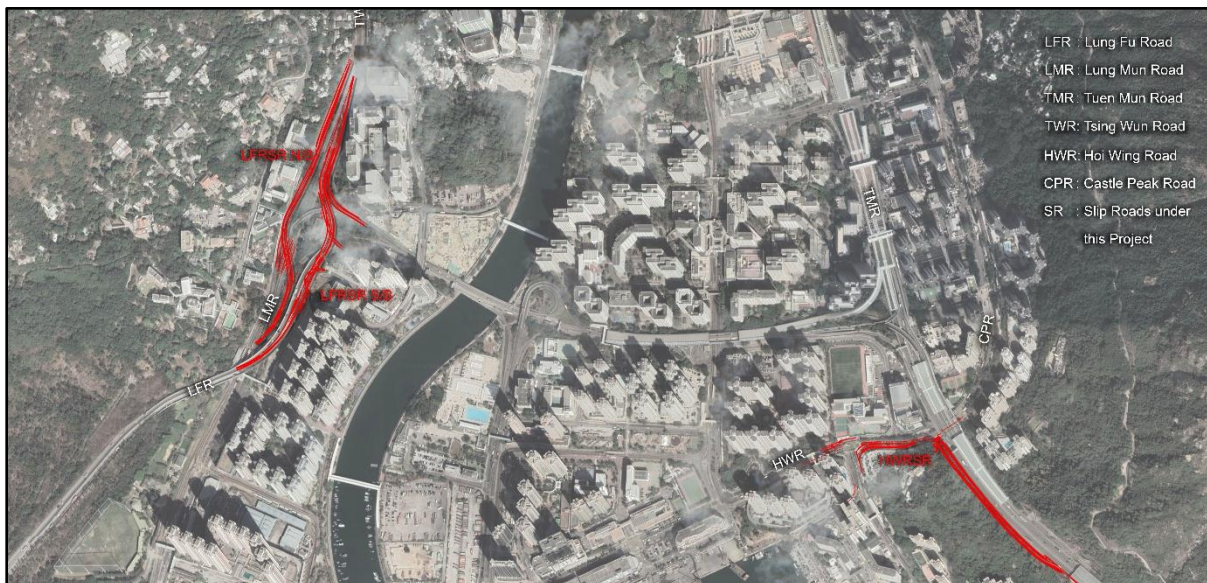


HIGHWAYS DEPARTMENT

TRAFFIC IMPROVEMENT SCHEME IN TUEN MUN – WIDENING AND ADDITION OF SLIP ROADS AT LUNG FU ROAD/ TUEN MUN ROAD/ WONG CHU ROAD/ HOI WING ROAD

Environmental Impact Assessment

Environmental Monitoring and Audit Manual





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Environmental Impact Assessment

Environmental Monitoring and Audit Manual

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WSP (ASIA) LTD.
7/F ONE KOWLOON
1 WANG YUEN STREET
KOWLOON BAY
HONG KONG

PHONE: +852 2579-8899
FAX: +852 2856-9902
WSP.COM

TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	Background.....	1
1.2	Project Location and Scope	1
1.3	Construction Programme	1
1.4	Purpose of the Manual.....	2
1.5	Project Organisation	3
1.6	Structure of the EM&A Manual.....	5
2	GENERAL REQUIREMENTS OF THE EM&A PROGRAMME	6
2.1	Introduction.....	6
2.2	Objectives of the EM&A Programme.....	6
2.3	Scope of the EM&A Programme	6
2.4	Methodology and Criteria	7
2.5	Environmental Monitoring.....	8
2.6	Action and Limit (A/L) Levels.....	8
2.7	Event and Action Plans	8
2.8	Environmental Audit	8
2.9	Enquiries, Complaints and Requests for Information.....	9
2.10	Reporting.....	9
2.11	Change or Cessation of the EM&A Programme ...	9
3	AIR QUALITY	10
3.1	Introduction.....	10
3.2	Monitoring Parameters	10
3.3	Monitoring Equipment	11
3.4	Laboratory Measurement and Analysis	12
3.5	Monitoring Locations	12
3.6	Baseline Monitoring	14
3.7	Impact Monitoring	15
3.8	Event and Action Plan	15
3.9	Mitigation Measures	17



3.10	Audit Requirements	17
4	NOISE	18
4.1	Introduction.....	18
4.2	General Monitoring Requirement	18
4.3	Monitoring Parameters of Construction Noise ..	19
4.4	Monitoring Locations for Construction Noise....	19
4.5	Impact Monitoring for Construction Noise	20
4.6	Event and Action Plan for Construction Noise ..	20
4.7	Noise Parameters for Operation Road Traffic Noise.....	22
4.8	Monitoring Locations for Road Traffic Noise	22
4.9	Impact Monitoring for Operation Road Traffic Noise.....	23
4.10	Event and Action Plan for Road Traffic Noise....	23
4.11	Mitigation Measures	24
4.12	Audit Requirements	26
5	WATER QUALITY	27
5.1	Introduction.....	27
5.2	Mitigation Measures.....	27
5.3	Construction Site Audits	27
6	WASTE MANAGEMENT	29
6.1	Introduction.....	29
6.2	Waste Management Approach	29
6.3	Staff Training	31
6.4	Audit Requirements	31
6.5	Mitigation Measures	31
7	LAND CONTAMINATION.....	33
7.1	Summary	33
8	ECOLOGY	34
8.1	Introduction.....	34
8.2	Mitigation Measures.....	34
8.3	Audit Requirements	35

9	LANDSCAPE AND VISUAL	36
9.1	Introduction.....	36
9.2	Mitigation Measures	36
9.3	Audit Requirements	36
10	CULTURAL HERITAGE	37
10.1	Introduction.....	37
10.2	Mitigation Measures	37
10.3	Audit Requirements	37
11	ENVIRONMENTAL AUDIT	39
11.1	Site Inspection	39
11.2	Compliance with Legal and Contractual Requirements	40
11.3	Environmental Complaints.....	40
11.4	Log Book	41
12	REPORTING	42
12.1	General	42
12.2	Interim Notification of Environmental Quality Limit Exceedances	42
12.3	Baseline Monitoring Report	42
12.4	Monthly EM&A Reports	43
12.5	Data Keeping.....	48
12.6	Electronic Reporting of EM&A Information	48

LIST OF FIGURES

FIGURE 1.1	LOCATION PLAN OF THE PROJECT
FIGURE 3.1	LOCATION OF PROPOSED AIR QUALITY MONITORING LOCATIONS
FIGURE 4.1	LOCATION OF PROPOSED CONSTRUCTION NOISE MONITORING STATIONS
FIGURE 4.2	LOCATION OF PROPOSED ROAD TRAFFIC NOISE MONITORING STATIONS

LIST OF APPENDICES

APPENDIX 1.1	TENTATIVE CONSTRUCTION PROGRAMME
APPENDIX 1.2	IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES
APPENDIX 1.3	PROPOSED PROJECT ORGANISATION AND LINE OF COMMUNICATIONS
APPENDIX 3.1	SAMPLE DATA SHEET FOR TSP MONITORING
APPENDIX 4.1	SAMPLE DATA SHEET FOR CONSTRUCTION NOISE MONITORING
APPENDIX 4.2	SAMPLE DATA SHEET FOR ROAD TRAFFIC NOISE MONITORING
APPENDIX 11.1	FLOW CHART OF COMPLAINT RESPONSE PROCEDURES
APPENDIX 12.1	SAMPLE TEMPLATE FOR INTERIM NOTIFICATIONS

1 INTRODUCTION

1.1 BACKGROUND

- 1.1.1 The title of the Project is “Traffic Improvement Scheme in Tuen Mun – Widening and Addition of Slip Roads at Lung Fu Road / Tuen Mun Road / Wong Chu Road / Hoi Wing Road” (hereinafter referred to as the Project).
- 1.1.2 The Tuen Mun - Chek Lap Kok Tunnel (TM-CLKT) was commissioned on 27 December 2020. The traffic flow within Tuen Mun (TM) District, including Tuen Mun Road (Town Centre Section) (TMR (TCS)) and its slip roads to and from Wong Chu Road (WCR), has been gradually increasing after the commissioning of TM-CLKT.
- 1.1.3 After the commissioning of TM-CLKT in 2020, Lung Fu Road (LFR), WCR and other local roads in Tuen Mun will be operating beyond capacity after 2026 due to the development in the Northwest New Territories (NWNT) and development in North Lantau. The concerned roads are currently very busy especially peak hours. The Project not only helps to relieve traffic congestion on TM area and other major roads in TM area but it also improves the capacity of major local road junction roads by directing traffic between NWNT and North Lantau.
-

1.2 PROJECT LOCATION AND SCOPE

- 1.2.1 The location plan of the Project is provided in **Figure 1.1**. The scope of works under the preferred option for the traffic improvement scheme for the various road links comprises the following:
- (a) Construction of Hoi Wing Road Slip Road (HWRSR) - a single lane at-grade slip road of approximate 550 meters long connecting Tuen Mun Road northbound to Castle Peak Road (Castle Peak Bay Section) westbound near Hoi Wing Road;
 - (b) Construction of Lung Fu Road Slip Road Northbound (LFRSR-NB) - a single lane elevated road of approximate 600 meters long connecting the existing elevated Lung Fu Road northbound to Tsing Wun Road (TWR) northbound;
 - (c) Construction of Lung Fu Road Slip Road Southbound (LFRSR-SB) – a single lane elevated road of approximate 800 meters long connecting Tsing Wun Road southbound to the existing elevated Lung Fu Road southbound;
 - (d) Modification of the existing at-grade slip road of 150m long approximately connecting TWR SB and WCR Eastbound (EB) affected by LFRSR SB;
 - (e) Modification of the existing at-grade slip road connecting WCR WB to TWR NB;
 - (f) Ancillary works including geotechnical, drainage, sewerage, water, utilities, lighting, landscaping, electrical and mechanical works, construction/reconstruction of noise barriers, retaining walls, slope improvement; and installation of street furniture and traffic aids.
-

1.3 CONSTRUCTION PROGRAMME

- 1.3.1 The construction works of the Project will tentatively commence in mid-2024 for completion by 2031. A preliminary outline construction programme for the Project is provided in **Appendix 1.1**.

1.4 PURPOSE OF THE MANUAL

- 1.4.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the set up of an EM&A programme to ensure compliance with the EIA Study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This EM&A Manual outlines the environmental monitoring and auditing works for both the construction and operation phases of the Project. It provides systematic procedures for the monitoring and auditing of potential environmental impacts that may arise from the works.
- 1.4.2 Hong Kong environmental regulations, the Hong Kong Planning Standards and Guidelines and the recommendations in the EIA Report of this Project have served as environmental standards and guidelines in the preparation of this EM&A Manual. In addition, this EM&A Manual has been prepared in accordance with the requirements stipulated in *Annex 21* of the *EIAO-TM*.
- 1.4.3 This EM&A Manual contains the following information:
- Responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), the Environmental Team (ET) and the Independent Environmental Checker (IEC) with respect to the environmental monitoring and audit requirements during the course of the Project;
 - Project organisation for the EM&A works of the Project;
 - Requirements with respect to the construction programme schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
 - Details of the methodologies to be adopted, including all field laboratories and analytical procedures, and details on quality assurance and quality control programme;
 - The rationale on which the environmental monitoring data will be evaluated and interpreted;
 - Definition of Action and Limit levels;
 - Establishment of Event and Action Plans (EAPs);
 - Requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints;
 - Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures; and
 - Requirements for review of EIA predictions and the effectiveness of the mitigation measures/environmental management systems and the EM&A programme.
- 1.4.4 This EM&A Manual is a dynamic document that should be reviewed regularly and to be updated (as necessary) during the implementation of the Project. The contractor should regularly review the mitigation measures and project implementation schedule in **Appendix 1.2** with respect to the design developments and construction methodology.
- 1.4.5 For this EM&A Manual, the "Engineer" refers to the Engineer as defined in the Contract and the ER, in case where the Engineer's power has been delegated to the ER, in accordance with the Contract. The ET Leader, who should be responsible for and in charge of the ET, refers to the person delegated the role of executing the EM&A requirements. The IEC should undertake the auditing role.

1.5 PROJECT ORGANISATION

1.5.1 The roles and responsibilities of the various parties involved in the construction phase EM&A programme are outlined below. The organisation and lines of communication with respect to environmental management for the Project are shown in **Appendix 1.3**.

1.5.2 The duties and responsibilities of the respective parties are as follows:

Engineer or Engineer's Representative (ER)

1.5.3 The *Engineer/ ER* is responsible for overseeing the construction works and for ensuring that the works undertaken by the Contractor are in accordance with the specification and contractual requirements.

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the EAPs or protocols or those in the Contract Specifications in the event of exceedance or complaint;
- Participate in joint site inspections undertaken by the ET; and
- Adhere to the procedures for carrying out complaint investigation in accordance with this EM&A Manual.

Contractor

1.5.4 The Contractor should report to the *Engineer/ ER*:

- Ensure thorough implementation of mitigation measures as required;
- Provide assistance to the ET in carrying out monitoring and preparing reporting;
- Accompany joint site inspections undertaken by ET and implement the corrective / follow-up actions/recommendations instructed by the Engineer;
- Follow the procedures stipulated in the agreed EAPs in the event of exceedance or complaint;
- Submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the EAPs;
- Implement measures to reduce impact whenever Action and Limit levels are exceeded;
- Report all findings of site inspections and corrective/ follow-up actions taken to the ER; and
- Adhere to the procedures for carrying out complaint investigation in accordance with this EM&A Manual.

Environmental Team (ET)

1.5.5 The ET should conduct the EM&A programme and ensure the Contractor's compliance with the Project's environmental performance requirements during construction. The ET should be an independent party from the IEC and the Contractor.

1.5.6 An ET shall be established before the commencement of construction of the Project. The ET leader should possess at least 7 years of experience in EM&A and/ or environmental management.

1.5.7 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 measures.

- Monitor the various environmental parameters as required by this or subsequent revisions to the Manual;
- Provide advice on all environmental issues to the Contractor;
- Analyse the EM&A data and review the success of the EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
- Carry out site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and review the programme of works, in order to anticipate environmental issues that may require mitigation before the problem arises;
- Audit the environmental monitoring data and report the status of general site environmental conditions and the implementation of mitigation measures resulting from site inspections;
- Follow the procedures stipulated in the agreed EAPs in the event of exceedance or complaint;
- Report the EM&A results and wider environmental issues and conditions to the IEC, Contractor, ER, and Environmental Protection Department (EPD);
- Prepare EM&A Reports as required in the EM&A Manual
- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the EAPs; and
- Adhere to the procedures for carrying out complaint investigation in accordance with this EM&A Manual.

Independent Environmental Checker (IEC)

1.5.8 An IEC shall be employed before commencement of construction of the Project. Appointment of IEC shall be approved by EPD. The IEC shall be an independent party from the Contractor and the ET and possess at least 7 years' experience in EM&A and/or environmental management. The IEC shall report directly to the EPD on matters relating to the EM&A programme and environmental impacts from the Project.

- Review the EM&A works performed by the ET (at not less than monthly intervals);
- Carry out random sample check and audit the monitoring activities and results (at not less than monthly intervals);
- Conduct random site inspection;
- Report the audit results to the ER and EPD in parallel;
- Review the EM&A Reports submitted by the ET;
- Review the effectiveness of environmental mitigation measures and project environmental performance;
- Review the proposal on mitigation measures submitted by the Contractor in accordance with the EAPs;

- Check the mitigation measures that have been recommended in the EIA and this EM&A Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- Adhere to the procedures for carrying out complaint investigation in accordance with this EM&A Manual.

1.5.9 Sufficient and suitably qualified professional and technical staff shall 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.

1.6 STRUCTURE OF THE EM&A MANUAL

1.6.1 The following sections present the EM&A requirements of various aspects. The structure of the EM&A Manual is outlined as follows:

- Section 2 – General Requirements of EM&A Programme;
- Section 3 – Sets out EM&A requirements for air quality;
- Section 4 – Sets out EM&A requirements for noise;
- Section 5 – Sets out EM&A requirements for water quality;
- Section 6 – Sets out EM&A requirements for waste management;
- Section 7 – Sets out EM&A requirements for land contamination;
- Section 8 – Sets out EM&A requirements for ecology;
- Section 9 – Sets out EM&A requirements for landscape and visual;
- Section 10 – Sets out EM&A requirements for cultural heritage;
- Section 11 – Describes the scope and frequency of environmental site audits and sets out the procedures for handling environmental complaints; and
- Section 12 – Details the EM&A reporting requirements.



2 GENERAL REQUIREMENTS OF THE EM&A PROGRAMME

2.1 INTRODUCTION

2.1.1 General requirements of the EM&A programme for the Project are presented in this section. The scope of the programme is developed with reference to the findings and recommendations of the EIA Report.

2.2 OBJECTIVES OF THE EM&A PROGRAMME

2.2.1 The potential environmental impacts associated with the Project have been assessed and described in the EIA Report. The EIA Report also specifies the mitigation measures required to comply with the environmental criteria. These mitigation measures and their implementation requirements are presented in the Implementation Schedule (refer to **Appendix 1.2**). The EIA recommends that an EM&A programme be implemented to assess the effectiveness of measures and to confirm that there will be no adverse environmental impacts during all phases of the Project. It is also recommended that regular site audits be undertaken during the construction and operation phases to check whether good site practices are properly implemented to prevent adverse environmental impacts. Any activities that have the potential to cause adverse environmental impacts are identified before the adverse impacts occurred. Ad-hoc visits should also be undertaken in response to any complaints or reported non-compliance with environmental standards in order to enable prompt actions to be taken to address the impacts.

2.2.2 This Manual provides details of the EM&A requirements that have been recommended in the EIA Report. The main objectives of the EM&A programme are to:

- Verify the environmental impacts predicted in the EIA Report;
 - Monitor the performance of the Project and the effectiveness of mitigation measures;
 - Determine Project compliance with regulatory requirements and standards;
 - Provide an early indication should any of the environmental control measures or practices fail to achieve the required standards;
 - Take remedial action if unexpected problems or unacceptable impacts arise;
 - Provide a database against which any short-term or long-term environmental impacts of the Project can be determined; and
 - Provide data against which environmental audits may be undertaken.
-

2.3 SCOPE OF THE EM&A PROGRAMME

2.3.1 The scope of the EM&A Programme is to:

- Establish baseline construction dust levels at designated locations;
- Implement impact monitoring programmes for construction dust and noise, and operation road traffic noise;

- Implement inspection and audit programmes for air quality, noise, water quality, waste management, ecology, landscape and visual and cultural heritage issues;
- Liaise with, and provide environmental advice (as requested or when otherwise necessary) to construction site staff on the comprehension and consequences of the environmental monitoring data and exceedances;
- Identify and resolve environmental issues and other functions as they may arise from the works;
- Check and advise the Contractor's overall environmental performance, the implementation of EAPs, and remedial actions taken to mitigate adverse environmental impacts as they may arise from the works;
- Conduct monthly reviews of monitored impact data as the basis for assessing compliance with the defined criteria and to ensure that necessary mitigation measures are identified and implemented, and undertake additional ad hoc monitoring and auditing as required by special circumstances;
- Evaluate and interpret all environmental monitoring data to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards, and to verify the environmental impacts assessed in the EIA Study;
- Manage and liaise with other individuals or parties concerning other environmental issues deemed to be relevant to the construction process;
- Conduct regular site inspections to assess:
 - The level of the Contractor's general environmental awareness;
 - The Contractor's implementation of the recommendations in the EIA Report;
 - The Contractor's performance as measured by the EM&A programme;
 - The need for specific mitigation measures to be implemented or the continued usage of those previously agreed;
 - To advise the Site Staff of any identified potential environmental issues; and
- Submit Monthly EM&A Reports which summarise environmental monitoring and auditing data, with full interpretation illustrating the acceptability or otherwise of any environmental impacts and identification or assessment of the implementation status of agreed mitigation measures.

