

Highways Department


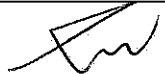
Agreement No. CE 20/2009 (EP)

Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling

(Stage 1) Between Island House Interchange and Tai Hang - Investigation

Baseline Monitoring Report

[11/2009]

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Reviewed & Approved:	Edith Ng	

Version: Rev. 0 Date: 9 November 2009

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 AECOM Environment accepts no responsibility for its use by others.

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9 November 2009

Mr. Tony Wong

By Fax (2805 5028) and Post

Dear Sir,

**Widening of Tolo Highway / Fanling Highway between
Island House Interchange and Tai Hang
Environmental Permit No.: EP-324/2008
Condition 3.2 – Submission of Baseline Monitoring Report (Stage 1)**

We refer to the revised Baseline Monitoring Report received on 9 November 2009 submitted by ET via email. Pursuant to EP Condition 3.2, I hereby verify the Baseline Monitoring Report Rev. 0 (Stage 1) for the Project.

Yours faithfully
for MOTT MACDONALD HONG KONG LIMITED



Joseph Chan
IEC

c.c. Sr Engr 1/Tolo Highway, HyD – Mr. C K Chan (Fax: 2714 5198)
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EXECUTIVE SUMMARY

The proposed widening of Tolo Highway and Fanling Highway between Island House Interchange and Fanling (the Project) is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO) and is governed by an Environmental Permit (EP-324/2008). The Project aims to widen Tolo Highway and Fanling Highway to dual 4-lane carriageway in order to alleviate the current traffic congestion problems and to cope with the increasing transport demands to and from the urban areas and also cross boundary traffic.

The construction works for this Project will be delivered in 2 stages i.e. Stage 1 (between Island House Interchange and Tai Hang) and Stage 2 (between Tai Hang and Wo Hop Shek Interchange). The construction works of Stage 1 will be commenced in fourth quarter 2009 and completed in mid 2013; while Stage 2 will be commenced in late 2010 and completed in 2014. This report focuses on Stage 1 of the Project only.

In accordance with the updated Environmental Monitoring and Audit Manual (EM&A Manual) for Stage 1 of the Project, baseline monitoring of air quality is required. However, as noise monitoring is also required at 7 monitoring locations during the construction phase of the Project, baselines noise monitoring was also conducted for reference purpose. This report documents the baseline monitoring of air quality at 4 sensitive receivers and noise monitoring at 7 sensitive receivers.

The baseline monitoring of both air quality and noise was carried out between 20 October 2009 and 4 November 2009. Air quality was recorded in terms of 1-hour Total Suspended Particulates (TSP) and 24-hour TSP. The weather during the monitoring period was mainly fine and sunny. For baseline noise levels, Leq(30-minutes) were recorded for non-restricted hours (07:00 – 19:00 of normal weekdays) and Leq(5-minutes) were recorded for restricted hours (19:00 – 23:00 and 23:00 – 07:00 of normal weekdays, whole day of Sundays and Public Holidays).

The averaged 1-hour TSP levels and 24-hour TSP levels at AM1-AM4 are summarized as follows:

Air quality monitoring location	AM1	AM2	AM3	AM4
Averaged 1-hr TSP ($\mu\text{g}/\text{m}^3$)	80.2	79.9	79.8	80.5
Averaged 24-hr TSP ($\mu\text{g}/\text{m}^3$)	71.6	74.7	97.0	105.4

The averaged baseline noise levels are summarized in the following table:

Noise monitoring location	NM1	NM2	NM3	NM4	NM5	NM6	NM7
Averaged baseline noise level during daytime of normal weekdays (dB(A))	64.2	68.1	64.8	67.4	65.2	64.5	61.5
Averaged baseline noise level during evening time and Public Holidays (dB(A))	61.3	64.9	64.2	65.1	64.5	61.9	56.2
Averaged baseline noise level during night-time (dB(A))	56.5	63.8	59.0	59.9	63.9	60.3	53.3

