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Your Ref :
Our Ref : (CV/2013/08)/M45/200/H03723

22 February 2017

FAXED
24 FEB 2017
BY:

By Hand

Environmental Impact Assessment Ordinance Register Office
Environmental Protection Department
27/F, Southorn Centre,
130 Hennessy Road,
Wanchai, Hong Kong

Attn.: Mr. Charles Pang

Dear Sirs,

Contract No. CV/2013/08
Liantang / Heung Yuen Wai Boundary Control Point
Site Formation and Infrastructure Works – Contract 6

Environmental Permit No. EP-404/2011/D
Condition 2.13 – Submission of Environmental Monitoring and Audit Programme (Revision 7)

With reference to Condition 2.13 of the Environmental Permit (EP) No. EP-404/2011/D for the captioned Project, and on behalf of the Permit Holder, Civil Engineering and Development Department (CEDD), I would like to submit three hard copies of the captioned updated Environmental Monitoring and Audit Programme (Revision 7) for the Project titled "Liantang / Heung Yuen Wai Boundary Control Point and Associated Works", which had been certified by the ET Leader and verified by the IEC for your approval.

Should you have any queries, please contact the undersigned or our Mr. Perry Yam at 2171 3350.

Yours faithfully,

Simon Leung
Chief Resident Engineer
AECOM Asia Co. Ltd.

Encl.

c.c.	CEDD/BCP	- Attn: Mr. Desmond Lam / William Cheung	- 1 hard copy
	AECOM	- Attn: Mr. Francis Leong / Mr. Pat Lam	- 1 CD copy
	SMEC(IEC)	- Attn: Mr. Antony Wong	- 1 CD copy
	AUES(ET)	- Attn: Mr. T. W. Tam	(by fax: 2959 6079) -w/o encl.
	ArchSD/BCP	- Attn: Mr. William Cheng	(by fax: 2804 6805) -w/o encl.
	Ronald Lu	- Attn: Mr. Justin Cheung	(by fax: 2838 6036) -w/o encl.
	Leighton	- Attn: Mr. Jon Kitching / Ms. Lighting Chan	(by fax: 2752 0696) -w/o encl.
	CCKJV	- Attn: Mr. Vincent Chan	-w/o encl.

SL/MW/PY/tc

Liantang / Heung Yuen Wai Boundary Control Point and Associated Works

Environmental Permit (EP No.: EP-404/2011/D)

Environmental Monitoring and Audit Programme (Rev.07)

Issued in Feb 2017

Our Ref: TCS00769/15/300/L0163

AECOM
8/f Grand Central Plaza, Tower 2
138 Shatin Rural Committee Road
Shatin, Hong Kong

Attn: Mr. Simon Leung

20 February 2017
By E-mail

Dear Sir,

Re: Agreement No. CE 45/2008 (CE)
Liantang/ Heung Yuen Wai Boundary Control Point and Associated Works
Environmental Monitoring and Audit (EM&A) Programme (Rev.07)

We herewith certify the Environmental Monitoring and Audit (EM&A) Programme (Rev.07) in accordance with *Condition 2.13* of Environmental Permit No. EP-404/2011/D.

Should you have any queries, please feel free to contact the undersigned at Tel: 2959-6059 or Fax: 2959-6079 or E-mail: twtam@fordbusiness.com.

Yours sincerely,
For and on Behalf of
Action-United Environmental Services & Consulting

T. W. Tam
Environmental Team Leader

cc	ArchSD/BCP	Mr. William WL Cheng	By-email
	Leighton (Contractor of SS C505)	Mr. Jon Kitching	By-email
	Ronald Lu	Mr. Justin Cheung	By-email
	SMEC (IEC)	Mr. Antony Wong	By e-mail

SMEC
Member of the Surbana Jurong Group

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20 February 2017

Our ref: 7076192/L21503/AB/AW/MC/rw

AECOM
8/F, Grand Central Plaza, Tower 2
138 Shatin Rural Committee Road
Shatin, N.T.

By Email & Post

Attention: Mr Simon LEUNG

Dear Sirs

Agreement No. CE 45/2008 (CE)
Liantang/Heung Yuen Wai Boundary Control Point and Associated Works
Independent Environmental Checker – Investigation
Environmental Monitoring and Audit Programme (Rev.07)

With reference to the Environmental Monitoring and Audit Programme (Rev.07) and the ET Leader's certification (ET's ref.: TCS00769/15/300/L0163) received on 20 February 2017, please be noted that we have no adverse comments on the captioned submission. We herewith verify the Environmental Monitoring and Audit Programme in accordance with Condition 2.13 of Environmental Permit No. EP-404/2011/D.

Thank you for your attention and please do not hesitate to contact the undersigned on tel. 3995 8120 or by email to antony.wong@smec.com; or our Mr Man CHEUNG on tel. 3995 8132 or by email to man.cheung@smec.com.

Yours faithfully
for and on behalf of
SMEC Asia Limited

Antony WONG
Independent Environmental Checker

cc	CEDD/BCP	-	Mr Desmond LAM	by fax: 3547 1659
	ArchSD	-	Mr William WL CHENG	by fax: 2804 6805
	AECOM	-	Mr Pat LAM / Mr Perry YAM	by email
	Ronald Lu	-	Mr Peter YAM / Mr Justin CHEUNG	by email
	CW	-	Mr Daniel HO	by email
	DHK	-	Mr Daniel ALTIER	by email
	CCKJV	-	Mr Vincent CHAN	by email
	KRSJV	-	Mr TY LEUNG	by email
	Leighton	-	Mr Jon KITCHING	by email
	AUES	-	Mr TW TAM	by email

Liantang / Heung Yuen Wai Boundary Control Point and Associated Works

List of Changes for the updated EM&A Programme for Rev.07

Section/ Table/ Appendix	Description
Cover page and Section 1.1 of page 1	The Environmental permit is updated to EP-404/2011/D
Section 3.1.5, page 21	In the 2nd paragraph, it is considered that noise measurement during restricted hours periods is not necessary to perform. A supplementary proposal for the changes was attached in Appendix G.
Section 4.1.4, Page 30	At the last paragraph about the water depth for water quality, bullet point (c) was added to clarify that "if no suitable alternative location could be found within 15m far from the original location, the sampling at that location will be cancelled since sampling at too far from the designated location could not make a representative sample."
Appendix G	Supplementary proposal for amendment of Section 3.1.5 is presented in Appendix G.
Appendix I	Supplementary proposal for amendment of Section 4.1.4 is presented in Appendix I.

Liantang / Heung Yuen Wai Boundary Control Point and Associated Works

List of Changes for the updated EM&A Programme for Rev.06

Section/ Table/ Appendix	Description
Table 3-2, page 20	Noise monitoring location NM2a was proposed to replace NM2. The proposal to relocate the noise monitoring station from NM2 to NM2a was verified by IEC and it is attached in Appendix H.
Section 3.1.5, page 21	In the 2nd paragraph, it is considered that noise measurement during restricted hours periods is not necessary to perform. A supplementary proposal for the changes was attached in Appendix G.
Table 4.1, page 27	Water quality monitoring location WM2A(a) was proposed to replace the WM2A in May 2016. The proposal was submitted to EPD on 2 June 2016 after verify by IEC and it was approved by EPD on 27 June 2016.
Section 4.1.4, Page 30	At the last paragraph about the water depth for water quality, bullet point (c) was added to clarify that "if no suitable alternative location could be found within 15m far from the original location, the sampling at that location will be cancelled since sampling at too far from the designated location could not make a representative sample."
Appendix A	The Project Layout Plan is updated.
Appendix C	The location plan for noise monitoring location for Construction Phase is revised.
Appendix E	The location plan for water monitoring location is revised.
Appendix G	Proposal for amendment of Section 3.1.5 is presented in Appendix G.
Appendix H	Proposal for relocate the noise monitoring station from NM2 to NM2a is presented in Appendix H.

Liantang / Heung Yuen Wai Boundary Control Point and Associated Works

List of Changes for the updated EM&A Programme for Rev.05

Section/ Table/ Appendix	Description
1.1, page 1	The EP No. is updated.
1.4, page 2	The Contract no. for Contracts 4 and 6 is updated. Moreover, there are two contracts newly added to LT/HYW project which are Contract 7 (NE/2014/03) and ArchSD Contract No. SS C505. The basic information for Contracts 7 and SS C505 are therefore supplemented.
1.4, page 3	Contract commencement date of Contract 2 is updated.
1.4, page 4	Contract no. and commencement date of Contract 4 is updated.
1.4, page 5	Contract no. and commencement date of Contract 6 is updated.
1.4, pages 5 and 6	Information for new contracts SS C505 and Contract 7 are added.
1.5, page 6	The project organization is updated by adding the role of Architectural Services Department and its architect consultant Ronald Lu & Partners (HK) Limited.
1.6, page 9	Contracts 2, 3 and 4 as well as Contract SS C505 are part of LT/HYW and they are taken from the list to avoid misleading.
Table 2-2, page 13	During construction phase of the project, air monitoring locations AM1a, AM7b and AM9b were proposed to replace the original location and they are summarized in Table 2-1. Moreover, in early November 2015, air monitoring AM1b, AM4ba and AM5a were proposed to replace the original location are summarized in Table 2-1 and the proposal is pending to approval by the EPD.
Table 2-3, page 15	Table 2-3 is revised based on the proposal mentioned in Table 2-2. Moreover, a new column is added in Table 2-3 to show the relationship of air quality monitoring location and the Work Contract.
Table 2-5, page 17	Architect is added in the 1st row of Table 2-5.
Table 3-2, page 20	A new column is added in Table 3-2 to present the relationship of noise monitoring location and the Work Contract.
Table 3-4, page 21	Architect is added in the 1st row of Table 3-4.
Section 4.1.2.4, page 25	Tape measure will normally use for determination of water depth at the monitoring station. There is detection limit for echo sounder and it is not appropriate to use for stream water which water depth lower than 0.5m.

	Moreover, work boat vessel is not necessary for monitoring at stream river under the project. Therefore, the relevant statement is removed.
Table 4.1, page 27	A new column is added in Table 4-1 to show the relationship of water quality monitoring location and the Work Contract. Moreover, in early November 2015, WM2A-controlx and WM3x were proposed to replace the original location and the proposal is pending to approval by EPD.
Section 4.1.4, Page 28	A new paragraph is added to present the proposal of the set-up of depth limit for water quality monitoring stations.
Table 4-2, page 29	In the Baseline Monitoring Report (AUES ref.: TCS00670/13/600/R0030v3 Version 3 dated 16 August 2013), it was proposed to amend the 'OR' requirement in the EM&A Manual for Turbidity and SS to 'AND' condition. A supplementary proposal for the changes was conducted and attached Appendix F.
Table 4-3, page 30	Architect is added in the 1st row of Table 4-3. Moreover, the action plan for ET is revised.
5	Section 5 Sewage and Sewage Treatment Implications which irrelevant to the EM&A programme is removed.
6	Section 6 Waste Management Implications which irrelevant to the EM&A programme is removed.
7	Section 7 Land Contamination which irrelevant to the EM&A programme is removed.
8.3.2.1 (updated Section 5.3.2.1, pages 34 and 35)	A last paragraph in S5.3.2.1 is added to present the current status of the Vegetation Survey. A vegetation survey according to EP Condition 2.8 to confirm the condition of individual flora species of conservation importance was conducted for Contract 2, Contract 3, Contract 5 and Contract 6. Final version of the Vegetation Survey Report for Contract 2, Contract 3 and Contract 5 and Update for Contract 6 were then submitted to the EPD. in September 2014 and September 2015 respectively. Both submissions had been approved by EPD.
8.3.2.2 (updated Section 5.3.2.2, page 35)	A last paragraph in S5.3.2.2 is added to present the current status of the Woodland Compensation Plan. The Woodland Compensation Plan was prepared according to EP Condition 2.9 to set out the planting strategy including details of plantation species, specifications for the establishment of the habitats and subsequent maintenance and monitoring requirements for the Woodland Compensation Area of an area not less than 18.6 hectares. Final version of the Plan was submitted to the EPD on 8 September 2015 and approved on 12 October 2015.
8.3.2.4	A last paragraph in S5.3.2.4 is added to present the current status of the

(updated Section 5.3.2.4, page 37)	Habitat Creation and Management Plan. A Habitat Creation and Management Plan (HCMP) has been prepared according to EP Condition 2.10 to set out details of the specifications for the habitats and ecological functions and to define the management and ecological monitoring and audit requirements of the Wetland Compensation Area.. Latest version of the Plan was submitted to the EPD for comments in October 2015 and pending for approval.
9	Section 9 fisheries impact which irrelevant to the EM&A programme is removed.
10.2 (updated Section 6.2, page 38)	A two last paragraph in S6.2 is added to present the current status of the Landscape Plan. A Landscape Plan under Agreement No. CE 38/2010 (CE) was prepared according to EP Condition 2.11 to include considerations for minimizing habitat fragmentation and show the locations, size, number, and species of planting, design details, implementation programme, maintenance and management schedules, and drawings showing the landscape and visual mitigation measures of the Project, in particular the landscape and compensatory planting, construction hoarding, noise barriers and buildings. It was submitted to the EPD on 30 July 2014 and approved on 4 September 2015. Further comments were given by Planning Department in September 2014 and the revision is on-going. In September 2015, Landscape plan for the BCP building works under ArchSD Agreement No. 9AA has been prepared to supplement the approved Landscape Plan, to cover the building and facilities design information within the Liantang/Heung Yuen Wai Boundary Control Point (BCP Works). This plan is pending for approval by EPD.
11.2.1.1 (updated Section 7.2.1.1, page 43)	The photographic and cartographic field survey for the built heritage in Contact 2, Contract 3 and Contract 5 were completed. Report for Contract 2 and Contract 5 was submitted to AMO and subsequently approved. Report for Contract 3 has been submitted to AMO and the Contractor is still working with AMO to finalise the report. Survey for Contract 6 is on-going.
11.2.2 (updated Section 7.2.2, page 44)	A last paragraph in S7.2.2 is added to present the current status of the archaeological survey. The archaeological field survey for areas in Contact 2, Contract 3, Contract 5 and Contract 6 were completed. Detail survey report for Contract 5 was submitted to AMO and subsequently approved. Detail survey report for Contract 2 and Contract 3 has been submitted to AMO and the archaeologist is still working with AMO to finalise the report. Report for Contract 6 is under preparation.
Appendix A	The project layout plan is revised to include all contracts.
Appendix B	The location plan for air monitoring location is revised.

Content

1 INTRODUCTION

1.1 Purpose of the Programme

This Environmental Monitoring and Audit (EM&A) Programme (hereafter referred to as the Programme) is set up based on the Environmental Permit (EP), Environmental Monitoring and Audit (EM&A) Manual and the Environmental Impact Assessment Report for Liantang / Heung Yuen Wai Boundary Control Point and Associated Works. The Programme is to guide the implementation of various requirements of EM&A Manual to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action.

This Programme shall be read in conjunction with the following documents:

(a) Environmental Permit (EP No.: EP-404/2011/D)

(b) The approved EM&A Manual

(c) The approved Environmental Impact Assessment (EIA) Report

1.2 Project Background

Currently, there are four Boundary Control Points (BCP)s in the HKSAR providing vehicular crossing at the Hong Kong – Shenzhen boundary. They are namely Shenzhen Bay, Lok Ma Chau, Man Kam To and Sha Tau Kok. On the eastern part of the boundary, the existing vehicular crossing points at Man Kam To and Sha Tau Kok have already reached their limits in the crossing capacity, while scope for the expansion works to enhance their capacities is limited by site constraints and capacity of connecting roads on both Hong Kong and Shenzhen sides. It is anticipated that the volume of cross-boundary traffic will continue to increase with the closer ties of Hong Kong- Shenzhen and the completion of the Eastern Corridor (東部過境通道) in Shenzhen. The establishment of a new BCP in the eastern part of Hong Kong-Shenzhen boundary is thus required to meet the future traffic demand and re-distribute cross-boundary traffic amongst the crossings in the east.

In December 2006, the Hong Kong and Shenzhen governments jointly commissioned a study, namely "Preliminary Planning Study on Developing Liantang/Heung Yuen Wai Control Point" (the Joint Study) ("深港興建蓮塘/ 香園圍口岸前期規劃研究") to examine the need, benefit and function of a new BCP at Liantang/Heung Yuen Wai (LT/HYW). The Joint Study confirmed the need for a new BCP at LT/HYW.

In January 2007, the Planning Department (PlanD) commissioned a consultancy study "Planning Study on Liantang/Heung Yuen Wai Cross-boundary Control Point and its Associated Connecting Roads in Hong Kong – Feasibility Study" (the Feasibility Study) to examine the land, planning, traffic and engineering implications and its associated connecting road within Hong Kong territory for the LT/HYW BCP. The Feasibility Study put forward the preferred option for the LT/HYW BCP layout and alignment for its connecting road.

Both Hong Kong and Shenzhen Governments at the second meeting of the Hong Kong-Shenzhen Joint Task Force on Boundary District Development on 18 September 2008 endorsed the major findings of the Joint Study and they jointly announced after the meeting to implement the LT/HYW BCP.

CEDD commissioned the investigation and preliminary design (I&PD) and relevant impact assessments for the Project in April 2009 under Agreement No. CE 45/2008 (CE) "Liantang/Heung Yuen Wai Boundary Control Point and Associated Works". The I&PD determined the general layout of the BCP and the alignment of the connecting road. The I&PD also concluded that the Project with the recommended mitigation measures is environmentally acceptable.

1.3 Project Scope

The scope of the Project under this Assignment covers the site formation and infrastructures for the LT/HYW BCP, and comprises:

(a) site formation of about 23 hectares of land for the development of the BCP;

(b) BCP buildings and associated facilities;

(c) provision of a perimeter road at the BCP together with the associated vehicular and pedestrian gates, fencing, etc;

(d) an approximately 11-kilometre (km) long dual two-lane trunk road (Connecting Road) (with about 1.0 km of at grade road, 4.3 km of viaduct and 5.7 km of tunnels) connecting the BCP with Fanling Highway and the associated traffic control and surveillance system;

(e) associated diversion/modification works at Lin Ma Hang Road;

(f) widening of access road to the resite area of Chuk Yuen Village and further modification works to the facilities in the resite area;

(g) provision of sewage collection, treatment and disposal facilities for the BCP and the resite of Chuk Yuen Village; and

(h) associated environmental mitigation measures, landscaping works, drainage/ sewerage, waterworks, utilities and traffic engineering works.

1.4 Construction Contract Packaging

To facilitate project management and implementation, the Project will be implemented in the following contract packages:

- Contract 2 (CV/2012/08)
- Contract 3 (CV/2012/09)
- Contract 4 (NE/2014/02)
- Contract 5 (CV/2013/03)
- Contract 6 (CV/2013/08)
- Contract 7 (NE/2014/03)
- ArchSD Contract No. SS C505

The details of each contracts is summarized below. **Appendix A** shows the Project layout plan and corresponding sections.

Contract 2	
Contract No.:	CV/2012/08
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 2
Contract Period:	Commencement date: December 2013
Major Scope of Works:	• construction of an approximately 5.2km long dual two-lane connecting road (with about 0.4km of at-grade road and 4.8km of tunnel) connecting the Fanling Interchange with the proposed Sha Tau Kok Interchange; • construction of a ventilation adit tunnel and the mid-ventilation building; • construction of the north and south portal buildings of the Lung Shan Tunnel and their associated slope works; • provision and installation of ventilation system, E&M works and building services works for Lung Shan tunnel and Cheung Shan tunnel and their portal buildings; • construction of Tunnel Administration Building adjacent to Wo Keng Shan Road and the associated E&M and building services works; and • construction of associated footpath, slopes, retaining structures, drainage, sewerage, waterworks, landscaping works and other ancillary works.

Contract 3	
Contract No.:	CV/2012/09
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 3
Contract Period:	Commencement date: July 2013
Major Scope of Works:	• construction of four link roads connecting the existing Fanling Highway and the south portal of the Lung Shan Tunnel; • realignment of the existing Tai Wo Service Road West and Tai Wo Service Road East; • widening of the existing Fanling Highway (HyD's

	entrustment works); • demolishing existing Kiu Tau vehicular bridge and Kiu Tau footbridge and reconstruction of the existing Kiu Tau Footbridge (HyD's entrustment works); and • construction of associated footpath, slopes, retaining structures, drainage, sewerage, waterworks, landscaping works and other ancillary works.

Contract 4	
Contract No.:	NE/2014/02
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works – Contract 4
Contract Period:	Commencement date: 27 April 2016
Major Scope of Works:	• The works include provision and installation of Traffic Control and Surveillance System and the associated electrical and mechanical works for the Project.

Contract 5	
Contract No.:	CV/2013/03
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 5
Contract Period:	Commencement date: 11 April 2013
Major Scope of Works:	• site formation of about 23 hectares of land for the development of the BCP; • construction of an approximately 1.6 km long perimeter road at the BCP including a 175m long depressed road; • associated diversion/modification works at existing local roads and junctions including Lin Ma Hang Road; • construction of pedestrian subway linking the BCP to Lin Ma Hang Road; • provision of resite area with supporting infrastructure for reprovisioning of the affected village houses; • construction of associated footpath, slopes, retaining structures, drainage, sewerage, waterworks, landscaping works and other ancillary works.

Contract 6	
Contract No.:	CV/2013/08
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 6
Contract Period:	Commencement date: June 2015
Major Scope of Works:	• construction of an approximately 4.6km long dual two-lane connecting road (with about 0.6km of at-grade road, 3.3km of viaduct and 0.7km of tunnel) connecting the BCP with the proposed Sha Tau Kok Road Interchange and the associated ventilation buildings; • associated diversion/modification works at access roads to the resite of Chuk Yuen Village; • provision of sewage collection, treatment and disposal facilities for the BCP and the resite of Chuk Yuen Village; • construction of a pedestrian subway linking the BCP to Lin Ma Hang Road; • reprovisioning of the affected facilities including Wo Keng Shan Road garden; and • construction of associated footpath, slopes, retaining structures, drainage, sewerage, waterworks, landscaping works and other ancillary works.

Contract 7	
Contract No.:	NE/2014/03
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 7
Contract Period:	Commencement date: 11 December 2015
Major Scope of Works:	• construction of the Hong Kong Special Administrative Region portion of four vehicular bridges • construction of one pedestrian bridge crossing Shenzhen River.

ArchSD Contract No. SS C505	
Contract No.:	SS C505
Contract Name:	Liantang/ Heung Yuen Wai Boundary Control Point (BCP) – BCP Buildings and Associated Facilities
Contract Period:	Commencement date: July 2015

Major Scope of Works:	• passenger-related facilities including processing kiosks and examination facilities for private cars and coaches, passenger clearance building and halls, the interior fitting works for the pedestrian bridge crossing Shenzhen River, etc.; • cargo processing facilities including kiosks for clearance of goods vehicles, customs inspection platforms, X-ray building, etc.; • accommodation for the facilities inside of the Government departments providing services in connection with the BCP; • transport-related facilities inside the BCP including road networks, public transport interchange, transport drop-off and pick-up areas, vehicle holding areas and associated road furniture etc; • a public carpark; and • other ancillary facilities such as sewerage and drainage, building services provisions and electronic systems, associated environmental mitigation measure and landscape works.

