Meinhardt Infrastructure and Environment Limited

Entrusted Portion of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling Stage 2

Monthly EM&A Report

(December 2013)

Certified by: Fredrick Leong

Position: Environmental Team Leader

Date: 13 January 2014

Mott MacDonald

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13 January 2014
By Fax (2805 5028) & Post

Dear Sir,

Attn: Mr. James Penny

EM&A for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling Stage 2 (between Tai Hang to Wo Hop Shek Interchange) – Entrusted Works
Environmental Permit No. EP-324/2008/A
Condition 3.3 – Submission of Monthly EM&A Report - December 2013 for the portion of Stage 2 works entrusted to CEDD under Contract No. CV/2012/09

We refer to the revised Monthly EM&A Report - December 2013 received on 9 and 13 January 2014 submitted by ET via email. Pursuant to EP Condition 3.3, I hereby verify the Monthly EM&A Report – December 2013 (Rev. 0) for the portion of works under Stage 2 of the captioned Project which is entrusted to CEDD under Contract No. CV/2012/09.

Yours faithfully
for MOTT MACDONALD HONG KONG LIMITED

Terence Kong
Independent Environmental Checker

c.c. HyD – Mr. Chung Lok Chin (Fax: 2714 5198) / Ms. Jackei Yin (Fax: 2761 4864)
CEDD/BCP – Mr. Chris Wong / Mr. Desmond Lam (Fax: 2714 0103)
AECOM – Mr. Alan Lee (Fax: 3922 9797)
Meinhardt Infrastructure and Environment Limited – Mr. Fredrick Leong (Fax: 2540 1580)

Date	Revision	Prepared By	Checked By	Approved By
13 January 2014	0	Ivan Ting	Fredrick LEONG	Helen COCHRANE

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EXECUTIVE SUMMARY

The Entrusted Portion of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling Stage 2 (hereafter called "the Project") covers part of the construction of the widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling which aimed 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 Project covers construction activities at Yuen Leng along the existing Fanling Highway.

The impact EM&A for the Project includes air quality, noise and water quality monitoring. The EM&A programme commenced on 5 November 2013.

This report documents the findings of EM&A works conducted in December 2013. As informed by the Contractor, the major activities in the reporting period were:

- Cable detection and trail trenches;
- Tree Felling Works;
- Trial Pit Excavation;
- Pre-drilling works and piling works;
- Extension of box culvert;
- Bored pile wall construction;
- Erection of site office; and
- Construction of haul road and temporary soil platform for geotechnical works.

Breach of Action and Limit Levels for Air Quality

Investigation for the exceedances events on 16, 22 and 28 November 2013 for 24-hour TSP monitoring have been completed. The exceedances were considered not related to the construction works and the respective investigation reports are presented in **Appendix L**.

Three (3) Action Level exceedances of 24-hour TSP monitoring were recorded on 4, 21 and 27 December 2013 while one (1) Limit Level exceedance was recorded on 10 December 2013 at the monitoring location (SR77) in the reporting month. Investigation for the exceedances have been conducted and concluded not related to the project works. The investigation reports for the incidents are presented in **Appendix L**.

No exceedance of Action and Limit Level was recorded for 1-hour TSP monitoring at the monitoring location (SR77) in the reporting month.

Breach of Action and Limit Levels for Noise

No Action Level exceedance was recorded since no noise related complaint was received in the reporting month.

No exceedance of Limit Level of noise was recorded at the monitoring location (SR77) in the reporting month.

Breach of Action and Limit Levels for Water Quality

Two (2) exceedances of Limit Level on Turbidity were recorded on 18 and 27 December 2013. One (1) exceedance of Action Level on 6 December 2013 and one (1) exceedance of Limit Level on Suspended Solids on 18 December 2013 were recorded in the reporting month. Investigation for the exceedances had been conducted which concluded that the exceedances event on 6 December 2013 on Suspended Solids and on 27 December 2013 on Turbidity were not related to the construction works while the exceedance event on 18 December 2013 on both Suspended Solids and Turbidity were considered related to a leakage of the diverted river through the concrete blocks. Necessary remedy actions have been completed and the investigation reports for the incidents are presented in **Appendix L**.

Complaint, Notification of Summons and Successful Prosecution

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

Reporting Change

There was no reporting of change recorded in the reporting month.

Future Key Issues

The major construction works in the coming reporting month are anticipated to include:

- Erection of site office;
- Cable detection and trial trenches;
- Pre-drilling works and piling works;
- Tree felling works, waterworks and excavation works;
- Dismantling works for abandoned houses;
- Slope upgrading works;
- Noise Barrier Installation;
- Extension of box culvert;
- Construction of haul road and temporary soil platform for geotechnical works; and
- Laying of concrete pipe works.