2.4 METHODOLOGY AND CRITERIA

- 2.4.1 The environmental issues associated with the construction phase of the Project will be mitigated through the monitoring and mitigation measures specified in the EIA Report and this EM&A Manual.
- 2.4.2 The monitoring of effectiveness of the mitigation measures will be achieved through the environmental monitoring programme as well as through site inspections. The inspections will include within scope, mechanisms to review and assess the implementation of the recommended mitigation measures, and that the timely resolutions of received complaints are managed and controlled in a manner consistent with the recommendations given in the EIA Report and the EM&A Manual.

2.5 ENVIRONMENTAL MONITORING

2.5.1 The environmental monitoring works throughout the construction period and the first year after the commencement of operation of the Project should be carried out in accordance with the EM&A Manual and reported by the ET. Monitoring should be conducted at the chosen and agreed representative sensitive receivers.

2.6 ACTION AND LIMIT (A/L) LEVELS

2.6.1 Action and Limit (A/L) Levels are defined levels for impact recorded by the environmental monitoring works, which represent levels at which a prescribed response is required. These levels are described in the principle below and later quantitatively defined in the relevant sections of the EM&A Manual:

- Action Level – beyond which there is a clear indication of a deteriorating ambient environment for which appropriate remedial actions are likely to be necessary to prevent environmental quality from falling outside the Limit Levels, which will be unacceptable.
- Limit Level – statutory limits stipulated in the relevant pollution control ordinances, Hong Kong Planning Standard Guidelines, or Environmental Quality Objectives established by the EPD. If these are exceeded, works should not proceed without appropriate remedial action, including a critical review of the plant and working methods.

2.7 EVENT AND ACTION PLANS

2.7.1 The purpose of the EAPs is to provide, in association with the environmental monitoring activities, procedures for ensuring that if any significant environmental impacts occur in the form of exceedance of A/L Levels identified in the EM&A programme, cause(s) will be quickly identified and remediated.

2.8 ENVIRONMENTAL AUDIT

2.8.1 The ET should undertake environmental audit of compliance with stipulated procedures and site inspections of on-site practices. The primary objective is to assess the effectiveness of the implementation of the environmental mitigation measures as recommended in the EIA Report and the EM&A Manual.

2.8.2 Whilst environmental audit will complement the environmental monitoring activity with regard to the effectiveness of dust suppression and noise attenuation, the criteria against which the audit should be derived from the clauses within the Contract, which seek to enforce the recommendations of the EIA Report and the EM&A Manual.

2.8.3 The findings of the environmental audit and site inspection should be made known to the Contractor at the time of the audit/inspection to enable rapid resolution of identified non-compliances or observations. Non-compliances, observations and the corrective/ follow-up actions undertaken will be reported in the Monthly EM&A Reports.

2.9 ENQUIRIES, COMPLAINTS AND REQUESTS FOR INFORMATION

- 2.9.1 Enquiries, complaints and requests for information will be expected from a wide range of individuals and organisations including members of the public, government departments, nearby residents, the press and community groups.
- 2.9.2 All enquiries concerning the environmental effects of the construction works, irrespective of the channel of receipt, will be directed to the Contractor and copied to the ER and Highways Department (HyD). Procedures for handling enquiries and complaints should follow the procedures set out in **Section 11**.
- 2.9.3 In all cases, the complainant should be notified of the findings, and environmental audit and site inspection should be put in place to minimise the reoccurrence of similar problems.

2.10 REPORTING

- 2.10.1 During the construction phase, Environmental Baseline Monitoring Reports, Monthly EM&A Reports and Final EM&A Review Reports should be prepared and certified by the ET Leader and verified by IEC prior to submission to the Contractor and HyD. In accordance with *Annex 21* of the *EIAO-TM*, a copy of the monthly EM&A reports and final EM&A review reports should be made available to the Director of Environmental Protection. Details of the reporting requirements and submission schedule should be in accordance with the guidelines set out in **Section 12**.

2.11 CHANGE OR CESSATION OF THE EM&A PROGRAMME

- 2.11.1 The ET should carry out the EM&A programme in accordance with the EM&A Manual throughout the construction and operational phases of the Project. Any change or cessation of the EM&A programme, or any part of it, should be justified by the ET Leader and verified by the IEC as conforming to the requirements set out in the EM&A Manual and should be submitted to the EPD for approval.

3 AIR QUALITY

3.1 INTRODUCTION

- 3.1.1 Potential air quality impacts arising from the construction and operation phases of the Project on air sensitive receivers (ASRs) were addressed in the EIA Report. It is concluded that no adverse air quality impact from the Project would be anticipated during the construction phase. Dust monitoring is proposed to be conducted during the construction phase of the Project.
- 3.1.2 No adverse air quality impact would be anticipated during the operation phase of the Project. No operation phase air quality monitoring and audit is therefore considered necessary.
- 3.1.3 Regular environmental site audit is recommended to be conducted during the entire construction phase of the Project to ensure proper implementation of the proposed dust mitigation measures and good site practices stipulated in the *Air Pollution Control (Construction Dust) Regulation* and those recommended in Section 3.9 of EIA Report. The implementation schedule of mitigation measures is presented in **Appendix 1.2**.
- 3.1.4 The dust monitoring criteria specified in this EM&A manual is TSP of 500 $\mu\text{g}/\text{m}^3$ (measured at 298K and 1atm) according to Annex 4 of the EIAO-TM (at the time of writing this EM&A manual). In view of the upcoming update of EIAO-TM under EIAO review, there is a chance that the criteria for construction dust monitoring will be changed ⁽¹⁾. In view of this, if there is any future update to the dust monitoring criteria and requirement (under the update of EIAO-TM) at the time of approval of this EIA, the Applicant shall separately submit a Construction Dust Monitoring Plan / revised EM&A Manual which includes details of the updated monitoring parameters, monitoring equipment, baseline and impact monitoring procedures, and event and action plan, etc. for EPD approval before carrying out the EM&A dust monitoring.

3.2 MONITORING PARAMETERS

- 3.2.1 Monitoring of the Total Suspended Particulate (TSP) levels shall be carried out by the ET to ensure that construction works are not generating dust that exceeds the acceptable level. 1-hour Total Suspended Particulates (TSP) concentrations shall be measured to indicate the impacts of construction dust. The criteria for 1-hour TSP limit is 500 $\mu\text{g}/\text{m}^3$. This level is not to be exceeded at any of the ASRs. Timely action should be taken to rectify the situation if an exceedance is detected.
- 3.2.2 The 1-hour TSP levels shall be measured by following the standard high-volume sampling method as set out in *Part 50 Chapter 1 Appendix B, Title 40 of the "Code of Federal Regulations"* of the USEPA. Upon approval of the IEC, 1-hour TSP levels can be measured by direct reading method which is capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.
- 3.2.3 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, special phenomena and work progress of the site etc., shall be recorded down in detail by the ET. A sample data sheet is shown in **Appendix 3.1**.

(1) <https://www.legco.gov.hk/yr2022/english/panels/ea/papers/ea20221212cb1-883-1-e.pdf>

3.3 MONITORING EQUIPMENT

3.3.1 A high volume sampler (HVS) in compliance with the following specifications should be used for carrying out the 1-hour TSP monitoring:

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

3.3.2 The ET is responsible for the provision, installation, operation, maintenance, and dismantling of the monitoring equipment. The ET shall ensure that a 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.

3.3.3 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 in the data sheet as mentioned in **Appendix 3.1**.

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

3.3.5 Wind data monitoring equipment shall also be provided and set up at suitable locations for logging wind speed and wind direction near the dust monitoring locations. The equipment installation location shall be proposed by the ET and agreed with the Engineer/ ER and the IEC. For the 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 10-metre 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 should be divided into 16 sectors of 22.5 degrees each.

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

3.4 LABORATORY MEASUREMENT AND ANALYSIS

3.4.1 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, equipment calibration and maintenance. The laboratory should be Hong Kong laboratory accreditation scheme (HOKLAS) accredited.

3.4.2 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 Engineer/ ER, in consultation with the IEC. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and IEC. The IEC shall regularly audit the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET shall provide the Engineer/ ER and the IEC with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for reference.

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

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

3.4.5 All the collected samples shall be kept in a good condition for six months before disposal.

3.5 MONITORING LOCATIONS

3.5.1 The selected monitoring locations are considered the worst potentially affected air sensitive receivers located in the vicinity of construction sites. The proposed air quality monitoring locations during the construction phase are listed in **Table 3.1** below and shown in **Figure 3.1**.

Table 3.1 Proposed Construction Dust Monitoring Stations

Monitoring Station ID	EIA ID	Location	Approximate Horizontal Distance from the Construction Project Site Boundary (m)
CDM1	A18	Kam Fai Garden	20
CDM2	A24	Chung Sing Benevolent Society Mrs. Aw Boon Haw Secondary School	15
CDM3	A22	Hanford Garden	20
CDM4	A23	Siu Lun Court	30

Monitoring Station ID	EIA ID	Location	Approximate Horizontal Distance from the Construction Project Site Boundary (m)
CDM5	A13	Ju Ching Chu Secondary School (Tuen Mun)	20
CDM6	A11	Hong Chi Morninglight School Tuen Mun	65
CDM7	A07	Church of Christ in China (CCC) Hoh Fuk Tong Primary School	50
CDM8	A06	Lung Yat Estate	20
CDM9	P01	Yip Wong Road PRH Phase 1	35
CDM10	A01	Luen Cheong Can Centre	15
CDM11	A03	Nam Fung Industrial City – Block 2	15
CDM12	A08	Lung Mun Oasis – Block 5	35
CDM13	A19	Dragon Inn Court – Block 2	70
CDM14	A20	Palm Cove – Tower 5	100
CDM15	A16	Tsing Shan Tsuen 83	25
CDM16	A21	Sam Shing Temple	45

3.5.2 The status and locations of the air quality sensitive receivers may change after issuing this Manual. In such case, the ET shall propose updated monitoring locations and seek approval from ER and IEC and agreement from EPD on the proposal.

3.5.3 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 air sensitive receivers as defined in the EIAO-TM;
- Proper position/sitting and orientation of the monitoring equipment; and
- Take into account the prevailing meteorological conditions.

3.5.4 The ET shall agree with the IEC on the position of the HVS for the 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 building, must be at least twice the height that the obstacle protrudes above the sampler;
- A minimum of 2-metre of separation from walls, parapets and penthouses is required for rooftop samplers;
- A minimum of 2-metre of 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-metre 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.

3.6 BASELINE MONITORING

- 3.6.1 Baseline monitoring shall be undertaken to determine the ambient 1-hour TSP levels at the monitoring stations prior to the commencement of construction of the Project. The ET shall carry out the baseline monitoring of 1-hour TSP levels at all of the designated monitoring locations listed in **Table 3.1** for at least fourteen consecutive days prior to the commissioning of the construction works of the Project. 1-hour TSP sampling should be done at least three times per day at each monitoring station.
- 3.6.2 Before commencing baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that the IEC, if considered necessary, can conduct on-site audit to ensure the accuracy of the baseline monitoring results.
- 3.6.3 During the baseline monitoring, there should not be any major construction or dust generation activities in the vicinity of the monitoring stations. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources should be recorded throughout the baseline monitoring period. The baseline monitoring programme is summarised in **Table 3.2**.
- 3.6.4 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring location shall be agreed with the ER and the IEC, and approved by the EPD.
- 3.6.5 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to the ER and IEC for approval.
- 3.6.6 Ambient conditions may vary seasonally and shall be reviewed once every three months. If the ET considered that the ambient conditions have changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be undertaken at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. The baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with the IEC and the EPD.

3.7 IMPACT MONITORING

3.7.1 The ET shall carry out impact monitoring during the construction phase of the Project. For 1-hour TSP monitoring, the sampling frequency of at least three times every six days should be undertaken when the highest dust impact is expected to occur. In case of non-compliance with the air criteria, more frequent monitoring, as specified in the Action Plan in the following section, should be conducted. This additional monitoring should be continued until the excessive dust emission or the deterioration in the air quality is rectified. The impact monitoring programme is summarised in **Table 3.2**.

3.7.2 The monthly schedule of the impact monitoring programme should be prepared by the ET one month prior to the commencement of the scheduled construction period. Before commencing the impact monitoring, the ET shall inform the IEC of the impact monitoring programme such that the IEC, if considered necessary, can conduct an on-site audit to ensure the accuracy of the impact monitoring results.

Table 3.2 Summary of Construction Dust Monitoring Programme

Monitoring Period	Duration	Sampling Parameter	Frequency
Baseline Monitoring	Consecutive days of at least fourteen days before the commencement of major construction works	1-hour TSP	three times per day
Impact Monitoring	Throughout the construction phase	1-hour TSP	three times in every six days

3.8 EVENT AND ACTION PLAN

3.8.1 The baseline monitoring results form the basis for determining the air quality criteria for impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP. **Table 3.3** shows the air quality criteria, namely action and limit levels to be used.

3.8.2 Should non-compliance with the air quality criteria occur, action in accordance with the EAP in **Table 3.4** shall be carried out.

Table 3.3 Action and Limit Levels for Air Quality (Construction Dust)

Parameter	Action Level ^(a)	Limit Level
TSP (1-hour averaged)	BL $\leq 384\mu\text{g}/\text{m}^3$, AL = $(\text{BL} \times 1.3 + \text{LL}) \div 2$ BL $> 384\mu\text{g}/\text{m}^3$, AL = LL	500 $\mu\text{g}/\text{m}^3$

Note: (a) BL = Baseline level, AL = Action level, LL = Limit level

Table 3.4 Event and Action Plan for Air Quality (Construction Dust)

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded	1. Identify the source, investigate the causes of the complaint and	1. Check monitoring data submitted by ET; 2. Check the Contractor's working method; and	1. Notify Contractor.	1. Identify the source(s), investigate the causes of exceedance and

Event	Action			
	ET	IEC	ER	Contractor
by one sampling	<ul style="list-style-type: none"> propose remedial measures; 2. Inform Contractor, IEC and ER; 3. Repeat measurement to confirm finding; and 4. Increase monitoring frequency to daily. 	<ul style="list-style-type: none"> 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures. 		<ul style="list-style-type: none"> propose remedial measures; 2. Implement remedial measures; and 3. Amend working methods agreed upon with the ER as appropriate.
Action level being exceeded by two or more consecutive sampling	<ul style="list-style-type: none"> 1. Identify source; 2. Inform Contractor, IEC and ER; 3. Advise the Contractor and ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meetings with the Contractor, IEC and ER; and 8. If exceedance stops, cease additional monitoring. 	<ul style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check the Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Advise the ET and ER on the effectiveness of the proposed remedial measures; and 5. Supervise the Implementation of remedial measures. 	<ul style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures are properly implemented. 	<ul style="list-style-type: none"> 1. Identify the source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; and 4. Amend the proposal as appropriate.
Limit level being exceeded by one sampling	<ul style="list-style-type: none"> 1. Identify the source, investigate the causes of exceedance and propose remedial measures; 2. Inform Contractor, IEC, ER, and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; and 5. Assess the effectiveness of the Contractor's remedial actions and keep IEC, EPD and ER informed of the results. 	<ul style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check the Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; and 5. Supervise the implementation of remedial measures. 	<ul style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify the Contractor; 3. Ensure remedial measures are properly implemented. 	<ul style="list-style-type: none"> 1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification; 4. Implement the agreed proposals; and 5. Amend the proposal if appropriate.

Event	Action			
	ET	IEC	ER	Contractor
Limit level being exceeded by two or more consecutive samplings	<ol style="list-style-type: none"> 1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out an analysis of the Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meetings with IEC and ER to discuss the remedial actions to be taken; 7. Assess the effectiveness of the Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 3. Review the Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 4. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if the problem is still not under control; and 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

3.9 MITIGATION MEASURES

3.9.1 Mitigation measures for construction phase air quality impact have been recommended in the EIA Report. All recommended mitigation measures are detailed in the implementation schedule presented in **Appendix 1.2**. The Contractor shall be responsible for the design and implementation of these measures.

3.10 AUDIT REQUIREMENTS

3.10.1 Regular environmental site inspections and audits at least once per week should be conducted during the entire construction phase of the Project to ensure the recommended mitigation measures are properly implemented. The audit programme serves to verify and keep track of the implementation status of the recommended mitigation measures and effectiveness of these mitigation measures.

4 NOISE

4.1 INTRODUCTION

- 4.1.1 The potential construction noise impact and road traffic noise impact during operation of the Project have been assessed in the EIA.
 - 4.1.2 Recommendations on construction noise mitigation measures have been given in the EIA to mitigate the noise impact. A noise monitoring and audit programme is recommended to be undertaken to confirm the proposed mitigation measures have been implemented properly.
 - 4.1.3 For road traffic noise impact, mitigation measures including the provision of low-noise road surfacing (LNRS) have been recommended to be implemented along some of the Project Roads. Road traffic noise levels should be monitored at representative Noise Sensitive Receivers (NSRs), which are in the vicinity of the recommended direct mitigation measures, during the first year after road opening. The purpose of the monitoring is to ascertain that the recommended mitigation measures are effective in mitigating the noise impacts.
 - 4.1.4 In this section, the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of noise impacts during the construction phase and operation phase of the Project are presented.
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4.2 GENERAL MONITORING REQUIREMENT

- 4.2.1 With reference to 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. The accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency, immediately prior to and following each noise measurement. Measurements shall be accepted as valid only if the calibration level from before and after the noise measurement agrees to be within 1.0dB(A).
- 4.2.2 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.
- 4.2.3 The ET is responsible for the provision of the monitoring equipment. The ET shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled. The location of equipment installation shall be proposed by the ET Leader and agreed with the IEC and EPD.
- 4.2.4 The noise monitoring station shall normally be at a point 1m from the exterior of the sensitive receivers building façade and be a position of 1.2m above ground. If there is a problem with access to the normal monitoring position, an alternative position shall 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 shall agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the impact monitoring shall be carried out at the same positions.

4.3 MONITORING PARAMETERS OF CONSTRUCTION NOISE

4.3.1 The construction noise levels shall be measured for the time period between 07:00 and 19:00 on normal weekdays using 30-minute A-weighted equivalent continuous sound pressure level ($L_{eq(30-min)}$) as the monitoring parameter, other parameters including L_{10} and L_{90} should also be taken for reference. A sample data record sheet for construction noise monitoring is shown in **Appendix 4.1** for reference.

4.4 MONITORING LOCATIONS FOR CONSTRUCTION NOISE

4.4.1 The proposed noise monitoring stations during the construction phase are shown in **Figure 4.1**. Details of the proposed noise monitoring stations are summarised in **Table 4.1**.

Table 4.1 Proposed Noise Monitoring Stations during the Construction Phase of the Project

Noise Monitoring Point	NSR ID in EIA Report	Location	Monitoring Period
CNM1	H1	Sam Shing Temple	Works at Zone 4a, 4b
CNM2	H5	Kam Fai Garden	Works at Zone 4a
CNM3	H8	Chung Sing Benevolent Society Mrs. Aw Boon Haw Secondary School	Works at Zone 4a, 4b
CNM4	H9	Four Gospel Church	Works at Zone 4b
CNM5	H11	Sam Shing Estate (Chun Yu House)	Works at Zone 4b, 4c
CNM6	H12	Siu Lun Court	Works at Zone 4b
CNM7	L27	Tsing Shan Tsuen	Works at Zone 3a, 3b, 3c, 3d
CNM8	L31	Ju Ching Chu Secondary School (Tuen Mun)	Works at Zone 3a, 3b, 3c
CNM9	L32	ICAC Training Camp	Works at Zone 3a, 3b, 3c
CNM10	L33	Hong Chi Morninglight School / Hong Chi Morninghill School	Works at Zone 3a, 3b
CNM11	L36	W.F.B. Avalokitesvara Nursery School	Works at Zone 3a, 3b, 3e
CNM12	L37	Church of Christ in China (CCC) Hoh Fuk Tong Primary School	Works at Zone 3a, 3b
CNM13	L38	Lung Yat Estate	Works at Zone 3a, 3b
CNM14	PN1 (a)	Proposed Public Housing Site at Tin Hau Road	Works at Zone 3a, 3b, 3c

Note:

a) The construction of the Project is tentatively to be commenced in mid-2024. The construction of the planned NSR PN1 is expected to be completed in late-2024. Based on this, future occupants of NSR PN1 may be affected by the construction of the Project. Noise monitoring at the NSR PN1 shall be carried out upon occupation when there is construction works at Zone 3a, 3b and/or 3c.

4.4.2 The status and location of NSRs may change after issuing this manual. If such case exists, the ET Leader should propose updated monitoring locations and seek approval from IEC and ER, and agreement from EPD before impact monitoring commences.

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

- Alternative locations should be similarly exposed to potential noise impacts;

- It should be close to the NSRs; and
- It should be located where there would be minimal disturbance to the occupants.

4.5 IMPACT MONITORING FOR CONSTRUCTION NOISE

- 4.5.1 Construction noise monitoring should be carried out at the designated monitoring stations when there are Project-related construction activities being undertaken within 300m radius from the monitoring stations. An initial guide on the monitoring is to obtain one set of 30-minute measurement at each station between 07:00 and 19:00 hours on normal weekdays at a frequency of once per week when construction activities are underway.
- 4.5.2 If construction works are extended to include works during the hours of 19:00 to 07:00, and/or percussive piling is to be carried out, applicable permits under NCO shall be obtained by the Contractor. The monitoring requirements and conditions, if any, stipulated in the permits have to be followed.
- 4.5.3 In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the EAP in **Table 4.3** 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.

4.6 EVENT AND ACTION PLAN FOR CONSTRUCTION NOISE

- 4.6.1 The Action and Limit levels for construction noise are defined in **Table 4.2**. Should non-compliance with the criteria is identified, action in accordance with the EAP in **Table 4.3** shall be carried out.

Table 4.2 Action and Limit Levels for Construction Noise

Noise Sensitive Uses	Period of Time	Action Level	Limit Level
Domestic Premise	07:00 to 19:00 on normal weekdays	When one documented complaint is received	75dB(A)
Place of Public Worship			70dB(A)
Education Institution			70dB(A) ^(b)
Notes:			
a) If works are to be carried out during restricted hours (i.e. 19:00 – 07:00) and/or percussive piling is to be carried out, the monitoring requirements and the conditions, if any, stipulated in the CNP issued by the Noise Control Authority shall be followed.			
b) Limit Level reduced to 65dB(A) for schools during school examination periods.			

Table 4.3 Event and Action Plan for Construction Noise

Event	Action			
	ET	IEC	ER	Contractor
Action Level	<ol style="list-style-type: none"> 1. Notify IEC, ER and Contractor; 2. Carry out the investigation; 3. Report the results of the investigation to the IEC, ER and Contractor; 	<ol style="list-style-type: none"> 1. Review the analyzed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify the Contractor; 3. Require the Contractor to propose remedial measures for the 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IEC; and 2. Implement noise mitigation proposals.

Event	Action			
	ET	IEC	ER	Contractor
	<ol style="list-style-type: none"> 4. Discuss with the Contractor and formulate remedial measures; and 5. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 3. Advise the ER accordingly; and supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 4. Analyzed noise problem; Review and agree on the remedial measures proposed by the Contractor for the analyzed noise problem; and 5. Ensure remedial measures are properly implemented. 	
Limit Level	<ol style="list-style-type: none"> 1. Identify source; 2. Inform IEC, ER, EPD and Contractor; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency; 5. Carry out an analysis of the Contractor's working procedures to determine possible mitigation to be implemented; 6. Inform IEC, ER and EPD on the causes and actions taken for the exceedances; 7. Assess the effectiveness of the Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 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 the Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. Notify the Contractor; 3. Require the Contractor to propose remedial measures for the analyzed noise problem; 4. Review and agree on the remedial measures proposed by the Contractor for the analyzed noise problem; 5. Ensure remedial measures are properly implemented; and 6. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if the problem is still not under control; and 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

4.7 NOISE PARAMETERS FOR OPERATION ROAD TRAFFIC NOISE

- 4.7.1 Notwithstanding the prediction that the NSRs will not be subject to adverse noise impact during the operational phase of the Project with the implementation of the proposed noise mitigation measures, noise monitoring should be carried out during the first year after opening to ensure the effectiveness of the recommended mitigation measures.
- 4.7.2 The traffic noise levels should be measured twice at six-month intervals within the first year upon operation of the Project. Measurements should be made in terms of the A-weighted L_{10} over three half-hour periods during the peak traffic hour, other parameters including L_{eq} and L_{90} should also be taken for reference.

4.8 MONITORING LOCATIONS FOR ROAD TRAFFIC NOISE

- 4.8.1 As shown in **Table 4.4** and **Figure 4.2**, three designated monitoring stations are selected for the operational noise monitoring.

Table 4.4 Proposed Noise Monitoring Stations for Road Traffic Noise

Noise Monitoring Point	NSR ID in EIA Report	Location	Proposed Mitigation Measures Nearby
TNM1	L30	Yan Chai No.2 Hospital Secondary School	LNRS
TNM2	L31	Ju Ching Chu Secondary School (Tuen Mun)	LNRS
TNM3	L37	The Church of Christ in China Hoh Fuk Tong Primary School	LNRS

- 4.8.2 The monitoring locations should be selected according to the following criteria:
- They should be at NSRs in the vicinity of recommended direct technical remedies; preferably, there should be one representative monitoring location near proposed mitigation measure (i.e., LNRS);
 - One high floor and one medium floor monitoring point should be chosen at each location as far as practicable; and
 - Selected monitoring locations should allow monitoring to be done twice within one year after the implementation of the mitigation measures during the operation of the Project.
- 4.8.3 The status and locations of the NSRs may change after this Manual is issued. If such cases exist, the ET Leader should propose updated monitoring locations and seek approval from IEC and ER, and agreement from EPD before commencement of traffic noise monitoring.
- 4.8.4 When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria:
- Alternative locations should be similarly exposed to potential noise impacts;
 - It should be close to the NSRs; and
 - It should be located where there would be minimal disturbance to the occupants.

4.9 IMPACT MONITORING FOR OPERATION ROAD TRAFFIC NOISE

- 4.9.1 The operational noise monitoring should be carried out at a distance of 1m from the openable window and 1.2m above the floor level of the noise sensitive receivers identified. The ET Leader should agree with the IEC on any necessary corrections adopted.
- 4.9.2 Traffic noise monitoring should be carried out at all the designated traffic noise monitoring stations. The following is an initial guide on the traffic noise monitoring requirements during the operational phase:
- One set of measurements at the morning traffic peak hour on a normal weekday;
 - One set of measurements at the evening traffic peak hour on a normal weekday;
 - A concurrent census of traffic flow and percentage of heavy vehicles shall be conducted for the Project roads 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 point; and
 - The two sets of monitoring data should be obtained within the first year of operation.
- 4.9.3 Measured noise levels should be compared with the predicted noise levels by applying appropriate conversion corrections to allow for the traffic conditions at the time of measurement. A sample data record sheet for traffic noise monitoring during the operational phase is shown in **Appendix 4.2** for reference.
- 4.9.4 Each set of measurements shall include three measurements of 30-minute. The parameters L_{10} , L_{eq} , L_{90} and L_{max} shall be recorded for data auditing and reference.
- 4.9.5 The ET shall prepare a monitoring plan for the purpose of assessing the accuracy of the traffic noise predictions by comparing the noise impact predictions with the actual impacts. The monitoring plan shall be submitted to EPD at least six months before the operation of the proposed roads under the Project. The monitoring plan shall include monitoring locations, monitoring schedules, methodology of noise monitoring such as noise measurement procedures, traffic counts and speed checks, and methodology of comparison with the predicted levels. The ET shall follow the monitoring plan unless with prior justifications. Monitoring details and results including the comparison between the measured noise levels and the predicted levels should be recorded in a report to be deposited with EPD within one month of the completion of the monitoring. The report should be certified by the ET Leader and verified by the IEC before submitting it to EPD.

4.10 EVENT AND ACTION PLAN FOR ROAD TRAFFIC NOISE

- 4.10.1 The measured road traffic noise levels should 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, explanations should be given to justify the discrepancies.

4.11 MITIGATION MEASURES

Construction Phase

4.11.1 In order to reduce the noise impact of construction site activities on nearby NSRs, the following mitigation measures have been considered:

- Use of quiet construction method/ Quality Power Mechanical Equipment (QPME);
- Use of Noise Barrier, Noise Insulation Fabric and Noise Enclosure;
- Good site practices;
- Scheduling of PME/construction activities; and
- Construction noise management plan.

Use of Quiet Construction Method / Quality Powered Mechanical Equipment

4.11.2 For sheet piles installation, “Press-in” method is more preferable than the use of traditional vibratory hammer due to lesser noise and vibration impact generated. According to the EPD web page, the noise emission of “Press-in” method is 69 dB(A) at 7 m from the silent piler, which is more than 20 dB(A) quieter than the vibratory hammer. The Contractor should prioritise the use of “Press-in” method over the traditional method if site conditions allowed. However, “Press-in” method would also have its own limitations and thus it should not restrict Contractor to fully adopt the “Press-in” as long as the Contractor can demonstrate the full compliance of daytime noise criteria by using vibratory hammer with proper mitigation measures.

4.11.3 Traditional demolition method relies on excavator mounted hydraulic breaker to break concrete structures, however, operating hydraulic breaker would inevitably generate significant noise impact to the NSRs nearby. As confirmed by Project Engineer, it is feasible to adopt quieter demolition equipment (e.g. hydraulic crusher) in some activities as a mitigation measure. Using hydraulic crusher would create lesser noise impact to the NSRs. The Contractor should, subject to the actual site condition, proactively adopt quieter demolition equipment to carry out the demolition works, where practicable. Apart from the above, the Contractor will be required to review and adopt quieter construction methods or technologies to further reduce the noise at its source as far as they are technically feasible and applicable for the proposed construction works. These include non-explosive chemical expansion agent, high pressure water jetting, hand-held concrete crusher, quieter type blade saw, and quieter type wire saw / diamond wire saw. These quieter equipment / construction methods, while not adopted in the assessment, shall be considered during the design, tendering and implementation stage of the construction works as appropriate.

4.11.4 Apart from the above, the Contractor will be required to review and adopt quieter construction methods or technologies to further reduce the noise at its source as far as they are technically feasible and applicable for the proposed construction works. These include non-explosive chemical expansion agent, high pressure water jetting, hand-held concrete crusher, quieter type blade saw, and quieter type wire saw / diamond wire saw. These quieter equipment / construction methods, while not adopted in the assessment, shall be considered during the design, tendering and implementation stage of the construction works as appropriate.

4.11.5 The use of QPME was considered to be a practicable means to mitigate the construction noise impact. A QPME is defined as a PME having an actual SWL lower than the value specified in the GW-TM. The contractors may adopt alternative QPME as long as it can demonstrate that they would not result in construction noise impacts worse than those predicted in this assessment.

Use of Noise Barrier, Noise Insulation Fabric and Noise Enclosure

- 4.11.6 Noise barriers or enclosures would be erected to provide screening from the construction plant. Noise barriers will become more effective when located immediately adjacent to the PME and be moved concurrently with the PME along the work site. The Contractor should be responsible for design of the noise barrier/enclosure with due consideration given to the size of the PME and the requirement of intercepting the line of sight between the NSRs and PME. A typical design which has been used locally is a wooden framed barrier with a small cantilevered upper portion of superficial density no less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining. Noise barriers should be erected/built in such a way with no openings or gaps on the joints, and should be long enough (e.g. at least five times greater than its height) or be bent around the noise sources to ensure the effectiveness. A cantilevered top cover would be required for the noise barriers to achieve screening benefits at the upper floors of NSRs. It is anticipated that suitably designed noise barriers/enclosures could achieve at least 5 to 10 dB(A) reduction for movable and stationary plants, respectively.
- 4.11.7 In addition, noise insulation fabric (the Fabric) would be installed for PME such as piling rigs and drilling rigs and the Fabric should be lapped such that there would be no opening or gaps on the joints.

Good Site Practices

- 4.11.8 It is also recommended to implement good site practices as far as practicable so as to further reduce the noise impact at NSRs. The following good site practices should be followed during the construction phase.
- Only well-maintained plant should be operated on-site and should be served regularly during construction period;
 - Mobile plant, if any, should be sited as far from NSRs as possible;
 - Use of site hoarding as a noise barrier to screen noise at low level NSRs;
 - Machines and plant that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum.
 - Silencers or mufflers on construction equipment should be utilized and be properly maintained during construction;
 - Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and
 - Material stockpiles should be effectively utilized, wherever practicable, in screening noise from on-site construction activities.

Scheduling of Construction Works

- 4.11.9 The Contractor shall liaise with the school representative(s) to obtain the examination schedule so as to avoid noisy construction activities during the school examination period. Scheduling construction works outside the school examination period to less intrusive periods or restricting critical works areas would reduce the overall construction noise impacts at the NSRs and ensure compliance with the construction noise criterion. In addition, since NSRs H1 and H9 are located in close vicinity to the works area of the Project and Cycle Track between Tsuen Wan and Tuen Mun (Tuen Mun to So Kwun Wat), the Contractor will continuously liaise with the contractor of the Cycle Track project to avoid concurrent operation of PMEs.

Construction Noise Management Plan

- 4.11.10 A construction noise management plan should be prepared during the design / tendering and implementation stage of the construction works, to verify the inventory of noise sources, assess



the effectiveness and practicality of all identified measures and update the construction noise impact assessment and proposed noise mitigation measures as necessary.

4.11.11 The implementation schedule for the recommended mitigation measures is presented in **Appendix 1.2**.

Operation Phase

Road Traffic Noise

4.11.12 Direct noise mitigation measures including LNRS have been proposed to alleviate the traffic noise impact. **Table 4.5** summarise the proposed noise mitigation measures.

Table 4.5 List of Proposed Noise Mitigation Measures

Proposed Noise Mitigation Measures	Location	Approximate Length (m) (rounded off to the nearest 10m)
LNRS	Proposed slip road LFRSR NB	470m
LNRS	Proposed slip road LFRSR SB	670m

4.11.13 In addition to the LNRS, 1.8m parapet wall is proposed along the western side of LFRSR NB and 0.5m parapet wall is proposed along remaining sides of LFRSR NB and SB as standard provisions.

4.11.14 After implementing the proposed LNRS, the predicted overall noise levels at all NSRs comply with the relevant noise criteria. Based on the criteria as stated in Section 4.6.14 of the EIA Report, the eligibility test for indirect noise mitigation measures is conducted. Details of the eligibility test are given in Appendix 4.14 of the EIA Report. As no representative existing NSRs would fall within all three testing criteria, it is considered that no indirect mitigation measures would be required.

4.11.15 The feasibility, practicability, programming and effectiveness of the above mitigation measures have been reviewed and confirmed by the engineer. Environmental reviews shall be conducted at later design stage to review and ascertain the proposed provisional noise mitigation measures taking into account the latest design standard at that time for the suitability and application of the LNRS materials.

4.11.16 The implementation schedule for the recommended mitigation measures is presented in **Appendix 1.2**.

4.12 AUDIT REQUIREMENTS

4.12.1 Regular environmental site inspections and audits during the construction phase of the Project should be conducted at least once per week to ensure proper implementation of mitigation measures and good site practices as listed in **Appendix 1.2** and the noise control requirements stated in EPD's "*Recommended Pollution Control Clauses for Construction Contracts*" to further minimise the potential noise nuisance during the construction phase.

5 WATER QUALITY

5.1 INTRODUCTION

- 5.1.1 Potential water pollution sources from the construction and operation of the Project have been identified including construction runoff, sewage, possible contamination due to oil and grease, use of fertilizers, pesticides and waste construction materials. With the implementation of the recommended mitigation measures, no unacceptable water quality impacts would be expected. No water quality monitoring is therefore considered necessary. Regular site inspections and audits are recommended during the construction phase to ensure the recommended mitigation measures are properly implemented.

5.2 MITIGATION MEASURES

- 5.2.1 Mitigation measures for water quality control during the construction phase have been recommended in the EIA Report. The Contractor should be responsible for the design and implementation of these measures. Recommended mitigation measures to minimise the adverse impacts on water quality during the construction activities are listed in the implementation schedule given in **Appendix 1.2**.

5.3 CONSTRUCTION SITE AUDITS

- 5.3.1 Regular site inspections and audits should be conducted to ensure that the recommended mitigation measures are properly implemented during the construction phase of the Project. It can also provide effective control of any malpractices and therefore achieve continual improvement of environmental performance on site.

Site Inspections

- 5.3.2 Regular site inspections shall be carried out by the ET at least once per week and shall be based on the mitigation measures for water pollution control recommended in **Appendix 1.2**. If the recommended mitigation measures are not fully or properly implemented, the deficiency shall be recorded and reported to the site management. Suitable actions are to be carried out to:

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

Compliance Audits

- 5.3.3 Monitoring of the treated effluent quality from the Works Areas is required during the construction phase of the Project. The monitoring shall be carried out at the pre-determined discharge point. Compliance audits are to be undertaken to ensure that a valid discharge licence has been issued by EPD prior to the discharge of effluent from the Project site. The monitoring frequency and parameters specified in the discharge licence shall be followed during the monitoring. All monitoring requirements shall be approved by EPD. The audit results reflect



whether the effluent quality complies with the discharge licence requirements. In case of non-compliance, suitable actions shall be undertaken to:

- (i) Notify the site management about the non-compliance;
- (ii) Identify the sources of pollution;
- (iii) Check the implementation status of the recommended mitigation measures;
- (iv) Investigate the operating conditions of the on-site treatment systems;
- (v) Implement corrective and remedial actions to improve the effluent quality;
- (vi) Increase monitoring frequency until the effluent quality complies with the discharge licence requirements; and
- (vii) Record the non-compliance and propose preventive measures.

6 WASTE MANAGEMENT

6.1 INTRODUCTION

- 6.1.1 Construction and Demolition (C&D) materials, chemical waste and general refuse from the workforce would be generated during the construction phase. This section sets out the handling, recycling, storage, transportation and disposal measures for these wastes which are recommended to avoid and minimise potential adverse impacts associated with waste arising from the construction of the Project.
 - 6.1.2 It is expected that no waste will be generated as a result of the operation of the Project, and thus there would be no adverse environmental impacts related to waste management during the operation phase of the Project. Monitoring and audit programme for the operation phase of the Project would not be required.
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6.2 WASTE MANAGEMENT APPROACH

Management of Waste Disposal

- 6.2.1 In accordance with the *Waste Disposal (Charges for Disposal of Construction Waste) Regulation*, the Contractor should open a billing account with the EPD. Every construction waste or public fill load to be transferred to the Government waste disposal facilities, namely public fill reception facilities, construction waste sorting facilities, and landfills will require a valid “chit” which contains information of the account holder (the Contractor) to facilitate waste transaction recording and billing to the waste producer.
- 6.2.2 A Construction and Demolition Material Management Plan (C&DMMP) should be prepared in accordance with Section 4.1.3 of Chapter 4 of Project Administration Handbook (PAH) for Civil Engineering Works (2020 Edition) and submitted to Public Fill Committee (PFC) for approval.
- 6.2.3 Inert C&D materials generated from the Project will be transferred to Tuen Mun Area 38 Fill Bank (TMFB), or other public fill reception facilities, managed by Civil Engineering and Development Department (CEDD), while the non-inert C&D materials, after segregation, will be sent to West New Territories Landfill (WENT) or West New Territories Landfill Extension (WENTX), or other waste disposal facilities, managed by the EPD.
- 6.2.4 A trip-ticket system will also be established in accordance with *DevB TC(W) No.6/2010* to monitor the disposal of construction waste at landfill and to control fly-tipping. In addition, all dump trucks should be equipped with GPS or equivalent system for monitoring of their transportation routes and parking locations to prohibit illegal dumping and landfilling of C&D materials. The Contractor should maintain a recording system to record the amount of C&D materials generated, recycled and disposed of at the disposal sites as well as the transportation routing and parking locations of the dump trucks. The trip-ticket system and the abovementioned recording system will be included as part of the contractual requirements and implemented by the Contractor(s).
- 6.2.5 As per recommendation under *ETWB TC(W) No. 19/2005*, a WMP, with details of the amount of waste generated, recycled and disposed of (including the disposal sites), will be established and implemented during the construction phase as part of the EMP. The Contractor will be required to prepare the EMP and submit it to the Engineer/ ER under the Contract for approval prior to implementation.

Approach to Reduce Waste Generation

Construction and Demolition (C&D) Materials

- 6.2.6 C&D materials generated from the construction works of the Project comprise both inert C&D materials (i.e. excavated soil, rock, broken concrete) and non-inert C&D materials (i.e. vegetation, wood, plastics, packaging materials, etc). The inert C&D materials will be segregated from other non-inert C&D materials and be sent to TMFB, or other public fill reception facilities. The non-inert C&D materials will be further segregated into recyclable materials, such as cardboard, carton box, waste paper and scrap metal for collection by recyclers, and non-recyclable materials, such as waste timber and packaging materials, which will be disposed of at WENT/WENTX, or other waste disposal facilities.

General Refuse

- 6.2.7 General refuse will be generated from daily site office operations and workforce. Recycling bins should be provided at strategic locations, such as the entrance of the site office to facilitate the recovery of aluminium cans and waste paper generated from the Site. Materials collected in the recycling bins should be collected by or sold to local recyclers.

Management of Chemical Waste

- 6.2.8 Chemical wastes likely to be generated from the construction of the Project may include residual paints and solvents and used lubricant oil from maintenance of the construction plant. It is anticipated that the quantity of chemical waste to be generated will be small and in the order of a few hundred litres per month during the construction phase. These chemical wastes will be stored and disposed of in an appropriate manner, as outlined in the *Waste Disposal (Chemical Waste) (General) Regulation* and the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*.
- 6.2.9 The Contractor should register as a chemical waste producer with the EPD, and handle the chemical waste in accordance with the *Code of Practice on the Package, Labelling and Storage of Chemical Wastes*. A brief summary of the site arrangement should be as follows:

Storage Containers

- 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 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.

Storage Area

- Be clearly labelled and used solely for the storage of chemical waste;
- Be enclosed on at least three sides;
- Have an impermeable floor and bunding, of a 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 (with water collected within the bund be disposed of as chemical waste when necessary); and

- Be arranged so that incompatible materials are appropriately separated.

Disposal

- Be collected by a licensed chemical waste collector; and
 - Be disposed/transferred to a facility licensed to receive chemical waste, such as Chemical Waste Treatment Facility (CWTF) at Tsing Yi or other chemical waste recyclers.
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6.3 STAFF TRAINING

- 6.3.1 At the commencement of the construction works, training should be provided to workers on the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling.
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6.4 AUDIT REQUIREMENTS

- 6.4.1 In order to review the good site practices of waste management, regular environmental site inspections and audits should be carried out by the ET at least once per week to check whether the Contractor has implemented the recommended good site practices and other mitigation measures. The inspection should look at all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspection, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and Contract requirements. Designated staff of the Contractor responsible for resource allocation, staff training and controlling the relevant documents will also be interviewed to review the effectiveness of site management.
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6.5 MITIGATION MEASURES

Good Site Practice

- 6.5.1 Under the condition of good site practices are strictly followed, it is anticipated that no adverse waste management-related impacts would arise. Recommendations for good site practices during the construction activities include:
- Nomination of approved personnel, such as a site manager, to be responsible for the implementation of good site practices, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the site;
 - Training of site personnel in site cleanliness, appropriate waste management procedures, including chemical waste handling procedures, and concepts of waste reduction, reuse and recycling;
 - Provision of sufficient waste disposal points and regular collection for disposal;
 - Appropriate measures to minimise windblown litter and dust during the transportation of waste by either covering trucks or by transporting wastes in enclosed containers;
 - Separation of chemical wastes for special handling and appropriate treatment at the CWTF;
 - Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;
 - Implementation with a recording system for the amount of wastes generated, recycled and disposed (including the disposal sites; should be proposed; and

- A waste management plan (WMP) should be prepared in accordance with *ETWB TC No. 19/2005* and submitted to the ER for approval.

Waste Reduction Measures

6.5.2 Good management and control can prevent the generation of a significant amount of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:

- Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance the reuse or recycling of material and their proper disposal;
- Encourage collection of aluminium cans and waste paper by individual collectors during construction with separate labelled bins being provided to allow the segregation of these wastes from other general refuse generated by the workforce;
- Any unused chemicals and those with remaining functional capacity be recycled as far as possible;
- Use of reusable non-timber formwork to reduce the amount of C&D materials;
- Before disposal of construction waste, wood, steel and other metals should be separated, to the extent practical for re-use and/or recycling to reduce the quantity of waste to be disposed to the landfills;
- Proper storage and site practices to reduce the potential for damage or contamination of construction materials; and
- Plan and stock construction materials carefully to reduce the amount of waste generated and avoid the unnecessary generation of waste.

6.5.3 Waste management approach recommended in the EIA Study is outlined in **Appendix 1.2**.

6.5.4 In the event of complaints, or non-compliance/area of improvement is observed, the ET and the Contractor should be responsible for reviewing the effectiveness of these mitigation measures and for proposing to ER for approval, designing and implementing alternative or additional mitigation measures as appropriate.



7 LAND CONTAMINATION

7.1 SUMMARY

- 7.1.1 The land contamination assessment has examined the potential contaminating land uses within the Project area and investigated any potential land contamination impacts arising from the Project.
- 7.1.2 Based on the site appraisal, no adverse land contamination impact arising from Project is anticipated. No EM&A programme is therefore required.

8 ECOLOGY

8.1 INTRODUCTION

- 8.1.1 Potential ecological impacts arising from the construction and operational phases of the Project were assessed in the EIA Report. Mitigation measures have been recommended to minimise the potential impacts to the nearby sensitive habitats and associated wildlife. With the implementation of appropriate mitigation measures, no unacceptable adverse residual impacts would be anticipated.
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8.2 MITIGATION MEASURES

Impact avoidance

- 8.2.1 No site or habitat of conservation importance would be directly impacted. Direct impacts on the flora and fauna species of conservation importance would also be avoided. Direct impacts on the Tai Lam Country Park (TLCP) which is located uphill and some distance away from the Project Site of the proposed Tuen Mun Road / Hoi Wing Road Slip Road (HWRSR) is also avoided. In the subsequent stage of the Project, any adjustment in Project Site shall take into consideration of the location of the Country Park and avoid encroaching onto it.

Minimisation

Minimising habitat and tree loss

- 8.2.2 Mixed woodland and semi-natural watercourse within the HWRSR site but outside the road layout will be retained during the construction phase, which could reduce the ecological impact brought by temporary loss of these habitats. Efforts will also be made to minimise tree loss brought by the Project as far as technically feasible during the detailed design stage of the Project. Temporary loss of plantation affected by the Project will be reinstated by compensatory planting. Transplantation and provision of compensation planting is provided in the Compensatory Planting Plan in Appendix 9.2 of EIA.

Minimising indirect disturbance impacts

Construction Site Runoff

- 8.2.3 During the construction phase, site runoff would need to pass through sedimentation tanks to reduce the concentration of suspended sediment. In accordance with the Practice Note for Professional Persons on Construction Site Drainage, Environmental Protection Department, 1994 (ProPECC PN 1/94), best management practices should be implemented on site as far as practicable to control site runoff and drainage at all work sites during construction, so that the treated runoff will be discharged to public drainage system in compliance with the WPCO. Construction effluent, site run-off and sewage should be properly collected and/or treated. Wastewater from a construction site should be managed. Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/rivers should be identified. Effluent monitoring should be incorporated to make sure that the discharged effluent from construction sites meets the effluent discharge guidelines. The best practices are detailed in Section 5 – Water Quality.

Good Site Practices

- 8.2.4 Standard site practices listed as follows would be implemented to minimise potential impacts, including dust, noise and site runoff, on the surrounding environment. Specific good site practices related to air, noise and water are also specified in the relevant EIA chapters.

- Regular checking should be undertaken to ensure that the work site boundary is not exceeded and that no damage occurs to surrounding areas;
- Implementation of mitigation measures specified in ProPECC PN 1/94 to control site runoff and drainage during construction;
- Implementation of noise control measures to reduce impacts of construction noise to wildlife habitats adjacent works area;
- Implementation of dust control measures at all construction sites to minimise dust nuisance to adjacent wildlife habitats during construction activities;
- Construction debris and spoil should be covered up and/or properly disposed of as soon as possible to avoid being washed into nearby waterbodies by rain;
- Good site practice and site precautionary measures will also be implemented to avoid the potential impact due to site runoff. Construction effluent, site runoff and sewage should be properly collected and/or treated. Wastewater from a construction site should be managed with the following approach in descending order;
- Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/rivers should be identified;
- Effluent monitoring should be incorporated to make sure that the discharged effluent from construction site meets the effluent discharge guidelines; and
- Supervisory staff should be assigned to station on site to closely supervise and monitor the works.

Mitigation

Minimisation of bird collision

- 8.2.5 In order to minimise bird collision due to the re-provided noise barriers along the new roads, bird friendly design should be adopted for the noise barriers, such as using falcon sticker and tinted materials. Guidelines on Design of Noise Barriers (EPD & HyD, 2003) and Practice Notes No. BSTR/PN/003 (Revision E) Noise Barriers with Transparent Panels (HyD, 2020) could be referred for the design of the noise barrier to avoid and minimise bird mortality from collision.

Compensatory tree planting

- 8.2.6 The loss of small area of mixed woodland should be mitigated by compensatory tree planting, which is detailed in **Section 9 - Landscape and Visual**.

8.3 AUDIT REQUIREMENTS

- 8.3.1 Regular site inspections and audits (i.e. at least once per week) will serve to check the implementation status of the mitigation measures and good practices recommended in the EIA report.

9 LANDSCAPE AND VISUAL

9.1 INTRODUCTION

9.1.1 The EIA Report has recommended landscape and visual mitigation measures for the construction and operation phases of the Project. This section defines the audit requirements to confirm the recommended landscape and visual impact mitigation measures are effectively implemented.

9.2 MITIGATION MEASURES

- 9.2.1 The landscape and visual mitigation measures should be incorporated in the detailed design. The mitigation measures during construction and operation phases as recommended in the EIA Report are presented in **Appendix 1.2**. Where feasible, the construction phase mitigation measures should be implemented as early as possible in order to minimise the landscape impacts in the construction stage 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 before commissioning of the Project.
- 9.2.2 Any potential conflicts among the proposed mitigation measures, the Project works, and operational requirements should also be identified and resolved at early stage. Any changes to the mitigation measures should be incorporated in the detailed design.
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9.3 AUDIT REQUIREMENTS

- 9.3.1 Site audits should be undertaken during the construction phase and the 12-month establishment period (operation phase) to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives. Site audit for the off-site woodland compensation should be carried out throughout the agreed establishment period with LCSD and HyD.
- 9.3.2 The ET shall audit the implementation of landscape construction works particularly during site clearance operations when the proposed tree felling and transplanting will take place and subsequent tree maintenance operations and planting works.
- 9.3.3 Site inspections should be undertaken by the ET at least once every month during the construction period, and once every two months for the 12-month establishment period during operation phase.

10 CULTURAL HERITAGE

10.1 INTRODUCTION

- 10.1.1 Potential cultural heritage impacts arising from the construction phase of the Project were identified and assessed in the EIA Report. With the implementation of the recommended mitigation measures, no unacceptable cultural heritage impacts would be expected.
- 10.1.2 Potential cultural heritage impact arising from the operation phase of the Project is not anticipated. No mitigation measures, monitoring and audit are considered necessary during the operation phase of the Project.
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10.2 MITIGATION MEASURES

- 10.2.1 As a precautionary measure, the project proponent and his/her contractor are required to inform AMO immediately when any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53) are discovered during the course of works.
- 10.2.2 Design proposal, method of works and choice of machinery should be targeted to minimise potential vibration impact on Shing Miu (GB-01) and seven other associated building structures. As a precautionary measure, it is recommended that during the pre-construction phase of the Project and implemented by the works contractor, a baseline condition survey and baseline vibration impact assessment be conducted for Shing Miu and the associated building structures by a qualified building surveyor or qualified structural engineer to evaluate the necessary construction monitoring and structural strengthening measures for AMO's consideration.
- 10.2.3 The temple owner/ manager of the Shing Miu compound shall be consulted to agree on appropriate mitigation measures to be adopted for the abandoned Earth God Shrine and access to Shing Miu during the construction phase of the Project.
- 10.2.4 The works area shall be reviewed and refined to exclude the Arch of the Shing Miu compound to avoid the potential impact. During the construction phase of the Project adjacent to the Arch, it shall be physically fenced off from the works area to minimise potential physical disturbance of construction works towards the Arch.
- 10.2.5 If there are any buildings/structures both at grade level and underground which were built in or before 1969, the project proponent is required to alert AMO in an early stage or once identified.
- 10.2.6 The above mitigation measures for cultural heritage during the construction phase have been recommended in the EIA Report. Recommended mitigation measures on cultural heritage during the construction phase are detailed in the implementation schedule given in **Appendix 1.2**.
- 10.2.7 Potential cultural heritage impact arising from the operation phase of the Project is not anticipated. No mitigation measure is considered necessary during the operation phase of the Project.
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10.3 AUDIT REQUIREMENTS

- 10.3.1 During the pre-construction phase of the Project and implemented by the works contractor, a baseline condition survey and baseline vibration impact assessment be conducted for Shing Miu (GB-01) and the associated building structures by a qualified building surveyor or qualified



structural engineer to define the vibration limit and to evaluate the necessary construction monitoring and structural strengthening measures for AMO's consideration.

- 10.3.2 Regular site inspections and audits should be carried out by the ET at least once per week during the construction phase to ensure that the recommended mitigation measures related to cultural heritage listed in **Appendix 1.2** are properly implemented.

11 ENVIRONMENTAL AUDIT

11.1 SITE INSPECTION

- 11.1.1 Site inspections provide a direct means to assess and confirm that the Contractor's environmental protection and pollution control measures are in compliance with the contract specifications. The site inspection will be undertaken routinely by the ET to verify that appropriate environmental protection and pollution control mitigation measures are properly implemented in accordance with the EIA recommendations. In addition, the ET will be responsible for defining the scope of the inspections, detailing any deficiencies that are identified and reporting any necessary action and/or additional mitigation measures that were implemented as a result of the inspection.
- 11.1.2 Site inspections should be carried out at least once per week. The areas of inspection should not be limited to the general environmental conditions in the vicinity of the site and the pollution control and mitigation measures within the site; the environmental conditions outside the site area which are likely to be affected, directly or indirectly, by site activities. The ET Leader should make reference to the following information in conducting the inspections:
- The EIA Study and EM&A recommendations on environmental protection and pollution control mitigation measures;
 - Ongoing results of the EM&A programme;
 - Works progress and programme;
 - Individual works method statements which should include proposals on associated pollution control measures;
 - Contract specifications on environmental protection;
 - Relevant environmental legislation and guidelines; and
 - Previous site inspection results undertaken.
- 11.1.3 The Contractor will update the ET with relevant information on the construction works prior to carrying out the site inspections. The site inspection results and their associated recommendations on improvements to the environmental protection and pollution control works should be submitted to the IEC and the Contractor in two working days, for reference and for taking immediate action. Should actions be necessary, the ET will follow up with recommendations on improvements to the environmental protection and pollution control works and will submit these recommendations in a timely manner to the IEC and the Contractor. They will also be presented, along with the remedial actions taken, in the monthly EM&A report. The Contractor should follow the procedures and time-frames stipulated in the environmental site inspection for the implementation of mitigation proposal. An action reporting system will be formulated and implemented to report on any remedial measures implemented subsequent to the site inspections.
- 11.1.4 Ad hoc site inspections will also be carried out by the ET and site audits by the IEC if significant environmental issues are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the associated investigation work, as specified in the Action Plan for environmental monitoring and audit.

