

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 July 2013**

[08/2013]

| | Name | Signature |
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|--|--------|----------------------|
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12 August 2013
By Fax (2805 5028) and Post

Attn.: Mr. James Penny

Dear Sir,

**Widening of Tolo Highway between
Island House Interchange and Tai Hang
Environmental Permit (EP) No.: EP-324/2008/A
Condition 3.3 – Submission of Monthly EM&A Report for July 2013 (Stage 1)**

We refer to the captioned Monthly EM&A Report received on 9 and 12 August 2013 submitted by Environmental Team (ET) via email. Pursuant to EP Condition 3.3, I hereby verify the Monthly EM&A Report for July 2013 (Stage 1) for the Project.

Yours faithfully
for MOTT MACDONALD HONG KONG LIMITED



Terence Kong
Independent Environmental Checker

c.c. HyD – Mr. Raymond T W Kong / Mr. Dennis Wong / Mr. William Chiang (Fax: 2761 4864)
ETL, AECOM – Mr. Y T Tang (Fax: 2317 7609)

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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) issued by EPD on 23 December 2008. Subsequently, EPD issued a Variation of Environmental Permit (EP-324/2008/A) (VEP) on 31 January 2012.

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 and the Environmental Monitoring and Audit (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 July 2013. As informed by the Contract 1 Contractor (China State Construction Engineering (Hong Kong) Ltd.), construction activities in the reporting period were:-

- Temporary shoring, sheetpiling and excavation
- Pile cap construction (Noise Barrier)
- Installation of soil nails
- At-grade road construction
- Widening and demolition of central dividers
- Retaining wall construction
- Noise barrier footing construction
- Noise barrier panels installation
- Asphalt laying
- Installation of Drainage Pipes
- Modification of Edge coping

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

- Condition survey of existing structures
- Initial and record survey
- Survey Setting out works for slopes and structures
- Setting up the temporary traffic arrangement
- Excavation of trial trenches to locate existing utilities
- Construction of haul road
- Extension of box culvert and subway
- Structural works of bridges
- Construction of Pilecap / Spread footing of Noise Barrier / Semi Noise Enclosure
- Slope works, including installation of soil nails
- NTHA mitigation works
- Construction of retaining wall and associated mini-piles
- Noise barrier construction
- Modification / Demolition of existing bridge structures
- Entrusted watermains works
- Sewer Installation
- Road and drainage works
- Landscaping works

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

No Action Level exceedance of construction noise was recorded in the reporting month, since no noise complaints related to 0700 – 1900 hours on normal weekdays was received and followed by Environmental Team in the reporting month.

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

Complaint, Notification of Summons and Successful Prosecution

No follow-up complaint, new complaint, 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, chemical waste and waste management;
- Collection of construction waste should be carried out regularly;
- Site runoff should be properly collected and treated prior to discharge;
- Properly maintain all drainage facilities and wheel washing facilities on site;
- Exposed slopes should be covered up properly if no temporary work will be conducted;
- Suppress dust generated from excavation, breaking and drilling activities, haul road traffic and grout mixing process;
- 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
- Tree protective measures for all retained trees should be well maintained.

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 9, which links other major strategic routes to Shenzhen. At present, this section of Route 9 is dual 3-lane carriageway. However, at several major interchanges along this section of Route 9, 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) issued by EPD on 23 December 2008. Subsequently, EPD issued a Variation of Environmental Permit (EP-324/2008/A) (VEP) on 31 January 2012.

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, except Sha Tin bound carriageway at Tai Po North Interchange, which is widened from 3-lane to 4-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. Hyder-Arup-Black and Veatch Joint Venture (HABVJV) are appointed by Highways Department (HyD) as the consultants for the design and construction assignment for the Tolo project under Agreement No. CE 58/2000 Supplementary Agreement No. 3 (SA3) (i.e. the Engineer for the Contracts).

1.1.8. China State Construction Engineering (Hong Kong) Ltd. (CSHK) was commissioned as the Contractor of Contract 1 of Stage 1 of the Project, while Gammon Construction Limited (GCL) was commissioned as the Contractor of Contract 2 of Stage 1 of the Project.

1.1.9. AECOM Asia Co. Ltd. was employed by HyD as the Environmental Team (ET) to undertake the Environmental Monitoring and Audit (EM&A) works for Stage 1 of the Project and Mott MacDonald Hong Kong Ltd. acts as the Independent Environmental Checker (IEC) for the Contracts.

