

Highways Department

**Agreement No. HMW
5/2009 (EP) Traffic
Improvements to Tuen
Mun Road Town Centre
Section**

Monthly Environmental
Monitoring and Audit
Report - May 2014

Final

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Highways Department

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June 2014

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Job number 211710

Job title	Agreement No. HMW 5/2009 (EP) Traffic Improvements to Tuen Mun Road Town Centre Section	Job number	211710
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Document title	Monthly Environmental Monitoring and Audit Report - May 2014	File reference	
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Document ref

Revision	Date	Filename	Monthly EM&A 2014 May v1		
1	13/06/2014	Description	First Revision		
			Prepared by	Checked by	Approved by
		Name	King Chan	Coleman Ng	Coleman Ng
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document

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Executive Summary

This is the forty-sixth monthly Environmental Monitoring and Audit (EM&A) report prepared by Ove Arup & Partners Hong Kong Limited (Arup), the designated Environmental Team (ET), for the Project “Traffic Improvement to Tuen Mun Road Town Centre Section”. This report presents the results of EM&A works conducted in the month of May 2014 (1 to 31 May 2014).

In the reporting month, the following activities took place for the Project:

- Road resurfacing.

Monitoring of 24-hour Total Suspended Particulates (TSP) and noise during non-restricted hours was performed and the results were checked and reviewed. Site audits were conducted on weekly basis. The implementation of the environmental mitigation measures, Event and Action Plans were checked.

Impact monitoring was carried out at 6 air quality sensitive receiver (SR) and 6 noise SRs during the reporting month.

Environmental Monitoring Works – Breaches of Action and Limit Levels

Air Quality

All measured 24-hour TSP concentrations in the reporting month were below the Action and Limit (AL) Levels.

Noise

No environmental complaints regarding construction noise was recorded in the reporting month.

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

Construction works were carried out during the restricted hours, the conditions stipulated in CNPs of related construction works were strictly followed by the Contractor. No non-compliance was recorded.

Landscape and Visual Audit

In the reporting month, landscape and visual site audit in accordance with the requirements stipulated in the EIA report was conducted on 8 and 22 May 2014.

In the reporting month, total 521 trees were felled and the pruning of the transplanted trees was carried out in accordance with the Specification for Tree Protection and Transplanting Works in Landscape Plan. The updated statuses of the felled and transplanted trees during the reporting month are described in Section 5.

The implementation and maintenance of landscape and visual mitigation measures, listed in EIA report, were checked during the site audit. No substantial change of LR, LCA and VSR was noted. No non-compliance has been triggered during the reporting month.

Waste Disposal

Inert C&D materials with actual amount of 340 m³ were generated, of which 340 m³ are disposed of at public fills at Tuen Mun Area 38 in the reporting month. 34 m³ general refuse were generated and disposed of at WENT landfill in the reporting month.

Environmental Licensing and Permitting

Permits or licenses granted to the Project included the Environmental Permit of the Project (EP-342/2009/C), Chemical Waste Producer Registration (5213-324-G3597-01) and Construction Waste Billing Account (7010350);

4 number of Construction Noise Permits and 2 numbers of Wastewater Discharge License under WPCO (WT00007251-2010 and WT00008195-2011).

Environmental Auditing

A total of 5 environmental site audits were conducted on a weekly basis in the reporting month. No non-conformance to the environmental requirements was identified during the reporting month.

Complaint Log

No environmental complaints was recorded in the reporting month.

Notifications of Summons and Successful Prosecutions

No summonses or prosecution related to the environmental issues were made against the Project in the reporting month.

Reporting Changes

There were no reporting changes in the reporting month.

Future Key Issues

Construction noise is one of the key environmental issues. The implemented construction noise mitigation measures should also be maintained and improved as necessary. Especially in restricted hours, the conditions stipulated in CNPs should be strictly followed when the construction works were carried out during the restricted hours.

Construction dust is another key environmental issue. The implemented construction dust mitigation measures should also be maintained and improved as necessary. Furthermore, water quality impact is also key environmental issue. As rainy season has approached, special attention should be paid to avoid any muddy surface runoff from exposed soil surface during rainy days. The effective and efficiency mitigation measures should be strictly implemented and improved if necessary.

1 Environmental Status

1.1 Project Background

Ove Arup & Partners Hong Kong Limited (Arup) was appointed by Highways Department (HyD) as the Environmental Team (ET) for *Agreement No. CE22/2005 (HY) Supplementary Agreement 1 Traffic Improvements to Tuen Mun Road Town Centre Section* (the Project) under Agreement No. HMW 5/2009 (EP) Traffic Improvements to Tuen Mun Road Town Centre Section. Environmental parameters including air quality, noise and landscape and visual are required for baseline monitoring prior to the commencement of the Project. The Project was commenced on August 2010 and substantial completed at 19 Feb 2014.

The Project involves widening the following sections of TMR from dual-two carriageway to dual-three carriageway:

- Wong Chu Road Section, (from Wong Chu Road Interchange to Tuen Hing Road);
- Tuen Mun Town Plaza Section, (from Yan Oi Town Square to Tuen Hing Road).

The Project is a designated project under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance (Cap. 499). Environmental Monitoring and Audit (EM&A) work is required in accordance with the conditions stipulated in the Environmental Permit (EP) (EP-342/2009/C) and the EM&A Manual of the Project.

1.2 Construction Programme

An up-to-date rolling construction programme is attached in **Appendix A**.

1.3 Work Undertaken During the Reporting Month

The major construction activities carried out by the Contractor in the reporting month are summarized in **Table 1.1**. Location of the works area is indicated in **Figure 1.1**. The structure of the project organisation in relation to the environmental management is shown in **Figure 1.2**. Contacts of key environmental staff of the Project and are shown in **Table 1.2**.