11.2 COMPLIANCE WITH LEGAL AND CONTRACTUAL REQUIREMENTS

- 11.2.1 The Contractor should comply with contractual environmental protection and pollution control requirements, Hong Kong's environmental protection and pollution control laws.
- 11.2.2 In order that the works are in compliance with the contractual requirements, all works method statements (where relevant to environmental measures) submitted by the Contractor to the ER for approval should also be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.
- 11.2.3 The ET shall review all the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented.
- 11.2.4 The Contractor shall regularly copy inspection relevant documents to the ET Leader so that works checking and auditing process could be carried out effectively. The relevant documents are expected to include the updated work progress reports, the updated works programme, the application letters for different licences/permits under the environmental protection laws, all valid licences/permits and environmental related records. The site diary should also be available for the ET Leader's inspection upon his request.
- 11.2.5 After reviewing the documentation, the ET Leader shall advise the IEC and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works is incompatible with the works programme or may result in a potential violation of environmental protection and pollution control requirements, he should also advise the Contractor and the ER in due course.
- 11.2.6 Upon receipt of the advice, the Contractor should undertake immediate action to remedy the situation. The ER should follow up to ensure that appropriate action has been taken by the Contractor in order to satisfy contractual and legal requirements.

11.3 ENVIRONMENTAL COMPLAINTS

- 11.3.1 Complaints shall be referred to the ET Leader for action. The ET Leader shall undertake the following procedures upon receipt of any environmental complaint:
- (i) Log the complaint and date of receipt onto the complaint database and inform the IEC immediately;
 - (ii) Investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;
 - (iii) Identify mitigation measures in consultation with the IEC if a complaint is valid and due to works;
 - (iv) Advise the Contractor if mitigation measures are required;
 - (v) Review the Contractor's response to identified mitigation measures and the updated situation;

- (vi) If the complaint is transferred from the Environmental Protection Department (EPD), submit an interim report to the EPD on the status of the complaint investigation and follow-up action within the time frame assigned by the EPD;
- (vii) Undertake additional monitoring and audit to verify the situation if necessary, and review those circumstances leading to the complaint not recurring;
- (viii) Report investigation results and subsequent actions to the complainant (if the source of complaint is identified through EPD, the results should be reported within the timeframe assigned by EPD); and
- (ix) Record the complaint, investigation, subsequent actions and the results in the monthly EM&A reports.

11.3.2 A flow chart of the complaint response procedure is shown in **Appendix 11.1**.

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

11.4 LOG BOOK

11.4.1 The ET Leader will keep a contemporaneous log book of each and every instance or circumstance or change of circumstances which may affect the EIA and every non-compliance from the recommendations of the EIA Report or the EP. The ET Leader will notify the IEC within one working day of the occurrence of any such instance or circumstance or change of circumstance. The ET Leader's log-book will be kept readily available for inspection by persons assisting in supervision of the implementation of the EIA Report recommendations (such as IEC and Contractor) or by EPD or his authorised officers.

12 REPORTING

12.1 GENERAL

- 12.1.1 Upon agreement with the ER and EPD, reports can be provided in electronic format. This would enable a transition from a paper/ historic and reactive approach to an electronic/real-time proactive approach. All monitoring data, including baseline and impact monitoring, shall also be submitted in electronic format.
- 12.1.2 The ET Leader shall submit baseline monitoring reports, monthly EM&A reports and final EM&A review reports. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final review EM&A reports will be made available to the Director of Environmental Protection (DEP). The exact details of the frequency, distribution and time frame for submission shall be agreed with the IEC, the ER and EPD prior to the commencement of works.

12.2 INTERIM NOTIFICATION OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCES

- 12.2.1 With reference to the EAPs, when the environmental quality performance limits are exceeded, the ET Leader shall immediately notify the IEC, HyD and EPD, as appropriate. The notification shall be followed up with advice to IEC, HyD and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notifications is presented in **Appendix 12.1**.

12.3 BASELINE MONITORING REPORT

- 12.3.1 Baseline Environmental Monitoring Report(s) shall be prepared within ten working days of completion of the baseline monitoring and then certified by the ET Leader. Copies of the Baseline Environmental Monitoring Report shall be submitted to the Contractor, the IEC, ER and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies they require. The report format and baseline monitoring data format shall be agreed upon with the IEC, the ER and EPD prior to submission.
- 12.3.2 The Baseline Environmental Monitoring Report shall include, but not be limited to the following information:
- (i) Up to half a page executive summary;
 - (ii) Brief project background information;
 - (iii) Drawings showing locations of the baseline monitoring stations;
 - (iv) An updated construction programme with milestones of environmental protection/ mitigation activities annotated;
 - (v) Monitoring results (in both hard and soft 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
 - Quality assurance (QA)/ quality control (QC) results and detection limits.
- (vi) Details on influencing factors, including:
- Major activities, if any, are carried out on the site during the period;
 - Weather conditions during the period; and
 - Other factors which might affect results.
- (vii) Determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored;
- (viii) Revisions for inclusion in the EM&A Manual; and
- (ix) Comments, recommendations and conclusions.
-

12.4 MONTHLY EM&A REPORTS

12.4.1 The results and findings of all EM&A works required in the Manual should be recorded in the monthly EM&A reports prepared by the ET Leader and verified by the IEC. The first Monthly EM&A Report should be prepared and submitted to EPD in the month after the major construction works commence with the subsequent Monthly Reports due within ten working days of the end of each reporting month. Copies of each monthly EM&A report shall be submitted to the parties: Contractor, IEC, HyD and EPD, as well as to other relevant departments as required. Before submission of the first monthly EM&A Report, the ET shall liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium.

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

Contents of First Monthly EM&A Report

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

- (i) Executive summary (1-2 pages), including:
- Breaches of Action and Limit levels;
 - Complaint log;
 - Notifications of any summons and successful prosecutions;
 - Reporting changes; and
 - Future key issues.
- (ii) Basic project information, including:
- Project organisation including key personnel contact names and telephone numbers;
 - Construction programme;
 - Management structure; and

- Works were undertaken during the month;
- (iii) Environmental status, including:
- Advice on the status of statutory environmental compliance, such as the status of compliance with the 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 the location of works, etc.); and
 - Drawings showing the Project area, any environmentally sensitive receivers and the locations of the monitoring stations;
- (iv) A brief summary of EM&A requirements, including:
- All monitoring parameters;
 - Environmental quality performance limits (Action and Limit levels);
 - Event and Action Plans;
 - Environmental mitigation measures as recommended in the Final EIA report; and
 - Environmental requirements in contract documents;
- (v) Implementation status, including:
- Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the EIA report;
- (vi) Monitoring results (in both hard and electronic copies) with the following information:
- Monitoring methodology;
 - Name of laboratory and types of equipment used and calibration details;
 - Monitoring parameters;
 - Monitoring locations and depth;
 - Monitoring date, time, frequency, and duration; and
 - Weather conditions during the period.
- (vii) Graphical plots of the monitored parameters in the month annotated against:
- The major activities being carried out on-site during the period;
 - Weather conditions that may affect the results;
 - Any other factors which might affect the monitoring results; and
 - QA/QC results and detection limits;
- (viii) Report on non-compliance, complaints, notifications of the summons and successful prosecutions, including; and:
- Record all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;

- Record of all notification of summons and successful prosecutions for breaches of current environmental protection/ pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance;

(ix) Others:

- Summary of future key issues as reviewed from the works programme and work method statements;
- Advice on the solid and liquid waste management status;
- Record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.);
- A forecast of the works programme, impact predictions and monitoring schedule for the next three months;
- Compare and contrast the EM&A data with the EIA predictions and annotate with an explanation for any discrepancies; and
- Comments (for example, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

Contents of Subsequent Monthly EM&A Report

12.4.4 Subsequent monthly EM&A reports shall include the following:

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

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

(ii) Basic project information, including:

- Project organisation including key personnel contact names and telephone numbers;
- Construction programme;
- Management structure,
- Works were undertaken during the month; and
- Any updates as needed to the scope of works and construction methodologies;

(iii) Environmental status, including:

- Advice on the status of statutory environmental compliance, such as the status of compliance with the 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 the location of works, etc.); and
 - Drawing(s) showing the Project site area, any environmental sensitive receivers and the locations of the monitoring stations;
- (iv) Implementation status, including:
- Advice on the implementation status of environmental protection and pollution control/ mitigation measures, as recommended in the EIA report;
- (v) Monitoring results (in both hard and electronic copies) 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;
 - Weather conditions during the period;
 - Any other factors which might affect the monitoring results; and
 - QA/ QC results and detection limits;
- (vi) Report on non-compliance, complaints, notifications of the summons and successful prosecutions, including:
- Record all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - Record of all notification of summons and successful prosecutions for breaches of current environmental protection/ pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance;
- (vii) Others:
- Summary of future key issues as reviewed from the works programme and work method statements;
 - Advice on the solid and liquid waste management status;

- Record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.);
- Comments (for example, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions;

(viii) Appendices:

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

Contents of Final EM&A Review Report

12.4.5 The final EM&A review report will be prepared by the ET Leader at the end of the construction phase of the Project. The final EM&A review report shall be submitted to the following parties: the IEC, the ER and the EPD. The final EM&A Review Report will contain at least the following information:

- (i) Executive summary (1-2 pages);
- (ii) Basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;
- (iii) A brief summary of EM&A requirements including:
 - Monitoring parameters;
 - Environmental quality performance limits (Action and Limit Levels); and
 - Environmental mitigation measures as recommended in the Final EIA report.
- (iv) Advice on the implementation status of environmental protection and pollution control/ mitigation measures, as recommended in the Final EIA report, summarised in the updated implementation schedule;
- (v) Drawings showing the project area, any environmentally sensitive receivers and the locations of the monitoring and control stations;
- (vi) Graphical plots of the trends of monitored parameters over the course of the project, for all monitoring stations annotated against:
 - the major activities being carried out on-site during the period;
 - weather conditions during the period; and

- any other factors which might affect the monitoring results.
- (vii) Compare and contrast the EM&A data with the EIA predictions and annotate with an explanation for any discrepancies;
- (viii) Provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;
- (ix) Advice on the solid and liquid waste management status;
- (x) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- (xi) A brief review of the reasons for and the implications of non-compliance including a review of pollution sources and working procedures;
- (xii) A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- (xiii) A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- (xiv) Review the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost-effectiveness);
- (xv) A summary record of notifications of the summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of breaches, investigation, follow-up actions taken and results;
- (xvi) Review the practicality and effectiveness of the EIA process and EM&A programme (for example, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme), recommendations (for example, any improvement in the EM&A programme); and
- (xvii) A conclusion to state the return to ambient and/or the predicted scenario as the EIA findings.

12.5 DATA KEEPING

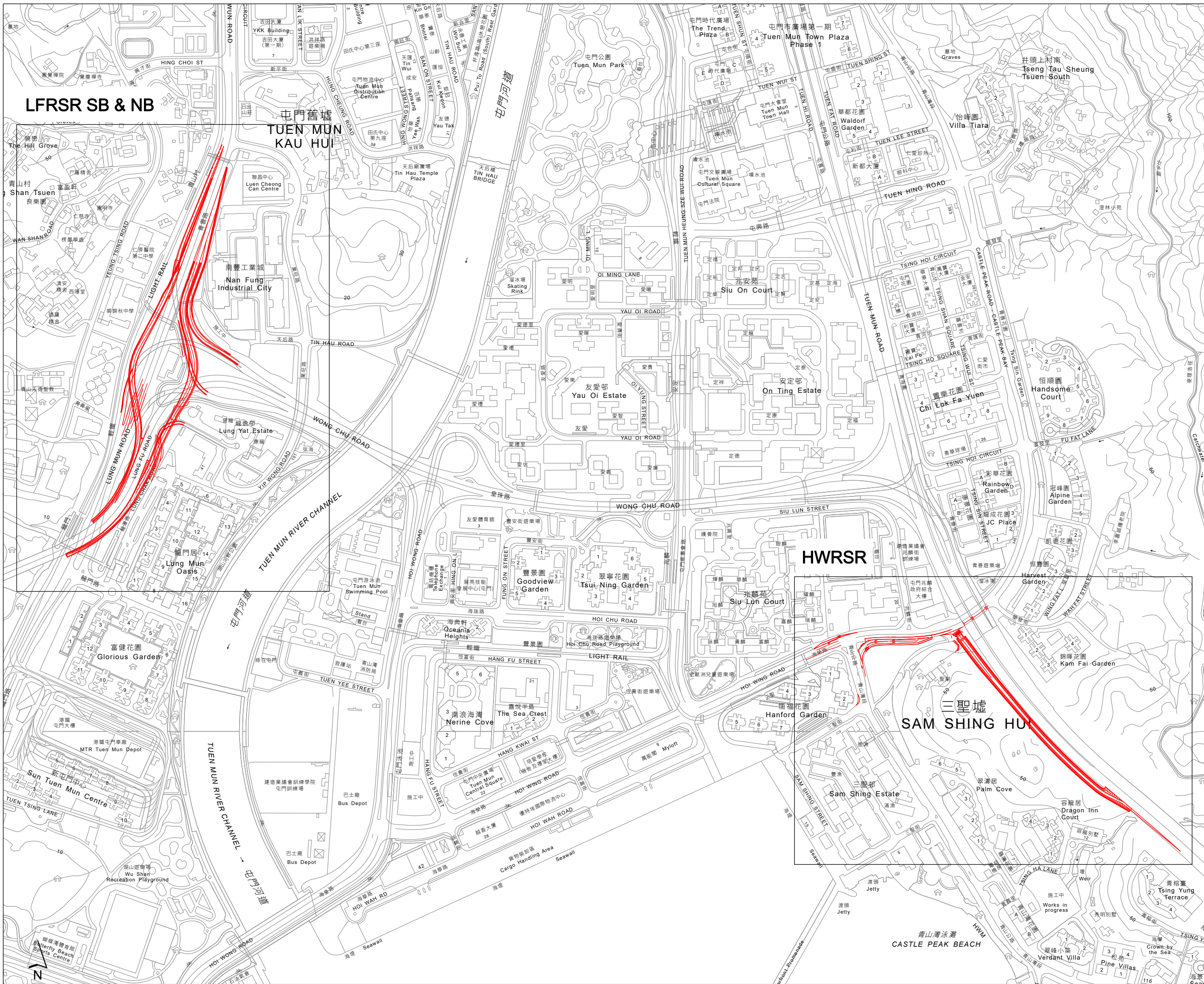
12.5.1 The site documents (such as monitoring field records, laboratory analysis records, site inspection forms etc.) are not required to be included in the EM&A Reports for submission. However, the documents will be kept by the ET Leader and be ready for inspection upon request. Relevant information will be clearly and systematically recorded in the documents. The documents and data (e.g. waste data) will be kept for at least one year after the completion of the construction contract.


12.6 ELECTRONIC REPORTING OF EM&A INFORMATION

12.6.1 To enable public inspection of the baseline monitoring report and various EM&A reports via the EIAO Internet website and at the EIAO register office, electronic copies of these reports shall be prepared in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF Adobe 11 Pro version or later), unless otherwise agreed by EPD and shall be submitted at the same time as the hard copies. For the HTML version, a content page capable of providing a hyperlink to each section and sub-section of these reports shall be



included at the beginning of the document. Hyperlinks to all figures, drawings and tables in these reports shall be provided in the main text from where the respective references are made. All graphics in these reports shall be in interlaced GIF format unless otherwise agreed by EPD. The summary of the monitoring data taken shall be included in the various EM&A Reports to allow for public inspection via the EIAO Internet website. The content of the electronic copies of these reports must be the same as the hard copies.