Potential environmental impacts arising from the above construction activities are anticipated to be mainly associated with construction dust, noise, water quality and waste management.

1 INTRODUCTION

1.1.1 Chun Wo Construction & Engineering Co Ltd (Chun Wo) was commissioned by the Civil Engineering and Development Department (CEDD) as the Civil Contractor for the Entrusted Portion of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling Stage 2. Meinhardt Infrastructure & Environment Ltd (MIEL) has been appointed by Chun Wo as the Environmental Team (ET) to fulfill the corresponding EM&A requirements pursuant to Environmental Permit No. EP-324/2008/A in accordance with the Updated EM&A Manual (dated October 2013) for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling Stage 2. The EM&A programme commenced in 5 November 2013.

1.2 Purpose of the Report

1.2.1 This is the monthly EM&A Report which summaries the impact monitoring results and audit findings for the Project during the reporting month of December 2013.

1.3 Report Structure

1.3.1 This monthly EM&A Report comprises the following sections:

- Section 1: Introduction
- Section 2: Project Information
- Section 3: Air Quality Monitoring
- Section 4: Noise Monitoring
- Section 5: Water Monitoring
- Section 6: Waste Management
- Section 7: Environmental Site Inspection and Audit
- Section 8: Implementation Status of Environmental Mitigation Measures
- Section 9: Environmental Non-conformance
- Section 10: Future Key Issues
- Section 11: Conclusions and Recommendations

2 PROJECT INFORMATION

2.1 Background

2.1.1 Tolo Highway and Fanling Highway are expressways in the North East New Territories connecting Sha Tin, Tai Po and Fanling. These highways form a vital part of the strategic Route 1, which links Hong Kong Island to Shenzhen. At present, this section of Route 1 is a dual 3-lane carriageway. However, at several major interchanges along this section of Route 1, the highway is only dual-2 lane. Severe congestion is a frequent occurrence during peak periods, particularly in the Kowloon bound direction.

2.1.2 The objective of the 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.

2.1.3 The construction works for the Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling are to be delivered in 2 stages:

- Stage 1 – Construction works between Island House Interchange and Tai Hang; and
- Stage 2 – Construction works between Tai Hang and Wo Hop Shek Interchange.

2.1.4 The construction works of Stage 1 under the EP commenced in November 2009 and was planned to be completed in December 2013 tentatively. The works of Stage 2 was planned to commence in November 2013 and complete by end of 2016. Hyder-Arup-Black and Veatch Joint Venture (HABVJV) was appointed by the Highways Department (HyD) as the consultants for the design and construction assignment for the Project. Mott MacDonald Hong Kong Ltd is the Independent Environmental Checker (IEC) of both Stage 1 and Stage 2 works.

2.1.5 A portion of Stage 2 works of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling (hereafter called “the Project”) is entrusted to the contractor of Contract No. CV/2012/09 Liantang / Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works Contract 3, i.e. Chun Wo. AECOM Asia Co Ltd was appointed by the CEDD as the consultant for the design and construction assignment for the Liantang development.

2.1.6 The Project is a Designated Project under the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499). An Environmental Impact Assessment (EIA) Report together with an Environmental Monitoring and Audit (EM&A) Manual were approved on 14 July 2000 (Register Number: EIA-043/2000). The Project is governed by an Environmental Permit (EP) (EP-324/2008) which was granted on 23 December 2008. A variation of EP (VEP) was applied and a VEP (EP-324/2008/A) was subsequently granted on 31 January 2012.

2.2 Site Description

2.2.1 The major construction activities under the Entrusted Portion of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling Stage 2 include:

- At-Grade Road Works – Temporary and permanent road formation, pipe laying, road drainage, footpath and noise barrier construction;
- Demolition of existing Kiu Tau Footbridge and Footbridge Reprovision; and
- Box Culvert Extension – Flow diversion of existing stream, excavation, sub-base and blinding, base, wall and top slab construction.

2.2.2 **Figure 1** shows the works areas for the Entrusted Portion of Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling Stage 2.

2.3 Construction Programme and Activities

2.3.1 The major construction activities undertaken in the reporting month are summarized below:

- Cable detection and trail trenches;
- Tree Felling Works;
- Trial Pit Excavation;
- Pre-drilling works and piling works;
- Extension of box culvert;
- Bored pile wall construction;
- Erection of site office; and
- Construction of haul road and temporary soil platform for geotechnical works.

2.3.2 The construction programme is presented in **Appendix A**.

2.4 Project Organisation

2.4.1 The project organization structure is shown in **Appendix B**. The key personnel contact names and numbers for the Project are summarised in **Table 2.1**.