Table 1.1 Construction activities in the reporting month

Locations	Major Works Undertaken
All area	Road resurfacing

Figure 1.1 Site plan of the Project

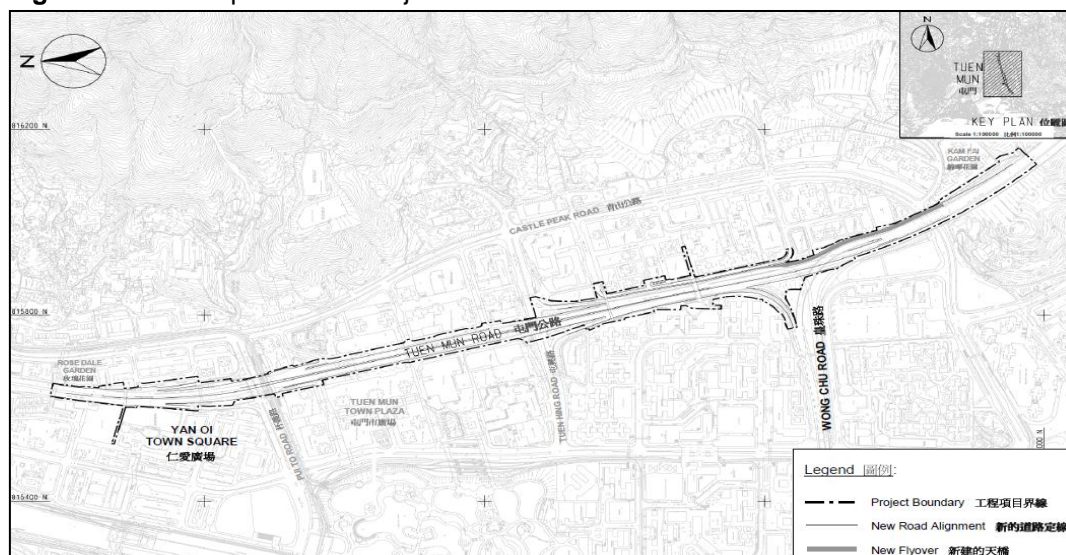


Figure 1.2 Project Organization – Environmental Management

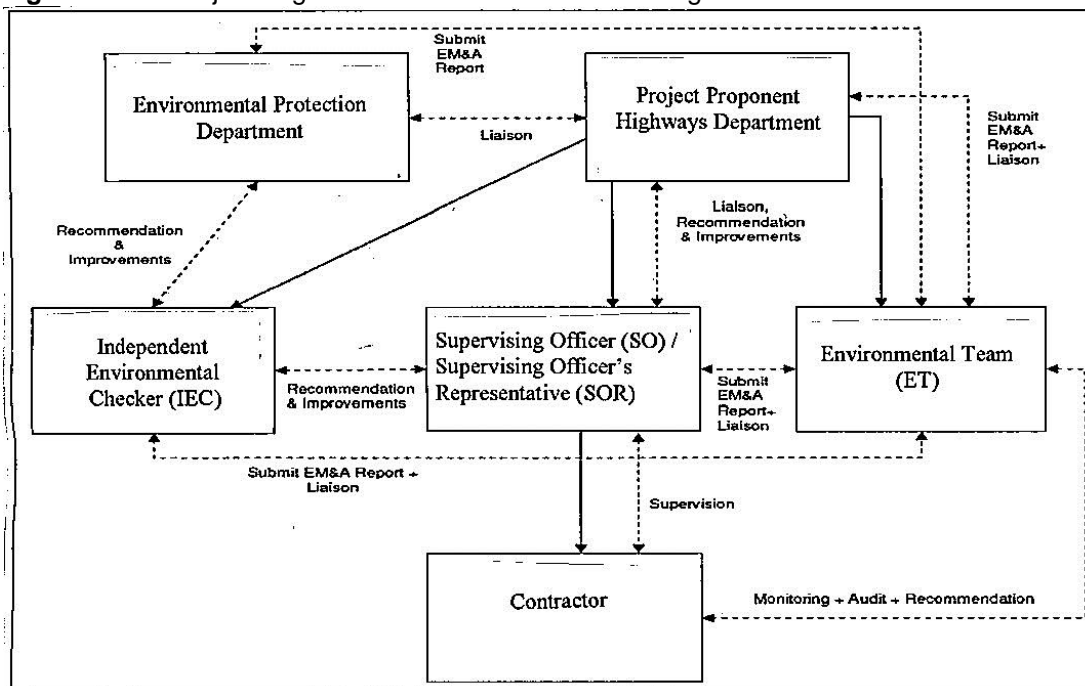


Table 1.2 Contacts of key environmental staff

Organization	Name	Telephone
Environmental Protection Department		
Environmental Protection Officer (Strategic Assessment)22	Thomas To	2835 1103
Project Proponent		
Highways Department: Senior Engineer	Peter Law	2762 3539
Supervising Officer / Supervising Officer's Representative		
AECOM Asia Co. Ltd.: Chief Resident Engineer	Patrick Lee	2969 9200
Independent Environmental Checker		
ENVIRON Hong Kong Limited: Independent Environmental Checker	David Yeung	3465 2818
Environmental Team		
Ove Arup & Partners Hong Kong Ltd: Environmental Team Leader	Coleman Ng	2268 3097
Contractor		
China Harbour Engineering Company Limited		
Site Agent	W.S. Ng	2403 0529
Environmental Officer	Marko Chan	2403 0527

1.4 Project Area, Sensitive Receivers and Environmental Monitoring locations

The Project area is shown in **Figure 1.1**, while **Table 1.3** and **Figure1.3** show the names and locations of the sensitive receivers and monitoring stations.

Table 1.3 Summary of air and noise monitoring stations

ID	Premise
Air	

ID	Premise
AM1	Chung Sing Benevolent Society Mrs. Aw Boon Haw Secondary School
AM2	Tung Wah Group of Hospitals Tai Tung Pui Social Service Building
AM3	Shun Tak Fraternal Association Wu Siu Kui Memorial Primary School
AM4	The Chinese Manufacturers' Association Of Hong Kong Choi Cheung Kok Secondary School
AM5	Tuen Mun Town Hall
AM6	Yan Oi Tong Jockey Club Community and Sports Centre
Noise	
N1	Kam Fai Garden
N2	Tung Wah Group of Hospitals Tai Tung Pui Social Service Building
N3	Po Leung Kuk The Hong Kong Taoist Association Yuen Yuen Primary School
N4	Shun Tak Fraternal Association Wu Siu Kui Memorial Primary School
N5	Tuen King Building
N6	The Chinese Manufacturers' Association Of Hong Kong Choi Cheung Kok Secondary School

1.5 Impact Monitoring Schedule

Environmental monitoring and audit will be carried out in accordance with the requirements stipulated in the EM&A manual. Air, noise, landscape and visual monitoring as well as weekly site audit schedule for the reporting month with respect to the construction programme is shown in **Appendix B**.

1.6 Status of Environmental Licensing and Permitting

All permits/licences inspected in the reporting month are summarised in **Table 1.4**. They are all properly kept by the contractor at their site office.

Table 1.4 Summary of environmental licensing status

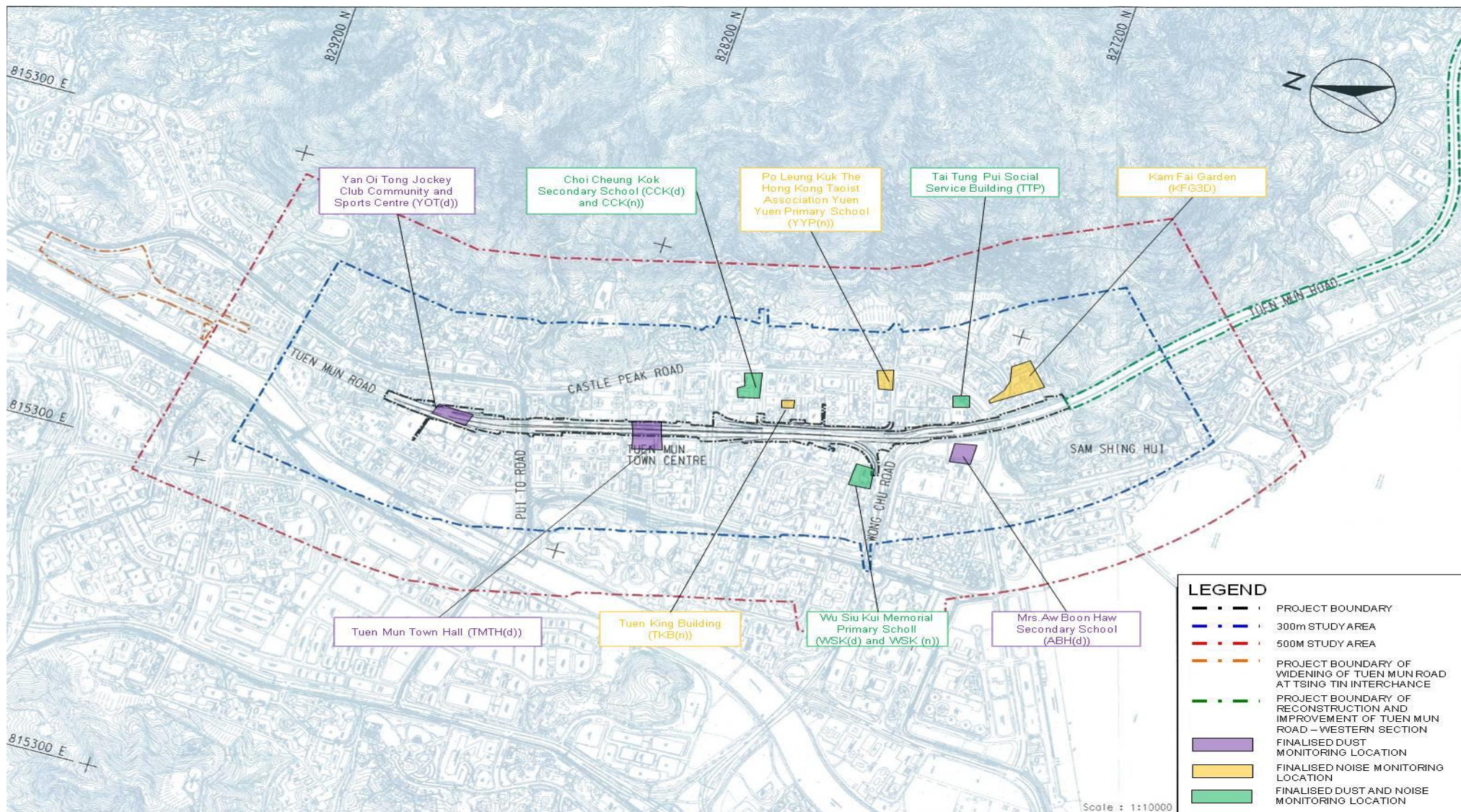
Types of Permits / Licenses	Reference No.	Valid from	Valid to
Environmental Permit	EP-342/2009	15 May 09	Superseded
	EP-342/2009/A	27 Oct 09	Superseded
	EP-342/2009/B	14 Feb 11	Superseded
	EP-342/2009/C	29 Feb 12	N.A.
Discharge License under WPCO	WT00007251-2010	12 Aug 10	31 Aug 15
	WT00008195-2011	06 Jan 11	30 Sep 15
Notification of Construction Work under APCO	Ref.: 314528	25 Feb 10	N/A
Construction Noise Permit	GW-RW0339-14	15 Jun 14	17 Aug 14
	GW-RW0409-14	03 Jun 14	02 Aug 14
	GW-RW0416-14	03 Jun 14	02 Aug 14
	GW-RW0422-14	15 Jun 14	17 Aug 14
Chemical Waste Producer Registration	5213-424-C3597-01	26 Mar 10	N/A
Construction Waste Billing	7010350	25 Mar 10	N/A

Account			
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1.7 Purpose of the Report

The purpose of the monthly EM&A report is to provide the information on monitoring methodology, monitoring results, environmental permit status, site audit findings, recommendations and conclusions for the scope of impact EM&A. This is the forty-sixth monthly EM&A report summarising the monitoring methodology, locations, periods, frequencies, results and any observation from the air quality, noise, water quality, ecology, waste management, landscape and visual monitoring and environmental site audit from 1 to 31 May 2014.

Figure 1.3 Location of air and noise monitoring stations



2 Implementation Status

2.1 Implementation Status of Mitigation Measures

During weekly site inspections, the environmental protection, and pollution control/mitigation measures in accordance with the requirements stipulated in the EIA were observed. **Table 2.1** summarises the key observations and ET's corresponding recommendations while the Contractor's response and follow-up status are described in Section 7.1.

Table 2.1 Summary of the key observations and ET's recommendations

Location	Key Observations and Recommendations
Waste Management Mitigation Measures	
Siu On Footbridge	The Contractor is reminded to remove the stagnant water in the drip tray.

2.2 Updated Implementation Schedule

According to the Environmental Permit, the mitigation measures detailed in the permits are required to be implemented. The Implementation Schedule of Mitigation Measures was inspected during the weekly site inspections in reporting month. The details of the findings/observations are described in Section 7.1. An updated summary of the Implementation Schedule of Mitigation Measures is presented in **Appendix C**.

3 Air Monitoring

3.1 Air Monitoring Requirements

Monitoring Parameters

Air quality monitoring shall be measured in terms of the TSP levels for 1-hour and 24-hour period.

Monitoring Frequency

24-hour TSP levels shall be monitored during the construction stage while 1-hour TSP levels shall be required to monitor in case of complaints received. The monitoring parameters and frequency are summarised in **Table 3.1**.

Table 3.1 TSP monitoring parameters and frequency

Parameters	Monitoring Frequency
24-hour TSP	Once every 6 days
1-hour TSP	3 times every 6 days (as required in case of complaints)

Monitoring Locations

In accordance with the EM&A Manual and the subsequent Baseline Report, six air quality monitoring locations during construction stage are required, namely:

- (i) Chung Sing Benevolent Society Mrs. Aw Boon Haw Secondary School (AM1);
- (ii) Tung Wah Group of Hospitals Tai Tung Pui Social Service Building (AM2);
- (iii) Shun Tak Fraternal Association Wu Siu Kui Memorial Primary School (AM3);
- (iv) The Chinese Manufacturers' Association Of Hong Kong Choi Cheung Kok Secondary School (AM4);
- (v) Tuen Mun Town Hall (AM5); and
- (vi) Yan Oi Tong Jockey Club Community and Sports Centre (AM6).

Wind Monitoring

Wind monitoring data including wind speed and wind directions shall be collected from Hong Kong Observatory – Tuen Mun Monitoring Station.

Environmental /Quality Performance Limits

The monitoring results will be checked against the Action and Limit levels described in the Baseline Report, of which they are excerpted and summarised in **Tables 3.2 and 3.3**.

Table 3.2 Action and Limit Level for air quality monitoring of 1-hour TSP level

Level	Air Monitoring Stations					
	AM1	AM2	AM3	AM4	AM5	AM6
Action Level, $\mu\text{g}/\text{m}^3$	290	291	287	292	286	290
Limit Level, $\mu\text{g}/\text{m}^3$	500					

Notes:

1-hr TSP monitoring would be required in case of receiving complaints.

Table 3.3 Action and Limit Level for air quality monitoring of 24-hour TSP level

Level	Air Monitoring Stations ^(Note 1)					
	AM1	AM2	AM3	AM4	AM5	AM6
Action Level, $\mu\text{g}/\text{m}^3$	146	151	150	150	146	147
Limit Level, $\mu\text{g}/\text{m}^3$	260					

3.2 Air Monitoring Methodology

3.2.1 Monitoring Equipment

High Volume Sampler (HVS) was used to monitor the 24-hour TSP. **Table 3.4** shows the equipment used for the air quality monitoring.

Table 3.4 Air quality equipment list for impact air quality monitoring

Equipment	Manufacturer & Model No	Measurement Parameter	Quantity	Serial No.
High Volume Sampler	GS-2310105 / TE-5170	24-hour TSP	6	521, 522, 505, 1278, 516 & 510
Fibreglass Filter	G810		6 per sampling date	-
HVS Calibration Kit	GMW-2535		1	1378

3.2.2 Maintenance and Calibration

The HVSs and their accessories were frequently checked and maintained in accordance with the manufacturer's operation and maintenance manual. The maintenance included checking of supporting screen and gasket, as well as routine replacement of motor carbon brushes for the blower motor. The power cords and power supply were checked each time before sampling to ensure proper operation.

The HVSs were calibrated at 2-month intervals using GMW-2535 calibration kit which is re-calibrated by the manufacturer after one year of use. The calibration spreadsheets of the HVS and calibration certificate of the calibration kit are provided in **Appendix D**.

3.2.3 Monitoring Procedures

Specifications of the HVS are as follows:

- 0.6 – 1.7 m³/min (20 – 60SCFM);
- Equipped with a timing/control device with +/- 5 minutes accuracy for 24 hour operation;
- Installed with elapsed time meter with +/- 2 minutes accuracy for 24 hour operation;
- Capable of providing a minimum exposed area of 406 cm² (63in²);
- Flow control accuracy: +/-2.5% deviation over 24-hour sampling period;
- Equipped with a shelter to protect the filter and sampler;
- Incorporated with an electronic mass flow rate controller or other equivalent devices;
- Equipped with a flow recorder for continuous monitoring;
- Provided with a peaked roof inlet;
- Incorporated with a manometer;
- Able to hold and seal the filter paper to the sampler housing at horizontal position;
- Easy to change the filter; and
- Capable of operating continuously for 24-hour period.

The HVSs were equipped with an electronic mass flow controller and calibrated against a traceable standard at regular intervals. All equipment, calibration kit and filter papers were clearly labelled.

The relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and other special phenomena observed and work progress of the concerned site were recorded.

A HOKLAS accredited laboratory (ALS Technichem (HK) Pty Ltd (HOKLAS no.: 066)), in accordance with their standard QA/QC procedures, with constant temperature and humidity control as well as equipped with necessary measuring and conditioning instruments to handle the 24-hour TSP samples was employed for sample analysis, and equipment calibration and maintenance. Filter papers of size 8"x10" were labelled before sampling. They were inspected clean with no pin holes and conditioned in a humidity controlled chamber for over 24-hour and be pre-weighed before use for the sampling.

The 24-hour TSP levels were measured by following the standard High Volume Method for Total Suspended Particulates as set out in the *Title 40 of the United States Code of Federal Regulations, Chapter 1 (Part 50), Appendix B*. TSP was sampled by drawing air through a conditioned, pre-weighted filter paper inside the HVS at a controlled air flow rate. After 24-hour sampling, the filter papers loaded with dust were kept in a clean and tightly sealed plastic bag, and then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg. All the collected samples shall be kept in a good condition for 6 months before disposal.

3.3 Monitoring Results and Observations

3.3.1 Weather Condition

No adverse weather conditions were recorded during the monitoring dates.

3.3.2 Air Quality Monitoring Results

Monitoring of 24-hour TSP was conducted on 2, 8, 14, 20, 26 and 30 May 2014. All monitoring data and graphical presentation of the monitoring results are provided in **Appendix E** and are summarised in **Table 3.5**. The graphical presentations of the monitoring results are provided in **Appendix E**. Wind data obtained from the Hong Kong Observatory – Tuen Mun station during the reporting period is presented in **Appendix F**.

Table 3.5 Summary of impact air quality monitoring results for reporting month

	Location					
	AM1	AM2	AM3	AM4	AM5	AM6
Average 24-hr TSP Concentration, $\mu\text{g}/\text{m}^3$ (Range)	21 (9 - 33)	19 (10 - 30)	30 (14 - 51)	23 (12 - 33)	23 (14 - 32)	27 (8 - 47)

All 24-hour TSP measurements during the reporting month were below the Action/Limit Level. No exceedance of action and limit level was found.

3.3.1 General Observations

Major construction works including site clearance, footbridge construction, pilling works, ground investigation, underground utilities and drainage diversion were implemented during the reporting month. No abnormal condition was recorded during monitoring period.

4 Noise Monitoring

4.1 Noise Monitoring Requirements

Monitoring Parameters

Construction noise shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). L_{10} and L_{90} shall also be recorded as supplementary reference information for data auditing.

Monitoring Frequency

Noise measurements shall be conducted on a weekly basis. The monitoring time periods, monitoring parameters and frequency are summarised in **Table 4.1**.

Table 4.1 Construction noise monitoring parameters and frequency

Time Period (when construction activity is found)	Parameters	Monitoring Frequency
Between 0700-1900 hours on normal weekdays	$L_{eq(30\text{ min})}$	Once per week
Between 1900-2300 hours on normal weekdays	$L_{eq(5\text{ min})}^*$	
Between 2300-0700 hours of next day		
Between 0700-1900 hours on holidays		

* The $L_{eq(5\text{ min})}$ will only be measured if construction activities are conducted.