1 INTRODUCTION

1.1. Background

- 1.1.1. Tolo Highway and Fanling Highway are expressways in the North East New Territories connecting Sha Tin, Tai Po and Fanling. These highways form a vital part of the strategic Route 1, which links Hong Kong Island to Shenzhen. At present, this section of Route 1 is dual 3-lane carriageway. However, at several major interchanges along this section of Route 1, the highway is only dual-2 lane. Severe congestion is a frequent occurrence during peak periods, particularly in the Kowloon bound direction.
- 1.1.2. The objective of the Project “Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling” is to widen Tolo Highway and Fanling Highway to dual 4-lane carriageway in order to alleviate the current traffic congestion problems and to cope with the increasing transport demands to and from the urban areas and also cross boundary traffic.
- 1.1.3. The Project is a designated project and is governed by an Environmental Permit (EP-324/2008)(EP).
- 1.1.4. The scope of the Project comprises mainly:
- (i) Widening of a 5.7 km section of Tolo Highway and 3.0 km section of Fanling Highway between Island House Interchange and Wo Hop Shek Interchange from the existing dual 3-lane to dual 4-lane, including construction of new vehicular bridges;
 - (ii) Widening of interchange sections at Island House Interchange, Tai Po North Interchange, and Lam Kam Road Interchange from dual 2-lane to dual 3-lane, including realignment of various slip roads;
 - (iii) Modification and reconstruction of highways, vehicular bridges, underpasses and footbridges.
- 1.1.5. The construction works for this Project will be delivered in 2 stages i.e. Stage 1 (between Island House Interchange and Tai Hang) and Stage 2 (between Tai Hang and Wo Hop Shek Interchange). The construction works of Stage 1 will be commenced in fourth quarter 2009 and completed in mid 2013; while Stage 2 will be commenced in late 2010 and completed in 2014. This report focuses on Stage 1 of the Project only.
- 1.1.6. The Highways Department (Major Works Project Management Office) has commissioned AECOM Asia Company Limited to undertake the Environmental Team (ET) services for implementation of all the EM&A works under the Contracts for Stage 1 of the Project from Island House Interchange to Tai Hang. In accordance with the updated EM&A Manual of the Project, environmental baseline conditions were established by the ET prior to the commencement of construction of the Project.
- 1.1.7. Baseline monitoring was undertaken and baseline monitoring report was prepared prior to commencement of construction of the Project in accordance with Condition 3.2 of EP and the updated EM&A Manual.

1.2. Purpose of the Baseline Monitoring Report

- 1.2.1. The purpose of this report is to review the baseline conditions of air quality and noise at the Project site, and to establish baseline levels for air quality in accordance with the updated EM&A Manual. These levels would be used as the basis for assessing environmental impact and compliance during construction of the Project. Besides, since impact noise monitoring is required, in accordance with the updated EM&A Manual, during the construction period of the Project, baseline noise monitoring was conducted and the monitoring results are presented in this baseline monitoring report for reference purpose.
- 1.2.2. This baseline monitoring report presents the baseline monitoring requirements, methodologies and monitoring results of air quality and noise conducted at 4 air quality sensitive receivers and 7 noise sensitive receivers described in the updated EM&A Manual.

2 AIR QUALITY MONITORING

2.1 Monitoring Requirements

2.1.1 In accordance with the updated EM&A Manual, baseline 1-hour and 24-hour TSP levels at 4 air quality monitoring stations should be established by conducting baseline 1-hour and 24-hour TSP monitoring for at least 14 days.

2.2 Monitoring Equipment

2.2.1 24-hour TSP air quality monitoring was performed using High Volume Sampler (HVS) located at each designated monitoring station. The HVS meets all the requirements of the updated EM&A Manual. Portable direct reading dust meters were used to carry out the 1-hour TSP monitoring. Brand and model of the equipment is given in Table 2.1.

Table 2.1 Air Quality Monitoring Equipment

Equipment	Brand and Model
Portable direct reading dust meter (1-hour TSP)	Sibata Digital Dust Monitor (Model No. LD-3)
High Volume Sampler (24-hour TSP)	Tisch Total Suspended Particulate Mass Flow Controlled High Volume Air Sampler (Model No. TE-5170)

2.3 Monitoring Locations

2.3.1 Monitoring locations AM2 and AM3 were set up at the proposed locations in accordance with updated EM&A Manual. However, for monitoring locations: Dynasty View (AM1) and Tai Po Garden (AM4), proposed in the updated EM&A Manual, as approval could not be obtained from the owner's corporation of the premises, baseline air quality monitoring was conducted at alternative monitoring locations. Figure 2.1 shows the locations of monitoring stations. Table 2.2 describes the details of the monitoring stations.

Table 2.2 Locations of Baseline Noise Monitoring Stations

Monitoring Station	Location	Description
AM1	13 Ha Wun Yiu	Ground floor outside the premises
AM2	12 Shan Tong New Village	Ground floor outside the premises
AM3	Riverain Bayside	Roof of the switch room
AM4	Tai Kwong Secondary School	Roof of the school

2.4 Monitoring Parameters, Frequency and Duration

2.4.1 Table 2.3 summarizes the monitoring parameters, frequency and duration of baseline TSP monitoring.

Table 2.3 Air Quality Monitoring Parameters, Frequency and Duration

Parameter	Frequency and Duration
1-hour TSP	3 times (at three consecutive hours) per day while the highest dust impact was expected, for 14 days
24-hour TSP	Daily, for 14 days

2.5 Monitoring Methodology

2.5.1 24-hour TSP Monitoring

- (a) The HVS was installed in the vicinity of the air sensitive receivers. The following criteria were considered in the installation of the HVS.
- (i) A horizontal platform with appropriate support to secure the sampler against gusty wind was provided.
 - (ii) The distance between the HVS and any obstacles, such as buildings, was at least twice the height that the obstacle protrudes above the HVS.
 - (iii) A minimum of 2 meters separation from walls, parapets and penthouse for rooftop sampler.
 - (iv) No furnace or incinerator flues nearby.
 - (v) Airflow around the sampler was unrestricted.
 - (vi) Permission was obtained to set up the samplers and access to the monitoring stations.
 - (vii) A secured supply of electricity was obtained to operate the samplers.
 - (viii) The sampler was located more than 20 meters from any dripline.
 - (ix) Any wire fence and gate, required to protect the sampler, did not obstruct the monitoring process.
 - (x) Flow control accuracy was kept within $\pm 2.5\%$ deviation over 24-hour sampling period.
- (b) Preparation of Filter Papers
- (i) Glass fibre filters, G810 were labelled and sufficient filters that were clean and without pinholes were selected.
 - (ii) All filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ± 3 °C; the relative humidity (RH) was < 50% and not variable by more than $\pm 5\%$. A convenient working RH was 40%.
 - (iii) All filter papers were prepared and analysed by ALS Technichem (HK) Pty Ltd., which is a HOKLAS accredited laboratory and has comprehensive quality assurance and quality control programmes.
- (c) Field Monitoring
- (i) The power supply was checked to ensure the HVS works properly.
 - (ii) The filter holder and the area surrounding the filter were cleaned.
 - (iii) The filter holder was removed by loosening the four bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully.
 - (iv) The filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter.
 - (v) The swing bolts were fastened to hold the filter holder down to the frame. The pressure applied was sufficient to avoid air leakage at the edges.
 - (vi) Then the shelter lid was closed and was secured with the aluminum strip.
 - (vii) The HVS was warmed-up for about 5 minutes to establish run-temperature conditions.
 - (viii) A new flow rate record sheet was set into the flow recorder.
 - (ix) On site temperature and atmospheric pressure readings were taken and the flow rate of the HVS was checked and adjusted at around 1.1 m³/min, and complied with the range specified in the updated EM&A Manual (i.e. 0.6-1.7 m³/min).
 - (x) The programmable digital timer was set for a sampling period of 24 hrs, and the starting time, weather condition and the filter number were recorded.
 - (xi) The initial elapsed time was recorded.
 - (xii) At the end of sampling, on site temperature and atmospheric pressure readings were taken and the final flow rate of the HVS was checked and recorded.
 - (xiii) The final elapsed time was recorded.
 - (xiv) The sampled filter was removed carefully and folded in half length so that only surfaces with collected particulate matter were in contact.
 - (xv) It was then placed in a clean plastic envelope and sealed.
 - (xvi) All monitoring information was recorded on a standard data sheet.
 - (xvii) Filters were then sent to ALS Technichem (HK) Pty Ltd. for analysis.

