

**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 February 2012**

[3/2012]

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

Version:	Rev. 0	Date: 7 March 2012
----------	--------	--------------------

**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.

AECOM Asia Co. Ltd.  
11/F, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong  
Tel: (852) 3105 8686 Fax: (852) 2317 7609 www.aecom.com

Our ref AFK/TK/bw/T264022/22.01/L-0102  
T 2828 5919  
E [terence.kong@mottmac.com.hk](mailto:terence.kong@mottmac.com.hk)  
Your ref

Hyder Consulting Limited  
47/F Hopewell Centre,  
183 Queen's Road East,  
Wanchai,  
Hong Kong.

9 March 2012  
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 February 2012 (Stage 1)**

We refer to the Monthly EM&A Report received on 6 and 9 March 2012 submitted by ET via email. Pursuant to EP Condition 3.3, I hereby verify the Monthly EM&A Report for February 2012 (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)

## TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	1
1 INTRODUCTION	3
1.1 Background	3
1.2 Scope of Report	4
1.3 Project Organization	4
1.4 Summary of Construction Works	5
1.5 Summary of EM&A Programme Requirements	5
2 AIR QUALITY MONITORING	6
2.1 Monitoring Requirements	6
2.2 Monitoring Equipment	6
2.3 Monitoring Locations	6
2.4 Monitoring Parameters, Frequency and Duration	6
2.5 Monitoring Methodology	7
2.6 Monitoring Schedule for the Reporting Month	8
2.7 Monitoring Results	9
2.8 Results and Observations	9
3 NOISE MONITORING	10
3.1 Monitoring Requirements	10
3.2 Monitoring Equipment	10
3.3 Monitoring Locations	10
3.4 Monitoring Parameters, Frequency and Duration	11
3.5 Monitoring Methodology	11
3.6 Monitoring Schedule for the Reporting Month	12
3.7 Monitoring Results	12
4 ENVIRONMENTAL SITE INSPECTION AND AUDIT	13
4.1 Site Inspection	13
4.2 Advice on the Solid and Liquid Waste Management Status	15
4.3 Environmental Licenses and Permits	15
4.4 Implementation Status of Environmental Mitigation Measures	16
4.5 Summary of Exceedances of the Environmental Quality Performance Limit	17
4.6 Summary of Complaints, Notification of Summons and Successful Prosecutions	17
5 FUTURE KEY ISSUES	18
5.1 Construction Programme for the Coming Months	18
5.2 Key Issues for the Coming Month	18
5.3 Monitoring Schedule for the Coming Month	18
6 CONCLUSIONS AND RECOMMENDATIONS	19
6.1 Conclusions	19
6.2 Recommendations	19

### List of Tables

Table 1.1	Contact Information of Key Personnel
Table 2.1	Air Quality Monitoring Equipment
Table 2.2	Locations of Impact Air Quality Monitoring Stations
Table 2.3	Air Quality Monitoring Parameters, Frequency and Duration
Table 2.4	Summary of 1-hour TSP Monitoring Results in the Reporting Period
Table 2.5	Summary of 24-hour TSP Monitoring Results in the Reporting Period
Table 3.1	Noise Monitoring Equipment
Table 3.2	Locations of Impact Noise Monitoring Stations
Table 3.3	Noise Monitoring Parameters, Frequency and Duration

Table 3.4	Summary of Construction Noise Monitoring Results in the Reporting Period
Table 4.1	Summary of Environmental Licensing and Permit Status

## Figures

Figure 1.1	General Project Layout Plan
Figure 2.1	EM&A Monitoring Locations
Figure 4.1	Environmental Complaint Handling Procedures

## List of Appendices

Appendix A	Project Organization Structure
Appendix B	Construction Programmes
Appendix C	Implementation Schedule of Environmental Mitigation Measures (EMIS)
Appendix D	Summary of Action and Limit Levels
Appendix E	Calibration Certificates of Monitoring Equipments
Appendix F	EM&A Monitoring Schedules
Appendix G	Impact Air Quality Monitoring Results and their Graphical Presentation
Appendix H	Meteorological Data for the Reporting Month
Appendix I	Impact Daytime Construction Noise Monitoring Results and their Graphical Presentation
Appendix J	Event Action Plan
Appendix K	Site Inspection Summaries
Appendix L	Statistics on Complaints, Notifications of Summons and Successful Prosecutions

## 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 29 February 2012. As informed by the Contract 1 Contractor (China State Construction Engineering (Hong Kong) Ltd.), construction activities in the reporting period were:-

- Site investigation;
- Temporary shoring, sheetpiling and excavation;
- Pre-bored H-piles construction;
- Pipe pile wall construction;
- Pile cap construction;
- Bridge construction;
- Tree felling & transplanted;
- At-grade road construction;
- Demolition of central dividers;
- Retaining wall construction;
- Slope works;
- Soil nails works;
- Noise barrier footing construction and panel installation;
- Road paving; and
- Drainage works.