Monitoring Location

In accordance with the EM&A Manual and the subsequent Baseline Report, six noise monitoring location during construction stage is required, namely:

- (i) Kam Fai Garden (N1);
- (ii) Tung Wah Group of Hospitals Tai Tung Pui Social Service Building (N2);
- (iii) Po Leung Kuk The Hong Kong Taoist Association Yuen Yuen Primary School (N3);
- (iv) Shun Tak Fraternal Association Wu Siu Kui Memorial Primary School (N4);
- (v) Tuen King Building (N5); and
- (vi) The Chinese Manufacturers' Association of Hong Kong Choi Cheung Kok Secondary School (N6).

Environmental /Quality Performance Limits

The monitoring results will be checked against the Action and Limit levels described in the Baseline Report, of which they are excerpted and summarised in **Tables 4.2**.

Table 4.2 Action and Limit Levels of construction noise

Location ^(Note 1)	Time Period	Action Level	Limit Level dB(A) ^(Note 2)
N1, N2 & N5	0700 - 1900 hours on normal weekdays	When one documented complaint is received	75
	0700 - 2300 hours on holiday; and 1900 – 2300 hours on all other days		-
	2300 – 0700 hours of next day		-
N3, N4 & N6	0700 - 1900 hours on normal weekdays	When one documented complaint is received	70/65 (Note 3)
	0700 - 2300 hours on holiday; and 1900 – 2300 hours on all other days		-
	2300 – 0700 hours of next day		-

Notes:

1. The detail of monitoring locations was presented in Table 2.2.
2. For normal day-time working hours, the noise criteria are 70 dB(A) and 65 dB(A) for normal reaching periods and examination period

respectively.

3. If works are to be carried out during restricted hours, the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be follows.

4.2 Noise Monitoring Methodology

4.2.1 Monitoring Equipment

Noise level was measured by a Sound Level Meter (SLM) in terms of A-weighted equivalent continuous sound pressure level. L_{eq} , L_{10} and L_{90} were recorded as supplementary information for data auditing. **Table 4.3** shows the equipment list of the noise monitoring.

Table 4.3 Noise equipment list for impact noise monitoring

Equipment	Manufacturer & Model No.	Serial No.	Precision Grade	Qty.
Integrated SLM	Brüel & Kjær 2238	2562763	IEC 651 Type 1 IEC 804 Type 1	1
Sound level calibrator	Rion NC-74	34304660	IEC 942 Type 1	1

4.2.2 Maintenance and Calibration

The SLM and calibrator in compliance with the International Electrotechnical Commission (IEC) Publication 651:1979 (Type 1) and 804:1985 (Type 1) specifications according to the EM&A manual.

SLM complying with the standards of IEC 651 (Fast, Slow, Impulse rms detector tests) and IEC 804 (L_{eq} functions) and acoustical calibrator complying with IEC 942 were adopted for the noise measurement. All equipments are calibrated externally. The calibration certificates for the noise equipment are given in **Appendix G**.

4.2.3 Monitoring Procedures

- The SLM and battery were checked to ensure that they are in proper condition. The SLM was set on a tripod at 1.2m above ground and at least 1m from the exterior of the building façade;
- Before conducting the measurement, the SLM was calibrated by an acoustical calibrator;
- Measurement parameter was set to A-weighted sound pressure level. The time weighting was set in fast response and the time period of measurement at 30 minutes;
- Wind speed was checked during noise monitoring to ensure the steady wind speed does not exceed 5m/s, or wind with gusts does not exceed 10m/s;
- Any abnormal conditions that generated intrusive noise during the measurement was recorded on the field record sheet;
- After each measurement, the equivalent continuous sound pressure level (L_{eq}), L_{10} and L_{90} were recorded on the field record sheet;
- After conducting the measurement, the SLM was calibrated by a sound level calibrator; and
- The SLM was re-calibrated by the sound level calibrator to confirm that there is no significant drift of reading. Measurements shall be accepted as valid only if the calibration levels before and after the noise measurement agrees to within 1.0 dB.

4.3 Monitoring Results and Observations

4.3.1 Weather Condition

The weather condition was fine during the noise monitoring period in the reporting month.

4.3.2 Noise Monitoring Results

Monitoring of the construction noise level was conducted during non-restricted hours at monitoring locations N1, N2, N3, N4, N5 and N6. All monitoring data and graphical presentation of the monitoring results are provided in **Appendix H** and are summarised in **Table 4.4 to 4.9**. The graphical presentations of the monitoring results are provided in **Appendix H**.

Table 4.4 Summary of impact noise monitoring at location N1 in the reporting month

Date	Time	Measured Noise Level, dB(A)	Baseline Noise Level, dB(A)	Construction Noise Level(Note1), dB(A)	Limit Level dB(A)
		Leq (30-min)	Leq (30-min)	Leq (30-min)	
10 May 14	9:50-10:20	68	76	Measured \leq Baseline	75
16 May 14	10:00-10:30	69		Measured \leq Baseline	
22 May 14	9:50-10:20	69		Measured \leq Baseline	
31 May 14	9:55-10:25	69		Measured \leq Baseline	

Notes:

1. Construction Noise Level = Measured Noise Level – Baseline Noise Level.

Table 4.5 Summary of impact noise monitoring at location N2 in the reporting month

Date	Time	Measured Noise Level, dB(A)	Baseline Noise Level, dB(A)	Construction Noise Level(Note1), dB(A)	Limit Level dB(A)
		Leq (30-min)	Leq (30-min)	Leq (30-min)	
10 May 14	10:35-11:05	68	78	Measured \leq Baseline	75
16 May 14	10:45-11:15	68		Measured \leq Baseline	
22 May 14	10:35-11:05	69		Measured \leq Baseline	
31 May 14	10:40-11:10	70		Measured \leq Baseline	

Notes:

1. Construction Noise Level = Measured Noise Level – Baseline Noise Level.

Table 4.6 Summary of impact noise monitoring at location N3 in the reporting month

Date	Time	Measured Noise Level, dB(A)	Baseline Noise Level, dB(A)	Construction Noise Level(Note1), dB(A)	Limit Level dB(A)
		Leq (30-min)	Leq (30-min)	Leq (30-min)	
10 May 14	11:15-11:45	65	69	Measured \leq Baseline	70
16 May 14	11:30-12:00	65		Measured \leq Baseline	
22 May 14	11:15-11:45	66		Measured \leq Baseline	
31 May 14	11:20-11:50	65		Measured \leq Baseline	

Notes:

1. Construction Noise Level = Measured Noise Level – Baseline Noise Level.

Table 4.7 Summary of impact noise monitoring at location N4 in the reporting month

