

Drainage Improvement Works in Mui Wo

Environmental Impact Assessment Report

EM&A Manual

Binnies Hong Kong Limited
43/F, AIA Kowloon Tower,
100 How Ming Street,
Kwun Tong
Hong Kong

Drainage Services Department,
Project Management Division,
42/F, Revenue Tower,
5 Gloucester Road,
Wan Chai

June 2023

CONTENTS

1. INTRODUCTION	1
1.1 Project Background	1
1.2 Purpose of the Manual.....	2
1.3 Project Description	3
1.4 Objectives of this EM&A Manual.....	4
1.5 Scope of the EM&A Programme.....	5
1.6 Organisation & Structure of the EM&A	7
1.7 Structure of this EM&A Manual.....	9
2. EM&A GENERAL REQUIREMENT	11
2.1 Introduction.....	11
2.2 Construction Phase EM&A	11
2.3 Operation Phase EM&A	13
3. AIR QUALITY IMPACT	15
3.1 Construction Phase	15
3.2 Operation Phase.....	15
3.3 Mitigation Measures	15
4. NOISE IMPACT	16
4.1 Construction Phase	16
4.2 Operation Phase.....	18
4.3 Mitigation Measures	18
5. WATER QUALITY IMPACT.....	19
5.1 Construction Phase	19
5.2 Operation Phase	27
5.3 Mitigation Measures	27
6. WASTE MANAGEMENT	28
6.1 Construction Phase	28
6.2 Operation Phase.....	28

6.3	Mitigation Measures	28
7.	ECOLOGICAL.....	29
7.1	Construction Phase	29
7.2	Operation Phase	29
7.3	Mitigation Measures	30
8.	CULTURAL HERITAGE.....	31
8.1	Construction Phase	31
8.2	Operation Phase	31
8.3	Mitigation Measures	32
9.	LANDSCAPE AND VISUAL.....	33
9.1	Construction Phase	33
9.2	Operation Phase	33
9.3	Mitigation Measures	33
10.	CONSTRUCTION SITE INSPECTION AND AUDIT.....	34
10.1	Site Inspection and Audit.....	34
10.2	Compliance with Legal & Contractual Requirements.....	35
10.3	Environmental Complaints	35
11.	REPORTING	37
11.1	General.....	37
11.2	Baseline Monitoring Report	37
11.3	Monthly EM&A Reports.....	38
11.4	Final EM&A Report	42
11.5	Data Keeping.....	43
11.6	Electronic Reporting of EM&A Information	44
11.7	Interim Notifications of Environmental Quality Limit Exceedance	44

Figures

Figure 1.1	Location of the Project Site and its Environs
Figure 4.1	Proposed Noise Monitoring Locations
Figure 5.1	Proposed Water Quality Monitoring Locations

Appendices

Appendix 1.1	Construction Programme
Appendix 1.2	Implementation Schedule
Appendix 2.1	Sample of Complaint Log
Appendix 4.1	Sample of Data Record Sheet (Construction Noise Impact)
Appendix 4.2	Event and Action Plan for Construction Noise Impact
Appendix 5.1	Sample of Data Record Sheet (Water Quality Impact)
Appendix 5.2	Event and Action Plan for Water Quality Impact
Appendix 11.1	Sample for Notification Environmental Quality Limit Exceedances

Table

Table 1.1 -	Summary of EM&A Parameters
Table 4.1 -	Proposed Construction Noise Monitoring Location
Table 4.2 -	Action and Limit Level for Construction Noise Monitoring
Table 5.1 -	Parameters measured in the Construction Phase Water Quality Monitoring
Table 5.2 -	In-situ/Laboratory Measurement, Standard Methods and Corresponding Detection Limits of Marine Water Quality Monitoring
Table 5.3 -	Location of Water Quality Monitoring Stations
Table 5.4 -	Action and Limit Level for Water Quality

1. INTRODUCTION

1.1 Project Background

- 1.1.1 The Drainage Services Department (DSD) completed the “Stormwater Drainage Master Plan Study in Sai Kung, East Kowloon and Southern Lantau” (DMP Study) in September 2000. The DMP Study identified deficiencies and flooding problems in the existing drainage systems in Sai Kung, East Kowloon and Southern Lantau. Drainage improvement works (including improvement works at the three bends at Tai Tei Tong River, construction of Luk Tei Tong Bypass Channel, bypass box culvert and floodwalls for Pak Ngan Heung River and U-channel at Ling Tsui Tau) have been completed by DSD Contract DC/2006/11 – Drainage Improvement in South Lantau in 2010.
- 1.1.2 Despite the drainage improvement in South Lantau completed in 2010, the Review of Drainage Master Plan in Lantau and the Outlying Islands – Feasibility Study (the DMP Review Study) completed by DSD in 2018 revealed that the drainage provisions in some areas in Mui Wo, including Tai Tei Tong, Luk Tei Tong, Nam Bin Wai, Ma Po Tsuen, Ling Tsui Tau and Chung Hau (hereafter refer to “the concerned area”) could not meet the current standard, taking cognisance of the topography, existing drainage capacity and updated hydrological statistics. The inadequate drainage are mainly caused by the under capacity of Tai Tei Tong River and the adverse effect of tidal backwater affecting low topography areas adjacent to the existing rivers. The flooding incident in Mui Wo recorded during the red rainstorm warning in May 2015, typhoon *Hato* in August 2017 and typhoon *Mangkhut* in September 2018 corroborated the above findings.
- 1.1.3 To relieve the flood risk at Mui Wo, the DMP Review Study has proposed drainage improvement measures in a combination of different approaches including diversion, pumping, drainage upgrading and river reprofiling.
- 1.1.4 Binnies Hong Kong Limited (Binnies) was commissioned by DSD to carry out an investigation of the “Drainage Improvement Works in Mui Wo” (hereafter refer to “the Project”) in July 2021 and propose design scheme for the above-mentioned drainage improvement measures.
- 1.1.5 The proposed design scheme should effectively mitigate the flood risk while land requirement for project implementation has been kept minimal. Upon completion of the drainage improvement measures, the flood protection standard in the areas concerned will be upgraded to meet the requirements in the current DSD’s Stormwater Drainage Manual and the flood risks of the low-lying areas in Mui Wo thereon can be significantly relieved.

1.1.6 An Environmental Impact Assessment (EIA) Study Brief (ESB-334/2020) for the Project was issued by the Environmental Protection Department (EPD) on 15 October 2020. The Project is a designated project by virtue of Item C.12(a)(iii) of Schedule 2, