



Paul Y Construction Company Ltd.

Contract No. HY/2002/19.

**Widening of Yuen Long Highway
Between Tan Kwai Tsuen and
Shap Pat Heung Interchange**

**Bimonthly Traffic Noise Monitoring Report
(June 2007 and July 2007)**

August 2007

| | Name | Signature |
|---------------------|-------------|---|
| Reviewed & Checked: | Connie Wong |  |
| Approved: | YT Tang |  |

| | | |
|---|-------|----------------------|
| Version: | Rev 0 | Date: 13 August 2007 |
| <p>The information contained in this report is, to the best of our knowledge, correct at the time of printing. The interpretation and recommendations in the report are based on our experience, using reasonable professional skill and judgment, and based upon the information that was available to us. These interpretations and recommendations are not necessarily relevant to any aspect outside the restricted requirements of our brief. This report has been prepared for the sole and specific use of our client and ENSR Asia (HK) Ltd. accepts no responsibility for its use by others.</p> <p>This report is copyright and may not be reproduced in whole or in part without prior written permission.</p> | | |

ENSR Asia (HK) Ltd.

11/F, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong
Tel: (852) 2893 1551 Fax: (852) 2891 0305 www.ensr.aecom.com www.maunsell.aecom.com



STANGERS

ESTABLISHED 1988

**INDEPENDENT ENVIRONMENTAL CHECKER
CHECK CERTIFICATE**

Contract No. HY/2002/19
Widening of Yuen Long Highway
Between Tan Kwai Tsuen and Shap Pat Heung Interchange
No. 6 Bimonthly Traffic Noise Monitoring Report (June 2007 and July 2007)

We certify that reasonable skill and care have been used in the checking of this report and the report has been verified by the IEC.

Signed: 
Independent Environmental Checker

Name: Wilson Fok
Environmental Scientist
Stanger Asia Limited

TABLE OF CONTENTS

| | | |
|----------|--|-----------|
| 1 | INTRODUCTION..... | 1 |
| | Background Information..... | 1 |
| 2 | MEASUREMENT METHODOLOGY..... | 2 |
| | Measurement Time..... | 2 |
| | Noise Monitoring Locations (Noise Sensitive Receivers)..... | 2 |
| | Noise Monitoring Equipment..... | 3 |
| | Maintenance and Calibration..... | 3 |
| | Noise Measurement Methodology..... | 3 |
| | Traffic Survey..... | 4 |
| 3 | MEASUREMENT RESULTS AND OBSERVATIONS..... | 5 |
| | General..... | 5 |
| | Traffic Noise Level Monitoring Results..... | 5 |
| | Road Condition and Traffic Survey..... | 6 |
| 4 | DISCUSSION..... | 7 |
| | Predicted Noise Levels under the Traffic Flow Condition in 2021..... | 7 |
| 5 | CONCLUSION..... | 9 |
| 6 | REFERENCES..... | 10 |

List of Tables

| | |
|-----------|--|
| Table 2.1 | Noise Monitoring Locations (Sensitive Receivers) |
| Table 2.2 | Traffic Noise Monitoring Equipment |
| Table 2.3 | Details of the Noise Measurement and Traffic Survey locations |
| Table 3.1 | Traffic Noise Measurement Results and Comparison with Noise Standard |
| Table 3.2 | Traffic Flow of Yuen Long Highway |
| Table 3.3 | Traffic Speed Measurement |
| Table 4.1 | Predicted 2021 Peak Hour Traffic Data |
| Table 4.2 | Correction Factor for Monitoring Stations M1 – M4, M6 – M11 |
| Table 4.3 | Measured and Normalized Noise Level |

List of Figures

| | |
|------------|-----------------------------------|
| Figure 1.1 | Layout of Noise Monitoring Points |
|------------|-----------------------------------|

Appendices

| | |
|------------|---------------------|
| Appendix A | Calibration Records |
|------------|---------------------|

1 INTRODUCTION

Background Information

- 1.1 This is the sixth bimonthly Operational Phase Traffic Noise Monitoring Report prepared by ENSR Asia (HK) Ltd. (ENSR), (formerly Maunsell Environmental Management Consultants Ltd), the designated Environmental Team (ET), for the Project "Widening of Yuen Long Highway Between Tan Kwai Tsuen and Shap Pat Heung Interchange". This report presents the results of operational traffic noise level at noise sensitive receivers (NSRs) identified in the Traffic Noise Monitoring Plan. The objective of this report is to assess whether the level of traffic noise measured at the designated NSRs are environmental compliance after the mitigation measures (noise barrier) was implemented.
- 1.2 In accordance with the "Final Environmental Impact Assessment Report for Preliminary Design and Ground Investigation for Widening of Yuen Long Highway between Lam Tei and Shap Pat Heung Interchange"^[1], in order to assess the effectiveness of the proposed barriers, traffic noise monitoring is required to be carried out at representative NSRs within one year of the road opening. A Traffic Noise Monitoring Plan (Version No.1) was prepared based on the requirement stipulated in the Environmental Permit No.EP-141/2002 Clause 5.1 and was submitted to EPD.
- 1.3 Pre-monitoring joint site inspection was carried out on 30 August 2006 by the Engineer Representative (ER), the Contractor and ET to determine the exact location of stations for the monitoring.
- 1.4 In accordance with the Traffic Noise Monitoring Plan, the noise measurements will be conducted at 11 designated monitoring locations as shown in **Figure 1.1**. However, at monitoring station M5 (Jasper Court), since the property management company at Jasper Court rejected us using the premise to conduct the traffic noise monitoring and there was no other alternative location for relocation in regard of reflecting the traffic noise impact on the station at M5, the traffic noise monitoring at Station M5 was not conducted in this bimonthly monitoring.
- 1.5 The objectives of the measurements were to obtain sound pressure levels (SPL), in $L_{10(1-hour)}$, as measured at the sensitive receivers during the peak traffic periods of a day and check if they complied with specified noise standard.
- 1.6 In addition to the SPL measurement, relevant information, including traffic counts, speed checks, weather conditions, activities which might generate extraneous noises were also recorded.
- 1.7 This Report presents the traffic noise results and observations of traffic noise monitoring in the bimonthly period from 1 June 2007 to 31 July 2007.

2 MEASUREMENT METHODOLOGY

Measurement Time

- 2.1 Traffic noise measurements were conducted on normal weekdays during the AM peak traffic hour from 08:00 to 09:00.

Noise Monitoring Locations (Noise Sensitive Receivers)

- 2.2 Noise measurements were conducted at eleven designated monitoring locations according to the Traffic Noise Monitoring Plan which was shown in **Figure 1.1. Table 2.1** describes these monitoring stations.
- 2.3 During the pre-monitoring joint site inspection carried out on 30 August 2006. Some occupants rejected us using their premises for monitoring and some premises were unoccupied. Traffic noise monitoring was thus carried out at alternative locations. Essentially, the alternative of monitoring locations were on the same premise but at different floor or the location which was adjacent to the proposed location in regard of reflecting the traffic noise impact on the residents.

Table 2.1 Noise Monitoring Locations (Sensitive Receivers)

| NSR ID* | Monitoring Station | Monitoring Station Location | Predicted Noise Level (mitigated), L ₁₀ dB(A) in Year 2021 [^] | Noise Standard L ₁₀ (peak hour) (dB(A)) |
|---------|--------------------|---|--|--|
| 93 | M1 | Village House in Tan Kwai Tsuen (1/F)** | 65 | 70 |
| 17 | M2 | Village House near Great Garden (1/F)** | 66 | |
| | M3 | Village House in Tai Tao Village (1/F)*** | 68 [!] | |
| | M4 | Village House beside Tong Tai Road (1/F)*** | 64 [@] | |
| 13 | M5 ^{##} | Jasper Court Block 10 (4/F) | 70 | |
| 24 | M6 | Village House in Lam Hau Tsuen (1/F)** | 66 | |
| 88 | M7 | Village House in Lam Hau Tsuen (1/F)** | 61 | |
| | M8 | Village House beside Kung Um Road (1/F)*** | 64 [#] | |
| | M9 | Sham Chung Tsuen (3/F)*** | 69 [%] | |
| | M10 | Shung Ching San Tsuen (1/F)*** | 65 ⁺ | |
| 26 | M11 | Village House near Kung Um Road (3/F) | 70 | |

* Noise Sensitive Receiver (NSR) ID number used in the Final EIA Report.

** Monitoring location was allocated to different floor.

*** Monitoring location was allocated to another premise nearby.

! Predicted noise level was obtained from NSR ID 57.

@ Predicted noise level was obtained from NSR ID 20.

Predicted noise level was obtained from NSR ID 79.

% Predicted noise level was obtained from NSR ID 31.

+ Predicted noise level was obtained from NSR ID 65.

^ Various types of noise barriers were built as mitigation measures.

Noise monitoring was not conducted in this bimonthly monitoring.

Noise Monitoring Equipment

- 2.4 The Sound Level Meters to be used for the monitoring will comply with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). Any other noise measuring and analysis instrument used will be of comparable professional quality. The instrumentation to be used for the noise monitoring is given Table 2-2.

Table 2.2 Traffic Noise Monitoring Equipment

| Manufacturer | Description |
|-------------------------------|-------------|
| Integrating Sound Level Meter | B&K 2238 |
| Calibrator | B&K 4231 |

Maintenance and Calibration

- 2.5 The sound level meter will be calibrated using a Bruel and Kjaer Sound Level Calibrator Type 4231 for 94dB at 1kHz, prior to and after each set of measurements. The results of the calibration will be recorded on the field data sheet. Measurement results will be discarded if the calibration before and after does not agree to within 1dB(A) and measurement will be taken until this condition is fulfilled.

Noise Measurement Methodology

- 2.6 The noise measurements were conducted to obtain one set of A-weighted $L_{10(1 \text{ hour})}$ sound pressure level during the AM peak traffic hour in one-hour monitoring period at each designated sensitive receiver.
- 2.7 The noise measurement point was at a point 1m from the exterior of the sensitive receiver building facades and was at a position at least 1.2m above ground of the sensitive receiver level.
- 2.8 Noise measurements were made in accordance with Section III of the "Calculation of Road Traffic Noise (CRTN), 1998"^[2].
- 2.9 As recommended in CRTN, a façade effect correction factor of 2.5 dB(A) will be further added to the measured noise level if the monitoring is carried out in a free field condition.
- 2.10 Statistical results such as L_{max} , L_{min} , L_{eq} and L_{90} were also obtained for reference purpose.
- 2.11 The wind speed was frequently checked with a portable wind meter.
- 2.12 Observations were recorded when intrusive noise was unavoidable.
- 2.13 Noise monitoring was cancelled in the presence of fog, rain, wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s.

Traffic Survey

- 2.14 Traffic surveys were conducted concurrently with the noise measurement for the sections of Yuen Long Highway in front of the representative sensitive receivers.
- 2.15 Background information, including weather conditions and noise sources other than traffic along Yuen Long Highway, was recorded at each sensitive receiver. The traffic survey included monitoring of traffic flow, percentage of heavy and light vehicles and average traffic speed.
- 2.16 Since there were slip roads dividing the highway into three sections with different traffic conditions, traffic surveys were conducted for three sections separately.
- 2.17 Details of the noise measurement and traffic survey locations as well as relevant activities are presented in **Table 2.3**.

Table 2.3 Details of the Noise Measurement and Traffic Survey locations

| Monitoring Station | Monitoring Station Location | Type of Measurement | Nature | Activities |
|--------------------|---|---------------------|--------------------------|--|
| M1 | Village House in Tan Kwai Tsuen (1/F) | Façade | Noise Sensitive Receiver | <ul style="list-style-type: none"> Noise measurement Recording of noise sources other than traffic along Yuen Long Highway |
| M2 | Village House near Great Garden (1/F) | | | |
| M3 | Village House in Tai Tao Village (1/F) | Free Field | | |
| M4 | Village House beside Tong Tai Road (1/F) | Façade | | |
| M6 | Village House in Lam Hau Tsuen (1/F) | | | |
| M7 | Village House in Lam Hau Tsuen (1/F) | | | |
| M8 | Village House beside Kung Um Road (1/F) | | | |
| M9 | Sham Chung Tusen (3/F) | | | |
| M10 | Shung Ching San Tsuen (1/F) | | | |
| M11 | Village House near Kung Um Road (3/F) | | | |
| M3 | Hill, near monitoring station for M1 - M3 | | | |
| - | Adjacent to Highway near Lam Hau Tsuen M4, M6 & M7* | | | |
| M9 | Roof, House 96, Shum Chung Tsuen for M8 - M11 | | | |

* Alternative location was used for traffic counting at M4, M6 and M7 in this report period

3 MEASUREMENT RESULTS AND OBSERVATIONS

General

3.1 During the course of noise monitoring, road traffic along Yuen Long Highway was the major noise source. Noise data was continuously recorded by sound level meter at an interval of 1 second. Other sources included community noise, dog barking, traffic on the local road, nearby construction activities, and etc. These activities were recorded during the monitoring events and these extraneous noises were not taken into calculation of the traffic noise level.

Traffic Noise Level Monitoring Results

3.2 Traffic noise measurements were conducted on three weekdays during the AM peak traffic hour from 08:00 – 09:00 on 10, 12 and 24 July 2007. Random check of wind speed at the monitoring station showed that it was below 5 m/s.

3.3 There were some activities, which generated extraneous noises, and these activities were recorded during the monitoring events. The noise data was recorded by the sound level meter. Based on the site records, non-traffic related data was neglected, in order to indicate the traffic noise level of Yuen Long Highway.

3.4 The summaries of traffic noise levels recorded and comparison was made against the noise standard of 70 dB(A). **Table 3.1** shows the traffic noise measurement result in comparison with the noise standard.

Table 3.1 Traffic Noise Measurement Results and Comparison with Noise Standard

| Monitoring Date | Weather Condition | Monitoring Station | Noise Level (Mitigated), L ₁₀ dB(A) | Noise Standard L ₁₀ (1 hour) dB(A) |
|-----------------|-------------------|--------------------|--|---|
| 10 July 2007 | Sunny | M1 | 60.5 | 70 |
| | | M2 | 57.4 | |
| | | M3 | 63.9 | |
| 24 July 2007 | Sunny | M4 | 63.8 | |
| | | M6 | 57.0 | |
| | | M7 | 58.4 | |
| 12 July 2007 | Sunny | M8 | 59.5 | |
| | | M9 | 64.3 | |
| | | M10 | 63.9 | |
| | | M11 | 63.8 | |

Road Condition and Traffic Survey

- 3.5 As noted during the course of monitoring, the road surfaces of Yuen Long Highway were asphalt paved. No obstruction or damage was noted from the road surfaces.
- 3.6 The traffic conditions along Yuen Long Highway were normal and there was no traffic congestion during the monitoring periods.
- 3.7 Details of the traffic flow and the percentage of heavy vehicle are provided in **Table 3.2**.

Table 3.2 Traffic Flow of Yuen Long Highway

| Monitoring Station | LV | HV | Total Flow | Percentage of HV |
|--------------------|------|------|------------|------------------|
| M1 | 2120 | 2884 | 5004 | 57.6 |
| M2 | 2120 | 2884 | 5004 | 57.6 |
| M3 | 2120 | 2884 | 5004 | 57.6 |
| M4 | 2040 | 2792 | 4832 | 57.8 |
| M6 | 2040 | 2792 | 4832 | 57.8 |
| M7 | 2040 | 2792 | 4832 | 57.8 |
| M8 | 2676 | 2376 | 5052 | 47.0 |
| M9 | 2676 | 2376 | 5052 | 47.0 |
| M10 | 2676 | 2376 | 5052 | 47.0 |
| M11 | 2676 | 2376 | 5052 | 47.0 |

Notes:
HV represents Heavy Vehicle
LV represents Light Vehicle

- 3.8 The traffic speeds along Yuen Long Highway were estimated concurrently with the noise measurement. **Table 3.3** provides a summary of averaged traffic speed monitoring results.

Table 3.3 Traffic Speed Measurement

| Monitoring Station | Speed (km/hr) |
|--------------------|---------------|
| M1 | 88.0 |
| M2 | 88.0 |
| M3 | 88.0 |
| M4 | 84.2 |
| M6 | 84.2 |
| M7 | 84.2 |
| M8 | 79.5 |
| M9 | 79.5 |
| M10 | 79.5 |
| M11 | 79.5 |

4 DISCUSSION

4.1 The noise levels recorded at the 10 monitoring stations were all below the noise standard in this reporting period.

Predicted Noise Levels under the Traffic Flow Condition in 2021

4.2 According to the Environmental Impact Assessment Final Report for the Project, "Agreement No. CE 98/98 - Preliminary Design and Ground Investigation for Widening of Yuen Long Highway Between Lam Tei and Shap Pat Heung Interchange" ^[1], for the worst case scenario, the traffic noise levels was predicted to occur in year 2021.

4.3 Based on the Traffic Noise Monitoring Plan (Version No.1) submitted to EPD. The predicted noise level under the traffic flow condition in 2021 was in accordance with Section III of the "Calculation of Road Traffic Noise (CRTN), 1988" ^[2] for adjustment to the measured traffic noise level by adding a correction factor and for comparison with prediction from the CRTN. This will include the traffic flow, percentage of heavy vehicles, and an average vehicular speed. The following equation extracted from the CRTN was adopted to correct the measured noise level in consideration of the differences between the measured traffic flow and the predicted traffic flow in the Final EIA Report.

$$* \text{ Correction Factor} = 10\text{Log}\left(\frac{Q'}{Q}\right) + 33\text{Log}\left(\frac{V' + 40 + 500/V'}{V + 40 + 500/V}\right) + 10\text{Log}\left(\frac{1 + 5p'/V'}{1 + 5p/V}\right)$$

Where Q' is predicted traffic flow by using the CRTN noise model,
 V' is predicted traffic speed by using the CRTN noise model,
 p' is predicted percentage heavy vehicle by using the CRTN noise model,
 Q is measured traffic flow during the traffic noise monitoring event,
 V is measured traffic speed during the traffic noise monitoring event,
 p is measured percentage heavy vehicle during the traffic noise monitoring event.

4.4 The predicted noise levels at the sensitive receivers, M1 – M4, M6 – M11 are estimated based on the equation from CRTN.

4.5 Detailed traffic conditions in year 2021 are summarized in the **Table 4.1**.

Table 4.1 Predicted 2021 Peak Hour Traffic Data

| Noise Monitoring Location | Traffic Flow (Nr/hr) | % of HV | Traffic Speed (km/hr) |
|---------------------------|----------------------|---------|-----------------------|
| M1 – M4, M6 – M11 | 10,900 | 53 | 80 |

4.6 The correction factors for each monitoring location were evaluated and summarized in **Table 4.2**.

Table 4.2 Correction Factor for Monitoring Stations M1 – M4, M6 – M11

| Sensitive Receiver | Correction Factor dB(A) |
|--------------------|----------------------------|
| M1 | 2.6 |
| M2 | 2.6 |
| M3 | 2.6 |
| M4 | 3.0 |
| M6 | 3.0 |
| M7 | 3.0 |
| M8 | 3.7 |
| M9 | 3.7 |
| M10 | 3.7 |
| M11 | 3.7 |

4.7 Under the designed traffic condition in Year 2021, the predicted noise levels as received at the sensitive receivers, M1 – M4, M6 – M11 are estimated and shown in **Table 4.3**.

Table 4.3 Measured and Normalized Noise Level

| Sensitive Receiver | Measured Noise Level, L ₁₀ dB(A) | Normalized Noise Level, L ₁₀ dB(A)* | Predicted Noise Level (Mitigated), L ₁₀ dB(A) in Year 2021* |
|--------------------|---|--|--|
| M1 | 60.5 | 63.1 | 65 |
| M2 | 57.4 | 60.0 | 66 |
| M3 | 63.9 | 66.5 | 68 |
| M4 | 63.8 | 66.8 | 64 |
| M6 | 57.0 | 60.0 | 66 |
| M7 | 58.4 | 61.4 | 61 |
| M8 | 59.5 | 63.2 | 64 |
| M9 | 64.3 | 68.0 | 69 |
| M10 | 63.9 | 67.6 | 65 |
| M11 | 63.8 | 67.5 | 70 |

Note

* Corrected by traffic flow, speed and percentage of heavy vehicles.

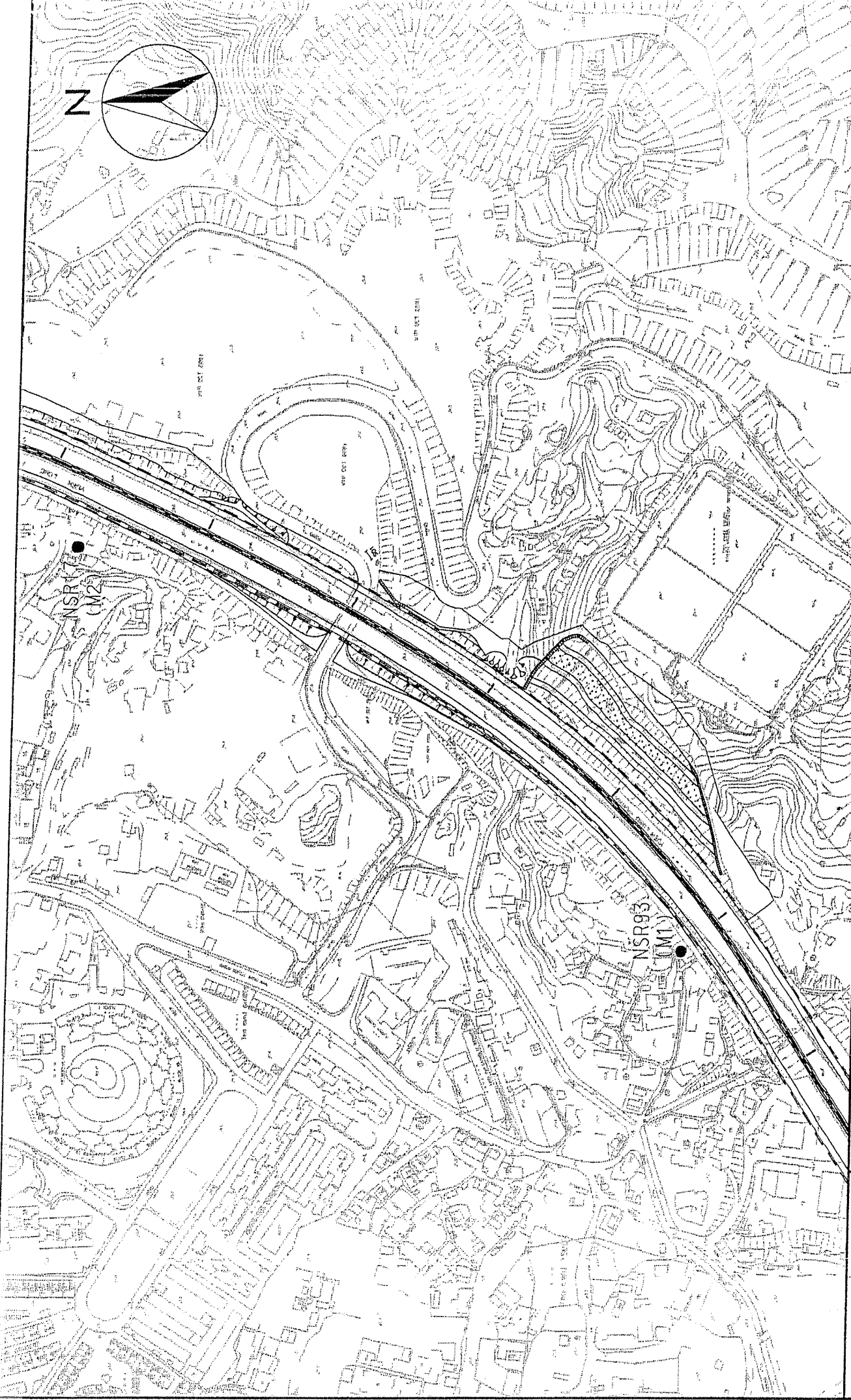
5 CONCLUSION

- 5.1 Traffic noise measurements were conducted on three weekdays during the AM peak traffic hour from 08:00 to 09:00 on 10, 12 and 24 July 2007. The weather conditions during the monitoring days were sunny. The traffic conditions, including traffic flows, type of vehicles and average traffic speeds were also monitored during the monitoring events.
- 5.2 Activities which generated extraneous noise were recorded, and these irrelevant noise data were not taken into the evaluation of traffic noise levels.
- 5.3 At monitoring station M5 (Jasper Court), since the property management company at Jasper Court rejected us using the premise to conduct the traffic noise monitoring and there was no other alternative location for relocation in regard of reflecting the traffic noise impact on the station at M5, the traffic noise monitoring at Station M5 would not be conducted in this bimonthly monitoring.
- 5.4 Sound pressure levels, in $L_{10(1hr)}$, were recorded at the 10 designated monitoring locations. Results indicated that all measurement $L_{10(1hour)}$ levels were below the noise standard of 70 dB(A).
- 5.5 The traffic flow, speed and percentage of heavy vehicles were recorded during each monitoring period. The correction factors for M1 - M4 and M6 - 11 were evaluated based on the differences of traffic conditions between these noise measurement events and the predicted traffic condition in Year 2021.
- 5.6 The normalized noise levels were also compared with the predicted noise levels. All normalized noise levels for the eleven monitoring locations in the year 2021 did not exceed the noise standard of 70 dB(A) under the predicted traffic condition in 2021.