Date	Time	Measured Noise Level, dB(A)	Baseline Noise Level, dB(A)	Construction Noise Level(Note1), dB(A)	Limit Level
		Leq (30-min)	Leq (30-min)	Leq (30-min)	dB(A)
10 May 14	08:30-09:00	64	67	Measured \leq Baseline	70
16 May 14	8:30-9:00	64		Measured \leq Baseline	
22 May 14	08:30-09:00	64		Measured \leq Baseline	
31 May 14	8:40-9:10	64		Measured \leq Baseline	

Notes:

1. Construction Noise Level = Measured Noise Level – Baseline Noise Level.

Table 4.8 Summary of impact noise monitoring at location N5 in the reporting month

Date	Time	Measured Noise Level, dB(A)	Baseline Noise Level, dB(A)	Construction Noise Level(Note1), dB(A)	Limit Level
		Leq (30-min)	Leq (30-min)	Leq (30-min)	dB(A)
10 May 14	13:30-14:00	68	70	Measured \leq Baseline	75
16 May 14	13:20-13:50	69		Measured \leq Baseline	
22 May 14	13:20-13:50	69		Measured \leq Baseline	
31 May 14	13:20-13:50	68		Measured \leq Baseline	

Notes:

1. Construction Noise Level = Measured Noise Level – Baseline Noise Level.

Table 4.9 Summary of impact noise monitoring at location N6 in the reporting month

Date	Time	Measured Noise Level, dB(A)	Baseline Noise Level, dB(A)	Construction Noise Level(Note1), dB(A)	Limit Level
		Leq (30-min)	Leq (30-min)	Leq (30-min)	dB(A)
10 May 14	14:30-15:00	67	69	Measured \leq Baseline	70
16 May 14	14:20-14:50	68		Measured \leq Baseline	
22 May 14	14:20-14:50	67		Measured \leq Baseline	
31 May 14	14:20-14:50	67		Measured \leq Baseline	

Notes:

1. Construction Noise Level = Measured Noise Level – Baseline Noise Level.

Restricted Hours

In the reporting months, the construction works and activities such as mobilization of materials and plants etc were carried out during restricted hours. The granted Construction Noise Permits (CNPs) were issued by EPD for the related activities before the works commencement, the Contractor strictly followed the conditions stipulated in the CNPs. There was no non-compliance recorded during the reporting month.

4.3.3 Exceedance of Limit and Action Levels for Construction Noise

No Action Level and Limit Level exceedance for noise measurements during non-restricted hours was recorded in the reporting month.

General Observations

The construction site had been under normal operation during the noise monitoring period and no unusual operation was observed. Traffic noise had been noticed at the monitoring location during the noise monitoring period.

5 Landscape and Visual Monitoring

5.1 Landscape and Visual Monitoring Requirements

Monitoring Parameters

The landscape and visual conditions of the site and its vicinity shall be reviewed with regards to parameters assessed in the EIA Report, including landscape resources (LR), landscape character area (LCA) and view condition of visual sensitive receiver (VSR).

Monitoring Frequency and Location

The landscape and visual monitoring and audit shall be undertaken bi-weekly throughout the construction period. The components of each assessed parameter of LR, LCA and VSR are summarised in **Table 5.1**.

Table 5.1 Parameters of landscape resources, landscape character areas and landscape sensitive receivers assessed during baseline site survey

ID No.	Names
Landscape Resources	
LR1	Tsing Sin Playground
LR2	Roadside Planting along Tuen Mun Road Adjacent to Kam Fai Garden
LR3	Street trees along Castle Peak Road – Castle Peak Bay
LR4	Street trees along Tuen Mun Road west of Chi Lok Fa Yuen and east of On Ting Estate
LR5	Street trees along Tuen Mun Road west of Waldorf Garden and CMA Choi Cheung Kok Prevocational School
LR6	Street trees along Tuen Mun Road near Tuen Mun Town Plaza
LR7	Street trees along Tuen Mun Road east of Yan Oi Tong
LR8	Trees at roadside planting areas near Yan Oi Tong Circuit
LR9	Trees at planting area near Tuen Mun Town Plaza
LR10	Trees at planting area near New Town Mansion
LR11	Trees at planting area near On Ting Estate
LR12	Tsing Hoi Playground
Landscape Character Areas	
LZ1	Tuen Mun Residential Urban Landscape
LZ2	Tuen Mun Mixed Modern Comprehensive Urban Development Landscape
LZ3	Tuen Mun 'Hui' Urban Landscape
Visual Sensitive Receivers	
C/R1	Tuen Mun Town Plaza, Waldorf Garden
C/R2	Tuen Cultural Centre, Tuen Mun Town Plaza
C/R3	Chelsea Height
GIC1	Tuen Mun Church and Tuen Mun Tseng Choi Street Joint-user Complex
GIC2	Sin Hing Tong Temple
GIC3	Semple Memorial Secondary School and Chung Shing Benevolent Society Mrs. Aw Boon Haw Secondary School
GIC4	Car park (Open)
GIC5	Yan Oi Tong Community & Sports Centre
GIC6	Tuen Mun Government Secondary School, Choi Cheung Kok Secondary School

ID No.	Names
GIC7	Madam Lau Wong Fat Primary School, Lui Cheung Kwong College, Leung Kau Kui College, Lui Cheung Kwong Primary School, Wu Siu Kui Primary School
GIC8	Sam Shing Temple
O1	San Hui Playground
O2	Tsing Sin Playground
O3	Siu Lun Sports Ground
O4	Hoi Sin Playground
R1	Residential Area of Tuen Mun San Hui
R2	Residential Area along Yan Oi Tong Circuit
R3	On Ting Estate and Siu On Court
R4	Residential Area along Tsing Hoi Circuit
R5	Handsome Court, Alpine Garden, Hoi Tak Garden and Harvest Garden, Kam Fai Garden
R6	Siu Lun Court
R7	Goodview Garden and Tsui Ning Garden
R8	Sam Shing Estate
R9	Hanford Garden
T1	Tuen Mun Road – Vehicular and Pedestrian

5.2 Audit Results

In the reporting month, landscape and visual site audit in accordance with the requirements stipulated in the EIA report was conducted on 8 and 22 May 2014.

In accordance with the Landscape Plan of the Project under the Clause 2.13 of the Part C of the EP and updated information by the Contractor, a total of 1031 trees would be affected. 102 trees would be retained, 399 trees would be transplanted to Siu Lang Shui Road and 521 trees would be felled during the construction phase. The implementation and maintenance of landscape and mitigation measures, listed in EIA report, were checked during the site audit. No substantial change of LR, LCA and VSR was noted. No non-compliance has been triggered during the reporting month.

Since the commencement of the Project, total 521 trees were felled and the pruning of the transplanted trees was carried out in accordance with the Specification for Tree Protection and Transplanting Works in Landscape Plan. The updated statuses of the felled and transplanted trees during the reporting month are summarized in **Table 5.2** and the summary report is presented in **Appendix I**.

