

Agreement No. CE 8/2012 (HY)

Flyover from Kwai Tsing Interchange Upramp to Kwai Chung Road

Environmental Monitoring and Audit Manual



AECOM Consulting Services Limited

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土木工程拓展署
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Department

Table of Contents

1.	INTRODUCTION.....	1-1
1.1	Project Background.....	1-1
1.2	Project Scope and Programme.....	1-1
1.3	Purpose of the Manual.....	1-2
1.4	Project Organisation.....	1-3
2.	AIR QUALITY IMPACT.....	2-1
2.1	Introduction.....	2-1
2.2	Air Quality Parameters.....	2-1
2.3	Monitoring Equipment.....	2-1
2.4	Laboratory Measurement / Analysis.....	2-3
2.5	Monitoring Locations.....	2-3
2.6	Baseline Monitoring.....	2-4
2.7	Impact Monitoring.....	2-5
2.8	Event and Action Plan for Air Quality.....	2-5
2.9	Dust Mitigation Measures.....	2-8
2.10	Site Audit Requirements.....	2-9
3.	NOISE IMPACT.....	3-1
3.1	Introduction.....	3-1
3.2	General Monitoring Requirement and Equipment.....	3-1
3.3	Noise Parameters for Construction Noise.....	3-1
3.4	Monitoring Locations for Construction Noise.....	3-1
3.5	Baseline Monitoring for Construction Noise.....	3-2
3.6	Impact Monitoring for Construction Noise.....	3-2
3.7	Event and Action Plan.....	3-3
3.8	Construction Noise Mitigation Measures.....	3-5
3.9	Parameters for Operational Traffic Noise.....	3-6
3.10	Monitoring Locations for Operational Traffic Noise.....	3-6
3.11	Baseline Monitoring.....	3-7
3.12	Operational Traffic Noise Impact Monitoring.....	3-7
3.13	Event and Action Plan for Traffic Noise.....	3-7
3.14	Noise Mitigation Measures for Traffic Noise.....	3-7
4.	WATER QUALITY IMPACT.....	4-1
4.1	Introduction.....	4-1
4.2	Monitoring Requirements.....	4-1
4.3	Mitigation Measures.....	4-1
4.4	Audit Requirements.....	4-1
5.	WASTE MANAGEMENT IMPLICATION AND LAND CONTAMINATION.....	5-1
5.1	Introduction.....	5-1
5.2	Mitigation Measures.....	5-1
5.3	Audit Requirements.....	5-3
6.	LANDSCAPE AND VISUAL IMPACTS.....	6-1
6.1	Introduction.....	6-1
6.2	Audit Requirements.....	6-1
6.3	Mitigation Measures.....	6-1

7.	LANDFILL GAS HAZARD.....	7-1
7.1	Introduction.....	7-1
7.2	Audit Requirements	7-1
8.	CULTURAL HERITAGE.....	8-1
8.1	Introduction.....	8-1
8.2	Audit Requirements	8-1
9.	ENVIRONMENTAL AUDITING	9-1
9.1	Site Inspection.....	9-1
9.2	Compliance with Legal and Contractual Requirements	9-2
9.3	Environmental Complaints	9-2
10.	REPORTING.....	10-1
10.1	General.....	10-1
10.2	Baseline Monitoring Report.....	10-1
10.3	Monthly EM&A Reports	10-2
10.4	Data Keeping.....	10-7
10.5	Interim Notifications of Environmental Exceedance.....	10-8

LIST OF TABLES

Table 2-1	Proposed Construction Dust Monitoring Locations.....	2-3
Table 2-2	Summary of Construction Dust Monitoring Programme.....	2-4
Table 2-3	Summary of Construction Dust Monitoring Programme.....	2-5
Table 2-4	Action and Limit (A/L) Levels for Construction Dust Impact Monitoring	2-6
Table 2-5	Event and Action Plan for Construction Dust Monitoring.....	2-6
Table 3-1	Proposed Construction Noise Monitoring Locations	3-2
Table 3-2	Action and Limit Levels for Construction Noise	3-3
Table 3-3	Event / Action Plan for Construction Noise	3-4
Table 3-4	Examples of “Quiet” PME and Alternative Plants.....	3-5
Table 3-5	Traffic Noise Monitoring Locations.....	3-6
Table 3-6	Summary of Direct Noise Mitigation Measures for Road Traffic Noise from Project Road in the EIA Report	3-7

LIST OF FIGURES

Figure 1.1	Proposed Road Works
Figure 1.2	Project Organisation and Lines of Communication for Environmental Works
Figure 2.1	Construction Dust Monitoring Locations
Figure 3.1	Construction Noise Monitoring Locations
Figure 3.2	Operational Noise Monitoring Locations
Figure 3.3A	Extent of Proposed Noise Mitigation Measures
Figure 3.3B	Section Views of Proposed Vertical and Cantilevered Barriers

APPENDICES

- Appendix 1-1 Tentative Construction Programme
- Appendix 1-2 Implementation Schedule of Recommended Mitigation Measures
- Appendix 2-1 Sample Data Record Sheet for TSP Monitoring
- Appendix 3-1 Sample Data Record Sheet for Construction Noise Monitoring
- Appendix 3-2 Sample Data Record Sheet for Operational Traffic Noise Monitoring
- Appendix 9-1 Flow Chart of Complaint Response Procedures
- Appendix 10-1 Sample Template for Interim Notification

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1. INTRODUCTION

1.1 Project Background

1.1.1 The Transport Department (TD) has reviewed the traffic conditions of Tsuen Wan Road (TWR) near Kwai Tsing Interchange (KT I/C) and considered that a section of the southbound carriageway of TWR between KT I/C and Kwai Chung Road (KCR) would deteriorate in the future years due to congestion that would occur during peak hours. TD considers that there is a need to implement the Project to improve the road section to cope with the future traffic growth, and the scope comprises the following principal works elements:

- Provision of an additional traffic lane for the southbound traffic between KT I/C upramp and KCR;
- Modification of existing slip roads; and
- Associated environmental mitigation measures, utility diversion, street lighting, traffic aids, traffic and control surveillance, drainage works, landscaping works and other related works.

1.1.2 AECOM Consulting Services Limited (formerly URS Hong Kong Ltd or Scott Wilson Ltd) was commissioned by the Civil Engineering and Development Department (CEDD) of the Government of the Hong Kong Special Administrative Region to undertake the investigation stage of Flyover from Kwai Tsing Interchange up-ramp to Kwai Chung Road ('the Project' refers hereinafter) under Agreement No. CE 8/2012 (HY).

1.1.3 The project is a Designated Project under the Environmental Impact Assessment Ordinance (EIAO). An Environmental Impact Assessment (EIA) Study for the Project has been undertaken as part of the Assignment, in accordance with the EIA Study Brief (No. ESB-242/2012) and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

1.2 Project Scope and Programme

1.2.1 To fulfil future demand and to prevent traffic congestion in the future during peak traffic flow hour, an additional southbound lane (a separated viaduct) is introduced on TWR and connected to the existing lane on the west side of KCR with design speed of 70 km/hr. The basis of design for this proposed flyover is to utilise the remaining capacity currently available on the two segregated KCR carriageways. The proposed road works is shown in **Figure 1.1** while proposed and associated works include:

- Existing footbridge NF303 is to be demolished and be re-provided;
- Existing Public Works Regional Laboratory will be affected;
- Existing drainage reserve zone positioned alongside TWR will be affected;
- Existing bus stop outside subway NS10A is to be relocated, and
- Minor modification to the existing Kwai Chung Road involves removal of the existing planter, breaking and reinstating Kwai Chung Road with the new road marking.

1.2.2 The construction of the Project is tentatively scheduled to commence in 2018 and complete in 2021. The tentative construction programme is provided in **Appendix 1-1**.

1.3 Purpose of the Manual

- 1.3.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the set-up of an EM&A programme to check the compliance with the recommendations of the EIA study, to assess the effectiveness of the mitigation measures recommended in the EIA report (the Implementation Schedule for Environmental Mitigation Measures is included in **Appendix 1-2** of this EM&A Manual), and to identify any further requirements for additional mitigation measures and remedial action. This EM&A Manual outlines the monitoring and audit programme for the Project. It aims to provide systematic procedures for the monitoring, auditing and minimising of environmental impacts associated with the activities of the Project.
- 1.3.2 All the environmental legislation of Hong Kong and the Hong Kong Planning Standards and Guidelines serve as the environmental standards and guidelines for the preparation of this EM&A Manual. In addition, this EM&A Manual has been prepared in accordance with the requirements as stipulated in Annex 21 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).
- 1.3.3 This EM&A Manual contains the following information:
- The responsibilities of the Contractor, Engineer, Environmental Team (ET), and the Independent Environmental Checker (IEC) with respect to the EM&A requirements during the course of the Project;
 - The requirements with respect to the construction schedule and the EM&A programme to track the varying environmental impacts;
 - The details of methodologies to be adopted, including all field laboratories and analytical procedures, and details on the quality assurance and quality control (QA/QC) programme;
 - The rationale on which the environmental monitoring data will be evaluated and interpreted;
 - The definition of Action and Limit levels;
 - The establishment of Event and Action Plans;
 - The requirements for reviewing the pollution sources and working procedures required in the event of the non-compliance with environmental criteria and complaints;
 - The requirements for the presentation of EM&A data and appropriate reporting procedures; and
 - The requirements for reviewing the EIA predictions and effectiveness of mitigation measures/environmental management systems and the EM&A programme.
- 1.3.4 For the purpose of this manual, the ET Leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the EM&A requirements.
- 1.3.5 This EM&A Manual is a dynamic document that should be reviewed regularly and updated as necessary during the construction and operation of the Project.

1.4 Project Organisation

1.4.1 The roles and responsibilities of various parties involved in the EM&A process and the organisation structure of the parties responsible for implementing the EM&A programme are outlined below. The project organisation and lines of communication with respect to environmental protection works are shown in **Figure 1.2**.

The Engineer or Engineer's Representative (ER)

1.4.2 The Engineer is responsible for overseeing the construction works and ensuring the works to be undertaken by the Contractor in accordance with the specifications and contractual requirements. The duties and responsibilities of the Engineer with respect to the EM&A programme include:

- To supervise the Contractor's activities and ensure the requirements in the EM&A Manual to be fully complied with;
- To inform the Contractor when action is required to reduce the environmental impacts in accordance with the Event and Action Plans;
- To lead the regular site inspections and audits attended by the Contractor and Environmental Team (ET); and
- To adhere to the procedures for carrying out the complaint investigation.

The Contractor

1.4.3 The Contractor should report to the Engineer. The duties and responsibilities of the Contractor are:

- To implement the recommendations and requirements of the EIA study;
- To provide assistance to the ET in carrying out the relevant environmental monitoring;
- To submit the proposal of mitigation measures in case of exceedances of the Action and Limit levels, in accordance with the Event and Action Plans;
- To implement the mitigation measures to reduce the environmental impacts where the Action and Limit levels are exceeded until the events are resolved; and
- To adhere to the procedures for carrying out the complaint investigation.

Environmental Team (ET)

1.4.4 The ET will conduct the EM&A programme to ensure the Contractor's compliance with the Project's environmental requirements during the construction phase.

1.4.5 The ET should be led and managed by an Environmental Team Leader (ET Leader), who should possess at least 7 years of experience in EM&A. The ET should monitor the mitigation measures implemented by the Contractor on a regular basis to ensure the compliance with the intended aims of the mitigation measures. The duties and responsibilities of the ET are:

- To monitor various environmental parameters as required in the EM&A Manual;

- To carry out regular site inspections to investigate and audit the Contractor's site practices, equipment and work methodologies with respect to the pollution control and environmental mitigation, and anticipate the environmental issues for the proactive and practicable action before problems arising;
- To analyse the EM&A data, review the success of EM&A programme to confirm the adequacy of mitigation measures implemented, and the validity of the EIA predictions and to identify any adverse environmental impacts arising and report the EM&A results to the Independent Environmental Checker (IEC), Contractor, and Engineer;
- To prepare the reports of environmental monitoring data and site environmental conditions; and
- To review the proposals of mitigation measures by the Contractor in case of exceedances of the Action and Limit levels, in accordance with the Event and Action Plans.
- To adhere to the procedures for carrying out the complaint investigation.

Independent Environmental Checker (IEC)

1.4.6 The IEC should advise the Engineer on the environmental issues related to the Project. The IEC should possess at least 7 years of experience in EM&A. The duties and responsibilities of the IEC are:

- To review and audit in an independent, objective and professional manner in all aspects of the EM&A programme;
- To validate and confirm the accuracy of the monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
- To carry out random sample checking and audit of the environmental monitoring data and sampling procedures, etc.;
- To conduct random site inspections during construction;
- To audit the recommendations and requirements of the EIA study against the status of the implementation of environmental protection measures on-site;
- To review the effectiveness of the environmental mitigation complaints and the effectiveness of corrective measures;
- On as-needed basis, to verify and certify the environmental acceptability of the EP holder's construction methodology (both temporary and permanent works), relevant design plans and submissions under the EP;
- To verify the investigation results of the environmental complaints and the effectiveness of corrective measures;
- To verify the EM&A reports that have been certified by the ET Leader; and
- To provide feedback of the audit results to the ET/EP holder according to the Event and Action Plans in the EM&A manual.
- To adhere to the procedures for carrying out the complaint investigation.

- 1.4.7 Sufficient and suitably qualified professional and technical staff should be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme for the duration of the Project.

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2. AIR QUALITY IMPACT

2.1 Introduction

- 2.1.1 The EIA study of this Project concluded that, with the implementation of sufficient dust suppression measures as stipulated under the Air Pollution Control (Construction Dust) Regulation and good site practices and proposed mitigation measures, adverse dust impact would not be anticipated at the Air Sensitive Receivers (ASRs) in the vicinity of the construction sites.
- 2.1.2 However, in order to ensure that appropriate dust control measures are properly implemented and good construction site practices are adopted throughout the construction period, an EM&A program is proposed to be carried out during construction to monitoring the short-term impacts.
- 2.1.3 Air quality monitoring during the operation phase of this Project is considered not necessary as air quality impacts to the adjacent identified ASRs arising from the Project would be insignificant.

2.2 Air Quality Parameters

- 2.2.1 Monitoring and audit of the Total Suspended Particulates (TSP) levels shall be undertaken by the ET Leader to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.
- 2.2.2 1-hour and 24-hour TSP levels shall be measured to indicate the impacts of construction dust on air quality. The TSP levels shall 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.
- 2.2.3 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 filter paper, and any other local atmospheric factors affecting or affected by site conditions etc. shall be recorded down in detail. A sample data sheet is shown in **Appendix 2-1**.

2.3 Monitoring Equipment

- 2.3.1 Monitoring and audit of the Total Suspended Particulates (TSP) levels shall be undertaken by the ET Leader to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.
- 2.3.2 High volume sampler (HVS) in compliance with the following specifications shall be used for carrying out the 1-hr and 24-hr TSP monitoring:
- 0.6-1.7 m³/min (20-60 SCFM) adjustable flow range;
 - equipped with a timing/control device with ± 5 minutes accuracy for 24 hours operation;
 - installed with elapsed-time meter with ± 2 minutes accuracy for 24 hours operation;
 - capable of providing a minimum exposed area of 406 cm² (63 in²);
 - flow control accuracy: $\pm 2.5\%$ deviation over 24-hr sampling period;

- equipped with a shelter to protect the filter and sampler;
- incorporated with an electronic mass flow rate controller or other equivalent devices;
- equipped with a flow recorder for continuous monitoring;
- provided with a peaked roof inlet;
- incorporated with a manometer;
- able to hold and seal the filter paper to the sampler housing at horizontal position;
- easy to change the filter; and
- capable of operating continuously for 24-hr period.

2.3.3 The ET Leader is responsible for provision of the monitoring equipment. He shall ensure that sufficient number of HVSs with an appropriate calibration kit are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc. shall be clearly labelled.

2.3.4 Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by the concerned parties such as the IEC. All the data shall be converted into standard temperature and pressure condition.

2.3.5 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded down in the data sheet in **Appendix 2-1**.

2.3.6 If the ET Leader proposes to use a direct reading dust meter to measure 1-hr TSP levels, he shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that the HVS and may be used for the 1-hr sampling. The instrument shall also be calibrated regularly, and the 1-hr sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.

2.3.7 Wind data monitoring equipment shall also be provided and set up at conspicuous locations for logging wind speed and wind direction near to the dust monitoring locations. The equipment installation location shall be proposed by the ET Leader and agreed with the ER in consultation with the IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed:

- the wind sensors shall be installed on masts at an elevated level 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;
- the wind data shall be captured by a data logger. The data recorded in the data logger shall be downloaded periodically for analysis at least once a month;
- the wind data monitoring equipment shall be re-calibrated at least once every six months; and
- wind direction shall be divided into 16 sectors of 22.5 degrees each.