Legend
 Proposed Improvement Scheme

Rev	Description	By	Date



Project Title
 TRAFFIC IMPROVEMENT SCHEME IN TUEN MUN
 - WIDENING AND ADDITION OF SLIP ROADS
 AT LUNG FU ROAD/ TUEN MUN ROAD/
 WONG CHU ROAD/ HOI WING ROAD

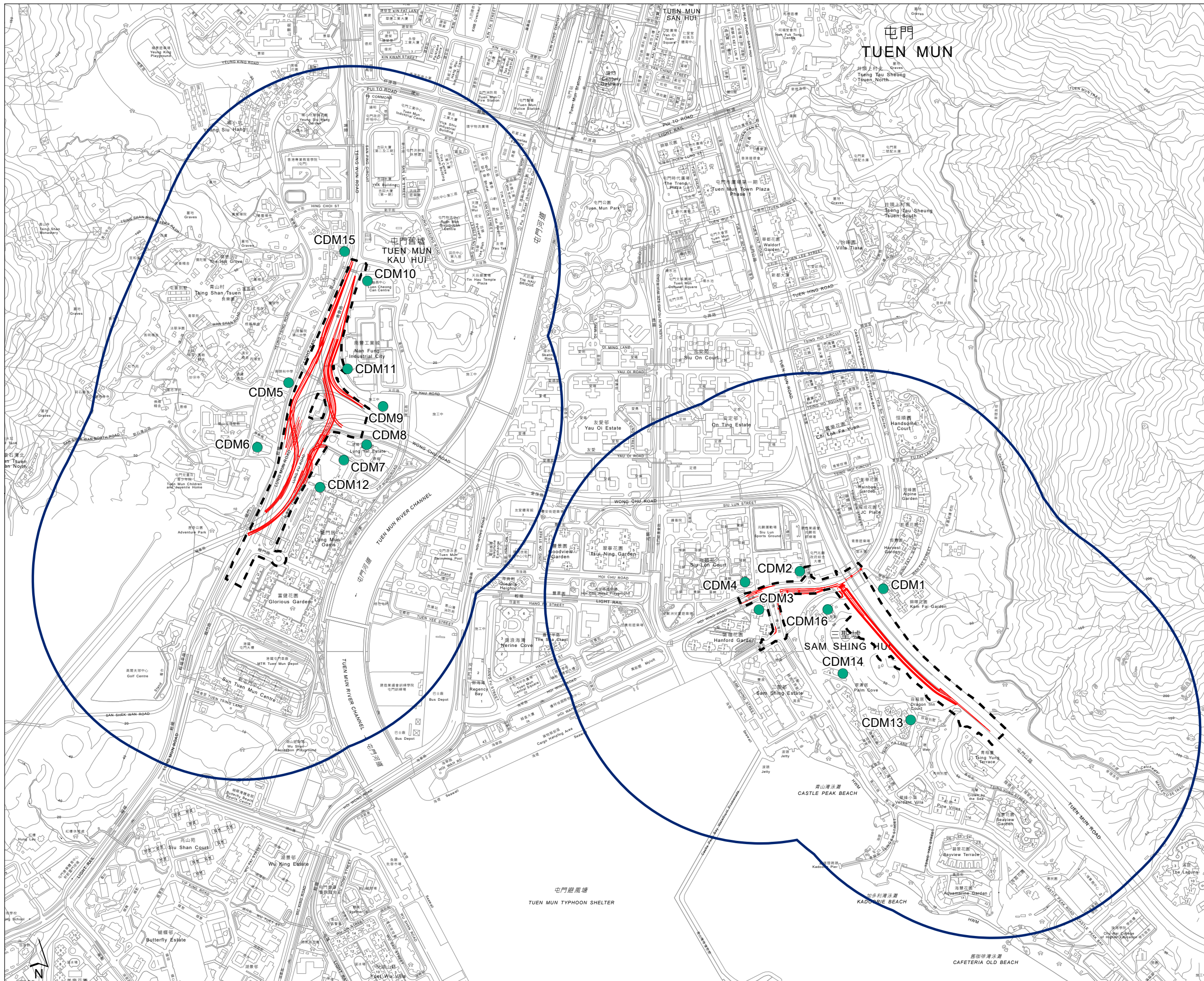
Title
 Location Plan of The Project

Drawing No. Rev.
 Figure 1.1

Drawn	Date: 13/2/2023	Checked	Approved
Scale	1:6,000 (A3)	Status	

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- Legend**
- Proposed Air Quality Monitoring Locations
 - Proposed Improvement Scheme
 - Project Site Boundary for Construction Phase
 - 500m Assessment Area

Rev	Description	By	Date

Consultant

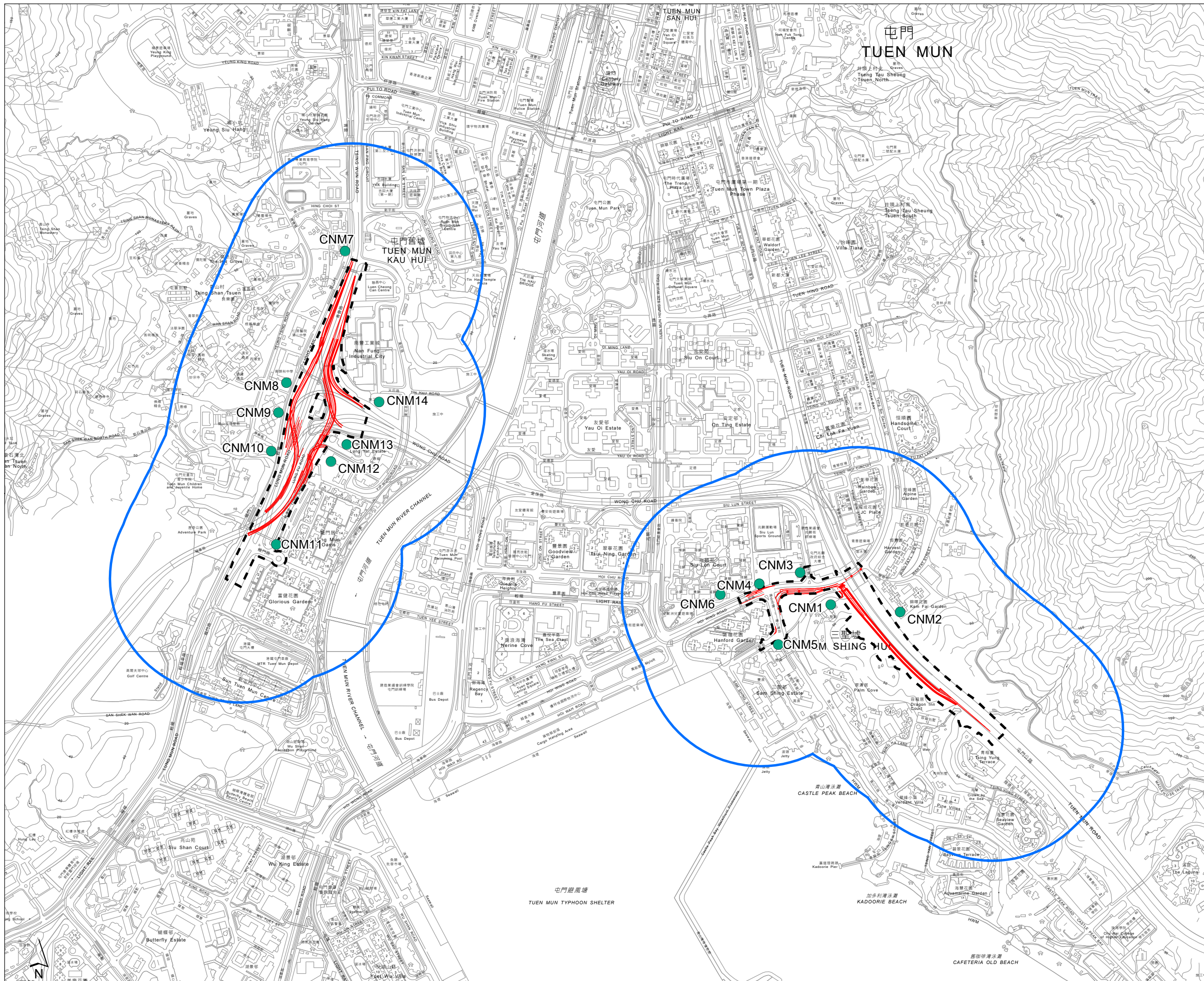
Project Title
 TRAFFIC IMPROVEMENT SCHEME IN TUEN MUN
 - WIDENING AND ADDITION OF SLIP ROADS
 AT LUNG FU ROAD/ TUEN MUN ROAD/
 WONG CHU ROAD/ HOI WING ROAD

Title
 Locations of Proposed Air Quality
 Monitoring Locations

Drawing No.		Rev.	
Figure 3.1			
Drawn	Date: 20/4/2023	Checked	Approved
Scale	1:9,000 (A3)	Status	

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 MAJOR WORKS PROJECT MANAGEMENT
 OFFICE (SPECIAL DUTIES)



- Legend**
- Proposed Construction Noise Monitoring Locations
 - Proposed Improvement Scheme
 - Project Site Boundary for Construction Phase
 - 300m Assessment Area (Construction Phase)

Rev	Description	By	Date

Consultant

Project Title
 TRAFFIC IMPROVEMENT SCHEME IN TUEN MUN
 - WIDENING AND ADDITION OF SLIP ROADS
 AT LUNG FU ROAD/ TUEN MUN ROAD/
 WONG CHU ROAD/ HOI WING ROAD

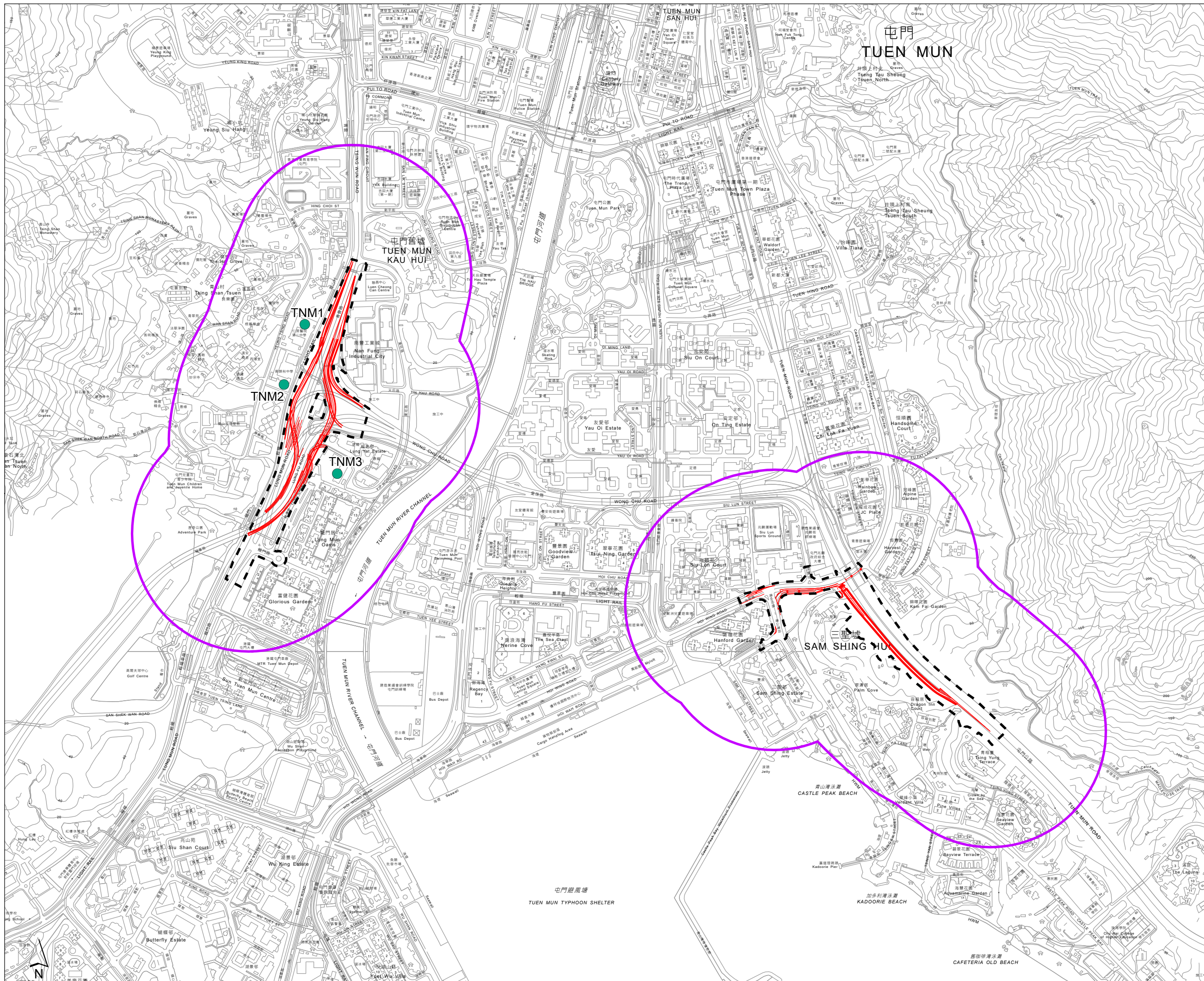
Title
 Locations of Proposed Construction
 Noise Monitoring Locations

Drawing No. Rev.

Figure 4.1	Drawn	Date: 3/5/2023	Checked	Approved
Scale: 1:9,000 (A3)	Status			

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 MAJOR WORKS PROJECT MANAGEMENT
 OFFICE (SPECIAL DUTIES)



Legend

- Proposed Road Traffic Noise Monitoring Locations
- Proposed Improvement Scheme
- Project Site Boundary for Construction Phase
- 300m Assessment Area (Operation Phase)

Rev	Description	By	Date

Consultant

Project Title
 TRAFFIC IMPROVEMENT SCHEME IN TUEN MUN
 - WIDENING AND ADDITION OF SLIP ROADS
 AT LUNG FU ROAD/ TUEN MUN ROAD/
 WONG CHU ROAD/ HOI WING ROAD

Title
 Locations of Proposed Road Traffic
 Noise Monitoring Locations

Drawing No. Rev.

Drawn	Date: 3/5/2023	Checked	Approved
Scale: 1:9,000 (A3)	Status		

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 OFFICE (SPECIAL DUTIES)



APPENDIX 1.1

TENTATIVE CONSTRUCTION PROGRAMME

Tentative Construction Programme

ID	Activity	2024				2025				2026				2027				2028				2029				2030				2031							
		7	8	9	10	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1	XP & TTM Application	[Gantt bar: 2024-07 to 2024-09]																																			
2	Tree Felling and/or Site Clearance	[Gantt bar: 2024-07 to 2024-12]																																			
3	Lung Fu Road Slip Road	[Gantt bar: 2024-07 to 2024-12]																																			
	3a - LFR Viaduct (North Section)	[Gantt bar: 2024-07 to 2029-12]																																			
	(i) Predrilling	[Gantt bar: 2024-07 to 2024-12]																																			
	(ii) UU Diversion	[Gantt bar: 2024-07 to 2024-12]																																			
	(iii) Piling	[Gantt bar: 2024-07 to 2024-12]																																			
	(iv) ELS	[Gantt bar: 2024-07 to 2024-12]																																			
	(v) Pile Caps	[Gantt bar: 2024-07 to 2024-12]																																			
	(vi) Abutment & Piers, and Reinstatement of Slope	[Gantt bar: 2024-07 to 2024-12]																																			
	(vii) Bridge Deck	[Gantt bar: 2024-07 to 2024-12]																																			
	(viii) Noise Barriers, Street Lighting, Street Furniture, Road Surfacing & Road Marking	[Gantt bar: 2024-07 to 2024-12]																																			
(ix) Landscape and Establishment Works	[Gantt bar: 2024-07 to 2024-12]																																				
3b - LFR Viaduct (South Section)	3b - LFR Viaduct (South Section)	[Gantt bar: 2024-07 to 2031-12]																																			
	(i) Predrilling	[Gantt bar: 2024-07 to 2024-12]																																			
	(ii) UU Diversion	[Gantt bar: 2024-07 to 2024-12]																																			
	(iii) Piling	[Gantt bar: 2024-07 to 2024-12]																																			
	(iv) ELS	[Gantt bar: 2024-07 to 2024-12]																																			
	(v) Pile Caps	[Gantt bar: 2024-07 to 2024-12]																																			
	(vi) Abutment & Piers, and Reinstatement of Slope	[Gantt bar: 2024-07 to 2024-12]																																			
	(vii) Bridge Deck	[Gantt bar: 2024-07 to 2024-12]																																			
	(viii) Noise Barriers, Street Lighting, Street Furniture, Road Surfacing & Road Marking	[Gantt bar: 2024-07 to 2024-12]																																			
	(ix) Landscape and Establishment Works	[Gantt bar: 2024-07 to 2024-12]																																			
3c - Slip Road between TWR & WCR	3c - Slip Road between TWR & WCR	[Gantt bar: 2024-07 to 2030-12]																																			
	(i) Predrilling	[Gantt bar: 2024-07 to 2024-12]																																			
	(ii) ELS	[Gantt bar: 2024-07 to 2024-12]																																			
	(iii) Piling (Stage 1 - At Ex. Slopes)	[Gantt bar: 2024-07 to 2024-12]																																			
	(iv) Retaining Walls and U-troughs (Stage 1)	[Gantt bar: 2024-07 to 2024-12]																																			
	(v) Formation of Temp. Road for Traffic Diversion	[Gantt bar: 2024-07 to 2024-12]																																			
	(vi) Piling (Stage 2 - At Ex. Slip Road)	[Gantt bar: 2024-07 to 2024-12]																																			
	(vii) Retaining Walls and U-troughs (Stage 2)	[Gantt bar: 2024-07 to 2024-12]																																			
	(viii) Street Lighting, Street Furniture, Road Surfacing & Road Marking	[Gantt bar: 2024-07 to 2024-12]																																			
	(ix) Landscape and Establishment Works	[Gantt bar: 2024-07 to 2024-12]																																			
3d - TWR adjacent to Tsing Shan Tsuen LRT Station	3d - TWR adjacent to Tsing Shan Tsuen LRT Station	[Gantt bar: 2029-07 to 2029-12]																																			
	(i) Street Lighting, Street Furniture, Road Surfacing & Road Marking	[Gantt bar: 2029-07 to 2029-12]																																			
(ii) Landscape and Establishment Works	[Gantt bar: 2029-07 to 2029-12]																																				
3e - Road Intersection of Lung Mun Road near Glorious Garden	3e - Road Intersection of Lung Mun Road near Glorious Garden	[Gantt bar: 2030-07 to 2030-12]																																			
	(i) Street Lighting, Street Furniture, Road Surfacing & Road Marking	[Gantt bar: 2030-07 to 2030-12]																																			
(ii) Landscape and Establishment Works	[Gantt bar: 2030-07 to 2030-12]																																				
4	Hoi Wing Road Slip Road and Junction Improvement of Castle Peak Road	[Gantt bar: 2024-07 to 2031-12]																																			
	4a - Hoi Wing Road Slip Road	[Gantt bar: 2024-07 to 2031-12]																																			
	(i) Boulder Survey	[Gantt bar: 2024-07 to 2024-12]																																			
	(ii) Predrilling	[Gantt bar: 2024-07 to 2024-12]																																			
	(iii) UU Diversion, Removal and Re-provision of Staircase	[Gantt bar: 2024-07 to 2024-12]																																			
	(iv) ELS Works (Stage 1 - For Piling Works)	[Gantt bar: 2024-07 to 2024-12]																																			
	(v) Piling (Bored Piles)	[Gantt bar: 2024-07 to 2024-12]																																			
	(vi) Piling (Socketed H-piles)	[Gantt bar: 2024-07 to 2024-12]																																			
	(vii) ELS Works (Stage 2 - For U-trough Construction)	[Gantt bar: 2024-07 to 2024-12]																																			
	(viii) U-trough Structure	[Gantt bar: 2024-07 to 2024-12]																																			
(ix) Street Lighting, Street Furniture, Road Surfacing & Road Marking	[Gantt bar: 2024-07 to 2024-12]																																				
(x) Landscape and Establishment Works	[Gantt bar: 2024-07 to 2024-12]																																				
4b - Junction Improvement Works between Hoi Wing Road and Castle Peak Road	4b - Junction Improvement Works between Hoi Wing Road and Castle Peak Road	[Gantt bar: 2024-07 to 2026-12]																																			
	(i) UU Diversion	[Gantt bar: 2024-07 to 2026-12]																																			
(ii) Junction Improvement Works	[Gantt bar: 2024-07 to 2026-12]																																				
4c - Junction Improvement Works between Sam Shing Street and Castle Peak Road	4c - Junction Improvement Works between Sam Shing Street and Castle Peak Road	[Gantt bar: 2024-07 to 2025-12]																																			
(i) Junction Improvement Works	[Gantt bar: 2024-07 to 2025-12]																																				



