
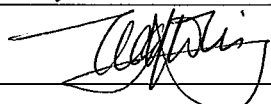


**Highways Department**

Agreement No. CE 20/2009 (EP)

**Environmental Team for the Widening of  
Tolo Highway / Fanling Highway between  
Island House Interchange and Fanling****(Stage 1)  
Between Island House Interchange and  
Tai Hang - Investigation****Monthly EM&A Report  
for December 2010**

[01/2011]

	Name	Signature
Prepared & Checked:	Ryan Wong	
Reviewed & Approved:	Y T Tang	

Version: Rev. 0 Date: 14 January 2011

**Disclaimer**

This report is prepared for Highways Department and is given for its sole benefit in relation to and pursuant to Environmental Team for the Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling (Stage 1) Between Island House Interchange and Tai Hang - Investigation and may not be disclosed to, quoted to or relied upon by any person other than Highways Department without our prior written consent. No person (other than Highways Department) into whose possession a copy of this report comes may rely on this report without our express written consent and Highways Department may not rely on it for any purpose other than as described above.

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14 January 2011  
By Fax (2805 5028) and Post

**Attn.: Mr. Tony Wong**

Dear Sir,

**Widening of Tolo Highway between  
Island House Interchange and Tai Hang  
Environmental Permit No.: EP-324/2008  
Condition 3.3 – Submission of Monthly EM&A Report for December 2010 (Stage 1)**

We refer to the Monthly EM&A Report received on 13 January 2011 submitted by ET via email. Pursuant to EP Condition 3.3, I hereby verify the Monthly EM&A Report for December 2010 (Stage 1) for the Project.

Yours faithfully  
for MOTT MACDONALD HONG KONG LIMITED

A handwritten signature in black ink, appearing to read 'Terence Kong'.

Terence Kong  
Independent Environmental Checker

c.c. HyD – Mr. Raymond Yip / Mr. C K Chan / Mr. William Chiang  
(Fax: 2761 4864/ 2714 5198/2761 4864)

ETL, AECOM – Mr. Y T Tang (Fax: 2891 0305)

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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)(EP). 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 were commenced on 23 November 2009 and will tentatively be completed in December 2013; while construction programme of Stage 2 is currently under review. This report focuses on Stage 1 of the Project only.

The construction phase of Stage 1 under the EP commenced on 23 November 2009.

The EM&A programme for Stage 1 of the Project commenced on 23 November 2009. The impact environmental monitoring and audit includes air quality and noise monitoring.

This report documents the findings of EM&A works conducted in the period between 1 and 31 December 2010. As informed by the Contract 1 Contractor (CSCE), construction activities in the reporting period were:

- Temporary shoring, sheetpiling and excavation;
- Bored piling;
- Pipe pile wall construction;
- Pile cap construction;
- Bridge construction;
- Tree felling and transplanting of trees;
- Installation of soil nails;
- At-grade road construction;
- Demolition of central dividers;
- Retaining wall construction;
- Demolition of bridges; and
- Slope works.

The construction works carried out by the Contract 2 Contractor (Gammon) in the reporting period were:

- Excavation of trial trenches to locate existing utilities;
- Ground investigation and predrilling;
- Construction of haul road;
- Piling and pile cap of bridges;
- Construction of Pilecap / Spread footing of Noise Barrier / Semi Noise Enclosure;
- Slope works, including installation of soil nail;
- Entrusted watermain works;
- Retaining wall construction;
- Modification of existing bridge structure; and
- Sewer installation.

### Reporting Change

There was no reporting change required in the reporting month.

### Breaches of Action and Limit Levels for Air Quality

No exceedance of Action and Limit Level was recorded for 1-hour and 24-hour TSP monitoring in the reporting month.

### **Breaches of Action and Limit Levels for Noise**

One noise related complaint was followed up by Environmental Team in the reporting month, but it was related to time period outside the 0700-1900 hours on normal weekdays and it was considered not related to the Project, hence no Action Level exceedance of noise was recorded.

No Limit Level exceedance of noise was recorded in the reporting month.

### **Complaint, Notification of Summons and Successful Prosecution**

One (1) environmental complaint was followed up by Environmental Team in December 2010. However it was considered not related to the Project.

No notification of summons and successful prosecution was received in the reporting month.

### **Future Key Issues**

Key issues to be considered in the coming month included:

- Properly store and label oils and chemicals on site;
- Chemical and waste management;
- Collection of construction waste should be carried out regularly;
- Site runoff should be properly collected and treated prior to discharge;
- Suppress dust generated from excavation and drilling activities, and haul road traffic;
- Quieter powered mechanical equipment should be used;
- Closely check and replace the sound insulation materials wrapped at the concrete breaker tip regularly;
- Better scheduling of construction works to minimize noise nuisance; and
- Properly maintain all drainage facilities on site.

## **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 commenced on 23 November 2009 and will tentatively be completed in December 2013; while construction programme of Stage 2 is currently under review. This report focuses on Stage 1 of the Project only.
- 1.1.6. The construction works for Stage 1 of the Project will be implemented under 2 works contracts (Contract 1 and Contract 2). Contract 1 covers the section of Tolo Highway between Island House Interchange and Ma Wo, Contract 2 covers the section of Tolo Highway between Ma Wo and Tai Hang.
- 1.1.7. China State Construction Engineering (Hong Kong) Ltd. (CSCE) was commissioned as the Contractor of Contract 1 of Stage 1 of the Project, while Gammon Construction Limited was commissioned as the Contractor of Contract 2 of Stage 1 of the Project. AECOM Asia Co. Ltd. was employed by Highways Department as the Environmental Team to undertake the EM&A works for Stage 1 of the Project.
- 1.1.8. Hyder-Arup-Black and Veatch Joint Venture are appointed by Highways Department as the consultants for the design and construction assignment for the Tolo project under Agreement No. CE 58/2000 (i.e. the Engineer for the Contracts) and Mott MacDonald Hong Kong Ltd. acts as the Independent Environmental Checker (IEC) for the Contracts.
- 1.1.9. The construction phase of Stage 1 under the EP commenced on 23 November 2009.
- 1.1.10. According to the updated EM&A Manual of Stage 1 of the Project, there is a need of an EM&A programme including air quality and noise monitoring. The EM&A programme for Stage 1 of the Project commenced on 23 November 2009.

**1.2. Scope of Report**

1.2.1. This is the fourteenth monthly Environmental Monitoring and Audit (EM&A) Report under the Agreement No. CE 20/2009 (EP) - Widening of Tolo Highway between Island House Interchange and Tai Hang – Investigation. This report presents a summary of the environmental monitoring and audit works, list of activities and mitigation measures proposed by the ET for Stage 1 of the Project in December 2010.

**1.3. Project Organization**

1.3.1. The project organization is shown in Appendix A. The key personnel contact names and numbers are summarized in Table 1.1.

**Table 1.1 Contact Information of Key Personnel**

Party	Position	Name	Telephone	Fax
ER of Stage 1, Contract 1 (Hyder-Arup-Black & Veatch Joint Venture)	Chief Resident Engineer /TOLO1	James Tsang	9038 8797	26674000
ER of Stage 1, Contract 2 (Hyder-Arup-Black & Veatch Joint Venture)	Chief Resident Engineer /TOLO2	Paul Appleton	9097 5833	2653 2348
IEC of Stage 1 (Mott MacDonald Hong Kong Limited)	Independent Environmental Checker	Terence Kong	2828 5919	2827 1823
Contractor of Stage 1, Contract 1 (CSCE)	Site Agent	David Lau	9499 0818	2667 5666
	Environmental Officer	Michael Tsang	9277 4956	2667 5666
Contractor of Stage 1, Contract 2 (Gammon)	Construction Manager	K F Tam	9032 1133	2559 3410
	Environmental Officer	Ir Thomson Chang	9213 6569	2559 3410
ET of Stage 1 (AECOM)	ET Leader	Y T Tang	2893 1551	2891 0305

**1.4. Summary of Construction Works**

1.4.1. The construction phase of Stage 1 under the EP commenced on 23 November 2009.

1.4.2. Details of the construction works carried out by the Contract 1 Contractor (CSCE) in this reporting period are listed below:

- Temporary shoring, sheetpiling and excavation;
- Bored piling;
- Pipe pile wall construction;
- Pile cap construction;
- Bridge construction;



- Tree felling and transplanting of trees;
- Installation of soil nails;
- At-grade road construction;
- Demolition of central dividers;
- Retaining wall construction;
- Demolition of bridges; and
- Slope works.

