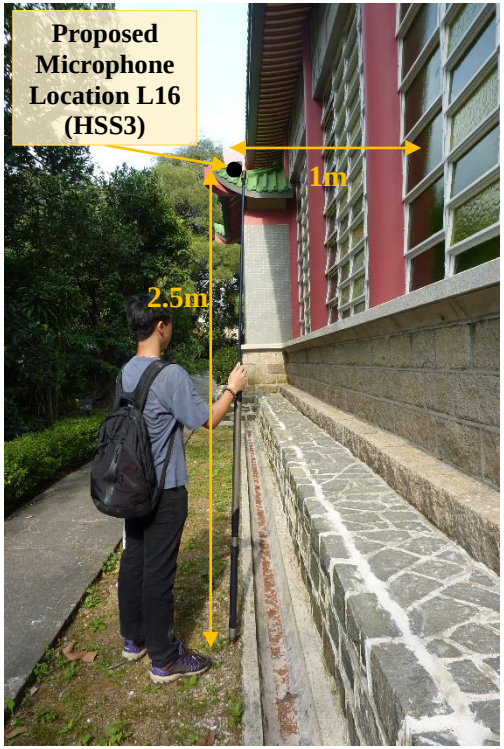


Figure B.13 L17 (HSS2), L18 (HSS1) - Holy Spirit Seminary

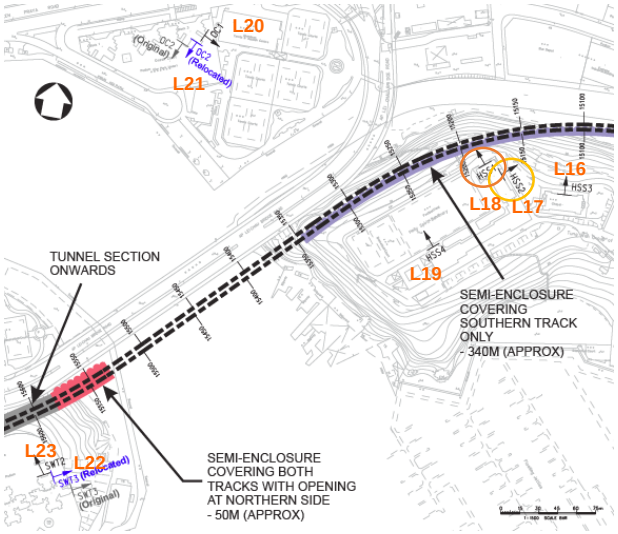
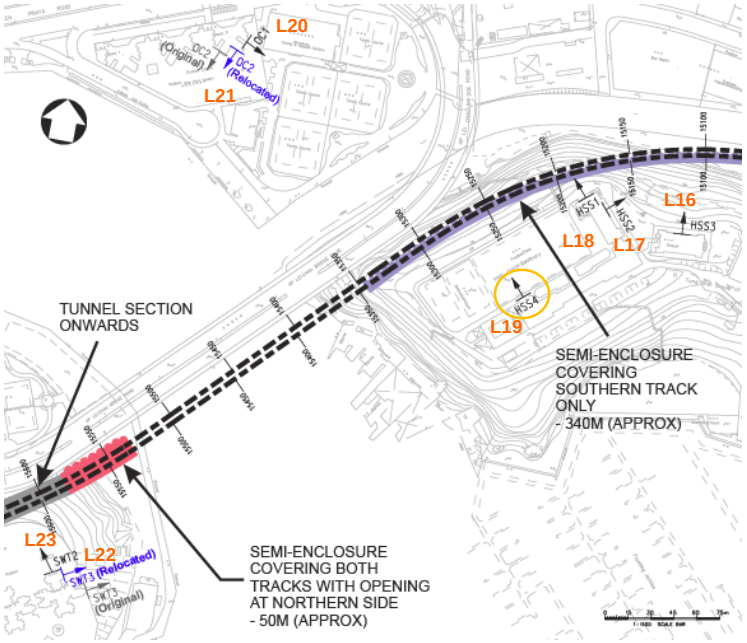


Figure B.14 L19 (HSS4) - Holy Spirit Seminary



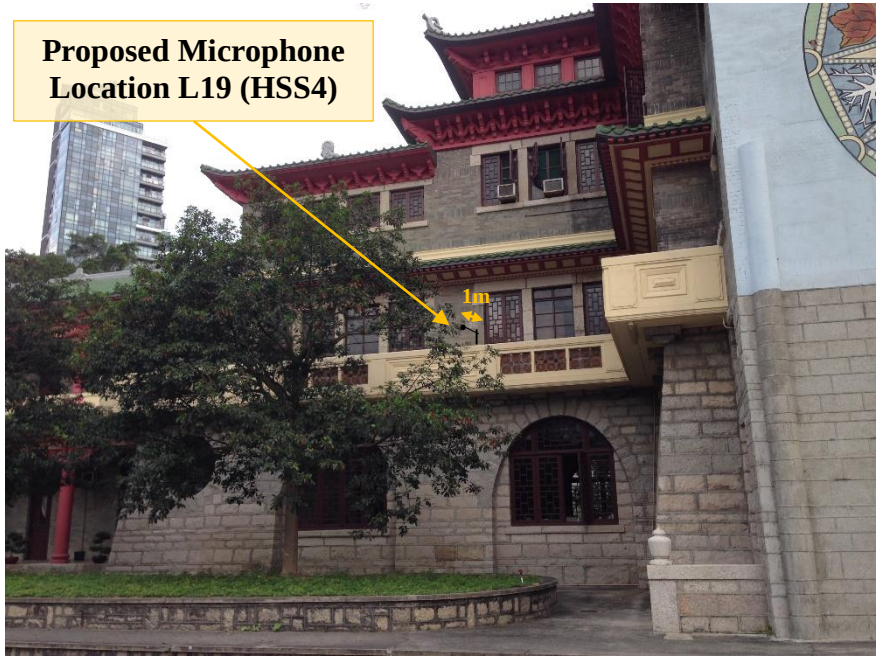
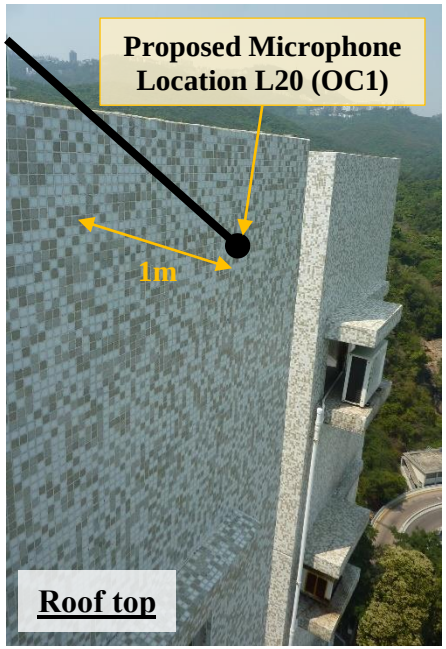
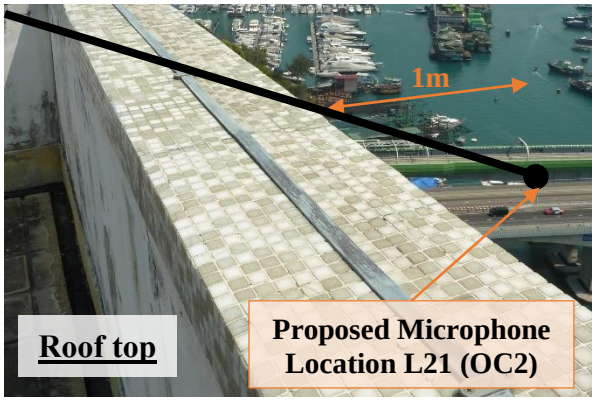


Figure B.15 L20 (OC1) & L21 (OC2) - Ocean Court Tower 3





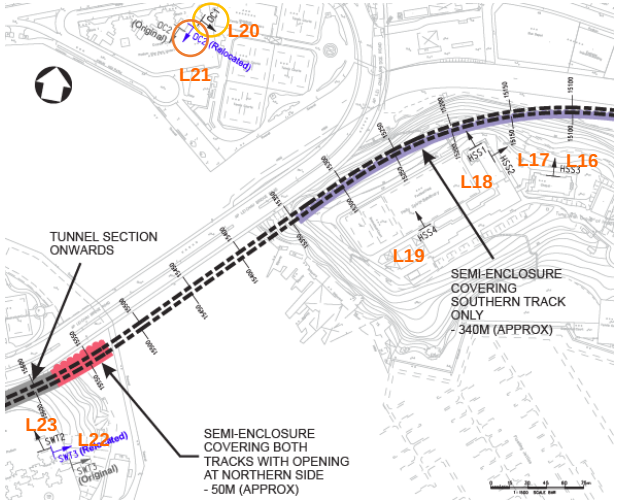
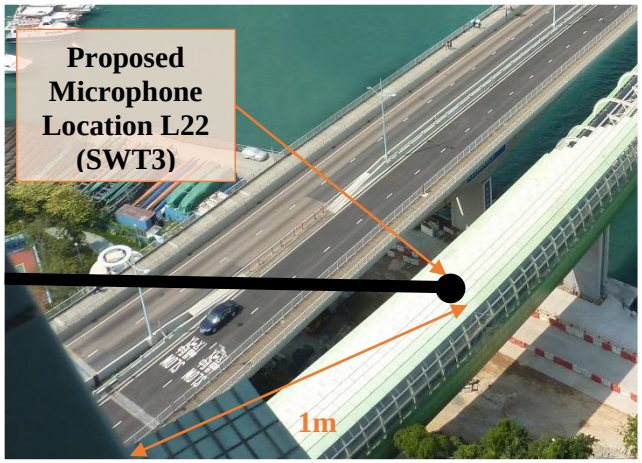
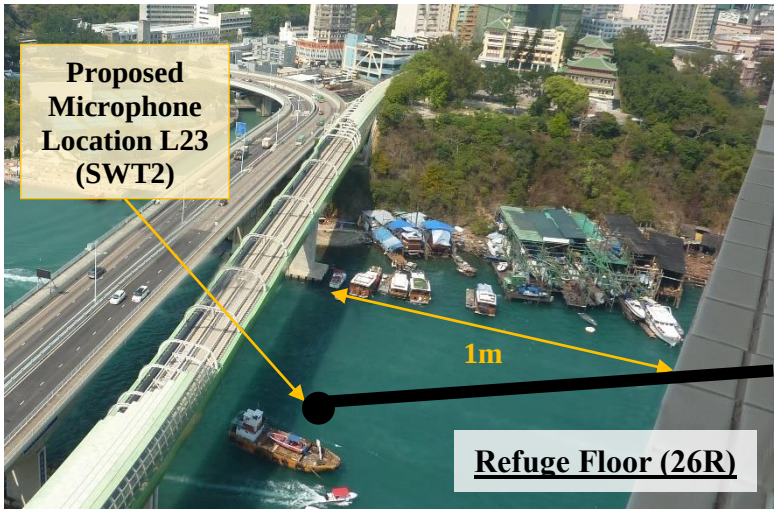
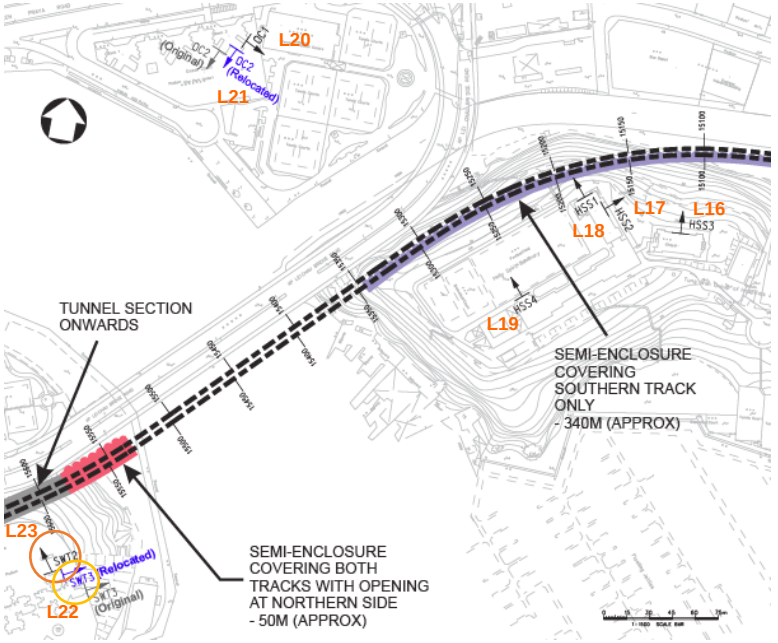


Figure B.16 L22 (SWT3) & L23 (SWT2) - Sham Wan Towers Tower 3







Appendix C

Boundary of OCP G/IC site

Figure C.1 Zoning Plan near OCP according to the Approved Aberdeen & Ap Lei Chau Outline Zoning Plan No. S/H15/29 (gazetted on 21/03/2014)

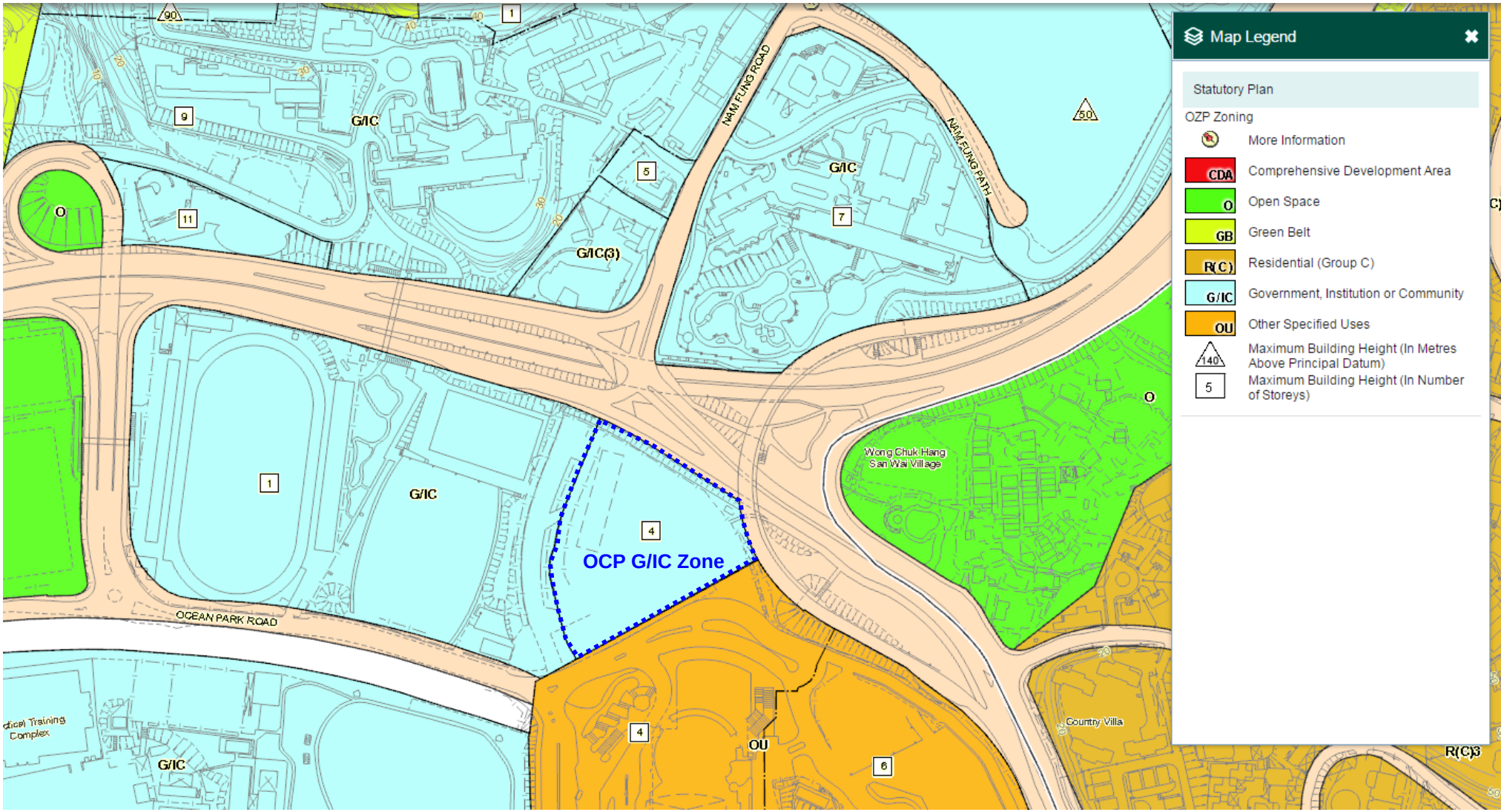
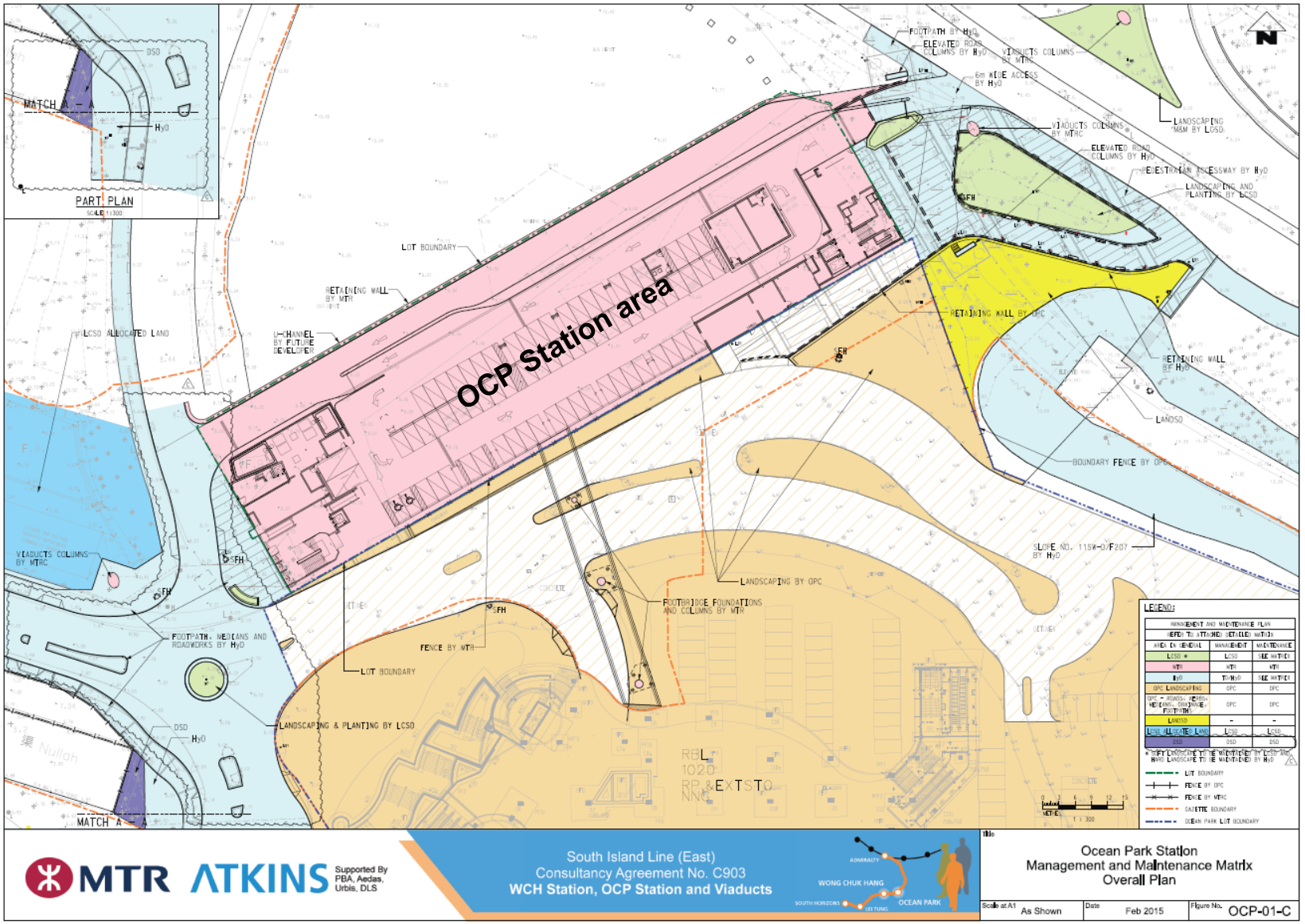


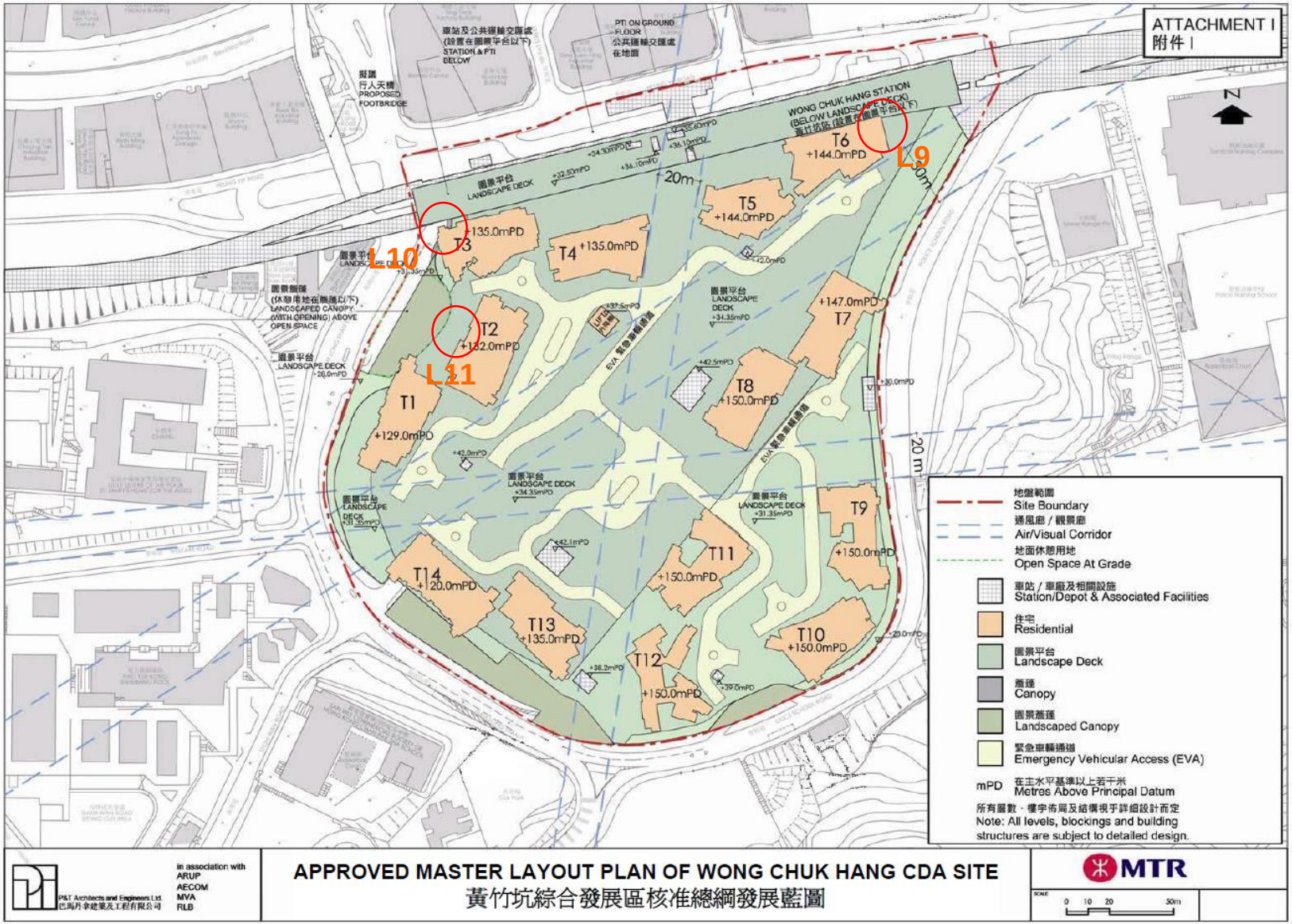
Figure C.2 OCP Station area managed by MTR (shown in pink)



Appendix D

Master Layout Plan of WCH CDA site

Figure D.1 Approved Master Layout Plan of Wong Chuk Hang CDA site



Appendix E

Operational Target Train Speed Profile

Figure E.1 Target Speed Profile for ADM to OCP (Up track)