Table 2.1 Contact Information of Key Personnel

Party	Role	Position	Name	Telephone	Fax
AECOM	Engineer's Representative	Senior Resident Engineer	Mr. Alan Lee	2472 7228	2472 0132
		Resident Engineer (Environmental)	Mr. Perry Yam	2674 2273	--
Mott MacDonald	Independent Environmental Checker (IEC)	IEC	Mr. Terence Kong	2828 5919	2827 1823
Chun Wo	Contractor	Site Agent	Mr. Daniel Ho	2638 6144	2638 7077
		Environmental Officer	Mr. Victor Huang	2638 6115	
		Environmental Officer	Mr. Sam Lam	2638 6147	

Party	Role	Position	Name	Telephone	Fax
Meinhardt	Environmental Team (ET)	ET Leader	Mr. Fredrick Leong	2859 1739	2540 1580

3 STATUS OF ENVIRONMENTAL LICENSES, NOTIFICATION AND PERMITS

3.1.1 The relevant environmental licenses, permits and/or notifications on environmental protection for this Project and valid in the reporting month are summarized in **Table 3.1**.

Table 3.1 Status of Environmental Licenses, Notifications and Permits

Permit / License No. / Notification/ Reference No.	Valid Period		Status	Remarks
	From	To		
Environmental Permit				
EP-324/2008/A	31 Jan 2012	--	Valid	--
Construction Noise Permit				
GW-RN0663-13	12/11/2013	Cancelled on 4/12/2013	Valid	For a section of Fanling Highway (slow lane)
GW-RN0747-13	4/12/2013	19/01/2014	Valid	--
Wastewater Discharge License				
WT00016832-2013	28 Aug 2013	31 Aug 2018	Valid	--
Chemical Waste Producer Registration				
5113-634-C3817-01	7 Oct 2013	--	Valid	--
Billing Account for Construction Waste Disposal				
7017914	2 Aug 2013	--	Account Active	--
Notification Under Air Pollution Control (Construction Dust) Regulation				
--	31 Jul 2013	30 Jul 2019	Notified	--

4 AIR QUALITY MONITORING

4.1 Monitoring Requirement

4.1.1 In accordance with the Updated EM&A Manual, 1-hr and 24-hr total suspended particulate (TSP) levels at the designated air quality monitoring station are required. Impact 24-hour TSP monitoring should be carried out for at least once every 6 days. For the 1-hr TSP impact monitoring, the sampling frequency of at least three times in every 6 days should be undertaken when the highest dust impact occurs.

4.2 Monitoring Equipment

4.2.1 The 24-hr TSP air quality monitoring was performed using a High Volume Sampler (HVS), of which its location and operation satisfy, as far as practicable, all the requirements as specified in the Updated EM&A Manual. A portable direct reading dust meter, which was proven to be capable of achieving comparable results as that of the HVS, was used to carry out the 1-hr TSP monitoring. The brand and model of the equipment are given in **Table 4.1**.

Table 4.1 Air Quality Monitoring Equipment

Equipment	Brand and Model	Quantity	Serial Number
Portable direct reading dust meter (1-hr TSP)	Sibata Digital Dust Monitor (Model No. AM 510)	1	11302029
High Volume Sampler (24-hr TSP)	Tisch Total Suspended Particulate Mass Flow Controlled High Volume Air Sampler (Model No. TE-5170 MFC)	1	2359

4.2.2 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.

4.2.3 Calibration of the HVS (five point calibration) using Calibration Kit was carried out every two months. The HVS calibration orifice and the portable direct reading dust meter will be calibrated annually. Calibration certificate of the TE-5025A Calibration Kit, the portable direct reading dust meter and the HVS are provided in **Appendix C**.

4.3 Monitoring Location

4.3.1 Air quality monitoring was conducted at the location specified in the Updated EM&A Manual. **Table 4.2** describes the details of the air quality monitoring station with its location as shown in **Figure 2**.

Table 4.2 Location of Air Quality Monitoring

Air Monitoring Station ID	Monitoring Location	Description
AM1(1); SR77(1)	Yuen Leng 2(1)	Residential, Ground floor

Remark:
(1) Location / Station / ASR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

4.4 Monitoring Parameters, Frequency and Duration

4.4.1 **Table 4.3** summarizes the monitoring parameters, frequency and duration of impact TSP monitoring.

Table 4.3 Air Quality Monitoring Parameters, Frequency and Duration

Parameter	Frequency and Duration
1-hour TSP	At least three times in every 6 days should be undertaken when the highest dust impact occur
24-hour TSP	Once every 6 days

4.5 Monitoring Methodology

24-hr TSP Monitoring

4.5.1 With the consideration of criteria stated in the Updated EM&A Manual, the HVS was installed in the vicinity of the air sensitive receivers.

4.5.2 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 any special phenomena observed were recorded. The weather information was referenced from Hong Kong Observatory (http://www.weather.gov.hk/wxinfo/pastwx/extractc.htm).