2.3.8 In exceptional situations, the ET Leader may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from the IEC.

2.4 Laboratory Measurement / Analysis

2.4.1 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 shall be HOKLAS accredited or other internationally accredited laboratory.

2.4.2 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 in consultation with the IEC. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and the IEC. IEC shall conduct regular 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.

2.4.3 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pin holes, and shall be conditioned in a humidity controlled chamber for over 24-hr and be pre-weighed before use for the sampling.

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

2.5 Monitoring Locations

2.5.1 Three representative Construction Dust Monitoring Locations are proposed in **Table 2-1** below and shown in **Figure 2.1**.

Table 2-1 Proposed Construction Dust Monitoring Locations

Monitoring Location ID	Description	Land Uses
AMC01	Lai King Catholic Secondary School	Educational Institution
AMC02	Fung King House	Residential
AMC03	HKEAA-Lai King Assessment Centre	Educational Institution

2.5.2 The status and locations of dust sensitive receivers may change after issuing this manual. If such cases exist, the ET Leader shall propose updated monitoring locations and seek approval from ER and agreement from the IEC.

2.5.3 When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:

- at the site boundary or such locations close to the major dust emission source;
- close to the sensitive receptors; and
- take into account the prevailing meteorological conditions.

2.5.4 The ET Leader shall agree with the ER in consultation with the IEC the position of the HVS for installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:

- a horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;
- no two samplers shall be placed less than 2 metre apart;
- the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
- a minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
- a minimum of 2 metre separation from any supporting structure, measured horizontally is required;
- no furnace or incinerator flue is nearby;
- airflow around the sampler is unrestricted;
- the sampler is more than 20 metres from the dripline;
- any wire fence and gate, to protect the sampler, shall not cause any obstruction during monitoring;
- permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the samplers.

2.6 Baseline Monitoring

2.6.1 The ET Leader shall carry out baseline monitoring at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works to obtain daily 24-hr TSP samples. 1-hr sampling shall also be done at least 3 times per day while the highest dust impact is expected. A summary of the requirements for the baseline monitoring is shown in **Table 2-2**.

Table 2-2 Summary of Construction Dust Monitoring Programme

Monitoring Period	Duration	Parameter	Frequency
Baseline Monitoring	Consecutive days of at least 2 weeks before commencement of construction works	1 hour TSP	3 times per day
		Continuous 24-hour TSP	Daily

2.6.2 Before commencing the baseline monitoring, the ET leader 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.

2.6.3 During the baseline monitoring, there shall not be any construction or dust generation activities in the vicinity of the monitoring stations.

2.6.4 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 which 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.

2.6.5 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader 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.

2.6.6 Baseline checking of ambient TSP levels shall be carried out every three months at each monitoring location when no dusty works activities are in operation. If the ET considers that significant change in the ambient conditions has taken place, a repeat of the baseline monitoring may be carried out to update the baseline levels. The revised baseline levels and, in turn, the air quality criteria shall be agreed with the IEC and EPD.

2.7 Impact Monitoring

2.7.1 The ET Leader 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-hr TSP monitoring. For 1-hr TSP monitoring, the sampling frequency of at least three times in every six-days shall be undertaken when the highest dust impact occurs. A summary of the requirements for the impact monitoring is shown in **Table 2-3**.

Table 2-3 Summary of Construction Dust Monitoring Programme

Monitoring Period	Duration	Parameter	Frequency
Impact Monitoring	Throughout the construction phase	1 hour TSP	At least 3 times in every 6 days when the highest dust impact are likely to occur or when one documented complaint is received
		Continuous 24-hour TSP	Once per 6 days

2.7.2 Before commencing the baseline monitoring, the ET leader 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.

2.7.3 The specific time to start and stop the 24-hr TSP monitoring shall be clearly defined for each location and be strictly followed by the field operator.

2.7.4 In case of non-compliance with the air quality criteria, more frequent monitoring exercise, as specified in the Action Plan, 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.

2.8 Event and Action Plan for Air Quality

2.8.1 The baseline monitoring results from the basis for determining the air quality criteria for the impact monitoring. The ET Leader shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP. **Table 2-4** shows the air quality criteria, namely Action and Limit Levels to be used.

Table 2-4 Action and Limit (A/L) Levels for Construction Dust Impact Monitoring

Parameter	Action Level*	Limit Level
TSP (24-hour average)	BL ≤ 200 µgm ⁻³ , AL = (BL x 1.3 + LL)/2 BL > 200 µgm ⁻³ , AL = LL	260 µg/m ³
TSP (1-hour average)	BL ≤ 384 µgm ⁻³ , AL = (BL x 1.3 + LL)/2 BL > 384 µgm ⁻³ , AL = LL	500 µg/m ³

* BL = Baseline Level; AL = Action level; LL = Limit level

2.8.2 Should non-compliance of the air quality criteria occur, actions in accordance with the Action plan in **Table 2-5** should be carried out.

Table 2-5 Event and Action Plan for Construction Dust Monitoring

EVENT	ACTION			
	ET	IEC	ER	Contractor
Action Level				
1. Exceedance for one sample	<ol style="list-style-type: none"> Identify sources, investigate the causes of complaint and propose remedial measures. Inform IEC and ER. Repeat measurement to confirm finding; Increase monitoring frequency. 	<ol style="list-style-type: none"> Check monitoring data submitted by the ET. Check the Contractor's working methods. 	<ol style="list-style-type: none"> Notify the Contractor. 	<ol style="list-style-type: none"> Rectify any unacceptable practices. Amend working methods agreed with the ER as appropriate.
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> Identify sources. Inform the IEC and ER. Advise the ER on the effectiveness of the proposed remedial measures; Repeat measurements to confirm findings. Increase monitoring frequency to daily. Discuss with the IEC, ER and Contractor on remedial action required. If exceedance continues, arrange meeting with the IEC, Contractor and ER. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> Check monitoring data submitted by the ET. Check the Contractor's working methods. Discuss with the ET, ER and Contractor on possible remedial measures if required. Advise the ER on the effectiveness of proposed remedial measures if required. 	<ol style="list-style-type: none"> Notify the Contractor. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> Submit proposals for remedial action to the ER within 3 working days of notification. Implement the agreed proposals. Amend proposal as appropriate.

EVENT	ACTION			
	ET	IEC	ER	Contractor
Limit Level				
1. Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify sources, investigate causes of exceedance and proposed remedial measures. 2. Inform the IEC, ER, and Contractor. 3. Repeat measurement to confirm finding. 4. Increase monitoring frequency to daily. 5. Assess effectiveness of the Contractor's remedial action and keep the IEC and ER informed of the results. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET. 2. Check the Contractor's working methods. 3. Discuss with the ET, ER and Contractor on possible remedial measures. 4. Advise the ER and ET on the effectiveness of the proposed remedial measures. 5. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of the notification of exceedance in writing. 2. Notify the Contractor. 3. Ensure remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance. 2. Submit proposals for remedial action to the ER and copy to the ET and IEC within 3 working days of notification. 3. Implement the agreed proposals. 4. Amend proposal as appropriate.
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Notify the IEC, ER and Contractor. 2. Identify sources. 3. Repeat measurements to confirm findings. 4. Increase monitoring frequency to daily. 5. Carry out analysis of the Contractor's working procedures with the ER to determine the possible mitigation to be implemented. 6. Arrange meeting with the IEC and ER to discuss the remedial action to be taken. 7. Assess the effectiveness of the Contractor's remedial action and keep the IEC, EPD and ER informed of the results. 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Discuss amongst the ER, ET and Contractor on the potential remedial action. 2. Review the Contractor's remedial action whenever necessary to assure their effectiveness and advise the ER and ET accordingly. 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of the notification of exceedance in writing. 2. Notify the Contractor. 3. In consultation with the IEC and ET, agree with the Contractor on the remedial measures to be implemented. 4. Ensure remedial measures are properly implemented. 5. If exceedance continues, consider what portion of works is responsible and instruct the Contractor to stop that portion of works until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance. 2. Submit proposals for remedial action to the ER and copy to the IEC and ET within 3 working days of notification. 3. Implement the agreed proposals. 4. Resubmit proposals if problems still not under control. 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

2.9 Dust Mitigation Measures

2.9.1 The EIA report has recommend dust control and mitigation measures. The contractor shall be responsible for the design and implementation of these measures.

2.9.2 The dust suppression measures as stipulated under the Air Pollution Control (Construction Dust) Regulation and good site practices is recommended and presented in **Appendix 1-2** in order to further minimize the construction dust generated including:

- Every temporary access road shall be paved with concrete, bituminous materials, hardcores or metal plates, and kept clear of dusty materials; or sprayed with water or a dust suppression chemical so as to maintain the entire road surface wet.
- Any stockpile of dusty materials shall be covered entirely by impervious sheeting, placed in an area sheltered on the top and the 3 sides, or sprayed with water or a dust suppression chemical so as to maintain the entire surface wet. The materials should be removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading.
- All dusty materials shall be sprayed with water or a dust suppression chemical immediately prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.
- Vehicles used for transporting dusty materials should be covered with tarpaulin or similar material, and the cover should extend over the edges of the sides and tailboards.
- Vehicle wheel washing facilities should be provided at each construction site exit. Immediately before leaving a construction site, every vehicle shall be washed to remove any dusty materials from its body and wheels.
- Where a vehicle leaving a construction site is carrying a load of dusty materials, the load shall be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle.
- The speed of vehicles on unpaved road within the site should be controlled to about 10 km/hr.
- Routing of vehicles and positioning of construction plants should be arranged at maximum possible distances from the sensitive receivers.
- Every stock of more than 20 bags of cement and dry pulverized fuel ash (PFA) shall be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides.
- Loading, unloading, transfer, handling or storage of large amount of cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with the an effective fabric filter or equivalent air pollution control system.
- Exposed earth shall be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabilizer within 6 months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.

2.9.3 If the above measures are not sufficient to restore the air quality to acceptable levels upon the advice of ET Leader, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose to ER for approval, and implement the mitigation measures.

2.10 Site Audit Requirements

- 2.10.1 The implementation of regular site audits aims to ensure the mitigation measures recommended in the EIA report to be properly undertaken during the construction phase of this Project. It can also provide an effective control of any mal-practices and, therefore, achieve the continual improvement of the environmental performance on-site.
- 2.10.2 Inspections of the construction activities, works sites and works areas should be conducted by the Contractor at least on a weekly basis to ensure the mitigation measures to be properly implemented.
- 2.10.3 Site audits should be carried out by the Engineer, ET and Contractor, and should be based on the mitigation measures for the air pollution control as recommended in **Appendix 1-2**. In the event that the recommended mitigation measures are not fully or properly implemented, the Contractor should report the deficiency to the Engineer and ET. The appropriate action will need to be taken by the Contractor:
- Investigate the problems and causes;
 - Discuss a remedial and corrective proposal with the Engineer and ET;
 - Take action according to the action notes agreed with the Engineer;
 - Implement the remedial and corrective action immediately;
 - Re-Inspect the site conditions upon the completion of the remedial and corrective action;
and
 - Record the event.

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3. NOISE IMPACT

3.1 Introduction

- 3.1.1 Based on assessment results in the EIA report, construction noise exceedance at NSRs is anticipated for the noise criteria during examination period even if mitigation measures are properly implemented. Regular noise monitoring should be carried out at representative NSRs.
- 3.1.2 Road traffic noise monitoring is recommended at representative NSRs during the first year of the road opening.

3.2 General Monitoring Requirement and Equipment

- 3.2.1 As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (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 agrees to within 1.0dB.
- 3.2.2 Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions.
- 3.2.3 The ET Leader is responsible for the provision, installation, operation, maintenance and dismantling 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 The monitoring station shall normally be at a point 1m from the exterior of the sensitive receiver's building facade and be at a position 1.2m 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 +3dB(A) shall be made to the free-field measurements. The ET Leader shall agree with the ER/IEC on the monitoring positions 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.

3.3 Noise Parameters for Construction Noise

- 3.3.1 The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq(30 \text{ min})}$ shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, $L_{eq(5 \text{ min})}$ shall be employed for comparison with the NCO criteria.
- 3.3.2 As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference. **Appendix 3-1** shows a sample data record sheet for construction noise monitoring.

3.4 Monitoring Locations for Construction Noise

- 3.4.1 Noise exceedance is anticipated at the following existing NSRs under unmitigated scenario:

- Lingnan Dr. Chung Wing Kong Memorial Secondary School
- Lai King Catholic Secondary School
- Fung King House
- Ming King House
- HKEAA-Lai King Assessment Centre

3.4.2 Three comprehensive Noise Monitoring Locations (NML) are proposed in **Table 3-1** below and shown in **Figure 3.1**.

Table 3-1 Proposed Construction Noise Monitoring Locations

Monitoring Location ID	Description	Land Uses
NMC01	Lai King Catholic Secondary School	Educational Institution
NMC02	Fung King House	Residential
NMC03	HKEAA-Lai King Assessment Centre	Educational Institution

3.4.3 The status and locations of noise sensitive receivers may change after issuing this manual. In this event, the ET Leader shall propose updated monitoring locations and seek approval from ER and the IEC and agreement from EPD of the proposal.

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

- At locations close to the major site activities which are likely to have noise impacts;
- Close to the most affected existing noise sensitive receivers; and
- For monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

3.5 Baseline Monitoring for Construction Noise

3.5.1 Baseline noise measurement shall be conducted to determine the background noise before commencement of work. Daily measurement of A-weighted levels L_{eq} , L_{10} and L_{90} shall be conducted for at least two weeks. Daily sampling periods should include: (i) between 0700 and 1900 hours; (ii) between 1900 and 2300 hours; and (iii) between 2300 to 0700 hours of next day. Each of the daily sampling periods shall include 30 minutes (six consecutive $L_{eq(5min)}$ readings). A schedule on the baseline monitoring shall be submitted to the ER/IEC for approval before the monitoring starts.

3.5.2 During the baseline monitoring, there should be no major construction activities near the monitoring stations.

3.5.3 Alternative baseline NML that can give representative baseline result may be proposed for ER and IEC's approval with justifications.

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

3.6 Impact Monitoring for Construction Noise

3.6.1 Noise monitoring shall be carried out at all the designated monitoring locations. 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 per week basis when noise generating activities are underway:

- One set of measurements between 0700-1900 hours on normal weekdays (six consecutive $L_{eq/5min}$ readings);
- One set of measurements between 1900-2300 hours;
- One set of measurements between 2300-0700 hours of next day; and
- One set of measurements between 0700-2300 hours on holidays.

3.6.2 For the latter 3 sets of measurements specified in **Section 3.6.1** above, one set of measurements shall at least include 3 consecutive $L_{eq(5min)}$ results.

3.6.3 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in **Section 3.7** shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

3.7 Event and Action Plan

3.7.1 Noise Standards for Daytime Construction Activities are specified under EIAO-TM. The Action and Limit levels for construction noise are defined in **Table 3-2**. Should non-compliance of the criteria occur, action in accordance with the Action Plan in **Table 3-3** shall be carried out. Necessary mitigation measures are shown in **Section 3.8**. Timing and responsibilities for the implementation of mitigation measures are shown in Implementation Schedule in **Appendix 1-2**.

Table 3-2 Action and Limit Levels for Construction Noise

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one documented complaint is received	75* dB(A)
0700-2300 hrs on holidays (including Sundays); and 1900-2300 hrs on all days		60/65/70** dB(A)
2300-0700 hrs of all days		45/50/55** dB(A)

Notes:

Construction noise during restricted hours is under the control of Noise Control Ordinance.

* reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.

** to be selected based on Area Sensitivity Rating.

Table 3-3 Event / Action Plan for Construction Noise

EVENT	ACTION			
	ET	IEC	ER	Contractor
Action Level exceeded	<ol style="list-style-type: none"> 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 monitor frequency to check mitigation effectiveness; 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to ET Leader / ER; 2. Implement noise mitigation proposals.
Limit Level exceeded	<ol style="list-style-type: none"> 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 stops, cease additional monitoring. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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.

3.8 Construction Noise Mitigation Measures

3.8.1 The EIA report has recommended construction noise control and mitigation measures as presented in **Appendix 1-2**. The Contractor shall be responsible for the design and implementation of these measures as listed below:

- selection and optimization of construction programmes, avoidance of parallel operation of noisy PME, and/or reduction in number and/or the on-time percentage of PME during noise sensitive periods such as school examination period, and avoidance of noisy construction activities during school examination period by liaising with the school representatives;
- use of Quality Powered Mechanical Equipment (QPME) and working methods;
- use of temporary at-source noise mitigation measures such as noise barriers, noise fabric, noise enclosures, noise jacket and mufflers; and
- use of good site practice to limit noise emission from construction site.