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

1.1.11. 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 forty-fifth monthly 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 July 2013.

1.3 Project Organization

1.3.1 The project organization structure 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 /TOL01 | James Tsang | 9038 8797 | 26674000 |
| ER of Stage 1, Contract 2 (Hyder-Arup-Black & Veatch Joint Venture) | Chief Resident Engineer /TOL02 | 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 (China State Construction Engineering (Hong Kong) Limited) | Site Agent | Eddie Tang | 9863 7686 | 2667 5666 |
| | Environmental Officer | Michael Tsang | 9277 4956 | 2667 5666 |
| | | M L Lam | 9489 4641 | 2667 5666 |
| Contractor of Stage 1, Contract 2 (Gammon Construction Limited) | Site Agent | John Chan | 3126 1202 | 2559 3410 |
| | Environmental Officer | Thomson Chang | 9213 6569 | 2559 3410 |
| | | Crispin Ao | 9223 8773 | 2559 3410 |
| | | Ao Ho Fo | 9220 5848 | 2559 3410 |
| ET of Stage 1 (AECOM Asia Company Limited) | ET Leader | Y T Tang | 3922 9393 | 3922 9797 |

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 (China State Construction Engineering (Hong Kong) Ltd.) in this reporting period are listed below:-
- Temporary shoring, sheetpiling and excavation
 - Pile cap construction (Noise Barrier)
 - Installation of soil nails
 - At-grade road construction
 - Widening and demolition of central dividers
 - Retaining wall construction
 - Noise barrier footing construction
 - Noise barrier panels installation
 - Asphalt laying
 - Installation of Drainage Pipes
 - Modification of Edge coping
- 1.4.3 Details of the construction works carried out by the Contract 2 Contractor (Gammon Construction Ltd.) in this reporting period are listed below:-
- Condition survey of existing structures
 - Initial and record survey
 - Survey Setting out works for slopes and structures
 - Setting up the temporary traffic arrangement
 - Excavation of trial trenches to locate existing utilities
 - Construction of haul road
 - Extension of box culvert and subway
 - Structural works of bridges
 - Construction of Pilecap / Spread footing of Noise Barrier / Semi Noise Enclosure
 - Slope works, including installation of soil nails
 - NTHA mitigation works
 - Construction of retaining wall and associated mini-piles
 - Noise barrier construction
 - Modification / Demolition of existing bridge structures
 - Entrusted watermains works
 - Sewer Installation
 - Road and drainage works
 - Landscaping works
- 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 areas is shown in Figure 1.1.
- 1.4.6 The environmental 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, water 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 and LD-3B) |
| High Volume Sampler (24-hour TSP) | Tisch Total Suspended Particulate Mass Flow Controlled High Volume Air Sampler (Model No. TE-5170 & GMW-2310) |

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 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. Also, the monitoring station at Tai Kwong Secondary School (AM4) was relocated to 168 Shek Kwu Lung Village (AM4A) in September 2011.

2.3.2 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 |
| AM4A | 168 Shek Kwu Lung Village | Roof of the switch room |

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) A minimum of 2 meters separation from any supporting structure, measured horizontally.
 - (v) No furnace or incinerator flues nearby.
 - (vi) Airflow around the sampler was unrestricted.
 - (vii) Permission was obtained to set up the samplers and access to the monitoring stations.
 - (viii) A secured supply of electricity was obtained to operate the samplers.
 - (ix) The sampler was located more than 20 meters from any dripline.
 - (x) Any wire fence and gate, required to protect the sampler, did not obstruct the monitoring process.
 - (xi) 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) 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 July 2013 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 impact 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 ($\mu\text{g}/\text{m}^3$) |
|-------------|--------------------------------------|------------------------------------|---|--|
| AM1A | 79.2 | 70.9 – 83.0 | 302.1 | 500 |
| AM2 | 78.7 | 71.6 – 81.9 | 301.9 | 500 |
| AM3 | 79.4 | 69.6 – 83.3 | 301.9 | 500 |
| AM4A | 79.1 | 72.6 – 82.8 | 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 ($\mu\text{g}/\text{m}^3$) |
|-------------|--------------------------------------|------------------------------------|---|--|
| AM1A | 14.7 | 2.3 – 21.2 | 176.6 | 260 |
| AM2 | 14.5 | 2.2 – 29.3 | 178.6 | 260 |
| AM3 | 16.3 | 6.0 – 23.9 | 193.1 | 260 |
| AM4A | 16.1 | 13.1 – 21.7 | 198.5 | 260 |