1.5 Project Organization

The proposed project organization is shown in **Figure 1.2** of EM&A Manual. The responsibilities of respective parties are:

Civil Engineering and Development Department (CEDD)

CEDD is the Project Proponent and the Permit Holder of the EP of the development of the Project and will assume overall responsibility for the project. An Independent Environmental Checker (IEC) shall be employed by CEDD to audit the results of the EM&A works carried out by the ET.

Architectural Services Department (ArchSD)

ArchSD acts as the works agent for Development Bureau (DEVB), for Contract SS C505 Liantang/ Heung Yuen Wai Boundary Control Point (BCP) – BCP Buildings and Associated Facilities.

Environmental Protection Department (EPD)

EPD is the statutory enforcement body for environmental protection matters in Hong Kong.

Ronald Lu & Partners (Hong Kong) Ltd (The Architect)

Ronald Lu & Partners (Hong Kong) Ltd is appointed by ArchSD as an Architect for Contract SS C505 Liantang/ Heung Yuen Wai Boundary Control Point (BCP) – BCP Buildings and Associated Facilities. It responsible for overseeing the construction works of Contract SS C505 and for ensuring that the works are undertaken by the Contractor in accordance with

the specification and contract requirements. The duties and responsibilities of the Architect with respect to EM&A are:

- Monitor the Contractors' compliance with contract specifications, including the implementation and operation of the environmental mitigation measures and their effectiveness
- Monitor Contractors' and ET's compliance with the requirements in the Environmental Permit (EP) and EM&A Manual
- Facilitate ET's implementation of the EM&A programme
- Participate in joint site inspection by the ET and IEC
- Oversee the implementation of the agreed Event / Action Plan in the event of any exceedance
- Adhere to the procedures for carrying out complaint investigation
- Liaison with DSD, Engineer/Engineer's Representative, ET, IEC and the Contractor of the "Construction of the DSD's Regulation of Shenzhen River Stage 4 (RSR 4)" Project discussing regarding the cumulative impact issues.

Engineer or Engineers Representative (ER)

The ER is responsible for overseeing the construction works and for ensuring that the works are undertaken by the Contractor in accordance with the specification and contract requirements. The duties and responsibilities of the ER with respect to EM&A are:

- Monitor the Contractors' compliance with contract specifications, including the implementation and operation of the environmental mitigation measures and their effectiveness
- Monitor Contractors', ET's and IEC's compliance with the requirements in the Environmental Permit (EP) and EM&A Manual
- Facilitate ET's implementation of the EM&A programme
- Participate in joint site inspection by the ET and IEC
- Oversee the implementation of the agreed Event / Action Plan in the event of any exceedance
- Adhere to the procedures for carrying out complaint investigation
- Liaison with DSD, Engineer/Engineer's Representative, ET, IEC and the Contractor of the "Construction of the DSD's Regulation of Shenzhen River Stage 4 (RSR 4)" Project discussing regarding the cumulative impact issues.

The Contractor

There will be one contractor for each individual works contract. Once the contractors are appointed, EPD, ET and IEC will be notified the details of the contractor.

The Contractor for Contracts under CEDD should report to the ER. For ArchSD Contract, the Contractor should report to the Architect or Architect's Representative (AR). The duties and responsibilities of the Contractor are:

- Comply with the relevant contract conditions and specifications on environmental

protection

- Employ an Environmental Team (ET) to undertake monitoring, laboratory analysis and reporting of EM &A Facilitate ET's monitoring and site inspection activities
- Participate in the site inspections by the ET and IEC, and undertake any corrective actions
- Provide information / advice to the ET regarding works programme and activities which may contribute to the generation of adverse environmental impacts
- Submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event / Action Plans
- Implement measures to reduce impact where Action and Limit levels are exceeded
- Adhere to the procedures for carrying out complaint investigation

Environmental Team (ET)

One ET will be employed for this Project. Once the ET is appointed, EPD, CEDD, the Architect and IEC will be notified the details of the ET.

The ET shall not be in any way an associated body of the Contractor or Independent Environmental Checker (IEC) for the Project, and shall be employed by the Project Proponent/Contractor to conduct the EM&A programme. The ET should be managed by the ET Leader. The ET Leader shall be a person who has at least 7 years' experience in EM&A and has relevant professional qualifications. The appointment of ET Leader should be subject to the approval of EPD. Suitably qualified staff should be included in the ET, and resources for the implementation of the EM&A programme should be allocated in time under the Contract, to enable fulfilment of the Project's EM&A requirements as specified in the EM&A Manual during construction of the Project. The ET shall report to the Project Proponent and the duties shall include:

- Monitor and audit various environmental parameters as required in this EM&A Manual
- Analyse the environmental monitoring and audit data, review the success of EM&A programme and the adequacy of mitigation measures implemented, confirm the validity of the EIA predictions and identify any adverse environmental impacts arising
- Carry out regular site inspection to investigate and audit the Contractors' site practice, equipment/plant and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems
- Monitor compliance with conditions in the EP, environmental protection, pollution prevention and control regulations and contract specifications
- Audit environmental conditions on site
- Report on the environmental monitoring and audit results to EPD, the ER, the Architect, the IEC and Contractor or their delegated representatives
- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans
- Liaise with the IEC on all environmental performance matters and timely submit all relevant EM&A proforma for approval by IEC
- Advise the Contractor on environmental improvement, awareness, enhancement measures etc., on site

- Adhere to the procedures for carrying out complaint investigation
- Liaison with the client departments, Engineer/Engineer's Representative, ET, IEC and the Contractor of the concurrent projects as listed under Section 1.6 below regarding the cumulative impact issues.

Independent Environmental Checker (IEC)

One IEC will be employed for this Project. Once the IEC is appointed, EPD, ER, the Architect and ET will be notified the details of the IEC.

The Independent Environmental Checker (IEC) should not be in any way an associated body of the Contractor or the ET for the Project. The IEC should be employed by the Permit Holder (i.e., CEDD) prior to the commencement of the construction of the Project. The IEC should have at least 10 years' experience in EM&A and have relevant professional qualifications. The appointment of IEC should be subject to the approval of EPD. The IEC should:

- Provide proactive advice to the ER and the Project Proponent on EM&A matters related to the project, independent from the management of construction works, but empowered to audit the environmental performance of construction
- Review and audit all aspects of the EM&A programme implemented by the ET
- Review and verify the monitoring data and all submissions in connection with the EP and EM&A Manual submitted by the ET
- Arrange and conduct regular, at least monthly site inspections of the works during construction phase, and ad hoc inspections if significant environmental problems are identified
- Check compliance with the agreed Event / Action Plan in the event of any exceedance
- Check compliance with the procedures for carrying out complaint investigation
- Check the effectiveness of corrective measures
- Feedback audit results to ET by signing off relevant EM&A proforma
- Check that the mitigation measures are effectively implemented
- Verify the log-book(s) mentioned in Condition 2.2 of the EP, notify the Director by fax, within one working day of receipt of notification from the ET Leader of each and every occurrence, change of circumstances or non-compliance with the EIA Report and/or the EP, which might affect the monitoring or control of adverse environmental impacts from the Project
- Report the works conducted, the findings, recommendation and improvement of the site inspections, after reviewing ET's and Contractor's works, and advices to the ER and Project Proponent on a monthly basis
- Liaison with the client departments, Engineer/Engineer's Representative, the Architect, ET, IEC and the Contractor of the concurrent projects as listed under Section 1.6 below regarding the cumulative impact issues.

1.6 Concurrent Projects

The concurrent construction works that may be carried out include, but not limited to, the following:

(a) Regulation of Shenzhen River Stage 4;

(b) Widening of Fanling Highway – Tai Hang to Wo Hop Shek Interchange – Contract No. HY/2012/06;

(c) Construction of cross-boundary vehicular and pedestrian bridges (total 5 numbers) across the Shenzhen River; and

(d) Construction of BCP facilities in Shenzhen.

2 AIR QUALITY IMPACT

2.1 Construction Air Quality Monitoring

Dust monitoring is considered necessary during the construction phase and regular site inspections are required to ensure that the dust control measures are properly implemented.

2.1.1 Monitoring Requirements

Monitoring and audit of the Total Suspended Particulate (TSP) levels should be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely actions taken to rectify the situation.

1-hour or 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The TSP levels should be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. Upon approval of the ER, 1-hour TSP levels can be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.

All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filler paper, other special phenomena and work progress of the concerned project area etc. should be recorded. A sample data record sheet is shown in **Appendix D**. The ET may develop project specific data record sheet to suit this EM&A programme.

2.1.2 Air Monitoring Equipment

The ET is responsible for provision of the monitoring equipment. He should ensure that sufficient number of equipment with appropriate calibration kits are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment should be clearly labelled. For both baseline and impact air quality monitoring, all equipment to be used in the monitoring work is listed in **Table 2.1**.

Table 2.1 Air Quality Monitoring Equipment

Equipment	Model
24-Hour TSP	
High Volume Air Sampler	TISCH High Volume Air Sampler, HVS Model TE-5170
Calibration Kit	TISCH Model TE-5028A
1-Hour TSP	
Portable Dust Meter	Sibata LD-3 Laser Dust monitor Particle Mass Profiler & Counter

Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bimonthly intervals. The transfer standard shall be traceable to the internationally recognized primary standard and be calibrated annually. All the data should be converted into standard temperature and pressure condition.

According to the Project EM&A Manual, wind data monitoring equipment shall also be provided and set up for logging wind speed and wind direction near the dust monitoring locations. The equipment installation location shall be proposed by the ET and agreed with the

IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed:

- The wind sensors should be installed 10 m above ground so that they are clear of obstructions or turbulence caused by buildings.
- The wind data should be captured by a data logger. The data shall be downloaded for analysis at least once a month.
- The wind data monitoring equipment should be re-calibrated at least once every six months.
- Wind direction should be divided into 16 sectors of 22.5 degrees each.

In order to do so, the ET has liaised with the landlords of the successful granted HVS installation premises. However, the owners rejected to provide premises for wind data monitoring equipment installation.

Therefore, the ET Leader proposed alternative methods to obtain representative wind data. Meteorological information as extracted from "the Hong Kong Observatory Ta Kwu Ling Station" is proposed by the ET Leader as the alternative method to obtain representative wind data. For Ta Kwu Ling Station, it is located nearby the Project site. Moreover, this station is situated at around 15m above mean sea level. The station's wind data monitoring equipment is set above the existing ground ten meters in compliance with the general setting up requirement. Furthermore, this station also can be to provide the humidity, rainfall, and air pressure and temperature etc. meteorological information. In Hong Kong of a lot development projects, weather information extracted from Hong Kong Observatory is common alternative method if weather station installation is not allowed.

2.1.3 Laboratory Measurement /Analysis

A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited.

If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the ER and the measurement procedures shall be witnessed by the IEC. Any measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and IEC. IEC shall regularly audit to the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET Leader shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for his reference.

Filter paper of size 8" x 10" shall be labelled before sampling. It shall be a clean filter paper with no pinholes, and shall be conditioned in a humidity-controlled chamber for over 24-hours and be pre-weighed before use for the sampling.

After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper shall then be returned to the laboratory for reconditioning in the humidity-controlled chamber followed by accurate weighing by an electronic balance with readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

2.1.4 Monitoring Locations

Nine air quality monitoring locations are proposed in the approved EM&A Manual of the Project. During site visits carried out by the Contractor of Contract 5 and the ET before commencement of the project, three designated air monitoring locations, AM4, AM7 and AM9, were rejected by the landlord for HVS installation. Moreover, AM1, AM7a and AM9a were required to be relocated during construction phase due to the power issue and rejection by the landlord. The alternative air monitoring locations were proposed by the ET Leader based on the following criteria:

1) At the site boundary or such locations close to the major dust emission source;
2) Close to the sensitive receptors;
3) Take into account the prevailing meteorological conditions;
4) For monitoring location located in the vicinity of the ASRs, care shall be taken to cause minimal disturbance to the occupants during monitoring.
5) When positioning the HVS, the following points shall be noted:
   a. a horizontal platform with appropriate support to secure the samples against gusty wind shall be provided;
   b. no two samplers shall be placed less than 2m apart;
   c. the distance between the HVS and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the HVS;
   d. a minimum of 2 m separation from walls, parapets and penthouses is required for HVS at the rooftop;
   e. a minimum of 2 m separation from any supporting structure, measures horizontally is required;
   f. no furnace or incinerator flue is nearby;
   g. airflow around the sampler is unrestricted;
   h. the HVS is more than 20 m from the dripline;
   i. any wire fence and gate to protect the HVS, shall not cause any obstruction during monitoring;
   j. permission must be obtained to set up the HVS and to obtain access to the monitoring stations; and
   k. a secured supply of electricity is needed to operate the HVS.

After liaising with the relevant landlords and residents for several times, the alternative air monitoring locations were identified and the consents of HVS installation were successfully granted. The proposed alternative locations of air quality monitoring are described in **Table 2-2** below.

Table 2.2 Proposed Alternative Location of Air Quality Monitoring

Station ID	Location nearby the Work Area	Conclusion and Consideration during site visit
AM1a*	BCP	The setup of HVS at AM1 was rejected by the landlord due to noise nuisance and AM1a (Garden farm at Tsung Yuen Ha Village) was therefore proposed by the ET. AM1a is a garden farm with stable electricity supply adjacent to the original air sensitive receiver Tsung Yuen Village and located at closer proximity of the construction works of the Project.
AM1b^	BCP	AM1a will be reconstructed for other use shortly and the owner requested to remove the HVS. AM1b was therefore proposed which is close to the construction site

Station ID	Location nearby the Work Area	Conclusion and Consideration during site visit
		and able to represent the ASR in Tseung Yuen Ha Village.
AM4a	LMH to Frontier Closed Area	This alternative location is a village house located at about 160m to the east of the original monitoring location AM4 as shown in **Appendix B.** AM4a was proposed by the ET Leader as it is the closest residential location with secured electricity supply and covering the construction works of the Project at east side.
AM4b^	LMH to Frontier Closed Area	Location AM4a was identified for baseline monitoring in 2013 based on the information provided in the EM&A Manual. After Contract 6 awarded in June 2015, the location of the monitoring station was further reviewed making reference to the contract site layout plan and site visit. It was then confirmed that AM4a is within the works boundary of the proposed road alignment. AM4b was therefore proposed which is the nearest air sensitive receiver which located at close proximity to the construction work area.
AM5a^	Ping Yeung to Wo Keng Shan	Location AM5 was identified for baseline monitoring in 2013 based on the information provided in the EM&A Manual. During our site visit in early September 2015, the landlord of AM5 refused the impact air quality monitoring. AM5a was therefore proposed which is the nearest air sensitive receiver which located at close proximity to the construction work area.
AM7a	Sha Tau Kok Road	The alternative location is the front yard of an unnamed village adjacent to Sha Tau Kok Road – Wo Hang Section proximity to Tai Tong Wu Village. AM7a is about 140m away from the original air monitoring location AM7 in **Appendix B** and it is also close to the works area compared with AM7. AM7a is proposed by the ET Leader as it is located just at the front of the residential area with secured electricity supply.
AM7b@	Sha Tau Kok Road	There are no power supplies for HVS at AM7a after 19:00 very night, therefore AM7b (Village House at Chun Yiu Village) was proposed by the ET for replacement. AM7b is a village house in Chun Yiu Village with stable electricity supply and located at closer proximity of the construction works of the Project.

Station ID	Location nearby the Work Area	Conclusion and Consideration during site visit
AM9a	Fanling	The alternative location Nam Wa Po Village House No. 71 is located at about 29m away from the original monitoring location AM9. AM9a was proposed by the ET Leader as it is the closest residential location with secured electricity supply and covering the construction works of the Project.
AM9b#	Fanling	The setup of HVS at AM9a was rejected by the landlord after the baseline monitoring due to noise nuisance. AM9b was therefore proposed by the ET for impact monitoring. It is a residential premise with stable electricity supply and located at closer proximity of the construction works of the Project.

 # Proposal for the change of air quality monitoring location from AM9a to AM9b was submitted to EPD on 4 Nov 2013 after verified by the IEC and it was approved by EPD (EPD's ref.: (15) in EP 2/N7/A/52 Pt.10 dated 8 Nov 2013).

** Proposal for the change of air quality monitoring location from AM1to AM1a was submitted to EPD on 24 March 2014 after verified by the IEC. It was approved by EPD (EPD's ref.: (6) in EP 2/N7/A/52 Pt.12 dated 9 Jun 2014).*

@ Proposal for the change of air quality monitoring location from AM7a to AM7b was submitted to EPD on 4 June 2014 after verified by the IEC. It was approved by EPD (EPD's ref.: (7) in EP 2/N7/A/52 Pt.12 dated 9 Jun 2014).

^ Proposal for the change of air quality monitoring location was included in the EM&A Programme Rev .05 which approved by EPD on 29 March 2016 (EPD ref.: (3) in EP2/N7/A/52 Ax(1) Pt.19)

The alternative air monitoring locations proposed by the ET Leader have been agreed by the ER and IEC.

All the air monitoring locations including the proposed alternative locations are listed in **Table 2.3** below and shown **Appendix B**.

Table 2.3 Construction Air Quality Monitoring Stations

ID	ID adopted in EM&A Manual	Description	Works Area	Related to the Work Contract
AM1b	TYH	Tsung Yuen Ha Village	BCP	ArchSD SS C505 Contract 5
AM2	V1	Village House near Lin Ma Hang Road	Lin Ma Hang to Frontier Closed Area	Contract 5, Contract 6
AM3	TKL2	Ta Kwu Ling Village House	Lin Ma Hang to Frontier Closed Area	Contract 5, Contract 6
AM4b	KTW4	Nga Yiu Ha Village	Lin Ma Hang to Frontier Closed Area	Contract 6
AM5a	PY1	Ping Yeung Village House	Ping Yeung to Wo Keng Shan	Contract 6

AM6	WKS7	Wo Keng Shan Village House	Ping Yeung to Wo Keng Shan	Contract 6
AM7b	TTW3	Chun Yiu Village Village House	Sha Tau Kok Road	Contract 2 Contract 6
AM8	PKT2	Po Kat Tsai Village	Po Kat Tsai	Contract 2
AM9b	NWP1	Nam Wa Po Village House No. 80	Fanling	Contract 3

2.1.5 **Baseline Monitoring**

Baseline monitoring shall be carried out at all of the designated monitoring locations for at least 14 consecutive days prior to the commencement of the Construction works to obtain daily 24-hour TSP samples. The selected baseline monitoring stations should reflect baseline conditions at the impact stations. One-hour sampling should also be done at least 3 times per day while the highest dust impact is expected.

During the baseline monitoring, there should not be any construction or dust generation activities in the vicinity of the monitoring stations. Before commencing baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.

In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader shall carry out the monitoring at alternative locations that can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the ER and agreed with the IEC.

In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to ER for approval.

Ambient conditions may vary seasonally and shall be reviewed once every three months. When the ambient conditions have changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with the IEC and EPD.

2.1.6 **Impact Monitoring**

The ET shall carry out impact monitoring during the course of the Works. For regular impact monitoring, the sampling frequency of at least once in every six-days, shall be strictly observed at all the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six-days should be undertaken when the highest dust impact occurs. Before commencing baseline monitoring, the ET shall inform the IEC of the impact monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the impact monitoring results.
The specific time to start and stop the 24-hour TSP monitoring shall be clearly defined for each location and be strictly followed by the operator.

In case of non-compliance with the air quality criteria, more frequent monitoring, as specified in the Action Plan in the following section, shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified.

2.1.7 **Event and Action Plan**

The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET should compare the impact monitoring results with air quality criteria set up for 24-hour TSP and 1-hour TSP level. **Table 2.4** shows the air quality criteria, namely Action and Limit (AL) Levels to be used. Should non-compliance of the air quality criteria occurs, actions in accordance with the Event and Action Plan in **Table 2.5** should be carried out.

Table 2.4 Typical Action and Limit Levels for Air Quality

Parameters	Action Level	Limit Level
24-hr TSP Level ($\mu g/m^3$)	For baseline level $\leq$200 $\mu g/m^3$, Action level = (130% of baseline 260 level + Limit level)/2 For baseline level > 200 $\mu g/m^3$, Action level = Limit Level	260
1-hr TSP Level ($\mu g/m^3$)	For baseline level $\leq$ 384 $\mu g/m^3$, Action level = (130% of baseline 500 level + Limit level)/2 For baseline level > 384 $\mu g/m^3$, Action level = Limit Level	500

Table 2.5 Event and Action Plan for Air Quality

Event	ET	IEC	ER/ the Architect	Action Contractor
Action Level				
1. Exceedance for one sample	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily;	1. Check monitoring data submitted by ET; 2. Check Contractor's working method;	1.Notify Contractor;	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
2. Exceedance for two or more consecutive samples	1. Identify source; 2. Inform IEC and ER; 3. Advise the ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with IEC and ER; 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ET on the effectiveness of the proposed remedial measures; 5. Monitor the implementation of remedial measures.	1. confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Submit proposals for remedial to ER within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.
Limit Level				
1. Exceedance for one sample	1. Identify Source, investigate the causes of esceedance and propose remedial measures;	1.Check monitoring data submitted by ET; 2.Check Contractor's	1. Confirm receipt of notification of failure in writing; 2.Notify	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions

Event	ET	IEC	ER/ the Architect	Action Contractor
	2. Inform ER, Contractor and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.	working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Monitor the implementation of remedial measures.	Contractor; 3.Ensure remedial measures properly implemented.	to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
2. Exceedance for two or more consecutive samples	1. Notify IEC,ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed on the results; 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 5. Monitor the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor: 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

2.1.8 Mitigation Measure

Appropriate dust suppression measures should be adopted as required under the Air Pollution Control (Construction Dust) Regulation. A control programme can be instigated to monitor the construction process in order to enforce dust controls and modify methods of works where feasible to reduce the dust emission down to acceptable levels. The implementation schedule of the recommended air quality mitigation measures is presented in **Appendix A** of EM&A Manual.

2.2 Operational Air Quality Monitoring

With the full implementation of the recommended mitigation measures during operation phase, no adverse air quality impact is anticipated. Operational phase air quality monitoring is considered not necessary.

3 NOISE IMPACT

3.1 Construction Airborne Noise Monitoring

3.1.1 Monitoring Requirements

The construction noise level shall be measured in terms of (the A-weighted equivalent continuous sound pressure level (Leq). Leq (30 minutes) shall be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays. For all other time periods, Leq (5 minutes) shall be employed for comparison with the Noise Control Ordinance (NCO) criteria.

Supplementary information for data auditing, statistical results such as L10 and L90 shall also be obtained for reference. A sample data record sheet is shown in **Appendix D**. The ET Leader may modify the data record sheet for this EM&A programme, of which the format should be agreed by the ER and the IEC.

As referred to in the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agree to within 1.0dB.

Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

The ET is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled.

3.1.2 Monitoring Equipment

Noise monitoring equipment for baseline and impact EM&A Programme are listed in **Table 3.1**.

