


Meinhardt Infrastructure and Environment Limited

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

**Baseline Monitoring Report**

(October 2013)

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Position: Environmental Team Leader

Date: 18 October 2013



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Dear Sir,

18 October 2013  
By Fax (2805 5028) & Post

**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 3.2 – Submission of Baseline Monitoring Report for the portion of Stage 2 works entrusted to CEDD under Contract No. CV/2012/09**





We refer to the revised Baseline Monitoring Report received on 16 October 2013 submitted by ET via email. Pursuant to EP Condition 3.2, I hereby verify the Baseline Monitoring Report (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

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

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)  
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## EXECUTIVE SUMMARY

The widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling (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 Project is a Designated Project under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO). An Environmental Impact Assessment (EIA) Report together with an Environmental Monitoring and Audit (EM&A Manual were completed and approved under the EIAO on 14 July 2000 (Register Number: EIA-043/2000). The project was governed by an Environmental Permit (EP) (EP-324/2008) which 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.

The construction works for this Project 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.

The construction works of Stage 1 under the EP commenced in November 2009 and is planned to be completed in December 2013 tentatively, while the works of Stage 2 will be planned to commence in November 2013 and complete by end of 2016.

A portion of Stage 2 works has been 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 Construction & Engineering Co Ltd (Chun Wo). The demarcation of the entrusted portion of works is indicated in **Figure 1**.

Meinhardt Infrastructure & Environment Ltd 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.

### *Air Quality*

The baseline air quality monitoring comprising three 1-hour and one 24-hour Total Suspended Particulates (TSP) was conducted at one monitoring station for 14 consecutive days from 4 September to 17 September 2013. The weather conditions during the monitoring period were mostly sunny with occasional cloudier conditions interspersed with bouts of rainfall in between. No major dust source affecting the monitoring results was observed. The data collected were reviewed and analysed to establish the Action and Limit Levels for air quality during impact monitoring period.

### *Airborne Noise*

The baseline airborne noise monitoring comprising of monitoring of  $L_{eq}$ ,  $L_{10}$  and  $L_{90}$  was conducted at one monitoring station over full continuous 24 hour periods between 4 September and 18 September 2013. There was no other major activity influencing the measured noise level during the baseline noise monitoring period. The dominant noise sources were railway and nearby traffic.

### *Water Quality*

The baseline water quality monitoring comprising dissolved oxygen level, dissolved oxygen saturation, water temperature, turbidity, suspended solids and pH value was carried out 3 days per week for 4 weeks between 26 August 2013 and 20 September 2013 at three water quality monitoring locations. No water quality monitoring was conducted under inclement weather condition such as in the presence of rain. The possible influences in monitoring results were suspected to be animals and birds movements to disturb riverbed sediment, domestic discharges in the vicinity, and possible site runoff from other construction works along the upper stream of the river. The data collected were reviewed and analysed to establish the Action and Limit Levels for water quality during the impact monitoring period.

## 1.0 INTRODUCTION

### 1.1 Background

- 1.1.1 Tolo Highway and Fanling Highway are expressways in the North East New Territories connecting Sha Tin, Tai Po and Fanling. These highways form a vital part of the strategic Route 1, which links Hong Kong Island to Shenzhen. At present, this section of Route 1 is dual 3-lane carriageway. However, at several major interchanges along this section of Route 1, the highway is only dual-2 lane. Severe congestion is a frequent occurrence during peak periods, particularly in the Kowloon bound direction.
- 1.1.2 The objective of the Widening of Tolo Highway / Fanling Highway between Island House Interchange and Fanling (the Project) 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 under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO). An Environmental Impact Assessment (EIA) Report together with an Environmental Monitoring and Audit (EM&A Manual) were completed and approved under the EIAO on 14 July 2000 (Register Number: EIA-043/2000). The project was 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.
- 1.1.4 The construction works for this Project 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.
- 1.1.5 The construction works of Stage 1 under the EP commenced in November 2009 and is planned to be completed in December 2013 tentatively. The works of Stage 2 will be 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.
- 1.1.6 A portion of Stage 2 works of the Project has been 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 Construction & Engineering Co Ltd (Chun Wo). The demarcation of the entrusted portion of works is indicated in **Figure 1**. AECOM Asia Co Ltd was appointed by the Civil Engineering and Development Department (CEDD) as the consultant for the design and construction assignment for the Liantang development.
- 1.1.7 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.