1.4.3. Details of the construction works carried out by the Contract 2 Contractor (Gammon) in this reporting period are listed below:

- Excavation of trial trenches to locate existing utilities;
- Ground investigation and predrilling;
- Construction of haul road;
- Piling and pile cap of bridges;
- Construction of Pilecap / Spread footing of Noise Barrier / Semi Noise Enclosure;
- Slope works, including installation of soil nail;
- Entrusted watermain works;
- Retaining wall construction;
- Modification of existing bridge structure; and
- Sewer installation.

1.4.4. The Construction Programmes are shown in Appendix B.

1.4.5. The general layout plan of the Project site showing the contract area is shown in Figure 1.1.

1.4.6. The mitigation measures implementation schedule are presented in Appendix C.

## 1.5. **Summary of EM&A Programme Requirements**

1.5.1. The EM&A programme required environmental monitoring for air quality, noise and environmental site inspections for air quality, noise, waste management, ecology, and landscape and visual impact. The EM&A requirements for each parameter described in the following sections include:

- All monitoring parameters;
- Monitoring schedules for the reporting month and forthcoming months;
- Action and Limit levels for all environmental parameters;
- Event / Action Plan;
- Environmental mitigation measures, as recommended in the Project EIA study final report; and
- Environmental requirement in contract documents.

## 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 were established. Impact 1-hour TSP monitoring was conducted for at least three times every 6 days, while impact 24-hour TSP monitoring was carried out for at least once every 6 days. The Action and Limit level of the air quality monitoring is provided in Appendix D.

### 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.

2.3.2 However, for monitoring locations: Dynasty View and Tai Po Garden, proposed in the updated EM&A Manual, as approval could not be obtained from the owner's corporation of the premises, baseline and impact air quality monitoring was conducted at 13 Ha Wun Yiu (AM1) and Tai Kwong Secondary School (AM4) respectively. The monitoring station at 13 Ha Wun Yiu (AM1) was relocated to Fan Sin Temple, 3 Sheung Wun Yiu (AM1A) in February 2010.

2.3.3 Figure 2.1 shows the locations of monitoring stations. Table 2.2 describes the details of the monitoring stations.

**Table 2.2 Locations of Impact Air Quality Monitoring Stations**

Monitoring Station	Location	Description
AM1A	3 Sheung Wun Yiu	Ground floor at the boundary outside Fan Sin Temple
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 impact TSP monitoring.

**Table 2.3 Air Quality Monitoring Parameters, Frequency and Duration**

Parameter	Frequency and Duration
1-hour TSP	Three times every 6 days while the highest dust impact was expected
24-hour TSP	Once every 6 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  $\pm 3$  °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 m<sup>3</sup>/min, and complied with the range specified in the updated EM&A Manual (i.e. 0.6-1.7 m<sup>3</sup>/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) 5-point calibration of the HVS was conducted using TE-5025A Calibration Kit prior to the commencement of baseline monitoring. Bi-monthly 5-point calibration of the HVS will be carried out during impact monitoring.
  - (iii) Calibration certificate of the HVSs are provided in Appendix E.

## 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 E.
- (ii) 1-hour validation checking of the TSP meter against HVS is carried out yearly at the air quality monitoring locations.

## 2.6 Monitoring Schedule for the Reporting Month

2.6.1 The schedule for environmental monitoring in December 2010 is provided in Appendix F.

## 2.7 Monitoring Results

2.7.1 The baseline condition of air quality in the Project site was reviewed in October and November 2009. A baseline monitoring of air quality, in terms of 1-hour Total Suspended Particulates (TSP) and 24-hour TSP, was carried out from 20 October 2009 to 4 November 2009 for 14 days. The baseline monitoring report was submitted by ETL and approved by the ER and the IEC on 9 November 2009. Action Levels for air quality were established and are summarized in Table 2.4, Table 2.5 and Appendix D.