4.5.3 A HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd (HOKLAS no.: 066), with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments, to handle the 24-hr TSP samples, was employed for sample analysis, and equipment calibration and maintenance.

4.5.4 Filter papers of size 8"x10" were labelled before sampling. They were inspected to be clean with no pin holes and conditioned in a humidity controlled chamber for over 24-hr and were pre-weighed before use for the sampling.

4.5.5 The 24-hr TSP levels were measured by following the standard high volume sampling method for TSP 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-hr 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.

4.5.6 All the collected samples were kept in a good condition for 6 months before disposal.

1-hr TSP Monitoring

4.5.7 The 1-hr TSP measurement followed manufacturer's instruction manual. Before initiating a measurement, zeroing the portable dust monitor was carried out to ensure maximum accuracy of concentration measurements.

4.5.8 The 1-hr TSP was sampled by drawing air into the portable dust monitor where particular concentrations were measured instantaneously with an in-built silicon

detector sensing light scattered by the particulates in the sampled air. Continuous TSP levels were indicated and logged by a built-in data logger compatible with Windows based program to facilitate data collection, analysis and reporting.

4.6 Monitoring Schedule for the Reporting month

4.6.1 The schedule for environmental monitoring in the reporting month is provided in **Appendix D**.

4.7 Monitoring Results

4.7.1 The monitoring results for 1-hr and 24-hr TSP are summarised in **Table 4.4** and **Table 4.5** respectively. Detailed air quality monitoring results and the graphical presentation of air quality monitoring data for the current and past reporting months are presented in **Appendix E**.

Table 4.4 Summary of 1-hr TSP Monitoring Results

ASR ID	Average ($\mu g/m^3$)	Range ($\mu g/m^3$)	Action Level ($\mu g/m^3$)	Limit Level ($\mu g/m^3$)
SR77 (AM1) *	201.1	147.0 – 283.0	292.7	500

Remark:
* Station / ASR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

Table 4.5 Summary of 24-hr TSP Monitoring Results

ASR ID	Average ($\mu g/m^3$)	Range ($\mu g/m^3$)	Action Level ($\mu g/m^3$)	Limit Level ($\mu g/m^3$)
SR77 (AM1) *	212.6	23.7 – 358.6	170.3	260

Remark:
* Station / ASR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

4.7.2 Investigation for the exceedances events on 16, 22 and 28 November 2013 for 24-hour TSP monitoring have been completed. The exceedances were considered not related to the construction works and the respective investigation reports are presented in **Appendix L**.

4.7.3 Three (3) Action Level exceedances of 24-hour TSP monitoring were recorded on 4, 21 and 27 December 2013 while one (1) Limit Level exceedance was recorded on 10 December 2013 at the monitoring location (SR77) in the reporting month. Investigation for the exceedances have been conducted and concluded not related to the project works. The investigation reports for the incidents are presented in **Appendix L**.

4.7.4 Investigation for the exceedance events in November 2013 have been completed. The investigation reports for the incidents are presented in **Appendix L**.

4.7.5 No exceedance of Action and Limit Level was recorded for 1-hour TSP monitoring at the monitoring location (SR77) in the reporting month.

4.7.6 The Event and Action Plan for the occurrence of non-compliance of the air quality criteria is annexed in **Appendix F**.

4.7.7 Details of monitoring conditions including influencing factors such as weather conditions and site observation are presented in **Appendix E**.

5 NOISE MONITORING

5.1 Monitoring Requirements

5.1.1 In accordance with the Updated EM&A Manual, the impact noise monitoring frequency shall depend on the scale of the construction activities. An initial guide on the regular monitoring frequency should be at least once per week when noise generating activities are underway.

5.2 Monitoring Equipment

5.2.1 Noise monitoring was performed using a sound level meter at the monitoring station. The sound level meter deployed complies with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications. An acoustic calibrator was deployed to check the sound level meter at a known sound pressure level. The brand and model of the equipment is given in **Table 5.1**.

Table 5.1 Noise Monitoring Equipment

Equipment	Brand and Model	Quantity	Serial Number
Acoustic Calibrator	B&K (Model No. 4231)	1	2685684
Integrated Sound Level Meter	Rion (Model No. NL-52)	1	00220553

5.2.2 The sound level meter and acoustic calibrator were verified by the certified laboratory once every two years. Calibration certificates of the sound level meter and acoustic calibrator are provided in **Appendix C**.

5.3 Monitoring Locations

5.3.1 Impact noise monitoring was conducted at the location specified in the Updated EM&A Manual. **Table 5.2** describes the details of the noise monitoring station with its location as shown in **Figure 2**.

Table 5.2 Location of Noise Monitoring

NSR ID	Monitoring Location	Description
M1(1), SR77(1)	Yuen Leng 2(1)	Residential, Ground floor

Remark:
(1) Location / Station / NSR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling

5.4 Monitoring Parameters, Frequency and Duration

5.4.1 **Table 5.3** summarizes the monitoring parameters, frequency and duration of impact noise monitoring.