2.8.2 The major dust source in the reporting period included construction 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 July 2013 from the Tai Mei Tuk Automatic Weather Station were missing, the weather data from Tai Po Automatic Weather Station in July 2013 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 | Rion NL-31 / B&K 2238 |
| Acoustic Calibrator | 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. The monitoring station at Tai Kwong Secondary School (NM1) was relocated to 168 Shek Kwu Lung Village (NM1A) in September 2011.

3.3.2 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 |
|--------------------|--------------------------------|---|
| NM1A | 168 Shek Kwu Lung Village | 1m from the exterior wall of the village house |
| 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 July 2013 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) |
|------|---------------------------------------|-------------------------------------|---|
| NM1A | 60.1 | 47.9 – 63.8 | 75 |
| NM2 | 64.1* | 57.9 – 67.9* | 75 |
| NM3 | 61.9 | 53.3 – 66.3 | 70 [#] |
| NM4 | 63.7 | 58.3 – 65.2 | 75 |
| NM5 | 62.5 | 60.9 – 63.1 | 75 |
| NM6 | 60.6* | 56.9 – 62.2* | 70 [#] |
| NM7 | 60.8 | 60.4 – 61.5 | 75 |

*+3dB(A) Façade correction included

Limit Level of 70dB(A) applies to education institutes while 65dB(A) applies during school examination period.

3.7.2 There was no noise complaint related to 0700 – 1900 hours on normal weekdays was received and followed up by Environmental Team in the reporting period. Hence, no Action Level exceedance was recorded.

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

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

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 3, 10, 17, 24 and 31 July 2013 for Contract 1 of the Project, and 4 site inspections for Contract 2 of the Project were carried out on 4, 11, 18 and 25 July 2013.

4.1.2 The environmental site inspections 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 Sand and soil stockpiles at Gate 3 were not covered. The Contractor was reminded to cover the stockpiles with tarpaulin.

Noise

4.1.5 No adverse observation was identified in the reporting month.

Water Quality

4.1.6 The Contractor was reminded to remove the stagnant water within the construction area at NB 19.

Chemical and Waste Management

4.1.7 The Contractor was reminded to remove the general refuse at NB 17.

4.1.8 Oil drum was put on bare ground at Gate 3. The Contractor was reminded to provide a drip tray to prevent oil leakage.

4.1.9 The Contractor was reminded to remove the oil stains found at Bridge 11A.

Landscape and Visual Impact

4.1.10 The Contractor was reminded to remove the stockpile of construction materials away from the retained trees at NB 22.

Miscellaneous

4.1.11 No adverse observation was identified in the reporting month.

4.1.12 Particular observations and reminder during the site inspections for Contract 2 are described below:

Air Quality

4.1.13 The Contractor was reminded to cover the soil stockpiles at Bridge 12A with tarpaulin.

Noise

4.1.14 No adverse observation was identified in the reporting month.

Water Quality

- 4.1.15 The Contractor was reminded to remove the stagnant water within the drip tray to prevent overflowing at Wall 59.
- 4.1.16 Stagnant water was observed within the construction site at Bridge 12A. The Contractor was reminded to remove the stagnant water to prevent mosquito breeding.

Chemical and Waste Management

- 4.1.17 Stockpile of construction wastes were accumulated at Bridge 12A NA. The Contractor was reminded to remove the construction waste regularly.
- 4.1.18 General refuse was dumped into the recycling bins at Bridge 12A. The Contractor was reminded to remove the general refuse and dump only the recycling materials into the appropriate recycling bins.

Landscape and Visual Impact

- 4.1.19 No adverse observation was identified in the reporting month.