Table 3.1 Construction Noise Monitoring Equipment

Equipment	Model
Integrating Sound Level Meter	B&K Type 2238 or Rion NL-14
Calibrator	Rion NC-73 / B&K Type 4231
Portable Wind Speed Indicator	Testo Anemometer

Sound level meters listed above comply with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications, as recommended in TM issued under the NCO. The acoustic calibrator and sound level meter to be used in the baseline monitoring will be calibrated yearly. Valid equipment calibration Certificates would be provided at Baseline Monitoring report and monthly EM&A report(s).

3.1.3 Monitoring Locations

The construction noise monitoring locations as shown in **Appendix C** are summarised in **Table 3.2**. The status and locations of noise sensitive receivers may change after issuing this programme. If such cases exist, the ET should propose updated monitoring locations and seek agreement from EPD.

Table 3.2 Construction Noise Monitoring Stations

ID	ID in EM&A Manual	Description	Works Area	Related to the Work Contract
NM1	TYH	Tsung Yuen Ha Village House No. 63	BCP	ArchSD SS C505 Contract 5
NM2	V2	Village House near Lin Ma Hang Road	Lin Ma Hang to Frontier Closed Area	Contract 5, Contract 6
NM2a#	NA	Village House near Lin Ma Hang Road	Lin Ma Hang to Frontier Closed Area	Contract 5, Contract 6
NM3	PY2	Ping Yeung Village House (façade facing northeast)	Ping Yeung to Wo Keng Shan	Contract 6
NM4	WKS6	Wa Keng Shan Village House	Ping Yeung to Wo Keng Shan	Contract 6
NM5	LT1	Village House, Loi Tung	Sha Tau Kok Road	Contract 2, Contract 6
NM6	TTW2	Tai Tong Wu Village House 2	Sha Tau Kok Road	Contract 2, Contract 6
NM7	PKT2	Po Kat Tsai Village	P0 Kat Tsai	Contract 2
NM8	TH1	Village House, Tong Hang	Fanling	Contract 2 Contract 3
NM9	KT3	Village House, Kiu Tau Village	Fanling	Contract 3
NM10	NWP1	Nam Wa Po Village House No. 78	Fanling	Contract 3

 # Proposal for the change of noise monitoring location from NM2 to NM2a was verified by IEC and it is attached in Appendix H.

The ET Leader has confirmed there will be no changes in the noise monitoring locations recommended in the EM&A Manual. If the status of designated NSR changes, alternative monitoring locations will be proposed by the ET. Agreement with the ER, IEC and EPD will be sought before commencement of the baseline monitoring.

When alternative monitoring locations are proposed, the monitoring locations shall be chosen based on the following criteria:

- Monitoring at sensitive receivers close to the major site activities which are likely to have noise impacts;
- Monitoring at the noise sensitive receivers as defined in the Technical Memorandum; and
- Assurance of minimal disturbance to the occupants during monitoring.

The monitoring station shall normally be at a point 1 m from the exterior of the sensitive receiver building facade and be at a position 1.2 m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB(A) shall be made to the free field measurements. The ET shall agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

3.1.4 Baseline Monitoring

The ET shall carry out baseline noise monitoring prior to the commencement of the construction works. The baseline monitoring shall be carried out daily for a period of at least two weeks. Before commencing the baseline monitoring, the ET shall develop and submit to the IEC the baseline monitoring programme such that the IEC can conduct on-site audit to check accuracy of the baseline monitoring results.

There shall not be any construction activities in the vicinity of the stations during the baseline monitoring.

In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with the ER, EPD and IEC to agree on an appropriate set of data to be used as a baseline reference and submit to the ER and IEC for agreement and EPD for approval.

3.1.5 Impact Monitoring

Noise monitoring shall be carried out at all the designated monitoring stations. The monitoring frequency shall depend on the scale of the construction activities. The following is an initial guide on the regular monitoring frequency for each station on a weekly basis when noise generating activities are underway:

- one set of measurements between 0700 and 1900 hours on normal weekdays;

If construction works are extended to include works during the hours of 1900 - 0700 as well as public holidays and Sundays, applicable permits under NCO shall also be obtained by the Contractor. (Refer to supplementary proposal in Appendix G)

If a school exists near the construction activity, noise monitoring shall be carried out at the monitoring stations for the schools during the school examination periods. The ET Leader shall liaise with the school's personnel and the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the contract.

In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action Plan in **Table 3.3,** shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or demonstrated to be unrelated to the construction activities.

3.1.6 Event and Action Plan

The Action and Limit (AL) Levels for construction noise are defined in **Table 3.3.** Should non-compliance of the criteria occurs, action in accordance with the Event and Action Plan in **Table 3.4,** should be carried out.

Table 3.3 Typical Action and Limit Levels for Construction Noise

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one valid documented complaint is received.	75* dB(A)
Note: *70 dB(A) for schools and 65 dB(A) during school examination periods. 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 followed.		

Table 3.4 Event and Action Plan for Construction Noise

Event	ET	IEC	ER/ the Architect	Action Contractor
Action Level	1. Notify ER, IEC and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the IEC and Contractor on remedial measures required; 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the investigation results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; 3. Advise the ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise the implementation of remedial measures.	1. Submit noise mitigation proposals to IEC and ER; 2. Implement noise mitigation proposals.
Limit Level	1. Inform IEC, ER, Contractor and EPD; 2. Repeat measurements to confirm findings; 3. Increase monitoring frequency; 4. Identify source and investigate the cause of exceedance; 5. Carry out analysis of Contractor's working procedures; 6. Discuss with the IEC, Contractor and ER on remedial measures required; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions: 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly.	1. Confirm receipt of notification of failure in writing: 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise the implementation of remedial measures; 5. If exceedance continues, consider stopping the Contractor to continue working on that portion of work which causes the exceedance until the exceedance is abated.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC and ER within 3 working days of notification; 3. Implement the agreed proposals; 4. Submit further proposal if problem still not under control; 5. Stop the relevant portion of works as instructed by the ER until the exceedance is abated.

Event	ET	IEC	ER/ the Architect	Action Contractor
	stops, cease additional monitoring.			

3.1.7 **Mitigation Measures**

The EIA Report has recommended construction noise control and mitigation measures. The Contractor should be responsible for the design and implementation of these measures under the supervision of the ER and monitored by the ET. The implementation schedule of the recommended noise mitigation measures is presented in Appendix A of EM&A Manual.

3.2 Operational Traffic Noise Monitoring

3.2.1 **Monitoring Requirements**

The ET Leader shall prepare and deposit to EPD, at least 6 months before the operation of the works under the Project, a monitoring plan for the purpose of assessing the accuracy of traffic noise predictions by comparing the project noise impact predictions with the actual impacts. The monitoring plan shall contain monitoring locations, monitoring schedules, methodology of noise monitoring including noise measurement procedures, traffic counts and speed checks, and methodology of comparison with the predicted levels. The ET Leader shall implement the monitoring plan in accordance with the deposited monitoring plan unless with prior justification. Monitoring details and results including the comparison between the measured noise levels and the predicted levels shall be recorded in a report to be deposited with EPD within one month of the completion of the monitoring. The report shall be certified by the ET Leader and verified by IEC and agreed with CEDD before deposit with EPD.

3.2.2 **Monitoring Parameters**

The traffic noise levels shall be measured twice at 6-month intervals within the first year upon completion of the Project. Measurements shall be made in terms of the A-weighted L10 over peak periods, other metrics like Leq, L90 and Lmax may be used for comparison.

3.2.3 **Monitoring Equipment**

Monitoring equipment to be used shall be the same as that specified in Section 3.1.2. That is, sound level meters in compliance with the International Electro-technical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications shall be used for carrying out the traffic noise monitoring. Calibration procedures and other measurement conditions shall also be in the same as stated in Section 3.1.1 and 3.1.2.

Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding l0m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

The ET Leader is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise monitoring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled..

3.2.4 Monitoring Locations

Three designated monitoring stations, OM1 to 0M3 are selected for operational noise monitoring. **Appendix C** shows the operational noise monitoring locations, which are also depicted in **Table 3.5.** The status and locations of noise sensitive receivers may change after this Programme is issued. If such cases exist, the ET Leader shall propose updated monitoring locations and seek approval from ER & IEC and agreement from EPD of the proposal.

Table 3.5 Operational Noise Monitoring Stations

ID	ID adopted in EIA	Description	Works Area
OM1	WKS4	Wo Keng Shan Village House	Ping Yeung to Wo Keng Shan
OM2	LT4	Village House, Loi Tung	Sha Tau Kok
OM3	TH2	Village House, Tong Hang	Fanling

The monitoring locations shall be selected according to the following criteria:-

- they should be at NSRs in the vicinity of recommended direct technical remedies; preferably, there should be one representative monitoring locations near each types of noise screening element (i.e. vertical barrier, cantilever barrier and enclosure);
- selected monitoring locations should enable monitoring to be done twice within one year after implementation of the mitigation measures during operation of the proposed road

When alternative monitoring locations are proposed, the monitoring locations shall be chosen based on the following criteria:-

- alternative location shall be similarly exposed to potential noise impacts;
- it shall be close to the noise sensitive receivers; and
- shall be located so as to cause minimal disturbance to the occupants.

3.2.5 Compliance Monitoring

The operational noise monitoring shall be carried out at a distance of 1 m from the openable window and 1.2 m above the floor level of the noise sensitive receivers identified. The ET Leader shall agree with the IEC on any necessary corrections adopted.

Noise monitoring shall be carried out at all the designated traffic noise monitoring stations. The following is an initial guide on the traffic noise monitoring requirements during the operational phase:

(a) one set of measurements at the morning traffic peak hour on normal weekdays;

(b) one set of measurements at the evening traffic peak hour on normal weekdays:

(c) a concurrent census of traffic flow and percentage heavy vehicle shall be obtained for far-side and near-side of the road and the existing road network in the vicinity of each measuring point;

(d) average vehicle speed estimated for far-side and near-side of the road and the existing road network in the vicinity of each measuring point; and

(e) the two sets of monitoring data should be obtained within the first year of operation.

Measured noise levels should be compared with predicted noise levels by applying appropriate conversion corrections to allow for the traffic conditions at the time of measurement. Operational noise field data sheet should be designed during submitting the monitoring plan.

The measured/monitor noise levels shall be compared with the predicted results and the predicted traffic flow conditions (calculated noise levels based on concurrent traffic census obtained). In case discrepancies are observed, explanation should be given to justify the discrepancies. Operational EM&A reports shall be certified by the ET Leader and verified by the IEC before sending to EPD.

4 WATER QUALITY IMPACT

4.1 Construction Water Quality Monitoring

4.1.1 Water Quality Parameter

Monitoring for Dissolved Oxygen (DO), Dissolved Oxygen Saturation (DO%), temperature, pH, turbidity, water depth and suspended solid (SS) should be undertaken at designated monitoring locations. All parameters should be measured in-situ whereas SS should be determined by the laboratory. DO should be presented in mg/L and in % saturation.

Other relevant data should also be recorded, including monitoring location / position, time, weather conditions and any special phenomena or work underway at the construction site.

4.1.2 Sampling Procedure and Monitoring Equipment

Water samples for all monitoring parameters should be collected, stored, preserved and analyzed according to Standard Methods, APHA and/or methods agreed by EPD. In-situ measurements at monitoring locations including DO, temperature, pH, turbidity and water depth shall be collected by equipment with the characteristics and functions listed in the following sections. A sample data record sheet is shown in **Appendix D** for reference.

The following equipment and facilities should be provided by the ET and used for the monitoring of water quality impacts:

4.1.2.1 Dissolved Oxygen and Temperature Measuring Equipment

DO and water temperature should be measured in-situ by a DO / temperature meter. The instrument should be portable and weatherproof using a DC power source. It should have a membrane electrode with automatic temperature compensation complete with a cable. The equipment should be capable of measuring:

- a DO level in the range of 0-20 mg/l and 0-200% saturation; and
- a temperature of between 0 and 45 degree Celsius.

4.1.2.2 pH Measuring Instrument

A portable pH meter capable of measuring a range between 0.0 and 14.0 should be provided to measure pH under the specified conditions accordingly to the Standard Methods, APHA.

4.1.2.3 Turbidity Measurement Instrument

The instrument should be portable and weatherproof using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU.

4.1.2.4 Water Depth Detector

A portable, battery-operated echo sounder or tape measure will be used for the determination of water depth at each designated monitoring station as appropriate.

4.1.2.5 Calibration of In-Situ Instruments

All in-situ monitoring instruments should be calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring programme. Responses of sensors and electrodes should be checked with certified standard

solutions before each use.

Wet bulb calibration for a DO probe should be carried out before measurement at each monitoring station. A zero check in distilled water should be performed with the turbidity probe at least once per monitoring day. The probe should then be calibrated with a solution of known NTU. In addition, the turbidity probe should be calibrated at least twice per month to establish the relationship between turbidity readings (in NTU) and levels of suspended solids (in mg/L).

For the on-site calibration of field equipment, the BS 1427: 1993, Guide to Field and On-Site Test Methods for the Analysis of Waters should be observed.

Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment should also be made available so that monitoring could proceed uninterrupted even when some equipment is under maintenance, calibration etc.

4.1.2.6 Sample Containers and Storage for Suspended Solids Measurement

A water sampler e.g. Kahlsico Water Sampler, which is a transparent PVC cylinder with a capacity not less than 2 litres and can be effectively sealed with latex cups at both ends, will be used for water sampling if the water depth is more than 0.5m. The sampler will have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth. For sampling from very shallow water depths e.g. <0.5 m, water sample will be directly collected from 100mm below the water surface below by using a sampling plastic bottle to avoid inclusion of bottom sediment or humus. Moreover, Teflon/ stainless steel bailer or self-made sampling buckets may be used for water sampling. The equipment used for sampling will be depended the sampling location conditions.

Water samples for SS analysis should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen), delivered to the laboratory, and analysed as soon as possible after collection.

4.1.3 Laboratory Measurement/Analysis

Analysis of suspended solids should be carried out in a HOKLAS or other accredited laboratory. Water samples of about 1 L should be collected at the monitoring stations for carrying out the laboratory suspended solids determination. The SS determination work should start within 24 hours after collection of the water samples. The SS analyses should follow the standard method APHA 2540D with a Limit of Reporting of 2 mg/L as described in APHA Standard Methods for the Examination of Water and Wastewater.

If in-house or non-standard methods are proposed, details of the method verification should, if required, be submitted to EPD. In any circumstances, the sample testing should have comprehensive quality assurance and quality control programmes. The laboratory should be prepared to demonstrate the quality control programmes to EPD or their representative if and when required.

Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis should be kept by the laboratory for 3 months in case repeat analysis is required. It in-house or non-standard methods are proposed, details of the method verification may also be required to submit to EPD. In any circumstance, the sample testing should have comprehensive quality assurance and quality control programmes. The laboratory should prepare to demonstrate the programmes to EPD or his representatives when requested.

4.1.4 Monitoring Locations

The water quality baseline monitoring should be conducted at monitoring stations

recommended in the EM&A Manual. Total eleven water quality monitoring locations including control stations and impact stations were designated for the Project.

Site visits to identify the water monitoring locations were undertaken between 20 May 2013 and 7 June 2013. Water quality monitoring stations WM1-Control, WM2B and WM3 have been identified and confirmed. However, access to other monitoring stations is questionable due to safety reason. Alternative monitoring locations are proposed according to the following criteria:

1) at locations close to and preferably at the boundary of the mixing zone of the major site activities as indicated in the EIA report, which are likely to have water quality impacts;
2) close to the sensitive receptors which are directly or likely to be affected;
3) for monitoring locations located in the vicinity of the sensitive receptors, care should be taken to cause minimal disturbance during monitoring;
4) two or more control stations which should be at locations representative of the project site in its undisturbed condition. Control stations should be located, as far as is practicable, both upstream and down-stream of the works area.

Moreover, control stations necessary to compare the water quality from potentially impacted sites with the ambient water quality. Control stations shall be located within the same body of water as the impact monitoring stations but shall be outside the area of influence of the works and, as far as practicable, not affected by any other works.

The locations (coordinate) to be carried out water quality monitoring are listed in **Table 4.1** and shown in **Appendix E**.

Table 4.1 Water Quality Monitoring Stations

Station ID	Description	Location recommended in EM&A Manual		Location found during site visit		Different of Original location	Related to the Work Contract
		Coordinates		Coordinates			
		Easting	Northing	Easting	Northing		
WM1	Downstream of Kong Yiu Channel	833668.635	845371.097	833679	845421	upstream 51m	ArchSD SS C505 Contract 5
WM1-Control	Upstream of Kong Yiu Channel	834185.480	845916.662	834185	845917	NA	ArchSD SS C505 Contract 5
WM2A	Downstream of River Ganges	834132.193	844432.910	834204	844471	upstream 81m	Contract 6
WM2A(a)*	Downstream of River Ganges	834132.193	844432.910	834191	844474	upstream 70m	Contract 6
WM2A-Control	Upstream of River Ganges	835205.329	844200.151	835270	844243	upstream 78m	Contract 6
WM2A-Controlx#	Upstream of River Ganges	835205.329	844200.151	835377	844188	upstream 160m	Contract 6
WM2B	Downstream of River Ganges	835434.744	843394.606	835433	843397	NA	Contract 6
WM2B-Control	Upstream of River Ganges	835845.878	843343.625	835835	843351	downstream 31m	Contract 6

Station ID	Description	Location recommended in EM&A Manual		Location found during site visit		Different of Original location	Related to the Work Contract
		Coordinates		Coordinates			
		Easting	Northing	Easting	Northing		
WM3	Downstream of River Indus	836323.622	842404.977	836324	842407	NA	Contract 2 Contract 6
WM3x#	Downstream of River Indus	836323.622	842404.977	836206	842270	downstream 180m	Contract 2 Contract 6
WM3-Control	Upstream of River Indus	836763.419	842425.507	836763	842400	downstream 26m	Contract 2 Contract 6
WM4	Downstream of Ma Wat Channel	833840.783	838344.842	833850	838338	upstream 11m	Contract 2 Contract 3
WM4–Control A	Kau Lung Hang Stream	834038.937	837668.995	834028	837695	downstream 28m	Contract 2 Contract 3
WM4–Control B	Upstream of Ma Wat Channel	833769.123	837406.936	833760	837395	upstream 15m	Contract 2 Contract 3

 # Proposal for the change of air quality monitoring location was included in the EM&A Programme Rev .05 which approved by EPD on 29 March 2016 (EPD ref.: (3) in EP2/N7/A/52 Ax(1) Pt.19)

** Proposal for the change of water quality monitoring location from WM2A to WM2A(a) was submitted to EPD on 2 June 2016 after verify by IEC and it was approved by EPD on 27 June 2016.*

The water quality at both original and alternative monitoring locations is not anticipated to have significant difference. The changes in monitoring locations proposed by the ET Leader have been agreed by the ER and the IEC.

Control stations are necessary to compare the water quality from potentially impacted sites with the ambient water quality. Control stations shall be located within the same body of water as the impact monitoring stations but shall be outside the area of influence of the works and, as far as practicable, not affected by any other works. The ET should agree with EPD on all the monitoring stations.

Duplicate in-situ measurements and samples collected from each independent monitoring event are required for all parameters to ensure a robust statistically interpretable dataset.

If the water level of a monitoring station is too shallow when sampling, sediment would be disturbed which affecting the accuracy of water quality monitoring. In order to avoid disturbing sediment, depth limits should be set up for the water sampling for the ease of reference. When the measured water depth of the monitoring station (both control and impact stations) is lower than 150mm, water monitoring would not be to perform at that monitoring location. Instead, the monitoring location will be moved to a temporary alternative location monitoring location based on the criteria below:-

(a) the alternative location should be either upstream or downstream of the original location and at the same the river/drain channel
(b) the alternative location should be within 15m far from the original location
(c) if no suitable alternative location could be found within 15m far from the original location, the sampling at that location will be cancelled since sampling at too far from the designated location could not make a representative sample. (refer to supplementary proposal in Appendix I)

4.1.5 Baseline Monitoring

Baseline conditions for the water quality of the sensitive nature of the rivers/streams shall be established and agreed with EPD prior to the commencement of works. The purposes of the baseline monitoring are to establish ambient conditions prior to the commencement of the construction works and to demonstrate the suitability of the proposed impact, control and reference monitoring points.

The baseline conditions shall normally be established by measuring the water quality parameters specified in **Section 4.1.1**. The measurements shall be taken at all designated monitoring stations including control points, 3 days per week, for at least 4 weeks prior to the commencement of construction works.

There shall not be any construction activities over water in the vicinity of the points during the baseline monitoring.

In exceptional case when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from the IEC and EPD on an appropriate set of data to be used as baseline reference.

Baseline monitoring schedule shall be faxed to EPD 1 week prior to the commencement of baseline monitoring. The interval between 2 sets of monitoring shall not be less than 36 hours.

4.1.6 Impact Monitoring

During construction period, impact monitoring should be undertaken at all monitoring stations three working days per week, with sampling /measurement. The interval between two sets of monitoring should not be less than 36 hours except where the Action and/or Limit levels is/are exceeded, in which case the monitoring frequency should be increased.

Two consecutive measurements of DO concentration (mg/L), DO saturation (%) and turbidity (NTU) should be taken in-situ according to the stated sampling method. Where the difference in value between the first and second measurement of DO or turbidity parameters is more than 25% of the value of the first reading, the reading should be discarded and further readings would be taken. Water samples for SS (mg/L) measurements should be collected at the same depths. Duplicate water samples should be taken and analyzed.

In addition to the above in-situ measurements, water temperature and pH should be determined at all monitoring stations at the same depths, as specified above. Note that in addition to the water depth, monitoring location/position, time, weather conditions and any special phenomena should be recorded.

4.1.7 Event and Action Plan

In the Baseline Monitoring Report (AUES ref.: TCS00670/13/600/R0030v3 Version 3 dated 16 August 2013), it was proposed to amend the 'OR' requirement in the EM&A Manual for Turbidity and SS to 'AND' condition. A supplementary proposal for the changes was conducted and attached Appendix F. The Action and Limit (AL) Levels for water quality are defined in **Table 4.2**. The actions in accordance with the Event and Action Plan in **Table 4.3** should be carried out if the water quality assessment criteria are exceeded at any designated

monitoring points.

Table 4.2 Typical Action and Limit Levels for Water Quality

Parameters	Action Level	Limit level
DO in mg/l	5 percentile of baseline data	4 mg/L or 1 percentile of baseline data
SS in mg/l	95 percentile of baseline data and 120% of upstream control station of the same day	99 percentile of baseline data and 130% of upstream control station of the same day
Turbidity in NTU	95 percentile of baseline data and 120% of upstream control station of the same day	99 percentile of baseline data and 130% of upstream control station of the same day

Notes:

1. For DO measurement, non-compliance occurs when monitoring result is lower than the limits.
2. For SS and turbidity, non-compliance of water quality results when monitoring results is higher that the limits.
3. All the figures given in the table are used for reference only and the EPD may amend the figures whenever necessary.
4 The criteria for setting up Action and Limit Level for SS and turbidity are changed according to the Baseline Monitoring Report.