Table 5.3 Noise Monitoring Parameters, Frequency and Duration

Parameter and Duration	Frequency
30-mins measurement at between 0700 and 1900 on normal weekdays. Leq, L10 and L90 would be recorded.	At least once per week

5.5 Monitoring Methodology

5.5.1 The monitoring procedures are summarised as below:

(a) The microphone head of the sound level meter was positioned 1m exterior of the noise sensitive facade and lowered sufficiently so that the building's external wall acts as a reflecting surface.

(b) The battery condition was checked to ensure good functioning of the meter.

(c) 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) parameters: Leq, L10 and L90

(iv) time measurement: Leq(30-minutes) during non-restricted hours i.e. 07:00 – 1900 hrs on normal weekdays; Leq(5-minutes) during restricted hours i.e. 19:00 – 23:00 hrs and 23:00 – 07:00 hrs of normal weekdays, whole day of Sundays and Public Holidays

(d) 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 1dB(A), the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.

(e) At the end of the monitoring period, the Leq, L10 and L90 were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.

(f) A façade correction of +3dB (A) shall be made to the noise parameter obtained by free field measurement.

5.6 Monitoring Schedule for the Reporting Month

5.6.1 The schedule for environmental monitoring in the reporting month is provided in **Appendix D**.

5.7 Monitoring Results

5.7.1 The monitoring results for noise are summarized in **Table 5.4** and the monitoring results and the graphical presentation of noise level for the current and past reporting months are presented in **Appendix G**.

Table 5.4 Summary of Noise Monitoring Results

Noise Monitoring Station ID	Average, dB(A), Leq (30min) (2)	Range, dB(A), Leq (30min) (2)	Action Level	Limit Level, dB(A)
SR77 (M1)(1)	68	62.5 – 73.5	When one documented valid complaint is received	75

Remark:
(1) Station / NSR ID as identified in Updated EM&A Manual / EIA Report for Widening of Tolo Highway/Fanling Highway between Island House Interchange and Fanling
(2) +3dB(A) façade correction included

5.7.2 Major noise sources during the noise monitoring included construction activities of the Project and that along Tai Wo Service Road East, and nearby traffic noise.

5.7.3 No noise complaint was received in the reporting month; hence, no Action Level exceedance was recorded. No Limit Level exceedance of noise was recorded in the reporting month.

5.7.4 The Event and Action Plan for the occurrence of non-compliance of the noise criteria is annexed in **Appendix F**.

6 WATER MONITORING

6.1 Monitoring Requirements

6.1.1 In accordance with the Updated EM&A Manual, during the course of the culvert extension works, monitoring shall be undertaken on three occasions per week. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit levels.

6.2 Monitoring Equipment

6.2.1 The equipment used in the water quality monitoring programme is summarised in **Table 6.1**.

Table 6.1 Water Quality Monitoring Equipment

Equipment	Model and Make
Turbidity meter	HACH Model 2100 Q (Serial No. 12010C015757)
Multimeter (Scope of Test: Conductivity, Dissolved Oxygen, pH, Salinity and Temperature)	YSI Proplus (Serial No. 09K100735)

6.2.2 The monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS before use and subsequently re-calibrated at 3-monthly intervals throughout all stages of the water quality monitoring. Copies of the calibration certificates for the water quality monitoring equipment are attached in **Appendix C**.

6.3 Monitoring Parameters, Frequency and Duration

6.3.1 Measurements for each monitoring station were conducted 3 days per week for the reporting month. **Table 6.2** summarises the monitoring parameters, frequency and duration of the baseline water quality monitoring.

Table 6.2 Water Quality Monitoring Parameters, Frequency and Duration

Monitoring Stations	Parameter, unit	Frequency
Control Stations: C3a and C3b Impact Station: I5	- Depth, m - Temperature, ℃ - Salinity, ppt - pH - DO, mg/L - DO Saturation, % - Turbidity, NTU - SS, mg/L	3 days per week

6.4 Monitoring Locations

6.4.1 According to the Updated EM&A Manual, measurements were taken at all impact and control stations as summarised in **Table 6.3**. The locations of the monitoring stations are shown in **Figure 3**.

Table 6.3 Locations of Water Quality Monitoring

Station	Description	Easting	Northing
I5	Downstream of Ma Wat River (Yuen Leng)	833931	837859
C3a	Upstream of Ma Wat River (Nam Wa Po)	833816	837644
C3b	Upstream of Ma Wat River (Yuen Leng)	833931	837736

6.5 Monitoring Methodology

Instrumentation

6.5.1 The parameters of in-situ measurements included water depth, dissolved oxygen (DO), dissolved oxygen saturation (DOS), turbidity level, pH value and water temperature.