6 REFERENCES

1. Scott Wilson (Hong Kong) Ltd. (2001), ***Agreement No. CE 98/98 - Preliminary Design and Ground Investigation for Widening of Yuen Long Highway Between Lam Tei and Shap Pat Heung Interchange - Environmental Impact Assessment Final Report***
2. Department of Transport, UK (1988), ***Calculation of Road Traffic Noise***

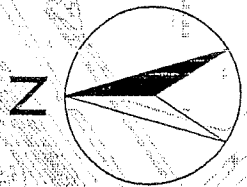
FIGURES



CONTRACT NO. HY/2002/19 WIDENING OF YUEN LONG HIGHWAY
 BETWEEN TAN KWAI TSUEN AND SHAP PAT HEUNG INTERCHANGE
LOCATIONS OF NOISE MONITORING POINTS
 (SHEET 1 OF 4)

ENSR | AECOM

| | | | |
|---------|---------------|-------------|---------|
| SCALE | A4 1:3000 | DATE | SEPT 06 |
| CHECK | BLHC | DRAWN | CCCM |
| JOB NO. | 60016788 -020 | DRAWING NO. | 1.1 |
| | | REV | - |



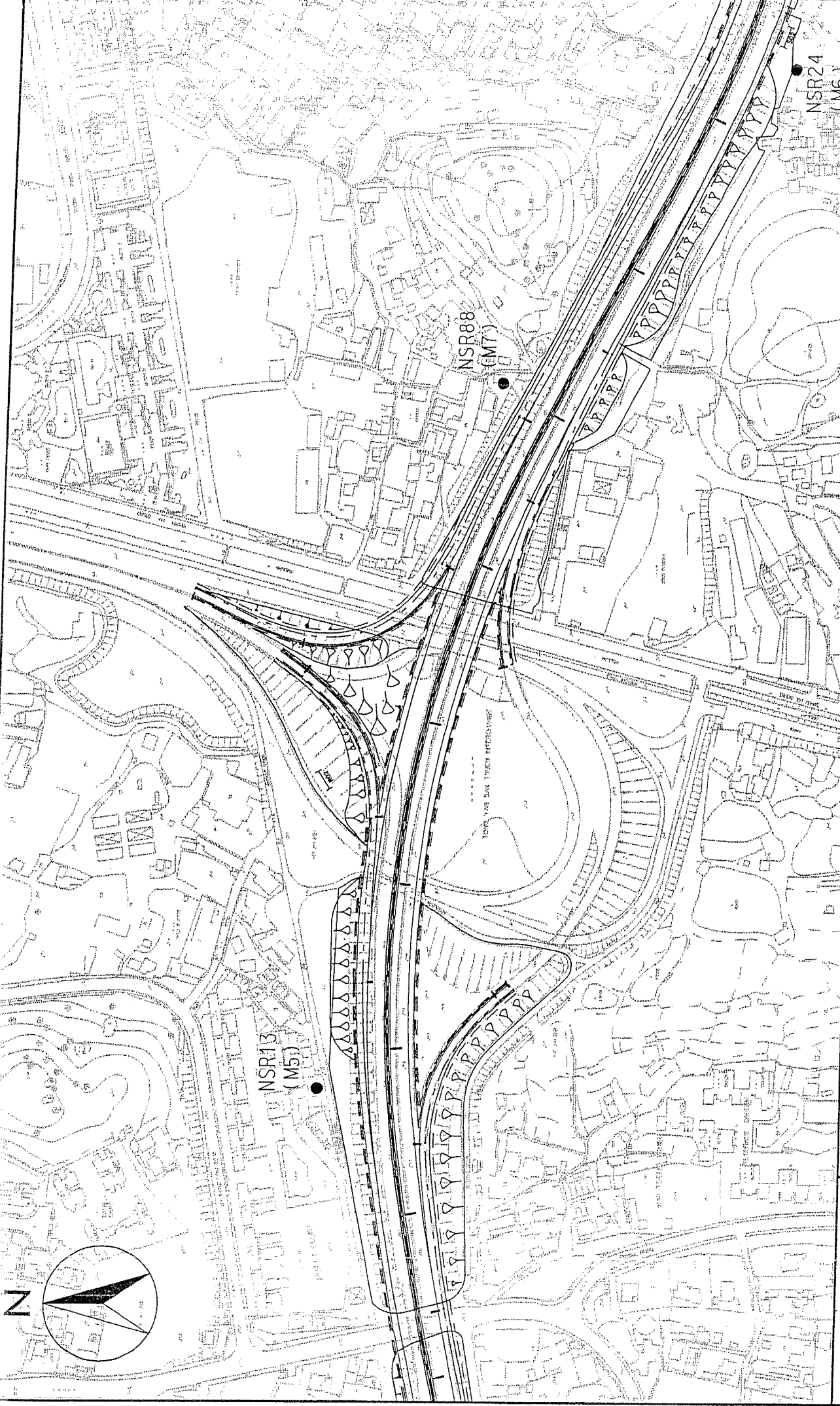
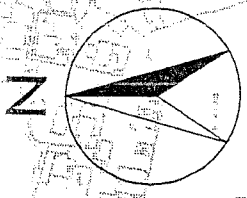
NSR20
(M4)

NSR57
(M3)

CONTRACT NO. HY/2002/19 WIDENING OF YUEN LONG HIGHWAY
BETWEEN TAN KWAI TSUEN AND SHAP PAT HEUNG INTERCHANGE
LOCATIONS OF NOISE MONITORING POINTS
(SHEET 2 OF 4)

