

MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU –
SHENZHEN – HONG KONG EXPRESS RAIL LINK
(No. EP-349/2009/I)

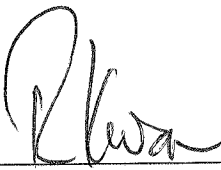
Baseline Ground-borne Noise Monitoring Report (Part 3)
(Rev A)

Verified by: 
Position: Independent Environmental Checker
Date: 15 November 2012

MTR Corporation Limited

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(Rev A)

Certified by: 

Position: Environmental Team Leader

Date: 13 NOV 2012

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EXECUTIVE SUMMARY

The environmental baseline monitoring for the Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link, hereinafter referred to “the XRL” was conducted at the designated ground-borne noise monitoring locations along the XRL alignment (Figures 1A – 1C) in 2010 and 2011. Noise measurements were taken in terms of L_{eq} with L_{10} and L_{90} as reference.

However, after further contact with the occupant of DD110 LOT 482, Wang Toi Shan (GN31) in Aug 2012, the house owner of GN31 rejected the Environmental Team’s (ET) request to conduct impact ground-borne noise monitoring within GN31. Consequently, baseline ground-borne noise monitoring was conducted at ground floor of store room at Wang Toi Shan village house near lamp post number “XRL823A0010” as an alternative monitoring location of GN31.

Baseline ground-borne noise monitoring was conducted during daytime (0700-1900 hours), evening time (1900-2300 hours) and night-time (2300-0700 hours) for seven consecutive days at ground floor of store room at Wang Toi Shan village house near lamp post number “XRL823A0010” (alternative monitoring location of GN31).

In this report, the measured ground-borne noise levels on weekdays were presented separately from general holidays and Sundays. According to the monitoring results, average baseline ground-borne noise levels for daytime (0700-1900) during normal weekdays at the alternative monitoring location of GN31 range from 38 to 51 dB(A) which was below the daytime criteria of 65 dB (A) for residential premises.

1. INTRODUCTION

1.1 Background

Further to the Government's decision made in April 2008, MTR Corporation (MTR) commenced to plan and design the Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (hereinafter referred to "the XRL" or "the Project"), which is a committed cross boundary transport infrastructure project.

The XRL will provide high speed rail services between Hong Kong and Guangzhou, and a connection to the national high-speed passenger rail network serving major mainland cities outside of Guangdong province. The Hong Kong section of the XRL is about 26km from new terminus located in West Kowloon (i.e. West Kowloon Terminus (WKT)) to the boundary at Huang Gang. Along the railway corridor, there will be a total of eight ventilation buildings/ emergency access point (EAP), stabling sidings and a maintenance facility at Shek Kong (SSS) and an Emergency Rescue Station (ERS) next to SSS serving the operation of the XRL.

1.2 Purpose of the report

In accordance with the Environmental Monitoring and Audit (EM&A) Manual, baseline ground-borne noise monitoring should be carried out before the commencement of the operation of tunnel boring machine (TBM). The purpose of this Baseline Ground-borne Noise Monitoring Report (Part 3) is to present the baseline monitoring results at the alternative monitoring location of GN31 and to establish the compliance levels for the subsequent environmental impact monitoring during construction stage.

2. GROUND-BORNE NOISE

2.1 Monitoring Methodology

Consecutive noise measurements were undertaken over a period of at least 7 days to establish the ambient noise levels at representative sensitive receivers. Continuous 5 minute A-weighted noise levels were recorded throughout the daytime, evening and night-time on weekdays (Monday to Saturday) and also on Sundays.

As referred to the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. In this baseline monitoring, B&K 2238 sound level meters, which comply with the above-mentioned specifications, were used.

No tunnelling activities were being conducted in the vicinity of the monitoring stations during the baseline monitoring. Any non-project related construction activities in the vicinity of the monitoring stations during the baseline monitoring were noted and the source and location of such activities were recorded.

With reference to Section 4.11 of the EM&A Manual, the ground-borne noise monitoring stations were located at the lowest sensitive floor of each designated monitoring location and at a position 1.2m above ground inside the building structures.

2.2 Monitoring Frequency

The baseline monitoring was measured daily for a continuous period of at least 7 consecutive days at a minimum logging interval of 30 minutes for daytime (between 0700 and 1900 hours of normal weekdays) and 15 minutes (as three consecutive $L_{eq, (5 \text{ minutes})}$ readings) for evening time (between 1900 and 2300 hours of normal weekdays), general holidays including Sundays (between 0700 and 2300 hours) and night-time (between 2300 and 0700 of all days). The L_{eq} , L_{10} and L_{90} were recorded at the specified interval.

2.3 Monitoring Location

After further contact with the occupant of DD110 LOT 482, Wang Toi Shan (GN31) in Aug 2012, the house owner of GN31 rejected Environmental Team's (ET) request to conduct impact ground-borne noise monitoring within GN31. Consequently, baseline ground-borne noise monitoring was conducted at ground floor of store room at Wang Toi Shan village house near lamp post number "XRL823A0010" as an alternative monitoring location of GN31. The location of this alternative monitoring station is shown in Figure 2A. This alternative monitoring location was chosen in accordance with Section 4.10 and 4.11 of the approved EM&A Manual. The monitoring location was within enclosure environment which disturbance from occupants activity would be minimal. A summary of monitoring location and period is presented in the table below:

Monitoring Station ID	Ground-borne Noise Monitoring Location	Lowest Sensitive Floor	Monitoring period	Serial number of Sound Level Meter
GN31	Ground floor of store room at Wang Toi Shan village house near lamp post number "XRL823A0010"	Ground Floor	8/9/2012 - 15/9/2012	2800927

Table 2.1: Details of Ground-borne Noise Monitoring Location

2.4 Calibration Requirements

B&K 2238 sound level meters which comply with the International Electrotechnical Commission Publication 651:1979 (Type 1) and 804:1985 (Type 1), specification as referred to in the Technical Memoranda to the NCO were used for the baseline ground-borne noise monitoring. The sound level meters and calibrator are calibrated by the certified laboratory or manufacturer once every year to ensure they perform to the same level of accuracy as stated in the manufacturer's specifications. Calibration certificates of the sound level meters and calibrator are attached in Appendix B.

Immediately prior to and following each noise measurement the accuracy of the sound level meter was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the difference between calibration levels obtained before and after the noise

measurement is less than 1.0 dB.

2.5 Ground-borne Construction Noise Criteria

Acceptable Noise Levels are assigned depending upon the Area Sensitivity Ratings. The criteria applicable to construction ground-borne noise as defined in the EM&A Manual are presented below for reference.