1.1.8 The baseline monitoring was undertaken and this Baseline Monitoring Report was prepared prior to commencement of construction of Stage 2 works of the Project in accordance with Condition 3.2 of EP.

## 1.2 Purpose of the Baseline Monitoring Report

1.2.1 In accordance with the Updated EM&A Manual, environmental baseline monitoring was carried out at one air quality, one noise monitoring station, and three water monitoring locations within the entrusted portion of works. This Baseline Monitoring Report presents baseline findings of these monitoring stations, as well as the background noise levels monitored for future reference during the construction works phase.

1.2.2 The purposes of this Baseline Monitoring Report are to:

- Summarise the findings of baseline air quality, noise and water quality monitoring; and
- Establish the Action and Limit (A/L) levels in accordance with the Updated EM&A Manual for the subsequent impact monitoring during construction stage.

## 1.3 Report Structure

1.3.1 This Baseline Monitoring Report comprises the following sections:

- Section 1 introduces the background of the Project, entrusted portion of works and purpose of this Report;
- Section 2 presents the baseline monitoring requirements, methodologies and monitoring results of air quality;
- Section 3 presents the baseline monitoring requirements, methodologies and monitoring results of noise;
- Section 4 presents the baseline monitoring requirements, methodologies and monitoring results of water quality; and
- Section 5 concludes the findings of baseline monitoring.

## 2.0 AIR QUALITY MONITORING

### 2.1 Monitoring Requirement

2.1.1 In accordance with the Updated EM&A Manual, the baseline 1-hr and 24-hr total suspended particulate (TSP) levels should be established by conducting baseline 1-hr and 24-hr TSP monitoring daily for at least 14 consecutive days or at least two weeks prior to the commissioning of major construction works.

### 2.2 Monitoring Equipment

2.2.1 24-hr TSP air quality monitoring at the monitoring stations were performed using High Volume Sampler (HVS), of which their locations and operation satisfy, as far as practicable, all the requirements stated in the Updated EM&A Manual. Portable direct reading dust meters were used to carry out the 1-hr TSP monitoring. Portable direct reading dust meters used in this baseline monitoring were proven to be capable of achieving comparable result as that of the HVS and could be used for sampling. Brand and model of the equipment are given in **Table 2.1**.

**Table 2.1 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

2.2.2 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.

2.2.3 Each HVS was calibrated using TE-5025A Calibration Kit prior to the commencement of baseline monitoring. Calibration certificate of the TE-5025A Calibration Kit and the HVS are provided in **Appendix A**.

2.2.4 The 1-hr TSP meter was calibrated at 1-year interval against a continuous particulate TEOM Monitor, Series 1400ab. Calibration certificates of the Laser Dust Monitors are provided in **Appendix A**.

### 2.3 Monitoring Locations

2.3.1 The Updated EM&A Manual specifies the baseline air quality monitoring location. However, the original monitoring station AM1, SR83A (Yuen Leng) (as indicated in **Figure 2**) fell within the demarcation of the captioned entrusted portion of works. It is known that the premises at and adjacent to SR83A will soon be resumed and then demolished to form the construction sites for Liantang/Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure works (as illustrated in **Figure 3**). As such, SR83A was considered no longer appropriate to carry out the baseline and impact monitoring for the captioned entrusted portion of works.

2.3.2 Taking into consideration the selection criteria stated in the Updated EM&A Manual, the monitoring location has been relocated to SR77 (Yuen Leng 2) (also indicated in

**Figures 2 and 3).** This alternative monitoring location has been proposed to AECOM Asia Co Ltd (refer to the relocation proposal in **Appendix B**).

2.3.3 **Table 2.2** describes the details of air quality monitoring with the monitoring location shown in **Figure 3**.