(d) Maintenance and Calibration

- (i) The HVS and its accessories were maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply.
- (ii) HVSSs were calibrated using TE-5025A Calibration Kit prior to the commencement of baseline monitoring.
- (iii) Calibration certificate of the TE-5025A Calibration Kit and the HVSSs are provided in Appendix A.

2.5.2 1-hour TSP Monitoring

(a) Measuring Procedures

The measuring procedures of the 1-hour dust meter were in accordance with the Manufacturer’s Instruction Manual as follows:

- (i) Turn the power on.
- (ii) Close the air collecting opening cover.
- (iii) Push the “TIME SETTING” switch to [BG]
- (iv) Push “START/STOP” switch to perform background measurement for 6 seconds.
- (v) Turn the knob at SENSI ADJ position to insert the light scattering plate.
- (vi) Leave the equipment for 1 minute upon “SPAN CHECK” is indicated in the display.
- (vii) Push “START/STOP” switch to perform automatic sensitivity adjustment. This measurement takes 1 minute.
- (viii) Pull out the knob and return it to MEASURE position.
- (ix) Push the “TIME SETTING” switch the time set in the display to 3 hours.
- (x) Lower down the air collection opening cover.
- (xi) Push “START/STOP” switch to start measurement.

(b) Maintenance and Calibration

- (i) The 1-hour TSP meter was calibrated at 1-year intervals against a continuous particulate TEOM Monitor, Series 1400ab. Calibration certificates of the Laser Dust Monitors are provided in Appendix A.

2.6 Results and Observations

2.6.1 The baseline monitoring was carried out in October and November 2009, during which, the weather was mostly sunny. Major dust sources were from nearby traffic emissions.

2.6.2 Baseline 1-hour TSP monitoring was carried out from 20 October 2009 to 2 November 2009 for consecutively 14 days.

2.6.3 Baseline 24-hour TSP monitoring was carried out consecutively between 20 October 2009 and 4 November 2009. As there were a few occasions of high volume sampler failure and power interruption: the filter papers and hence the results were void, supplementary monitoring events were carried out to fulfill the 14 days baseline monitoring requirement.

2.6.4 The baseline monitoring results for 1-hour TSP and 24-hour TSP are summarized in Table 2.4 and 2.5 respectively. Detailed air quality monitoring results are presented in Appendix B.

Table 2.4 Summary of 1-hour TSP Baseline Monitoring Results

	AM1	AM2	AM3	AM4
Average ($\mu\text{g}/\text{m}^3$)	80.2	79.9	79.8	80.5
Range ($\mu\text{g}/\text{m}^3$)	71.3 – 89.2	70.1 – 86.3	65.7 – 86.0	71.5 – 89.9

Table 2.5 Summary of 24-hour TSP Baseline Monitoring Results

	AM1	AM2	AM3	AM4
Average ($\mu\text{g}/\text{m}^3$)	71.6	74.7	97.0	105.4
Range ($\mu\text{g}/\text{m}^3$)	27.8 – 119.4	39.7 – 122.1	54.3 – 164.2	58.3 – 147.2

2.7 Action and Limit Levels

- 2.7.1 The air quality monitoring results, in terms of 1-hour TSP and 24-hour TSP, were below the Limit Level set out in the Air Quality Objective (AQO) at both monitoring locations.
- 2.7.2 The Action and Limit Levels for air quality impact monitoring were based on the criteria adopted from the updated EM&A Manual as presented in Table 2.6.

Table 2.6 Derivation of Action and Limit Levels for Air Quality

Parameter	Action Level	Limit Level
1-hour TSP Level in $\mu\text{g}/\text{m}^3$	For Baseline Level $<384 \mu\text{g}/\text{m}^3$, Action Level = $(130\% \text{ of baseline level} + \text{Limit level}) \div 2$ For Baseline Level $> 384 \mu\text{g}/\text{m}^3$, Action Level = Limit Level	500
24-hour TSP Level in $\mu\text{g}/\text{m}^3$	For Baseline Level $<200 \mu\text{g}/\text{m}^3$, Action Level = $(130\% \text{ of baseline level} + \text{Limit level}) \div 2$ For Baseline Level $> 200 \mu\text{g}/\text{m}^3$, Action Level = Limit Level	260

- 2.7.3 Table 2.7 shows the derived Action and Limit Levels for air quality impact monitoring for the Project.