## 2.8 Results and Observations

2.8.1 The 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 G.

**Table 2.4 Summary of 1-hour TSP Monitoring Results in the Reporting Period**

	Average ( $\mu\text{g}/\text{m}^3$ )	Range ( $\mu\text{g}/\text{m}^3$ )	Action Level ( $\mu\text{g}/\text{m}^3$ )	Limit Level ( $\mu\text{g}/\text{m}^3$ )
<b>AM1A</b>	76.2	62.6 – 88.9	302.1	500
<b>AM2</b>	77.7	63.4 – 88.5	301.9	500
<b>AM3</b>	76.7	61.8 – 89.8	301.9	500
<b>AM4</b>	77.7	64.1 – 90.2	302.3	500

**Table 2.5 Summary of 24-hour TSP Monitoring Results in the Reporting Period**

	Average ( $\mu\text{g}/\text{m}^3$ )	Range ( $\mu\text{g}/\text{m}^3$ )	Action Level ( $\mu\text{g}/\text{m}^3$ )	Limit Level ( $\mu\text{g}/\text{m}^3$ )
<b>AM1A</b>	64.5	40.6 – 107.8	176.6	260
<b>AM2</b>	49.7	29.5 – 74.6	178.6	260
<b>AM3</b>	57.9	16.0 – 112.4	193.1	260
<b>AM4</b>	71.0	51.0 – 126.1	198.5	260

2.8.2 The major dust source in the reporting period included concrete breaking, soil nail installation, excavation activities from Stage 1 of the Project, as well as nearby traffic emissions.

2.8.3 All 1-hour and 24-hour TSP results were below the Action and Limit Level at all monitoring locations in the reporting month.

2.8.4 The event action plan is annexed in Appendix J.

2.8.5 Weather information including wind speed and wind direction is annexed in Appendix H. The information was obtained from Hong Kong Observatory Sha Tin and Tai Mei Tuk Automatic Weather Station. As some of the weather data in December 2010 from the Tai Mei Tuk Automatic Weather Station were missing, the weather data from Tai Po Automatic Weather Station in December 2010 are included in Appendix H for supplementary purpose.

### 3 NOISE MONITORING

#### 3.1 Monitoring Requirements

3.1.1 In accordance with the EM&A Manual, impact noise monitoring was conducted for at least once per week during the construction phase of Stage 1 of the Project. The Action and Limit level of the noise monitoring is provided in Appendix D.

#### 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-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, impact 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 monitoring stations.

**Table 3.2 Locations of Impact 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	1m from the exterior of the roof top façade of the club house
NM6	PLK Tin Ka Ping Primary School	1.2m ground floor free-field near the entrance
NM7	Riverain Bayside	1m 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 impact noise monitoring.

**Table 3.3 Noise Monitoring Parameters, Frequency and Duration**

Parameter	Frequency and Duration
30-mins measurement at each monitoring station between 0700 and 1900 on normal weekdays. $L_{eq}$ , $L_{10}$ and $L_{90}$ would be recorded.	At least once per week

### 3.5 Monitoring Methodology

#### 3.5.1 Monitoring Procedure

- (a) Façade measurements were made at all monitoring locations, except monitoring stations NM2 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 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:  $L_{eq(30\text{-minutes})}$  during non-restricted hours i.e. 07:00 – 1900 on normal weekdays;  $L_{eq(5\text{-minutes})}$  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 E.

**3.6 Monitoring Schedule for the Reporting Month**

3.6.1 The schedule for environmental monitoring in December 2010 is provided in Appendix F.

**3.7 Monitoring Results**

3.7.1 The monitoring results for construction noise are summarized in Table 3.4 and the monitoring data is provided in Appendix I.

**Table 3.4 Summary of Construction Noise Monitoring Results in the Reporting Period**

	Average, dB(A), $L_{eq}$ (30 mins)	Range, dB(A), $L_{eq}$ (30 mins)	Limit Level, dB(A), $L_{eq}$ (30 mins)
NM1	55.9	47.9 – 64.1	65/70 <sup>#</sup>
NM2	67.0*	66.3 – 67.8*	75
NM3	62.1	53.3 – 64.7	65/70 <sup>#</sup>
NM4	66.5	65.5 – 67.4	75
NM5	62.9	62.1 – 63.7	75
NM6	58.7*	51.2 – 64.2*	65/70 <sup>#</sup>
NM7	59.2	58.6 – 60.1	75

\*+3dB(A) Façade correction included

# Limit Level of 65 dB(A) during school examination period

3.7.2 No noise monitoring result exceeding the Limit Level was recorded at all monitoring stations in the reporting month.

3.7.3 Major noise sources during the noise monitoring included construction activities of Stage 1 of the Project, nearby traffic noise and general school activities.

3.7.4 One noise related complaint was followed up by Environmental Team in the reporting period, but it was related to time period outside the 0700-1900 hours on normal weekdays and it was considered not related to the Project, hence no Action Level exceedance of noise was recorded.