**Table 2.2 Details of Baseline Air Quality Monitoring**

Air Monitoring Station ID	Original Monitoring Location (Station ID) in Updated EM&A Manual	Alternative Monitoring Location	Description	Monitoring Period
SR77 <sup>(1)</sup>	Yuen Leng (AM1, SR83A <sup>(1)</sup> )	Yuen Leng 2	Residential, Ground floor	4 Sep 2013 – 17 Sep 2013

Remark:

(1) 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

## 2.4 Monitoring Parameters, Frequency and Duration

2.4.1 **Table 2.3** summarises the monitoring parameters, frequency and duration of baseline TSP monitoring.

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

Parameter	Duration	Frequency and
1-hr TSP	14 consecutive days or at least two weeks prior to commencement of major construction works	3 times per day
Continuous 24-hr TSP		Daily

## 2.5 Monitoring Methodology

### *24-hr TSP Monitoring*

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

2.5.2 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>).

2.5.3 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.

2.5.4 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.

2.5.5 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.

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

*1-hr TSP Monitoring*

- 2.5.7 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.

- 2.5.8 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.

**2.6 Results and Observations**

- 2.6.1 The baseline air quality monitoring was conducted between 4 September and 17 September 2013. Apart from 4 September 2013 and 5 September 2013 being rainy days, the weather of remaining dates was sunny. No major dust source affecting the monitoring results was observed. Details of influencing factors such as weather conditions and site observation are presented in **Appendix C**.

- 2.6.2 The baseline monitoring results for 1-hr and 24-hr TSP are summarised in **Tables 2.4** and **2.5** respectively. Detailed air quality monitoring results and graphical presentation of air quality monitoring data are presented in **Appendix C**.

**Table 2.4 Summary of 1-hr TSP Baseline Monitoring Results**

1-hr TSP Levels	Yuen Leng 2
Dust Monitoring Station ID	SR77 <sup>(1)</sup>
Average ( $\mu\text{g}/\text{m}^3$ )	65.6
Range ( $\mu\text{g}/\text{m}^3$ )	27.0 – 109.0

Remark:

(1) 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 2.5 Summary of 24-hr TSP Baseline Monitoring Results**

24-hr TSP Levels	Yuen Leng 2
Dust Monitoring Station ID	SR77 <sup>(1)</sup>
Average ( $\mu\text{g}/\text{m}^3$ )	62.0
Range ( $\mu\text{g}/\text{m}^3$ )	29.4 – 109.0

Remark:

(1) 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

**2.7 Action and Limit Levels**

- 2.7.1 The air quality monitoring results, in terms of 1-hr TSP and 24-hr TSP, were below the Limit Level set out in the EIAO-TM and Air Quality Objective (AQO) respectively at the monitoring locations. The Action and Limit Levels for air quality impact monitoring were

established according to the criteria and methodology in the Updated EM&A Manual as presented in **Table 2.6**.

**Table 2.6 Derivation of Action and Limit Levels for Air Quality**

Parameter	Action Level	Limit Level
1-hr TSP Level in $\mu\text{g}/\text{m}^3$	For Baseline Level $\leq 384 \mu\text{g}/\text{m}^3$ , Action Level = (baseline level * 1.3 + Limit level) / 2 For Baseline Level $> 384 \mu\text{g}/\text{m}^3$ , Action Level = Limit Level	500 $\mu\text{g}/\text{m}^3$
24-hr TSP Level in $\mu\text{g}/\text{m}^3$	For Baseline Level $\leq 200 \mu\text{g}/\text{m}^3$ , Action Level = (baseline level * 1.3 + Limit level) / 2 For Baseline Level $> 200 \mu\text{g}/\text{m}^3$ , Action Level = Limit Level	260 $\mu\text{g}/\text{m}^3$

2.7.2 **Table 2.7** shows the derived Action and Limit Levels for air quality impact monitoring for the Project.

**Table 2.7 Action and Limit Levels for Air Quality**

Parameter	Monitoring Station	Action Level ( $\mu\text{g}/\text{m}^3$ )	Limit Level ( $\mu\text{g}/\text{m}^3$ )
1-hr TSP Level in $\mu\text{g}/\text{m}^3$	SR77	292.7	500
24-hr TSP Level in $\mu\text{g}/\text{m}^3$		170.3	260

## 3.0 NOISE MONITORING

### 3.1 Monitoring Requirements

3.1.1 As stated in the Updated EM&A Manual, baseline noise monitoring is not normally required in accordance with the “Environmental Monitoring and Audit Guidelines for Development Projects in Hong Kong” issued by EPD in 1998. However, in order to obtain background noise levels for future reference, baseline noise monitoring was conducted for 14 consecutive days prior to the commissioning of major construction works.