Table 2.7 Action and Limit Levels for Air Quality

Parameter	Monitoring Station	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
1-hour TSP Level in $\mu\text{g}/\text{m}^3$	AM1	302.1	500
	AM2	301.9	500
	AM3	301.9	500
	AM4	302.3	500
24-hour TSP Level in $\mu\text{g}/\text{m}^3$	AM1	176.6	260
	AM2	178.6	260
	AM3	193.1	260
	AM4	198.5	260

3 NOISE MONITORING

3.1 Monitoring Requirements

3.1.1 Although baseline noise monitoring is not a requirement in accordance with the updated EM&A Manual, as impact noise monitoring is required during the construction phase of the Project, baseline noise monitoring at 7 monitoring stations was conducted, for consecutively 14 days, to obtain background noise levels at the area for reference purpose.

3.2 Monitoring Equipment

3.2.1 Noise monitoring was performed using sound level meter at each designated monitoring station. The sound level meters deployed comply with the International Electrotechnical Commission Publications (IEC) 651:1979 (Type 1) and 804:1985 (Type 1) specifications. Acoustic calibrator was deployed to check the sound level meters at a known sound pressure level. Brand and model of the equipment is given in Table 3.1.

Table 3.1 Noise Monitoring Equipment

Equipment	Brand and Model
Integrated Sound Level Meter	B&K (Model No. 2238)
	Rion NL-18
	Rion NL-31
Acoustic Calibrator	B&K (Model No. 4231)
	Rion NC-73

3.3 Monitoring Locations

3.3.1 Monitoring stations NM3, NM6 and NM7 were set up at the proposed locations in accordance with updated EM&A Manual. However, for monitoring locations: Tai Po Garden (NM1), Dynasty View (NM2), Hong Kong Teachers' Association Lee Heng Kwei Secondary School (NM4) and Grand Palisades (NM5), proposed in the updated EM&A Manual, baseline noise monitoring was conducted at alternative monitoring locations, as approval of access could not be obtained from the owner's corporation of the premises or the principal of the education institutes. Figure 2.1 shows the locations of the monitoring stations. Table 3.2 describes the details of the two monitoring stations.

Table 3.2 Locations of Baseline Noise Monitoring Stations

Monitoring Station	Location	Description
NM1	Tai Kwong Secondary School	1m from the exterior of the roof top façade of the School
NM2	38 Ha Wun Yiu	1.2m from the ground floor free-field of the village house
NM3	Wong Shiu Chi Middle School	1m from the exterior of the roof top façade of the New Wing
NM4	Uptown Plaza	1m from the exterior of the roof top façade of Block 4
NM5	The Paragon	1.2m ground floor free-field at the front gate

Monitoring Station	Location	Description
NM6	PLK Tin Ka Ping Primary School	1.2m ground floor free-field near the entrance
NM7	Riverain Bayside	1 m from the exterior of the roof façade of the switch room

3.4 Monitoring Parameters, Frequency and Duration

3.4.1 Table 3.3 summarizes the monitoring parameters, frequency and duration of baseline noise monitoring.

Table 3.3 Noise Monitoring Parameters, Frequency and Duration

Time Period	Duration, min	Parameters
Daytime: 0700-1900 hrs on normal weekdays	30 ($L_{eq(30-min)}$)	L_{eq} , L_{90} & L_{10}
Evening: 1900-2300 hrs on normal weekdays	15 (average of 3 consecutive $L_{eq(5-min)}$)	
General Holidays and Sundays 0700-2300 hrs		
Night-time: 2300-0700 hrs on all days		

3.5 Monitoring Methodology

3.5.1 Monitoring Procedure

- (a) Façade measurements were made at all monitoring locations, except monitoring stations NM2, NM5 and NM6.
- (b) The sound level meter was set on a tripod at a height of 1.2 m above the ground for free-field measurements at NM2, NM5 and NM6.
- (c) The battery condition was checked to ensure the correct functioning of the meter.
- (d) Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:
 - (i) frequency weighting: A
 - (ii) time weighting: Fast
 - (iii) time measurement: $L_{eq(30-min)}$ during non-restricted hours i.e. 07:00 – 1900 on normal weekdays; $L_{eq(5-min)}$ during restricted hours i.e. 19:00 – 23:00 and 23:00 – 07:00 of normal weekdays, whole day of Sundays and Public Holidays
- (e) Prior to and after each noise measurement, the meter was calibrated using the acoustic calibrator for 94dB(A) at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1 dB(A), the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.
- (f) During the monitoring period, the L_{eq} , L_{10} and L_{90} were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- (g) Noise measurement was paused during periods of high intrusive noise (e.g. dog barking, helicopter noise) if possible. Observations were recorded when intrusive noise was unavoidable.

- (h) Noise monitoring was cancelled in the presence of fog, rain, wind with a steady speed exceeding 5m/s, or wind with gusts exceeding 10m/s.

3.5.2 Maintenance and Calibration

- (a) The microphone head of the sound level meter was cleaned with soft cloth at regular intervals.
 (b) The meter and calibrator were sent to the supplier or HOKLAS laboratory to check and calibrate at yearly intervals.
 (c) Calibration certificates of the sound level meters and acoustic calibrators are provided in Appendix A.

3.6 Results and Observations

- 3.6.1 There was no other major activity influencing the measured noise level during the baseline noise monitoring period. The dominant noise sources were from community noises, school activities and nearby traffic emissions.
- 3.6.2 Baseline noise monitoring was conducted for consecutively 14 days, from 20 October 2009 to 3 November 2009.
- 3.6.3 The baseline noise monitoring results are summarized in Tables 3.4 to 3.6. Detailed noise monitoring results are presented in Appendix C.

Table 3.4 Summary of Baseline Daytime Noise Monitoring Results

0700-1900 hrs of normal weekdays	30-min Mean of Noise Levels, dB(A)			Range, dB(A)
	L _{eq}	L ₁₀	L ₉₀	L _{eq}
NM1	64.2	66.0	59.9	63.1 – 65.9
NM2	68.1*	71.1*	62.2*	66.9 – 69.0
NM3	64.8	67.2	60.5	63.8 – 65.6
NM4	67.4	68.2	65.7	66.4 – 68.8
NM5	65.2*	67.7*	60.8*	63.6 – 66.6
NM6	64.5*	65.9*	62.1*	61.8 – 68.4
NM7	61.5	63.1	57.9	59.3 – 65.4

*+3dB(A) Façade correction included

Table 3.5 Summary of Baseline Evening, Sunday and Public Holiday Noise Monitoring Results

1900-2300 hrs of normal weekdays, 0700-2300 hrs of Sundays and Public Holidays	5-min Mean of Noise Levels, dB(A)			Range, dB(A)
	L _{eq}	L ₁₀	L ₉₀	L _{eq}
NM1	61.3	63.9	56.1	59.6 – 62.2
NM2	64.9*	66.8*	60.8*	61.9 – 68.4
NM3	64.2	66.9	59.5	62.9 – 66.1
NM4	65.1	66.2	63.2	64.2 – 66.1
NM5	64.5*	66.8*	60.8*	62.2 – 67.0
NM6	61.9*	63.2*	59.8*	59.2 – 64.2
NM7	56.2	57.6	53.0	52.2 – 59.8

*+3dB(A) Façade correction included

Table 3.6 Summary of Baseline Night-time Noise Monitoring Results

2300-0700 hrs	5-min Mean of Noise Levels, dB(A)			Range, dB(A)
	L _{eq}	L ₁₀	L ₉₀	L _{eq}
NM1	56.5	59.5	49.7	54.4 – 57.8
NM2	63.8*	66.8*	58.2*	61.0 – 66.7
NM3	59.0	61.6	53.4	57.9 – 60.8
NM4	59.9	61.7	56.5	58.1 – 61.8
NM5	63.9*	66.5*	59.6*	59.9 – 66.1
NM6	60.3*	61.3*	59.0*	58.9 – 63.4
NM7	53.3	54.2	50.9	51.4 – 55.2