3.7.5 The event action plan is annexed in Appendix J.



## **4 ENVIRONMENTAL SITE INSPECTION AND AUDIT**

### **4.1 Site Inspection**

4.1.1 Site Inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for Stage 1 of the Project. In the reporting month, 5 site inspections were carried out on 1, 7, 15, 22 and 29 December 2010 for Contract 1 of the Project, and 5 site inspections for Contract 2 of the Project were carried out on 2, 9, 15, 23 and 29 December 2010.

4.1.2 The environmental site inspection summaries are provided in Appendix K.

4.1.3 Particular observations during the site inspections for Contract 1 are described below:

#### ***Air Quality***

4.1.4 The stock of cement bags near the vehicle site entrance of Wall 8 was not covered. The Contractor was reminded to cover the stock of cement bags with tarpaulin sheets.

#### ***Noise***

4.1.5 An air compressor at bridge level of Wall 8 was not fitted with noise emission label. The Contractor was reminded to fit proper noise emission label at obvious location on the air compressor.

#### ***Water Quality***

4.1.6 General refuse and C&D materials were observed inside the u-channel at TP7. The Contractor was reminded to remove the general refuse and C&D materials from the u-channel and properly maintain the drainage system on-site.

#### ***Chemical and Waste Management***

4.1.7 Oil stains were observed near the drip tray of chemical containers at bridge level of Wall 8. While no leakage from the tray or chemical containers was observed, the Contractor was reminded to properly handle the chemicals and to clean up the oil stains.

#### ***Landscape and Visual Impact***

4.1.8 C&D materials were placed very close to the retained trees at Retaining Wall 10. The Contractor was reminded to keep all construction materials away from the retained trees.

4.1.9 Particular observations during the site inspections for Contract 2 are described below:

#### ***Air Quality***

4.1.10 Dusty material was observed on the ground at Area C. The Contractor was reminded to clear the dusty material and properly handle them in the future.

#### ***Noise***

4.1.11 No adverse observation was identified in the reporting month.

**Water Quality**

4.1.12 The u-channel on the slope at Gate 30 was blocked by silt and felled trees. The Contractor was advised to clear the silt and remove the felled trees from the u-channel.

**Chemical and Waste Management**

4.1.13 Excavated materials and non-inert C&D waste were accumulated near the sump pit at W73. The Contractor was reminded to keep excavated materials and C&D waste away from the sump pit and dispose of the waste in a timely manner.

4.1.14 A drip tray of chemical containers at Gate 30 was filled with silt. The Contractor was advised to clear the silt and prevent silt from getting into drip trays.

**Landscape and Visual Impact**

4.1.15 No adverse observation was identified in the reporting month.

**4.2 Advice on the Solid and Liquid Waste Management Status**

4.2.1 The Contract 1 Contractor (CSCE) and the Contract 2 Contractor (Gammon) are registered as chemical waste producers for Stage 1 of the Project. C&D material sorting was carried out on site. Sufficient numbers of receptacles were available for general refuse collection.

4.2.2 As advised by the Contract 1 Contractor (CSCE), 411m<sup>3</sup> of inert C&D material was disposed as public fill to Tuen Mun 38, while 59m<sup>3</sup> of general refuse were disposed at NENT landfill, 10633kg of metal, 211kg of paper/cardboard and 835kg of plastic were collected by recycling contractor in the reporting month. 15688m<sup>3</sup> of inert C&D materials were reused on site.

4.2.3 As advised by the Contract 2 Contractor (Gammon), 740m<sup>3</sup> of inert C&D material were disposed to Tuen Mun 38 and 130m<sup>3</sup> of general refuse was disposed to NENT landfill in the reporting period.

4.2.4 The Contract 1 Contractor (CSCE) and the Contract 2 Contractor (Gammon) are advised to maintain on site waste sorting and recording system and maximize reuse / recycle of C&D wastes.

**4.3 Environmental Licenses and Permits**

4.3.1 The environmental licenses and permits for Stage 1 of the Project and valid in the reporting month is summarized in Table 4.1.