Table 4.3 Event and Action Plan for Water Quality

Event	ET	IEC	ER/ the Architect	Action Contractor
Action Level being exceeded by one sampling day	1. Repeat in-situ measurement of the exceeded parameter to confirm findings; 2. Identify reasons for non-compliance and sources of impact; 3. Inform IEC and Contractor; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with	1. Discuss with ET and Contractor On mitigation measures: 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; 3. Assess the effectiveness of the implemented mitigation measures	1. Discuss with IEC on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented: 3. Assess the effectiveness of the implemented mitigation measures	1. Inform the ER and confirm notification of the noncompliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with ET and IEC and propose mitigation measures to IEC and ER; 6. Implement the agreed mitigation measures.

Event	ET	IEC	ER/ the Architect	Action Contractor
	IEC and Contractor and if exceedance due to the Project; 6. If exceedance is due to the Project, repeat measurement of the exceeded parameter on next day of exceedance.			
Action Level being exceeded by more than two consecutive sampling days	1. Repeat in-situ measurement of the exceeded parameter to confirm findings; 2. Identify reasons for non-compliance and sources of impact; 3. Inform IEC and Contractor; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC and Contractor and if exceedance due to the Project; 6. Ensure mitigation measures are implemented; 7. Prepare to increase the monitoring frequency to daily; 8. If exceedance is due to the	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals mitigation measures submitted by Contractor and advise the ER accordingly; 3. Assess the effectiveness of the implemented mitigation measures	1. Discuss with IEC on the proposed mitigation measures: 2. Make agreement on the mitigation measures to be implemented; 3. Assess the effectiveness of the implemented mitigation measures	1. Inform the ER and confirm notification of the non- compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with ET and IEC and propose mitigation measures to IEC and ER within 3 working days; 6. Implement the agreed mitigation measures.

Event	ET	IEC	ER/ the Architect	Action Contractor
	Project, repeat measurement of the exceeded parameter on next day of exceedance.			
Limit Level being exceeded by one sampling day	1. Repeat in-situ measurement of the exceeded parameter to confirm findings; 2. Identify reasons for non-compliance and sources of impact: 3. Inform IEC, Contractor and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, ER and Contractor and if exceedance due to the Project; 6. Ensure mitigation measures are implemented; 7. If exceedance is due to the Project, increase the monitoring frequency of the exceeded parameter to daily until no exceedance of Limit Level.	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly: 3. Assess the effectiveness of the implemented mitigation measures	1. Discuss with IEC, ET and Contractor on the proposed mitigation measures; 2. Request Contractor to critically review the working methods: 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures	1. Inform the ER and confirm notification of the non- compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within 3 working days; 6. Implement the agreed mitigation measures.
Limit level being	1. Repeat in-situ measurement of	1. Discuss with ET and Contractor on the	1. Discuss with IEC, ET and Contractor on the	1. Inform the ER and confirm notification of the

Event	ET	IEC	ER/ the Architect	Action Contractor
exceeded by more than one consecutive sampling days	the exceeded parameter to confirm findings; 2. Identify reasons for non-compliance and sources of impact; 3. Inform IEC, Contractor and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC. ER and Contractor and if exceedance due to the Project; 6. Ensure mitigation measures are implemented; 7. If exceedance is due to the Project, increase the monitoring frequency of the exceeded parameter to daily until no exceedance of Limit Level for two Consecutive days.	mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; 3. Assess the effectiveness of the implemented mitigation measures,	proposed mitigation measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures; 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit Level.	non- compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER within 3 working days; 6. Implement the agreed mitigation measures; 7. As directed by the ER, to slow down or to stop all or part of the construction activities.

4.1.8 Mitigation Measures

The implementation schedule of the recommended water quality mitigation measures is presented in **Appendix A** of EM&A Manual.

4.2 Operational Water Quality Monitoring

With the full implementation of the recommended mitigation measures during operation phase, no adverse water quality impact is anticipated. Operation phase water quality monitoring is not

considered necessary.

5 ECOLOGICAL IMPACT

5.1 Introduction

The ecological impact assessment in the EIA Report has evaluated the ecological consequences of the proposed Project and concluded that the overall impacts would be of minor significance with the implementation of mitigation measures.

The major mitigation measures proposed for the identified ecological impact include woodland compensation, wetland compensation and transplanting of floral species of conservation interest. The proposed ecological mitigation measures to avoid, minimize and compensate the identified impacts arising from the proposed project should be checked as part of the environmental monitoring and audit programme during the construction phase.

5.2 Ecological Mitigation Measures

Mitigation measures were designed in accordance with Annex 16 of the EIAO-TM which states the general policy and guidance in planning of ecological measures. The implementation schedule of the recommended mitigation measures is presented in **Appendix A** of EM&A Manual. The major ecological mitigation measures proposed include provision of woodland compensation area (approx. 18.6 ha is proposed), provision of wetland compensation area (more than 1 .4 ha is proposed) and transplanting flora species of conservation interest. Mitigation measures for noise, water quality and landscape impact proposed in EIA report **Sections 4, 5** and **11** respectively are also applicable to minimize the disturbance on ecology integrity.

5.3 Environmental Monitoring and Audit

5.3.1 Environmental Audit

The implementation of mitigation measures stated in **Section 8.2** of this Programme shall be routinely audited, during the implementation of the Project. Requirements of the environmental audit are given in **Section 12** of this Programme. Implementation of the recommended ecological mitigation measures, detailed in **Section 15** of the EIA report and **Appendix A** of EM&A Manual, shall be examined during the routine environmental audit.

5.3.2 Environmental Monitoring

5.3.2.1 Monitoring on Transplanting of Flora Species of Conservation Interest

According to the EIA, two species of conservation interest *Euonymus kwangtungensis* and *Aquilaria sinensis* are required to be transplanted to undisturbed areas. As the condition (health and abundance) of plants recorded in the EIA stage may be varied in the detailed design stage, conducting a vegetation survey to confirm the condition of the affected plants (not covered by ETWB TCW 3/2006) prior to the commencement of the construction works is recommended. Suitable reception sites shall also be identified in the vegetation survey report for review by EPD and AFCD. The scope of the vegetation survey shall include the following:

- The checking and updating the number, health condition and location of the floral species of conservation interest identified *(Euonymus kwangtungensis,* and seedlings and individual trees of *Aquilaria sinensis* suitable for transplanting) in the EIA;
- Preparation of an updated location plan showing the individuals identified during the vegetation survey;
- Identification of suitable reception site(s) in retained woodland habitat within the project limit for the shrub species Euonymus kwangtungerisis;

- Identification of suitable reception Site(s) within the proposed compensatory woodland; or temporary transit nursery for seedlings/individuals trees of the tree species Aquilaria sinensis;

- Recommendation of an implementation programme of transplanting.

The transplanting shall be monitored by a suitably qualified ecologist / botanist appointed as a member of the Environmental Team. The transplanted individuals shall be monitored at least twice a month during the first year and once a month for the remaining of the planting period of the compensation woodland. The parameters to be monitored shall include the health condition and survival rate of the transplanted species. Any observations and recommendations should be reported in periodic EM&A reports.

A vegetation survey according to EP Condition 2.8 to confirm the condition of individual flora species of conservation importance was conducted for Contract 2, Contract 3, Contract 5 and Contract 6. Final version of the Vegetation Survey Report for Contract 2, Contract 3 and Contract 5 and Update for Contract 6 were then submitted to the EPD. in September 2014 and September 2015 respectively. Both submissions had been approved by EPD.

5.3.2.2 Monitoring on Woodland Compensation

In order to mitigate the ecological impact of loss of 6.2ha of woodland habitats, a Woodland Compensation Area (WLCA) of about 18.6 ha is proposed on existing hillside grassland and shrubland. Location of the WLCA is illustrated in **Figure 8.1** of EM&A Manual. A Woodland Compensation Plan is presented in Appendix 9.4 of the EIA Report with an aim to form the basis to guide the implementation of the proposed woodland mitigation.

According to the proposed Woodland Compensation Plan, the planting works will be carried out in two phases, viz. Initial Planting Phase and Enhancement Planting Phase, which would take about 5 years and 3 years of time respectively. The second phase Enhancement Planting Phase could commence after the implementation of the first Initial Planting Phase for 3 years or any earlier time as agreed with AFCD.

Apart from the standard inspection and establishment works for landscape softworks, a 6-year ecological monitoring programme covering both initial and enhancement planting phases is proposed. The necessity for further monitoring would be reviewed after the 6-year ecological monitoring programme. The monitoring of planting includes parameters of: general health condition and survival rate; with establishment works would include basic replacement of dead plants, weeding and watering. Due to the large size of the WLCA, monitoring is proposed to be carried out in inspection walk and quadrat sampling. Monitoring in inspection walks aims to observe the overview / progress of the planting within the whole WLCA; while monitoring in quadrats aims to collect quantitative information.

The Woodland Compensation Plan was prepared according to EP Condition 2.9 to set out the planting strategy including details of plantation species, specifications for the establishment of the habitats and subsequent maintenance and monitoring requirements for the Woodland Compensation Area of an area not less than 18.6 hectares. Final version of the Plan was submitted to the EPD on 8 September 2015 and approved on 12 October 2015.

5.3.2.3 Monitoring Requirements

The monitoring shall be conducted by the Environmental Team (ET) and supervised by a qualified botanist/ecologist (Project Botanist/Ecologist) of the ET.

The routes of the general inspection walk should be selected to cover all representative areas of the WLCA as far as possible. The general health condition (good/fair/poor/dead) and survival (%) of individual species of planted trees and shrubs will be recorded by direct

observation.

Nine fixed 20m x 20m quadrats are proposed for quantitative monitoring. These quadrats shall be evenly distributed throughout the WLCA. Parameters to be measured within quadrats include health condition (good/fair/poor/dead), and survival rate (%) of individual species. Proposed locations for the fixed quadrats are shown in **Figure 8.1** of EM&A Manual.

The frequency of the monitoring is proposed to be bi-monthly during the first year of the initial planting phase and shall be reduced to quarterly from the second year. Change of monitoring frequency shall be advised by the Project Ecologist/Botanist and approved by Environmental Protection Department and Agriculture, Fisheries and Conservation Department.

The Trigger and Action Levels for Monitoring and Action Plan of the WLCA are presented in **Table 5.1.**

Table 5.1 Trigger and Action Levels for Monitoring and Action Plan of the WLCA

Parameters	Trigger and Action Level	Action Plan
General Health Condition	Trigger Level: % of individual plant species in poor health condition >20%	- the ET should inform Contractor and IEC immediately; - identify the cause(s) of the exceedance; - advise Contractor the necessity of replanting.
	Action Level: % of individual plant species in poor health condition >30%	- the ET should inform Contractor and IEC immediately; - identify the cause(s) of the exceedance; - advise remedial action and work out solution including change of species in re-planting, re soiling of the target areas; and seek acceptance from AFCD; - Once the remedial action has been accepted by AFCD, the Contractor should implement the remedial action.
Survival of Plants	Trigger Level: Survival rate of individual plant species <80%	- the ET should inform Contractor and IEC immediately; - identify the cause(s) of the exceedance; - advise Contractor the necessity of replanting.
	Action Level: Survival rate of individual plant species < 70%	- the ET should inform Contractor and IEC immediately; - identify the cause(s) of the exceedance; - advise remedial action and work out solution including change of species in re-planting, resoiling of the target areas; and seek acceptance from AFCD; - Once the remedial action has been

		accepted by AFCD, the Contractor should implement the remedial action.

5.3.2.4 **Monitoring on Wetland Compensation**

In order to mitigate the ecological impact of loss of 1.4 ha freshwater wetland, more than 1.4 ha Wetland Compensation Area (WCA) will be created near Nga Yiu Ha. Location of the WCA is illustrated in **Figure 8.2** of the EM&A Manual while a conceptual plan is presented in **Figure 8.3** of the EM&A Manual.

Details of the Wetland Compensation and the monitoring plan would be formulated and provided under a Habitat Creation and Management Plan during the detailed design stage. According to the proposed plan, the programme will comprise implementation, establishment and maintenance stages. Ecological monitoring at implementation and establishment periods will be conducted to cover the ecological attributes. Implementation of the wetland will commence within the construction phase after completion of the construction works at Ping Yeung Section. Monitoring on the WCA will be conducted in implementation and establishment stages. The monitoring shall be conducted by the Environmental Team (ET) and supervised by a qualified ecologist (Project Ecologist) who will be formed as a member of the ET. After establishment stage, AFCD will be responsible of the maintenance and the monitoring works, which is not covered in this Programme.

Habitat Creation and Management Plan (HCMP) has been prepared according to EP Condition 2.10 to set out details of the specifications for the habitats and ecological functions and to define the management and ecological monitoring and audit requirements of the Wetland Compensation Area.. Latest version of the Plan was submitted to the EPD for comments in October 2015 and it is approved by EPD on 26 November 2015.

6 LANDSCAPE, VISUAL AND GLARE IMPACT

6.1 Introduction

The EIA has recommended that EM&A for landscape and visual resources be undertaken during both the construction arid operation phases of the Project. The implementation and maintenance of landscape, visual and glare mitigation measures (see Appendix A of EM&A Manual) should be checked to ensure that they are properly implemented and that the potential conflicts between the proposed measures and any other project works and operational requirements are resolved at the earliest practical date and without compromising the intention of the mitigation measures.

6.2 Construction Phase and Initial Operation Phase

A specialist landscape sub-contractor should be employed by the Contractor for the construction of the landscape works and subsequent maintenance operations during a 12-month establishment period. A qualified landscape architect of the ET should monitor the works of the specialist Landscape sub-contractor, including both hard and soft landscape works.

A tree survey update should be prepared by the Contractor for submission to DLO prior to commencement of construction, and for the purpose of protecting the retained / preserved trees by the Project, if any. Removal of existing trees should be minimised.

All measures undertaken by both the Contractor and the specialist landscape sub-contractor during the construction phase and establishment period (i.e. the first 12 months of operation phase) will be audited by a qualified landscape architect of the ET, to ensure compliance with the aims of the proposed measures. Site inspection should be undertaken at least once per month throughout the construction phase and establishment period.

The broad scope of the site inspection to be undertaken by the qualified landscape architect is detailed below. For a detailed checklist refer to **Table 6.1.**

- To check the extent of the agreed works areas regularly during the construction phase. Any trespass by the Contractor outside the limits of the work areas, including any damage to existing trees should be reported in the audit report;
- To review the progress of the engineering works regularly to identify the earliest practical opportunities for the landscape works to be undertaken;
- To check if the existing trees and vegetation within the project site boundary which are not affected by the construction works are retained and protected;
- To review and confirm that the methods of protection of the existing vegetation proposed by the Contractor are acceptable and properly implemented;
- To check if the preparation, lifting transport and re-planting operations for any transplanted trees are undertaken in accordance with the relevant guidelines;
- To check if the Landscape works are carried out in accordance with the contract specifications;
- To check if the planting of new trees, shrubs, groundcover, climbers, ferns, grasses and other plants, together with the replanting of any transplanted trees are carried out properly and within the right season; and
- To check if necessary horticultural operations and replacement planting are undertaken throughout the establishment period to ensure the healthy establishment and growth of both transplanted trees and all newly established plants.

Table 6.1 Detailed Checklist for Implementation of Landscape Mitigation Measures during the Construction Phase/ Establishment Period

Measures	Description
CM1	Tree Protection and Preservation - Trees/ woodland within the works area will be protected and preserved during the detailed design stage and construction phase
CM2	Tree Transplantation - Should removal of trees be unavoidable due to construction impacts, trees will be transplanted where technically feasible.(3)
CM3	Decorative Screen Hoarding - Decorative screen hoarding will be erected along areas of the construction works site boundary where the works site borders publically accessible routes and/or is close to visually sensitive receivers (VSRs) to screen undesirable views of the works site. It is proposed that the screening be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used.
CM4	Light Control - Construction and night time lighting glare will be Controlled to minimize glare impact to adjacent VSRs during the construction stage.
CM5	Topsoil reuse - Excavated topsoil should be conserved for re-use by the Project or other projects.
CM6	Watercourse Impact Mitigation - Where watercourses are anticipated to be unavoidably affected, for natural / semi-natural watercourses, these will be modified to achieve a natural appearance similar to existing. A proposed Wetland Compensatory Area is also included within the Project Site and this will accommodate the natural watercourse currently existing in the proposed area. For channelized watercourses these will be modified to match the existing and some additional enhancement planting should be implemented to upgrade these channels. Bridges will be used to minimise the necessity of watercourse modification, and box culverts will also be used to protect watercourses where necessary.
OM1	Detailed Design Considerations - Detailed design of development components should reduce landscape footprint and visibility of structures. The area allowed for any development components should be reduced to a practical minimum.
OM2	Aesthetically Pleasing Design - The form, textures, finishes and colours of the proposed development components should be compatible with the existing surroundings. Light earthy tone colours such as shades of green, shades of grey, shades of brown and off-white may be utilised where technically feasible to reduce the visibility of the development components, including all roadwork, buildings and noise barriers etc. to further improve visual amenity, natural building materials such as stone and timber, should be preferably adopted for architectural

Measures	Description
	features, where technically feasible.
OM3	Compensatory Planting - All compensatory planting of trees is to be carried out in accordance with *ETWB TCWNo. 03/2006*. Section 9 (Ecology) of the EIA Report contains further details of the compensatory planting specifically for woodland. A total woodland compensation area of 18.6 ha is proposed. In view of the maturity of the secondary woodland impacted, a higher compensation ratio is proposed and details can be found in the proposed Woodland Compensation Plan in Appendix 9.4. For key LRs containing substantial numbers of affected trees, Table 11.15a of the EIA Report gives an approximation of the number of trees to be planted to compensate for the trees felled in each of these key LRs.
	Some compensatory shrub and ground cover planting will also be provided. Space is to be allowed on both sides of the associated road works, on the peripheries of both BCP and the Middle Ventilation building for such planting. This area of compensatory shrub and ground cover planting is approximately 21 ha in size over the whole project area.
	In addition, a Wetland Compensation Area (WCA) is proposed to compensate for some wet areas of farmland and shrubby grassland on lowland Section 9 (Ecology) contains further details of the WCA with Figure 9.28 of the EIA Report showing a conceptual plan of the area. Details of the Wetland Compensation Plan (WCP) would be formulated and provided under a Habitat Creation and Management Plan during the detailed design stage.
OM4	Buffer Tree Planting - Tree planting shall be provided to screen the proposed structures and associated facilities. In addition, the compensatory shrub and ground cover planting detailed in 0M3 will provide screening and improve compatibility with the surrounding environment..
OM5	Aesthetic Improvement Planting-Viaduct Structure Planters will be provided for trailer planting to soften the hard, straight edges of the viaduct. Where space allows for planters, climbers are proposed to cover vertical, hard surfaces of the piers.
OM6	Aesthetic Improvement Planting-Under Viaduct - Shade tolerant plants will be planted, where light is sufficient, to improve aesthetic value of areas under viaducts.
OM7	Landscaped Slope - Where existing hillside slopes are anticipated to be modified (eg cut slope at the portals of the tunnel sections and embankments along the alignment) the final slope surface will be landscaped by hydroseeding, tree or shrub planting where slope gradient allows.
OM8	Green Roof - Green roofing should be established on proposed buildings to reduce exposure to untreated concrete surfaces and mitigate visual impact to VSRs at high levels.
OM9	Vertical Greening - Vertical planting should be established to soften the

Measures	Description
	hard, vertical surfaces of the proposed development components. These components will include walls of administration and ventilation buildings, retaining walls and road abutments.
OM10	Roadside Amenity Planting - Roadside amenity planting should be provided, to enhance the landscape and visual quality of the existing and proposed transport routes and car parks. noise barriers etc. To further improve visual amenity, natural building materials such as stone and timber, should be preferably adopted for architectural features, where technically feasible.
OM11	Reinstatement - Certain areas unavoidably disturbed by the Project will be reprovisioned. The Chuk Yuen Village within the BCP area will be re-sited to a designed location before commencement of the Project. Further details on the ¡¥Re-site of Chuk Yuen Village' are discussed in Section 11.8 of the EIA Report.
	Existing farmland, rural built/open storage areas and industrial/factory areas will not be reinstated but such areas affected should be conditioned to suit future land use. For reinstatement involving planting measures, refer to other mitigation measures e.g. for woodland/shrubby grassland/vegetated slopes. See CM1, CM2, OM3, OM7. For watercourse, see CM6.
OM12	Light Control - Street and night time lighting glare will be controlled to minimize glare impact to adjacent VSRs during the operation stage.
OM13	Reprovisioned LCSD Garden - The Open Space of Wo Keng Shari public garden falls within the Project Site and will be reprovisioned to reprovide the amenities of the garden on a one to one basis e.g. existing trees, benches etc will be re-provided in the new garden.
	The proposed location of the reprovisioned garden is near the existing location and shown on **Figure 10.5** of EM&A Manual and this is subject to confirmation by CEDD and LCSD.

The landscape mitigation measures are shown in **Figures 10.1-10.7** of EM&A Manual. In the event of non-compliance the responsibilities of the relevant parties are detailed in the Event] Action Plan provided on **Table 6.2**.

Table 6.2 Event and Action Plan for Landscape and Visual Monitoring during Construction and Operational Phases

Action level	Environmental Team (ET)	Independent Environmental Checker (IEC)	Contractor
Non-conformity on one occasion	1. Identify source 2. Inform the IEC and the Contractor 3. Discuss remedial actions with the IEC and the Contractor 4. Monitor remedial actions until rectification has been completed	1. Check report 2. Check the Contractors working method 3. Discuss with the FT and the Contractor on practical remedial measures 4. Advise ER on effectiveness of	6. Amend working methods 7. Rectify damage and undertake any necessary replacement

Action level	Environmental Team (ET)	Independent Environmental Checker (IEC)	Contractor
		proposed remedial measures 5. Check implementation of remedial measures.	
Repeated Non-conformity	8. Identify source 9.Inform the IEC and the Contractor 10. Increase monitoring frequency 11. Discuss remedial actions with the IEC and the Contractor 12. Monitor remedial actions until rectification has been completed 13. If non-compliance stops, cease additional monitoring	14.Check monitoring report 15. Check the Contractor's working method 16. Discuss with the ET and the Contractor on practical remedial measures 17. Advise the ER on effectiveness of proposed remedial measures 18. Monitor the implementation of remedial measures	19.Amend working methods 20. Rectify damage and undertake any necessary replacement

A Landscape Plan under Agreement No. CE 38/2010 (CE) was prepared according to EP Condition 2.11 to include considerations for minimizing habitat fragmentation and show the locations, size, number, and species of planting, design details, implementation programme, maintenance and management schedules, and drawings showing the landscape and visual mitigation measures of the Project, in particular the landscape and compensatory planting, construction hoarding, noise barriers and buildings. It was submitted to the EPD on 30 July 2014 and approved on 4 September 2015. Further comments were given by Planning Department in September 2014 and the revision is on-going.

In September 2015, Landscape plan for the BCP building works under ArchSD Agreement No. 9AA has been prepared to supplement the approved Landscape Plan, to cover the building and facilities design information within the Liantang/Heung Yuen Wai Boundary Control Point (BCP Works). This plan is pending for approval by EPD.

7 CULTURAL HERITAGE IMPACT

7.1 Introduction

The cultural heritage impact assessment in the EIA Report has evaluated the potential cultural heritage impacts of the Project and recommended appropriate mitigation measures to avoid and minimize the identified impacts arising from the construction of the Project. As part of the EM&A requirements, the following EM&A programme should be implemented prior to and during Construction stage of the Project.

As there will be no impact during the operation of the Project, no EM&A programme will be required during the operation phase.

7.2 Construction Phase

7.2.1 Built Heritage

7.2.1.1 Photographic and Cartographic Records

Mitigation measures in the form of detailed photographic and cartographic recordings are recommended to be conducted on the sixteen sites of the directly impacted graves, built structures and historical/cultural landscape features in order to preserve them in record prior to their removal/relocation. These directly impacted built heritage features include thirteen graves (GRO1, GRO2, GRO5, GRO6, GRO8, GR1O, GR13, GR15, GR16, GR17, GR18, GR19, GR2O), two built structures (BS64 and BS65) and one historical/cultural landscape feature (LFO8). Their details are listed in **Table 7.1**:

Table 7.1 Impacted Built Heritage that Require Detailed Photographic and Cartographic Recordings

Site Code	Site Name	Relevant Project Sections	Reference Figures
Graves			
GR01	Group of Law Clan Graves (4 Nos.)	BCP Section	Figure 12.2.1 of EIA Report
GR02	Group of Tang Clan Graves (5 Nos.)	BCP Section	Figure 12.2.1 of EIA Report
GR05	Fu Grave	Section between Ling Ma Hang and Frontier Closed Area Boundary	Figure 12.2.3 of EIA Report
GR06	Yu Grave	Section between Ling Ma Hang and Frontier Closed Area Boundary	Figure 12.2.3 of EIA Report
GR08	Chan Grave	Section between Ping Yeung and Wo Keng Shan	Figure 12.2.7a of EIA Report
GR10	Tsui Grave	Section between Ping Yeung and Wo Keng Shan	Figure 12.2.9c of EIA Report
GR13	Yim Grave	Fanling section	Figure 12.2.18 of EIA Report
GR15	Chan Grave	Fanling section	Figure 12.2.21 of EIA Report
GR16	Ho Grave	Fanling section	Figure 12.2.21 of EIA Report
GR17	Cheung Grave	Fanling section	Figure 12.2.21 of EIA Report
GR18	Yip Grave	Section between Ping Yeung and Wo Keng Shan	Figure 12.2.7b of EIA Report
GR19	Law Grave	BCP section	Figure 12.2.1 of EIA Report
GR20	Lam Grave	Cheung Shan Tunnel Section	Figure 12.2.10c of EIA Report

Site Code	Site Name	Relevant Project Sections	Reference Figures
Site Code	Site Name	Relevant Project Sections	Reference Figures
Built Structures			
BS64	Village Houses, Ha Wo Keng Shan Village	Section between Ping Yeung and Wo Keng Shan	Figure 12.2.9b of EIA Report
BS65	Village Houses, Ha Wo Keng Shan Village	Section between Ping Young and Wo Keng Shan	Figure 12.2.9b of EIA Report
Historical/Cultural Landscape Feature			
LF08	Well	BCP Section	Figure 12.2.1 of EIA Report

Prior to the commencement of the photographic and cartographic recording, detailed work plan should be submitted to the Antiquities and Monuments Office (AMO) for agreement. The plan should be prepared in accordance with the requirements of the Guidelines for Photographic Records and Cartographic Records established by AMO (see **Appendix D** of EM&A Manual). Liaison with and obtaining agreement from the descendents of the directly impacted graves will need to be carried out by the Lands Department.

The photographic and cartographic field survey for the built heritage in Contact 2, Contract 3 and Contract 5 were completed. Report for Contract 2 and Contract 5 was submitted to AMO and subsequently approved. Report for Contract 3 has been submitted to AMO and the Contractor is still working with AMO to finalise the report. Survey for Contract 6 is on-going.

7.2.1.2 Vibration Monitoring

Since no potential construction vibration impacts have been identified for the proposed scheme assessed in the EIA Study, no vibration monitoring is considered necessary. However, if there is any amendment to the design during detailed design stage, the potential impacts will need to be reviewed. In case the design change will cause potential vibration impacts on the identified built heritage features, it is recommended that prior to commencement of the construction works, a baseline condition survey and baseline vibration monitoring should be conducted by a qualified building surveyor and a qualified structural engineer to define the vibration limit and to evaluate if construction vibration monitoring and structural strengthening measures are required during construction phase to ensure that the construction of the Project will not cause adverse impact to the heritage features.

7.2.1.3 Temporary Grave Access Diversion

Access of the grave GR03 will temporarily be affected by the proposed works during construction phase. Temporary access division will be provided during the construction phase so that access to the grave will not be blocked as a result of the construction works. After completion of construction works, the affected access route is required to be re-provided.

7.2.2 Archaeology

Two mitigation measures are recommended to mitigate the potential direct impacts on the

potential or unknown archaeological resources, namely Archaeological Survey-cum-Rescue Excavation and Archaeological Survey on the resumed private land areas. These archaeological works should be conducted by a professional archaeologist who should obtain a Licence to Excavate and Search for Antiquities from the Authority under the AM Ordinance. An Archaeological Action Plan (AAP) following the Guideline for Cultural Heritage Impact Assessment should be submitted to Antiquities and Monuments Office (AMO). The project proponent should appoint qualified and experienced archaeologist(s) with sufficient funding, time and personnel arrangements to implement the AAP. Details of the proposal plan with specification for further archaeological survey and survey-cum-rescue excavation should be agreed with AMO. The AAP should include , but not limited to, the following information:

- a detailed plan for further archaeological survey at inaccessible areas in Section between Lin Ma Hang and Frontier Closed Area Boundary, Section between Ping Yeung and Wo Keng Shan, Sha Tau Kok Road Section (Between North and South Tunnel), Lau Shui Heung Tunnel Section (South Tunnel) and Fanling Section;
- a detailed plan for survey-cum-rescue excavation at the Section between Ping Yeung and Wo Keng Shan; and
- a contingency plan to address possible arrangement if significant archaeological findings are unearthed during the further archaeological survey and survey-cum-rescue excavation.

Details of these mitigation measures are described in **Sections 7.2.2.1 and 7.2.2.2** below:

The archaeological field survey for areas in Contact 2, Contract 3, Contract 5 and Contract 6 were completed. Detail survey report for Contract 5 was submitted to AMO and subsequently approved. Detail survey report for Contract 2 and Contract 3 has been submitted to AMO and the archaeologist is still working with AMO to finalise the report. Report for Contract 6 is under preparation.

7.2.2.1 Survey-cum-rescue-excavtion

A survey-cum-rescue excavation with an indicative boundary as shown in **Figure 11.1 – 11.6** of EM&A Manual in the Section between Ping Yeung and Wa Keng Shan should be conducted after land resumption and before the commencement of the construction works to further investigate the archaeological remains and to preserve the archaeological remains, if any, confirmed by the survey.

7.2.2.2 Archaeological Survey in Resumed Private Land Area

Due to site access constraint, some areas have not yet been surveyed during the EIA Study of the Project. A further archaeological survey should be conducted after land resumption to complete the outstanding survey proposed for the EIA Study to obtain field data to verify the EIA findings. **Table 11.2** summarises the areas that need further archaeological survey after land resumption.

Table 7.2 Areas Requiring Further Archaeological Survey

Relevant Project Sections	Scope of Work	Reference Figures
Section between Lin Ma Hang and Frontier Closed Area Boundary	• 7 test pits • 4 auger holes; and • Additional test pits and auger holes in area of low archaeological potential illustrated in	**Figures 11.1 to 11.6** of EM&A Manual

Relevant Project Sections	Scope of Work	Reference Figures
	Figure 12.6.1 of the EIA Report. Quantity and location of test pits and auger holes required to be agreed with AMO.	
Section between Ping Yeung and Wo Keng Shan	• 4 test pits: • 6 auger holes; and • Survey-cum-rescue excavation, detailed scope to be agreed with AMO.	**Figures 11.1 to 11.6** of EM&A Manual
Sha Tau Kok Road Section (Between North and South Tunnel)	• 9 test pits; and • 12holes auger	**Figures 11.1 to 11.6** of EM&A Manual
Lau Shui Heung Tunnel Section (South Tunnel)	• 2 test pits.	**Figures 11.1 to 11.6** of EM&A Manual
Fanling Section	• 2 test pits; and • 3 holes.	**Figures 11.1 to 11.6** of EM&A Manual

7.3 Operation Phase

7.3.1 Built Heritage

Since all directly impacted built heritage features are to be relocated or removed prior to commencement of construction works, no impact is anticipated, and no EM&A programme is required during the operation phase of the Project.

7.3.2 Archaeological Resources

No EM&A programme is required.

8 ENVIRONMENTAL AUDITING

8.1 Site Inspections

Site inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They should be undertaken routinely by the ET to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. With well defined pollution control and mitigation specifications and a well established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

The ET Leader shall be responsible for formulating the environmental site inspection, the deficiency and action reporting system, and for carrying out the site inspection works. He shall submit a proposal for site inspection and deficiency and action reporting procedures to the IEC for agreement, and to the ER for approval. The Contractor's proposal for rectification would be made known to the ER and IEC.

Regular site inspections led by the ET leader shall be carried out at least once per week. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site; it should also review the environmental situation outside the Project sites which is likely to be affected, directly or indirectly, by the site activities. The ET shall make reference to the following information in conducting the inspection:

- the EIA and EM&A recommendations on environmental protection and pollution control mitigation measures
- the Environmental Permit conditions
- ongoing results of the EM&A program
- works progress and programme
- individual works methodology proposals (which shall include proposal on associated pollution control measures)
- contract specifications on environmental protection
- relevant environmental protection and pollution control laws
- previous site inspection results undertaken by the ET and others

The Contractor shall keep the ET Leader updated with all relevant information on the construction contract necessary for him to carry out the site inspections. Inspection results and associated recommendations for improvements to the environmental protection and pollution control works shall be submitted to the IEC and the Contractor within 24 hours for reference and for taking immediate action. The Contractor shall follow the procedures and time-frame stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.

The ET shall also carry out ad hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work.

8.2 Compliance with Legal and Contractual Requirements

There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.

In order that the works are in compliance with the contractual requirements, relevant sections (e.g. sections related to environmental measures) of works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.

The ET Leader shall also keep himself informed of the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violation can be prevented.

The Contractor shall regularly copy relevant documents to the ET Leader so that works checking can be carried out. The document shall at least include the updated Works Progress Reports, updated Works Programme, any application letters for different licence / permits under the environmental protection laws, and copies of all valid licences / permits. The site diary shall also be made available for the ET Leader's inspection upon his request.

After reviewing the documentation, the ET Leader shall advise the Contractor of any noncompliance with contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions, including any potential violation of requirements.

Upon receipt of the advice, the Contractor shall undertake immediate action to correct the situation. The ER shall follow up to ensure that appropriate action has been taken in order to satisfy contractual and legal requirements.

8.3 Environmental Complaints

`Handling of environmental complaints should follow the environmental complaint flow diagram and reporting channel as presented in **Figure 12.1** of EM&A Manual.

During the complaint investigation work, the Contractor and ER shall cooperate with the ET in providing all necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor shall promptly carry out the mitigation works. The ER shall ensure that the measures have been carried out by the Contractor.

9 REPORTING

9.1 Introduction

The reporting requirements of EM&A are based upon a paper-documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the IEC, the ER and EPD (for construction phase), and with the Environmental Consultant, CEDD and EPD (for operation phase). This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach.

For construction phase of EM&A, types of reports that the ET Leader shall prepare and submit include baseline monitoring report, monthly EM&A report, quarterly EM&A summary report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final review EM&A reports shall be submitted to the Director of Environmental Protection. The exact details of the frequency, distribution and time frame for submission shall be agreed with the IEC, the ER and EPD prior to commencement of works

9.2 Baseline Monitoring Report

The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to the Contractor, the IEC, the ER, CEDD and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies they require. The report format and baseline monitoring data format shall be agreed with the IEC, the ER and EPD prior to submission.

The baseline monitoring report shall include at least the following:

(i) up to half a page executive summary

(ii) brief project background information

(iii) drawings showing locations of the baseline monitoring stations

(iv) monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology
- name of laboratory and types of equipment used and calibration details
- parameters monitored
- monitoring locations (and depth)
- monitoring date, time, frequency and duration
- quality assurance (QA) / quality control (QC) results and detection limits

(v) details of influencing factors, including:

- major activities, if any, being carried out on the site during the period/monitoring
- weather conditions during the period/monitoring
- other factors which might affect results

(vi) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored

(vii) revisions for inclusion in the EM&A Manual

(viii) comments, recommendations and conclusions.

9.3 Monthly EM&A Reports

The results and findings of all EM&A work carried out during the month shall be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report shall be prepared and submitted within 10 working days from the end of each reporting month. Each monthly EM&A report shall be submitted to the following parties: the Contractor, the IEC, the ER, CEDD and the EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.

The ET leader shall review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

9.3.1 First Monthly EM&A Report

The first monthly EM&A report shall include at least but not be limited to the following:

(i) executive summary (1-2 pages):

- breaches of Action and Limit levels
- complaint log
- notifications of any summons and status of prosecutions
- changes made that affect the EM&A
- future key issues

(ii) basic project information:

- project organisation including key personnel contact names and telephone numbers
- scope of works of the Project
- construction programme
- works undertaken during the month with illustrations (such as location of works etc)
- drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations)

(iii) a brief summary of EM&A requirements including:

- all monitoring parameters
- environmental quality performance limits (Action and Limit levels)
- Event-Action Plans
- environmental mitigation measures, as recommended in the project EIA study final report
- environmental requirements in contract documents

(iv) environmental status:

- advice on status of compliance with environmental permit including the status of submissions under the environmental permit

(v) implementation status:

- implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report

(vi) monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology
- name of laboratory and types of equipment used and calibration details
- parameters monitored
- monitoring locations
- monitoring date, time, frequency, and duration
- weather conditions during the period/monitoring
- graphical plots of the monitored parameters in the month annotated against

  - the major activities being carried out on site during the period

  - weather conditions that may affect the monitoring results

  - any other factors which might affect the monitoring results

  - QA/QC results and detection limits

(vii) Analysis of monitoring results, non-compliance, complaints, and notifications of summons and status of prosecutions:

- analysis and interpretation of monitoring results in the month
- any non-compliance (exceedances) of the environmental quality performance limits (Action
- and Limit levels)
- changes made that affect the EM&A during the month
- complaints received (written or verbal) for each media, including locations and nature of complaints, investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary
- notification of summons and status of prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary
- reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures
- actions taken in the event of non-compliance and deficiency, and follow-up actions related to earlier non-compliance

(viii) others

- an account of the future key issues as reviewed from the works programme and work method statements
- comment on the solid and liquid waste management status during the month including waste generation and disposal records
- outstanding issues and deficiencies
- comments on effectiveness of the environmental management systems, practices, procedures and mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions

(ix) appendix

- monitoring schedule for the present and next reporting period
- cumulative statistics on complaints, notifications of summons and successful prosecutions
- outstanding issues and deficiencies

9.3.2 **Subsequent Monthly EM&A Reports**

Subsequent monthly EM&A reports shall include the following:

(i) executive summary (1-2 pages):

- breaches of Action and Limit levels
- complaint log
- notifications of any summons and status of prosecutions
- changes made that affect the EM&A
- future key issues

(ii) environmental status:

- advice on status of compliance with environmental permit including the status of submissions under the environmental permit

(iii) implementation status:

- implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report

(iv) monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology
- name of laboratory and types of equipment used and calibration details
- parameters monitored
- monitoring locations
- monitoring date, time, frequency, and duration
- weather conditions during the period/monitoring

- graphical plots of the monitored parameters in the month annotated against:

  - the major activities being carried out on site during the period

  - weather conditions that may affect the monitoring results

  - any other factors which might affect the monitoring results

  - QA/QC results and detection limits

(v) Analysis of monitoring results, non-compliance, complaints, and notifications of summons and status of prosecutions:

- analysis and interpretation of monitoring results in the month
- any non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
- changes made that affect the EM&A during the month
- complaints received (written or verbal) for each media, including locations and nature of complaints, investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary
- notification of summons and status of prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary
- reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures
- actions taken in the event of non-compliance and deficiency, and follow-up actions related to earlier non-compliance

(vi) others

- an account of the future key issues as reviewed from the works programme and work method statements
- comment on the solid and liquid waste management status during the month including waste generation and disposal records
- outstanding issues and deficiencies
- comments on effectiveness of the environmental management systems, practices, procedures and mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions

(vii) appendix

- monitoring schedule for the present and next reporting period
- cumulative statistics on complaints, notifications of summons and successful prosecutions
- outstanding issues and deficiencies

Some information concerning the EM&A works, such as the EM&A requirements would remain unchanged throughout the EM&A programme. In the subsequent Monthly EM&A Reports, the First Monthly EM&A Report can be referred instead of repeating the description of the unchanged information.

9.4 Quarterly EM&A Reports

A quarterly EM&A report shall be produced and shall contain at least the following information. In addition, the first quarterly summary report should also confirm if the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

(i) up to half a page executive summary

(ii) (basic project information including a synopsis of the project organisation and programme, and a synopsis of works undertaken during the quarter

(iii) a brief summary of EM&A requirements including:

- monitoring parameters
- environmental quality performance limits (Action and Limit levels)
- environmental mitigation measures, as recommended in the project EIA Final Report

(iv) (drawings showing the project area, environmental sensitive receivers and the locations of the monitoring and control stations

(v) implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report

(vi) graphical plots of the monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:

- the major activities being carried out on site during the period
- weather conditions during the period
- any other factors which might affect the monitoring results

(vii) advice on the solid and liquid waste management status during the quarter including waste generation and disposal records

(viii) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels)

(ix) a brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures

(x) a summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance

(xi) a summary of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken

(xii) comments on the effectiveness and efficiency of the mitigation measures); recommendations on any improvement in the EM&A programme and conclusions for the quarter

(xiii) proponents / contacts and any hotline telephone number for the public to make enquiries.

9.5 Final EM&A Review Report

The EM&A program could be terminated upon completion of those construction activities that have the potential to cause significant environmental impacts, and/or the completion of operational traffic noise monitoring, monitoring of woodland compensation and wetland compensation, whichever is the later.

The proposed termination by the Contractor should only be implemented after the proposal has been endorsed by the IEC, the ER and the Project proponent followed by final approval from the Director of Environmental Protection.

The final EM&A report should include, inter alia, the following information:

(i) an executive summary

(ii) basic project information including a synopsis of the project organisation and programme, contacts of key management, and a synopsis of work undertaken during the entire construction period

(iii) a brief summary of EM&A requirements including:

- monitoring parameters
- environmental quality performance limits (Action and Limit levels)
- environmental mitigation measures, as recommended in the project EIA study final report

(iv) (drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations

(v) advice on the implementation status of environmental and pollution control/mitigation measures, as recommended in the project EIA study final report, summarised in the updated implementation status proformas

(vi) graphical plots of the monitored parameters over the construction period for representative monitoring stations, including the post-project monitoring annotated against:

- the major activities being carried out on site during the period
- weather conditions during the period
- any other factors which might affect the monitoring results
- the baseline condition

(vii) compare the EM&A data with the EIA

(viii) Effectiveness of the solid and liquid waste management

(ix) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels)

(x) a brief account of the reasons the noncompliance including a review of pollution sources and working procedures

(xi) a summary of the actions taken against the non-compliance

(xii) a summary of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken

(xiii) a review of the monitoring methodology adopted and with the benefit of hindsight, comment its effectiveness (including cost effectiveness)

(xiv) a summary of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results

(xv) a review of the practicality and effectiveness of the EM&A programme (e.g. effectiveness and efficiency of the mitigation measures), and recommendation on any improvement in the EM&A programme

(xvi) a conclusion to state the return of ambient and/or the predicted scenario as per EIA findings

9.6 Data Keeping

No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the EM&A reporting documents. However, any such document shall be well kept by the ET Leader / Monitoring Team and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. Monitoring data shall also be recorded in magnetic media form, and the software copy must be available upon request. Data format shall be agreed with the IEC, the ER, CEDD and EPD. All documents and data shall be kept for at least one year following completion of the construction contract and one year after the completion of operation phase monitoring for construction phase LM&A and operational phase LM&A respectively.

9.7 Interim Notifications of Environmental Quality Limit Exceedances

For construction phase EM&A, with reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader shall immediately notify the IEC, the ER and EPD, as appropriate and shall keep them informed of the results of the investigation, proposed remedial measures, actions taken, updated situation on site, need for further follow-up proposals, etc. A sample template for the interim notifications is shown in Appendix C of EM&A Manual. The ET Leader may modify the interim notification form for this EM&A programme, the format of which should be approved by the ER and agreed by the IEC.

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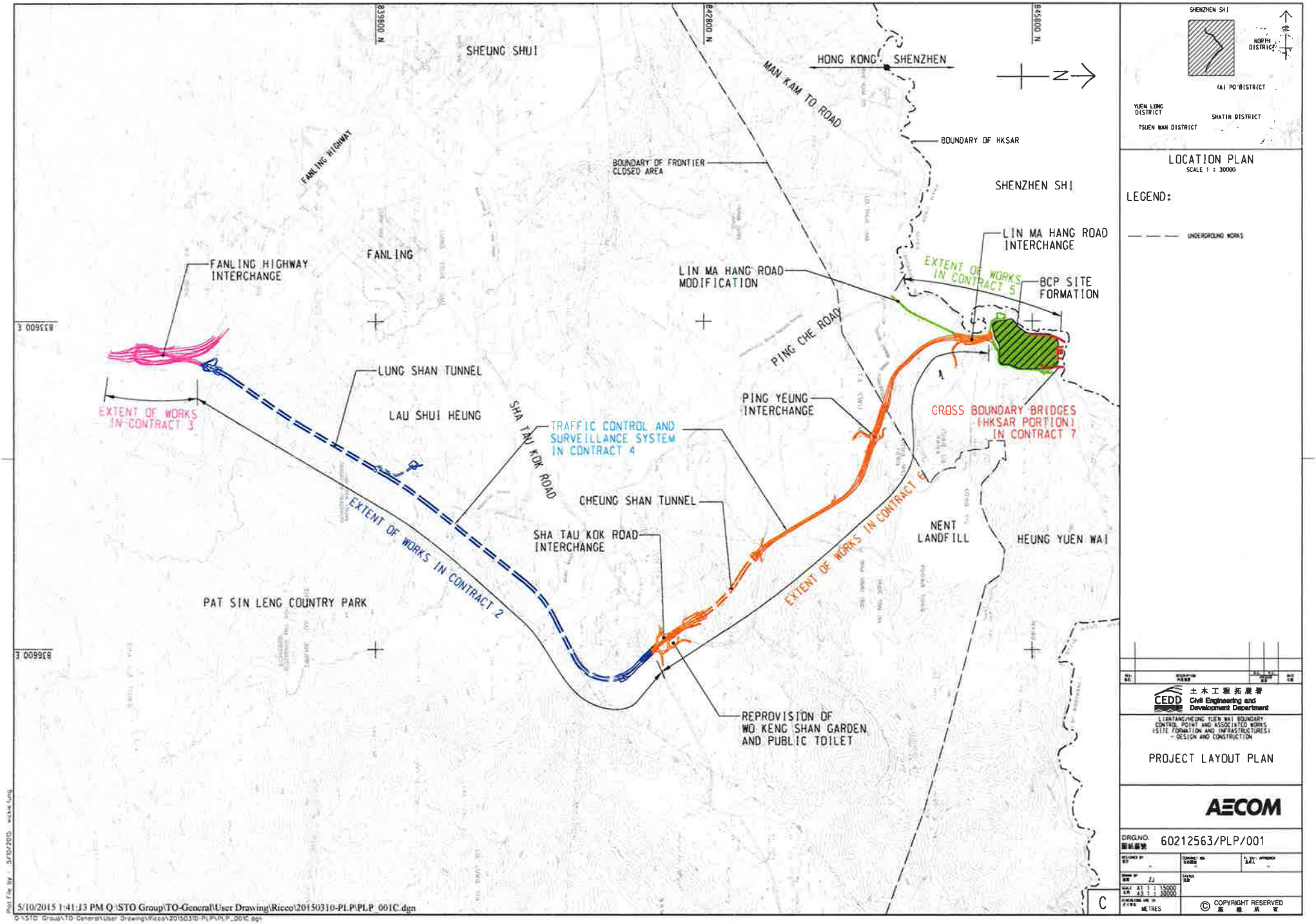
Appendix A

Project Layout Plan



SHENZHEN SHI

NORTH DISTRICT

FAI PO DISTRICT

YUEN LONG DISTRICT

SHATIN DISTRICT

TSUEN WAN DISTRICT

LOCATION PLAN

SCALE 1 : 30000

LEGEND:

UNDERGROUND WORKS

CEDD 土木工程拓展署 Civil Engineering and Development Department

LIANTANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT AND ASSOCIATED WORKS (SITE FORMATION AND INFRASTRUCTURES) - DESIGN AND CONSTRUCTION

PROJECT LAYOUT PLAN

AECOM

DRG.NO. 60212563/PLP/001

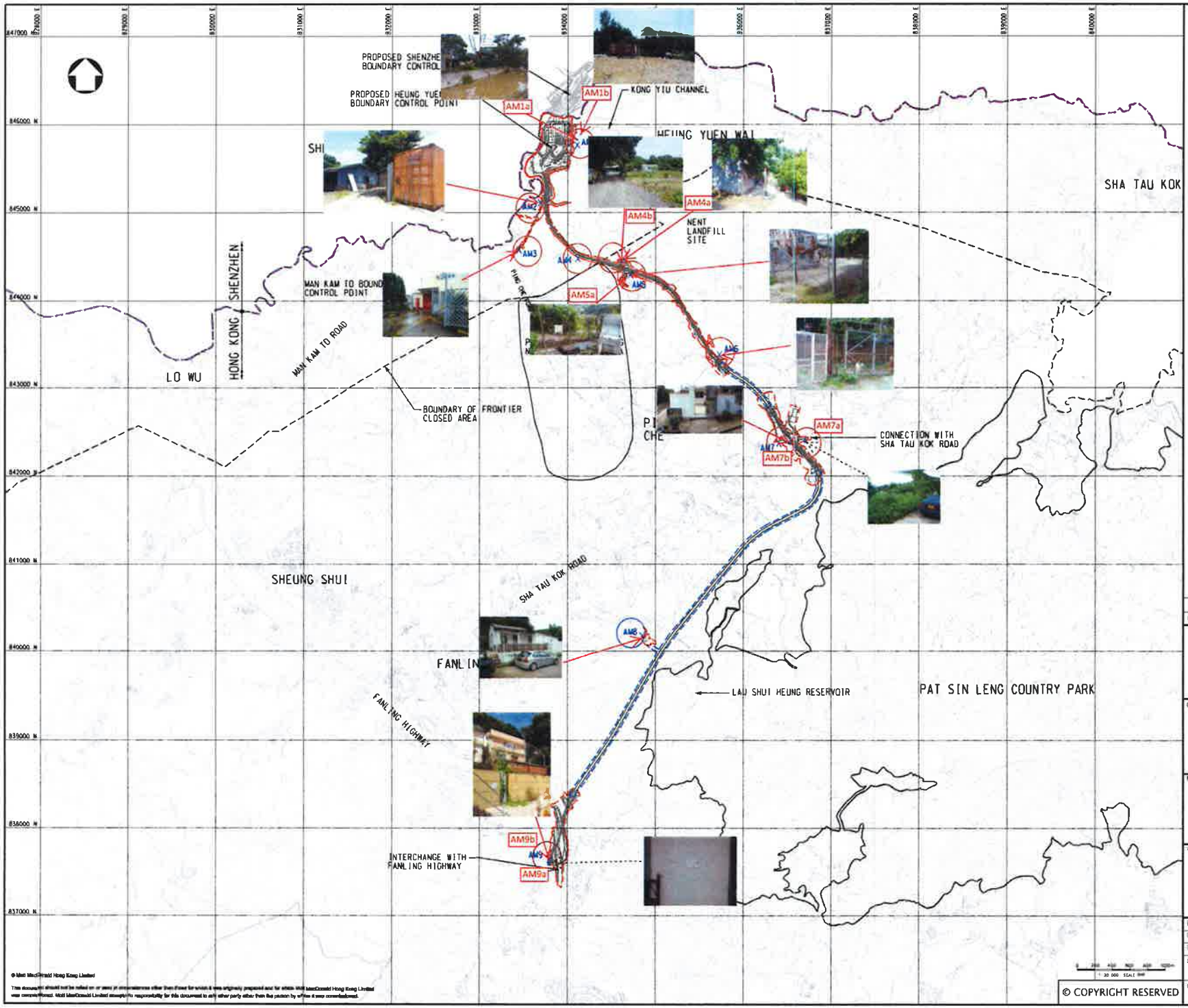
METRES

C

5/10/2015 1:41:13 PM Q:\STO Group\TO-General\User Drawing\Ricco\20150310-PLP\PLP_001C.dgn

Appendix B

Location Plan of Air Monitoring Station



LEGEND:

- BOUNDARY OF HKSAR
- WORKS AREA (ABOVE GROUND)
- WORKS AREA (TUNNEL)
- X Air Monitoring Stations in the EM&A Manual
- Proposed Air Monitoring Stations

Rev	Date	Drawn	Description	Ch'k'd	Appd
P1	AUG 10	MING	FIRST ISSUE	DC	HT

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20/F Two Landmark East
100 How Ming Street
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Client

CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Project

AGREEMENT NO. CE45/2008(CE)
LIANTANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT AND ASSOCIATED WORKS

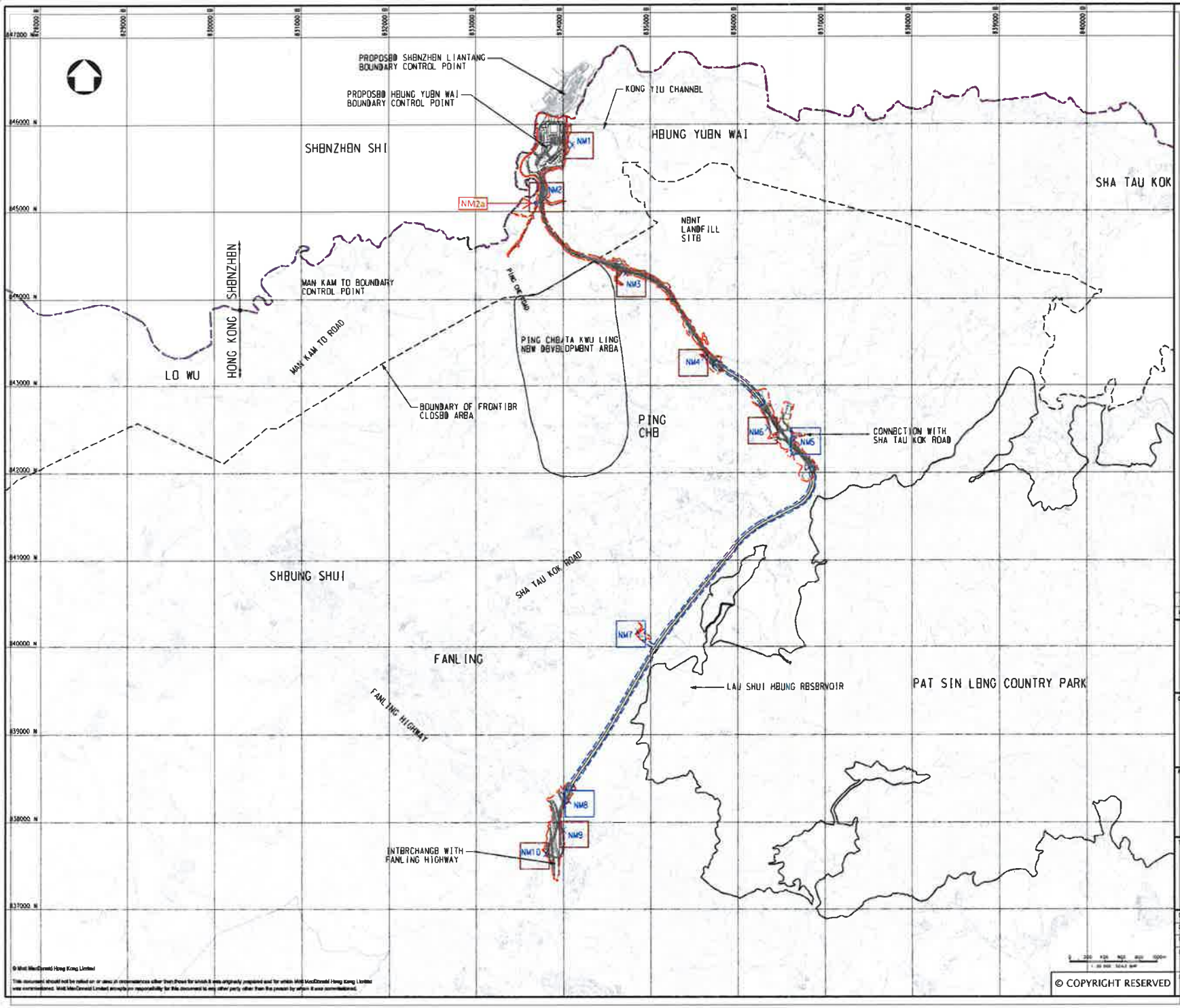
Title

PROPOSED LOCATION OF CONSTRUCTION AIR QUALITY MONITORING STATIONS

Designed	DC		Eng Chk.	EC	
Drawn	MING		Coordination	EC	
Dwg Chk.	DC		Approved	HT	
Scale at A1	1:20000	Project	255228	Status	PRE
Drawing No	FIGURE 2.1			Rev	P1

Appendix C

Location Plan of Noise Monitoring Station



Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	AUG 10	MING	FIRST ISSUE	BC	HT

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CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

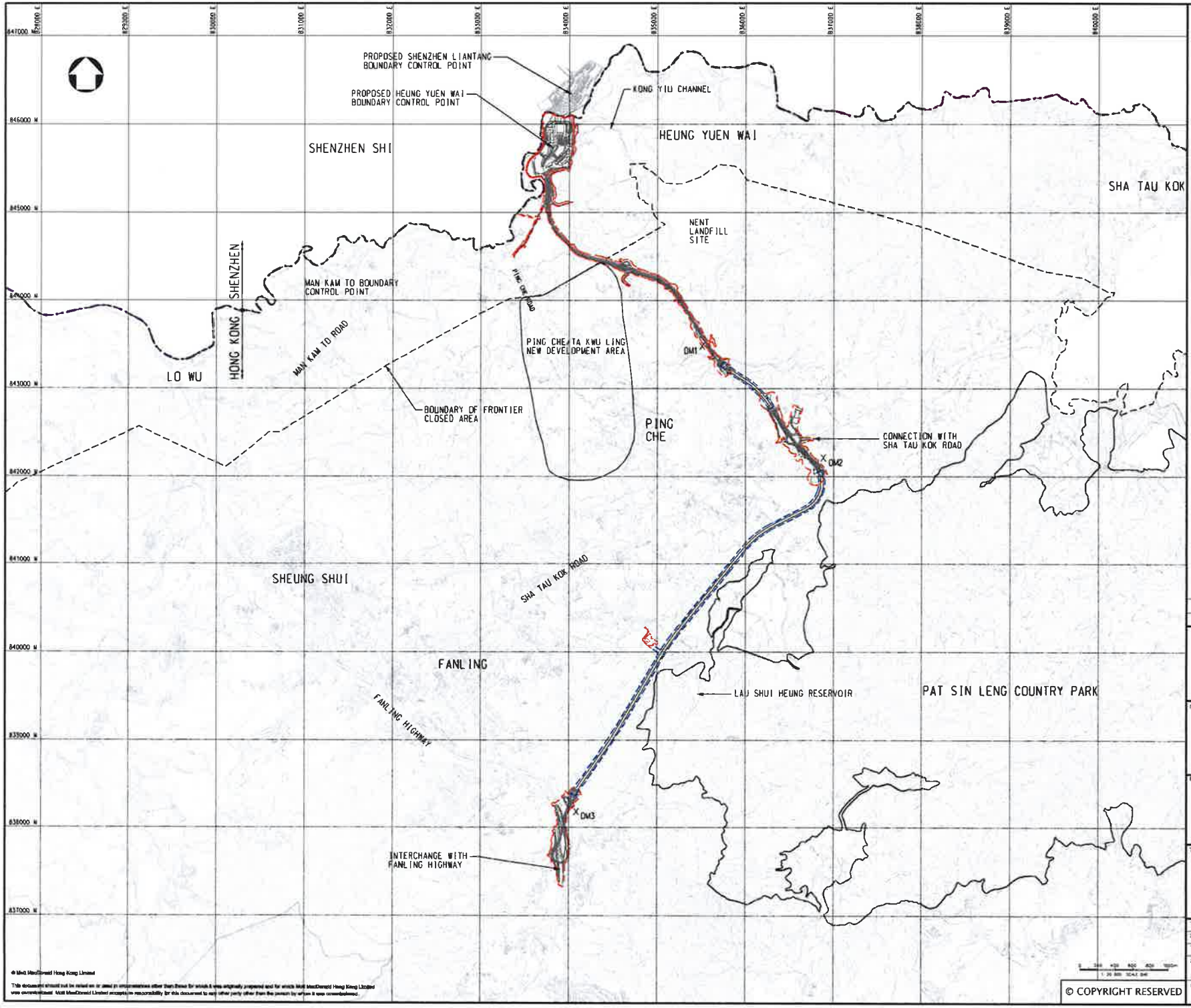
Project

AGREEMENT NO. CE45/2008(CE)
LIANTANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT AND ASSOCIATED WORKS

Title

PROPOSED LOCATION OF CONSTRUCTION NOISE MONITORING STATIONS

Designed	BC		Eng Chk	BC	
Drawn	MING		Coordination	BC	
Eng Chk	BC		Approved	HT	
Scale at A1	1:20000	Project	255228	Status	PRE
Drawing No	FIGURE 3.1			Rev	P1



LEGEND:

- BOUNDARY OF HKSAR
- WORKS AREA (ABOVE GROUND)
- WORKS AREA (TUNNEL)
- X OPERATIONAL NOISE MONITORING STATIONS

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	AUG 10	MING	FIRST ISSUE	DC	NT

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Project

AGREEMENT NO. CE45/2008(CE)
LIANTANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT AND ASSOCIATED WORKS

Title

PROPOSED LOCATION OF OPERATIONAL NOISE MONITORING STATIONS

Designed	DC		Eng.Chk.	EC	
Drawn	MING		Coordination	EC	
Dwg Chk.	DC		Approved	NT	
Scale at A1	1:20000	Project	255228	Status	PRE
Drawing No	FIGURE 3.2			Rev	P1

Appendix D

Sample Data Record Sheet

Data Sheet for 24-hr TSP Monitoring

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (hour)	
	Stop (hour)	
Total Sampling Time (min.)		
Weather Conditions		Fine / Sunny / Cloudy / Rainy
Site Conditions		
Initial Flow Rate, Qsi	Pi (hpa)	
	Ti (°C)	
	Hi (cfm)	
	Qsi (Std. m^3)	
Final Flow Rate, Qsf	Pf (hpa)	
	Tf (°C)	
	Hf (cfm)	
	Qsf (Std. m^3)	
Average Flow Rate (Std. m^3)		
Total Volume (Std. m^3)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final wt. of Filter (g)		
Measured TSP Level (ug/m^3)		
Observations / Remarks		

	Name & Designation	Signature	Date
Record by:	_____	_____	_____
Checked by:	_____	_____	_____

Data Sheet for 1-hr TSP Monitoring

Monitoring Location				
Details of Location				
Sampler Identification				
Date of Sampling				
Time of Sampling		1	2	3
Elapsed-time	Start Time			
Meter Reading	End Time			
Total Sampling Time (min.)				
Measured TSP Level (g/m^3)				
Weather Conditions		Fine / Sunny / Cloudy / Rainy		
Site Conditions				
Observations / Remarks				

	Name & Designation	Signature	Date
Record by:	_____	_____	_____
Checked by:	_____	_____	_____

Noise Monitoring Field Record Sheet

Monitoring Location							
Details of Location							
Date of Monitoring							
Measurement Start Time (hh:mm)							
Measurement Time Length (min.)							
Weather Conditions	Fine / Sunny / Cloudy / Rainy						
Wind Speed (m/s)							
Noise Meter Model/Identification							
Calibrator Model/Identification							
Calibration Before Measurement (dB(A))							
Calibration After Measurement (dB(A))							
Measurement Result	**5min**	**5min**	**5min**	**5min**	**5min**	**5min**	**30min**
L_{90} (dB(A))							
L_{10} (dB(A))							
L_{eq} (dB(A))							
Major Construction Noise Source(s) During Monitoring							
Other Noise Source(s) During Monitoring							
Remarks							

	Name & Designation	Signature	Date
Record by:	_____	_____	_____
Checked by:	_____	_____	_____

Water Quality Monitoring Data Record Sheet

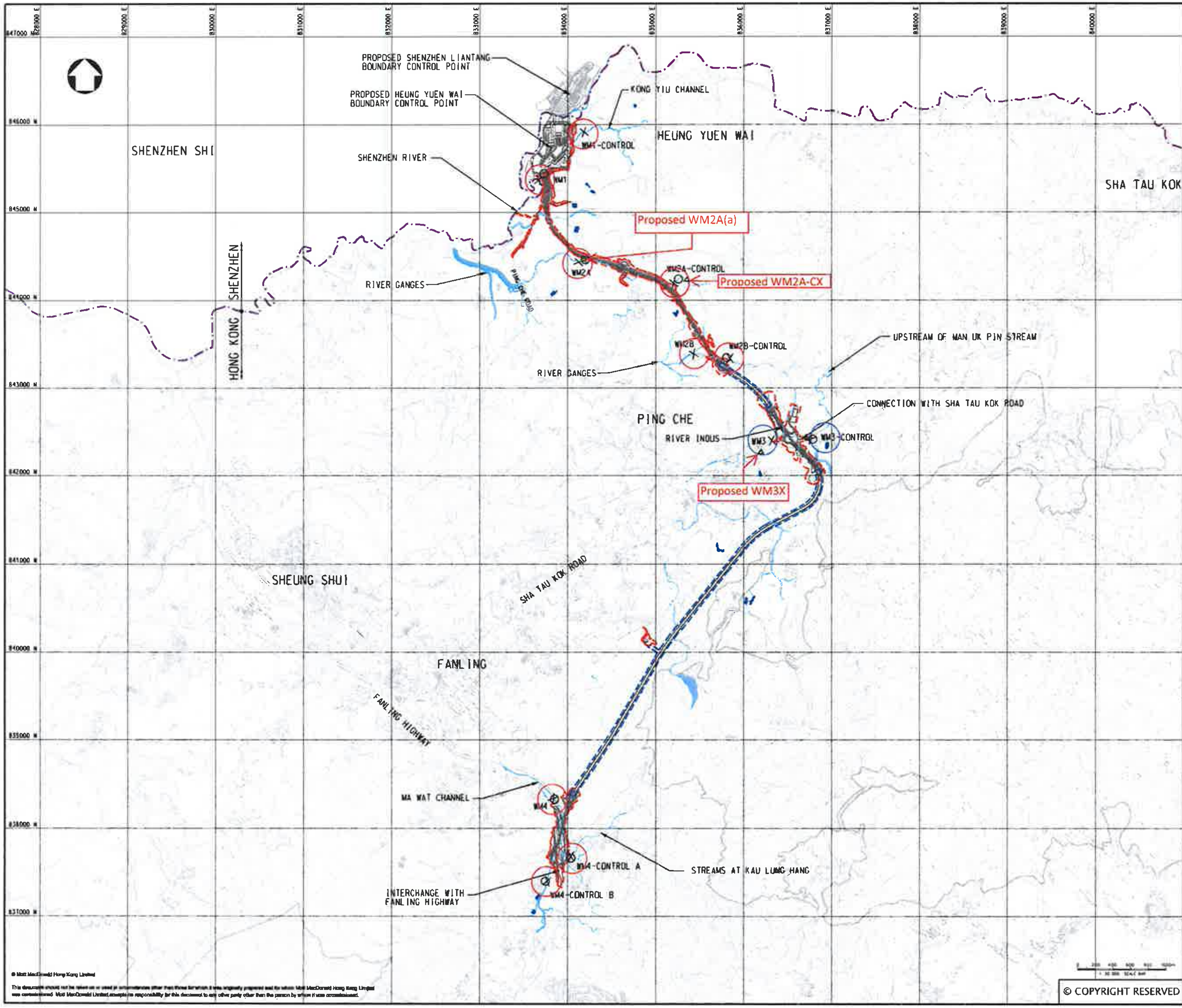
Location			
Date			
Start Time （hh:mm）			
Weather			
Water Depth			
Monitoring Results		1st reading	2nd reading or Duplicate
Salinity			
Temperature			
pH			
DO Saturation			
DO			
Turbidity			
SS Sample Identification			
SS	(mg/l)		
	<100m from location		
	>100m from location		
Other Observations			

	Name & Designation	Signature	Date
Record by:	_____	_____	_____
Checked by:	_____	_____	_____

Note: The SS results are to be filled up once they are available from the laboratory.