Operating/Analytical Procedures

6.5.2 Since water depths for all monitoring stations were less than 1m throughout the whole baseline measurement period, only mid-depth level was monitored.

6.5.3 At each monitoring station, at least duplicate readings of dissolved oxygen content and turbidity were taken. The probes were retrieved out of the water after the first measurement and then re-deployed for the second measurement.

6.5.4 Water samples were collected by the water sampler and filled into polyethylene bottles for laboratory determination of suspended solids. Sampling bottles were pre-rinsed with the same water samples, and filled up to the rim, capped tightly and labeled immediately. The sample bottles were then packed into a cool-box kept at 4℃, and delivered to a HOKLAS accredited laboratory, ALS Technichem (HK) Pty Ltd for analysis. The results for laboratory analysis of suspended solids are presented in **Appendix H**.

6.6 Monitoring Schedule for the Reporting Month

6.6.1 The schedule for environmental monitoring in the reporting month is provided in **Appendix D**.

6.7 Monitoring Results

6.7.1 The water quality criteria, namely Action and Limit Levels, as specified in the Updated EM&A Manual are shown in **Table 6.4**.

Table 6.4 Action and Limit Levels for Water Quality Monitoring

Parameters	Action	Limit
DO in mg/L	6.7 mg/L	4 mg/L or 40% saturation at 15 degree Celsius
SS in mg/L	42.6 mg/L or 120% of upstream control station's SS of the same day	46.8 mg/L or 130% of upstream station's SS of the same day and specific sensitive receiver water quality requirements

Parameters	Action	Limit
Turbidity (Tby) in NTU	81.9 mg/L or 120% of upstream control station's Tby of the same day	91.9 mg/L or 130% of upstream control station's Tby of the same day

Notes:
For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
For SS and Tby, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

6.7.2 The detailed water quality monitoring results and the graphical presentation of water quality monitoring data for the current and past reporting months are presented in **Appendix I**.

6.7.3 The possible influences in monitoring results were suspected to be the domestic discharges, and possible erosion of silt after rainfall at up-stream locations.

6.7.4 Two (2) exceedances of Limit Level on Turbidity were recorded on 18 and 27 December 2013. One (1) exceedance of Action Level on 6 December 2013 and one (1) exceedance of Limit Level on Suspended Solids on 18 December 2013 were recorded in the reporting month. Investigation for the exceedances had been conducted which concluded that the exceedances event on 6 December 2013 on Suspended Solids and on 27 on Turbidity were not related to the construction works while the exceedance event on 18 December 2013 on both Suspended Solids and Turbidity were considered related to a leakage of the diverted river through the concrete blocks. Necessary remedy actions have been completed and the investigation reports for the incidents are presented in **Appendix L**.

6.7.5 The Event and Action Plan for the occurrence of non-compliance of the water quality criteria is annexed in **Appendix F**.

7 WASTE MANAGEMENT

7.1.1 The Contractor has registered as a chemical waste producer of the Project. The C&D materials and waste sorting were carried out on-site. Receptacles were provided for general refuse collection.

7.1.2 As advised by the Contractor, a total of 177m^3 of excavated material has been generated. 140m^3 of inert C&D materials was disposed of at public fill to Tuen Mun Area 38, while 30m^3 of inert C&D materials were reused on site. 55kg of general refuse was disposed of at North East New Territories (NENT) Landfill. No paper/cardboard packaging, plastics and metals were collected by recycling contractor in the reporting month. No chemical waste was collected by licensed contractor in the reporting period. Details of the waste management data are presented in **Appendix J**.

7.1.3 The Contractor was advised to properly maintain the on-site C&D materials and waste collection, sorting and recording system, and maximize the reuse/recycle of C&D materials and wastes. The Contractor was also reminded to properly maintain the site tidiness and dispose of wastes accumulated site regularly and properly.

7.1.4 The Contractor was reminded that chemical waste containers should be properly treated and stored temporarily in the designated chemical waste storage area on-site in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.

8 ENVIRONMENTAL SITE INSPECTION AND AUDIT

8.1 Site Inspection

8.1.1 Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for the Project. A summary of the site inspection is provided in **Appendix K**.

8.1.2 In the reporting month, 5 site inspections were carried out on 4, 11, 18, 23 and 30 December 2013. The one held on 23 December 2013 was a joint inspection with the IEC, ER, ET and Contractor. No site inspection was conducted by the EPD during the reporting month. No non-compliance was recorded during the site inspection. A summary of the reminders and observations recorded during the site inspections are presented in **Table 8.1**.