Description	Ground-borne Construction Noise Criteria, dB(A)						
	Daytime (0700-1900 hrs) (except General Holidays & Sunday)	Daytime during general holidays and Sundays and all days during Evening (1900 to 2300 hrs)			Night-time (2300 to 0700 hrs)		
		A	B	C	A	B	C
Education institutions	60/55 ^[a]	50	55	60	[b]		
Domestic premises, hotels	65	50	55	60	35	40	45

Notes:

[a] A 5dB(A) reduction in the ground-borne noise criterion is recommended for school during examination period.

[b] No sensitive use during this period.

Table 2.2: Ground-borne Construction Noise Criteria

2.6 Monitoring Results

Baseline ground-borne noise monitoring was conducted during the period shown in Table 2.1 alternative monitoring location of GN31. The weather condition was generally fine during the monitoring period with occasional rainfall. The major noise sources at respective monitoring location are summarized at the table below:

Monitoring Station ID	Ground-borne Noise Monitoring Location	Major Noise Source
GN31	Ground floor of store room at Wang Toi Shan village house near lamp post number "XRL823A0010"	Noise from domestic premises.

Table 2.3: Major Noise Source at Ground-borne Noise Monitoring Locations

Baseline ground-borne noise monitoring results are summarised in Table 2.4. Detailed monitoring data at each monitoring location together with the graphical presentation are given in Appendix A.

Monitoring result at GN31			
Period	L_{eq}(30min), dB(A) (Range)	L₁₀(30min), dB(A) (Range)	L₉₀(30min), dB(A) (Range)
0700 – 1900	46	48	41
(Daytime, Normal weekday)	(38 - 51)	(40 - 52)	(34 - 43)
Period	L_{eq}(5min), dB(A) (Range)	L₁₀(5min), dB(A) (Range)	L₉₀(5min), dB(A) (Range)
1900 – 2300	55	56	53
(Evening, Normal weekday)	(45 – 58)	(46 - 59)	(43 - 57)
0700 – 2300	51	52	49
(General Holiday including Sunday)	(30 - 60)	(31 - 61)	(27 - 59)
2300 – 0700	53	55	51
(Night-time, all days)	(33 - 58)	(34 - 59)	(29 - 56)

Table 2.4: Baseline Ground-borne Noise Monitoring Results

As revealed from the monitoring results, average baseline ground-borne noise levels for daytime (0700-1900) during normal weekdays at the alternative monitoring location of GN31 range from 38 to 51 dB(A) which is below the daytime criteria of 65 dB (A) for residential premises.

3. CONCLUSION

3.1 Ground-borne Construction Noise

Baseline ground-borne noise monitoring for alternative monitoring location of GN31 was carried on 8 September – 15 September 2012. The weather condition was generally fine during the monitoring period with occasional rainfall.

According to the monitoring results, average baseline ground-borne noise levels for daytime (0700-1900) during normal weekdays at the alternative monitoring location of GN31 range from 38 to 51 dB(A), which are well within ground-borne construction noise criteria for residential premises.

Appendix A

Baseline ground-borne noise
monitoring data

Baseline Ground-borne Noise Monitoring Result

Location: GN31 ground floor of store room at Wang Toi Shan village house near lamp post number “XRL823A0010”

Baseline monitoring period: 8/9/2012 - 15/9/2012

Parameter: Leq

Time Slot Averaged Baselines

1) Weekdays Daytime Noise Level, dB(A)

Time slot	Leq, 30 min	L10	L90
07:00-07:30	38.3	39.8	34.4
07:30-08:00	41.2	42.8	37.8
08:00-08:30	45.3	46.7	42.0
08:30-09:00	46.4	48.3	41.6
09:00-09:30	48.3	49.9	42.5
09:30-10:00	45.6	47.1	42.5
10:00-10:30	48.1	47.8	42.5
10:30-11:00	45.7	47.1	42.8
11:00-11:30	47.9	47.3	41.0
11:30-12:00	42.3	44.5	38.2
12:00-12:30	42.2	44.5	38.0
12:30-13:00	44.0	45.9	40.5
13:00-13:30	47.0	48.8	43.1
13:30-14:00	46.5	48.1	42.7
14:00-14:30	45.2	47.3	41.9
14:30-15:00	51.2	48.5	41.7
15:00-15:30	45.5	47.8	41.9
15:30-16:00	45.1	47.3	41.3
16:00-16:30	47.0	48.9	42.9
16:30-17:00	48.2	50.8	42.7
17:00-17:30	45.8	46.9	41.7
17:30-18:00	42.8	44.9	39.6
18:00-18:30	48.2	51.9	40.0
18:30-19:00	43.8	45.5	39.6
Average	46.3	47.7	41.4
Max	51.2	51.9	43.1
Min	38.3	39.8	34.4

Noise Control Period Averaged Baselines

2) Weekdays Evening Noise Level, dB(A)

Time Slot	Leq, 5min	L10	L90
19:00-19:15	46.6	47.4	43.5
	45.2	46.2	43.8
	50.5	51.8	46.6
19:15-19:30	51.7	52.7	49.4
	50.9	52.5	42.8
	52.0	53.8	50.0
19:30-19:45	53.0	54.2	51.0
	53.3	54.1	51.8
	53.2	55.2	50.6
19:45-20:00	52.7	54.6	48.4
	53.2	55.1	51.3
	54.1	55.5	51.4
20:00-20:15	54.9	56.3	52.3
	53.8	55.2	52.0
	55.1	55.9	53.4
20:15-20:30	55.7	57.0	51.9
	56.3	57.9	54.7
	56.7	57.7	54.3
20:30-20:45	56.8	58.4	54.7
	56.2	57.0	53.7
	55.5	57.2	52.8
20:45-21:00	56.0	57.3	53.1
	57.9	58.6	56.5
	57.5	58.4	56.0
21:00-21:15	57.4	58.5	55.1
	56.0	57.0	54.5
	55.7	57.3	52.5
21:15-21:30	55.3	56.7	52.6
	53.5	55.2	51.3
	53.3	54.5	51.3

Time Slot	Leq, 5min	L10	L90
21:30-21:45	54.3	56.6	51.0
	54.0	55.5	51.5
	53.5	55.5	47.6
21:45-22:00	52.8	54.9	49.6
	53.3	54.2	51.3
	54.1	55.7	50.9
22:00-22:15	54.8	56.2	51.6
	52.5	53.7	50.4
	54.0	55.7	51.5
22:15-22:30	55.8	56.6	54.0
	56.3	57.3	54.8
	56.6	57.8	54.9
22:30-22:45	57.4	58.3	55.7
	57.5	58.6	55.9
	57.6	58.3	56.6
22:45-23:00	56.0	56.9	54.2
	55.9	57.5	53.3
	53.9	55.8	52.0
Average	55.0	56.3	52.8
Max	57.9	58.6	56.6
Min	45.2	46.2	42.8

3) General Holidays (including Sundays) (0700-2300) Noise Level, dB(A)