Miscellaneous

- 4.1.20 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 (CSHK) and the Contract 2 Contractor (GCL) 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 (CSHK), 90m³ of inert C&D material was disposed as public fill to Tuen Mun 38 (of which 10m³ was broken concrete), while 98m³ of general refuse was disposed at NENT landfill. 106kg of paper/cardboard packaging, 2,797kg of plastics and 17kg of metals were collected by recycling contractor in the reporting month. 1,738m³ and 311m³ of inert C&D materials were reused on site and reused in NENT for backfilling purpose respectively. 0kg of chemical waste was collected by licensed contractor in the reporting period.
- 4.2.3 As advised by the Contract 2 Contractor (GCL), 560m³ of inert C&D material were disposed to Tuen Mun 38 and 270m³ general refuse was disposed to NENT landfill in the reporting period. No paper/cardboard packaging was collected by recycling contractor in the reporting month. Besides, no chemical waste was collected by licensed contractor in the reporting period.
- 4.2.4 The Contract 1 Contractor (CSHK) and the Contract 2 Contractor (GCL) 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/A | 31/01/2012 | 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 | CSHK | Discharge at Site Office |
| | Discharge License (Site) | WT00005445-2009 | 15/12/2009 | 31/12/2014 | CSHK | Discharge of Construction Runoff |
| | Discharge License (Office) | WT00006782-2010 | 25/06/2010 | 30/06/2015 | GCL | Discharge at Site Office |
| | Discharge License (Site) | WT00007162-2010 | 09/08/2010 | 31/07/2015 | GCL | Discharge of Construction Runoff |
| WDO | Chemical Waste Producer Registration | 5213-727-C3249-46 | 25/09/2009 | N/A | CSHK | Chemical waste produced in Contract HY/2008/09 |
| | | 5213-722-G2347-18 | 18/05/2010 | N/A | GCL | Chemical waste produced in Contract HY/2009/08 |
| WDO | Billing Account for Disposal of Construction Waste | 7009328 | 08/09/2009 | N/A | CSHK | Waste disposal in Contract HY/2008/09 |
| | | 7010320 | 02/03/2010 | N/A | GCL | Waste disposal in Contract HY/2009/08 |
| NCO | Construction Noise Permit | GW-RN0029-13 | 21/01/2013 | 20/07/2013 | CSHK | TB1&2 Construction |
| | | GW-RN0122-13 | 04/03/2013 | 17/08/2013 | CSHK | Routine Road Maintenance |
| | | GW-RN0226-13 | 24/04/2013 | 23/10/2013 | CSHK | Construction of W4 - NLKRB South Abutment |
| | | GW-RN0246-13 | 03/05/2013 | 28/09/2013 | CSHK | Road Pavement at Slip Road from Tolo Highway to Tai Po Road-Yuen Chau Tsai |
| | | GW-RN0328-13 | 18/06/2013 | 31/07/2013 | CSHK | Road Paving Works & Road Marking Alternation at Tolo Highway near Island House Interchange |

| Statutory Reference | License/ Permit | License or Permit No. | Valid Period | | License/ Permit Holder | Remarks |
|---------------------|-----------------|-----------------------|--------------|------------|------------------------|--|
| | | | From | To | | |
| | | GW-RN0329-13 | 18/06/2013 | 31/07/2013 | CSHK | Sign Gantry Demolition |
| | | GW-RN0332-13 | 25/06/2013 | 07/08/2013 | CSHK | Modification of Sign Gantry near Shatin Section (G12 & G72) |
| | | GW-RN0352-13 | 01/07/2013 | 31/08/2013 | CSHK | Carrying out construction works within MTRC's tracks protection zone |
| | | GW-RN0365-13 | 07/07/2013 | 11/08/2013 | CSHK | Road Marking Alternation at Tolo Highway near Ma Wo – Stage 8B(Joint operation with Contract HY/2009/08) |
| | | GW-RN0372-13 | 03/07/2013 | 31/07/2013 | CSHK | Tree Felling at Tai Po Road - Yuen Chau Tsai |
| | | GW-RN0375-13 | 09/07/2013 | 17/09/2013 | CSHK | Erection of Columns of Sign Gantry & Noise Barrier between Shan Tong Road and Ma Wo |
| | | GW-RN0377-13 | 09/07/2013 | 17/09/2013 | CSHK | Modification of Sign Gantry_G13, G14, 15, 16, 17, 65, 66, 67 68 & 70 |
| | | GW-RN0384-13 | 14/07/2013 | 25/08/2013 | CSHK | Road Marking Alternation at south bound of Tolo Highway near Ma Wo |
| | | GW-RN0388-13 | 27/07/2013 | 06/10/2013 | CSHK | Modification of Sign Gantry_G11, 73, 74, 75 & 76 |
| | | GW-RN0393-13 | 16/07/2013 | 20/08/2013 | CSHK | Stitching Works on Bridge 11 |
| | | GW-RN0417-13 | 21/07/2013 | 17/01/2014 | CSHK | Construction works at Island House Interchange |
| | | GW-RN0422-13 | 29/07/2013 | 31/12/2013 | CSHK | Road Paving on Tolo Highway at Island House Interchange |
| | | GW-RN0425-13 | 29/07/2013 | 28/09/2013 | CSHK | Installation of Noise Barrier on Tolo Highway at Island House Interchange |
| | | GW-RN0056-13 | 29/01/2013 | 24/07/2013 | GCL | Tolo Highway Northbound (CH 18.39 - 19.1) |