3.8.2 Examples of QPME are provided in **Table 3-4** below.

Table 3-4 Examples of “Quiet” PME and Alternative Plants

Identificati on Code in GW-TM	Descriptions of PME	SWL in GW-TM, dB(A)	QPME example on QPME list ^[1]	SWL of QPME, dB(A)
CNP 004	Asphalt Paver	109	EPD-01226 (VOLVO ABG5770)	104
CNP 081	Excavator, Wheeled/Tracked	112	EPD-01896 (HYUNDAI R80CR-9)	98
CNP 048	Mobile Crane	112	EPD-01516 (KOBELCO CKS900)	101
CNP 170	Poker, vibratory, hand held	113	Poker, vibratory, hand held (electric)	102
CNP 185	Road Roller	108	EPD-01806 (KANTO-TK KV25DS)	95

Note:

^[1] QPME list available on the EPD website

3.8.3 Good Practices are also recommended as follow:

- use of well-maintained and regularly-serviced plant during the works;
- plant operating on intermittent basis should be turned off or throttled down when not in active use;
- plant that is known to emit noise strongly in one direction should be orientated to face away from the NSRs;
- silencers, mufflers and enclosures for plant should be used where possible and maintained adequately throughout the works;
- where possible fixed plants should be sited away from NSRs; and

- stockpiles of excavated materials and other structures such as site buildings should be used effectively to screen noise from the works.

3.8.4 If the above measures are not sufficient to restore the construction noise quality to acceptable levels, upon the advice of ET Leader, the Contractor shall liaise with the ET Leader on alternative mitigation measures, propose such measures to the ER/IEC for approval, and implement the mitigation measures.

3.8.5 Implementation status and the effectiveness of mitigation measures shall be audited through regular site inspection.

3.9 Parameters for Operational Traffic Noise

3.9.1 The ET should also carry out monitoring of road traffic noise after the works under Contract are completed and put into operation. The road traffic noise during operation of the Project should be measured in terms of the A-weighted equivalent of $L_{10(1-hr)}$. During the traffic noise measurement, traffic count should also be undertaken concurrently. Supplementary information for data auditing and statistical results such as L_{eq} and L_{90} should also be obtained for reference.

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

3.10 Monitoring Locations for Operational Traffic Noise

3.10.1 Those most affected noise sensitive receivers identified in the EIA report has been identified as the noise monitoring locations in this EM&A Manual. The traffic noise monitoring locations during operational phase are listed in **Table 3-5** and shown in **Figure 3.2**. In addition, noise monitoring shall be carried out for one year following construction. The locations for operational noise monitoring shall be defined during detailed design on the basis of the status of the most up-to-date information on proposed developments surrounding the Project.

Table 3-5 Traffic Noise Monitoring Locations

Monitoring Location No.	Description	Land Uses
NMT01	Lai King Catholic Secondary School	Educational Institute
NMT02	Fung King House	Residential

3.10.2 The status and locations of noise sensitive receivers may change after issuing this manual. In this event, the ET Leader shall propose updated monitoring locations and seek approval from ER/IEC and agreement from EPD of the proposal.

3.10.3 When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria in that they should be:

- At locations close to the major site activities which are likely to have noise impacts;
- Close to the noise sensitive receivers; and
- For monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

3.11 Baseline Monitoring

3.11.1 No baseline monitoring is required for Operational Road Traffic Noise.

3.12 Operational Traffic Noise Impact Monitoring

3.12.1 Traffic noise monitoring shall be carried out twice at representative NSRs at 6-month intervals within one year of the road opening. The following is an initial guide on the traffic noise monitoring requirements during the operational phase:

- One set of measurements at the morning traffic peak hour on normal weekdays;
- One set of measurements at the evening traffic peak hour on normal weekdays;
- A concurrent census of traffic flow and percentage heavy vehicle shall be conducted for the road and the existing road network in the vicinity of each measuring point;
- Average vehicle speed estimated for Project road and the existing road network in the vicinity of each measuring points; and
- The two sets of monitoring data should be obtained within the first year of operation.

3.12.2 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. **Appendix 3-2** shows a sample data record sheet for operational noise monitoring.

3.12.3 Each set of measurements shall include three measurements of 30 minutes. The parameters L_{10} , L_{eq} , L_{90} and L_{max} will be recorded for data auditing and reference.

3.13 Event and Action Plan for Traffic Noise

3.13.1 For traffic noise, the measured/monitored 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 shall be given to justify the discrepancies.

3.14 Noise Mitigation Measures for Traffic Noise

3.14.1 The recommended noise mitigation measures in the EIA report are described in **Table 3-6** below and illustrated in **Figure 3.3**.

Table 3-6 Summary of Direct Noise Mitigation Measures for Road Traffic Noise from Project Road in the EIA Report

ID	Description	Length (m)	Location
A	5.5m high with 2.5m cantilevered barrier at 45°	85	Bridge H Southbound
B	5.5m vertical barrier	20	Bridge H Southbound
C	5.5m high with 2.5m cantilevered barrier at 45°	230	Bridge H Southbound
D	5.5m high with 3.5m cantilevered barrier at 45°	45	Bridge H Southbound
-	Low Noise Road Surfacing ^[1]	-	Bridge G & H (i.e. All Project Roads)

Notes:

- [1] Low noise road surfacing is applied on highways with speed 70kph or above in general. Such mitigation measure has been included in both unmitigated scenario and mitigated scenario in road traffic noise impact analysis.

4. WATER QUALITY IMPACT

4.1 Introduction

4.1.1 The implementation of proper mitigation measures in place as recommended in the EIA report, adverse water quality impact would not be anticipated to the identified Water Sensitive Receivers (WSRs) during the construction and operation phases of this Project. As such, regular inspections of construction activities, works sites and works areas should be conducted to ensure that the recommended mitigation measures are properly implemented.

4.2 Monitoring Requirements

Construction Phase

4.2.1 No surface water quality monitoring would be required during the construction phase. To avoid any potential water quality impacts arising from the construction activities, regular site audits should be conducted to ensure the recommended mitigation measures are properly implemented.

Operation Phase

4.2.2 No adverse water quality impact would be anticipated during the operation phase, provided that all mitigation measures recommended in the EIA report are properly implemented. Therefore, water quality monitoring and auditing are not required during the operation phase.

4.3 Mitigation Measures

4.3.1 The recommended mitigation measures for water quality impacts are presented the implementation schedule in **Appendix 1-2** of this EM&A Manual. In the event of complaints or non-compliances, the ET, ER and Contractor should review the effectiveness of these mitigation measures, design alternatives or additional mitigation measures as appropriate. The Contractor should propose the corrective action to the ER for approval, and implement them accordingly.

4.4 Audit Requirements

4.4.1 The implementation of regular site audits aims to ensure the mitigation measures recommended in the EIA report to be properly undertaken during the construction phase of this Project. It can also provide an effective control of any mal-practices and, therefore, achieve the continual improvement of the environmental performance on-site. Site audits should include both site inspections and compliance audits.

Site Inspection

4.4.2 Inspections of the construction activities, works sites and works areas should be conducted by the Contractor at least on a weekly basis to ensure the mitigation measures to be properly implemented. During operation, the system should be properly maintained and cleaned regularly to ensure good service condition in which Highway Department will be responsible for the maintenance of road drains.

4.4.3 Site audits should be carried out by the ER, ET and Contractor, and should be based on the mitigation measures for the water pollution control as recommended in **Appendix 1-2**. In the event that the recommended mitigation measures are not fully or properly implemented,

the Contractor should report the deficiency to the ER and ET. The appropriate action will need to be taken by the Contractor:

- Investigate the problems and causes;
- Issue action notes to the Contractor who is responsible for the works;
- Implement the remedial and corrective action immediately;
- Re-inspect the site conditions upon the completion of the remedial and corrective action; and
- Record the event and discuss with the Contractor for preventive actions.

Compliance Audits

4.4.4 Compliance audits are to be undertaken to ensure that a valid Water Pollution Control Ordinance (WPCO) discharge license has been issued by the EPD prior to the discharge of effluent from the construction activities of this Project site. Monitoring of the quality of the treated effluent from the works areas should be carried out in accordance with the WPCO discharge license. The audit results reflect whether the effluent quality is in compliance with the discharge license requirements. In case of non-compliances, the following action should be taken:

- The Contractor should notify the ER, ET and IEC;
- The ER, ET and IEC should identify the sources of pollution and recommend and agree the appropriate mitigation measures for the Contractor;
- The ER and ET should check the implementation status of the agreed mitigation measures by the Contractor;
- The ET should increase the monitoring frequency until the effluent quality is in compliance with the requirements of the discharge license; and
- The ET should record the non-compliances and propose preventive measures.

5. WASTE MANAGEMENT IMPLICATION AND LAND CONTAMINATION

5.1 Introduction

- 5.1.1 Regular auditing should be carried out by the ET during the construction phase of the Project to ensure wastes are being managed with the appropriate procedures or practices in accordance with relevant legislation and waste management guidelines as well as those recommended in this EIA Report. The audits will examine all aspects of waste management including waste generation, storage, recycling, transportation and disposal.
- 5.1.2 A Waste Management Plan (WMP), as part of Environmental Management Plan (EMP), should be prepared in accordance with ETWB TC(W) No.19/2005 and submitted to the ER for approval. The recommended mitigation measures should form the basis of the WMP. The monitoring and auditing requirement stated in ETWB TC(W) No.19/2005 should be followed with regard to the management of Construction and Demolition (C&D) Materials.
- 5.1.3 The Public Works Regional Laboratory of Tsuen Wan (Laboratory) has been identified as a chemical waste producer, which is a potential contaminated land use within the project boundary. The allocatee shall be responsible for the land contamination assessment of the Laboratory Site and ensure the Laboratory Site is free from contamination at the expiry of allocation and therefore any land contamination concern arising from past activities would have been remediated prior to the construction of the works.
- 5.1.4 With implementation of good site practice and design, land contamination at the Site arising from construction and operation phases of the Project as road upgrading works is not envisaged. , no EM&A for contaminated land is recommended.

5.2 Mitigation Measures

- 5.2.1 With proper handling, collection, transportation and disposal of waste arising from the construction of the Project, it is anticipated that potential adverse environmental impacts would be avoided or minimised. During site inspections, the Engineer and ET should pay special attention to the issues relating to the waste management and check whether the Contractor has implemented the recommended good site practices and other mitigation measures. The following waste management measures should be implemented by the Contractor:
- The Contractor should be requested to submit an outline WMP prior to the commencement of construction work, in accordance with the ETWB TC(W) No.19/2005 so as to provide an overall framework of Waste Management and Reduction. The WMP should include:
 - Waste management policy;
 - Record of generated waste;
 - Waste reduction target;
 - Waste reduction programme;
 - Role and responsibility of waste management team;
 - Benefit of waste management;
 - Analysis of waste materials;

- Reuse, recycling and disposal plans;
 - Transportation process of waste products; and
 - Monitoring and action plan.
- The waste management hierarchy as provided in Section 6.6.4 of the EIA report and below should be strictly followed and applied in evaluating the waste management options in order to maximise the waste reduction and often reduce costs, for example, by controlling, reducing or eliminating over-ordering of construction materials. Records of quantities and locations of wastes generated, recycled and disposal should be properly documented. The hierarchy shall be as follows:
 - Avoidance and minimisation, i.e. avoiding or not generating waste through changing or improving practices and design;
 - Reuse of materials, thus avoiding disposal (generally with only limited reprocessing);
 - Recovery and recycling, thus avoiding disposal (although reprocessing may be required); and
 - Treatment and disposal, according to relevant laws, guidelines and good practice.
 - A trip-ticket system should be established in accordance with DevB TC(W) No. 6/2010 and Waste Disposal (Charges for Disposal of Construction Waste) Regulation in order to monitor the disposal of inert C&D Materials at public fill reception facilities and the remaining C&D Waste to landfills, and control fly-tipping. A trip-ticket system should be included as one of the contractual requirements and implemented by the Contractor. The ER should regularly audit the effectiveness of the system.
 - A recording system for the amount and locations of waste generated, recycled and disposed should be established. The Contractor should also provide proper training to workers regarding the appropriate concepts of site cleanliness and waste management procedures, e.g. waste reduction, reuse and recycling all the time.
 - If chemical wastes are to be produced at the construction site, the Contractor would be required to register with the EPD as a Chemical Waste Producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used, and incompatible chemicals should be stored separately. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste (such as explosive, flammable, oxidizing, irritant, toxic, harmful, or corrosive).
 - The Contractor should use a licensed collector to transport and dispose of the chemical wastes, to either the Chemical Waste Treatment Centre at Tsing Yi, or another licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation.
 - No waste should be burnt on-site. Disposal of waste at unlicensed location e.g. natural habitat should be prohibited. The Contractor should propose the final disposal sites in the EMP and WMP for approval before implementation.

5.3 Audit Requirements

- 5.3.1 Regular audits and site inspection should be carried out by the ER, ET and Contractor to ensure that the recommended good site practices and other mitigation measure are implemented by the Contractor. The audits should look at all aspects of on-site waste management practices including the waste generation, storage, recycling, transportation and disposal. Apart from site inspections, documents including licenses, permits, disposal and recycling records should be reviewed and audited for the compliance with the legislation and contract requirements. The requirements of the environmental audit programme are set out in this EM&A Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

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6. LANDSCAPE AND VISUAL IMPACTS

6.1 Introduction

- 6.1.1 Landscape and Visual Impact Assessment in the EIA Report has identified and the possible impacts due to the Project. It has also recommended mitigation measures for minimizing the impacts and for improving overall landscape and visual quality. The Contractor to be employed by the Project Proponent will be responsible for the implementation of mitigation measures. The Contractor should employ his own qualified landscape consultant (LC) for the construction and maintenance periods.

6.2 Audit Requirements

- 6.2.1 The ET should be responsible for conducting regular review on the implementation of landscape and visual mitigation measures during the construction phase in accordance with the recommendations of the EIA Report.

Construction Phase

- 6.2.2 The design, implementation and maintenance of landscape and visual mitigation measures should be checked bi-weekly by the ET to confirm that they are fully realised. Any potential conflicts between the proposed landscape measures, the Project works, and operational requirements should also be identified and resolved as early as possible. Any changes to the mitigation measures should be incorporated in the detailed design.

Operational Phase

- 6.2.3 The ET should conduct site inspection to confirm that all operation phase mitigation measures are implemented in accordance with the Project design and the EIA recommendations. Operational phase auditing will be restricted to the 12 months establishment works of the landscaping proposals.

6.3 Mitigation Measures

- 6.3.1 The landscape and visual mitigation measures should be incorporated in the detailed design. The construction phase and operational phase mitigation measures proposed in the EIA are presented in **Appendix 1-2**. The construction phase mitigation measures should be adopted from the commencement of construction and should be in place throughout the entire construction period while the mitigation measures for the operation phase should be adopted during the detailed design and be built as part of the construction works so that they are in place on the date of commissioning of the Project.
- 6.3.2 Any potential conflicts between the proposed mitigation measures and any other project works and operational requirements should be resolved early and without compromising the intention of the mitigation measures.

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7. LANDFILL GAS HAZARD

7.1 Introduction

7.1.1 As the work boundary of the Project does not fall within the 250m Consultation Zone of the restored Gin Drinkers Bay Landfill. Therefore, the LFG hazard assessment is considered not necessary unless there is any possible change(s) on the alignment option in the future that the project/construction boundary shows encroachment on the Consultation Zone.

7.2 Audit Requirements

7.2.1 The ET should regularly review the design and works area during construction phase. If the works area has fallen within the 250m Consultation Zone of the restored Gin Drinkers Bay Landfill, all works within the consultation zone should be ceased, and the ET should inform EPD immediately and conduct the Landfill Gas Hazard Assessment. The Landfill Gas Hazard Assessment must be approved by EPD before any works within the consultation zone commences again. Appropriate mitigation measures should be provided and regular EM&A monitoring should be conducted when necessary.

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8. CULTURAL HERITAGE

8.1 Introduction

8.1.1 As no cultural heritage resource was identified within the Assessment Area of the Project, no impacts to cultural heritage are expected during both construction and operational phases of the Project. As a result, no mitigation measures would be required and, therefore, no EM&A is required.

8.2 Audit Requirements

8.2.1 The ET should inform AMO immediately in case of discovery of antiquities or supposed antiquities during works within the project boundary.