### 3.2 Monitoring Equipment

3.2.1 Noise monitoring was performed using sound level meter at each monitoring station. The sound level meters deployed comply with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications. Acoustic calibrators were deployed to check the sound level meters at a known sound pressure level. The brand and model of the equipment is given in **Table 3.1**.

**Table 3.1 Noise Monitoring Equipment**

Equipment	Brand and Model	Quantity	Serial Number
Integrated Sound Level Meter	B&K (Model No. 2238)	1	2694908
Acoustic Calibrator	B&K (Model No. 4231)	1	2685684

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

### 3.3 Monitoring Locations

3.3.1 Baseline monitoring was conducted at the proposed impact monitoring location as identified in the Updated EM&A Manual. The original monitoring station M1, SR83A (Yuen Leng) (as indicated in **Figure 2**) fell within the demarcation of the captioned entrusted portion of works. It is known that the premises at and adjacent to SR83A will soon be resumed and then demolished to form the construction sites for Liantang/Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure works (as illustrated in **Figure 3**). As such, SR83A is considered no longer appropriate to carry out the baseline and impact monitoring for the captioned entrusted portion of works.

3.3.2 Taking into consideration the selection criteria stated in the Updated EM&A Manual, the monitoring location has been relocated to SR77 (Yuen Leng 2) (also indicated in **Figures 2 and 3**). This alternative monitoring location has been proposed to AECOM Asia Co Ltd (refer to the relocation proposal in **Appendix B**).

3.3.3 The baseline airborne noise monitoring was conducted between 4 September and 18 September 2013. **Figure 2 and 3** shows the location of the monitoring station. **Table 3.2** describes the details of the noise monitoring.

**Table 3.2 Locations of Baseline Noise Monitoring Stations**

Air Monitoring Station ID	Original Monitoring Location (Station ID) in Updated EM&A Manual	Alternative Monitoring Location	Description	Monitoring Period
SR77 <sup>(1)</sup>	Yuen Leng (AM1, SR83A <sup>(1)</sup> )	Yuen Leng 2	Residential, Ground floor	4 Sep 2013 – 18 Sep 2013

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

### 3.4 Monitoring Parameters, Frequency and Duration

3.4.1 **Table 3.3** summarises the monitoring parameters, frequency and duration of baseline noise monitoring.

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

Time Period	Duration, min	Parameters
Daytime: 0700-1900 hrs on normal weekdays	30 ( $L_{eq(30-min)}$ )	$L_{eq}$ , $L_{10}$ & $L_{90}$
Evening: 1900-2300 hrs on normal weekdays	15 (average of 3 consecutive $L_{eq(5-min)}$ )	
General Holidays and Sundays 0700-2300 hrs		
Night-time: 2300-0700 hrs on all days		

### 3.5 Monitoring Methodology

3.5.1 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:  $L_{eq}$ ,  $L_{10}$  and  $L_{90}$
  - (iv) time measurement:  $L_{eq(30-min)}$  during non-restricted hours i.e. 07:00 – 1900 hrs on normal weekdays;  $L_{eq(5-min)}$  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.

### 3.6 Results and Observations

3.6.1 There was no other major activity influencing the measured noise level during the baseline noise monitoring period. The dominant noise sources were railway and nearby traffic. Details of influencing factors such as weather conditions and site observation are presented in **Appendix D**.

3.6.2 Baseline noise monitoring was conducted for 14 consecutive days to obtain the background noise data. The baseline noise monitoring results are summarised in **Tables 3.4 to 3.6**. Detailed noise monitoring results and the graphical presentation of noise level monitoring data are presented in **Appendix D**.