Time Slot	Leq, 5min	L10	L90
0700-07:15	29.6	32.0	27.5
	30.5	32.0	27.5
	33.0	31.5	27.5
07:15-07:30	34.4	32.5	27.5
	33.6	33.5	27.5
	33.3	31.5	27.5
07:30-07:45	35.8	38.0	29.0
	33.1	32.0	28.0

Time Slot	Leq, 5min	L10	L90
	32.4	34.0	28.0
07:45-08:00	35.3	37.5	28.0
	30.3	31.0	28.0
	30.7	31.5	27.5
08:00-08:15	30.3	31.0	28.0
	37.7	41.0	28.5
	35.8	33.5	28.5
08:15-08:30	33.0	31.0	28.0
	30.3	31.0	28.0
	33.1	33.5	28.0
08:30-08:45	50.9	55.0	28.5
	38.0	43.0	28.5
	45.4	47.5	28.5
08:45-09:00	31.3	31.5	28.0
	49.7	54.5	29.5
	32.0	32.0	29.0
09:00-09:15	32.6	35.0	28.5
	48.4	52.5	35.5
	47.7	52.0	30.0
09:15-09:30	37.9	39.0	30.0
	48.7	53.5	30.0
	40.6	41.0	30.5
09:30-09:45	31.9	35.0	27.5
	31.1	33.0	28.0
	34.2	37.5	29.0
09:45-10:00	39.7	41.5	28.0
	36.9	40.0	29.0
	40.8	41.0	32.5
10:00-10:15	41.2	43.5	31.5
	37.9	41.5	29.0
	37.0	40.0	28.5
10:15-10:30	30.4	31.5	27.5
	31.0	33.0	27.5
	32.1	33.0	28.5
10:30-10:45	31.3	32.5	28.5

Time Slot	Leq, 5min	L10	L90
	37.9	39.0	30.0
	48.7	53.5	30.0
10:45-11:00	40.6	41.0	30.5
	31.9	35.0	27.5
	31.1	33.0	28.0
11:00-11:15	36.3	39.5	28.0
	39.4	40.5	28.0
	42.9	42.0	27.0
11:15-11:30	37.2	39.5	28.5
	46.8	51.5	28.0
	48.1	51.5	43.5
11:30-11:45	45.0	46.5	28.0
	30.5	31.0	27.0
	36.0	37.5	29.0
11:45-12:00	39.6	42.0	28.5
	31.9	33.0	28.0
	30.6	31.0	27.5
12:00-12:15	44.7	44.5	27.5
	45.7	51.5	28.0
	39.2	43.0	31.0
12:15-12:30	39.5	43.5	30.0
	32.6	34.0	29.0
	36.6	38.0	29.5
12:30-12:45	39.9	45.0	29.0
	34.1	35.5	28.5
	35.8	39.0	30.5
12:45-13:00	30.1	31.5	28.0
	32.7	35.0	28.5
	37.7	41.5	29.0
13:00-13:15	41.9	44.5	30.0
	46.8	50.5	30.0
	39.7	41.0	29.5
13:15-13:30	37.8	42.5	28.0
	37.6	42.5	28.5
	40.2	41.0	38.5

Time Slot	Leq, 5min	L10	L90
13:30-13:45	40.5	39.0	38.0
	34.2	38.5	28.5
	34.4	34.0	28.5
13:45-14:00	41.4	46.0	29.0
	35.7	38.5	29.5
	32.3	34.5	28.0
14:00-14:15	32.8	33.0	28.5
	42.3	47.5	28.5
	34.1	37.5	28.5
14:15-14:30	32.8	34.5	29.0
	31.5	33.0	29.0
	35.4	39.0	28.5
14:30-14:45	38.4	43.0	29.5
	40.8	43.5	29.5
	44.5	46.0	31.0
14:45-15:00	41.1	43.0	30.0
	46.4	48.5	33.5
	40.8	42.5	30.5
15:00-15:15	38.7	38.5	29.0
	35.3	37.5	30.5
	34.5	38.0	29.5
15:15-15:30	30.8	32.5	28.5
	35.5	39.0	29.0
	42.0	46.5	32.0
15:30-15:45	40.7	42.5	30.5
	33.5	36.5	28.5
	40.3	44.0	30.0
15:45-16:00	40.2	44.5	30.0
	32.5	35.0	28.5
	34.9	37.5	30.0
16:00-16:15	39.2	43.0	31.0
	39.5	43.5	30.0
	39.0	42.0	28.0
16:15-16:30	36.6	37.0	28.0
	30.4	31.0	28.5

Time Slot	Leq, 5min	L10	L90
	31.9	31.5	27.5
16:30-16:45	31.4	33.5	28.0
	33.1	36.5	28.5
	32.8	35.5	29.0
16:45-17:00	38.3	41.5	29.5
	46.4	38.5	28.5
	33.7	35.0	29.0
17:00-17:15	55.9	56.5	55.0
	55.5	56.5	53.0
	55.0	56.0	53.0
17:15-17:30	33.9	37.0	28.5
	30.6	31.5	28.0
	31.3	32.5	28.5
17:30-17:45	31.7	33.0	29.5
	34.7	37.5	29.0
	33.5	34.0	28.5
17:45-18:00	33.3	35.0	28.5
	32.9	35.5	28.5
	36.3	36.0	29.0
18:00-18:15	32.1	34.0	28.5
	35.6	39.5	30.0
	33.1	35.5	29.5
18:15-18:30	32.8	35.5	28.5
	30.5	31.5	28.5
	31.3	33.0	29.0
18:30-18:45	33.9	36.0	29.5
	45.7	48.5	29.0
	39.3	40.5	36.0
18:45-19:00	38.9	40.5	34.0
	34.6	36.5	31.5
	33.1	34.5	31.0
19:00-19:15	33.9	35.5	31.5
	38.7	41.5	33.5
	57.5	59.0	42.5
19:15-19:30	51.0	57.5	38.0

Time Slot	Leq, 5min	L10	L90
	49.3	53.5	40.0
	47.6	53.0	40.0
19:30-19:45	48.0	52.5	42.5
	55.1	56.5	50.0
	56.2	58.0	53.5
19:45-20:00	54.2	56.5	52.0
	53.0	53.5	52.0
	56.2	57.5	52.5
20:00-20:15	55.5	57.5	53.0
	60.0	61.0	58.5
	56.2	59.5	53.5
20:15-20:30	56.4	59.0	53.0
	59.0	59.5	58.0
	58.9	59.5	58.0
20:30-20:45	58.9	59.5	58.0
	58.9	59.5	58.0
	56.7	59.5	42.5
20:45-21:00	54.8	55.5	54.0
	56.3	57.0	54.5
	56.5	57.0	55.5
21:00-21:15	55.9	56.5	55.0
	55.5	56.5	53.0
	55.0	56.0	53.0
21:15-21:30	56.0	56.5	55.0
	55.9	56.5	55.0
	55.9	56.5	55.0
21:30-21:45	55.8	56.5	55.0
	55.8	56.5	55.0
	55.9	56.5	55.0
21:45-22:00	54.6	56.5	41.5
	52.5	56.0	39.5
	56.5	57.5	45.0
22:00-22:15	56.7	57.5	55.5
	57.2	58.0	56.5
	57.2	58.0	56.5

Time Slot	Leq, 5min	L10	L90
22:15-22:30	57.4	58.0	56.5
	56.5	57.0	55.5
	56.8	57.5	56.0
22:30-22:45	57.1	58.0	56.0
	57.2	58.0	56.5
	57.1	58.0	56.0
22:45-23:00	57.2	58.0	56.0
	57.2	58.0	56.5
	57.2	58.0	56.0
Average	50.7	52.1	48.7
Max	60.0	61.0	58.5
Min	29.6	31.0	27.0

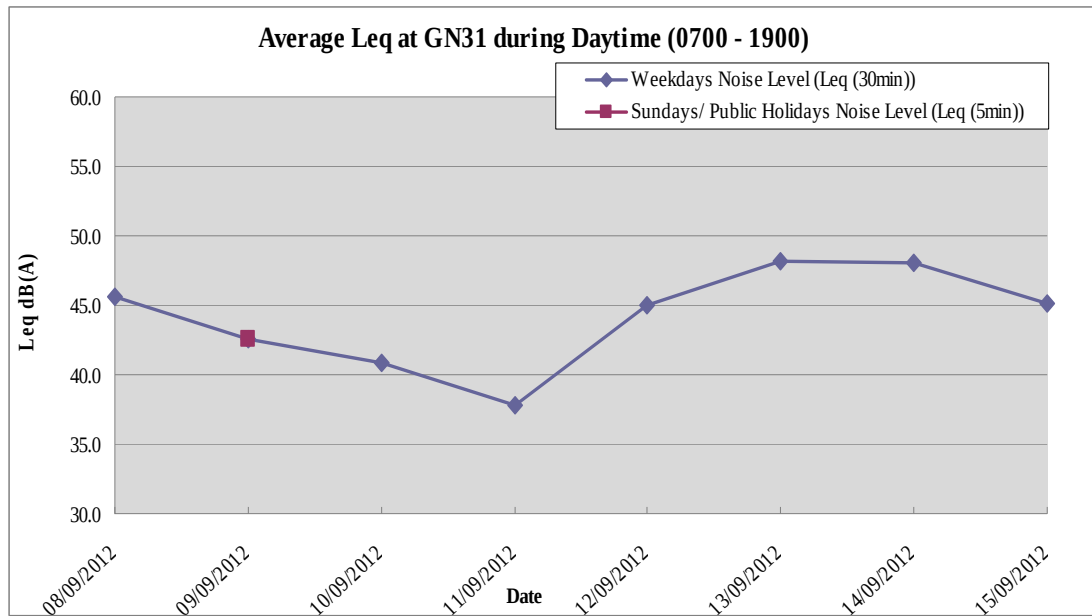
4) Night-time (for all days) Noise Level, dB(A)

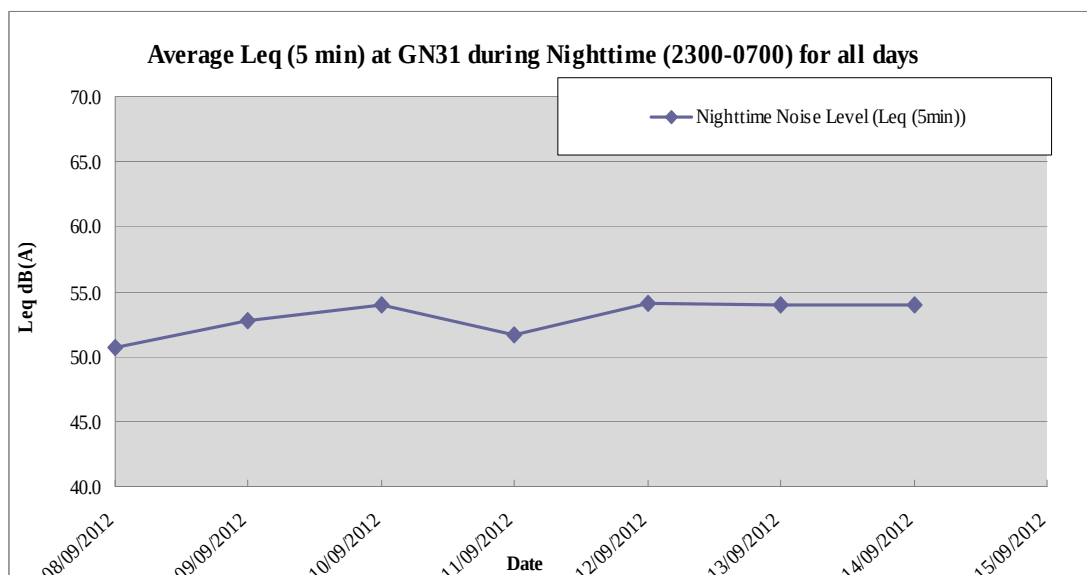
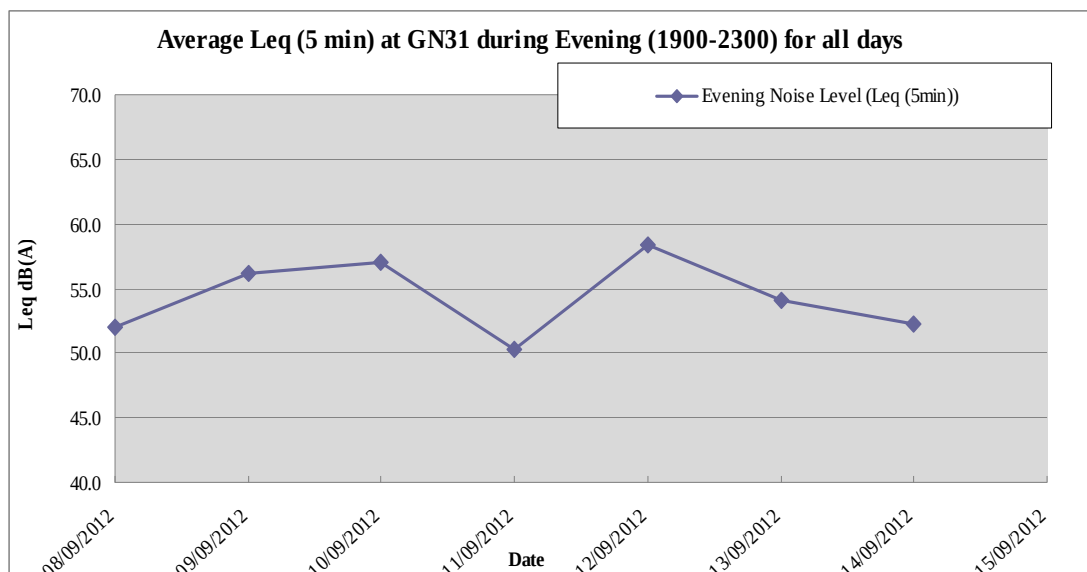
Time Slot	Leq, 5min	L10	L90
23:00-23:15	55.6	56.6	53.9
	55.4	56.6	52.9
	56.2	57.0	54.7
23:15-23:30	56.4	57.2	54.7
	55.5	56.6	53.3
	54.9	56.4	52.3
23:30-23:45	52.1	55.4	46.1
	51.7	53.3	49.5
	52.5	54.6	49.8
23:45-00:00	53.8	54.7	52.5
	53.7	54.3	52.7
	53.4	54.6	52.0
00:00-00:15	53.6	54.7	51.6
	53.2	53.8	52.1
	53.9	55.5	51.3
00:15-00:30	55.3	56.4	53.5
	54.6	56.2	52.3
	54.0	56.0	49.7
00:30-00:45	54.5	55.9	52.8

Time Slot	Leq, 5min	L10	L90
	54.8	55.6	53.8
	54.9	55.7	53.8
	55.2	56.1	54.1
00:45:01:00	54.2	55.9	52.4
	54.1	56.1	51.2
01:00-01:15	54.8	57.0	51.7
	54.5	56.9	50.4
	52.5	54.4	50.7
01:15-01:30	53.5	55.7	50.1
	53.3	55.6	50.4
	55.8	56.8	53.8
01:30-01:45	55.9	57.4	50.7
	53.0	54.2	50.7
	54.6	56.6	51.2
01:45-02:00	55.6	57.2	53.4
	55.1	55.8	53.6
	54.6	55.7	52.7
02:00-02:15	54.7	55.7	53.0
	53.6	54.9	52.0
	53.5	55.0	49.7
02:15-02:30	54.7	57.7	51.9
	54.5	56.1	49.9
	55.3	57.0	52.1
02:30-02:45	55.8	56.5	54.6
	54.3	55.8	51.5
	53.9	55.1	51.9
02:45-03:00	58.0	59.3	55.1
	57.3	58.1	56.3
	56.8	57.5	55.5
03:00-03:15	55.4	57.1	51.7
	53.2	55.5	50.9
	55.7	56.9	54.3
03:15-03:30	56.3	57.0	55.1
	56.8	57.6	55.4
	57.2	57.7	56.2

Time Slot	Leq, 5min	L10	L90
03:30-03:45	55.4	56.8	53.5
	54.5	55.2	53.2
	54.1	55.2	46.5
03:45-04:00	47.4	48.7	45.4
	48.2	49.4	46.6
	47.3	48.4	45.6
04:00-04:15	47.3	48.5	43.4
	46.5	47.6	45.0
	46.5	47.6	44.1
04:15-04:30	48.1	49.6	44.4
	48.6	50.0	45.0
	51.1	51.9	50.1
04:30-04:45	51.2	51.9	49.7
	54.8	56.2	51.8
	53.7	54.7	52.3
04:45-05:00	53.9	55.1	52.4
	52.0	54.6	49.3
	52.5	55.0	49.5
05:00-05:15	51.4	52.6	48.9
	50.3	51.2	49.0
	49.3	50.8	47.5
05:15-05:30	48.4	50.4	45.5
	47.2	48.5	45.1
	46.7	48.3	40.4
05:30-05:45	44.4	46.6	40.8
	44.5	47.0	41.3
	43.4	44.8	41.2
05:45-06:00	41.6	44.2	33.6
	39.8	44.1	32.3
	36.0	38.4	31.5
06:00-06:15	35.0	38.1	30.3
	36.0	39.8	29.9
	34.9	38.2	29.4
06:15-06:30	32.5	34.3	29.6
	33.1	34.6	29.8

Time Slot	Leq, 5min	L10	L90
	33.1	35.9	29.7
06:30-06:45	33.1	34.6	29.7
	36.3	40.4	29.9
	33.6	34.6	30.0
06:45-07:00	33.4	33.9	30.1
	34.8	36.9	30.0
	33.5	35.1	30.1
Average	53.2	54.5	51.1
Max	58.0	59.3	56.3
Min	32.5	33.9	29.4





Appendix B

Calibration Certificates for

Monitoring Equipments



CERTIFICATE OF CALIBRATION

Certificate No.: 12CA0823 01

Page: 1 of 2

Item tested

Description: Acoustical Calibrator (Class 1)
Manufacturer: B & K
Type/Model No.: 4231
Serial/Equipment No.: 1790985 / N.004.01
Adaptors used: -

Item submitted by

Customer: AECOM Asia Company Limited
Address of Customer: -
Request No.: -
Date of receipt: 23-Aug-2012

Date of test: 23-Aug-2012

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	29-May-2013	SCL
Preamplifier	B&K 2673	2239857	05-Jan-2013	CEPREI
Measuring amplifier	B&K 2610	2346941	29-Dec-2012	CEPREI
Signal generator	DS 360	61227	29-May-2013	CEPREI
Digital multi-meter	34401A	US36087050	16-Dec-2012	CEPREI
Audio analyzer	8903B	GB41300350	29-May-2013	CEPREI
Universal counter	53132A	MY40003662	29-May-2013	CEPREI

Ambient conditions

Temperature: 22 ± 1 °C
Relative humidity: 60 ± 10 %
Air pressure: 1000 ± 5 hPa

Test specifications

- 1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- 2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on page 2 of this certificate.

Approved Signatory:

Huang Jian Min/Feng Jun Qi

Date: 23-Aug-2012

Company Chop:



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



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

12CA0823 01

Page: 2 of 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μ Pa)			
Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Uncertainty dB
1000	94.00	94.08	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz

STF = 0.001 dB

Estimated uncertainty

0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz

Actual Frequency = 999.8 Hz

Estimated uncertainty

0.1 Hz

Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz

TND = 0.5 %

Estimated uncertainty

0.7 %

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

Calibrated by:

Date:

Fung Chi Yip
23-Aug-2012

- End -

Checked by:

Date:

Feng Jun Qi
23-Aug-2012

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

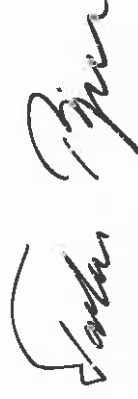
MANUFACTURER'S CERTIFICATE OF CONFORMANCE

We certify that Brüel & Kjær -2238--001- Serial No. 2800927 has been tested and passed all production tests, confirming compliance with the manufacturer's published specification at the date of the test.

The final test has been performed using calibrated equipment, traceable to National or International Standards or by ratio measurements.

Brüel & Kjær is certified under ISO 9001:2008 assuring that all test data is retained on file and is available for inspection upon request.