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9. ENVIRONMENTAL AUDITING

9.1 Site Inspection

- 9.1.1 Site inspections should be conducted regularly to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented for the construction works activities associated with the Project, as they are one of the most effective tools to enforce the environmental protection requirements at the works sites and works areas.
- 9.1.2 The ET Leader should be responsible for formulating the environmental site inspection requirements, deficiency and action reporting system, and conducting the site inspection works. Within 21 days of the commencement of construction works, the ET Leader should submit a proposal for site inspection and deficiency and action reporting procedures to the Contractor for agreement, and to ER for approval. The ET Leader's proposal for any rectification should be made known to the IEC.
- 9.1.3 Regular site inspections should be carried out at least once per week. The areas of inspection should not be limited to the environmental conditions, pollution control and mitigation measures within the works sites and works areas. It should also review the environmental conditions of that location that are beyond the boundary of the works sites and works areas likely to be affected directly or indirectly by the construction site activities. The ET Leader should make reference to the following information when conducting site inspection:
- The EIA and EM&A recommendations on the environmental protection and pollution control mitigation measures;
 - On-going results of the EM&A programme;
 - The works progress and programme;
 - Proposals of individual works methodologies (which should include the proposal of the associated pollution control measures);
 - Contract specifications on environmental protection and pollution prevention control;
 - The relevant environmental protection and pollution control legislation; and
 - Previous site inspection findings that were undertaken by the ET and/or others.
- 9.1.4 The Contractor should keep the Engineer and ET updated with all the relevant environmental related information on the construction contract to carry out the site inspections. The inspection findings and associated recommendations for improvements to the environmental protection and pollution control and outcome of the improvement should be recorded and followed up by the Contractor in an agreed timeframe.
- 9.1.5 The Engineer, ET and Contractor should also carry out ad hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to the receipt of environmental complaints, or as part of the investigation work, as specified in the Even and Action Plans for the EM&A programme.

9.2 Compliance with Legal and Contractual Requirements

- 9.2.1 There are contractual requirements and legislation in Hong Kong on environmental protection and pollution control with which the construction activities must comply.
- 9.2.2 To ensure the works are in compliance with the contractual requirements, all method statements of major works should be submitted by the Contractor to the Engineer for approval and to the ET for vetting so as to ensure whether sufficient environmental protection and pollution control measures have been incorporated. The mitigation implementation schedule is included in **Appendix 1-2**.
- 9.2.3 The Engineer and ET should also review the progress and programme of the construction works in order to check that the relevant environmental legislation has not been violated and that any foreseeable potential for violating laws can be prevented.
- 9.2.4 The Contractor should provide the update of the relevant documents to the Engineer and ET, so that the checking can be carried out in good time. Such documents should at least include the updated works progress reports, works programme, application letters for environmental licenses/ permits, and all valid licenses/ permits. The Contractor's site diary and environmental records should also be available for inspection by the relevant parties.
- 9.2.5 The Engineer and ET should advise the Contractor of any non-compliance with the contractual and legislative requirements on the environmental protection and pollution control so that they can timely take the follow-up action as appropriate. If it would still be insufficient to comply with the environmental protection and pollution control requirements, the Engineer and ET should provide further advice to the Contractor to take remedial action to resolve the problems.
- 9.2.6 Upon the receipt of such advice, the Contractor should undertake the immediate action to remedy the situation. The Engineer should follow up to ensure that appropriate action has been taken in order to satisfy the contractual and legal requirements.

9.3 Environmental Complaints

- 9.3.1 All environmental complaints should be referred to the ET for carrying out complaint investigation procedures. The ET shall prepare a flow chart of the complaint response procedures addressing complaint receiving channels responsible parties/contacts for information, the investigation process, procedures for the implementation of mitigation/remedial action, guidelines for communication and public relation with the complainant etc. The flow chart should be agreed by all parties and issued to the Contractor, Engineer and IEC for reference.
- 9.3.2 The ET should undertake the following procedures upon receipt of any complaints:
- To log the complaints and dates of receipt onto the complaint database to be kept by the Contractor and inform the Engineer and IEC immediately;
 - To investigate with the Engineer and Contractor the complaints to determine their validity, and assess whether the source of the problems is due to the construction works activities with the support of additional monitoring frequency, stations and parameters, if necessary;
 - To identify the mitigation measures if the complaints are valid and due to the construction works of the Project;

- To advise the Contractor if remedial measures are required, and to agree with IEC any additional monitoring frequency, stations and parameters, where necessary, for checking the effectiveness of remedial measures;
- To review the effectiveness of the Contractor's responses to the identified remedial measures, and the updated situation;
- To undertake the additional monitoring and audit in order to verify the situation if necessary, and oversee that the circumstances leading to the complaints would not recur;
- If the complaint is referred by the EPD, to submit interim report to the EPD on the status of the complaint investigations and follow-up action stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, within the time frame assigned by the EPD; and
- To record the details of the complaints, results of the investigations, subsequent action taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports.

9.3.3 During the complaint investigation, the Contractor and Engineer should coordinate with the ET to provide all the necessary information and assistance for the completion of the investigation. If mitigation measures are identified to be required, the Contractor should promptly implement such measures and the Engineer should ensure that the measures have been carried out properly. A flow chart of the complaint response procedures is shown in **Appendix 9-1**.

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10. REPORTING

10.1 General

10.1.1 The types of reports that the ET should prepare and submit include the Baseline Monitoring Report, Monthly EM&A Reports and Final EM&A Review Report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final review EM&A reports should be made available to the Director of Environmental Protection. All monitoring data (baseline and impact) should be submitted in an electronic medium. The sample data record sheets for construction noise and operation noise monitoring are shown in **Appendices 3-1** and **3-2**, respectively, of this EM&A Manual.

10.2 Baseline Monitoring Report

10.2.1 The ET should prepare and submit a Baseline Monitoring Report within 10 working days of the completion of the baseline monitoring. Copies of the Baseline Monitoring Report should be submitted to the Contractor, IEC, Engineer and EPD. The ET should liaise with the relevant parties on the exact number of copies required.

10.2.2 The Baseline Monitoring Report should include at least the following information:

- (i) An Executive Summary of up to half a page;
- (ii) A brief description of the project background;
- (iii) Drawing 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;
 - Monitoring parameters;
 - Monitoring locations;
 - Monitoring date, time, frequency and duration; and
 - QA/QC results and detection limits.
- (v) Details of the influencing factors, including:
 - Major activities, if any, being carried out on-site during the period;
 - Weather conditions during the period; and
 - Other factors which might affect the monitoring results.
- (vi) Determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data which should conclude if there is any significant difference between the control and impact stations for the parameters monitored, where appropriate;
- (vii) Revisions for inclusion in EM&A Manual; and
- (viii) Comments, recommendations and conclusions.

10.3 Monthly EM&A Reports

10.3.1 The results and findings of the EM&A programme required in this EM&A Manual should be recorded in the monthly EM&A reports prepared by the ET and endorsed by IEC. The EM&A reports should be prepared and submitted within 10 working days from the end of each reporting month, with the First Monthly EM&A Report due in the month after the major construction works commences. Copies of each monthly EM&A report should be submitted to the Contractor, Engineer, IEC and EPD. Before the submission of the First Monthly EM&A Report, the ET should liaise with the relevant parties on the exact number of copies and format of the reports in both hard and electronic copies.

10.3.2 The ET should review the number and location of the 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.

First Monthly EM&A Report

10.3.3 The First Monthly EM&A Report should include at least but not limited to the following information:

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

- Breaches of the Action and Limit levels;
- Complaint log;
- Notification of any summons and successful prosecutions;
- Reporting changes; and
- Future key issues.

(ii) Basic project information:

- The project organisation including key personnel contact names and telephone numbers;
- The construction programme;
- The management structure; and
- Works undertaken during the reporting month.

(iii) Environmental status:

- Advice on the status of the statutory environmental compliance, e.g. EP conditions under the EIAO, submission status under the EP and implementation status of mitigation measures, etc.;
- Works undertaken during the reporting month with illustrations (e.g. location of works, etc.); and
- Drawings showing the project area, environmental sensitive receivers and locations of the monitoring and control stations.

(iv) Summary of EM&A requirements:

- All monitoring parameters;
- Environmental quality performance limits (Action and Limit levels);

- Event and Action Plans;
 - Environmental mitigation measures, as recommended in the EIA report; and
 - Environmental requirements in contract documents.
- (v) Implementation status:
- Advice on the implementation status of environmental protection and pollution control mitigation measures as recommended in the EIA report, summarised in the updated implementation schedule.
- (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;
 - Monitoring parameters;
 - Monitoring locations;
 - Monitoring date, time, frequency and duration; and
 - Graphical plots of the monitoring parameters in the reporting month annotated against the following information:
 - Major activities being carried out on site during the reporting period
 - Weather conditions during the reporting period
 - Any other factors which might affect the monitoring results
 - QA/QC results and detection limits
- (vii) The report on the non-compliance, complaints, notifications of summons and status of prosecutions:
- Records of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - Records of all complaints received (written or verbal), including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - Records of all notifications of summons and successful 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;
 - The review of the reasons for an implications of non-compliances, complaint, summons and prosecutions including review of pollution sources and working procedures; and
 - Description of the actions taken in the event of non-compliances and deficiency reporting and any follow-up procedures related to the earlier non-compliances.
- (viii) Others:
- A forecast of the works programme, impact predictions and monitoring schedule for the next three months;

- An account of the future key issues as reviewed from the works programme and work method statements;
- Advice on the solid and liquid waste management status;
- Comparisons of the EM&A data in the reporting month with the EIA predictions and annotate with explanation for any discrepancies; and
- Comments (e.g. the effectiveness and effectiveness and efficiency of mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions.

Subsequent Monthly EM&A Reports

10.3.4 The subsequent monthly EM&A reports during the construction phase should include the following information:

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

- Breaches of the Action and Limit levels;
- Complaint log;
- Notifications of any summons and successful prosecutions;
- Reporting changes; and
- Future key issues.

(ii) Basic project information:

- The project organisation including key personnel contact names and telephone numbers;
- The construction programme;
- The management structure; and
- Works undertaken during the reporting month.

(iii) Environmental status:

- Advice on the status of statutory environmental compliance, status of compliance with EP conditions under the EIAO, submission status under the EP and implementation status of mitigation measures;
- Works undertaken during the reporting month with illustrations (such as location of works, etc.); and
- Drawing showing the project area, environmental sensitive receivers and locations of the monitoring and control stations.

(iv) Implementation status:

- Advice on the implementation status of environmental protection and pollution control/ mitigation measures as recommended in the EIA report, summarised in the updated implementation schedule.

(v) 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; and
 - Graphic plots of the monitoring parameter in the month annotated against the following information:
 - Major activities being carried out on site during the reporting period
 - Weather conditions during the reporting period
 - Any other factors which might affect the monitoring results
 - QA/QC results and detection limits
- (vi) The report on non-compliances, complaints, notifications of summons and status of prosecutions:
- Records of all non-compliance (exceedances) of the environmental quality performance limits (action and Limit levels);
 - Records of all complaints received (written or verbal), including the locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - Records of all notifications of summons and successful 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;
 - The review of the reasons for and implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - Descriptions of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to the earlier non-compliances.
- (vii) Others:
- A forecast of the works programme, impact predictions and monitoring schedule for the next three months;
 - An account of the future key issues as reviewed from the works programme and work method statements;
 - Advice on the solid and liquid waste management status;
 - Comparisons of the EM&A data in the reporting month with the EIA predictions and annotate with explanation for any discrepancies; and
 - Comments (e.g. the effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions.
- (viii) Appendices:
- Action and Limit levels;

- Graphical plots of trends of the monitored parameters at key stations over the past four reporting periods for the representative monitoring stations annotated against the following information:
 - Major activities being carried out on site during the reporting period
 - Weather conditions during the reporting period
 - Any other factors that might affect the monitoring results
- The monitoring schedule for the present and next reporting period;
- Cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- Outstanding issues and deficiencies.

Annual/Final EM&A Review Report – Construction Phase

- 10.3.5 The EM&A programme should be terminated upon the completion of the construction activities that have the potential to cause significant environmental impacts.
- 10.3.6 Prior to the proposed termination, it may be advisable to consult the relevant local communities. The proposed termination should only be implemented after the proposal has been endorsed by the IEC, Engineer and Project Proponent followed by the approval from the Director of Environmental Protection. The EM&A programme will be proposed to be ceased based on following conditions:
- (i) Completion of construction activities and insignificant environmental impacts of the remaining outstanding construction works;
 - (ii) Trends analysis to demonstrate the narrow down of monitoring exceedances due to construction activities and, return of ambient environmental conditions in comparison with baseline data; and
 - (iii) No environmental complaint and prosecution involved.
- 10.3.7 The ET should prepare and submit the Final EM&A Report within 14 working days after the completion of the construction activities that have the potential to cause significant environmental impacts. The Final EM&A Report should contain at least the following information:
- (i) Executive summary (1-2 pages);
 - (ii) Drawings showing the project area environmental sensitive receivers and locations of the monitoring and control stations;
 - (iii) The basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of works undertaken during the course of the project or past twelve months;
 - (iv) A brief summary of EM&A requirements including:
 - Environmental mitigation measures implemented as recommended in the EIA report
 - Environmental impact hypotheses tested

- Environmental quality performance limits (Action and Limit levels)
 - Monitoring parameters
 - Event and Action Plans
- (v) A summary of the implementation status of environmental protection and pollution control/ mitigation measures, as recommended in the EIA report, summarised in the updated environmental mitigation implementation schedule;
- (vi) Graphical plots and statistical analysis of the trends of the monitored parameters over the course of the project, including the post-project monitoring for all monitoring stations annotated against:
- Major activities being carried out on site during the reporting period
 - Weather conditions during the reporting period
 - Any other factors which might affect the monitoring results
- (vii) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- (viii) A review of the reasons for and implications of non-compliances including the review of pollution sources and working procedures as appropriate;
- (ix) A description of the action taken in the event of non-compliances;
- (x) A summary record of all complaints received (written or verbal), liaison and consultation undertaken, action and follow-up procedures taken;
- (xi) A summary record of the notifications of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislation, locations and nature of the breaches, follow-up investigation taken and results;
- (xii) A review of the validity of EIA predictions and identification of shortcomings in the recommendations of the EIA study;
- (xiii) Comments (e.g. a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, i.e., of the overall EM&A programme); and
- (xiv) Recommendations and conclusions (e.g. a review of the success of the overall EM&A programme to cost-effectively identify deterioration and to initiate prompt effective mitigation action when necessary).

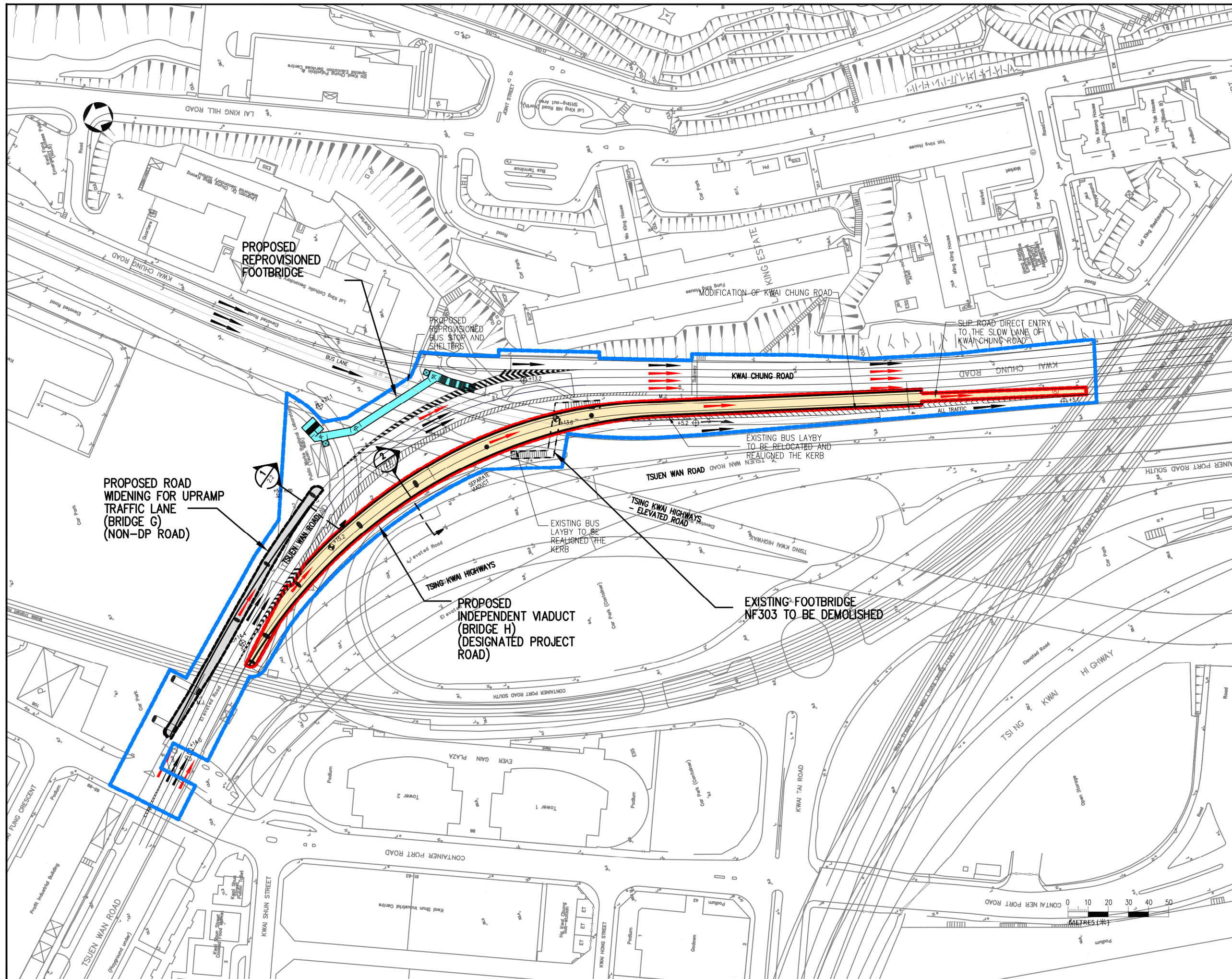
10.4 Data Keeping

10.4.1 No site-based documents (e.g. the monitoring field records, laboratory analysis records, site inspection form, etc.) are required to be included in the EM&A reporting documents. However, any such documents should be properly maintained by the ET and be ready for inspection upon request. All relevant information should be clearly and systematically recorded in the document. The monitoring data should also be recorded in magnetic media form, and the electronic copy must be available upon request. All documents and data should be kept for at least one year following the completion of the construction phase EM&A for each construction contract.