ENSR | AECOM

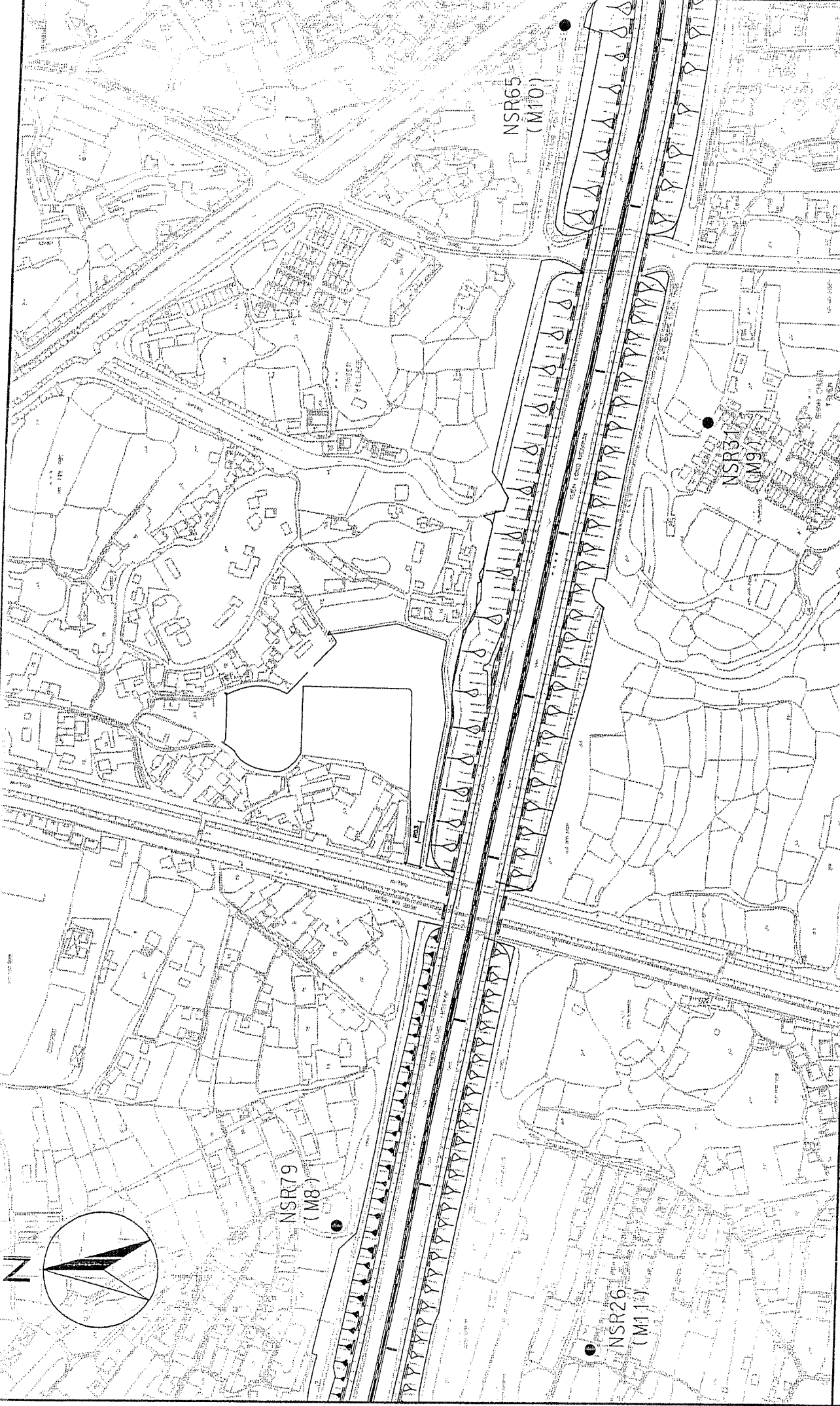
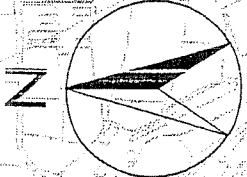
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| SCALE | A4 1:3000 | DATE | SEPT 06 |
| CHECK | BLHC | DRAWN | CCCM |
| JOB No. | 60016788-020 | DRAWING No. | 1.1 |
| | | REV | - |



CONTRACT NO. HY/2002/19 WIDENING OF YUEN LONG HIGHWAY
 BETWEEN TAN KWAI TSUEN AND SHAP PAT HEUNG INTERCHANGE
LOCATIONS OF NOISE MONITORING POINTS
 (SHEET 3 OF 4)

ENSR | AECOM

| | | | |
|---------|--------------|-------------|---------|
| SCALE | A4 1:3000 | DATE | SEPT 06 |
| CHECK | BLHC | DRAWN | CCCM |
| JOB No. | 60016788-020 | DRAWING No. | 1.1 |
| | | REV | - |



CONTRACT NO. HY/2002/19 WIDENING OF YUEN LONG HIGHWAY
 BETWEEN TAN KWAI TSUEN AND SHAP PAT HEUNG INTERCHANGE
LOCATIONS OF NOISE SENSITIVE RECEIVERS
 (SHEET 4 OF 4)

ENSR | AECOM

| | | | |
|---------|---------------|-------------|---------|
| SCALE | A4 1:3000 | DATE | SEPT 06 |
| CHECK | BLHC | DRAWN | CCCM |
| JOB No. | 60016788 -020 | DRAWING No. | 1.1 |
| | | REV | - |

**APPENDIX A
CALIBRATION RECORDS**



CERTIFICATE OF CALIBRATION

Certificate No.: 06CA0713 01-04 Page 1 of 2

Item tested

| | | | |
|-----------------------|-----------------------------|---|------------|
| Description: | Sound Level Meter (Class I) | , | Microphone |
| Manufacturer: | B & K | , | B & K |
| Type/Model No.: | 2238 | , | 4188 |
| Serial/Equipment No.: | 2255680 | , | 2250454 |
| Adaptors used: | - | , | - |

Item submitted by

Client: Maunsell Environmental Management Consultants Ltd.
 Request No.: -
 Date of request: 12-Jul-2006

Date of test: 14-Jul-2006

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---------------------------------|----------|------------|--------------|---------------|
| Multi function sound calibrator | B&K 4226 | 2288444 | 11-Jan-2007 | CIGISMEC |
| Measuring amplifier | B&K 2610 | 2346941 | 30-Nov-2006 | SCM |
| Signal generator | DS 360 | 33873 | 30-Nov-2006 | SCM |
| Signal generator | DS 360 | 61227 | 12-Jul-2007 | SCM |

Ambient conditions

Temperature: (24 ± 1) °C
 Relative humidity: (55 ± 10) %
 Air pressure: (1000 ± 15) hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsiveness of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

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

Actual Measurement data are documented on worksheet.