APPENDIX 1.2

IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES



APPENDIX 1.2 - IMPLEMENTATION SCHEDULE OF RECOMMENDED MITIGATION MEASURES

EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ^(a)			Relevant Legislation & Guidelines
					D	C	O	
Air Quality								
S3.9	S3	Impervious sheet will be provided for skip hoist for material transport.	Construction sites/ during construction (particularly dry season)	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	The area where dusty work takes place should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after dusty activities as far as practicable.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	Establishment and use of vehicle wheel and body washing facilities at the exit points of the site.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	Provision of not less than 2.4m high hoarding from ground level along site boundary where adjoins a road, streets or other accessible to the public except for a site entrance or exit.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	All dusty materials should be sprayed with water or a dust suppression chemical immediately prior to any loading, unloading or transfer operation.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	Dropping heights for excavated materials should be controlled to a practical height to minimise the fugitive dust arising from unloading.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	During transportation by truck, materials should not be loaded to a level higher than the side and tail boards, and should be dampened or covered before transport.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	Temporary stockpiles of dusty materials will be either covered entirely by impervious sheets or sprayed with water to maintain the entire surface wet all the time.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	Stockpiles of more than 20 bags of cement, dry pulverised fuel ash and dusty construction	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>



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		materials will be covered entirely by impervious sheeting sheltered on top and 3-sides.						
S3.9	S3	All exposed areas will be kept wet always to minimise dust emission.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	Ultra-low-sulphur diesel (ULSD) will be used for all construction plant on-site, as defined as diesel fuel containing not more than 0.005% sulphur by weight) as stipulated in <i>Environment, Transport and Works Bureau Technical Circular (ETWB-TC(W)) No 19/2005</i> on Environmental Management on Construction Sites.	Construction sites/ during construction	Contractor(s)		✓		<i>Environment, Transport and Works Bureau Technical Circular (ETWB-TC(W)) No 19/2005 on Environmental Management on Construction Sites</i>
S3.9	S3	The engine of the construction equipment during idling will be switched off.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	Regular maintenance of construction equipment deployed on-site will be conducted to prevent black smoke emission.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Construction Dust) Regulation</i>
S3.9	S3	NRMMs, e.g. mobile generator and air compressor, will comply with the prescribed emission standards with a proper label approved by EPD.	Construction sites/ during construction	Contractor(s)		✓		<i>Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation</i>
S3.9	S3	Electric power supply for on-site machinery will be provided as far as practicable for construction activities.	Construction sites/ during construction	Contractor(s)		✓		-
S3.12	S3	To ensure proper implementation of the recommended dust mitigation measures and good construction site practices during the construction phase, regular environmental site inspections, i.e. on weekly basis, is recommended throughout the construction period.	Construction sites/ during construction	Contractor(s)/ Environmental Team (ET) & Independent Environmental Checker (IEC)		✓		-
Noise								
S4.8	S4	The use of quiet construction method/ QPME/ press-in method/ quieter demolition equipment is recommended. The contractors may adopt alternative QPME as long as it can demonstrate	Construction sites/ during construction	Contractor(s)		✓		EIAO-TM



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		that they would not result in construction noise impacts worse than those predicted in this assessment.						
S4.8	S4	<p>Noise barriers or enclosures would be erected to provide screening from the construction plant. Noise barriers will become more effective when located immediately adjacent to the PME and be moved concurrently with the PME along the work site. The Contractor should be responsible for design of the noise barrier/enclosure with due consideration given to the size of the PME and the requirement of intercepting the line of sight between the NSRs and PME. A typical design which has been used locally is a wooden framed barrier of superficial density no less than 14kg/m² on a skid footing with 25mm thick internal sound absorptive lining.</p> <p>Noise insulation fabric would be installed for PME such as piling rigs and drilling rigs and the Fabric should be lapped such that there would be no opening or gaps on the joints.</p> <p>Noises barriers should be erected/ built in such a way with no openings or gaps on the joints and should be long enough (e.g. at least five times greater than its height) or be bent around the noise sources to ensure the effectiveness.</p>	Construction sites/ during construction	Contractor(s)		✓		EIAO-TM
S4.8	S4	<p>Good site practices should be followed:</p> <ul style="list-style-type: none"> ▪ Only well-maintained plant should be operated on-site and should be served regularly during construction period; ▪ Mobile plant, if any, should be sited as far from NSRs as possible; ▪ Use of site hoarding as a noise barrier to screen noise at low level NSRs; 	Construction sites/ during construction	Contractor(s)		✓		EIAO-TM



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		<ul style="list-style-type: none"> ▪ Machines and plant that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum. ▪ Silencers or mufflers on construction equipment should be utilized and be properly maintained during construction; ▪ Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and ▪ Material stockpiles should be effectively utilized, wherever practicable, in screening noise from on-site construction activities. 						
S4.8	S4	Liaise with the school's management for the schedule of construction works to avoid carrying out noise construction activities during examination period.	Construction sites/ during construction	Contractor(s)		✓		EIAO-TM
S4.8	S4	Considering NSRs H1 and H9 are located in close vicinity to the works area of the Project and Cycle Track between Tsuen Wan and Tuen Mun (Tuen Mun to So Kwun Wat), the Contractor will continuously liaise with the contractor of Cycle Track Project to avoid concurrent operation of PMEs.	Construction sites/ during construction	Contractor(s)		✓		EIAO-TM
S4.10	S4	To ensure proper implementation of the recommended noise mitigation measures and good construction site practices during the construction phase, regular environmental site inspections, i.e. on weekly basis, is recommended throughout the construction period.	Construction sites/ during construction	Contractor(s)/ Environmental Team (ET) & Independent Environmental Checker (IEC)		✓		-



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S4.10	S4	Prepare a construction noise management plan prior to the construction works to verify the inventory of noise sources, update the construction noise impact assessment if necessary, assess the effectiveness and practicality of all identified measures and update the proposed noise mitigation measures as necessary.	Construction sites/ during construction	Contractor(s)	✓	✓		-
S4.8	S4	Provide low noise road surfacing material on Project Roads.	Construction sites/ during design/ construction/ operation (Refer to Figure 4.3 of the EIA Report)	Contractor(s) (design & construction phases) HyD (operation phase)	✓	✓	✓	EIAO-TM
S4.10	S4	To verify the effectiveness of the proposed noise mitigation measures, road traffic noise levels should be monitored at representative NSRs during the first year after completion of road works.	Representative NSRs/ during operation	HyD/ Environmental Team (ET) & Independent Environmental Checker (IEC)			✓	-
Water Quality								
S5.7	S5	Surface run-off from construction sites should be discharged into storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels or earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Perimeter channels at site boundaries should be provided where necessary to intercept storm run-off from outside the site so that it will not wash across the site. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94



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S5.7	S5	Silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly, at the onset of and after each rainstorm to ensure that these facilities are functioning properly at all times.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94
S5.7	S5	Minimum distance of 100m should be maintained between the discharge points of construction site run-off and the existing saltwater intakes and gazetted beaches. No effluent will be discharged into typhoon shelter.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94
S5.7	S5	Construction works should be programmed to minimize soil excavation works in rainy seasons (April to September). If excavation in soil could not be avoided in these months or at any time of year when rainstorms are likely, for the purpose of preventing soil erosion, temporarily exposed slope surfaces should be covered e.g. by tarpaulin. Intercepting channels should be provided (e.g. along the crest/edge of excavation) to prevent storm runoff from washing across exposed soil surfaces. Arrangements should always be in place to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94
S5.7	S5	Earthworks final surfaces should be well compacted and the subsequent permanent work or surface protection should be carried out immediately after the final surfaces are formed to prevent erosion caused by rainstorms. Appropriate drainage like intercepting channels should be provided where necessary	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94
S5.7	S5	Measures should be taken to minimize the ingress of rainwater into trenches. If excavation of trenches in wet seasons is necessary, they should be dug and backfilled in short sections. Rainwater pumped out from trenches or foundation excavations should	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94



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		be discharged into storm drains via silt removal facilities.						
S5.7	S5	Open stockpiles of construction materials (e.g. aggregates, sand and fill material) on sites 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.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94
S5.7	S5	Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers. Discharge of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94
S5.7	S5	Water used in ground boring and drilling for site investigation or rock/soil anchoring should as far as practicable be recirculated after sedimentation. When there is a need for final disposal, the wastewater should be discharged into storm drains via silt removal facilities.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94
S5.7	S5	All vehicles and plant should be cleaned before they leave a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. A wheel washing bay should be provided at every site exit if practicable and wash-water should have sand and silt settled out or removed before discharging into storm drains. The section of construction road between the wheel washing bay and the public road should be paved with backfall to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94



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S5.7	S5	Wastewater generated from building construction activities including concreting, cleaning of works and similar activities should not be discharged into the stormwater drainage system. If the wastewater is to be discharged into foul sewers, it should undergo the removal of settleable solids in a silt removal facility, and pH adjustment as necessary.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94
S5.7	S5	Acidic wastewater generated from acid cleaning, etching, pickling and similar activities should be neutralized to within the pH range of 6 to 10 before discharging into foul sewers. If there is no public foul sewer in the vicinity, the neutralized wastewater should be tankered off site for disposal into foul sewers or treated to a standard acceptable to storm drains and the receiving waters.	Construction sites/ during construction	Contractor(s)		✓		ProPECC PN 1/94
S5.7	S5	Sufficient number of chemical toilets should be required for each work area. These toilets should be regularly cleaned, maintained and emptied by licensed contractor. Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the surrounding environment. Regular environmental audit of the construction site will provide an effective control of any malpractices and can encourage continual improvement of environmental performance on site.	Construction sites/ during construction	Contractor(s)		✓		-
S5.7	S5	Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport.	Construction sites/ during construction	Contractor(s)		✓		Waste Disposal Ordinance (Cap 354)
S5.7	S5	Chemical waste containers should be suitably labelled, to notify and warn the personnel who are handling the wastes, to avoid accidents.	Construction sites/ during construction	Contractor(s)		✓		Waste Disposal Ordinance (Cap 354)
S5.7	S5	Storage area should be selected at a safe location on site and adequate space should be allocated to the storage area.	Construction sites/ during construction	Contractor(s)		✓		Waste Disposal Ordinance (Cap 354)



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S5.7	S5	The use of less or smaller construction plant may be specified to reduce disturbance to the riverbed where aquatic inhabitants are located.	Construction sites/ during construction	Contractor(s)		✓		ETWB TCW No. 5/2005
S5.7	S5	Temporary sewerage system should be designed and installed to collect wastewater and prevent it from entering rivers and streams.	Construction sites/ during construction	Contractor(s)		✓		ETWB TCW No. 5/2005
S5.7	S5	The proposed works site inside or in the proximity of natural rivers and streams should be temporarily isolated, such as by placing of sandbags or silt curtains with lead edge at bottom and properly supported props, to prevent adverse impacts on the stream water qualities. Other protective measures should also be taken to ensure that no pollution or siltation occurs to the water gathering grounds of the work site.	Construction sites/ during construction	Contractor(s)		✓		ETWB TCW No. 5/2005
S5.7	S5	Proper locations well away from rivers/streams for temporary storage of materials (e.g. equipment, filling materials, chemicals and fuel) and temporary stockpile of construction debris and spoil should be identified before commencement of the works. Stockpiling of construction materials should be properly covered.	Construction sites/ during construction	Contractor(s)		✓		ETWB TCW No. 5/2005
S5.7	S5	Construction debris and spoil should be covered up and/or properly disposed of as soon as possible to avoid being washed into nearby rivers/streams by rain. e. Construction effluent, site run-off and sewage should be properly collected and/or treated. Wastewater from a construction site should be managed with the following approach in descending order: (i) minimisation of wastewater generation; (ii) reuse and recycle; (iii) treatment.	Construction sites/ during construction	Contractor(s)		✓		ETWB TCW No. 5/2005



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		Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/rivers should be identified.						
S5.7	S5	Supervisory staff should be assigned to station on site to closely supervise and monitor the works.	Construction sites/ during construction	Contractor(s)		✓		ETWB TCW No. 5/2005
S5.7	S5	<p>Drainage system should be fitted with appropriate design measures to control pollution of drainage water, namely,</p> <ul style="list-style-type: none"> ▪ Standard screening designs such as gully grating should be provided to stop large objects from entering; ▪ Exposed surface shall be avoided to minimize soil erosion. ▪ Where appropriate, silt traps and oil interceptors should be provided to remove pollutants from runoff / stormwater. <p>These facilities should also be cleaned, maintained and inspected regularly and particularly before and after a rainstorm.</p>	Project Area / during design/ operation	Engineer's Representative / HyD	✓		✓	-
S5.10	S5	To ensure proper implementation of the recommended water quality mitigation measures and good construction site practices during the construction phase, regular environmental site inspections, i.e. on weekly basis, is recommended throughout the construction period.	Construction sites/ during construction	Contractor(s)/ Environmental Team (ET) & Independent Environmental Checker (IEC)		✓		-
Waste Management								
S6.5	S6	The contractor(s) must ensure that all the necessary waste disposal licences are obtained prior to the commencement of the construction works.	Contract mobilisation/ during construction	Contractor(s)		✓		-



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S6.5	S6	The contractor will open a billing account with EPD in accordance with the <i>Waste Disposal (Charges for Disposal of Construction Waste) Regulation</i> for the payment of disposal charges.	Contract mobilisation/ during construction	Contractor(s)		✓		<i>Cap 354N Waste Disposal (Charges for Disposal of Construction Waste) Regulation</i>
S6.5	S6	A trip-ticket system will be established in accordance with <i>DEVB TC(W) No. 6/2010</i> to monitor the reuse of surplus excavated materials off-site and disposal of construction waste and general refuse at transfer facilities/ landfills, and to control fly-tipping.	Contract mobilisation/ during construction	Contractor(s)		✓		<i>DEVB TC(W) No. 6/2010, Trip Ticket System for Disposal of Construction & Demolition Materials</i>
S6.5	S6	Recyclables (e.g. plastics, cardboard) generated during the construction phase will be segregated and sent to recycler for recycling as far as practicable.	Construction sites/ during construction	Contractor(s)		✓		-
S6.5	S6	A WMP, with details of the amount of waste generated, recycled and disposed of (including the disposal sites), will be established and implemented during the construction phase as part of the Environmental Management Plan (EMP). The Contractor will be required to prepare the EMP and submits it to the Engineer / Engineer's Representative (ER) of the Project under the Contract for approval prior to implementation.	Construction sites/ during construction	Contractor(s)		✓		<i>ETWB TC(W) No. 19/2005</i>
S6.5	S6	A Construction and Demolition Material Management Plan (C&DMMP) should be prepared in accordance with Section 4.1.3 of Chapter 4 of <i>Project Administration Handbook (PAH) for Civil Engineering Works (2020 Edition)</i> and submitted to Public Fill Committee (PFC) for approval.	Contract mobilisation/ during construction	Contractor(s)	✓			<i>ETWB TC(W) No. 19/2005</i> <i>Project Administration Handbook (PAH) for Civil Engineering Works (2020 Edition)</i>
S6.5	S6	C&D materials will be segregated on-site into public fill and construction waste and stored in different containers or skips to facilitate reuse of the public fill and proper disposal of the construction waste. Specific areas of the Site will be designated for such segregation and storage if immediate use is	Construction sites/ during construction	Contractor(s)		✓		-



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		not practicable. Prefabrication will be adopted as far as practicable to reduce the construction waste arisings.						
S6.5	S6	All dump trucks should be equipped with GPS or equivalent system for monitoring of their transportation routes and parking locations to prohibit illegal dumping and landfilling of C&D materials. The Contractor should maintain a recording system to record the amount of C&D materials generated, recycled and disposed of at the disposal sites as well as the transportation routing and parking locations of the dump trucks.	Construction sites/ during construction	Contractor(s)		✓		-
S6.5	S6	The contractor(s) will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the <i>Code of Practice on the Packaging, Handling and Storage of Chemical Wastes</i> .	Construction sites/ during construction	Contractor(s)		✓		<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</i>
S6.5	S6	Containers used for storage of chemical wastes will: <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 450 L 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. 	Construction sites/ during construction	Contractor(s)		✓		<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</i>
S6.5	S6	The storage area for chemical wastes will: <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 	Construction sites/ during construction	Contractor(s)		✓		<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</i>



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		<p>chemical waste stored in that area, whichever is the greatest;</p> <ul style="list-style-type: none"> ▪ Have adequate ventilation; ▪ Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and ▪ Be arranged so that incompatible materials are appropriately separated. 						
S6.5	S6	<p>Chemical waste will be disposed of:</p> <ul style="list-style-type: none"> ▪ Via a licensed chemical waste collector; and ▪ 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. 	Construction sites/ during construction	Contractor(s)		✓		<i>Waste Disposal (Chemical Waste) (General) Regulation; Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</i>
S6.5	S6	<p>General refuse will be stored in enclosed bins separately from construction and chemical wastes. The general refuse will be delivered separately from construction and chemical wastes for offsite disposal on a daily basis to reduce odour, pest and litter impacts.</p>	Construction sites/ during construction	Contractor(s)		✓		-
S6.5	S6	<p>Recycling bins will be provided at strategic locations within the Project Site to facilitate recovery of recyclable materials (including aluminium cans, waste papers, glass bottles and plastic bottles, etc.). Materials recovered will be sold for recycling.</p>	Construction sites/ during construction	Contractor(s)		✓		-
S6.5	S6	<p>At the commencement of the construction works, training will be provided to workers on the concepts of site cleanliness and on appropriate waste management procedures, including waste reduction, reuse and recycling.</p>	Construction sites/ during construction	Contractor(s)		✓		-
S6.7	S6	<p>It is recommended that regular environmental site inspections, i.e. on weekly basis, of the waste</p>	Construction sites/ during construction	Contractor(s)/ Environmental		✓		-



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		management practices be carried out during the construction phase to determine if wastes are being managed in accordance with the recommended good site practices and WMP. The site inspections will investigate all aspects of waste management including waste generation, storage, handling, recycling, transportation and disposal.		Team (ET) & Independent Environmental Checker (IEC)				
Landscape and Visual								
S9.10 & 10.11, Table 9.11	S9	CM1 - Preservation of Existing Vegetation – Any existing vegetations, trees and tree of particular interest (TPI) not affected by the Project and within 5m offset from the PDA Boundary shall be carefully preserved and protected in accordance with DEVB TCW No. 4/2020 and the latest Guidelines on Tree Preservation During Development by GLTMS of DEVB. If needed, they shall be transplanted to a suitable location within the PDA as far as feasible.	Construction sites/ during design and construction	HyD (via Contractor)	✓	✓		<i>ETWB TC(W) No. 29/2004 and 3/2006</i> <i>DEVB TC(W) NO.4/2020 and DEVB TC(W) No. 5/2020</i>
S9.10 & 10.11, Table 9.11	S9	CM2 - Transplanting of Affected Trees – 23 trees have been recommended for transplanting for their moderate transplanting success, and it is recommended to relocated the tree to a permanent receptor site within the Project Boundary directly after the completion of a 2 stages root preparation period (with a minimum of 60 days interval) as far as practicable, and the work should follow the Highways Guidelines HQ/GN/13 - Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation, as well as the latest guidelines issued from the Greening, Landscape and Tree Management Section of the Development Bureau. Details regarding the transplantation will be submitted in the tree survey report to relevant government departments for approval in accordance with ETWB TCW No. 29/2004, DEVB TC (W) No.4/2020 and "Guidelines on Tree Transplanting", GLTMS of DEVB.	Construction sites/ during design and construction	HyD (via Contractor until handover to the future tree maintenance departments)	✓	✓		<i>ETWB TC(W) No. 29/2004 and 3/2006</i> <i>HyD HQ/GN/13 Interim Guidelines for Tree Transplanting Works under Highways Department's Vegetation Maintenance Ambit</i> <i>DEVB TC(W) NO.4/2020 and DEVB TC(W) No. 5/2020</i>