10.5 Interim Notifications of Environmental Exceedance

- 10.5.1 With reference to the Event and Action Plans, when the environmental quality performance limits are exceeded and if they are proven to be valid, the ET should immediately notify the IEC and EPD, as appropriate. The notification should be followed up with advice to the IEC and EPD on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notification is presented in **Appendix 10-1** of this EM&A Manual.

FIGURES



- LEGEND:**
- PROPOSED WIDENING OF BRIDGE DECK / ABUTMENT
 - PROPOSED VIADUCT
 - PROPOSED REPROVISIONED FOOTBRIDGE
 - PROJECT BOUNDARY
 - EXISTING TRAFFIC DIRECTION (ONE ARROW REPRESENTS ONE LANE)
 - OPTION 2A: ROUTING
 - PROPOSED COLUMN

Rev. 日期 Description 內容 繪圖 校核

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

OFFICE: NEW TERRITORIES NORTH AND WEST DEVELOPMENT OFFICE

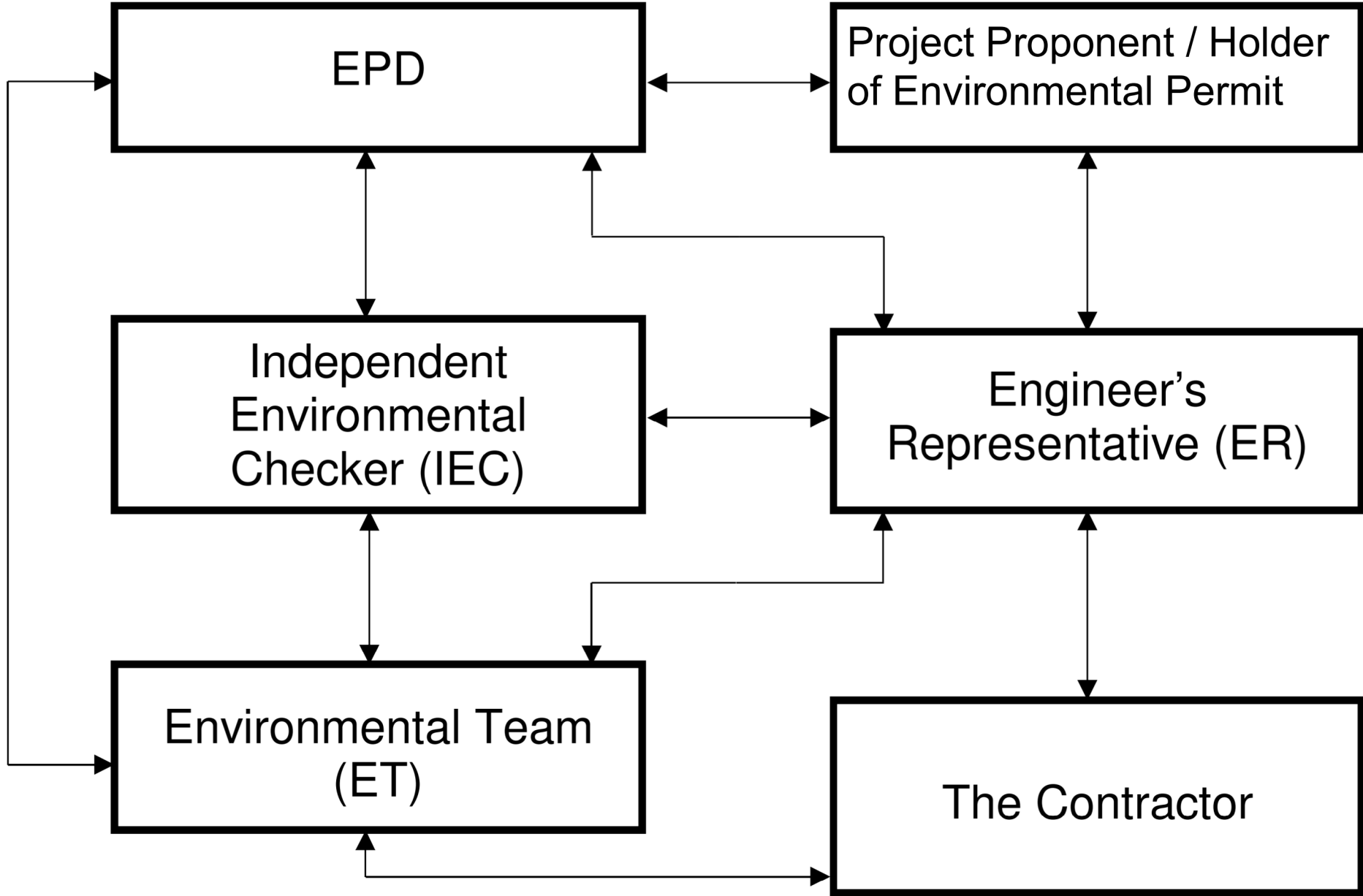
AGREEMENT NO. CE 8/2012 (HY)
FLYOVER FROM KWAI TSING INTERCHANGE UPRAMP TO KWAI CHUNG ROAD - INVESTIGATION

PROPOSED ROAD WORKS


Drawing No. 圖則編號		FIGURE 1.1	
Designed 設計	SL	Checked 校核	MSP
Drawn 繪圖	SL	Scale 比例	AS SHOWN
Approved 批准	ICWR	Date 日期	29/08/14
		Status 狀況	FINAL



Legend:
 —— Line of Communication



Rev. 修訂	Date 日期	Description 內容摘要	Drawn 繪圖	Checked 校核


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AGREEMENT NO. CE 8/2012 (HY)
 FLYOVER FROM KWAI TSING INTERCHANGE UPRAMP TO KWAI CHUNG ROAD – INVESTIGATION

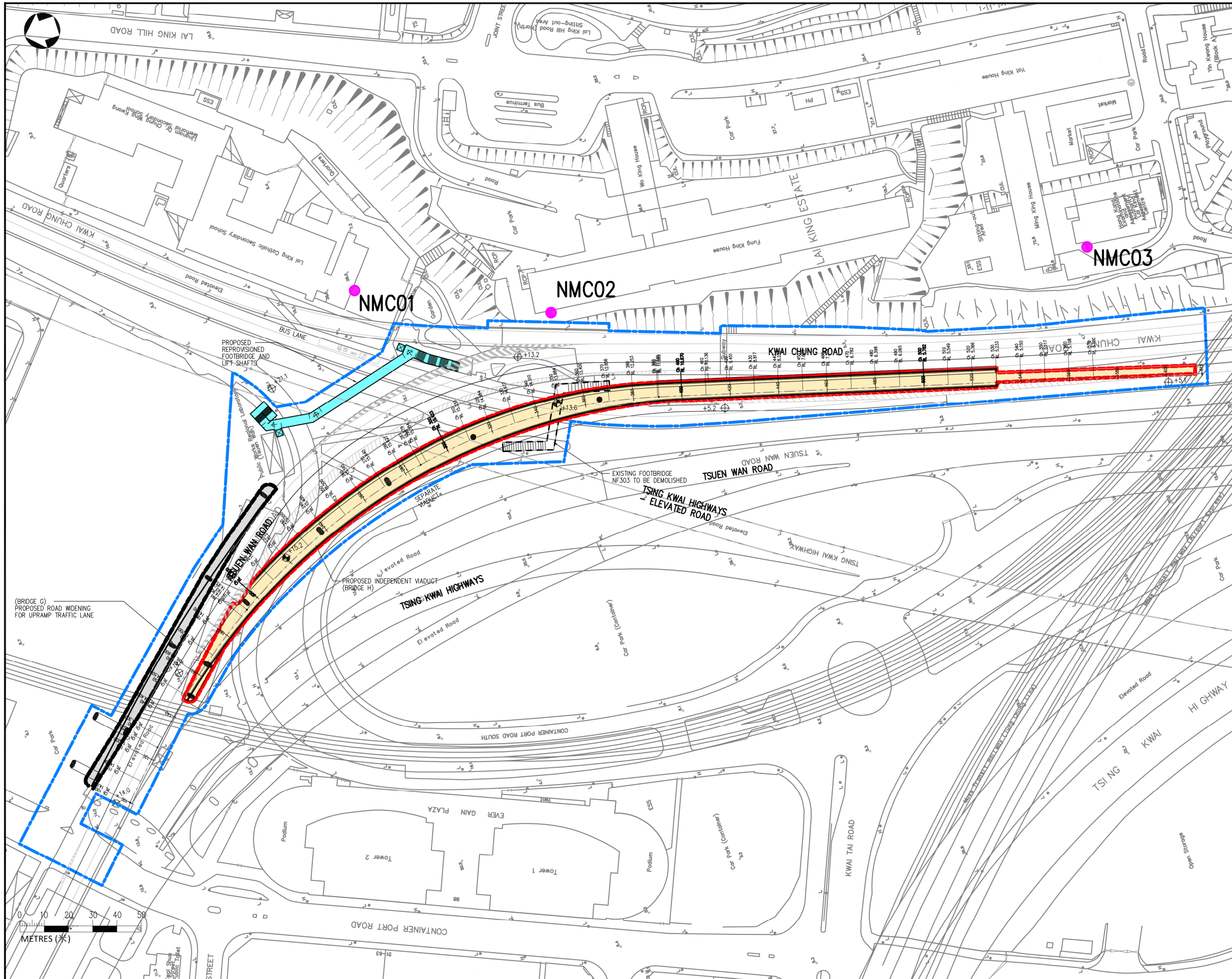
PROJECT ORGANISATION AND LINES OF COMMUNICATION FOR ENVIRONMENTAL WORKS

Drawing No. 圖則編號: **FIGURE 1.2**







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—	—	MASP	—



Approved 批准	Date 日期	Status 狀況
ICWR	09/14	FINAL

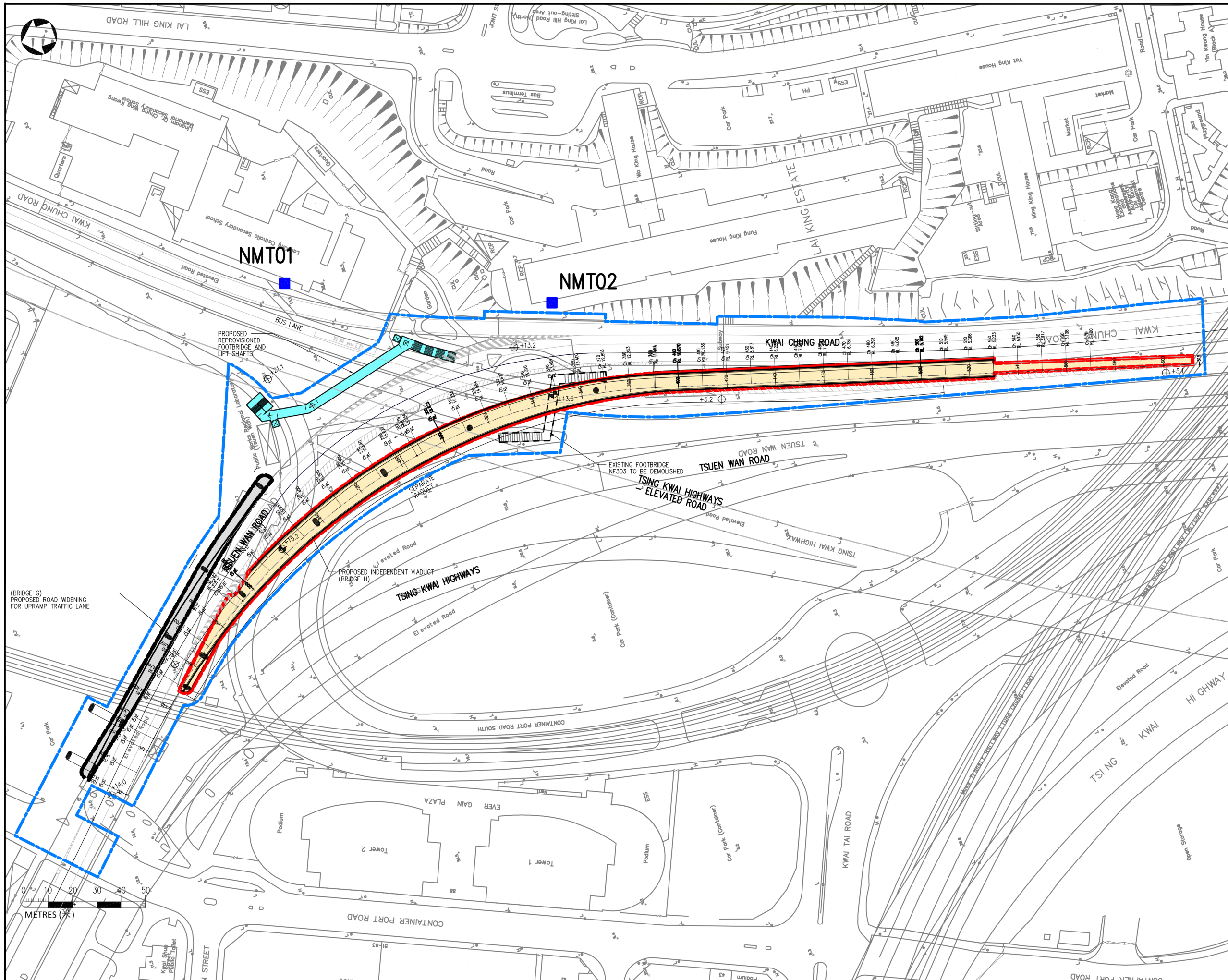




LEGEND:

-  PROPOSED WIDENING OF BRIDGE DECK / ABUTMENT
-  PROPOSED VIADUCT
-  PROPOSED REPROVISIONED FOOTBRIDGE
-  PROJECT BOUNDARY
-  CONSTRUCTION NOISE MONITORING LOCATIONS
-  PROPOSED COLUMN

Rev. 序	Date 日期	Description 內容摘要	Drawn 繪圖	Checked 校核
 土木工程拓展署 Civil Engineering and Development Department				
OFFICE: NEW TERRITORIES NORTH AND WEST DEVELOPMENT OFFICE				
AGREEMENT NO. CE 8/2012 (HY) FLYOVER FROM KWAI TSING INTERCHANGE UPRAMP TO KWAI CHUNG ROAD – INVESTIGATION				
CONSTRUCTION NOISE MONITORING LOCATIONS				
Drawing No. 圖則編號		FIGURE 3.1		
Designed 設計	SL	Drawn 繪圖	SL	Checked 校核
Approved 批准	ICWR	Date 日期	2/9/2014	Status 狀態
			AS SHOWN	FINAL
				



- LEGEND:**
- PROPOSED WIDENING OF BRIDGE DECK / ABUTMENT
 - PROPOSED VIADUCT
 - PROPOSED REPROVISIONED FOOTBRIDGE
 - PROJECT BOUNDARY
 - OPERATIONAL NOISE MONITORING LOCATIONS

(BRIDGE G)
PROPOSED ROAD WIDENING FOR UPRAMP TRAFFIC LANE

PROPOSED REPROVISIONED FOOTBRIDGE AND LIFT SHAFTS

EXISTING FOOTBRIDGE NF303 TO BE DEMOLISHED

PROPOSED INDEPENDENT VIADUCT (BRIDGE H)