Approved Signatory: 

Huang Jian Min

Date: 14-Jul-2006

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

Certificate No.: 07CA0713 01-02 Page 1 of 2

Item tested

| | | | |
|-----------------------|----------------------------|---|------------|
| Description: | Sound Level Meter (Type I) | , | Microphone |
| Manufacturer: | B & K | , | B & K |
| Type/Model No.: | 2238 | , | 4188 |
| Serial/Equipment No.: | 2255680 / N.009.01 | , | 2250454 |
| Adaptors used: | - | , | - |

Item submitted by

Customer Name: Maunsell Environmental Management Consultants Ltd.
Address of Customer: Room 1213-1219, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Rd, Sha Tin, New Territories, HK
Request No.: -
Date of request: 13-Jul-2007

Date of test: 13-Jul-2007

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---------------------------------|----------|------------|--------------|---------------|
| Multi function sound calibrator | B&K 4226 | 2288444 | 11-Jan-2008 | CIGISMEC |
| Signal generator | DS 360 | 33873 | 23-Nov-2007 | CEPREI |
| Signal generator | DS 360 | 61227 | 13-Jun-2008 | CEPREI |

Ambient conditions

Temperature: (23 ± 2) °C
Relative humidity: (50 ± 15) %
Air pressure: (990 ± 10) hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure response of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

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

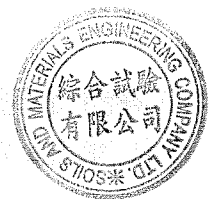
Actual Measurement data are documented on worksheets.

Approved Signatory:

Huang Jian Min/Feng Jun Qi

Date: 14-Jul-2007

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

Certificate No.: 06CA1012 01 Page 1 of 2

Item tested

| | | |
|-----------------------|-----------------------------|------------|
| Description: | Sound Level Meter (Class I) | Microphone |
| Manufacturer: | B & K | B & K |
| Type/Model No.: | 2238 | 4188 |
| Serial/Equipment No.: | 2255677 | 2250420 |
| Adaptors used: | (N.009.027) | - |

Item submitted by

Client: Maunsell Environmental Management Consultants Ltd.
Request No.: -
Date of request: 11-Oct-2006

Date of test: 13-Oct-2006

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---------------------------------|----------|------------|--------------|---------------|
| Multi function sound calibrator | B&K 4226 | 2288444 | 11/Jan/2007 | CIGISMEC |
| Measuring amplifier | B&K 2610 | 2346941 | 30/Nov/2006 | SCM |
| Signal generator | DS 360 | 33873 | 30/Nov/2006 | SCM |
| Signal generator | DS 360 | 61227 | 12/Jul/2007 | SCM |

Ambient conditions

Temperature: (21.5 ± 1) °C
Relative humidity: (50 ± 10) %
Air pressure: (1000 ± 15) hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsiveness of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

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

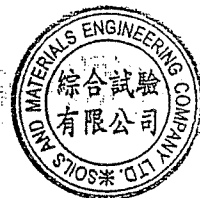
Actual Measurement data are documented on worksheet.

Approved Signatory:

Huang Jian Min

Date: 13-Oct-2006

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

Certificate No.: 07CA0713 01-03 Page 1 of 2

Item tested

| | | | |
|-----------------------|----------------------------|---|------------|
| Description: | Sound Level Meter (Type I) | , | Microphone |
| Manufacturer: | B & K | , | B & K |
| Type/Model No.: | 2238 | , | 4188 |
| Serial/Equipment No.: | 2255677 / N.009.02 | , | 2250455 |
| Adaptors used: | - | , | - |

Item submitted by

Customer Name: Maunsell Environmental Management Consultants Ltd.
Address of Customer: Room 1213-1219, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Rd, Sha Tin, New Territories, HK
Request No.: -
Date of request: 13-Jul-2007

Date of test: 14-Jul-2007

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---------------------------------|----------|------------|--------------|---------------|
| Multi function sound calibrator | B&K 4226 | 2288444 | 11-Jan-2008 | CIGISMEC |
| Signal generator | DS 360 | 33873 | 23-Nov-2007 | CEPREI |
| Signal generator | DS 360 | 61227 | 13-Jun-2008 | CEPREI |

Ambient conditions

Temperature: (23 ± 2) °C
Relative humidity: (55 ± 15) %
Air pressure: (990 ± 10) hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

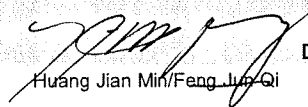
Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

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

Actual Measurement data are documented on worksheets.

Approved Signatory:


Huang Jian Min / Feng Jun Qi

Date: 14-Jul-2007

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

Certificate No.: 06CA0713 01-01

Page 1 of 2

Item tested

| | | | |
|-----------------------|-----------------------------|---|------------|
| Description: | Sound Level Meter (Class I) | , | Microphone |
| Manufacturer: | B & K | , | B & K |
| Type/Model No.: | 2238 | , | 4188 |
| Serial/Equipment No.: | 2255687 | , | 2250447 |
| Adaptors used: | - (H.009.03) | , | - |

Item submitted by

Client: Maunsell Environmental Management Consultants Ltd.
Request No.: -
Date of request: 12-Jul-2006

Date of test: 13-Jul-2006

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---------------------------------|----------|------------|--------------|---------------|
| Multi function sound calibrator | B&K 4226 | 2288444 | 11-Jan-2007 | CIGISMEC |
| Measuring amplifier | B&K 2610 | 2346941 | 30-Nov-2006 | SCM |
| Signal generator | DS 360 | 33873 | 30-Nov-2006 | SCM |
| Signal generator | DS 360 | 61227 | 12-Jul-2007 | SCM |

Ambient conditions

Temperature: (24 ± 1) °C
Relative humidity: (55 ± 10) %
Air pressure: (1000 ± 15) hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsiveness of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

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

Actual Measurement data are documented on worksheet.



Approved Signatory:

Huang Jian Min

Date: 14-Jul-2006

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

Certificate No.: 07CA0713 01-01 Page 1 of 2

Item tested

| | | | |
|-----------------------|----------------------------|---|------------|
| Description: | Sound Level Meter (Type I) | , | Microphone |
| Manufacturer: | B & K | , | B & K |
| Type/Model No.: | 2238 | , | 4188 |
| Serial/Equipment No.: | 2255687 / N.009.03 | , | 2250420 |
| Adaptors used: | - | , | - |

Item submitted by

Customer Name: Maunsell Environmental Management Consultants Ltd.
Address of Customer: Room 1213-1219, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Rd, Sha Tin, New Territories, HK
Request No.: -
Date of request: 13-Jul-2007

Date of test: 13-Jul-2007

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---------------------------------|----------|------------|--------------|---------------|
| Multi function sound calibrator | B&K 4226 | 2288444 | 11-Jan-2008 | CIGISMEC |
| Signal generator | DS 360 | 33873 | 23-Nov-2007 | CEPREI |
| Signal generator | DS 360 | 61227 | 13-Jun-2008 | CEPREI |

Ambient conditions

Temperature: (23 ± 2) °C
Relative humidity: (50 ± 15) %
Air pressure: (990 ± 10) hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure response of the Sound Level Meter.

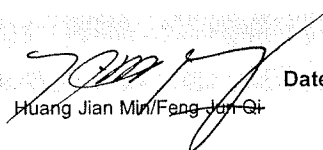
Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

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

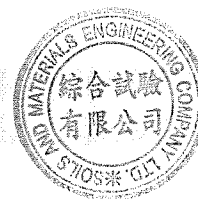
Actual Measurement data are documented on worksheets.

Approved Signatory:


Huang Jian Min/Feng Jun Qi

Date: 14-Jul-2007

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

Certificate No.:

06CA0925 02

Page 1 of 2

Item tested

| | | | |
|-----------------------|-----------------------------|---|------------|
| Description: | Sound Level Meter (Class I) | , | Microphone |
| Manufacturer: | B & K | , | B & K |
| Type/Model No.: | 2238 | , | 4188 |
| Serial/Equipment No.: | 2285692 | , | 2304287 |
| Adaptors used: | - (N. 509.04) | , | - |

Item submitted by

Client: Maunsell Environmental Management Consultants Ltd.
Request No.: -
Date of request: 25-Sep-2006

Date of test: 03-Oct-2006

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---------------------------------|----------|------------|--------------|---------------|
| Multi function sound calibrator | B&K 4226 | 2288444 | 11-Jan-2007 | CIGISMEC |
| Measuring amplifier | B&K 2610 | 2346941 | 30-Nov-2006 | SCM |
| Signal generator | DS 360 | 33873 | 30-Nov-2006 | SCM |
| Signal generator | DS 360 | 61227 | 12-Jul-2007 | SCM |

Ambient conditions

Temperature: (22 ± 1) °C
Relative humidity: (60 ± 10) %
Air pressure: (1000 ± 15) hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

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

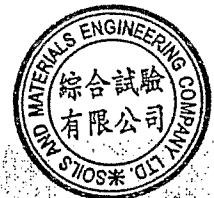
Actual Measurement data are documented on worksheet.

Approved Signatory:

Huang Jian Min

Date: 03-Oct-2006

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

Certificate No.: 06CA1208 01

Page 1 of 2

Item tested

| | | | |
|-----------------------|----------------------------|---|------------|
| Description: | Sound Level Meter (Type I) | , | Microphone |
| Manufacturer: | B & K | , | B & K |
| Type/Model No.: | 2238 | , | 4188 |
| Serial/Equipment No.: | 2255688/N.009.05 | , | 2250455 |
| Adaptors used: | - | , | - |

Item submitted by

Client: Maunsell Environmental Management Consultants Ltd.
Request No.: -
Date of request: 08-Dec-2006

Date of test: 11-Dec-2006

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|---------------------------------|----------|------------|--------------|---------------|
| Multi function sound calibrator | B&K 4226 | 2288444 | 11/Jan/2007 | CIGISMEC |
| Signal generator | DS 360 | 33873 | 28/Nov/2007 | CEPREI |
| Signal generator | DS 360 | 61227 | 12/Jul/2007 | SCM |

Ambient conditions

Temperature: (21 ± 1) °C
Relative humidity: (65 ± 10) %
Air pressure: (1000 ± 15) hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsiveness of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

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

Actual Measurement data are documented on worksheet.

Approved Signatory:

Huang Jian Min

Date: 12-Dec-2006

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

Certificate No.: 06CA0713 01-05

Page: 1 of 2

Item tested

Description: Acoustical Calibrator (Class 1)
Manufacturer: B&K
Type/Model No.: 4231
Serial/Equipment No.: 1790985
Adaptors used: Yes (N.O.A. 01)

Item submitted by

Client: Maunsell Environmental Management Consultants Ltd.
Request No.: -
Date of request: 12-Jul-2006

Date of test: 13-Jul-2006

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|-------------------------|----------|------------|--------------|---------------|
| Lab standard microphone | B&K 4180 | 2239857 | 12-Apr-2007 | SCL |
| Preamplifier | B&K 2673 | 2239857 | 30-Nov-2006 | SCM |
| Measuring amplifier | B&K 2610 | 2346941 | 30-Nov-2006 | SCM |
| Signal generator | DS 360 | 61227 | 12-Jul-2007 | SCM |
| Digital multi-meter | 34401A | US36087050 | 30-Nov-2006 | CIGISMEC |
| Audio analyzer | 8903B | GB41300350 | 28-Nov-2006 | SCM |
| Universal counter | 53132A | MY40003662 | 12-Jul-2007 | SCM |

Ambient conditions

Temperature: 24 ± 1 °C
Relative humidity: 55 ± 10 %
Air pressure: 1000 ± 15 hPa

Test specifications

- The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 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 under 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

Date: 14-Jul-2006

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

Certificate No.: 07CA0713 01-04

Page: 1 of 2

Item tested

Description: Acoustical Calibrator (Class 1)
Manufacturer: B&K
Type/Model No.: BK4231
Serial/Equipment No.: 1790985 / N.004.01
Adaptors used: Yes

Item submitted by

Customer: Maunsell Environmental Management Consultants Ltd.
Address of Customer: Room 1213-1219, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Rd, Sha Tin, New Territories, HK
Request No.: -
Date of request: 13-Jul-2007

Date of test: 14-Jul-2007

Reference equipment used in the calibration

| Description: | Model: | Serial No. | Expiry Date: | Traceable to: |
|-------------------------|----------|------------|--------------|---------------|
| Lab standard microphone | B&K 4180 | 2412857 | 29-Nov-2007 | SCL |
| Preamplifier | B&K 2673 | 2239857 | 29-Nov-2007 | CEPREI |
| Measuring amplifier | B&K 2610 | 2346941 | 29-Nov-2007 | CEPREI |
| Signal generator | DS 360 | 61227 | 13-Jun-2008 | CEPREI |
| Digital multi-meter | 34401A | US36087050 | 30-Nov-2007 | CIGISMEC |
| Audio analyzer | 8903B | GB41300350 | 27-Nov-2007 | CEPREI |
| Universal counter | 53132A | MY40003662 | 15-Jun-2008 | CEPREI |

Ambient conditions

Temperature: 23 ± 1 °C
Relative humidity: 55 ± 10 %
Air pressure: 1000 ± 15 hPa

Test specifications

- The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- 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.

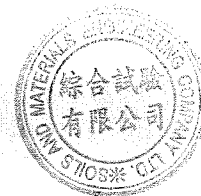
Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory:

Huang Jian Min/Feng Jun Qi

Date: 14-Jul-2007

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.