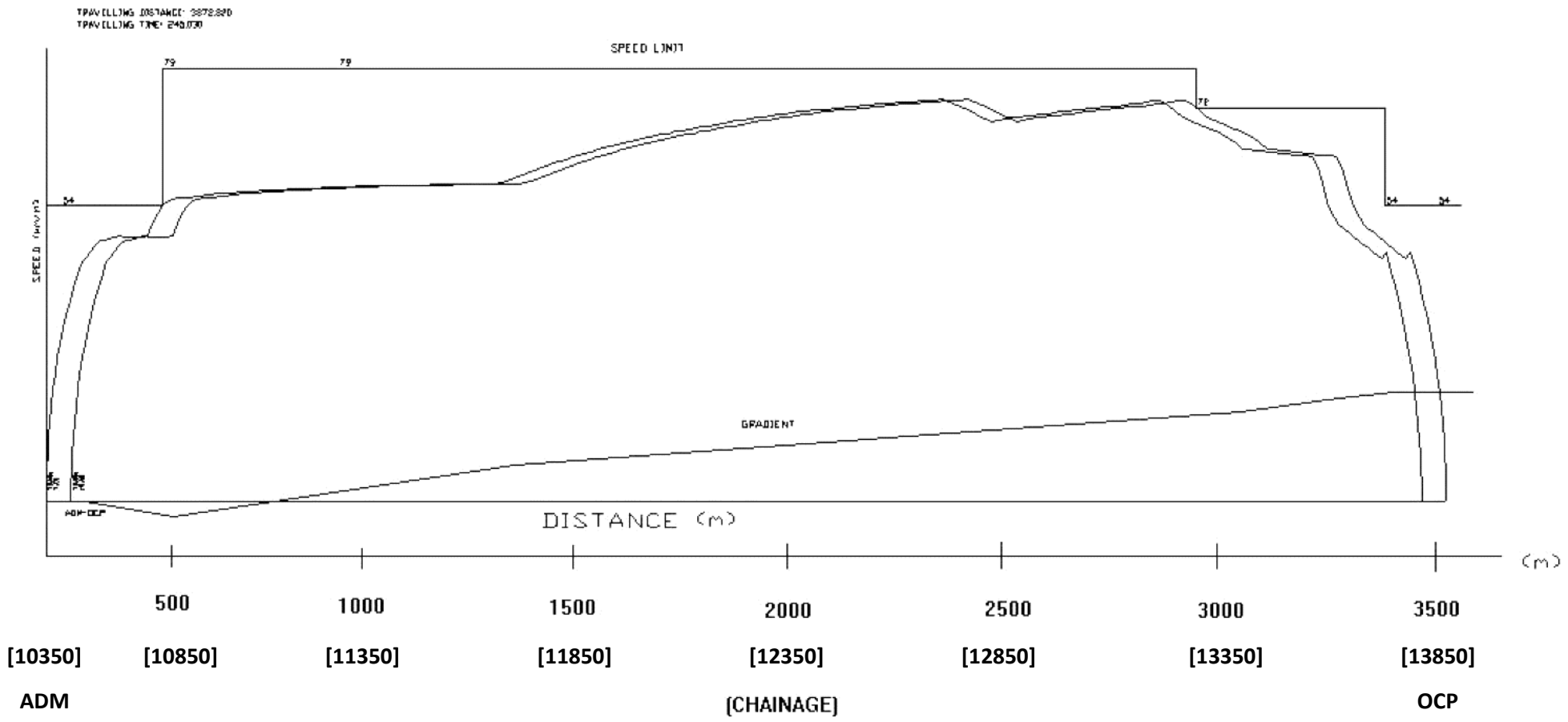


Figure E.2 Target Speed Profile for OCP to ADM (Down track)

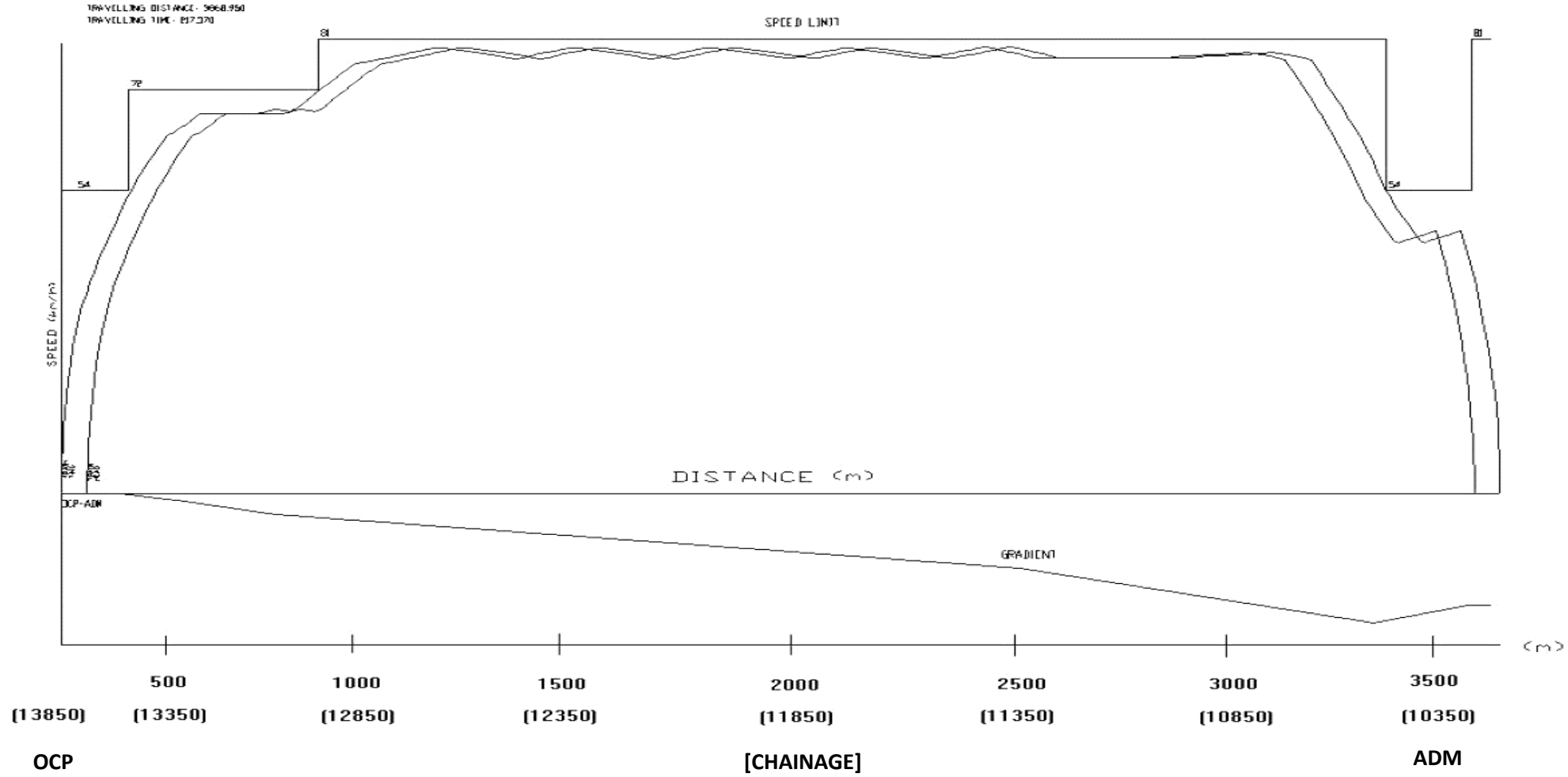


Figure E.3 Target Speed Profile for OCP to WCH (Up track)

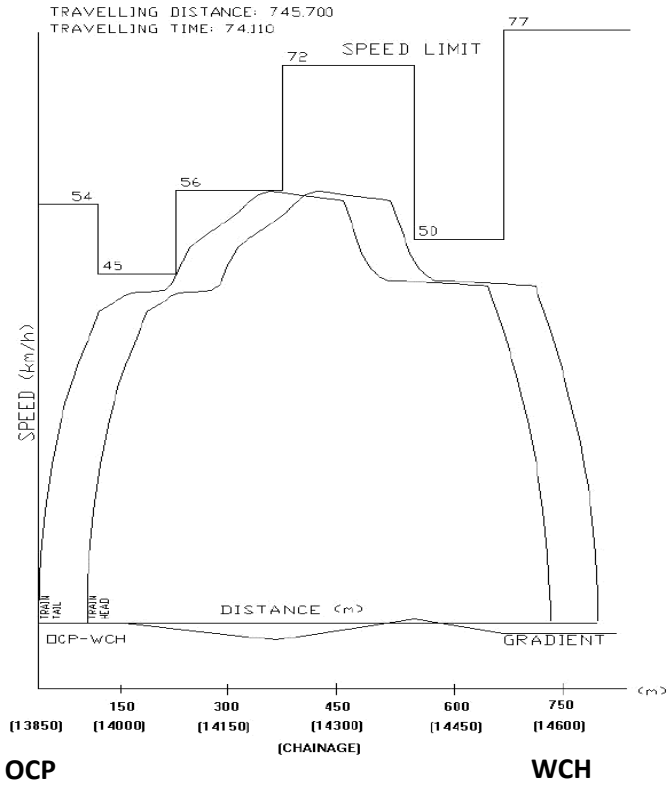


Figure E.4 Target Speed Profile for WCH to OCP (Down track)