| Statutory Reference | License/ Permit | License or Permit No. | Valid Period | | License/ Permit Holder | Remarks |
|---------------------|-----------------|-----------------------|--------------|------------|------------------------|--|
| | | | From | To | | |
| | | GW-RN0091-13 | 27/02/2013 | 27/08/2013 | GCL | Tolo Highway and Fanling Highway near Tai Po Tai Wo Road, Lam Kam Interchange & Tai Wo Service Road West |
| | | GW-RN0139-13 | 19/03/2013 | 24/08/2013 | GCL | Dismantling of Overhead Falsework at NLKP6 and NLKP7 |
| | | GW-RN0192-13 | 02/04/2013 | 20/08/2013 | GCL | Tolo Highway Northbound near Lam Kam Interchange |
| | | GW-RN0194-13 | 03/04/2013 | 02/10/2013 | GCL | Near Lam Kam Interchange Supersede CNP GW-RN0064-13 |
| | | GW-RN0235-13 | 19/04/2013 | 16/10/2013 | GCL | Tolo Highway Northbound near Buddhist Tai Kwong Middle School and Shek Lin Road |
| | | GW-RN0250-13 | 30/04/2013 | 26/10/2013 | GCL | Tolo Highway Southbound near Parc Versailles |
| | | GW-RN0284-13 | 15/05/2013 | 02/11/2013 | GCL | Construction of B15A |
| | | GW-RN0268-13 | 12/05/2013 | 09/07/2013 | GCL | Tolo Highway South Bound CH19.8 to CH 18.7 |
| | | GW-RN0260-13 | 08/05/2013 | 25/10/2013 | GCL | Slip Road from Tolo Highway North Bound to Tai Po Tai Wo Road |
| | | GW-RN0259-13 | 14/05/2013 | 13/07/2013 | GCL | Dismantling of Overhead Falsework from NLKP8 NLKP10 |
| | | GW-RN0298-13 | 09/06/2013 | 22/07/2013 | GCL | Road Diversion at Tolo Highway North and South Bound CH18.7 to 19.8 |
| | | GW-RN0309-13 | 27/06/2013 | 26/12/2013 | GCL | Tai Po Tai Wo Road Uphill Northbound |
| | | GW-RN0348-13 | 30/06/2013 | 26/08/2013 | GCL | Tolo Highway between Dynasty View and Tai Po Tai Wo Road |
| | | GW-RN0350-13 | 28/06/2013 | 31/08/2013 | GCL | South bound near Tai Po Garden |

| Statutory Reference | License/ Permit | License or Permit No. | Valid Period | | License/ Permit Holder | Remarks |
|---------------------|-----------------|-----------------------|--------------|------------|------------------------|--|
| | | | From | To | | |
| | | GW-RN0351-13 | 30/06/2013 | 08/09/2013 | GCL | Tolo Highway near Ma Wo Village |
| | | GW-RN0358-13 | 29/06/2013 | 31/08/2013 | GCL | North bound near Tai Po Garden |
| | | GW-RN0360-13 | 03/07/2013 | 27/09/2013 | GCL | Renewal of GW-RN0237-13 Dismantling at Tai Po Tai Wo Road Uphill |
| | | GW-RN0362-13 | 16/07/2013 | 29/10/2013 | GCL | Renewal of GW-RN0259-13 Dismantling of Overhead Falsework between NLKP8 and NLKP10 |
| | | GW-RN0367-13 | 07/07/2013 | 12/08/2013 | GCL | Tolo Highway Northbound from CH17.95 to 18.3B near Dynasty View |
| | | GW-RN0391-13 | 14/07/2013 | 16/09/2013 | GCL | Lane Shifting at Tolo Highway Northbound for tie-in with NLKRF |
| | | GW-RN0398-13 | 12/07/2013 | 26/09/2013 | GCL | Steel Portal Dismantle at Tai Po Tai Wo Road Uphill |
| | | GW-RN0404-13 | 16/07/2013 | 20/08/2013 | GCL | Stitching construction for B12B near CH19.25 |
| | | GW-RN0405-13 | 25/07/2013 | 24/01/2014 | GCL | Northbound near CH.18.39 - 19.1 near Shek Link Road |