Nærum 20-jun-2012



Torben Bjørn
Vice President, Operations

Please note that this document is not a calibration certificate.
For information on our calibration services please contact your nearest Brüel & Kjær office.

HEADQUARTERS: Brüel & Kjær Sound & Vibration Measurement A/S · DK-2850 Nærum · Denmark
Telephone: +45 7741 2000 · Fax: +45 4580 1405 · www.bkav.com · info@bkav.com
Local representatives and service organisations worldwide

Brüel & Kjær 

Appendix C

Figures

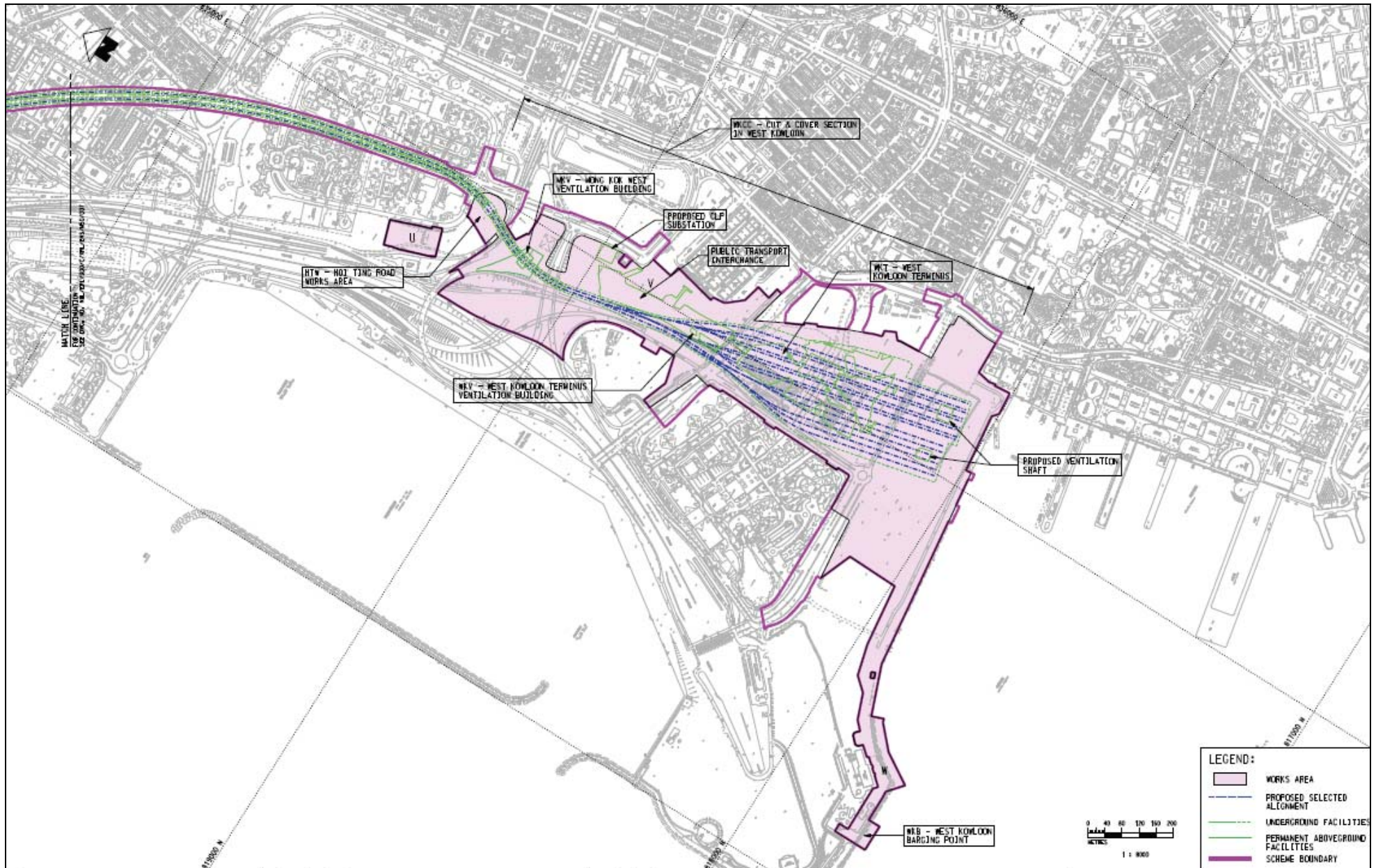
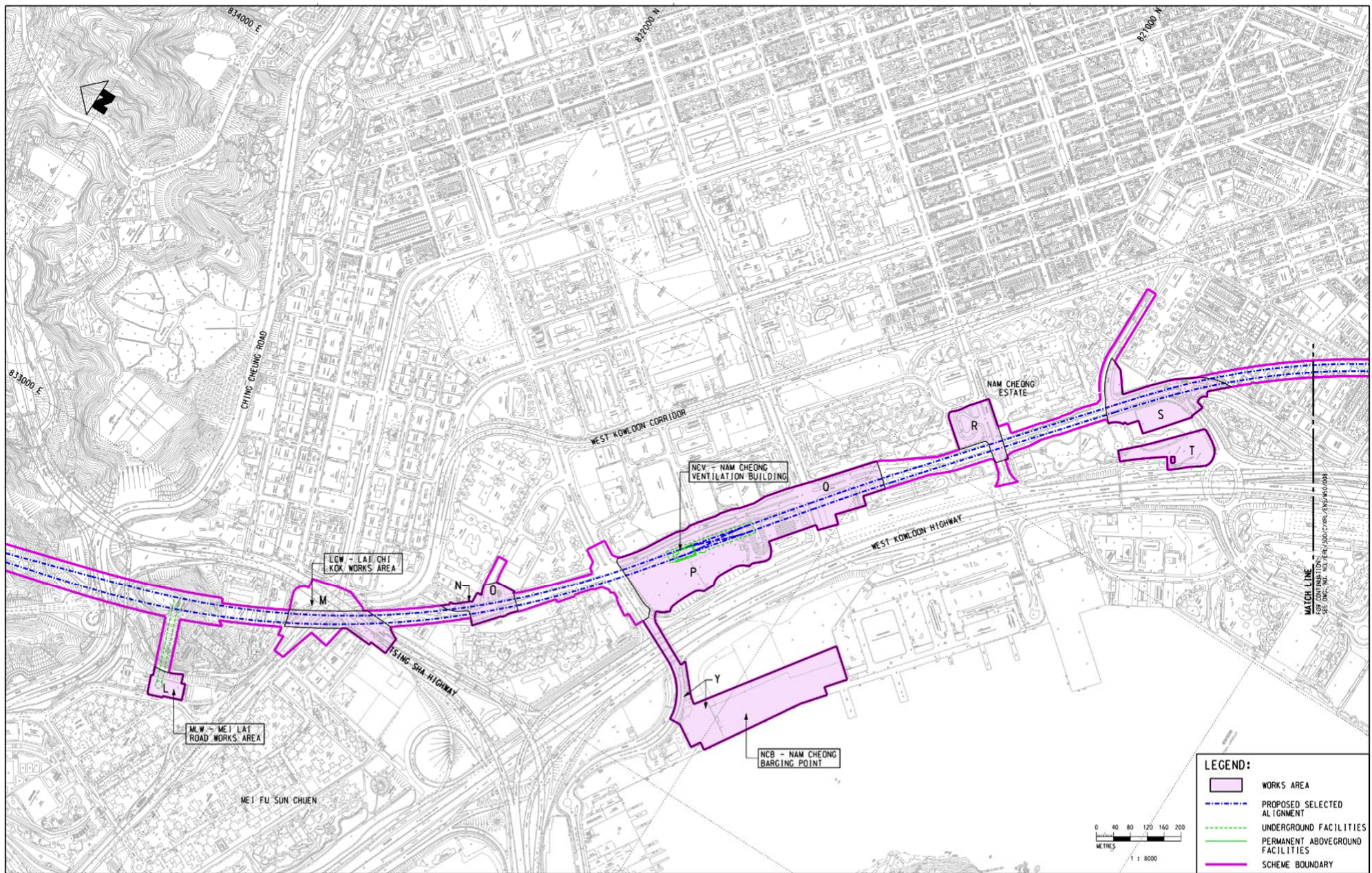