**Table 3.4 Summary of Baseline Daytime Noise Monitoring Results**

Noise Monitoring Station ID	Time period	30-min Average Noise Levels, dB(A) <sup>(2)</sup>			Range, dB(A)		
		Leq	L10	L90	Leq	L10	L90
SR77 <sup>(1)</sup>	0700 – 1900 hrs of normal weekdays	67.8	71.1	59.0	65.7 – 72.2	69.6 – 75.3	57.2 – 61.3

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

**Table 3.5 Summary of Baseline Evening, Sunday and Public Holiday Noise Monitoring Results**

Noise Monitoring Station ID	Time period	5-min Average Noise Levels, dB(A) <sup>(2)</sup>			Range, dB(A)		
		Leq	L10	L90	Leq	L10	L90
SR77 <sup>(1)</sup>	1900 – 2300 hrs of normal weekdays, 0700 – 2300 hrs of Sundays and Public Holidays	63.8	67.1	55.3	55.1 – 79.8	57.2 – 81.4	50.9 – 75.5

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



**Table 3.6 Summary of Baseline Night-time Noise Monitoring Results**

Noise Monitoring Station ID	Time period	5-min Average Noise Levels, dB(A) <sup>(2)</sup>			Range, dB(A)		
		L <sub>eq</sub>	L <sub>10</sub>	L <sub>90</sub>	L <sub>eq</sub>	L <sub>10</sub>	L <sub>90</sub>
SR77 <sup>(1)</sup>	2300 - 0700 hrs	61.1	63.5	53.8	56.7 – 67.2	58.9 – 70.4	51.7 – 58.3

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

3.6.3 Results indicated that the average baseline daytime noise monitoring results at the monitoring location are within the criteria of 75dB(A) for residential premises.

### 3.7 Action and Limit Levels

3.7.1 During the impact monitoring period, the baseline noise level should be deducted from the future impact monitoring result for comparison with the Limit Level.

3.7.2 The Action and Limit Levels of noise monitoring have been set in accordance with the criteria specified in the Updated EM&A Manual as shown in **Table 3.8** below.

**Table 3.7 Criteria for Action and Limit Levels for Construction Noise**

Time Period	NSR ID	Monitoring Station	Action Level	Limit Level, dB(A)
0700-1900 hrs of normal weekdays	SR77 <sup>(1)</sup>	Yuen Leng 2	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

## 4.0 WATER QUALITY MONITORING

### 4.1 Monitoring Requirements

4.1.1 In accordance with the Updated EM&A Manual, baseline water quality monitoring was undertaken to establish the baseline water quality levels at three monitoring stations. The baseline monitoring was conducted 3 days per week for 4 weeks prior to the commencement of the entrusted works which is tentatively scheduled to commence in November 2013.

### 4.2 Monitoring Equipment

4.2.1 Equipment used in the baseline water quality monitoring programme is summarised in **Table 4.1**. A copy of the calibration certificates for the water quality monitoring equipments are attached in **Appendix A**.

**Table 4.1 Water Quality Monitoring Equipment**

Equipment	Model and Make
DO and Temperature Meter, Salinity Meter, pH meter	YSI Model Professional Plus (Serial no. 09K100735)
Turbidimeter	HACH Model 2100 Q (Serial no. 11050C001264)

### 4.3 Monitoring Parameters, Frequency and Duration

4.3.1 Measurements for each monitoring station were conducted 3 days per week for 4 weeks between 26 August 2013 and 20 September 2013. **Table 4.2** summarises the monitoring parameters, frequency and duration of the baseline water quality monitoring.

**Table 4.2 Water Quality Monitoring Parameters, Frequency and Duration**

Monitoring Stations	Parameter, unit	Frequency
<i>Control Stations: C3a and C3b</i> <i>Impact Station: I5</i>	<ul style="list-style-type: none"> <li>• Depth, m</li> <li>• Temperature, °C</li> <li>• Salinity, ppt</li> <li>• pH</li> <li>• DO, mg/L</li> <li>• DO Saturation, %</li> <li>• Turbidity, NTU</li> <li>• SS, mg/L</li> </ul>	3 days per week (for 4 weeks)

### 4.4 Monitoring Locations

4.4.1 According to the Updated EM&A Manual, the measurements were taken at all impact and control stations summarised in **Table 4.3**. The locations of the monitoring stations are shown in **Figure 4**.