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 Environmental 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 For construction noise, no Action and Limit Level exceedance 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 There was no complaint followed up by Environmental Team in the reporting period.
- 4.6.3 No new complaint, notification of summons and prosecution was received in the reporting period.
- 4.6.4 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 August 2013 will be:-

- Temporary shoring, sheetpiling and excavation
- Installation of soil nails
- At-grade road construction
- Widening and demolition of central dividers
- Retaining wall construction
- Noise barrier footing construction
- Noise barrier panels installation
- Asphalt laying
- Installation of drainage pipes
- Modification of edge coping

5.1.2 The major construction works for Contract 2 in August 2013 will be:-

- Condition survey of existing structures
- Initial and record survey
- Survey Setting out works for slopes and structures
- Setting up the temporary traffic arrangement
- Excavation of trial trenches to locate existing utilities
- Construction of haul road
- Extension of box culvert and subway
- Structural works of bridges
- Construction of Pilecap / Spread footing of Noise Barrier / Semi Noise Enclosure
- Slope works, including installation of soil nails
- NTHA mitigation works
- Construction of retaining wall and associated mini-piles
- Noise barrier construction
- Modification / Demolition of existing bridge structures
- Entrusted watermains works
- Sewer Installation
- Road and drainage works
- Landscaping works

5.2 Key Issues for the Coming Month

5.2.1 Key issues to be considered in August 2013:-

- Properly store and label oils and chemicals on site;
- Chemical, chemical waste and waste management;
- Collection of construction waste should be carried out regularly;
- Site runoff should be properly collected and treated prior to discharge;
- Properly maintain all drainage facilities and wheel washing facilities on site;
- Exposed slopes should be covered up properly if no temporary work will be conducted;
- Suppress dust generated from excavation, breaking and drilling activities, haul road traffic and grout mixing process;
- 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
- Tree protective measures for all retained trees should be well maintained.

5.3 Monitoring Schedule for the Coming Month

5.3.1 The tentative schedule for environmental monitoring in August 2013 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 and 24-hour TSP monitoring results complied with the Action / Limit Levels in the reporting period.

6.1.4 No Action and Limit Level exceedance for construction noise was recorded at all monitoring stations in the reporting month.

6.1.5 Environmental site inspection was carried out 9 times in July 2013. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.

6.1.6 There was no complaint followed up by Environmental Team in the reporting month.

6.1.7 No new complaint, notification of summons and prosecution was received in the reporting period.

6.2 Recommendations

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

Air Quality Impact

- The soil stockpiles should be properly covered.

Construction Noise Impact

- Properly erect the temporary noise barriers in accordance with the Environmental Permit requirement.
- 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.

Water Quality Impact

- Preventive measures should be implemented to avoid the spread of mud trails on the public road.
- Silty effluent should be treated/desilted before discharged. Untreated effluent should be prevented from entering public drain channel.
- Proper drainage channels/bunds should be provided at the site boundaries to collect/intercept the surface run-off from works areas.
- Stagnant water accumulated within works area should be removed.

Chemical and Waste Management

- C&D materials and wastes, general refuse should be sorted properly and removed timely.
- All chemical containers and oil drums should be properly stored.
- All plants and vehicles on site should be properly maintained to prevent oil leakage.
- All drain holes of the drip trays utilized within works areas should be properly plugged to avoid any oil leakage.
- Oil stains on soil surface and empty chemical containers should be cleared and disposed of as chemical waste.
- Drip tray should be provided to prevent oil leakage.
- Only the recycling materials should be dumped into the appropriate recycling bins.

Landscape and Visual Impact

- All retained trees should be properly fenced off at the works area.
- Stockpile of construction materials should be put away from the retained trees.