Table 8.1 Observations and Recommendations of Site Audit

Parameters	Date	Observations and Recommendations	Follow-up
Water Quality	26 Nov 2013	Observation: A water pump at the box culvert works area was connected directly to the river. The Contractor should either remove the pump or connect it to water treatment facility before discharge.	The Contractor has removed the water pump which directly connected to the river as observed by the ET weekly site inspection on 04 December 2013.
	13 Nov 2013	Reminder: The Contractor was reminded to regularly inspect and maintain the performance of the AquaSed.	The performance of the AquaSed was improved as observed during the ET weekly site inspection on 04 December 2013.
	4 Dec 2013	Observation: The Contractor was advised to remove the water pump at the box culvert work area connected to the river, to avoid discharge of untreated water.	The Contractor has removed the water pump at the box culvert work area as observed during the ET weekly site inspection on 11 December 2013.
	4 Dec 2013	Reminder: The Contractor was reminded to provide impervious sheeting to cover the stockpile.	Impervious sheets were provided to cover the stockpile as observed during the ET site inspection on 18 December 2013.
	4 Dec 2013	Reminder: The Contractor was reminded to properly maintain the functioning of the AquaSed.	The functioning of the AquaSed was properly maintained as observed during the ET site inspection on 18 December 2013.
	18 Dec 2013	Observation: Water flow from the upstream river was spread over the box culvert extension works area. The Contractor should enhance the performance of water flow diversion.	No seepage of upstream water into the works area was observed during the ET's weekly site inspection on 23 December 2013. The performance of water flow diversion was enhanced.
	30 Dec 2013	Observation: Muddy runoff was observed leaving the box culvert extension works area to the stream. The Contractor should implement sufficient and proper mitigation measures to avoid such issue to occur.	The Contractor has constructed concrete bund at the boundary of earth works closed to the stream. No muddy runoff was observed entering the stream during the ET's site inspection on 6 January 2013.

Parameters	Date	Observations and Recommendations	Follow-up
Air Quality	18 Dec 2013	Reminder: The Contractor was reminded to ensure all vehicles are washed properly at wheel washing facility before they leave the work site.	Stop sign in Chinese was provided in front of the wheel washing facility and workers were trained to ensure all vehicles are washed properly before they leave the work site as observed during the ET's site inspection on 23 December 2013.
	18 Dec 2013	Reminder: The Contractor was reminded to cover the stockpile on site entirely with impervious sheeting.	The stockpiles were fully covered with impervious sheeting while they were not in use.
Noise	N/A	N/A	N/A
Waste / Chemical Management	26 Nov 2013	Observation: An oil drum was observed without secondary containment. The Contractor should ensure the provision of drip trays for all chemical/oil containers.	The Contractor has provided drip tray for the chemical container as observed during the ET weekly site inspection on 04 December 2013.
	4 Dec 2013	Observation: Chemical for the AquaSed was observed without secondary containment. The Contractor was advised to provide drip tray to avoid chemical spillage.	The Contractor has provided secondary containments for the chemical containers as observed during the ET weekly site inspection on 11 December 2013.
Landscape & Visual	4 Dec 2013	Observation: The Contractor was advised to properly set up tree protection zone to all retained and to be transplanted tree.	Tree protection zones were set up for all retained trees and trees to be transplanted as observed during the ET site inspection on 18 Dec 2013.
	18 Dec 2013	Reminder: The Contractor was reminded to enlarge the tree protection zone for a tree to be transplanted near the bore piling works area.	The tree protection zone for a tree to be transplanted near the bore piling works area was enlarged as observed during the ET's weekly site inspection on 23 December 2013.
Permits / Licenses	N/A	N/A	N/A

9 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

9.1.1 The Contractor has implemented the relevant environmental mitigation measures as specified in the EIA Reports, EPs and updated EM&A Manual. The implementation status of environmental mitigation measures during the reporting period is summarized in **Appendix K**. The status of the required submissions under the EP during the reporting period is summarized in **Table 9.1**.

Table 9.1 Status of Required Submission under Environmental Permit

EP Condition	Submission	Submission Date
Condition 3.3	Monthly EM&A Report	13 December 2013

10 ENVIRONMENTAL NON-CONFORMANCE

10.1 Summary of Monitoring Exceedances

10.1.1 Investigation for the exceedances events on 16, 22 and 28 November 2013 for 24-hour TSP monitoring have been completed. The exceedances were considered not related to the construction works and the respective investigation reports are presented in **Appendix L**.

10.1.2 Three (3) Action Level exceedances of 24-hour TSP monitoring were recorded on 4, 21 and 27 December 2013 while one (1) Limit Level exceedance was recorded on 10 December 2013 at the monitoring location (SR77) in the reporting month. Investigation for the exceedances have been conducted and concluded not related to the project works. The investigation reports for the incidents are presented in **Appendix L**.

10.1.3 All 1-hour TSP results were below the Action and Limit Levels in the reporting month.

10.1.4 No noise complaint was received in the reporting month; hence, no Action Level exceedance was recorded. No Limit Level exceedance of noise was recorded in the reporting month.