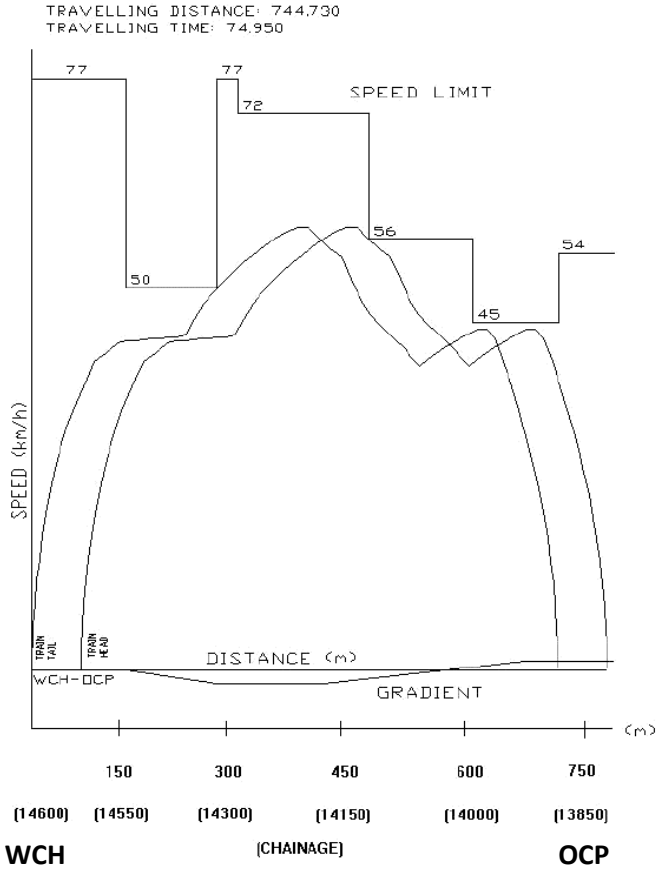


Figure E.5 Target Speed Profile for WCH to LET (Up track)

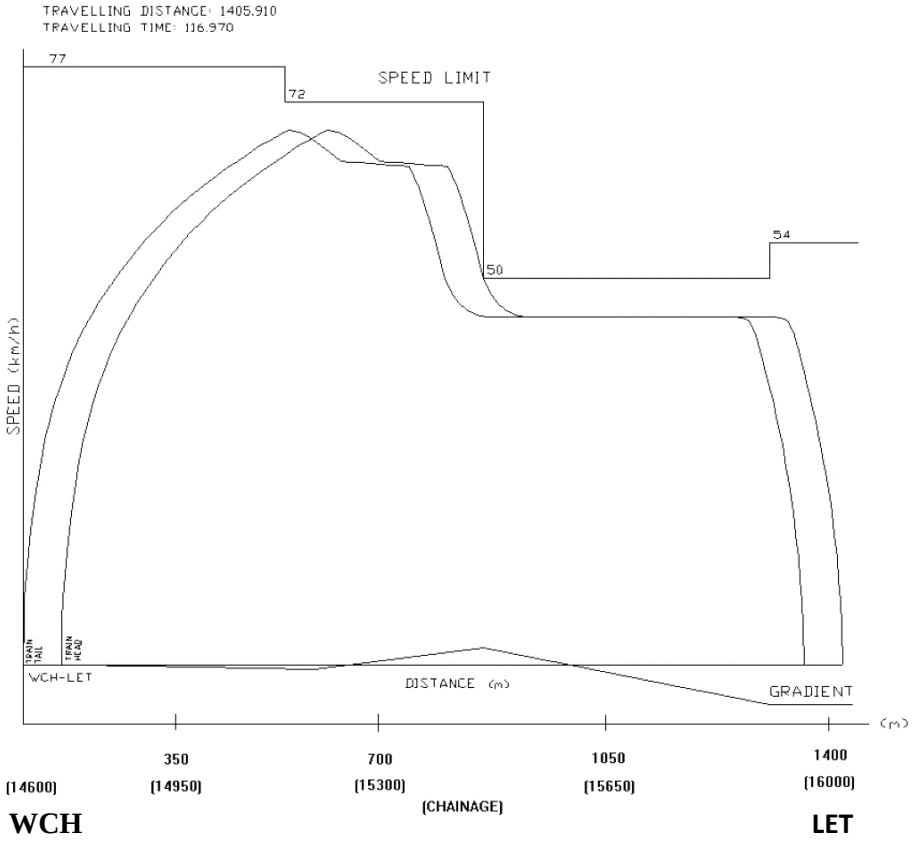
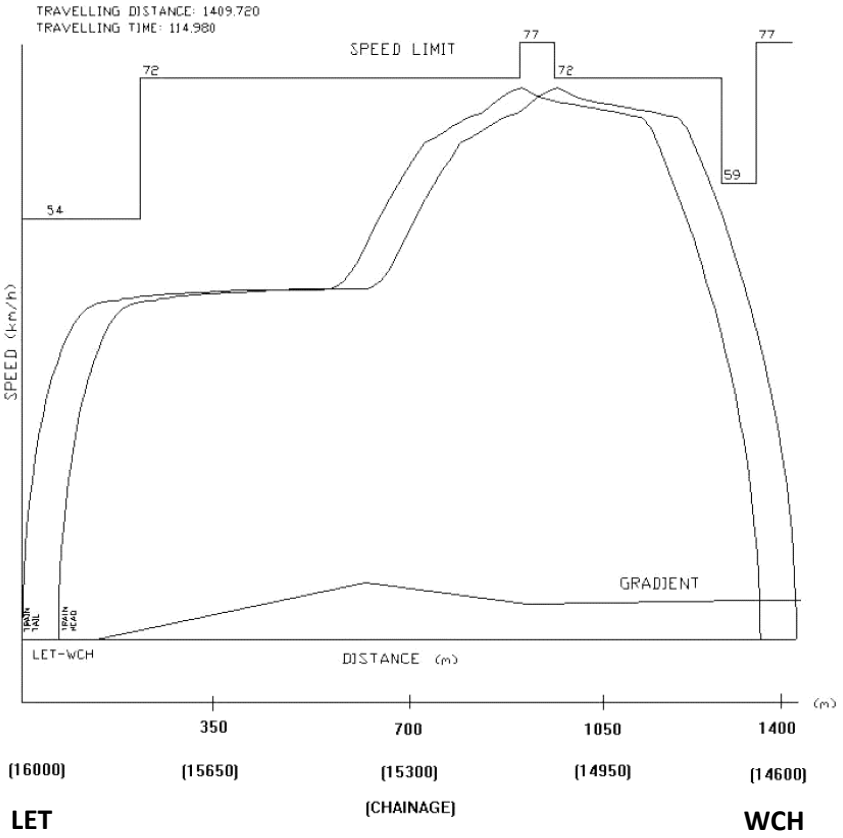


Figure E.6 Target Speed Profile for LET to WCH (Down track)



Appendix F

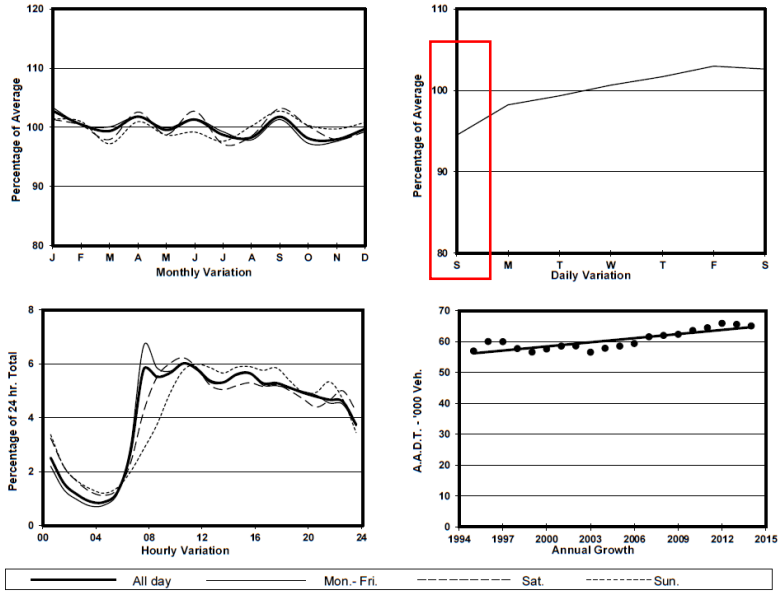
Traffic Data Extracted from "*The Annual Traffic Census 2014*"

Figure F.1 Traffic data at Aberdeen Tunnel

YEAR 2014 LINK ABERDEEN TUNNEL (from TOLL PLAZA to NORTH PORTAL)

CORE STATION 1004
ROAD NETWORK MAJOR
ROAD TYPE URBAN TRUNK ROAD

1. TRAFFIC FLOW VARIATION AND GROWTH



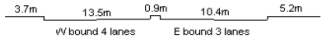
2. TRAFFIC CHARACTERISTICS (BY DIRECTION)