Figure 1A - Alignment of the Project
(Mongkok West and West Kowloon)



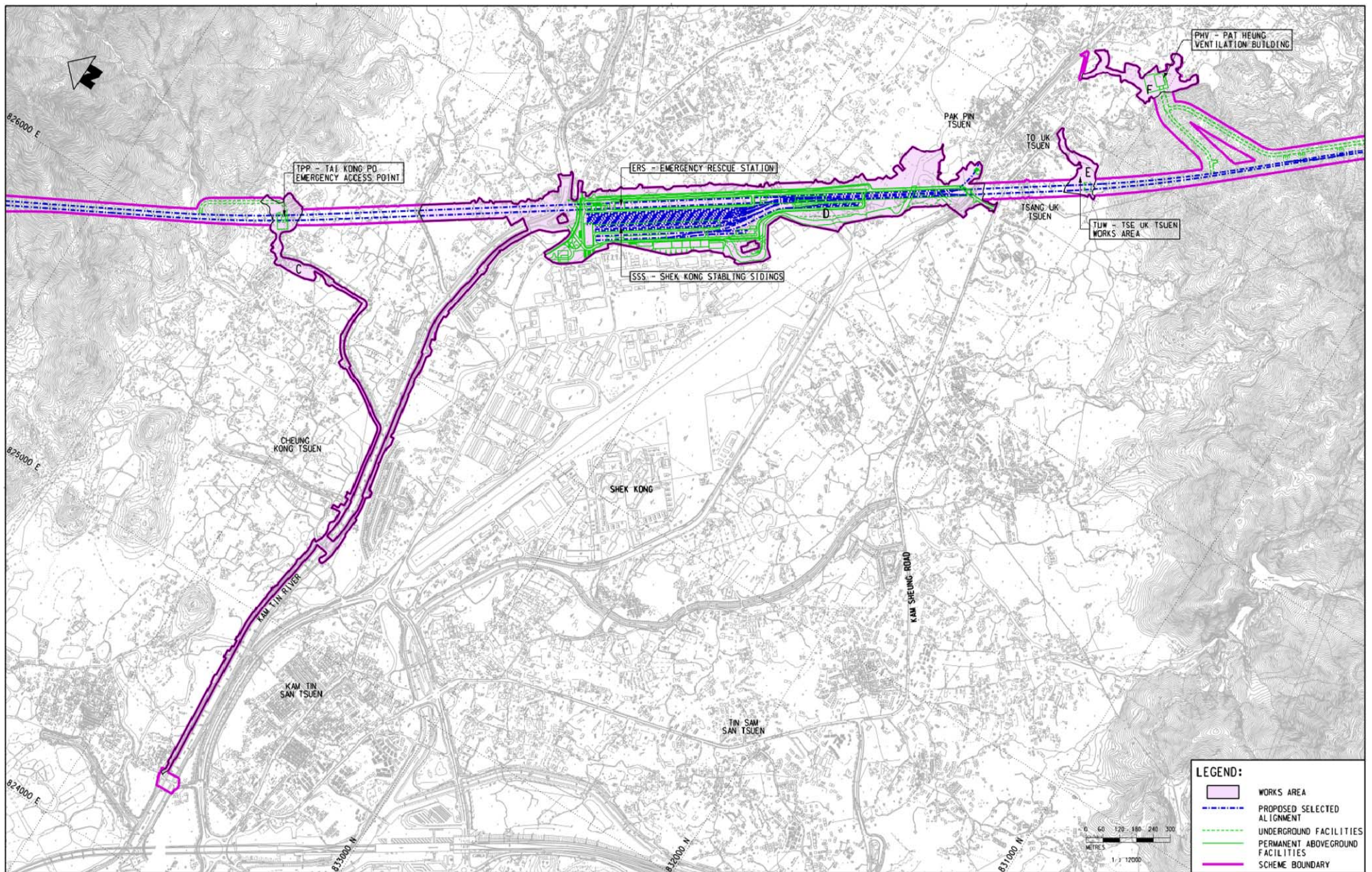


Figure 1C - Alignment of the Project (Shek Kong)

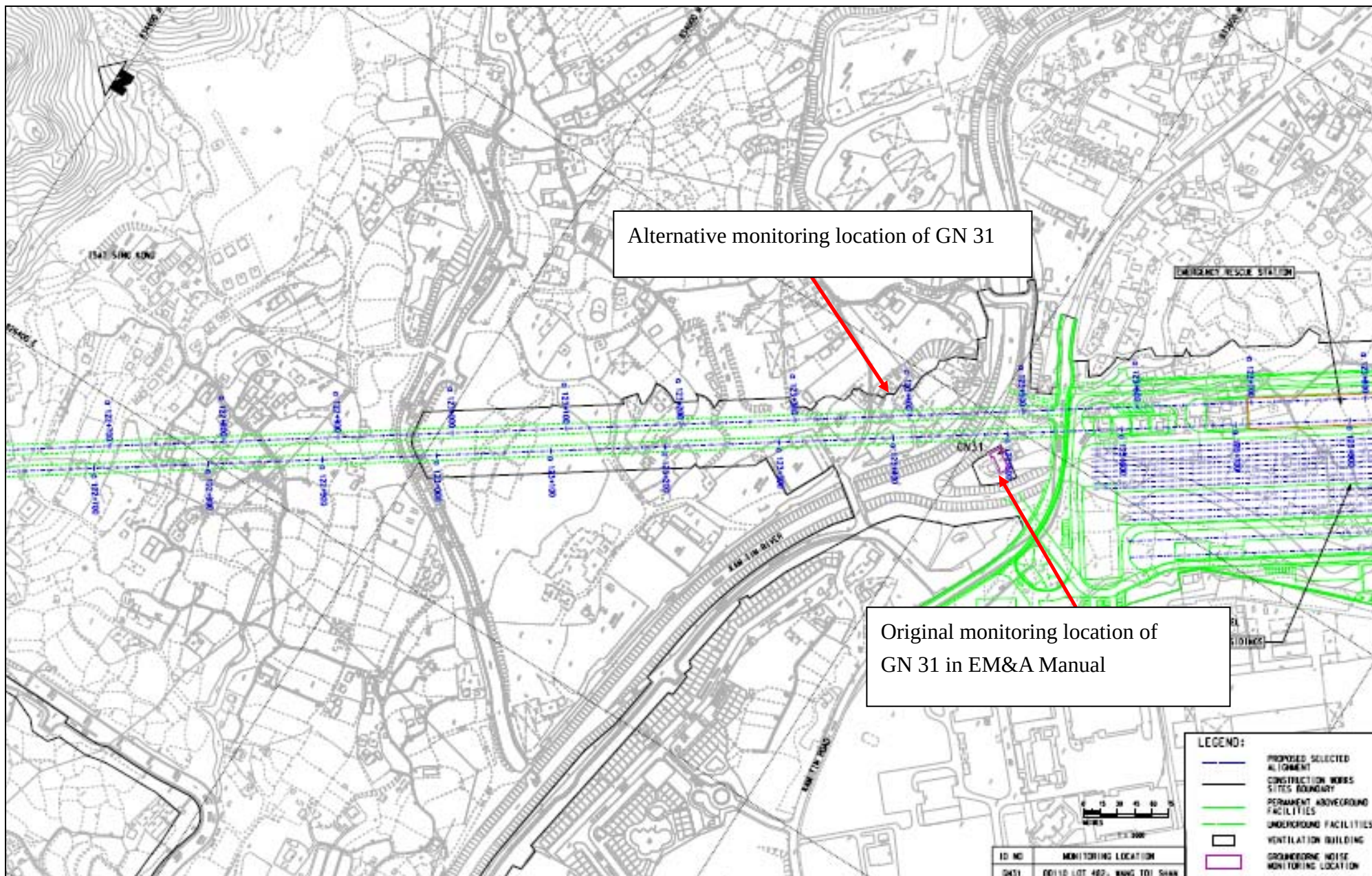


Figure 2A - Alternative ground-borne noise monitoring location at GN 31

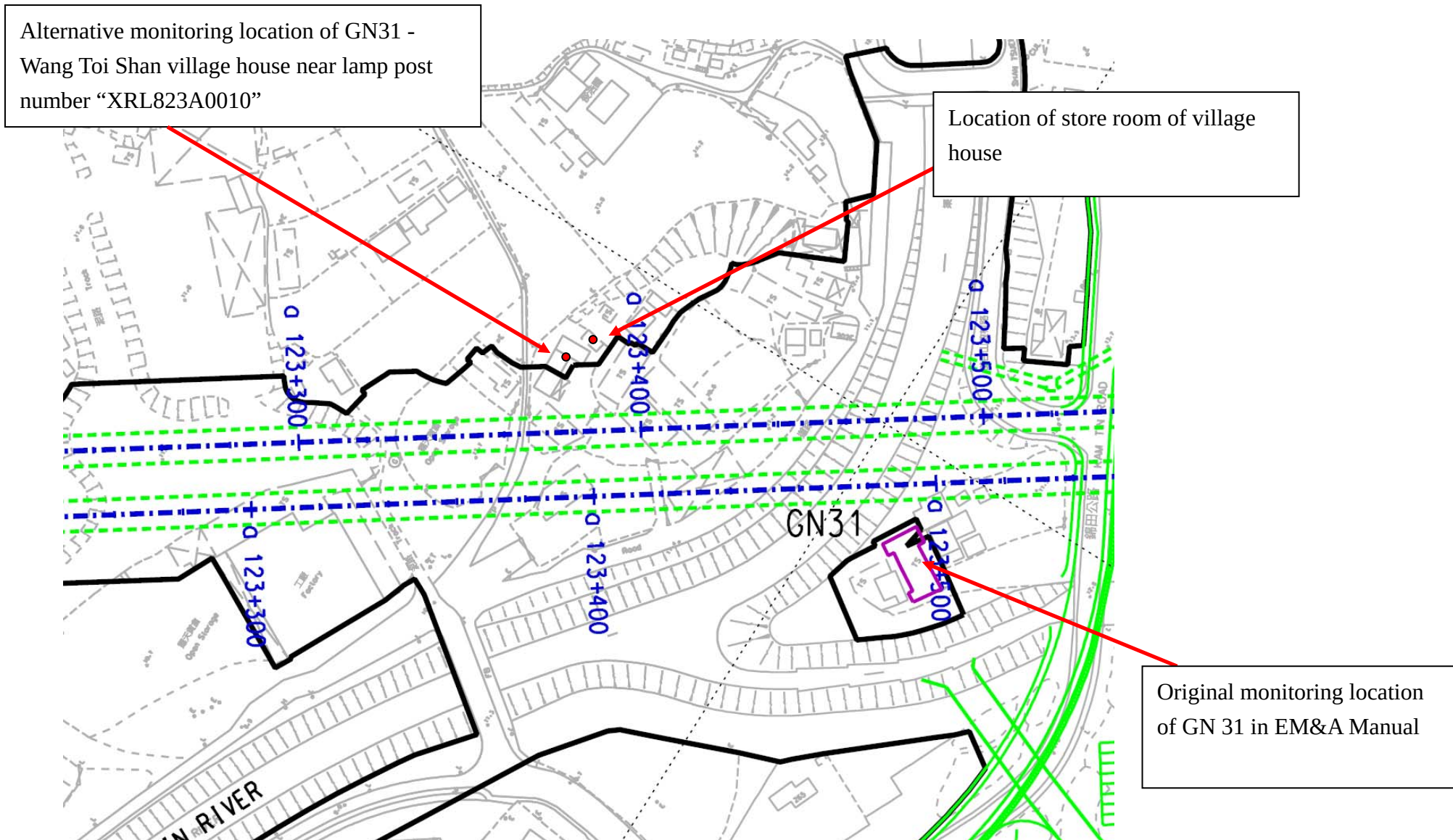


Figure 2B – Detailed alternative ground-borne noise monitoring location at GN 31



**Figure 2C - Photo of Wang Toi Shan village house
near lamp post number “XRL823A0010”**



Figure 2D - Photo of store room



Figure 2E - Photo of alternative monitoring location at GN 31 (inside store room)