10.1.5 Two (2) exceedances of Limit Level on Turbidity were recorded on 18 and 27 December 2013. One (1) exceedance of Action Level on 6 December 2013 and one (1) exceedance of Limit Level on Suspended Solids on 18 December 2013 were recorded in the reporting month. Investigation for the exceedances had been conducted which concluded that the exceedances event on 6 December 2013 on Suspended Solids and on 27 on Turbidity were not related to the construction works while the exceedance event on 18 December 2013 on both Suspended Solids and Turbidity were considered related to a leakage of the diverted river through the concrete blocks. Necessary remedy actions have been completed and the investigation reports for the incidents are presented in **Appendix L**.

10.2 Summary of Environmental Non-Compliance

10.2.1 No environmental non-compliance was recorded in the reporting month. The cumulative statistics are provided in **Appendix M**.

10.3 Summary of Environmental Complaints

10.3.1 No environmental complaint was received in the reporting month. The cumulative statistics are provided in **Appendix M**.

10.4 Summary of Environmental Summon and Successful Prosecutions

10.4.1 No environmental related prosecution or notification of summons was received in the reporting month. The cumulative statistics are provided in **Appendix M**.

11 FUTURE KEY ISSUES

11.1 Construction Programme for the Next Month

11.1.1 The major construction works in the coming reporting month are anticipated to include:

- Erection of site office;
- Cable detection and trial trenches;
- Pre-drilling works and piling works;
- Tree felling works, waterworks and excavation works;
- Dismantling works for abandoned houses;
- Slope upgrading works;
- Noise Barrier Installation;
- Extension of box culvert;
- Construction of haul road and temporary soil platform for geotechnical works; and
- Laying of concrete pipe works.

11.2 Key Issues for the Coming Month

11.2.1 Key issues to be considered in the coming month are anticipated to include:

- Site runoff should be properly collected and treated prior to discharge;
- Properly maintain all drainage facilities and wheel washing facilities on site;
- Chemical, chemical waste and waste management;
- Tree protective measures for all retained trees should be well maintained; and
- Expose slopes and dusty stockpile should be covered up properly if no temporary work will be conducted.

11.3 Monitoring Schedule for the Next Month

11.3.1 The tentative schedule for environmental monitoring for the coming month is provided in **Appendix D**.

12 CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

12.1.1 The construction phase EM&A programme of the Project commenced on 5 November 2013.

12.1.2 The 1-hr TSP, 24-hr TSP, noise and water monitoring were carried out in the reporting period.

12.1.3 Investigation for the exceedances events on 16, 22 and 28 November 2013 for 24-hour TSP monitoring have been completed. The exceedances were considered not related to the construction works and the respective investigation reports are presented in **Appendix L**.

12.1.4 Three (3) Action Level exceedances of 24-hour TSP monitoring were recorded on 4, 21 and 27 December 2013 while one (1) Limit Level exceedance was recorded on 10 December 2013 at the monitoring location (SR77) in the reporting month. Investigation for the exceedances have been conducted and concluded not related to the project works. The investigation reports for the incidents are presented in **Appendix L**.

12.1.5 All 1-hour TSP results were below the Action and Limit Levels in the reporting month.

12.1.6 No noise complaint was received in the reporting month; hence, no Action Level exceedance was recorded. No Limit Level exceedance of noise was recorded in the reporting month.

12.1.7 Two (2) exceedances of Limit Level on Turbidity were recorded on 18 and 27 December 2013. One (1) exceedance of Action Level on 6 December 2013 and one (1) exceedance of Limit Level on Suspended Solids on 18 December 2013 were recorded in the reporting month. Investigation for the exceedances had been conducted which concluded that the exceedances event on 6 December 2013 on Suspended Solids and on 27 on Turbidity were not related to the construction works while the exceedance event on 18 December 2013 on both Suspended Solids and Turbidity were considered related to a leakage of the diverted river through the concrete blocks. Necessary remedy actions have been completed and the investigation reports for the incidents are presented in **Appendix L**.

12.1.8 Five (5) environmental site inspection was carried out in the reporting month. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audit.

12.2 Recommendations

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

Water Quality

- Implement proper mitigation measures (e.g. sand bags) to avoid earth, mud and debris leaving the works area via storm water drainage;
- Properly maintain the water treatment system and also ensure proper treatment of wastewater before discharge;

- Avoid waste being accumulated near the water stream; and
- Ensure drainage facilities erosion and sediment control structures are well maintained and inspected regularly.

Chemical and Chemical Waste Management

- Ensure the provision of drip tray for chemical being stored on site to avoid chemical spillage.

Landscape & Visual

- Ensure the provision of tree protection zone for all existing trees to be transplanted or retained.