Parameter	All - Day	Mon. - Fri.	Sat.	Sun.
SOUTH BOUND				
A.A.D.T.	35080	35610	36030	32220
R 12 / 24 - %	64.3	65.2	62.5	60.9
R 16 / 24 - %	84.8	85.9	81.8	82
AM Peak Hour	0900-1000	0700-0800	0900-1000	0900-1000
One-way flow at AM peak hour	1960	2140	1990	1420
T - % (AM)	-	17.7	-	-
PM Peak Hour	1800-1900	1800-1900	1600-1700	1600-1700
One-way flow at PM peak hour	1890	1960	1900	1870
T - % (PM)	-	11	-	-
Prop.of commercial vehicles - 16 hr.	-	14.1	-	-
NORTH BOUND				
A.A.D.T.	29960	30020	30770	29480
R 12 / 24 - %	68.9	70.1	65.7	66.4
R 16 / 24 - %	86	86.7	83.8	85
AM Peak Hour	0700-0800	0700-0800	0900-1000	0900-1000
One-way flow at AM peak hour	1920	2240	2030	1620
T - % (AM)	-	14	-	-
PM Peak Hour	1700-1800	1700-1800	1700-1800	1700-1800
One-way flow at PM peak hour	1650	1620	1620	1870
T - % (PM)	-	16.1	-	-
Prop.of commercial vehicles - 16 hr.	-	15.9	-	-

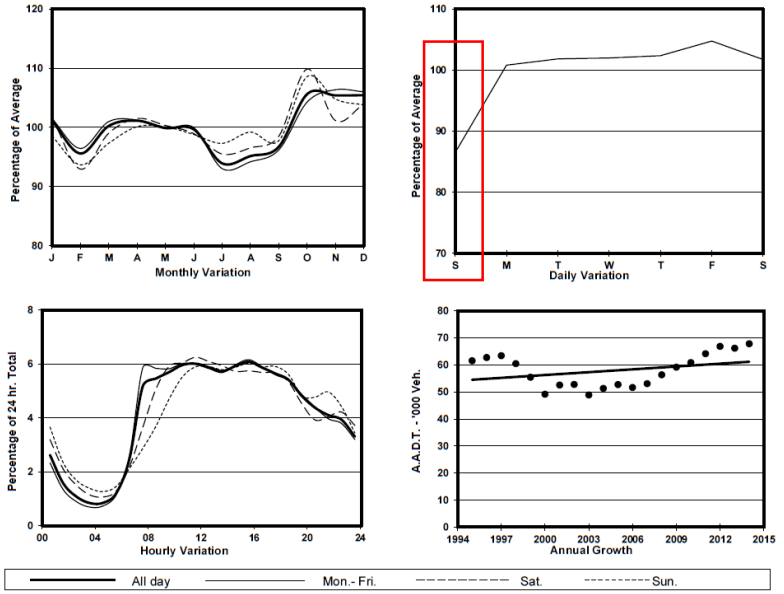
Figure F.2 Traffic data at Wong Chuk Hang Road (between Nam Fung Road and Nam Long Shan Road)

YEAR 2014 LINK WONG CHUK HANG RD (from NAM LONG SHAN RD to NAM FUNG RD)

CORE STATION 1010
ROAD NETWORK MAJOR
ROAD TYPE PRIMARY DISTRIBUTOR



1. TRAFFIC FLOW VARIATION AND GROWTH



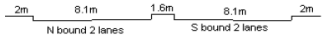
2. TRAFFIC CHARACTERISTICS (BY DIRECTION)

Parameter	All - Day	Mon. - Fri.	Sat.	Sun.
EAST BOUND				
A.A.D.T.	35540	36510	36710	31320
R 12 / 24 - %	71.4	72.6	69.5	66.6
R 16 / 24 - %	87	87.9	85	84
AM Peak Hour	0900-1000	0700-0800	0900-1000	0900-1000
One-way flow at AM peak hour	2110	2440	2410	1640
T - % (AM)	-	-	-	-
PM Peak Hour	1600-1700	1600-1700	1700-1800	1700-1800
One-way flow at PM peak hour	2120	2220	2060	1900
T - % (PM)	-	-	-	-
Prop.of commercial vehicles - 16 hr.	-	-	-	-
WEST BOUND				
A.A.D.T.	32250	33370	32760	27780
R 12 / 24 - %	66	67.3	64.4	60.4
R 16 / 24 - %	85	86.2	82.4	81.1
AM Peak Hour	0900-1000	0900-1000	0900-1000	0900-1000
One-way flow at AM peak hour	1760	1910	1700	1150
T - % (AM)	-	-	-	-
PM Peak Hour	1800-1900	1800-1900	1600-1700	1600-1700
One-way flow at PM peak hour	1870	1960	1900	1660
T - % (PM)	-	-	-	-
Prop.of commercial vehicles - 16 hr.	-	-	-	-

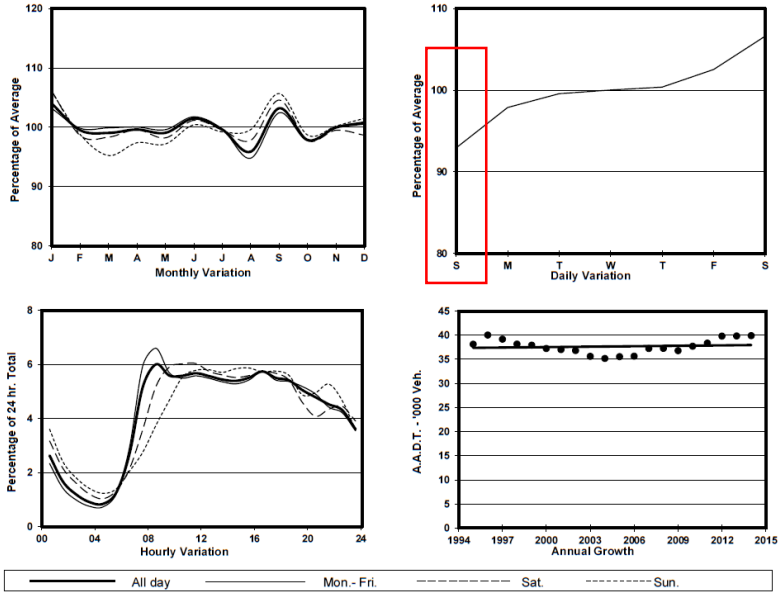
Figure F.3 Traffic data at Ap Lei Chau Bridge

YEAR 2014 LINK AP LEI CHAU BRIDGE & AP LEI CHAU BRIDGE RD (from WONG CHUK HANG RD to AP LEI CHAU EST)

CORE STATION 1017
ROAD NETWORK MAJOR
ROAD TYPE DISTRICT DISTRIBUTOR



1. TRAFFIC FLOW VARIATION AND GROWTH



2. TRAFFIC CHARACTERISTICS (BY DIRECTION)

Parameter	All - Day	Mon. - Fri.	Sat.	Sun.
SOUTH BOUND				
A.A.D.T.	19670	19740	21040	18490
R 12 / 24 - %	63.9	64.6	63.6	60.3
R 16 / 24 - %	84.8	85.8	82.7	81.9
AM Peak Hour	0800-0900	0800-0900	0900-1000	0900-1000
One-way flow at AM peak hour	1030	1140	1130	750
T - % (AM)	-	-	-	-
PM Peak Hour	1600-1700	1800-1900	1600-1700	1600-1700
One-way flow at PM peak hour	1130	1160	1240	1080
T - % (PM)	-	-	-	-
Prop.of commercial vehicles - 16 hr.	-	-	-	-
NORTH BOUND				
A.A.D.T.	20230	20360	21640	18720
R 12 / 24 - %	69.2	70.1	68.3	65.2
R 16 / 24 - %	85.7	86.4	84.2	83.2
AM Peak Hour	0800-0900	0700-0800	0900-1000	0900-1000
One-way flow at AM peak hour	1360	1530	1390	990
T - % (AM)	-	-	-	-
PM Peak Hour	1600-1700	1600-1700	1700-1800	1700-1800
One-way flow at PM peak hour	1160	1170	1270	1140
T - % (PM)	-	-	-	-
Prop.of commercial vehicles - 16 hr.	-	-	-	-

Annex F

Calibration Certificates

Svantek SVAN 958 (Serial no. 14210)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	22-Aug-2015	**Certificate Number**	MLCN151389S

Customer Information

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

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	14210
Equipment Number	--

Calibration Particular

Date of Calibration	22-Aug-2015		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-2016		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 22-Aug-2015

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.