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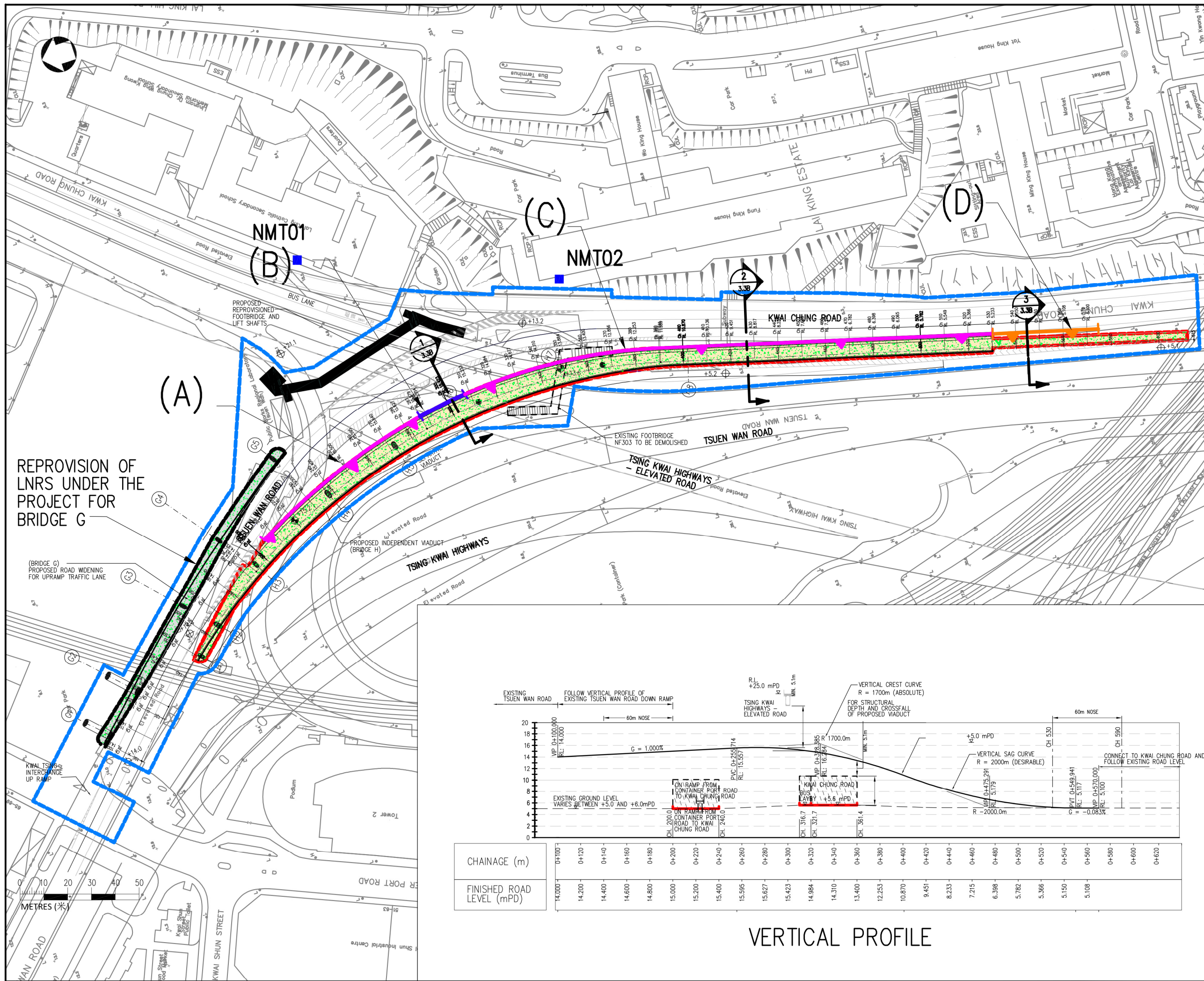
AGREEMENT NO. CE 8/2012 (HY)
FLYOVER FROM KWAI TSING INTERCHANGE UPRAMP TO KWAI CHUNG ROAD – INVESTIGATION

OPERATIONAL NOISE MONITORING LOCATIONS

Drawing No. **FIGURE 3.2**

Designed 設計	SL	Drawn 繪圖	SL	Checked 校核	MSP	Scale 比例	AS SHOWN
Approved 批准	ICWR	Date 日期	2/9/2014	Status 校核			FINAL

AECOM



- LEGEND:**
- PROPOSED WIDENING OF BRIDGE DECK / ABUTMENT
 - PROPOSED VIADUCT
 - PROPOSED REPROVISIONED FOOTBRIDGE
 - PROJECT BOUNDARY
 - PROPOSED 5.5M VERTICAL BARRIER(B)
 - PROPOSED 5.5M CANTILEVERED BARRIER(A/C)
 - PROPOSED 5.5M WITH 3.5M CANTILEVERED BARRIER(D)
 - PROPOSED LOW NOISE ROAD SURFACING
 - OPERATIONAL NOISE MONITORING LOCATIONS

Rev.	Date	Description	Drawn	Checked

土木工程拓展署
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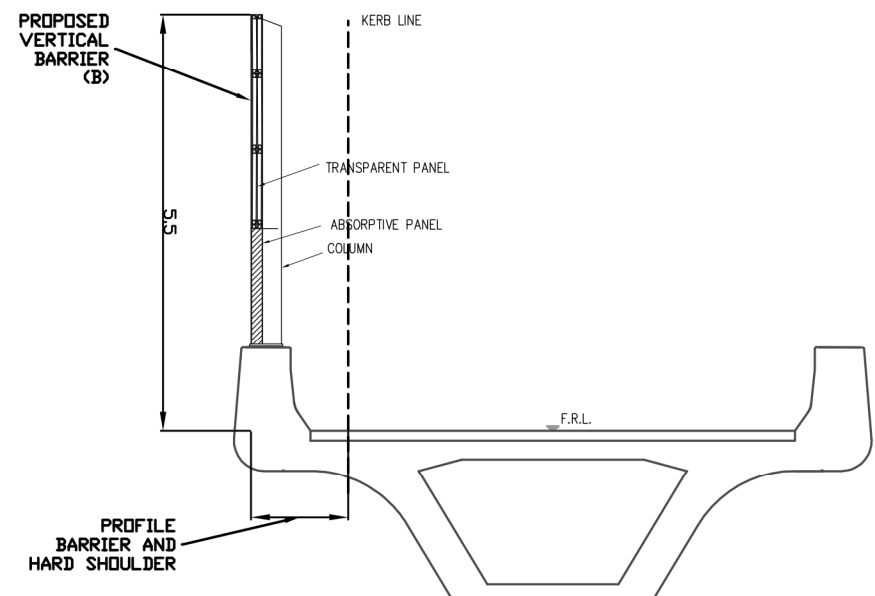
AGREEMENT NO. CE 8/2012 (HY)
FLYOVER FROM KWAI TSING INTERCHANGE UP-RAMP TO KWAI CHUNG ROAD - INVESTIGATION

EXTENT OF PROPOSED NOISE MITIGATION MEASURES

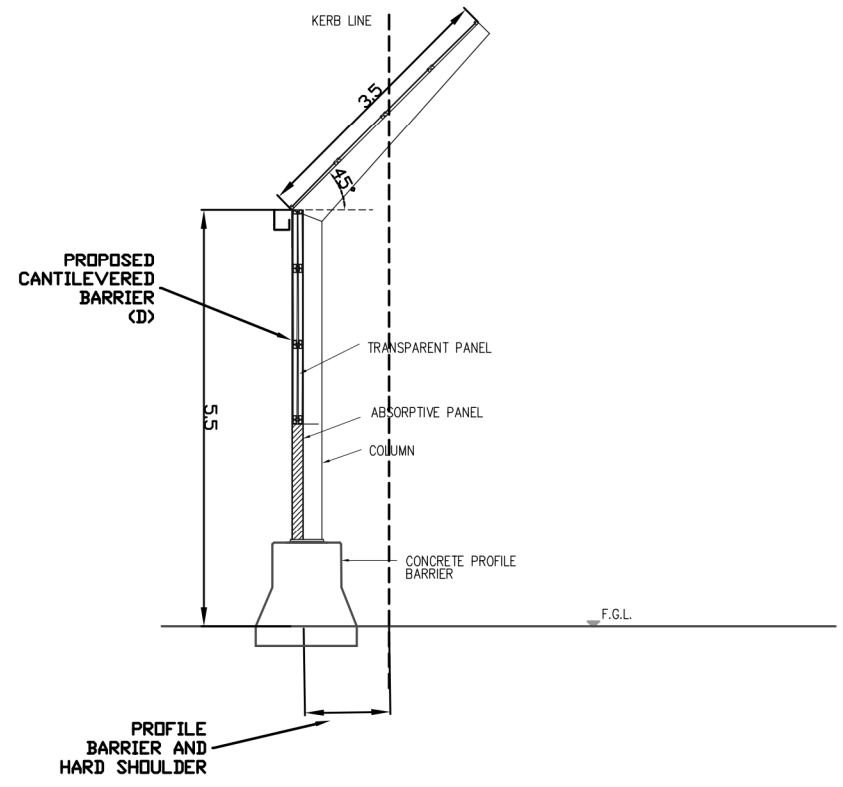
Drawing No. **FIGURE 3.3A**

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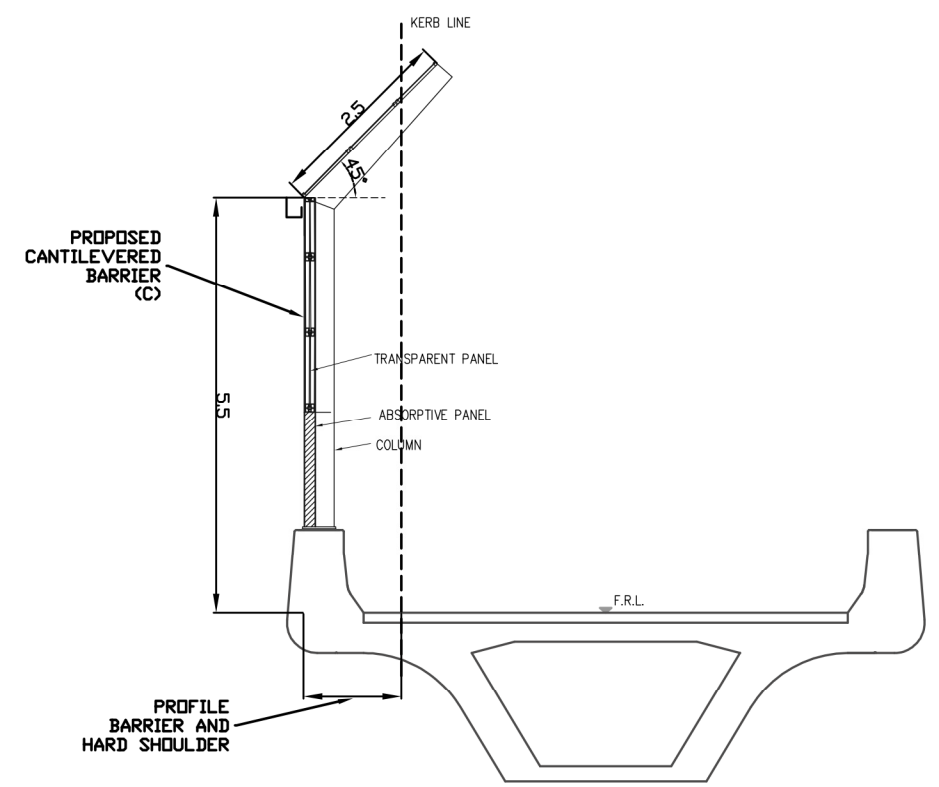
AECOM



BRIDGE H
SECTION 1 - 1



BRIDGE H (AT GRADE PORTION)
SECTION 3 - 3



BRIDGE H
SECTION 2 - 2

NOTE:
1. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN METERS
2. SCHEMATIC SECTIONS ARE INDICATIVE ONLY; DETAILS TO BE DETERMINED DURING DETAILED DESIGN STAGE

Rev.	Date	Description	Drawn	Checked

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NEW TERRITORIES NORTH AND WEST DEVELOPMENT OFFICE

AGREEMENT NO. CE 8/2012 (HY)
FLYOVER FROM KWAI TSING INTERCHANGE UPRAMP TO KWAI CHUNG ROAD - INVESTIGATION

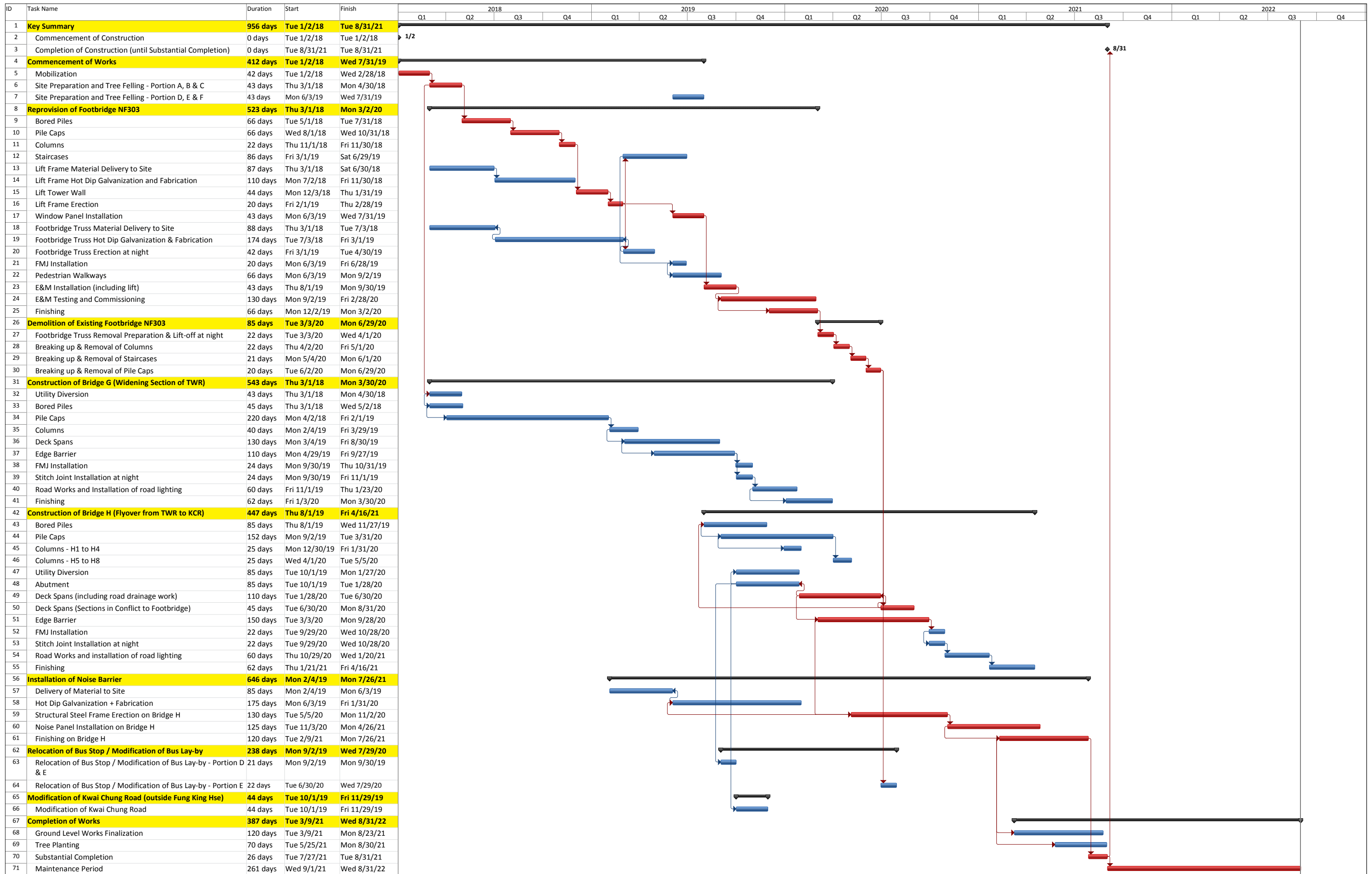
SECTION VIEWS OF PROPOSED VERTICAL AND CANTILEVERED BARRIERS

Drawing No.		FIGURE 3.3B			
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SL	SL	SL	MSP	Scale	N.T.S.
Approved	Date	Status			
ICWR	11/14	FINAL			



APPENDICES

Appendix 1-1
Tentative Construction Programme



Agreement No. CE 8/2012 (HY)
Flyover from Kwai Tsing Interchange
Up-ramp to Kwai Chung Road - Investigation
Construction Programme (Draft)
Rev. in September 2014

Task	Summary	External Milestone	Inactive Summary	Manual Summary Rollup	Finish-only	Critical Split
Split	Project Summary	Inactive Task	Manual Task	Manual Summary	Deadline	Progress
Milestone	External Tasks	Inactive Milestone	Duration-only	Start-only	Critical	Progress

Appendix 1-2
Implementation Schedule of
Recommended Mitigation Measures

APPENDIX 1-2 IMPLEMENTATION SCHEDULE AND RECOMMENDED MITIGATION MEASURES

Table 1 Implementation Schedule for Air Quality Control

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
Construction Phase						
S3.5.8	<ul style="list-style-type: none"> • Dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices: • Every temporary access road shall be paved with concrete, bituminous materials, hardcores or metal plates, and kept clear of dusty materials; or sprayed with water or a dust suppression chemical. • Any stockpile of dusty materials shall be covered entirely by impervious sheeting, placed in an area sheltered on the top and the 3 sides, or sprayed with water or a dust suppression chemical. • All dusty materials shall be sprayed with water or a dust suppression chemical immediately prior to any loading, unloading or transfer operation. • Vehicles used for transporting dusty materials should be covered with tarpaulin. • Vehicle wheel washing facilities should be provided at each construction site exit. • Where a vehicle leaving a construction site is carrying a load of dusty materials, the load shall be covered entirely by clean impervious sheeting. 	To minimise dust impacts	Contractor and Sub-contractors	All works sites	Construction Phase	Air Pollution Control (Construction Dust) Regulation

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	<ul style="list-style-type: none"> • The speed of vehicles on unpaved road within the site should be controlled to about 10 km/hr. • Routing of vehicles and positioning of construction plants should be arranged at maximum possible distances from the sensitive receivers. • Every stock of more than 20 bags of cement and dry pulverized fuel ash (PFA) shall be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides. • Loading, unloading, transfer, handling or storage of large amount of cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with the an effective fabric filter or equivalent air pollution control system. • Exposed earth shall be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabilizer within 6 months after the last construction activity on the construction site or part of the construction site where the exposed earth lies. 					

Table.2 Implementation Schedule for Noise Control

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
Construction Phase						
S4.8.1	<ul style="list-style-type: none"> • Selection and optimisation of construction programmes, avoidance of parallel operation of noisy PME, and/or reduction in the proportion of usage of PME during noise sensitive periods such as school examination period; • Use of “quiet” PME and working methods; • Use of temporary at-source noise mitigation measures such as noise barriers, acoustic fabric, noise enclosures, noise jacket and mufflers; and • Use of good site practice to limit noise emission from construction site. 	To reduce potential construction noise impact	Contractor	All works sites	Construction Phase	EIAO-TM, NCO
S4.8.2	<p>Selection and Programming of Construction Processes</p> <ul style="list-style-type: none"> • The timing and sequencing of the various construction activities shall be carefully arranged according to the actual site work situation, in order to limit the amount of concurrent activities and where applicable, to avoid parallel operation of noisy PME in order to minimize the total noise generated during construction periods. • Limiting the quantity of PME to be operated concurrently and also their proportion of usage were recommended in the Project and incorporated in this assessment. • In the case during school examination when more 	To reduce potential construction noise impact	Contractor	All works sites	Construction Phase	EIAO-TM, NCO

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve												
	stringent construction noise criteria should be imposed, the potentially most disruptive construction activities should be avoided, and arranged to be conducted during school holidays as far as practicable.																	
S4.8.3 – 4.8.5	<p>Use of “Quiet” Alternative Plant and Working Methods</p> <ul style="list-style-type: none"> The use of particular plant with equipment noise levels quieter than those specified in the GW-TM can result in reduction of noise levels generated by the plant. The level of noise reduction achieved is dependent on the Contractor’s chosen methods of working. It is possible for the Contractor to achieve noise reductions from the adopted working methodologies by specifying maximum limits of sound power level for specific plant. <p>Examples of “quiet” PME and alternative PME:</p> <table border="1" data-bbox="275 1015 1010 1385"> <thead> <tr> <th>ID Code in GW-TM</th> <th>Descriptions of PME</th> <th>“Quiet” PME example on QPME list ^[1]</th> <th>SWL of “Quiet” PME, dB(A)</th> </tr> </thead> <tbody> <tr> <td>CNP 004</td> <td>Asphalt Paver</td> <td>EPD-01226 (VOLVO ABG5770)</td> <td>104</td> </tr> <tr> <td>CNP 081</td> <td>Excavator, Wheeled/ Tracked</td> <td>EPD-01896 (HYUNDAI R80CR-9)</td> <td>98</td> </tr> </tbody> </table>	ID Code in GW-TM	Descriptions of PME	“Quiet” PME example on QPME list ^[1]	SWL of “Quiet” PME, dB(A)	CNP 004	Asphalt Paver	EPD-01226 (VOLVO ABG5770)	104	CNP 081	Excavator, Wheeled/ Tracked	EPD-01896 (HYUNDAI R80CR-9)	98	To reduce potential construction noise impact	Contractor	All works sites	Construction Phase	EIAO-TM, NCO
ID Code in GW-TM	Descriptions of PME	“Quiet” PME example on QPME list ^[1]	SWL of “Quiet” PME, dB(A)															
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EIA Ref.	Recommended Mitigation Measures				Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	ID Code in GW-TM	Descriptions of PME	“Quiet” PME example on QPME list ^[1]	SWL of “Quiet” PME, dB(A)					
	CNP 048	Mobile Crane	EPD-01516 (KOBELCO CKS900)	101					
	CNP 170	Poker, vibratory, hand held	Poker, vibratory, hand held (electric)	102					
	CNP 185	Road Roller	EPD-01806 (KANTO-TK KV25DS)	95					
	Note: ^[1] QPME list available on the EPD website								
S4.8.6 – S4.8.9	<p>Temporary Noise Barrier:</p> <p>Use of Temporary Noise Barrier/ Acoustic Fabric for breaker, mini-robot mounted; excavator/loader, wheeled/tracked; lorry; lorry with crane/grab; mobile crane; poker vibratory, hand-held (electric); road roller; hand-held chain saw; concrete pump, lorry mounted; asphalt paver; air compressor. The minimum surface density of the movable noise barrier is 10kg/m².</p> <p>A not less than 8m high movable barrier with skid footing and a small cantilevered upper portion to be located within a few metres of the grab and chisel piling</p>				To reduce potential construction noise impact	Contractor	All works sites	Construction Phase	EIAO-TM, NCO

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	<p>plants.</p> <p>When temporary noise barriers are not practicable or noise reduction achieved is insufficient, noise jacket/muffler can be applied to cover the noisy part of the engine or at the engine exhaust of particular mobile plants respectively.</p>					
S4.8.10	<p>Good Site Practice:</p> <ul style="list-style-type: none"> • Use of well-maintained and regularly-serviced plant during the works; • Plant operating on intermittent basis should be turned off or throttled down when not in active use; • Plant that is known to emit noise strongly in one direction should be orientated to face away from the NSRs; • Silencers, mufflers and enclosures for plant should be used where possible and maintained adequately throughout the works; • Where possible fixed plants should be sited away from NSRs; and • Stockpiles of excavated materials and other structures such as site buildings should be used effectively to screen noise from the works. 	To reduce potential construction noise impact	Contractor	All works sites	Construction Phase	EIAO-TM, NCO

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve																								
Operation Phase (Road Traffic Noise)																														
S4.8.18	<p>Direct mitigation measures for existing NSRs:</p> <table border="1" data-bbox="271 488 972 1066"> <thead> <tr> <th data-bbox="271 488 344 560">ID</th> <th data-bbox="344 488 622 560">Description</th> <th data-bbox="622 488 757 560">Length (m)</th> <th data-bbox="757 488 972 560">Location</th> </tr> </thead> <tbody> <tr> <td data-bbox="271 560 344 671">A</td> <td data-bbox="344 560 622 671">5.5m high with 2.5m cantilevered barrier at 45°</td> <td data-bbox="622 560 757 671">85</td> <td data-bbox="757 560 972 671">Bridge H Southbound</td> </tr> <tr> <td data-bbox="271 671 344 743">B</td> <td data-bbox="344 671 622 743">5.5m vertical barrier</td> <td data-bbox="622 671 757 743">20</td> <td data-bbox="757 671 972 743">Bridge H Southbound</td> </tr> <tr> <td data-bbox="271 743 344 847">C</td> <td data-bbox="344 743 622 847">5.5m high with 2.5m cantilevered barrier at 45°</td> <td data-bbox="622 743 757 847">230</td> <td data-bbox="757 743 972 847">Bridge H Southbound</td> </tr> <tr> <td data-bbox="271 847 344 959">D</td> <td data-bbox="344 847 622 959">5.5m high with 3.5m cantilevered barrier at 45°</td> <td data-bbox="622 847 757 959">45</td> <td data-bbox="757 847 972 959">Bridge H Southbound</td> </tr> <tr> <td data-bbox="271 959 344 1066">-</td> <td data-bbox="344 959 622 1066">Low Noise Road Surfacing ^[1]</td> <td data-bbox="622 959 757 1066">-</td> <td data-bbox="757 959 972 1066">Bridge G&H (i.e. All Project Roads)</td> </tr> </tbody> </table> <p>Notes:</p> <p>[1] Low noise road surfacing is applied on highways with speed 70kph or above in general. Such mitigation measure has been included in both unmitigated scenario and mitigated scenario in road traffic noise impact analysis.</p> <p>It should be noted that the exact length of the mitigation measures would be subject to minor refinement during the detail design stage.</p>	ID	Description	Length (m)	Location	A	5.5m high with 2.5m cantilevered barrier at 45°	85	Bridge H Southbound	B	5.5m vertical barrier	20	Bridge H Southbound	C	5.5m high with 2.5m cantilevered barrier at 45°	230	Bridge H Southbound	D	5.5m high with 3.5m cantilevered barrier at 45°	45	Bridge H Southbound	-	Low Noise Road Surfacing ^[1]	-	Bridge G&H (i.e. All Project Roads)	To reduce traffic noise impact at nearby NSRs	Project Proponent/ Contractor	Project Roads	Design and construction phases prior to the operation of the Project	EIAO-TM
ID	Description	Length (m)	Location																											
A	5.5m high with 2.5m cantilevered barrier at 45°	85	Bridge H Southbound																											
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C	5.5m high with 2.5m cantilevered barrier at 45°	230	Bridge H Southbound																											
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-	Low Noise Road Surfacing ^[1]	-	Bridge G&H (i.e. All Project Roads)																											

Table 3 Implementation Schedule for Water Quality Control

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S5.9.2	<p>In accordance with ProPECC PN 1/94, construction phase mitigation measures with good management practices should include the following:</p> <ul style="list-style-type: none"> • At the establishment of works site, perimeter drains to direct off-site water around the Site should be constructed with internal drainage works and erosion and sedimentation control facilities implemented. Channels (both temporary and permanent drainage pipes and culverts), earth bunds or sand bag barriers should be provided to divert the stormwater to silt removal facilities. The design of the temporary on-site drainage system will be undertaken by the Contractor prior to the commencement of construction; • Dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the run-off discharge into an appropriate watercourse, through a silt/sediment trap. Silt/sediment traps should also be incorporated in the permanent drainage channels to enhance deposition rates; • The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94, which states that the retention 	To control water quality impact from construction site runoff	Contractor and Sub-contractors	All work sites	Construction Phase	Water Pollution Control Ordinance, ProPECC PN 1/94

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	<p>time for silt / sand traps should be 5 minutes under maximum flow conditions. A sedimentation basin would be required when necessary. The detailed design of the silt / sand traps should be undertaken by the Contractor prior to the commencement of construction;</p> <ul style="list-style-type: none"> • The construction works should be programmed to minimise surface excavation works during rainy seasons (April to September), as possible. All exposed earth areas should be completed and vegetated as soon as possible after the earthworks have been completed. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces should be covered by tarpaulin or other means; • The overall slope of works sites should be kept to a minimum to reduce the erosive potential of surface water flows, and all trafficked areas and access roads should be protected by coarse stone ballast. An additional advantage accruing from the use of crushed stone is the positive traction gained during the prolonged periods of inclement weather and the reduction of surface sheet flows; • All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure their proper and efficient operation at all times particularly following 					

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	<p>rainstorms. Deposited silts and grits should be removed regularly and disposed of by spreading evenly over stable, vegetated areas;</p> <ul style="list-style-type: none"> • Measures should be taken to minimise the ingress of site drainage into excavations. If the excavation of trenches in wet season is inevitable, they should be dug and backfilled in short sections wherever practicable. The water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities; • All open stockpiles of construction materials (for example, aggregates, sand and fill material) should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system; • Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm run-off being directed into foul sewers; • Precautions to be taken at any time of the year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted and during or after rainstorms, are summarised in Appendix A2 of ProPECC PN 1/94. Particular attention should be 					

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	<p>paid to the control of silty surface run-off during storm events;</p> <ul style="list-style-type: none"> • All vehicles and plant should be cleaned before leaving the Site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facilities / bay should be provided at the exit of the Site where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-washing bay to public roads should be paved with sufficient backfall toward the wheel-washing bay to prevent vehicle tracking of soil and silty water to public roads and drains; • Oil interceptors should be provided in the drainage system downstream of any oil / fuel pollution sources. Oil interceptors should be emptied and cleaned regularly to prevent the release of oil and grease into the storm water drainage system after accidental spillage. A bypass should be provided for oil interceptors to prevent flushing during heavy rain; • The construction solid waste, debris and rubbish on-site should be collected, handled and disposed of properly to avoid causing any water quality impacts; and 					

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	<ul style="list-style-type: none"> All fuel tanks and storage areas should be provided with locks and sited on sealed areas, within bunds with adequate storage capacity to prevent spilled fuel oils. 					
S5.9.5	<p>Control of effluent discharge</p> <ul style="list-style-type: none"> A discharge licence for discharge of effluent from the construction site under the WPCO shall be applied to the EPD for. The discharge quality must meet the requirements specified in the discharge licence. All the run-off and wastewater generated from the works areas should be treated so that it satisfies all the standards listed in the Technical Memorandum. Minimum distances of 100m should be maintained between the discharge points of construction site effluent and the existing seawater intakes. No new effluent discharges in nearby typhoon shelters should be allowed. The beneficial uses of the treated effluent for other on-site activities such as dust suppression, wheel washing and general cleaning etc., would minimise water consumption and reduce the effluent discharge volume. 	To control the effluent discharge from the Site	Contractor and Sub-contractors	All work sites	Construction Phase	Water Pollution Control Ordinance
S5.9.6	<p>Sewage from Workforce</p> <ul style="list-style-type: none"> Portable chemical toilets and sewage holding tanks are recommended for the handling of the construction 	To control Sewage generated from on-site construction	Contractor and Sub-	All work sites	Construction	Water Pollution Control Ordinance and

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	sewage generated by the workforce. • A licensed Contractor should be employed to provide appropriate and adequate portable toilets and be responsible for appropriate disposal and maintenance.	workers	contractors			Waste Disposal Ordinance
S5.9.7 – S5.9.8	Accidental Spillage of Chemicals • The Contractor must register as a chemical waste producer if chemical wastes would be produced from the construction activities. • Any maintenance facilities should be located on hard standings within a bunded area, and sumps and oil interceptors should be provided. • Maintenance of vehicles and equipment involving activities with potential for leakage and spillage should only be undertaken within the areas appropriately equipped to control these discharges.	To control accidental spillage of chemicals	Contractor and Sub-contractors	All work sites	Construction Phase	EIAO-TM, Water Pollution Control Ordinance and Waste Disposal (Chemical Waste) (General) Regulation
S5.9.9	Provision of surface runoff collection system • All surface runoff on the road shall be direct to the system. • The capacity of the system should be properly designed to cater for all surface water. • The system should be properly maintained and cleaned regularly to ensure good service condition.	To control road surface runoff	Contractor and Sub-contractors Highway Department	Along Road Alignment	Design and Construction Phases Operation Phase	Water Pollution Control Ordinance

Table 4 Implementation Schedule of Waste Management and Land Contamination

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
<i>Waste Management Plan (WMP)</i>						
S6.6.3	WMP should be prepared and submitted for approval by the Engineer prior to any construction activities. During the construction period the WMP should be used as a working document to detail the on-going management procedures and to record waste arising from construction works and import of fill throughout the Contract. The WMP shall be subject to audit under the requirements of the Environmental Monitoring and Audit (EM&A) Procedures set out in the EM&A Manual accompanying this EIA Report.	Preparation and approval of WMP	Contractor	All works sites	Design and Construction Phases	ETWB TC(W) No. 19/2005
S6.6.4 and S6.6.5	<p>The WMP shall be developed and implemented according to a best-practice philosophy of waste management. There are various waste management options, which can be categorised in terms of preference from an environmental viewpoint. The options considered to be more preferable have the least impacts and are more sustainable in a long-term context. The hierarchy is as follows:</p> <ul style="list-style-type: none"> • Avoidance and minimisation, i.e. avoiding or not generating waste through changing or improving practices and design; • Reuse of materials, thus avoiding disposal (generally with only limited reprocessing); • Recovery and recycling, thus avoiding disposal (although reprocessing may be required); 	To minimise waste generation	Contractor	All works sites	Design and Construction Phases	ETWB TC(W) No. 19/2005