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

- Condition survey of existing structures;
- Excavation of trial trenches to locate existing utilities;
- Ground investigation and predrilling;
- Construction of haul road;
- Extension of box culvert and subway;
- Piling and structural works of bridges;
- Construction of pilecap / spread footing of noise barrier / semi noise enclosure;
- Slope works, including installation of soil nails;
- Retaining wall construction;
- Noise barrier construction;
- Modification of existing bridge structures;
- Entrusted watermains works; 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**

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

There was one (1) noise related complaint followed up by Environmental Team in February 2012. Investigation was carried out. The findings and the proposed mitigation measures and follow-up site visit findings were submitted to all relevant parties. One (1) Action Level exceedance of construction noise was recorded in the reporting month. Summary of investigation is described in Section 4.6.2.

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

One (1) noise related complaint was followed up by Environmental Team in February 2012.

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, 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 Hong Kong Island 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 twenty-eighth 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 February 2012.

## 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
<b>ER of Stage 1, Contract 1</b>  (Hyder-Arup-Black & Veatch Joint Venture)	Chief Resident Engineer /TOLO1	James Tsang	9038 8797	26674000
<b>ER of Stage 1, Contract 2</b>  (Hyder-Arup-Black & Veatch Joint Venture)	Chief Resident Engineer /TOLO2	Paul Appleton	9097 5833	2653 2348
<b>IEC of Stage 1</b>  (Mott MacDonald Hong Kong Limited)	Independent Environmental Checker	Terence Kong	2828 5919	2827 1823
<b>Contractor of Stage 1, Contract 1</b>  (China State Construction Engineering (Hong Kong) Limited)	Site Agent	S.Y. Tse	9078 0458	2667 5666
	Environmental Officer	Michael Tsang	9277 4956	2667 5666
<b>Contractor of Stage 1, Contract 2</b>  (Gammon Construction Limited)	Site Agent	Edmond Chan	9483 8885	2559 3410
	Environmental Officer	Ir Thomson Chang	9213 6569	2559 3410
<b>ET of Stage 1</b>  (AECOM Asia Company Limited)	ET Leader	Y T Tang	3922 9393	2371 7609



#### **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:-

- Site investigation;
- Temporary shoring, sheetpiling and excavation;
- Pre-bored H-piles construction;
- Pipe pile wall construction;
- Pile cap construction;
- Bridge construction;
- Tree felling & transplantation;
- At-grade road construction;
- Demolition of central dividers;
- Retaining wall construction;
- Slope works;
- Soil nails works;
- Noise barrier footing construction and panel installation;
- Road paving; and
- Drainage works.

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;
- Excavation of trial trenches to locate existing utilities;
- Ground investigation and predrilling;
- Construction of haul road;
- Extension of box culvert and subway;
- Piling and structural works of bridges;
- Construction of pilecap / spread footing of noise barrier / semi noise enclosure;
- Slope works, including installation of soil nails;
- Retaining wall construction;
- Noise barrier construction;
- Modification of existing bridge structures;
- Entrusted watermains works; 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 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) 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 February 2012 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 ( $\mu\text{g}/\text{m}^3$ )
<b>AM1A</b>	75.7	70.2 – 80.6	302.1	500
<b>AM2</b>	74.1	68.6 – 79.2	301.9	500
<b>AM3</b>	75.7	71.1 – 79.0	301.9	500
<b>AM4A</b>	74.8	70.1 – 80.2	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>	25.0	14.2 – 35.8	176.6	260
<b>AM2</b>	28.3	16.2 – 40.7	178.6	260
<b>AM3</b>	25.4	15.9 – 34.0	193.1	260
<b>AM4A</b>	41.2	23.9 – 66.0	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 February 2012 from the Tai Mei Tuk Automatic Weather Station were missing, the weather data from Tai Po Automatic Weather Station in February 2012 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 2238 Rion NL-31
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 February 2012 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	60.4	55.1 – 62.5	75
NM2	66.3*	63.5 – 67.5*	75
NM3	64.6	64.5 – 64.7	65/70 <sup>#</sup>
NM4	64.6	61.5 – 65.7	75
NM5	63.5	62.4 – 64.3	75
NM6	59.6*	51.2 – 63.6*	70 <sup>#</sup>
NM7	60.7	58.0 – 64.4	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 No noise monitoring result exceeding the Limit Level was recorded at all monitoring stations in the reporting month.