萬儀校正中心有限公司
MaxLab Calibration Centre Limited
香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B2 室
Unit B2, 9/F., Boldwin Industrial Bldg., 16-18 Wah Sing Street, Kwai Chung, N.T., Hong Kong. Tel: (852) 2116 1380 Fax: (852) 2264 6480 Email: info@maxlab.com.hk

MAXLAB

Certificate NoMLCN151389S

Calibration Data

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

- END -

Calibrated By : Dan
Date : 22-Aug-2015

Checked By : K.O. Lo
Date : 22-Aug-2015

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MaxLab Calibration Centre Limited
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Svantek SVAN 958 (Serial no. 28422)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	20-Oct-2014	**Certificate Number**	MLCN141705S

Customer Information

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

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	28422
Equipment Number	--

Calibration Particular

Date of Calibration	20-Oct-2014		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-2016		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 20-Oct-2014

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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MAXLAB

Certificate NoMLCN141705S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.2 dB	114.0 dB	0.2 dB	0.2 dB
	C / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.2 dB	114.0 dB	0.2 dB	0.2 dB
	LIN / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			114.2 dB	114.0 dB	0.2 dB	0.2 dB
	A / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.2 dB	114.0 dB	0.2 dB	0.2 dB
	C / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.2 dB	114.0 dB	0.2 dB	0.2 dB
	LIN / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.2 dB	114.0 dB	0.2 dB	0.2 dB
	A / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.2 dB	114.0 dB	0.2 dB	0.2 dB
	C / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.2 dB	114.0 dB	0.2 dB	0.2 dB
	LIN / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.2 dB	114.0 dB	0.2 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 20-Oct-2014

Checked By : K.O. Lo
Date : 20-Oct-2014

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Svantek SVAN 958 (Serial No. 34507)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	9-Jul-2015	**Certificate Number**	MLCN151117S

Customer Information

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

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 958
Serial Number	34507
Equipment Number	--

Calibration Particular

Date of Calibration	9-Jul-2015		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-2016		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 9-Jul-2015

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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MAXLAB

Certificate NoMLCN151117S

Calibration Data

Channel / Mode	Filter / Detector	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
CH4 / Sound	A / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / FAST	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			114.1 dB	114.0 dB	0.1 dB	0.2 dB
	A / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / SLOW	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	A / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	LIN / IMPULSE	105 dB	94.0 dB	94.0 dB	0.0 dB	0.2 dB
	(1 kHz Input)	130 dB	114.1 dB	114.0 dB	0.1 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 9-Jul-2015

Checked By : K.O. Lo
Date : 9-Jul-2015

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MaxLab Calibration Centre Limited
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Svantek SVAN 959 (Serial no. 11228)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	7-Mar-2015	**Certificate Number**	MLCN150356S

Customer Information

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

Equipment-under-Test (EUT)

Description	Sound & Vibration Analyser
Manufacturer	Svantek
Model Number	SVAN 959
Serial Number	11228
Equipment Number	--

Calibration Particular

Date of Calibration	7-Mar-2015		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-2016		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 7-Mar-2015

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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MAXLAB

Certificate No. MLCN150356S

Calibration Data

Weighting / Time	Range	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
A / FAST (1 kHz Input)	LOW	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
		114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
	HIGH	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
		114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
C / FAST (1 kHz Input)	LOW	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
		114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
	HIGH	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
		114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
Z / FAST (1 kHz Input)	LOW	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
		114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
	HIGH	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
		114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
A / SLOW (1 kHz Input)	LOW	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
	HIGH	114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
C / SLOW (1 kHz Input)	LOW	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
	HIGH	114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
Z / SLOW (1 kHz Input)	LOW	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
	HIGH	114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
A / IMPULSE (1 kHz Input)	LOW	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
	HIGH	114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
C / IMPULSE (1 kHz Input)	LOW	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
	HIGH	114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB
Z / IMPULSE (1 kHz Input)	LOW	94.2 dB	94.0 dB	0.2 dB	0.2 dB	± 0.7 dB
	HIGH	114.2 dB	114.0 dB	0.2 dB	0.2 dB	± 0.7 dB

- END -

Calibrated By : Dan
Date : 7-Mar-2015

Checked By : K.O. Lo
Date : 7-Mar-2015

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Svantek SVAN 955 (Serial no. 15234)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	21-Feb-2014	**Certificate Number**	MLCN140202S

Customer Information

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

Equipment-under-Test (EUT)

Description	Sound Level Meter
Manufacturer	Svantek
Model Number	SVAN 955
Serial Number	15234
Equipment Number	--

Calibration Particular

Date of Calibration	21-Feb-2014		
Calibration Equipment	4231(MLTE008) / DC120076 / 29-Mar-2014		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 21-Feb-2014

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
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MAXLAB

Certificate No.MLCN140202S

Calibration Data

Parameter	Frequency Weighting	Range (dB)	Time Weighting	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
SPL	A (1 kHz Input)	25 - 130	F	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			S	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			I	94.1 dB	94.0 dB	0.1 dB	0.2 dB
	C (1 kHz Input)	25 - 130	F	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			S	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			I	94.1 dB	94.0 dB	0.1 dB	0.2 dB
	Z (1 kHz Input)	25 - 130	F	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			S	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			I	94.1 dB	94.0 dB	0.1 dB	0.2 dB
	A (1 kHz Input)	25 - 130	F	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			S	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			I	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	C (1 kHz Input)	25 - 130	F	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			S	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			I	114.1 dB	114.0 dB	0.1 dB	0.2 dB
	Z (1 kHz Input)	25 - 130	F	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			S	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			I	114.1 dB	114.0 dB	0.1 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 21-Feb-2014

Checked By : K.O. Lo
Date : 21-Feb-2014

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香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B2 室
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MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	1-Feb-2016	**Certificate Number**	MLCN160237S

Customer Information

Company Name	Acoustics Innovation Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T.

Equipment-under-Test (EUT)

Description	Sound Level Meter
Manufacturer	Svantek
Model Number	SVAN 955
Serial Number	15234
Equipment Number	--

Calibration Particular

Date of Calibration	1-Feb-2016		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-2016		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 1-Feb-2016

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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MAXLAB

Certificate No.MLCN160237S

Calibration Data

Parameter	Frequency Weighting	Range (dB)	Time Weighting	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
SPL	A (1 kHz Input)	25 - 130	F	94 dB	94.0 dB	0.0 dB	0.2 dB
			S	94 dB	94.0 dB	0.0 dB	0.2 dB
			I	94 dB	94.0 dB	0.0 dB	0.2 dB
	C (1 kHz Input)	25 - 130	F	94 dB	94.0 dB	0.0 dB	0.2 dB
			S	94 dB	94.0 dB	0.0 dB	0.2 dB
			I	94 dB	94.0 dB	0.0 dB	0.2 dB
	Z (1 kHz Input)	25 - 130	F	94 dB	94.0 dB	0.0 dB	0.2 dB
			S	94 dB	94.0 dB	0.0 dB	0.2 dB
			I	94 dB	94.0 dB	0.0 dB	0.2 dB
	A (1 kHz Input)	25 - 130	F	114 dB	114.0 dB	0.0 dB	0.2 dB
			S	114 dB	114.0 dB	0.0 dB	0.2 dB
			I	114 dB	114.0 dB	0.0 dB	0.2 dB
	C (1 kHz Input)	25 - 130	F	114 dB	114.0 dB	0.0 dB	0.2 dB
			S	114 dB	114.0 dB	0.0 dB	0.2 dB
			I	114 dB	114.0 dB	0.0 dB	0.2 dB
	Z (1 kHz Input)	25 - 130	F	114 dB	114.0 dB	0.0 dB	0.2 dB
			S	114 dB	114.0 dB	0.0 dB	0.2 dB
			I	114 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 1-Feb-2016

Checked By : K.O. Lo
Date : 1-Feb-2016

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MaxLab Calibration Centre Limited
香港新界葵涌華星街 16-18 號保盈工業大廈 9 樓 B2 室
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Brüel & Kjær Type 2250L (Serial no. 2828706)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	3-Oct-2014	**Certificate Number**	MLCN141631S

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	Hand-held Analyzer
Manufacturer	Brüel & Kjær
Model Number	Type 2250-L
Serial Number	2828706
Equipment Number	--

Calibration Particular

Date of Calibration	3-Oct-2014		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-2016		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 3-Oct-2014