**Table 4.3 Locations of Water Quality Impact Stations**

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

## 4.5 Monitoring Methodology

### *Instrumentation*

- 4.5.1 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*

- 4.5.2 Since water depths for all monitoring stations were less than 1m throughout the whole baseline measurement period, only mid-depth level was monitored.
- 4.5.3 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.
- 4.5.4 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 are filled up to the rim, capped tightly and labeled immediately. The sample bottles were then packed into a cool-box kept at 4°C, 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 E**.

### *Maintenance and Calibration*

- 4.5.5 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.

## 4.6 Results and Observations

- 4.6.1 The baseline water quality monitoring for all the three monitoring stations was conducted between 26 August 2013 and 20 September 2013. The monitoring results are summarised in **Tables 4.4**. Details of water quality monitoring results and graphical presentation of water quality monitoring data are presented in **Appendix F**.

**Table 4.4 Summary of Baseline Water Quality Monitoring Results**

Locations		Parameters				
		Salinity (ppt)	Dissolved Oxygen (mg/L)	pH	Turbidity (NTU)	Suspended Solids (mg/L)
I5	Avg.	<0.1	8.0	7.8	26.1	16.4
	Min.	<0.1	6.6	7.6	11.9	6
	Max.	<0.1	8.8	8.2	92.3	47
C3a	Avg.	<0.1	7.5	7.5	22.6	16.1
	Min.	<0.1	5.6	7.3	8.3	4
	Max.	<0.1	8.7	8.3	86.9	51
C3b	Avg.	<0.1	7.6	8.1	51.2	34.3
	Min.	<0.1	6.5	7.5	12.8	7
	Max.	<0.1	8.4	10.1	116.0	88

4.6.2 The weather conditions during the monitoring period were sunny and cloudy. No water quality monitoring was conducted under inclement weather conditions.

4.6.3 The possible influences in monitoring results were suspected to be the presence of fish disturbing riverbed sediment, domestic discharges, and possible erosion of silt after rainfall at up-stream locations.

**4.7 Action and Limit Levels**

4.7.1 The water quality criteria, namely Action and Limit Levels, specified in the Updated EM&A Manual is shown in **Table 4.5**.

**Table 4.5 Derivation of Action and Limit Levels for Water Quality**

Parameters	Action	Limit
DO in mg/L (Surface, Middle & Bottom)	5%-ile of baseline data	4 mg/L or 40% saturation at 15 degree Celsius
SS in mg/L (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's SS at the same tide of the same day	99%-ile of baseline, or 130% of upstream station's SS at the same tide of the same day and specific sensitive receiver water quality requirements
Turbidity (Tby) in NTU (depth averaged)	95%-ile of baseline data or 120% of upstream control station's Tby at the same tide of the same day	99%-ile of baseline or 130% of upstream control station's Tby

Notes:

- (1) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- (2) For SS and Tby, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- (3) All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.

4.7.2 Based on the baseline water quality monitoring results and the derivation criteria specified in the Updated EM&A Manual, the Action and Limit Levels have been derived and are presented in **Table 4.6**.

**Table 4.6 Derived of Action and Limit Levels for Water Quality**

<b>Parameters</b>	<b>Action</b>	<b>Limit</b>
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 at the same tide of the same day	46.8 mg/L or 130% of upstream station's SS at the same tide of the same day and specific sensitive receiver water quality requirements
Turbidity (Tby) in NTU	81.9 mg/L or 120% of upstream control station's Tby at the same tide of the same day	91.9 mg/L or 130% of upstream control station's Tby

## **5.0 CONCLUSION**

### **5.1 Air Quality**

5.1.1 Baseline air quality monitoring was carried out between 4 September and 17 September 2013 at 1 monitoring station SR77. The air quality monitoring results were measured, and the Action and Limit Levels for air quality were derived.

### **5.2 Construction Noise**

5.2.1 Baseline noise quality monitoring was carried out between 4 September and 18 September 2013 at 1 monitoring station SR77. The averaged baseline daytime noise monitoring results were measured, and the Action Level of construction noise is based on documented valid complaints received, while the Limit Level for each monitoring location is set at a specific limit.

### **5.3 Water Quality**

5.3.1 Baseline water quality monitoring was conducted between 26 August and 20 September 2013 at one impact (I5) and two control stations (C3a and C3b). The water quality monitoring results were measured, and the Action and Limit Levels were derived.