Appendix E

Location Plan of Water Quality Monitoring Station



LEGEND:

- BOUNDARY OF HKSAR
- LAND REQUIREMENT LIMIT (ABOVE GROUND)
- LAND REQUIREMENT LIMIT (TUNNEL)
- X Water Quality Monitoring Location Recommended in EM&A Manual
- O Alternative Water Quality Monitoring Location for EM&A Programme
- △ New Proposed Water Quality Monitoring Location in November 2015
- △ New Proposed Water Quality Monitoring Location in May 2016

Station ID	Location recommended in EM&A Manual Coordinates		Location found during site visit Coordinates	
	Easting	Northing	Easting	Northing
WM1	835668.435	845371.097	835671	845421
WM1 Control	834165.480	845916.462	834185	845917
WM2A	834132.193	844432.310	834204	844475
WM2A Control	835205.325	844200.151	835270	844243
WM2B	835434.744	843304.606	835433	843357
WM2B Control	835845.878	843343.825	835835	843351
WM3	836323.622	842406.977	836324	842402
WM3 Control	836763.415	842425.507	836763	842400
WM4	833840.783	838344.842	833810	838316
WM4 Control A	834058.937	837688.595	834026	837693
WM4 Control B	833769.123	837606.336	833760	837595

New Proposed Water Quality Monitoring Location in November 2015

Location ID	Easting	Northing
WM2A-C(Original)	0835270	0844243
WM2A-C(Proposed)	0835377	0844158
WM3(Original)	0836324	0842402
WM3(Proposed)	0836226	0842370

New Proposed Water Quality Monitoring Location in May 2016

Location ID	Easting	Northing
WM2A (Original)	834204	844475
WM2A(a) (Proposed)	834191	844474

Rev	Date	Drawn	Description	Ch'k'd	App'd
P2	NOV 10	MING	GENERAL REVISION	HC	HT
P1	OCT 10	MING	FIRST ISSUE	HC	HT

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CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Project

AGREEMENT NO. CE45/2008(CE)
LIANTANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT AND ASSOCIATED WORKS

Title

LOCATIONS OF PROPOSED WATER QUALITY MONITORING STATIONS

Designed	HC	Eng Chk.	EC
Drawn	MING	Coordination	EC
Dwg Chk.	HC	Approved	HT
Scale at A1	1:20000	Project	255228
Status	PRE		
Drawing No	Appendix C	Rev	P2

Appendix F

Proposal for Amendment of Action/ Limit Level

Proposal for amendment of AL Level

In the Baseline Monitoring Report (AUES ref.: TCS00670/13/600/R0030v3 Version 3 dated 16 August 2013), it was proposed to amend the 'OR' requirement in the EM&A Manual for Turbidity and SS to 'AND' condition. The justification for the aforesaid proposed change provided in Sections 4.4.3 to 4.4.5 of the Baseline Monitoring Report is extracted as follows.

> *"According to the EM&A Manual, EITHER the 95%-ile and 99%-ile of baseline data OR the 120% and 130% of upstream control station of the same day would trigger 'Exceedance Actions' of the Event and Action Plan. It is important to point out that the Turbidity and SS data in both control and impact stations may synchronic increase significantly under rainy or typhoon conditions, due to significant increase of the water flow in the monitoring streams to stir up the sediment and significant increase of soil erosion resulting in subsequent increase of Turbidity and SS brought by rain water to the streams etc. In this situation, even though the upstream SS and Turbidity levels indicate full compliance with the 120% and 130% criteria, the exceedances of Action and Limit levels will inevitably trigger 'Exceedance Actions'. It is considered that the EM&A Manual poses extremely stringent 'OR' requirements for establishment of environmental performance criteria for SS and turbidity especially during rainy day.*
>
> *It is therefore proposed that that the 'OR' requirement in the EM&A Manual for Turbidity and SS be relaxed to an 'AND' condition as follows:*
> *'95%-ile of baseline data AND 120% of upstream control station of the same day' and*
> *'99%-ile of baseline data AND 130% of upstream control station of the same day.'*
>
> *Moreover, the baseline SS and turbidity conditions at the monitoring locations may differ significantly during seasonal changes and the environmental performance criteria may need to be reviewed regularly or even re-established if it is evident that the baseline conditions have changed significantly. It is beneficial to the project if the proposed 'AND' condition is adopted as the environmental performance criteria would also cater to the seasonal changes."*

According to the second paragraph of Section 4.1.4 of the EM&A Manual, control stations are necessary to compare the water quality from potentially impacted sites within the ambient water quality and located within the same body of water as the impact monitoring stations but shall be outside the area of influence of the works as far as practicable, not affected by any

other works of the Project.

Apart from the justifications as stated in Sections 4.4.3 to 4.4.5 of the Baseline Monitoring Report, the impact monitoring data measured at WM3 for Contract 6 in December 2015 and January 2016 as enclosed in Appendix I were further reviewed. 15 events of turbidity and 12 events of SS were recorded higher than the Action Levels (ALs) Levels derived from 95 %-ile of the baseline data and exceedance should be triggered. However, 14 events of turbidity and 11 events of SS did not exceed 120% of the Control Station WM3-C which is not influenced by the works of the Project. Thus the aforesaid 14 events of turbidity and 11 events of SS measured at the Impact Station WM3 exceeding 95%-ile of the baseline data should not be related to the works of the Project. To avoid numerous non-project related exceedance causing false alarm, it is considered that the "AND" condition for turbidity and suspended solids as proposed in the Baseline Monitoring Report is considered to be more appropriate than the "OR" condition for the water quality monitoring for the Project.

Proposed Action and Limit Levels for Water Quality

Parameter	Performance criteria	Monitoring Location				
		WM1	**WM2A**	**WM2B**	**WM3**	**WM4**
DO (mg/L)	Action Level	(*)4.23	(**)4.00	(*)4.74	(**)4.00	(*)4.14
	Limit Level	(#)4.19	(**)4.00	(#)4.60	(**)4.00	(#)4.08
Turbidity (NTU)	Action Level	51.3	24.9	11.4	13.4	35.2
		AND 120% of upstream control station of the same day				
	Limit Level	67.6	33.8	12.3	14.0	38.4
		AND 130% of upstream control station of the same day				
SS (mg/L)	Action Level	54.5	14.6	11.8	12.6	39.4
		AND 120% of upstream control station of the same day				
	Limit Level	64.9	17.3	12.4	12.9	45.5
		AND 130% of upstream control station of the same day				

Remarks:

(*) *The Proposed **Action Level** of Dissolved Oxygen is adopted to be used 5%-ile of baseline data*

(**) *The Proposed **Action & Limit Level** of Dissolved Oxygen is used 4mg/L*

(#) *The Proposed **Limit Level** of Dissolved Oxygen is adopted to be used 1%-ile of baseline data*

Appendix I

Date	WM3	WM3-C	Action Level derived 95%-ile of baseline data	Action Level derived from 120% of control station data	Limit Level derived 99%-ile of baseline data	Limit Level derived from 130% of control station data	exceedances if the Action Levels are determined based on 95%-ile OR 120% control station	exceedances if the Limit Levels are determined based on 99%-ile OR 130% control station	exceedances if the Action Levels are determined based on 95%-ile AND 120% control station	exceedances if the Limit Levels are determined based on 99%-ile AND 130% control station
	Turbidity (NTU)	Turbidity (NTU)								
2-Dec-15	35.8	31.5	13.4	37.7	14.0	40.9		exceedance		
4-Dec-15	13.5	14.4	13.4	17.2	14.0	18.7	exceedance			
7-Dec-15	20.6	27.4	13.4	32.9	14.0	35.6		exceedance		
9-Dec-15	226.0	48.3	13.4	57.9	14.0	62.7		exceedance		exceedance
11-Dec-15	17.0	26.0	13.4	31.1	14.0	33.7		exceedance		
15-Nov-15	13.0	11.8	13.4	14.1	14.0	15.3				
17-Dec-15	6.5	18.6	13.4	22.3	14.0	24.1		exceedance		
19-Dec-15	16.6	21.5	13.4	25.7	14.0	27.9		exceedance		
21-Dec-15	21.5	23.2	13.4	27.8	14.0	30.1		exceedance		
23-Dec-15	23.8	26.7	13.4	32.0	14.0	34.7		exceedance		
26-Dec-15	15.7	17.0	13.4	20.4	14.0	22.1		exceedance		
29-Dec-15	15.3	38.7	13.4	46.4	14.0	50.3		exceedance		
31-Dec-15	18.6	30.2	13.4	36.2	14.0	39.2		exceedance		
2-Jan-16	9.6	18.8	13.4	22.5	14.0	24.4				
4-Jan-16	20.7	25.5	13.4	30.6	14.0	33.2		exceedance		
6-Jan-16	13.4	10.8	13.4	12.9	14.0	14.0				
8-Jan-16	9.2	8.0	13.4	9.6	14.0	10.4				
12-Jan-16	6.9	72.3	13.4	86.7	14.0	93.9				
14-Jan-16	9.8	8.1	13.4	9.7	14.0	10.5				
16-Jan-16	57.9	49.2	13.4	59.0	14.0	64.0		exceedance		
18-Jan-16	12.7	9.7	13.4	11.7	14.0	12.6				
20-Jan-16	22.1	19.4	13.4	23.2	14.0	25.2		exceedance		
22-Jan-16	13.0	22.5	13.4	27.0	14.0	29.3				
26-Jan-16	10.4	21.6	13.4	25.9	14.0	28.1				
28-Jan-16	275.5	260.0	13.4	312.0	14.0	338.0		exceedance		
30-Jan-16	11.6	14.8	13.4	17.8	14.0	19.2				
					number of exceedance		1	15	0	1

Date	WM3 Suspended Solids (mg/L)	WM3-C Suspended Solids (mg/L)	Action Level derived 95%-ile of baseline data	Action Level derived from 120% of control station data	Limit Level derived 99%-ile of baseline data	Limit Level derived from 130% of control station data	exceedances if the Action Levels are determined based on 95%-ile OR 120% control station	exceedances if the Limit Levels are determined based on 99%-ile OR 130% control station	exceedances if the Action Levels are determined based on 95%-ile AND 120% control station	exceedances if the Limit Levels are determined based on 99%-ile AND 130% control station
2-Dec-15	47.0	70.5	12.6	84.6	12.9	110.0		exceedance		
4-Dec-15	14.0	14.0	12.6	16.8	12.9	21.8		exceedance		
7-Dec-15	20.0	30.5	12.6	36.6	12.9	47.6		exceedance		
9-Dec-15	148.0	58.0	12.6	69.6	12.9	90.5		exceedance		exceedance
11-Dec-15	8.5	61.5	12.6	73.8	12.9	95.9				
15-Nov-15	11.5	14.0	12.6	16.8	12.9	21.8				
17-Dec-15	11.5	13.0	12.6	15.6	12.9	20.3				
19-Dec-15	11.0	19.5	12.6	23.4	12.9	30.4				
21-Dec-15	14.0	24.5	12.6	29.4	12.9	38.2		exceedance		
23-Dec-15	13.0	28.5	12.6	34.2	12.9	44.5		exceedance		
26-Dec-15	13.0	17.0	12.6	20.4	12.9	26.5		exceedance		
29-Dec-15	14.5	40.0	12.6	48.0	12.9	62.4		exceedance		
31-Dec-15	8.5	22.5	12.6	27.0	12.9	35.1				
2-Jan-16	10.0	21.0	12.6	25.2	12.9	32.8				
4-Jan-16	14.5	25.0	12.6	30.0	12.9	39.0		exceedance		
6-Jan-16	11.5	20.5	12.6	24.6	12.9	32.0				
8-Jan-16	12.5	25.5	12.6	30.6	12.9	39.8				
12-Jan-16	6.5	102.0	12.6	122.4	12.9	159.1				
14-Jan-16	4.0	13.0	12.6	15.6	12.9	20.3				
16-Jan-16	45.5	321.0	12.6	385.2	12.9	500.8		exceedance		
18-Jan-16	7.5	51.0	12.6	61.2	12.9	79.6				
20-Jan-16	23.5	55.0	12.6	66.0	12.9	85.8		exceedance		
22-Jan-16	9.0	26.5	12.6	31.8	12.9	41.3				
26-Jan-16	11.5	32.0	12.6	38.4	12.9	49.9				
28-Jan-16	229.5	396.5	12.6	475.8	12.9	618.5		exceedance		
30-Jan-16	7.5	9.0	12.6	10.8	12.9	14.0				
					number of exceedance		0	12	0	1

Appendix G

Proposal for Amendment of Section 3.1.5

Proposal for amendment of EM&A Programme Section 3.1.5

According to Environmental Monitoring &Audit (EM&A) Programme Section 3.1.5, it states that

> *"If construction works are extended to include works during the hours of 1900 - 0700 as well as public holidays and Sundays, additional weekly impact monitoring shall be carried out during respective restricted hours periods. Applicable permits under NCO shall also be obtained by the Contractor."*

Notwithstanding, we would like to propose not to perform the impact noise monitoring within restricted hour with the following justifications.

(a) It is the statuary requirement under Noise Control Ordinance (NCO) that Construction Noise Permit (CNP) is required for any use of Powered Mechanical Equipment (PME) and/ or Prescribed Construction Work (PCW) (for Designated Area only) during restricted hour. CNP may be granted if the applicant can demonstrate the associated noise level together with other construction works (if any) is within the Acceptable Noise Level as stipulated in the relevant Technical Memorandum. The CNP may also be granted for special case such as unavoidable constraints on working hour.

(b) Once the CNP is granted, the Contractor shall strictly follow the CNP conditions, e.g. the number of equipment permitted to be used on construction site, time allowed to operate the equipment and carry out the activities in accordance with the condition stipulated in the CNP, e.g. use of noise barrier. It is considered that the compliance of CNP requirement is more stringent and significant.

(c) As informed by the Contractors in October and November 2016, construction activities were extended to restricted hours and CNP has been obtained for such works. Noise monitoring was therefore conducted during respective restricted hours periods at the relevant noise monitoring locations NM1, NM5, NM7, NM8, NM9 and NM10 in accordance with the EM&A Programme requirement. The factual data and observation during 8 events of noise monitoring during restricted hours are summarized below.

    (i) During the course of noise monitoring for restricted hours throughout October 2016 and November 2016, no construction noise was noted and recorded at all monitoring locations. However, the noise measurement was readily disturbed and influenced by other noise sources such as dogs barking, road traffic and trains passing by. Since there was no construction noise noted during the event of monitoring, the obtained noise monitoring data were considered to be the background noise only.

    (ii) The monitoring periods during restricted hours are at evening and midnight time and all the monitoring locations are rural area and inside the villages, it

may cause nuisance to the resident. Most importantly, it is not safe to work in these remote areas at midnight in consideration of the safety aspect.

(iii) Impact noise monitoring during restricted hours will easily create unnecessary misleading and false alarm, particularly for the works under unavoidable situations.

Based on the above justification, we propose to amend Section 3.1.5 of the EM&A Programme as follows:-

"If construction works are extended to include works during the hours of 1900 - 0700 as well as public holidays and Sundays, applicable permits under NCO shall also be obtained by the Contractor."

Proposal for amendment of EM&A Programme Section 3.1.5

NM5

Monitoring Location NM5 (Loi Tung Village)

Noise from vehicle from parking lot, occasionally dogs barking from village

Noise from vehicle from parking lot, occasionally dogs barking from village

Proposal for amendment of EM&A Programme Section 3.1.5

NM7

Monitoring Location NM7 (Po Kat Tsai Village)

Noise from water flowing in the gully, occasionally dogs barking from village

Proposal for amendment of EM&A Programme Section 3.1.5

NM8

Monitoring Location NM8 (Tong Hang)

Noise from train passing by, occasionally dogs barking from village

Proposal for amendment of EM&A Programme Section 3.1.5

NM9

Monitoring Location NM9 (Kiu Tau Village)

Noise from vehicle and train passing by, occasionally dogs barking from village

Dogs crowd

Proposal for amendment of EM&A Programme Section 3.1.5

NM10

Monitoring Location NM10 (Nam Wa Po Village)

Noise from traffic in the highway, occasionally dogs barking from village

Noise from traffic in the highway, occasionally dogs barking from village

Proposal for amendment of EM&A Programme Section 3.1.5

NM1

Monitoring Location NM1 (Tsung Yuen Ha Village)
occasionally dogs barking from village

Noise Monitoring Result during Restricted Hours (Evening period)

Noise Monitoring results for Location - NM5						
Date	**Start Time**	**L_{eq5min}**	**L10**	**L90**	**ANLs**	**Observation**
13-Oct-16	22:47	46.9	49.5	43.5	65	Noise from vehicle from parking lot, occasionally dogs barking from village
23-Oct-16	22:47	47.8	50.3	44.1	65	Noise from vehicle from parking lot, occasionally dogs barking from village
28-Oct-16	22:09	44.9	47	42.7	65	Noise from vehicle from parking lot, occasionally dogs barking from village
4-Nov-16	22:45	46.1	54.4	38.9	65	Noise from vehicle from parking lot, occasionally dogs barking from village
11-Nov-16	22:47	46.1	48.2	37.6	65	Noise from vehicle from parking lot, occasionally dogs barking from village
18-Nov-16	22:40	52.6	57.2	38.7	65	Noise from vehicle from parking lot, occasionally dogs barking from village
25-Nov-16	22:47	45.3	48.4	38.4	65	Noise from vehicle from parking lot, occasionally dogs barking from village

Impact Noise Monitoring results for Location - NM7						
Date	**Start Time**	**L_{eq5min}**	**L10**	**L90**	**ANLs**	**Observation**
13-Oct-16	22:31	48.5	49.1	47.6	65	Noise from water flowing in the gully, occasionally dogs barking from village
23-Oct-16	22:16	47.2	48.6	46.3	65	Noise from water flowing in the gully, occasionally dogs barking from village
28-Oct-16	21:55	52.0	52.8	50.9	65	Noise from water flowing in the gully, occasionally dogs barking from village
4-Nov-16	22:22	55.8	57.8	48.5	65	Noise from water flowing in the gully, occasionally dogs barking from village
11-Nov-16	22:24	46.4	49.7	44.1	65	Noise from water flowing in the gully, occasionally dogs barking from village
18-Nov-16	22:21	49.5	52.9	44.6	65	Noise from water flowing in the gully, occasionally dogs barking from village
25-Nov-16	21:58	46.8	47.0	44.3	65	Noise from water flowing in the gully, occasionally dogs barking from village

Impact Noise Monitoring results for Location - NM8						
Date	**Start Time**	**L_{eq5min}**	**L10**	**L90**	**ANLs**	**Observation**
13-Oct-16	21:57	58.8	64.6	47.0	65	Noise from train passing by, occasionally dogs barking from village
23-Oct-16	20:57	58.4	64.2	47.7	65	Noise from train passing by, occasionally dogs barking from village
28-Oct-16	21:26	62.8	64.6	55.5	65	Noise from train passing by, occasionally dogs barking from village
4-Nov-16	21:43	57.3	63.3	47.2	65	Noise from train passing by, occasionally dogs barking from village
11-Nov-16	21:50	55.9	58.9	45.4	65	Noise from train passing by, occasionally dogs barking from village
18-Nov-16	21:38	59.6	62.6	48.4	65	Noise from train passing by, occasionally dogs barking from village
25-Nov-16	21:21	57.6	57.5	47.0	65	Noise from train passing by, occasionally dogs barking from village

Impact Noise Monitoring results for Location - NM9						
Date	**Start Time**	**L_{eq5min}**	**L10**	**L90**	**ANLs**	**Observation**
23-Oct-16	21:25	66.3	71.3	56.9	65	Noise from vehicle and train passing by, occasionally dogs barking from village

Impact Noise Monitoring results for Location - NM10							
Date	**Start Time**	**L_{eq5min}**	**corrected L_{eq5min}**	**corrected L10**	**corrected L90**	**ANLs**	**Observation**
23-Oct-16	21:36	59	62	63.4	60.2	65	Noise from traffic in the highway, occasionally dogs barking from village

Impact Noise Monitoring results for Location - NM1						
Date	**Start Time**	**L_{eq5min}**	**L10**	**L90**	**ANLs**	**Observation**
25-Nov-16	22:22	51.6	51.7	44.8	65	occasionally dogs barking from village

Noise Monitoring Result during Restricted Hours (Night period)

Noise Monitoring results for Location - NM5						
Date	**Start Time**	**L_{eq5min}**	**L10**	**L90**	**ANLs**	**Observation**
13-Oct-16	23:00	46.8	50.6	40.5	45	Noise from vehicle from parking lot, occasionally dogs barking from village
23-Oct-16	23:01	46.1	49.3	43.8	45	Noise from vehicle from parking lot, occasionally dogs barking from village
28-Oct-16	23:00	45.7	48.3	42.7	45	Noise from vehicle from parking lot, occasionally dogs barking from village
4-Nov-16	23:00	44.8	48.7	38.9	45	Noise from vehicle from parking lot, occasionally dogs barking from village
11-Nov-16	23:01	48.0	51.3	38.2	45	Noise from vehicle from parking lot, occasionally dogs barking from village
18-Nov-16	23:00	50.0	53.0	38.2	45	Noise from vehicle from parking lot, occasionally dogs barking from village
25-Nov-16	23:00	45.6	49.2	37.4	45	Noise from vehicle from parking lot, occasionally dogs barking from village

Impact Noise Monitoring results for Location - NM7						
Date	**Start Time**	**L_{eq5min}**	**L10**	**L90**	**ANLs**	**Observation**
13-Oct-16	23:15	49.1	49.8	47.8	45	Noise from water flowing in the gully, occasionally dogs barking from village
23-Oct-16	23:27	49.6	50.2	46.9	45	Noise from water flowing in the gully, occasionally dogs barking from village
28-Oct-16	23:14	50.8	51.5	49.8	45	Noise from water flowing in the gully, occasionally dogs barking from village
4-Nov-16	23:17	49.8	51.5	48.5	45	Noise from water flowing in the gully, occasionally dogs barking from village
11-Nov-16	23:20	50.7	52.0	47.7	45	Noise from water flowing in the gully, occasionally dogs barking from village
18-Nov-16	23:22	48.2	50.2	45.6	45	Noise from water flowing in the gully, occasionally dogs barking from village
25-Nov-16	23:21	42.7	46.2	36.2	45	Noise from water flowing in the gully, occasionally dogs barking from village

Impact Noise Monitoring results for Location - NM8						
Date	**Start Time**	**L_{eq5min}**	**L10**	**L90**	**ANLs**	**Observation**
13-Oct-16	23:40	56.0	56.7	46.4	45	Noise from train passing by, occasionally dogs barking from village
23-Oct-16	23:49	59.6	63.2	47.5	45	Noise from train passing by, occasionally dogs barking from village
28-Oct-16	23:34	64.2	58.1	46.1	45	Noise from train passing by, occasionally dogs barking from village
4-Nov-16	23:41	62.5	64.9	46.6	45	Noise from train passing by, occasionally dogs barking from village
11-Nov-16	23:53	59.4	63.9	44.4	45	Noise from train passing by, occasionally dogs barking from village
18-Nov-16	23:49	57.8	62.8	43.1	45	Noise from train passing by, occasionally dogs barking from village
25-Nov-16	23:49	56.7	55.2	44.0	45	Noise from train passing by, occasionally dogs barking from village

Impact Noise Monitoring results for Location - NM9						
Date	**Start Time**	**L_{eq5min}**	**L10**	**L90**	**ANLs**	**Observation**
14-Oct-16	0:00	63.8	68.3	54.2	45	Noise from vehicle and train passing by, occasionally dogs barking from village
24-Oct-16	0:06	61.6	65.6	55.5	45	Noise from vehicle and train passing by, occasionally dogs barking from village
29-Oct-16	0:00	59.7	62.4	52.3	45	Noise from vehicle and train passing by, occasionally dogs barking from village
5-Nov-16	0:00	59.1	63.9	51.5	45	Noise from vehicle and train passing by, occasionally dogs barking from village
12-Nov-16	0:12	60.5	61.9	53.8	45	Noise from vehicle and train passing by, occasionally dogs barking from village
19-Nov-16	0:13	61.5	66.4	51.9	45	Noise from vehicle and train passing by, occasionally dogs barking from village
26-Nov-16	0:07	60	64.3	52.8	45	Noise from vehicle and train passing by, occasionally dogs barking from village

Impact Noise Monitoring results for Location - NM10							
Date	**Start Time**	**L_{eq5min}**	**corrected L_{eq5min}**	**corrected L10**	**corrected L90**	**ANLs**	**Observation**
14-Oct-16	0:11	58.3	61.3	62.6	57.5	45	Noise from traffic in the highway, occasionally dogs barking from village
24-Oct-16	0:19	59.3	62.3	63.6	60.8	45	Noise from traffic in the highway, occasionally dogs barking from village
29-Oct-16	0:09	56	59	60.9	56.4	45	Noise from traffic in the highway, occasionally dogs barking from village
5-Nov-16	0:11	55.2	58.2	60	56	45	Noise from traffic in the highway, occasionally dogs barking from village
12-Nov-16	0:33	56.7	59.7	61.9	56.9	45	Noise from traffic in the highway, occasionally dogs barking from village
19-Nov-16	0:24	56.6	59.6	61.5	56.3	45	Noise from traffic in the highway, occasionally dogs barking from village
26-Nov-16	0:20	55.7	58.7	60.6	55.7	45	Noise from traffic in the highway, occasionally dogs barking from village

Appendix H

Proposal for Relocation of Noise Monitoring Station From NM2 to NM2a

Our Ref: TCS00694/13/300/L0300a

SMEC Asia Limited
27/F Ford Glory Plaza,
37-39 Wing Hong Street,
Cheung Sha Wan,
Kowloon, Hong Kong

Attn: Mr. Antony Wong

4 May 2016
By E-mail and fax
(Fax No. 3995-8101)

Dear Sir,

Ref: Agreement No. CE 45/2008 (CE)
Liantang/ Heung Yuen Wai Boundary Control Point and Associated Works
Proposal for Relocation of Construction Noise Monitoring Location NM2

The current location NM2 for construction noise monitoring is not appropriate for impact noise monitoring due to the relocation of the household (noise sensitive receiver of NM2) and demolition of the village house. We therefore seek for an alternative location for the construction noise monitoring work to replace NM2.