3.7.3 There was one (1) noise related complaint followed up by Environmental Team in the reporting period. Investigation was carried out. The findings and the proposed mitigation measures were submitted to all relevant parties. One (1) Action Level exceedance of construction noise was recorded in the reporting month. Summary of investigation is described in Section 4.6.2.

3.7.4 Major noise sources during the noise monitoring included construction activities of Stage 1 of the Project and nearby traffic noise. In addition, for NM3 and NM6, general school activities are also a major noise source during the noise monitoring.

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, 10, 15, 22 and 29 February 2012 for Contract 1 of the Project, and 5 site inspections for Contract 2 of the Project were carried out on 2, 9, 16, 23 and 29 February 2012.

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 Exposed soil stockpile was observed stored up at S15. The Contractor was reminded to cover up the exposed soil stockpile with tarpaulin sheet to minimize the fugitive dust arising.

4.1.5 Cement was observed on the ground at W8. The Contractor was reminded to clear it up or spray water on the cement.

#### ***Noise***

4.1.6 No adverse observation was identified in the reporting month.

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

4.1.7 No adverse observation was identified in the reporting month.

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

4.1.8 No adverse observation was identified in the reporting month.

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

4.1.9 No adverse observation was identified in the reporting month.

#### ***Miscellaneous***

4.1.10 No adverse observation was identified in the reporting month.

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

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

4.1.12 Mud trails were found on ground at the exit point near NLKP 9. The Contractor was reminded to clear up the mud trails and provide measure to ensure the vehicles bodies and wheels were kept clean of deposited silt before leaving the site.

4.1.13 Dusty construction material was found placed on ground at W65b. The Contractor was reminded to remove the dusty construction material to avoid fugitive dust spreading.

4.1.14 Exposed slope near Bridge 15 AP4 was incompletely covered with tarpaulin sheet. The Contractor was reminded to cover up the exposed slope with tarpaulin sheet completely or provide shotcreting to prevent generation of silty surface run-off.

- 4.1.15 The Contractor was reminded to provide regular water spraying or tarpaulin sheet coverage to the exposed soil surfaces/slopes at NB42 to minimize dust impacts. (Reminder)

**Noise**

- 4.1.16 Sound insulation material wrapping at the breaking tip at W65b should be improved. The Contractor was advised to completely wrap the breaking tip of the breaker with sound insulation materials.

**Water Quality**

- 4.1.17 Desilting facility near Bridge 15 AP4 should be improved. The Contractor was recommended to install additional inlet pipe to the sedimentation tank for the wastewater collection from the desilting pit to prevent overflowing of untreated water from the desilting pit in coming wet season.
- 4.1.18 Mud and silt accumulated inside the u-channel and mud trails were observed on ground at Bridge 15 AP4. The Contractor was recommended to clear the mud and silt inside the u-channel and provide sufficient sand bags/bundings to intercept the muddy surface run-off before discharge. Mud trail on ground should be cleared and regularly review the drainage system to ensure the drainage system is properly maintained.
- 4.1.19 Substandard wastewater was found discharging at W51. The Contractor was recommended to clear the deposited silt regularly and provide additional sand bags around the sump pit to prevent overflowing of untreated water. Regular review and monitoring on the drainage system should be carried out to ensure the drainage system is properly maintained.

**Chemical and Waste Management**

- 4.1.20 Oil stains were observed on the ground at NLKP 7. The Contractor was reminded to clear the oil stains.
- 4.1.21 Two chemical containers were placed on ground without drip tray at W38. The Contractor was reminded to provide drip tray to the chemical containers on site.
- 4.1.22 Vegetation wastes were found accumulated along the site boundary at W56. The Contractor was reminded to clear up the vegetation wastes to keep the site in a tidy condition.

**Landscape and Visual Impact**

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

**Miscellaneous**

- 4.1.24 Stagnant water with silt and weeds were observed inside the u-channel at S34. The Contractor was reminded to remove the stagnant water with silt and weeds inside the drainage channel to maintain the drainage system properly. Also, sand bags should be provided to intercept the silt to prevent muddy water discharge to the public drainage.