Table 5.2 Status of felled and transplanted trees during reporting month

	No. of trees to be felled	No. of trees to be transplanted			
		Crown pruning	1 st root pruning	2 nd root pruning	3 rd root pruning
In progress	0	5	14	14	14
Completed	521	394	385	385	385
Total	521	399	399	399	399
Percentage completed (%)	100	99	96	96	96

In order to enhance the landscape and visual experience to Tuen Mun town centre neighborhood and compensate for the district tree felling, compensatory tree planting of 699 no. of trees would be carried out throughout various area in Tuen Mun after the discussion and agreement with Tuen Mun District Council (TMDC) and relevant government parties (e.g. LCSD).

5.3 Implementation Status of Consultation Phase Landscape and Visual Mitigation Measures

The design, implementation and maintenance of landscape and visual mitigation measures stipulated in the EM&A manual, were checked during the site audits. No non-compliance has been triggered.

The Implementation Schedule of Mitigation Measures was inspected during the weekly site inspections in reporting month. The details of the findings/observations are described in **Section 7.1**. Summary of the implementation status of construction phase Landscape and Visual mitigation measures are presented in **Appendix C**.

5.4 Recommendations, Corrective Actions and Outstanding Issues

The recommendations, corrective actions or outstanding issues in relation with the landscape and visual monitoring are as follows:

- The Contractor was reminded to strip and store the topsoil for re-use in the construction of soft landscape works, where practical;
- The Contractor was reminded to protect the retained trees carefully during construction;
- The Contractor was reminded to transplant the trees which affected by the works where possible and practical;
- The Contractor was reminded to compensate the trees for felled trees;
- The Contractor was reminded to control of night-time lighting;
- The Contractor was reminded to erect a compatible decorative screen hoarding with the surrounding setting;
- The Contractor was reminded to avoid placing the construction materials too close to the trees.

6 Waste Disposal

The actual amounts of different types of waste generated by the activities of the Project during the reporting month are shown in Table 6.1. The monthly summary flow table is provided in **Appendix J**.

Table 6.1 Amount of waste generated in reporting month

Waste Type	Amount	Disposal Locations
Inert C&D Materials	0 m ³	Broken concrete
	0 m ³	Reused in the Contract
	0 m ³	Reused in other Projects
	340m ³	Disposal of at public fill at Tuen Mun Area 38
Chemical Waste	0 kg	N/A
Paper / cardboard packaging	0 kg	Recycler
Plastic	0 kg	
Metal	0 kg	
General Refuse	34 m ³	Disposal of at WENT landfill

7 Environmental Performance

7.1 Environmental Site Inspection

Environmental site inspections were carried out on a weekly basis to monitor environmental issues on the construction sites to ensure that all mitigation measures were implemented timely and properly. A summary of the site inspections in the reporting month is presented in **Table 7.1**.

Table 7.1 Key findings of weekly environmental site audit in the reporting month

Location	Inspection Date	Key Observations and Recommendations	Contractor's Response / Environmental Outcome	Closed Date / Follow up Status
Waste Management Mitigation Measures				
Siu On Footbridge	15 May 14	The Contractor is reminded to remove the stagnant water in the drip tray.	Agreed with the ET's advice.	The reminder has been noted. Closed on 22 May 14

7.2 Complaint Record

No environmental complaint was recorded in the reporting month.

The updated statistical summary of complaint is presented in **Table 7.2**. The updated complaint logs of the Project in the reporting month are shown in **Appendix L**.

Table 7.2 Summary of complaints for the contract

Reporting Period	Complaint Statistics		Area of Concern	Validity to the Project	Status
	Number	Cumulative			
02/08/10 – 31/10/10	0	0	-	-	-
01/11/10 – 30/11/10	1	1	Noise	Yes (Ref.: C001)	Closed on 30 Nov 10.
01/12/10 – 31/01/11	0	1	-	-	-
01/02/11 – 28/02/11	1	2	Noise	Yes (Ref.: C002)	Closed on 2 Mar 11.
01/03/11 – 31/03/11	0	2	-	-	-
01/04/11 – 30/04/11	2	4	Water	Yes (Ref.: C003)	Closed on 16 Apr 11.
			Noise	Yes (Ref.: C004)	Closed on 16 May 11.
01/05/11 – 31/05/11	1	5	Water	Yes (Ref.: C005)	Closed on 10 Jun 11.
01/06/11 – 30/06/11	1	6	Air	Yes (Ref.: C006)	Closed on 23 Jun 11.
	1	7	Noise	Yes (Ref.: C007)	Closed on 24 Jun 11.
	1	8	Water	Yes (Ref.: C008)	Closed on 4 Jul 11.
	1	9	Air	Yes (Ref.: C009)	Closed on 14 Jul 11.
01/07/11 – 31/07/11	1	10	Noise	Yes (Ref.: C010)	Closed on 4 Aug 11.
	1	11	Water	Yes (Ref.: C011)	Closed on 4 Aug 11.
01/08/11 – 31/08/11	0	11	-	-	-
01/09/11 – 30/09/11	1	12	Noise	Yes (Ref.: C012)	Closed on 29 Sep 11.
	1	13	Water	Yes (Ref.: C013)	Closed on 14 Oct 11.
	1	14	Water	Yes (Ref.: C014)	Closed on 14 Oct 11.
01/10/11 – 31/10/11	1	15	Water	Yes (Ref.: C015)	Closed on 28 Oct 11.
01/11/11 – 30/11/11	1	16	Noise	Yes (Ref.: C016)	Closed on 24 Nov 11.
	1	17	Noise	Yes (Ref.: C017)	Closed on 30 Nov 11.
01/12/11 – 31/12/11	0	17	-	-	-

Reporting Period	Complaint Statistics		Area of Concern	Validity to the Project	Status
	Number	Cumulative			
01/01/12 – 31/01/12	1	18	Water	Yes (Ref.: C018)	Closed on 6 Feb 12.
	1	19	Water	Yes (Ref.: C019)	Closed on 6 Feb 12.
01/02/12 – 29/02/12	0	19	-	-	-
01/03/12 – 31/03/12	1	20	Water	Yes (Ref.: C020)	Closed on 22 Mar 12.
	1	21	Noise	Yes (Ref.: C021)	Closed on 28 Mar 12.
	1	22	Noise	Yes (Ref.: C022)	Closed on 5 Apr 12.
	1	23	Water	Yes (Ref.: C023)	Closed on 5 Apr 12.
01/04/12 – 30/04/12	0	23	-	-	-
01/05/12 – 31/05/12	1	24	Water	Yes (Ref.: C024)	Closed on 24 May 12.
	1	25	Noise	Yes (Ref.: C025)	Closed on 7 Jun 12.
	1	26	Noise	Yes (Ref.: C026)	Closed on 7 Jun 12.
01/06/12 – 30/06/12	0	26	-	-	-
01/07/12 – 31/07/12	0	26	-	-	-
01/08/12 – 31/08/12	0	26	-	-	-
01/09/12 – 30/09/12	0	26	-	-	-
01/10/12 – 31/10/12	0	26	-	-	-
01/11/12 – 30/11/12	1	27	Noise	Yes (Ref.: C027)	Closed on 8 Nov 12.
	1	28	Noise	Yes (Ref.: C028)	Closed on 8 Nov 12.
01/12/12 – 31/12/12	1	29	Noise	Yes (Ref.: C029)	Closed on 31 Dec 12.
	1	30	Noise	Yes (Ref.: C030)	Closed on 31 Dec 12.
	1	31	Noise	Yes (Ref.: C031)	Closed on 31 Dec 12.
01/01/13 – 31/01/13	0	31	-	-	-
01/02/13 – 28/02/13	1	32	Noise	Yes (Ref.: C032)	Closed on 15 Feb 13.
	1	33	Noise	Yes (Ref.: C033)	Closed on 15 Feb 13.
	1	34	Noise	Yes (Ref.: C034)	Closed on 15 Feb 13.
	1	35	Noise	Yes (Ref.: C035)	Closed on 15 Feb 13.

Reporting Period	Complaint Statistics		Area of Concern	Validity to the Project	Status
	Number	Cumulative			
01/03/13 – 31/03/13	0	35	-	-	-
01/04/13 – 30/04/13	1	36	Noise	Yes (Ref.: C036)	Closed on 9 May 13.
01/05/13 – 31/05/13	0	36	-	-	-
01/06/13 – 30/06/13	1	37	Noise	Yes (Ref.: C037)	Closed on 11 July 13.
01/07/13 – 31/07/13	1	38	Noise	Yes (Ref.: C038)	Closed on 25 July 13.
01/08/13 – 31/08/13	1	39	Noise	Yes (Ref.: C039)	Closed on 29 Aug 13.
01/09/13 – 30/09/13	1	40	Noise	Yes (Ref.: C040)	Closed on 26 Sep 13.
	1	41	Noise	Yes (Ref.: C041)	Closed on 26 Sep 13.
01/10/13 – 31/10/13	0	41	-	-	-
01/11/13 – 30/11/13	0	41	-	-	-
01/12/13 – 31/12/13	1	42	Air	Yes (Ref.: C042)	Closed on 10 Jan 14.
01/01/14 – 31/01/14	0	42	-	-	-
01/02/14 – 28/02/14	0	42	-	-	-
01/03/14 – 31/03/14	1	43	Noise	Yes (Ref.: C043)	Closed on 20 Mar 14.
	1	44	Noise	Yes (Ref.: C044)	Closed on 20 Mar 14.
01/04/14 – 30/04/14	1	45	Noise	Yes (Ref.: C045)	Closed on 11 Apr 14.
	1	46	Noise	Yes (Ref.: C046)	Closed on 17 Apr 14.
	1	47	Noise	Yes (Ref.: C047)	Closed on 17 Apr 14.
	1	48	Noise	Yes (Ref.: C048)	Closed on 30 Apr 14.
01/05/14 – 31/05/14	0	48	-	-	-

7.3 Notification of Summons and Successful Prosecution

No summons or prosecutions related to environmental issues were received or made against the Project in the reporting month.

7.4 Review of Reasons of Non-Compliance

There was no non-compliance identified during the reporting month so review of the non-compliance was not required.

8 Future Key Issues

8.1 Key Issues for the Coming Month

Key issues to be considered in the coming month include:

- Dust generation from activities on-site, such as vehicular movements along unpaved area, excavation and demolition;
- Noise impact from operating equipment and machinery on-site;
- Muddy surface runoff overflow to public area;
- Uncontrolled water discharge into nearby water body;
- Storage and using of chemicals/fuel and chemical waste/waste oil on site;
- Disposal of construction waste; and
- Tree maintenance.

8.2 Environmental Monitoring Program for the Coming Month

Environmental monitoring and audit will be carried out in accordance with the requirements stipulated in the EM&A manual. Tentative air, noise, landscape and visual monitoring as well as weekly site audit schedule for the coming month with respect to the construction programme is shown in **Appendix K**.

The construction programme for the coming month is shown in **Table 8.1**.

Table 8.1 Tentative programme of construction works

Month	Locations	Details of Construction Works
June 2014	Various locations	road resurfacing

9 Conclusions and Recommendations

9.1 Conclusions

The construction phase of the Project was commenced on 2 August 2010. The EM&A programme has been implemented since then, including air quality, noise, landscape and visual and environmental site audits.

No Action Level and Limit Level exceedance of air monitoring was recorded in the reporting month.

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

No summons or prosecution related to environmental issues was received during the reporting month.

In accordance with the requirements stipulated in the EM&A manual, landscape and visual site audit was conducted on 8 and 22 May 2014. Total 521 trees were felled and the pruning of the transplanted trees was carried out during the reporting month. No substantial change of LR, LCA and VSR was noted.

Five (5) weekly environmental site audits were carried out during the reporting month. The major environmental concerns were related to air quality, noise, water quality, waste management and tree maintenance.

9.2 Recommendations

Impact monitoring will be continued to carry out in the following month and followed by the requirement stipulated in the EM&A manual. Attention will be paid to environmental issues identified in EIA report and weekly site audit. Mitigation measures recommended in EIA report and Implementation Schedule of Mitigation Measure will be fully implemented.

Construction noise is one of the key environmental issues especially in restricted hours. The conditions stipulated in CNPs should be strictly followed when the construction works were carried out during the restricted hours.

Construction dust is another key environmental issue. The implemented construction dust mitigation measures including covering of exposed slope / soil with tarpaulin sheet etc., should be maintained and improved as necessary. Adequate water spraying should be provided for the unpaved area to minimize dust disturbance.

Water quality impact is also key environmental issue. The drainage system should be well maintained. All wastewater generated within the site should be collected and treated prior to discharge. The solid and liquid waste management should be strictly followed in accordance with the requirements described in the EIA report.

10 Reference

- [1] AECOM Asia Co. Ltd. December 2008. Agreement No. CE 22/2005 (HY) Supplementary No. 1 Traffic Improvements to Tuen Mun Road Town Centre Section – Environmental Monitoring & Audit Manual.
- [2] Ove Arup & Partners Hong Kong Limited. July 2010. Agreement No. HMW 5/2009 (EP) Traffic Improvements to Tuen Mun Road Town Centre Section – Baseline Monitoring Report (Revision_4).