*+3dB(A) Façade correction included

- 3.6.4 At all monitoring locations, the averaged baseline daytime noise monitoring results are within the criteria of 75dB(A) for residential premises and 70dB(A) for educational institutions.
- 3.6.5 However, although no construction work was carried out in the vicinity, the baseline daytime noise levels recorded at Tai Kwong Secondary School (NM1), Wong Shiu Chi Middle School (NM3) and PLK Tin Ka Ping Primary School (NM6) approached or even exceeded the Limit Level of 65dB(A) for educational institutions during examination period.
- 3.6.6 The averaged baseline night-time noise monitoring results exceeded the criteria of 55dB(A) at all monitoring locations, except for monitoring location NM7.

3.7 Action and Limit Levels

- 3.7.1 The Action and Limit Levels of noise monitoring have been set in accordance with the derivation criteria specified in the updated EM&A Manual as shown in Table 3.7 below.

Table 3.7 Criteria for Action and Limit Levels for Construction Noise

Time Period	Action Level	Limit Levels
0700-1900 hrs of normal weekdays	When one documented complaint is received from any one of the sensitive receivers	65/70/75 dB(A)*
1900-2300 hrs of normal weekdays, 0700-2300 hrs of Sundays and Public Holidays		60/65/70 dB(A)**
2300-0700 hrs		45/50/55 dB(A)**

* Standard maximum permissible noise level for different nature of the NSR(s) in accordance with the *TM on Environmental Impact Assessment Process*.

** To be selected based on the Area Sensitivity Rating of A/B/C, and the conditions of the applicable CNP(s) must be followed.

- 3.7.2 Area Sensitivity Ratings of the noise sensitive receivers (NSRs) of the Projects are considered as “C” as they are directly affected urban areas. Since NM1, NM3 and NM6 are educational institutions, it is anticipated that they would be closed after 19:00 of normal weekdays and on Sundays and Public Holidays. Therefore, Action and Limit Levels during restricted hours would not be applicable. The Action and Limit Levels for impact noise monitoring are derived and presented in Table 3.8 below.

Table 3.8 Action and Limit Levels for Construction Noise of the Project

Time Period	Monitoring Station	Action Level	Limit Levels
0700-1900 hrs of normal weekdays	NM1	When one documented complaint is received from any one of the sensitive receivers	65/70 dB(A)*
	NM2		75 dB(A)
	NM3		65/70 dB(A)*
	NM4		75 dB(A)
	NM5		75 dB(A)
	NM6		65/70 dB(A)*
	NM7		75 dB(A)
1900-2300 hrs of normal weekdays, 0700-2300 hrs of Sundays and Public Holidays	NM1	When one documented complaint is received from any one of the sensitive receivers	N/A
	NM2		70 dB(A)
	NM3		N/A
	NM4		70 dB(A)
	NM5		70 dB(A)
	NM6		N/A
	NM7		70 dB(A)
2300-0700 hrs	NM1	When one documented complaint is received from any one of the sensitive receivers	N/A
	NM2		55 dB(A)
	NM3		N/A
	NM4		55 dB(A)
	NM5		55 dB(A)
	NM6		N/A
	NM7		55 dB(A)

* 70dB(A) for normal daytime and 65dB(A) for daytime during examination period

4 CONCLUSION

- 4.1.1 Baseline air quality monitoring was carried out from 20 October 2009 to 4 November 2009 at 4 monitoring stations. Action Levels for air quality at each location were derived from the baseline monitoring results.
- 4.1.2 Baseline noise monitoring was carried out from 20 October 2009 to 3 November 2009 at 7 monitoring stations for reference purpose. The Action Level of construction noise is based on documented complaints received, while the Limit Level is the level at a specific limit according to EIAO-TM.
- 4.1.3 The averaged baseline daytime noise levels recorded at Tai Kwong Secondary School (NM1), Wong Shiu Chi Middle School (NM3) and PLK Tin Ka Ping Primary School (NM6) approached the Limit Level of 65dB(A) for educational institutions during examination period.
- 4.1.4 The averaged baseline night-time noise monitoring results exceeded the criteria of 55dB(A) at all monitoring locations, except for monitoring location NM7.