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	<ul style="list-style-type: none"> • Treatment and disposal, according to relevant laws, guidelines and good practice; and • The suitability (or otherwise) of material for reuse on site shall be detailed in the WMP. If, for any reason, the recommendations cannot be implemented, full justification should be given in the WMP for approval by the Engineer. 					
S6.6.6	To facilitate adoption of the best-practice philosophy, training shall be provided to all personnel working on site. The training shall promote the concept of general site cleanliness and clearly explain the appropriate waste management procedures defined in the WMP.	To encourage all workers to reduce, reuse and recycle wastes.	Contractor	All works sites	Construction Phase	EIAO-TM
S6.6.7	<p>a. During construction, the WMP should be kept up-to-date on a monthly basis with records of the actual quantities of wastes generated, recycled and disposed of off-site.</p> <p>b. Quantities shall be determined by weighing each load or other methods agreed to by the Engineer's Representative. Waste shall only be disposed of at licensed sites and the WMP should include procedures to ensure that illegal disposal of wastes does not occur.</p> <p>c. Only waste haulers authorised to collect the specific category of waste concerned should be employed and a trip ticket system shall be implemented for offsite disposal of inert C&D material and C&D waste at public fill reception facilities and landfills.</p>	To keep trace of waste generation, minimisation, reuse and disposal	Contractor	All works sites	Construction Phase	ETWB TC(W) No. 19/2005

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	d. Appropriate measures should be employed to minimise windblown litter and dust during transportation by either covering trucks or transporting wastes in enclosed containers.					
S6.6.8	The WMP shall include plans indicating specific areas designated for the storage of particular types of waste, reusable and recyclable materials as well as areas and management proposals for any stockpiling areas. Generally, waste storage areas should be well maintained and cleaned regularly.	Work site(s):- a. Arrange and manage to facilitate the proper management of wastes and materials. b. Design to avoid cross contamination of materials and pollution of the surrounding environment.	Contractor	All works sites	Design and Construction Phases	ETWB TC(W) No. 19/2005
<i>Inert Construction and Demolition Material (Inert C&D Materials)</i>						
S6.6.9	The design of formwork should maximise the use of standard wooden panels so that high reuse levels can be achieved. Alternatives such as steel formwork or plastic facing should be considered to increase the potential for reuse.	To maximise reuse of inert C&D Materials	Contractor	All works sites	Design and Construction Phases	ETWB TC(W) No. 19/2005
S6.6.10	a. Inert C&D materials should be segregated on site into	To maximise reuse	Contractor	All works	Design and	ETWB TC(W)

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
and S6.6.11	<p>different waste and material types. Where materials cannot be reused on site, opportunities for recycling materials off-site shall be explored.</p> <p>b. Potential opportunities for recycling and reuse of inert C&D materials from the Project include:</p> <ul style="list-style-type: none"> • Milling wastes arising from regrading of the existing pavement could be recycled on site and reused as either road-base in the new carriageways or fill for new embankments; • Existing marginal roadside barriers comprise pre-cast units, it may be possible to re-use these following widening works; and • Existing bridge parapets comprise aluminium post and railings, these have a recyclable value and could be sold on for reconditioning or reused for scrap metal. 	and facilitate recycling by segregating inert C&D Materials		sites	Construction Phases	No. 19/2005
S6.6.12	Any stockpile should be sited away from existing watercourses and suitably covered.	To prevent wind erosion and impacts on air and water quality	Contractor	All works sites	Design and Construction Phases	ETWB TC(W) No. 19/2005
S6.6.13	C&D waste which cannot be reused or recycled should be segregated and stored in different containers or skips from the inert C&D material and should be disposed of to landfill.	To facilitate disposal of C&D waste	Contractor	All works sites	Construction Phase	ETWB TC(W) No. 19/2005

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
<i>Marine Sediment</i>						
S6.6.14	Workers should, when necessary, wear appropriate personal protective equipment (PPE) when handling contaminated sediments. Adequate washing and cleaning facilities should also be provided on site.	To minimise the exposure to contaminated materials	Contractor	All works sites when necessary	Construction Phase	Practice Guide, Guidance Note, Guidance Manual
S6.6.15 and S6.6.16	<p>a. The marine sediment should be excavated, transported and processed properly.</p> <p>b. Stockpiling of contaminated sediments should be avoided as far as possible.</p> <p>c. If temporary stockpiling of contaminated sediments is necessary, the excavated sediment should be covered by tarpaulin and the area should be placed within earth bunds or sand bags to prevent leachate from entering the ground, nearby drains and surrounding water bodies. The stockpiling areas should be completely paved or covered by linings in order to avoid contamination to underlying soil or groundwater. Separate and clearly defined areas should be provided for stockpiling of contaminated and uncontaminated materials.</p> <p>d. Leachate, if any, should be collected and discharged according to the WPCO.</p> <p>e. The approved Sediment Assessment Plan and Sediment Assessment Report with Remediation Plan shall be incorporated to the WMP.</p>	To minimise any potential adverse impacts arising from the handling, treatment and reuse of the marine sediment	Contractor	All works sites	Design and Construction Phases	Practice Guide, Guidance Note, Guidance Manual

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
<i>Chemical Waste</i>						
S6.6.17	<p>Chemical waste should be handled in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes as follows. Containers used for the storage of chemical wastes should:</p> <ul style="list-style-type: none"> • Be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; • Have a capacity of less than 450L unless the specifications have been approved by the EPD; and • Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations. 	To reduce environmental impacts in packaging, handling and storage of chemical wastes	Contractor	All works sites	Construction Phase	Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
S6.6.18	<p>The storage area for chemical wastes should:</p> <ul style="list-style-type: none"> • Be clearly labelled and used solely for the storage of chemical waste; • Be enclosed on at least 3 sides; • Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest; • Have adequate ventilation ; • Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical 	To reduce environmental impacts by managing storage area for chemical wastes	Contractor	All works sites	Construction Phase	Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	waste if necessary); and • Be arranged so that incompatible materials are adequately separated.					
S6.6.19	The Contractor shall register with EPD as a Chemical Waste Producer. Waste oils and other chemical wastes as defined in the Waste Disposal (Chemical Waste) (General) Regulation will require disposal by appropriate means and could require pre-notification to EPD prior to disposal. Appropriate means include disposal: • Be via a licensed waste collector; and • Be to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility which also offers a chemical waste collection service and can supply the necessary storage containers	To reduce environmental impacts in disposing chemical wastes.	Contractor	All works sites	Design and Construction Phases	Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
General Refuse						
S6.6.20 and S6.6.21	a. General refuse generated on-site should be stored in enclosed bins or compaction units separate from construction and chemical wastes. A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily or every second day basis to minimise odour, pest and litter impacts. The burning of refuse on construction sites is prohibited by law.	To reduce environmental impacts in handling general refuse.	Contractor	All works sites	Construction Phase	Waste Disposal Ordinance (Cap 354)

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
	<p>b. General refuse is generated largely by food service activities on site, so reusable rather than disposable dishware should be used if feasible. Aluminum cans are often recovered from the waste stream by individual collectors if they are segregated or easily accessible. Therefore separate, labelled bins for their deposit should be provided if feasible.</p>					
S6.6.22	<p>Office waste can be reduced through recycling of paper if volumes are large enough to warrant collection. Opportunities for participation in a local collection scheme should be investigated.</p>	To reduce office waste	Contractor	All works sites	Construction Phase	Waste Disposal Ordinance (Cap 354)

Table 5 Implementation Schedule for Landscape and Visual Impact

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
Landscape and Visual Impact						
S7.9.6	For Impacts during Construction Phase:					
	<p>Mitigation Planting</p> <ul style="list-style-type: none"> Replanting of disturbed vegetation should be undertaken at the earliest possible stage of the construction phase of the project and this should use the recommended transplant trees identified in the Tree Removal Recommendation. 	To avoid potential damage to these identified transplant trees	Contractor	Identified locations for tree planting	Construction Phase	<p>Follow the relevant guidelines in the ETWB TC(W) 10/2013; ETWB TC(W)2/2004; ETWB TC(W)29/2004; ETWB TC(W)7/2002; <i>Tree Planting and Maintenance in HK, HKSAR 1991</i></p> <p>Relevant sections of the latest version of General Specifications for Civil Engineering Works, HKSAR</p>

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S7.9.6	<p>Development Site and Temporary Works Area</p> <ul style="list-style-type: none"> • The construction area and Contractor’s temporary works area should be minimized to avoid impacts on adjacent landscape • The landscape of these works areas will be restored following the completion of the construction phase • Construction site controls shall be enforced, where possible, to ensure that the landscape and visual impacts arising from the construction phase activities are minimized including the storage of materials • The location and appearance of site accommodation and the careful design of site lighting to prevent light spillage • Screen hoarding may be a practicable for this project due to the viewing distances is short in a lot of site situation 	<p>To minimize potential impacts on adjacent landscape and VSRs</p> <p>To minimize potential impacts on the landscape</p> <p>To minimize potential visual impacts on identified VSRs</p> <p>To minimize potential impacts on identified VSRs</p> <p>To minimize potential impacts on identified VSRs</p>	<p>Contractor</p> <p>Contractor</p> <p>Contractor</p> <p>Contractor</p> <p>Contractor</p>	<p>The project area where appropriate</p> <p>The project area where appropriate</p> <p>The project area where appropriate</p> <p>The project area where appropriate</p> <p>The project area where appropriate</p>	<p>Construction Phase</p> <p>Construction Phase</p> <p>Construction Phase</p> <p>Construction Phase</p> <p>Construction Phase</p>	<p>N/A</p>

EIA Ref.	Recommended Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	Location of the measure	When to implement the measures?	What requirements or standards for the measure to achieve
S7.9.6	For Impacts during Operation Phase					
	Roadside and Amenity Planting	These planting will utilize native tree species as far as possible to improve the road side planting in creating a more coherent landscape network in the area.	Designer and contractor to implement	The project area where appropriate	Design and construction phases	The latest version of General Specifications for Civil Engineering Works, HKSAR
	Enhancement of Streetscape	The landscape proposal should consider introducing coloured paved materials to tie with the paving theme of the Kwai Chung area.	Designer	The project area where appropriate	Design and construction phases	
S7.9.6	Visual Impact during Operation					
	Design of the Proposed Carriageway Structures and Associate Facilities – the carriageway structure will incorporate design features as part of design mitigation measures including choices of material, colour, and shape.	To minimise potential long term visual impact to the surrounding VSRs	Designer to implement during design	The new carriageway and associate structures	Design phase	Structural Design Manual for Highways and Railway, HyD
	Integrated Design Approach - other associated structures such as noise barrier should integrate, as far as technically feasible, with the carriageway as part of design mitigation measures to reduce the potential cumulative impact of the proposed works.	To minimize potential long term visual impact to the surrounding VSRs	Designer to implement during design	The new carriageway and associate structures	Design phase	DEVB and HyD's Guidelines on greening and design of noise barriers

Appendix 2-1
Sample Data Record Sheet for
TSP Monitoring

Appendix 2-1 Sample Data Record Sheet for TSP Monitoring

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time	Start (min.)	
Meter Reading	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Q_{s_i}	P_i (mmHg)	
	T_i (°C)	
	H_i (in.)	
	Q_{s_i} (Std. m^3)	
Final Flow Rate, Q_{s_f}	P_f (mmHg)	
	T_f (°C)	
	H_f (in.)	
	Q_{s_f} (Std. m^3)	
Average Flow Rate (Std. m^3)		
Total Volume (Std. m^3)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Initial Wt. of Filter (g)		
Measured TSP Level (g/m^3)		

<u>Name & Designation</u>	<u>Signature</u>	<u>Date</u>
Field Operator:		
Laboratory Staff:		
Checked by:		

Appendix 3-1
Sample Data Record Sheet for
Construction Noise Monitoring

Appendix 3-1 Sample Data Record Sheet for Construction Noise

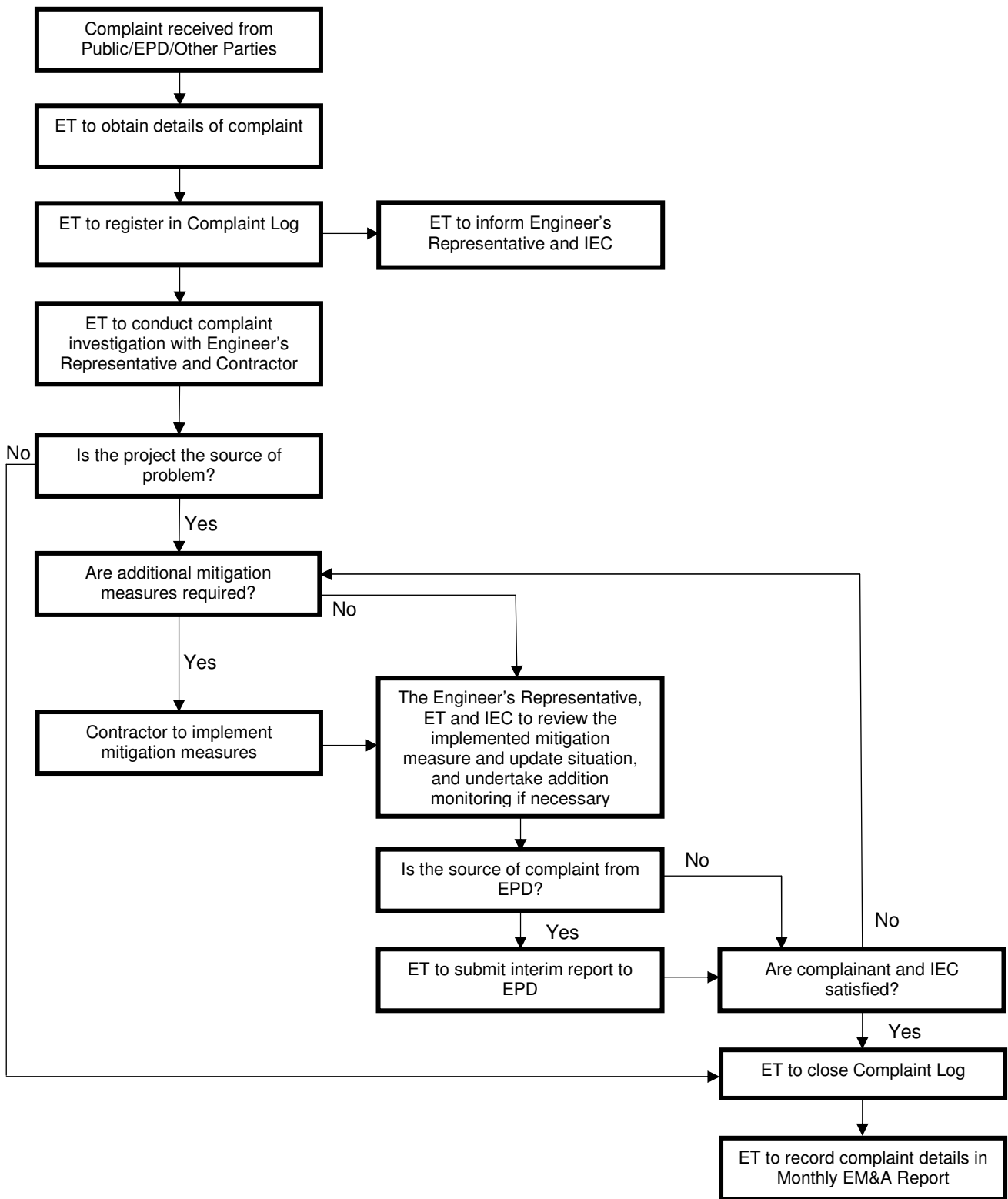
Monitoring Location:							
Description of Location:							
Date of Monitoring:							
Weather Conditions:				Wind Speed (m/s)			
Measurement Start Time (hh:mm):							
Measurement Time Length (min.):							
Noise Meter Model/Identification:							
Calibrator Model/Identification:							
Calibration Before Measurement (dB(A))				Calibration After Measurement (dB(A))			
Measurement Results in 5 min / 30 min	L90 (dB(A))						
	L10 (dB(A))						
	Leq (dB(A))						
Major Construction Noise Source(s) During Monitoring:							
Other Noise Source(s) During Monitoring:							
Remarks:							

	Name & Designation	Signature	Date
Recorded By			
Checked By			

Appendix 3-2
Sample Data Record Sheet for
Operational Traffic Noise Monitoring

Appendix 9-1
Flow Chart of Complaint Response Procedures

Appendix 9-1 Flow Chat of Complaint Response Procedures



Appendix 10-1
Sample Template for Interim Notification

Appendix 10-1 Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action or Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

Prepared by: _____

Designation: _____

Signature: _____

Date: _____