During joint site visit with the ER, IEC and Contractor of Contract 6 on 28 April 2016, a newly location NM2a (Village House, near Lin Ma Hang Road) is selected. The selection of the alternative monitoring location is considered in accordance with the requirement under EM&A Manual Section 3.1.3. The rationales of the proposed location are summarized as following:-

- Sensitivity – Location NM2a is a village house in Lin Ma Hang Road located at close proximity of the construction work area in approximately 20 meter away from the construction site boundary. Therefore, NM2a is identified as a noise sensitive receiver (NSR) and the most affected by noise from the construction work.
- Suitability – NM2a is a village type housing and located in the shortest distance to the original noise monitoring location NM2. The distance between NM2 and NM2a is about 68 meter and it is considered that the background condition for both locations would not have significant change. Thus, the Action and Limit Level of NM2 would also apply for NM2a. It is considered that NM2a as a NSR is the most appropriate noise monitoring location for the relocation of NM2.
- Disturbance – The noise monitoring is proposed to be conducted at the front gate of the village house (refer to Annex A) and less disturbance will be caused to the household.

In view of NM2a is a free-field monitoring, corrections for acoustic reflections should be taken into consideration; hence +3.0dB(A) façade correction will be included into the noise level calculation at NM2a.

Enclosed please find:-

- Figure 1: Location map for Construction Noise Monitoring Location NM2 and NM2a
- Annex A: Photo record on 28 April 2016
- Annex B: Updated Impact Noise Monitoring Location Plan

Pursuant to condition 5.1 of the EP-404/2011C, any changes to the programme shall be justified by the ET Leader and verified by the IEC before submission to the EPD for approval. We would like you to verify this proposal prior formally submit it to EPD.

Should you have any queries, please feel free to contact the undersigned at Tel: 2959-6059 or Fax: 2959-6079 or e-mail: twtam@fordbusiness.com.

Yours sincerely,
For and on Behalf of
Action-United Environmental Services & Consulting

T.W. Tam
Environmental Team Leader

Encl.

cc	AECOM (RE-ENV)	Mr. Perry Yam	by e-mail
	SRJV (Contractor of C5)	Mr. Edwin Au	by e-mail
	CRBC-CEC Kaden JV (Contractor of C6)	Mr. Vincent Chan	by e-mail

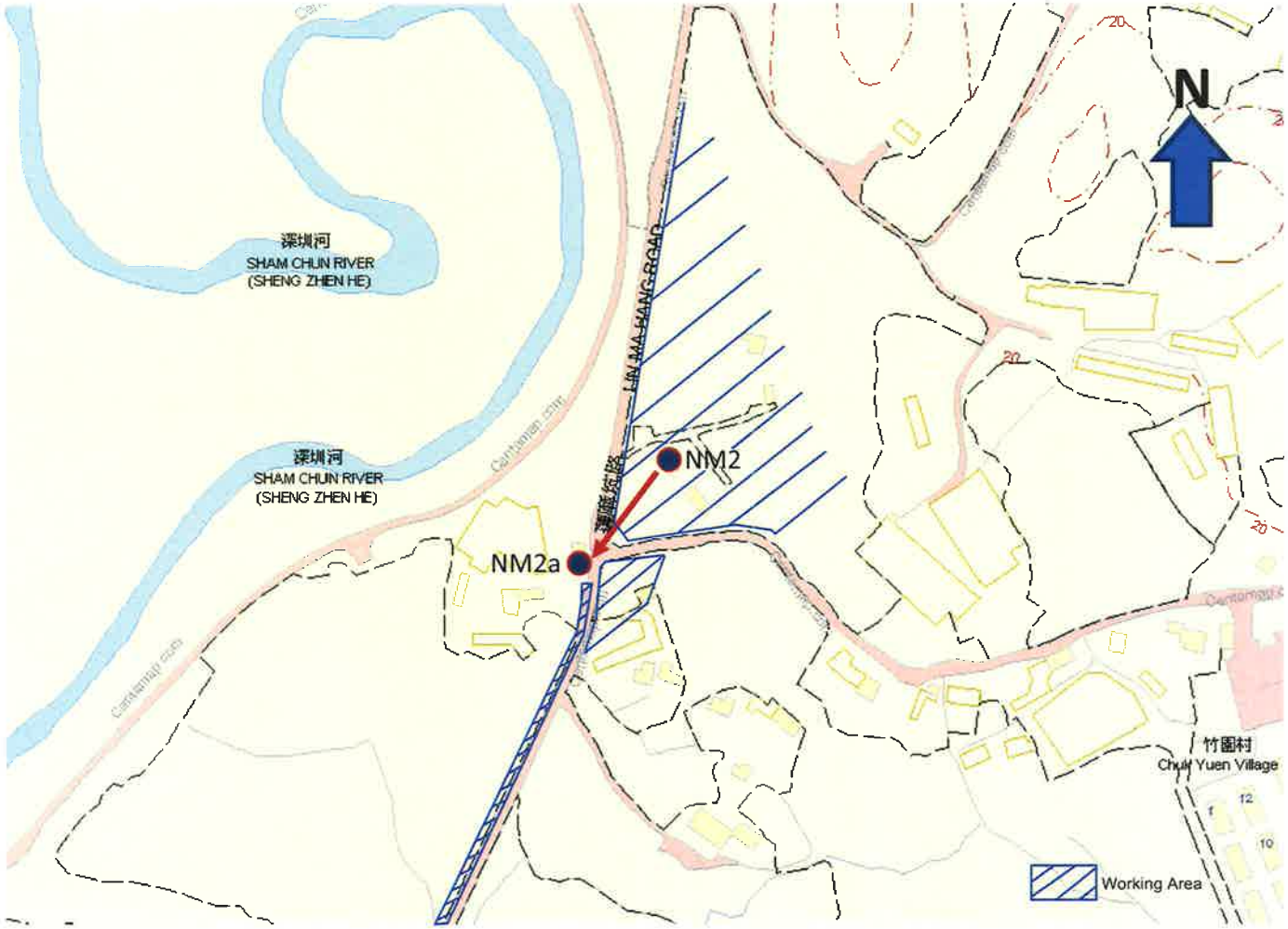


Figure 1. Location of map for Construction Noise Monitoring Location NM2 and NM2a

Annex A: Photo record on 28 April 2016

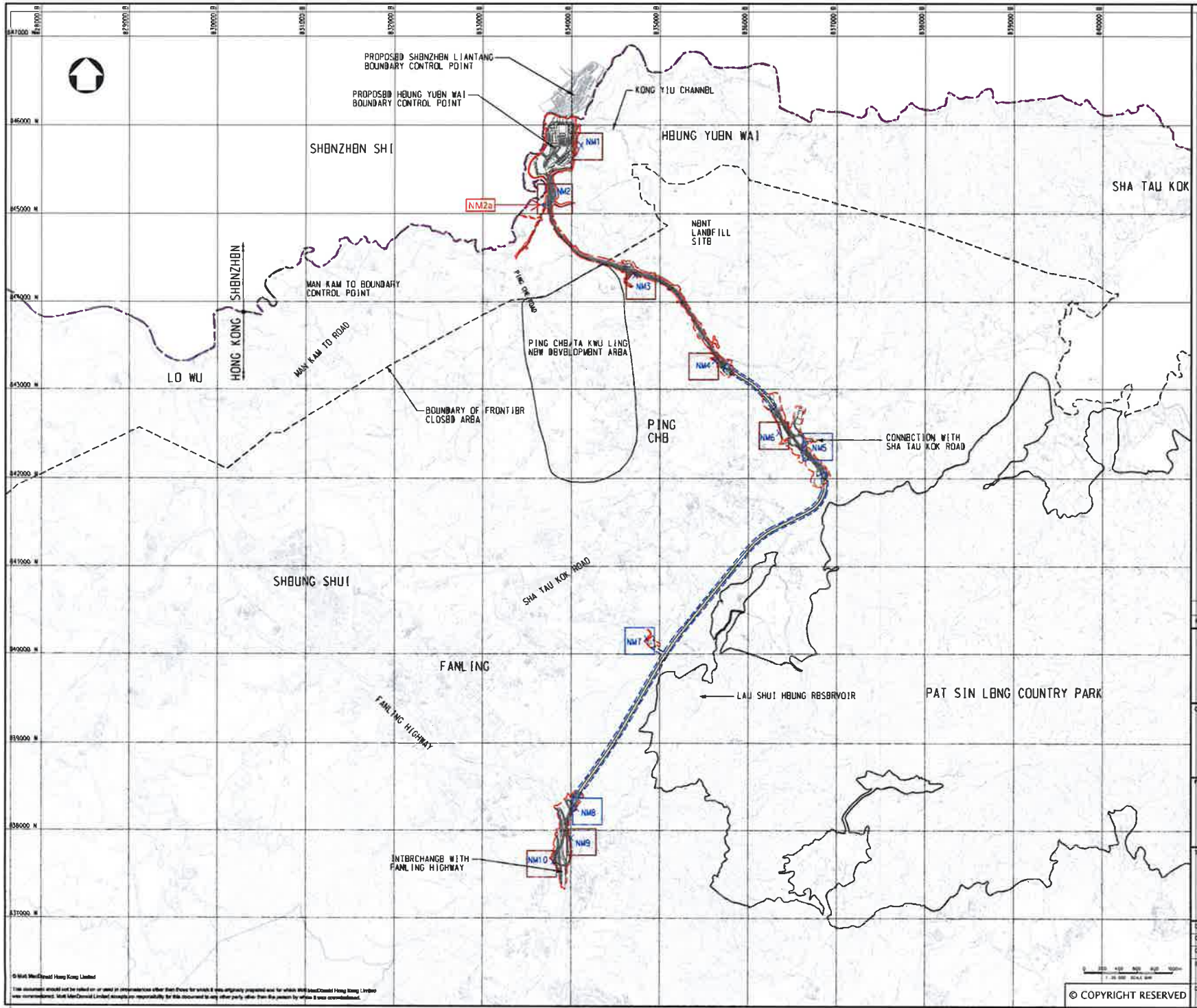
View of NM2a

View from NM2a to the construction site

Annex B: Updated Impact Noise Monitoring Location Plan

Impact Monitoring Stations - Construction Noise

Station ID	Description	Works Area	Related to the Work Contract
NM1	Tsung Yuen Ha Village House No. 63	BCP	SS C505 Contract 5 Contract 7
NM2a	Village House near Lin Ma Hang Road	Lin Ma Hang Road	Contract 5, Contract 6
NM3	Ping Yeung Village House (facade facing northeast)	Ping Yeung to Wo Keng Shan	Contract 6
NM4	Wo Keng Shan Village House	Ping Yeung to Wo Keng Shan	Contract 6
NM5	Village House, Loi Tung	Sha Tau Kok Road	Contract 2, Contract 6
NM6	Tai Tong Wu Village House 2	Sha Tau Kok Road	Contract 2, Contract 6
NM7	Po Kat Tsai Village	Po Kat Tsai	Contract 2
NM8	Village House, Tong Hang	Fanling	Contract 2 Contract 3
NM9	Village House, Kiu Tau Village	Fanling	Contract 3
NM10	Nam Wa Po Village House No. 80	Fanling	Contract 3



Rev	Date	Drawn	Description	Chk'd	App'd
P1	AUG 10	MING	FIRST ISSUE	BC	HT

Mott MacDonald

Client

CEDD CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT

Project

AGREEMENT NO. CE45/2008(CE)
LIANTANG/HEUNG YUEN WAI BOUNDARY CONTROL POINT AND ASSOCIATED WORKS

Title

PROPOSED LOCATION OF CONSTRUCTION NOISE MONITORING STATIONS

Designed	BC		Eng Chk.	BC	
Drawn	MING		Coordination	BC	
Dwg Chk	BC		Approved	HT	
Scale at A1	1:20000	Project	255228	Status	PRE
Drawing No	FIGURE 3.1			Rev	P1

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6 May 2016

Our ref: 7076192/L20412/AB/AW/MC/rw

AECOM
8/F, Grand Central Plaza, Tower 2
138 Shatin Rural Committee Road
Shatin, N.T.

By Email & Post

Attention: Mr Simon LEUNG

Dear Sirs

Agreement No. CE 42/2012 (EP)
Liantang/Heung Yuen Wai Boundary Control Point and Associated Works
Independent Environmental Checker – Investigation
Relocation of Noise Quality Monitoring Locations NM2

Reference is made to the ET Leader's proposal of relocating noise quality monitoring locations at NM2 (ET's ref.: TCS00694/13/300/L0300a) received on 5 May 2016, please be noted that we have no adverse comments and verify the ET Leader's proposal.

Thank you for your attention and please do not hesitate to contact the undersigned on tel. 3995-8120 or by email to antony.wong@smec.com; or our Mr Man CHEUNG on tel. 3995-8132 or by email to man.cheung@smec.com.

Yours faithfully
for and on behalf of
SMEC Asia Limited

Antony WONG
Independent Environmental Checker

cc	CEDD/BCP	-	Mr Karl KL KWAN	by fax: 3547 1659
	AECOM	-	Mr Pat LAM / Mr Perry YAM	by email
	AUES	-	Mr TW TAM	by email
	SRJV	-	Mr Edwin AU	by email
	CCKJV	-	Mr Vincent CHAN	by email

Appendix I

Proposal for Amendment of Section 4.1.4

As mentioned in the last paragraph of S.4.1.4 of the EM&A programme (Rev.06):

If the water level of a monitoring station is too shallow when sampling, sediment would be disturbed which affecting the accuracy of water quality monitoring. In order to avoid disturbing sediment, depth limits should be set up for the water sampling for the ease of reference. When the measured water depth of the monitoring station (both control and impact stations) is lower than 150mm, water monitoring would not be to perform at that monitoring location. Instead, the monitoring location will be moved to a temporary alternative location monitoring location based on the criteria below:-

(a) the alternative location should be either upstream or downstream of the original location and at the same the river/drain channel
(b) the alternative location should be within 15m far from the original location
(c) if no suitable alternative location could be found within 15m far from the original location, the sampling at that location will be cancelled since sampling at too far from the designated location could not make a representative sample.

During our routine water quality monitoring, water samples were taken at the Impact Stations WM2B and WM2B-C with very shallow water depths, normally ranging from 0.01m to 0.03m. Monitoring Stations WM2B and WM2B-C are located at the middle of the river channel. Due to safety reason, the sampling technicians are not permitted to enter the channel to collect water sample by the Resident Site Staff (RSS). In our sampling approach, an open bucket will be dropped from a height of ~4m into the channel to sample the river water. Due to shallow water, the procedure of sampling shall be repeated for numerous times in order to collect sufficient volume of water sample (1L) for analysis of suspended solids (SS). In our experience, when water sampling conducted at shallow water, the sediment at the river bed would be easily disturbed and collected which affecting the accuracy of water quality monitoring result.

The situation of WM2B and WM2B-C was further reviewed by RSS, IEC, Contractor and ET in September 2016. It was observed that water depth are the same at 15m upstream and downstream of the sampling location and it is not able to find a suitable location for water sampling.

To avoid false alarm and unnecessary NOE, we therefore propose that water sample will not be taken for water depth shallower than 150mm. Instead of the water sampling, we will record the observation of the monitoring locations of shallow water for reference purpose and present in the EM&A report.

Photo record for water sampling on 26 September 2016

Photo 1
Location WM2B (under the bridge)
The water depth of WM2B is approximately 0.01-0.02m

Photo 2
View of upstream of Location WM2B
The water depth is approximately 0.01-0.02m.

Photo 3
View of downstream of Location WM2B
The water depth is approximately 0.01-0.02m.

Photo 4
Location WM2B-C
The water depth of WM2C is approximately 0.01 - 0.02m

Photo 5
View of upstream Location WM2B-C
The water depth is approximately 0.01 - 0.02m.

Photo 6
View of downstream of Location WM2B-C
The water depth is approximately 0.01 - 0.02m.

Photo 7
Close view of channel at Location WM2B-C
The water depth is approximately 0.01 - 0.02m.

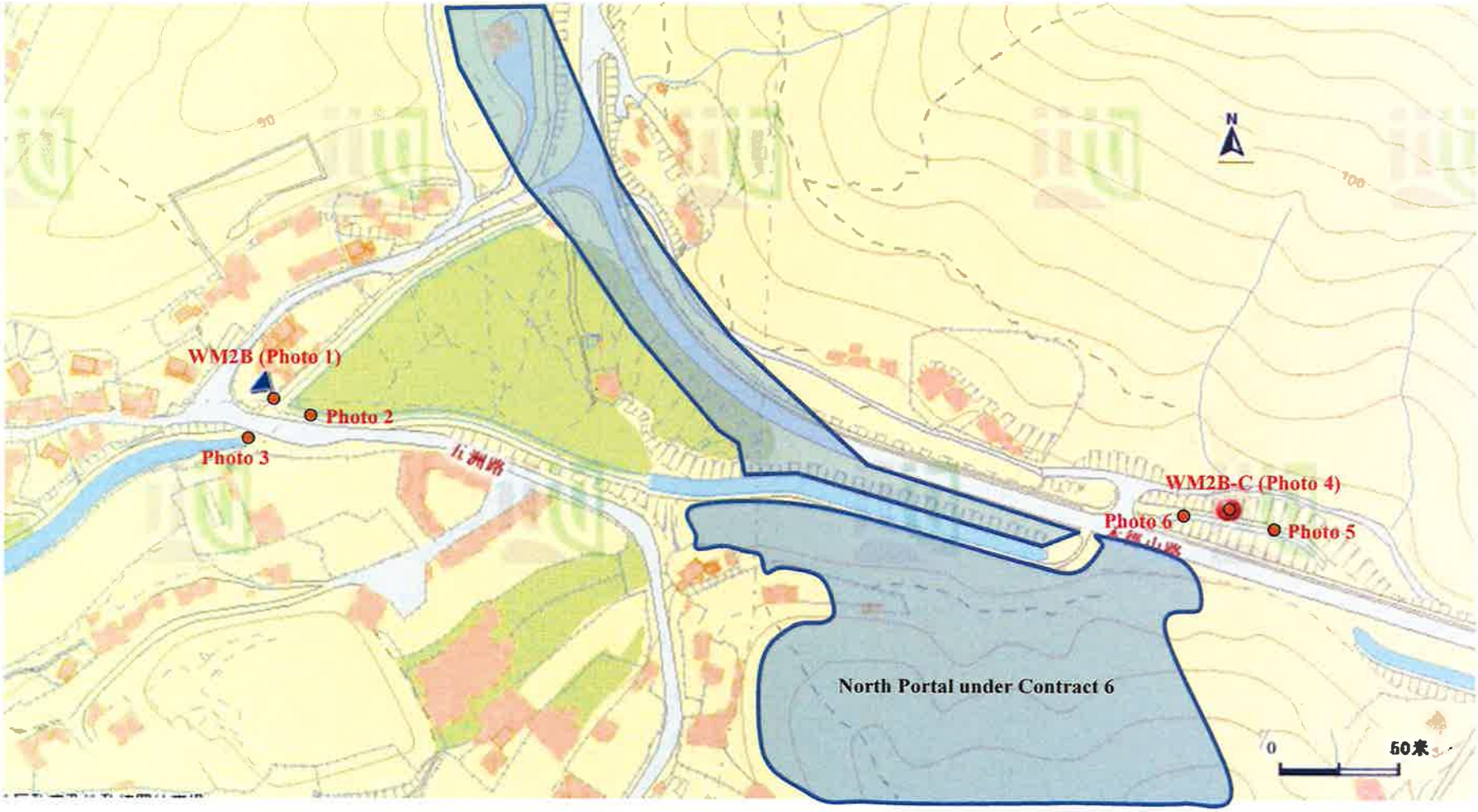

Figure 1 Location Map for Water Quality Monitoring Locations WM2B and WM2B-Control

****
*** TX REPORT ***
****

TRANSMISSION OK

TX/RX NO	2836
DESTINATION TEL #	29596079
DESTINATION ID	
ST. TIME	24/02 09:41
TIME USE	00'20
PAGES SENT	1
RESULT	OK

****
*** TX REPORT ***
****

TRANSMISSION OK

TX/RX NO	2841
DESTINATION TEL #	28046805
DESTINATION ID	
ST. TIME	24/02 09:54
TIME USE	00'22
PAGES SENT	1
RESULT	OK

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*** TX REPORT ***
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TRANSMISSION OK

TX/RX NO	2838
DESTINATION TEL #	28386036
DESTINATION ID	
ST. TIME	24/02 09:43
TIME USE	00'37
PAGES SENT	1
RESULT	OK

****
*** TX REPORT ***
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TRANSMISSION OK

TX/RX NO	2839
DESTINATION TEL #	27520696
DESTINATION ID	
ST. TIME	24/02 09:44
TIME USE	00'40
PAGES SENT	1
RESULT	OK