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					D	C	O	
S9.10 & 10.11, Table 9.11	S9	CM3 - Control of Night-time Lighting Glare – Any lighting provision of the construction works at night shall be carefully control to prevent light overspill to the nearby VSRs and into the sky. Relevant best practices as suggested in the “Guidelines on Industry Best Practices for External Lighting Installations” promulgated by ENB shall be adopted.	Construction sites/ during construction	HyD (via Contractor)		✓		<i>Guidelines on Industry Best Practices for External Lighting Installations</i> promulgated by ENB
S9.10 & 10.11, Table 9.11	S9	CM4 - Good Site Practice – Construction areas’ control, such as reducing the extent of working areas, temporary working areas, storage area and shortening construction period, shall be enforced to minimise potential landscape and visual impact arising from construction activities. The proposed site should reduce topographical / landform changes to reduce disturbance with the natural terrain. Earthworks and engineered slopes should be designed to be visually interesting and compatible with the surrounding landscape, mimic contouring and terrain. Temporary landscape treatment such as hydroseeding temporary stockpiles is recommended. Protection measures for the nearby water bodies, will be conducted in accordance with ETWB TCW 5/2005.	Construction sites/ during construction	HyD (via Contractor)		✓		-
S9.10 & 10.11, Table 9.11	S9	CM5 - Erection of Decorative Screen Hoarding – Site hoardings shall be painted in a colour that is compatible with the surroundings and shall screen the views to the construction works. Hoarding should be taken down at the end of the construction period.	Construction sites/ during construction	HyD (via Contractor)		✓		-
S9.10 & 10.11, Table 9.12	S9	OM1 - Compensatory Tree Planting – Trees felled due to the Project will be compensated as far as practicable in accordance with Development Bureau Technical Circular (Works) No. 4/2020.	Project sites/ during design, construction and operation	LCSD/ HyD/ Allocatee of the SIMAR slopes as per <i>DEVB TC(W) No. 6/2015</i>	✓	✓	✓	Tree Removal Application process under <i>ETWBTC 4/2020</i> . <i>The Greening Master Plan</i> issued by CEDD and the <i>Street Tree Selection Guide</i> issued by DEVB



EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ^(a)			Relevant Legislation & Guidelines
					D	C	O	
		For trees to be compensated on slopes, the guidelines for tree planting stipulated in GEO Publication No. 1/2011 will be followed.						
S9.10 & 10.11, Table 9.12	S9	<p>OM2 - Roadside Planting – Although most of the works are carried out along the existing transportation corridors, greening opportunities for roadside planting shall be maximized as far as possible to effective visual relief to the adjacent VSRs.</p> <p>Planting opportunities shall be also explored in the shaded area underneath the proposed elevated roads to maximize the greening effect by shade-tolerant tree or shrub species.</p> <p>The roadside plant species shall be made reference to the Greening Master Plan issued by CEDD and the Street Tree Selection Guide issued by DEVB.</p>	Project sites/ during design, construction and operation	LCSD/ HyD as per DEVB TC(W) No. 6/2015	✓	✓	✓	<p>Tree Removal Application process under ETWBTC 4/2020.</p> <p><i>GEO Publication No. 1/2011 and the Guiding Principles on Use of Native Plant Species in Public Works Projects</i> issued by DEVB</p> <p><i>The Greening Master Plan</i> issued by CEDD and the <i>Street Tree Selection Guide</i> issued by DEVB</p>
S9.10 & 10.11, Table 9.12	S9	<p>OM3 - Provision of Aesthetic Pleasing Treatment on Noise Barriers – Sensitive design of noise barriers and noise enclosures with chromatic measures. The design and color themes shall be coherent with the existing noise barrier design along the adjoining transportation corridors such as Lung Fu Road, Wong Chu Road and Tuen Mun Road to echo with the visual context and character of the transportation corridors.</p> <p>The detail design of noise barriers and noise enclosures shall make reference to "Guidelines on Greening of Noise Barriers" published by DEVB in appropriate locations, subject to the agreement of future maintenance departments. Greening measures such as screen planting and/or climbers along the barriers shall be fully explored in design stage. Early advice from maintenance / management parties and ACABAS shall be sought.</p>	Project sites/ during design, construction and operation	HyD	✓	✓	✓	<i>Guidelines on Greening of Noise Barriers</i> published by DEVB



EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ^(a)			Relevant Legislation & Guidelines
					D	C	O	
S9.10 & 10.11, Table 9.12	S9	OM4 - Aesthetically pleasing design for carriageways and other highways structures – Footbridges, pedestrian subways, cycle paths, carriageways and other highways structures proposed shall be sensitively designed in the regard of form, tonal colour and texture so as to minimise any potential adverse landscape and visual impact. Greening measures such as climbers along viaduct piers and shrubs along footbridges shall be fully explored in design stage. Early advice from maintenance / management parties and ACABAS shall be sought.	Project sites/ during design, construction and operation	LCSD for soft landscape/ HyD for hard landscape	✓	✓	✓	-
Cultural Heritage								
S10.6, 10.8	S10	As a precautionary measure, the project proponent and his/her contractor are required to inform AMO immediately when any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance (Cap. 53) are discovered during the course of works	Construction sites/ during construction	Contractor(s)		✓		-
S10.6, 10.8	S10	Design proposal, method of works and choice of machinery should be targeted to minimise potential vibration impact to Shing Miu (GB-01) and seven other associated building structures including the Castle Peak Sam Shing Hui Village Office, Hau Shi Tong (孝思堂), Tai Sui Din (太歲殿), Office of Shing Miu, Fook Tak Tsz (福德祠), an Earth God Shrine and an Arch. As a precautionary measure, it is recommended that during pre-construction stage of the Project and implemented by the works contractor, a baseline condition survey and baseline vibration impact assessment be conducted for Shing Miu and the associated building structures by a qualified building surveyor or qualified structural engineer to evaluate on the	Construction sites/ during design/ construction	Contractor(s)	✓	✓		-



EIA Reference	EM&A Reference	Recommended Environmental Protection Measures/ Mitigation Measures	Location/ duration of recommended measures & timing of completion of recommended measures	Implementation Agent	Implementation Stage ^(a)			Relevant Legislation & Guidelines
					D	C	O	
		necessary construction monitoring and structural strengthening measures for AMO's consideration.						
S10.6, 10.8	S10	The temple owner/ manager of Earth God Shrine and Shing Miu shall be consulted to agree on appropriate mitigation measure to be adopted. This may include relocate the Shrine to another location in the compound permanently or temporarily. If temporary blockage or diversion of the access path from the Arch to Shing Miu is required, the temple owner/manager shall be consulted to agree on appropriate access to Shing Miu during construction stage.	Construction sites/ during design/ construction	Contractor(s)	✓	✓		-
S10.6, 10.8	S10	The works area near the Arch should be refined to exclude the Arch from the works area so that potential impact is avoided. The Arch should be physically fenced off from the works area during construction stage to minimise potential physical disturbance of construction works towards the Arch.	Construction sites/ during design/ construction	Contractor(s)		✓		-
S10.6	S10	If there are any buildings / structures both at grade level and underground which were built in or before 1969, the project proponent is required to alert AMO in an early stage or once identified.	Construction sites/ during design/ construction	Contractor(s)		✓		-

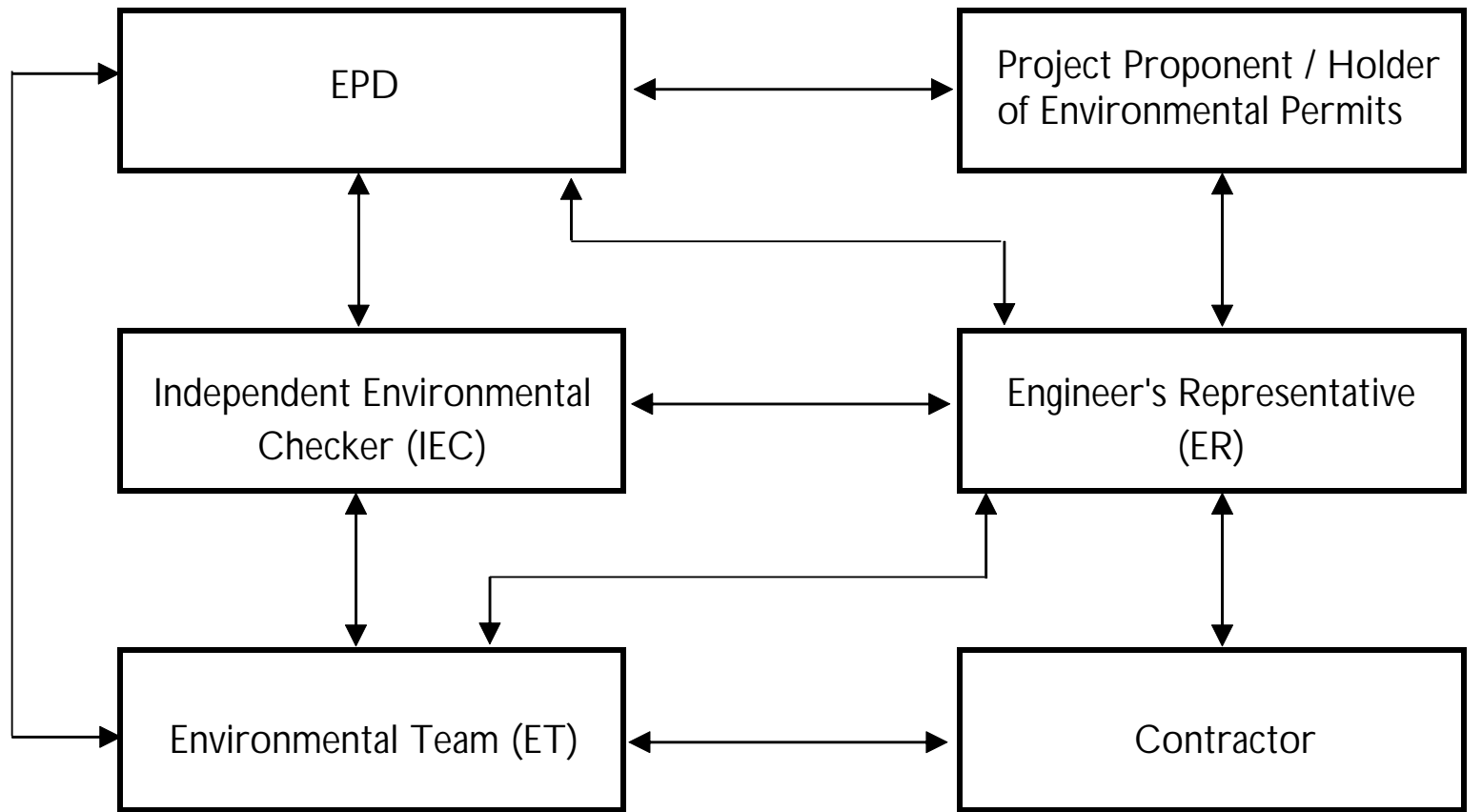
Note: (a) D = Design, C = Construction, O = Operation.



APPENDIX 1.3

PROPOSED PROJECT ORGANISATION AND LINE OF COMMUNICATIONS

Project Organisation for Environmental Work



↔ Line of Communication



APPENDIX 3.1

SAMPLE DATA SHEET FOR AIR QUALITY EM&A

Data Sheet for TSP Monitoring

Person	Name	Designation	Signature	Date
Field Operator				
Laboratory Staff				
Checked by				

Item	Unit	Data
Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start	(minute)
	Stop	(minute)
Total Sampling Time	(minute)	
Weather Conditions		
Site Conditions		
Initial Flow Rate, Qsi	Pi	(mmHg)
	Ti	(°C)
	Hi	(in.)
	Qsi	(standard m ³)
Final Flow Rate, Qsf	Pi	(mmHg)
	Ti	(°C)
	Hi	(in.)
	Qsi	(standard m ³)
Average Flow Rate	(standard m ³)	
Total Volume	(standard m ³)	
Filter Identification No.		
Initial Weight of Filter	(g)	
Final Weight of Filter	(g)	
Measured TSP Level	(µg/m ³)	
Remarks:		



APPENDIX 4.1

SAMPLE DATA SHEET FOR CONSTRUCTION NOISE MONITORING

Data Sheet for Construction Noise Monitoring

Person	Name	Designation	Signature	Date
Field Operator				
Checked by				

Item	Unit	Data
Monitoring Location		
Details of Location		
Date of Monitoring		
Measurement Start Time	(HH:MM)	
Measurement End Time	(HH:MM)	
Measurement Time Length	(minute)	
Measurement Results	L ₉₀	(dB(A))
	L ₁₀	(dB(A))
	L _{eq}	(dB(A))
Major Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Sound Level Meter (Model, S/N)		
Calibrator (Model, S/N)		
Remarks:		



APPENDIX 4.2

SAMPLE DATA SHEET FOR ROAD TRAFFIC NOISE MONITORING

Field Survey Record Sheet for Operational Road Traffic Noise Monitoring

Person	Name	Designation	Signature	Date
Field Operator				
Checked by				

General

Monitoring Location/Reference No.		
Person-in-charge		
Date and Day of Monitoring		
Measurement Time	Start	
	End	
Description of Location (including floor level) (attach plan separately)		
Microphone Position		

Weather Conditions

Weather Conditions			
Temperature (in °C)		Wind Speed (in m/s)	

Equipment

Instrument	Type	Serial Number	Settings
Sound Level Meter			
Calibrator			

Calibration

Before Measurement		After Measurement	
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Time	Traffic Data ⁽¹⁾				Noise Level (30-min) dB(A)				Average Speed (in kph) ⁽²⁾
	Near side		Far side		L ₁₀	L ₉₀	L _{eq}	L _{max}	
	LV	HV	LV	HV					

Notes: LV = Light vehicle (i.e. private car, motorcycle, taxi and van) HV = Heavy vehicle (i.e. other than LV)
 (1) = Traffic count for a duration of 30 minutes. (2) a/b | c/d = near side LV / near side HV | far side LV / far side HV

Others

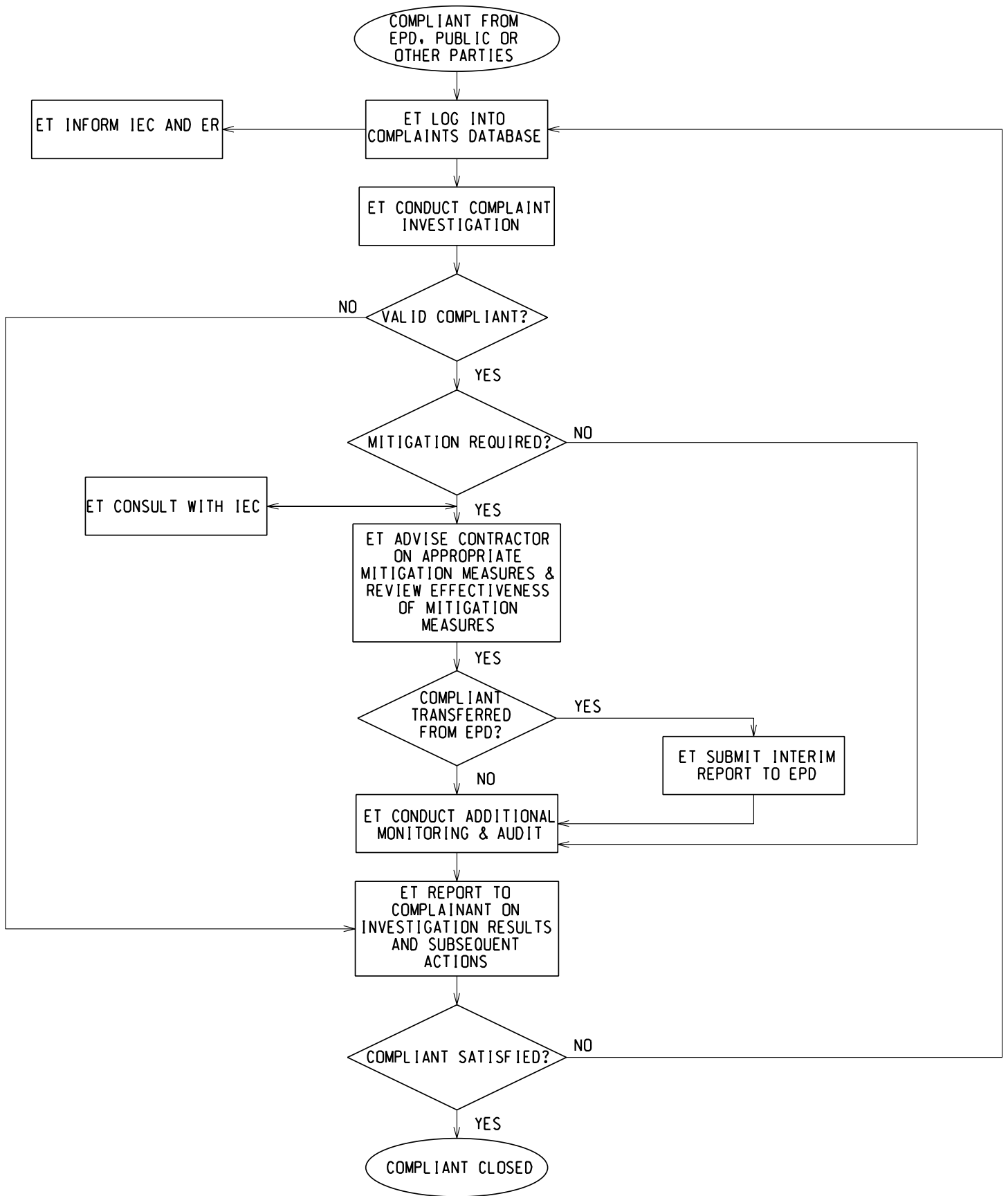
Mitigation Measures In Place near Measurement Location	
Other Noise Source(s) During Monitoring	
Remarks	



APPENDIX 11.1

FLOW CHART OF COMPLAINT RESPONSE PROCEDURES

FLOW CHART OF COMPLAINT RESPONSE PROCEDURE





APPENDIX 12.1

SAMPLE TEMPLATE FOR INTERIM NOTIFICATIONS

Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action and/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: _____