#### 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), 34m<sup>3</sup> of inert C&D material was disposed as public fill to Tuen Mun 38, while 111m<sup>3</sup> of general refuse was disposed at NENT landfill. 132kg of paper/cardboard packaging was collected by recycling contractor in the reporting month. 4,748m<sup>3</sup> and 4,730m<sup>3</sup> of inert C&D materials were reused on site and reused in NENT for backfilling purpose respectively. No chemical waste was collected by licensed contractor in the reporting period.
- 4.2.3 As advised by the Contract 2 Contractor (GCL), 305m<sup>3</sup> of inert C&D material were disposed to Tuen Mun 38 and 240m<sup>3</sup> general refuse was disposed to NENT landfill 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	23/12/2008	30/01/2012 (Superseded by EP-324/2008/A with effect from 31/01/2012)	HyD	Tolo Highway/Fanling Highway between Island House Interchange and Ma Wo
		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-RN0361-11	1/10/2011	11/3/2012	CSHK	NB16 Construction
		GW-RN0391-11	21/10/2011	20/4/2012	CSHK	Construction of W4-7 & LKB
		GW-RN0466-11	30/11/2011	19/5/2012	CSHK	Installation of Noise Panel from W8 to W10
		GW-RN0493-11	15/12/2011	14/6/2012	CSHK	Loading & Unloading Along Tolo Highway
		GW-RN0525-11	30/12/2011	15/6/2012	CSHK	Road Marking Alternation near Ma Wo & W10
		GW-RN0028-12	15/1/2012	14/7/2012	CSHK	TB1&2 Construction
		GW-RN0049-12	1/2/2012	31/7/2012	CSHK	Routine Road Maintenance
		GW-RN0050-12	13/2/2012	12/5/2012	CSHK	Construction of TB1 & TB2 - Nighttime Work
		GW-RN0055-12	5/2/2012	15/7/2012	CSHK	Modification of Sign Gantries along Tolo Highway
		GW-RN0083-12	21/2/2012	31/3/2012	CSHK	Yuen Shin Road road resurfacing
		GW-RN0021-12	13/01/2012	21/04/2012	GCL	Erection of Overhead Falsework between Piers 6 and 7 of New Lam Kam Flyover
GW-RN0086-12	29/02/2012	28/08/2012	GCL	Entire site		

#### 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 one (1) noise related complaint followed up by Environmental Team in February 2012.

EPD refer a complaint about construction noise was generated from the construction site of Widening of Tolo Highway near Ma Wo Tsuen on 22 February 2012 starting from 8:30a.m. As informed by the Contractor (Gammon Construction Ltd) and confirmed by the Engineer of the Project, excavation of base at retaining wall W56 and fixing rebar of base slab at bay 11 at retaining wall W38 were being carried out on 22 February 2012. The Contractor was reminded to carry out mitigation measures, including informing the nearby residents in advance for any noisy works to be carried out in the morning; erecting temporary noise barriers fitted with noise absorbing materials at W56 and other noisy construction works areas near Ma Wo Tsuen in the future; and regularly review the adequacy and effectiveness of noise mitigation measure. Erection of temporary noise barrier at W56 was implemented by the Contractor to minimize the noise impact from the works area on 7 March 2012.

- 4.6.3 No 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 March 2012 will be:-

- Temporary shoring, sheetpiling and excavation;
- Pre-bored H-piles construction;
- Pipe pile wall construction;
- Pile cap construction;
- Bridge construction;
- Tree felling & transplanted;
- Soil nails works;
- Slope works;
- At-grade road construction;
- Demolition of central dividers;
- Retaining wall construction;
- Noise barrier footing construction and panel Installation;
- Installation of soil nails;
- Road paving; and
- Drainage works.

5.1.2 The major construction works for Contract 2 in March 2012 will be:-

- Condition survey of existing structures;
- Excavation of trial trenches to locate existing utilities;
- Ground investigation and predrilling;
- Construction of haul road;
- Extension of box culvert and subway;
- Piling and structural works of bridges;
- Construction of pilecap / spread footing of noise barrier / semi noise enclosure;
- Slope works, including installation of soil nails;
- Retaining wall construction;
- Noise barrier construction;
- Modification of existing bridge structures;
- Entrusted watermains works; and
- Sewer Installation.

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

5.2.1 Key issues to be considered in March 2012:-

- 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 March 2012 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 Limit Level exceedance for construction noise was recorded at all monitoring stations in the reporting month.
- 6.1.5 There was one (1) noise related complaint followed up by Environmental Team in the reporting period. Investigation was carried out. The findings and the proposed mitigation measures were submitted to all relevant parties. One (1) Action Level exceedance of construction noise was recorded in the reporting month.
- 6.1.6 Environmental site inspection was carried out 10 times in February 2012. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.
- 6.1.7 There was one (1) noise related complaint followed up by Environmental Team in February 2012.
- 6.1.8 No 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***

- 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.
- 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.
- Noise Emission Label (NEL) shall be affixed to the air compressor and hand-held breaker operating within works area.
- Better scheduling of construction works to minimize noise nuisance.

***Water Quality Impact***

- Silt, debris and leaves accumulated at public drains, wheel washing bays and perimeter u-channels and desilting facilities should be cleaned up regularly.
- 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.
- Exposed slopes and stockpiles should be covered up properly during rainstorm.
- 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.

***Landscape and Visual Impact***

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