Statements

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MAXLAB

Certificate No. MLCN141631S

Calibration Data

Parameter	Range (dB)	Frequency Weighting	Response	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
SPL	Auto 20 - 140	A (1 kHz Input)	F	93.8 dB	94.0 dB	-0.2 dB	0.2 dB
			S	93.8 dB	94.0 dB	-0.2 dB	0.2 dB
			I	93.8 dB	94.0 dB	-0.2 dB	0.2 dB
		Z (1 kHz Input)	F	93.8 dB	94.0 dB	-0.2 dB	0.2 dB
			S	93.8 dB	94.0 dB	-0.2 dB	0.2 dB
			I	93.8 dB	94.0 dB	-0.2 dB	0.2 dB
		A (1 kHz Input)	F	113.8 dB	114.0 dB	-0.2 dB	0.2 dB
			S	113.8 dB	114.0 dB	-0.2 dB	0.2 dB
			I	113.8 dB	114.0 dB	-0.2 dB	0.2 dB
		Z (1 kHz Input)	F	113.8 dB	114.0 dB	-0.2 dB	0.2 dB
			S	113.8 dB	114.0 dB	-0.2 dB	0.2 dB
			I	113.8 dB	114.0 dB	-0.2 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 3-Oct-2014

Checked By : K.O. Lo
Date : 3-Oct-2014

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Brüel & Kjær Type 2250L (Serial no. 3003992)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information			
Date of Issue	9-Jul-2015	**Certificate Number**	MLCN151116S

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	Hand-held Analyzer
Manufacturer	Brüel & Kjær
Model Number	Type 2250-L
Serial Number	3003992
Equipment Number	--

Calibration Particular			
Date of Calibration	9-Jul-2015		
Calibration Equipment	4231(MLTE008) / PA140064 / 19-Apr-2016		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date		
	K.O. Lo	9-Jul-2015

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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MAXLAB

Certificate No. MLCN151116S

Calibration Data

Parameter	Range (dB)	Frequency Weighting	Response	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
SPL	Auto 20 - 140	A (1 kHz Input)	F	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			S	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			I	94.1 dB	94.0 dB	0.1 dB	0.2 dB
		Z (1 kHz Input)	F	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			S	94.1 dB	94.0 dB	0.1 dB	0.2 dB
			I	94.1 dB	94.0 dB	0.1 dB	0.2 dB
		A (1 kHz Input)	F	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			S	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			I	114.1 dB	114.0 dB	0.1 dB	0.2 dB
		Z (1 kHz Input)	F	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			S	114.1 dB	114.0 dB	0.1 dB	0.2 dB
			I	114.1 dB	114.0 dB	0.1 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 9-Jul-2015

Checked By : K.O. Lo
Date : 9-Jul-2015

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Brüel & Kjær Type 2250L (Serial no. 3004555)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	28-Oct-2015	**Certificate Number**	MLCN151848S

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	Hand-held Analyzer
Manufacturer	Brüel & Kjær
Model Number	Type 2250-L
Serial Number	3004555
Equipment Number	--

Calibration Particular

Date of Calibration	28-Oct-2015		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-2016		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	10 minutes
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages.		

Approved By & Date

K.O. Lo 28-Oct-2015

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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Certificate No. MLCN151848S

Calibration Data

Parameter	Range (dB)	Frequency Weighting	Response	EUT Reading	Standard Reading	EUT Error	Calibration Uncertainty
SPL	Auto 20 - 140	A (1 kHz Input)	F	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			S	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			I	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		Z (1 kHz Input)	F	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			S	94.0 dB	94.0 dB	0.0 dB	0.2 dB
			I	94.0 dB	94.0 dB	0.0 dB	0.2 dB
		A (1 kHz Input)	F	114.0 dB	114.0 dB	0.0 dB	0.2 dB
			S	114.0 dB	114.0 dB	0.0 dB	0.2 dB
			I	114.0 dB	114.0 dB	0.0 dB	0.2 dB
		Z (1 kHz Input)	F	114.0 dB	114.0 dB	0.0 dB	0.2 dB
			S	114.0 dB	114.0 dB	0.0 dB	0.2 dB
			I	114.0 dB	114.0 dB	0.0 dB	0.2 dB

- END -

Calibrated By : Dan
Date : 28-Oct-2015

Checked By : K.O. Lo
Date : 28-Oct-2015

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Larson Davis CAL200 (Serial No. 10478)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	22-Aug-2015	**Certificate Number**	MLCN151388S

Customer Information

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

Equipment-under-Test (EUT)

Description	Precision Acoustic Calibrator
Manufacturer	Larson Davis
Model Number	CAL200
Serial Number	10478
Equipment Number	--

Calibration Particular

Date of Calibration	22-Aug-2015		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-16 1357(MLTE190) / MLEC15/05/02 / 13-May-16		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 22-Aug-2015

Statements

* Calibration equipment used for this calibration are traceable to national / international standards.
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MAXLAB

Certificate No. MLCN151388S

Calibration Data				
EUT Setting	**Standard Reading**	**EUT Error from Setting**	**Calibration Uncertainty**	**EUT Specification**
94 dB	93.9 dB	-0.1 dB	0.15 dB	± 0.2 dB
114 dB	114.0 dB	0.0 dB	0.15 dB	± 0.2 dB

- END -

Calibrated By : Dan
Date : 22-Aug-15

Checked By : K.O. Lo
Date : 22-Aug-15

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Svantek SV30A (Serial no. 10814)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	4-May-2015	**Certificate Number**	MLCN150722S

Customer Information

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

Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	10814
Equipment Number	--

Calibration Particular

Date of Calibration	2-May-2015		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-16 1351(MLTE049) / MLEC14/06/02 / 4-Jun-15		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 4-May-2015

Statements

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MAXLAB

Certificate No. MLCN150722S

Calibration Data

EUT Setting	Standard Reading	EUT Error	Calibration Uncertainty	EUT Specification
94 dB	94.1 dB	-0.1 dB	0.15 dB	± 0.3 dB
114 dB	114.0 dB	0.0 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Dan
Date : 2-May-15

Checked By : K.O. Lo
Date : 4-May-15

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CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	25-May-2016	**Certificate Number**	MLCN161053S

Customer Information

Company Name	Acoustics Innovation Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T.

Equipment-under-Test (EUT)

Description	Acoustic Calibrator
Manufacturer	Svantek
Model Number	SV 30A
Serial Number	10814
Equipment Number	--

Calibration Particular

Date of Calibration	25-May-2016		
Calibration Equipment	4231(MLTE008) / PA160059 / 20-May-18 1351(MLTE049) / MLEC15/06/02 / 3-Jun-16		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 25-May-2016

Statements

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MAXLAB

Certificate No. MLCN161053S

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

- END -

Calibrated By : Dan
Date : 25-May-16

Checked By : K.O. Lo
Date : 25-May-16

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Svantek SV30A (Serial no. 29088)

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	23-Jan-2015	**Certificate Number**	MLCN150089S

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	23-Jan-2015		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-16 1351(MLTE049) / MLEC14/06/02 / 4-Jun-15		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 23-Jan-2015

Statements

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MAXLAB

Certificate No. MLCN150089S

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	113.8 dB	0.2 dB	0.15 dB	± 0.3 dB

- END -

Calibrated By : Dan
Date : 23-Jan-15

Checked By : K.O. Lo
Date : 23-Jan-15

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MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	1-Feb-2016	**Certificate Number**	MLCN160236S

Customer Information

Company Name	Acoustics Innovation Limited
Address	Unit 601, Block A, Shatin Industrial Centre, Yuen Shun Circuit, Shatin, N. T.

Equipment-under-Test (EUT)

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

Calibration Particular

Date of Calibration	1-Feb-2016		
Calibration Equipment	4231(MLTE008) / PA140064 / 29-Apr-16 1351(MLTE049) / MLEC15/06/02 / 3-Jun-16		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		

Approved By & Date

K.O. Lo 1-Feb-2016

Statements

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MAXLAB

Certificate No. MLCN160236S

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 : Dan
Date : 1-Feb-16

Checked By : K.O. Lo
Date : 1-Feb-16

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MaxLab Calibration Centre Limited
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Svantek SV35 (Serial no. 44797)

SVANTEK

ISO9001 certified

Sound Level Calibrator

Type: **SV35** Serial No: **44797**

Calibration Chart

Sound pressure level (94dB): **93.99 dB** (THD: **0.08 %**)

Sound pressure level (114dB): **113.99 dB** (THD: **0.09 %**)

Frequency: 1000 Hz
Short term level stability: 0.05 dB
Frequency stability: 0.01 %

Measurement conditions

Temperature:	**23 °C**
Relative humidity:	**30 %**
Ambient pressure:	**1001 hPa**

Reference conditions

Temperature:	23.0 °C
Relative humidity:	50 %
Ambient pressure:	1013.2 hPa

CONFORMITY & TEST DECLARATION

The stated level is valid at reference conditions.
Measured according to IEC 60942:2003.
The stated level is relative to 20 μPa .

The level is traceable to GUM (Central Office of Measures, Poland) with a calculated uncertainty less then ±0.15 dB (2*sd).

Calibration specialist : .....

Date : 2015-11-03