**Table 4.1 Summary of Environmental Licensing and Permit Status**

Statutory Reference	License/ Permit	License or Permit No.	Valid Period		License/ Permit Holder	Remarks
			From	To		
EIAO	Environmental Permit	EP-324/2008	23/12/2008	N/A	HyD	Tolo Highway/Fanling Highway between Island House Interchange and Ma Wo
WPCO	Discharge License (Office)	WT00005096-2009	03/12/2009	31/12/2014	CSCE	Discharge at Site Office
	Discharge License (Site)	WT00005445-2009	15/12/2009	31/12/2014	CSCE	Discharge of Construction Runoff

	Discharge License (Office)	WT00006782-2010	25/06/2010	30/06/2015	Gammon	Discharge at Site Office
	Discharge License (Site)	WT00007162-2010	09/08/2010	31/07/2015	Gammon	Discharge of Construction Runoff
WDO	Chemical Waste Producer Registration	5213-727-C3249-46	25/09/2009	N/A	CSCE	Chemical waste produced in Contract HY/2008/09
		5213-722-G2347-18	18/05/2010	N/A	Gammon	Chemical waste produced in Contract HY/2009/08
WDO	Billing Account for Disposal of Construction Waste	7009328	08/09/2009	N/A	CSCE	Waste disposal in Contract HY/2008/09
		7010320	02/03/2010	N/A	Gammon	Waste disposal in Contract HY/2009/08
NCO	Construction Noise Permit	GW-RN0321-10	14/9/2010	10/3/2011	CSCE	Construction of TB1 & TB2
		GW-RN0340-10	11/10/2010	10/4/2011	CSCE	Construction of W4 to W7
		GW-RN0364-10	22/10/2010	4/1/2011	CSCE	Construction of Site Entrance No. 29 and plant mobilization
		GW-RN0365-10	4/11/2010	15/1/2011	CSCE	Loading and unloading along Tolo Highway
		GW-RN0377-10	4/11/2010	31/1/2011	CSCE	Road Maintenance
		GW-RN0402-10	22/11/2010	10/4/2011	CSCE	Bored piling
		GW-RN0426-10	13/12/2010	4/3/2011	CSCE	Construction of TB1 & TB2
		GW-RN0432-10	19/12/2010	27/2/2011	CSCE	Cutting trees along Tolo Highway
		GW-RN0438-10	20/12/2010	13/6/2011	CSCE	Works next to MTRC's Tracks
		GW-RN0443-10	24/12/2010	19/6/2011	CSCE	Construction of Bridges over the Shan Tong Road and Tat Wan Road
		GW-RN0286-10	31/08/2010	28/02/2011	Gammon	Installation of Safety Fence, Delivery of Plant & Materials, and Alternation of Road Marking
		PP-RN0028-10	10/11/2010	7/5/2011	Gammon	Drop hammer driving steel sheet pile

#### 4.4 **Implementation Status of Environmental Mitigation Measures**

4.4.1 In response to the site audit findings, the Contractors carried out corrective actions.

4.4.2 A summary of the Implementation Schedule of Mitigation Measures (EMIS) is presented in Appendix C. Most of the necessary mitigation measures were implemented properly.

#### 4.5 **Summary of Exceedances of the Environmental Quality Performance Limit**

4.5.1 All 1-hour and 24-hour TSP monitoring results complied with the Action / Limit Levels in the reporting period.

4.5.2 One noise related complaint was followed up by Environmental Team in the reporting period, but it was related to time period outside the 0700-1900 hours on normal weekdays and it was considered not related to the Project, hence no Action Level exceedance of noise was recorded.

4.5.3 No monitoring Limit Level exceedance for noise was recorded at all monitoring stations in the reporting period.

#### 4.6 **Summary of Complaints, Notification of Summons and Successful Prosecutions**

4.6.1 The Environmental Complaint Handling Procedure is annexed in Figure 4.1.

4.6.2 One (1) environmental complaint was followed up by Environmental Team in the reporting month.

4.6.3 EPD referred a public complaint about renovation noise from roadwork at Ha Wun Yiu, Tai Po, at midnight on 10 December 2010. As informed by the Contract 1 (HY/2008/09) Contractor (China State Construction Engineering (Hong Kong)) and Contract 2 (HY/2009/08) Contractor (Gammon) of Stage 1 of the Project, and confirmed by the Engineer, no construction activity was carried out by the Contractors of Stage 1 of the Project at the concerned area during the concerned timeslot. The complaint was considered unrelated to the Project works.

4.6.4 No notification of summons and prosecution was received in the reporting period.

4.6.5 Statistics on complaints, notifications of summons and successful prosecutions are summarized in Appendix L.

## 5 **FUTURE KEY ISSUES**

### 5.1 **Construction Programme for the Coming Months**

5.1.1 The major construction works for Contract 1 in January 2011 will be:

- Temporary shoring, sheetpiling and excavation;
- Bored piling;
- Pre-bored H-piles construction
- Pipe pile wall construction;
- Pile cap construction;
- Bridge construction;
- Tree felling and transplanting of trees;
- Installation of soil nails;
- At-grade road construction;
- Demolition of central dividers;
- Retaining wall construction; and
- Slope works.

5.1.2 The major construction works for Contract 2 in January 2011 will be:

- Excavation of trial trenches to locate existing utilities;
- Ground investigation and predrilling;
- Construction of haul road;
- Piling and pile cap of bridges;
- Construction of Pilecap / Spread footing of Noise Barrier / Semi Noise Enclosure;
- Slope works, including installation of soil nail;
- Entrusted watermain works;
- Retaining wall construction;
- Modification of existing bridge structure; and
- Sewer installation.

## 5.2 **Key Issues for the Coming Month**

5.2.1 Key issues to be considered in January 2011:

- Properly store and label oils and chemicals on site;
- Chemical and waste management;
- Collection of construction waste should be carried out regularly;
- Site runoff should be properly collected and treated prior to discharge;
- Suppress dust generated from excavation and drilling activities, and haul road traffic;
- Quieter powered mechanical equipment should be used;
- Closely check and replace the sound insulation materials wrapped at the concrete breaker tip regularly;
- Better scheduling of construction works to minimize noise nuisance; and
- Properly maintain all drainage facilities on site.

## 5.3 **Monitoring Schedule for the Coming Month**

5.3.1 The tentative schedule for environmental monitoring in January 2011 is provided in Appendix F.

## **6 CONCLUSIONS AND RECOMMENDATIONS**

### **6.1 Conclusions**

- 6.1.1 The construction phase and EM&A programme of Stage 1 of the project commenced on 23 November 2009.
- 6.1.2 1-hour TSP, 24-hour TSP and noise monitoring were carried out in the reporting period.
- 6.1.3 All 1-hour TSP and 24-hour TSP monitoring results complied with the Action / Limit Level.
- 6.1.4 No Action Level exceedance of noise was recorded, and no Limit Level exceedance for noise was recorded at all monitoring stations in the reporting month.
- 6.1.5 Environmental site inspection was carried out 10 times in December 2010. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.
- 6.1.6 One (1) environmental complaint was followed up by Environmental Team in the reporting period. However it was considered not related to the Project.
- 6.1.7 No notification of summons and prosecution was received in the reporting period.

### **6.2 Recommendations**

- 6.2.1 According to the environmental site inspection performed in the reporting month, the following recommendations were provided:

#### ***Air Quality Impact***

- All plants on site should be properly maintained to avoid dark smoke emission.
- All vehicles should be washed to remove any dusty materials before leaving the site.
- Haul roads should be sufficiently dampened to minimize fugitive dust generation.
- Wheel washing facilities should be properly maintained to ensure properly functioning.
- Temporary exposed slopes and open stockpiles should be properly covered.
- Enclosure should be erected for cement mixing operations.
- Ensure all vehicles to be washed before leaving the site.
- Provide water spraying to suppress fugitive dust for any dusty construction activity.

#### ***Construction Noise Impact***

- Properly erect the temporary noise barriers in accordance with the Environmental Permit requirement.
- Noise barriers should be closely packed and properly aligned to ensure effective noise reduction.
- Noisy operations should be oriented to a direction away from sensitive receivers as far as possible.
- Sound insulation materials shall be wrapped at the breaker tip for concrete breaking works.
- Better scheduling of construction works to minimize noise nuisance.

#### ***Water Quality Impact***

- Stagnant water accumulated in drip trays should be removed.
- Silt, debris and leaves accumulated at public drains and perimeter u-channels should be cleaned up regularly.

- Silty effluent should be treated/desilted before discharged. Untreated effluent should be prevented from entering public drain channel.

***Chemical and Waste Management***

- C&D material should be sorted and removed timely.
- All plants and vehicles on site should be properly maintained to prevent oil leakage.
- Oil stains on soil surface and empty chemical containers should be cleared and disposed of as chemical waste.

***Landscape and Visual Impact***

- All retained trees should be properly fenced off at the works area.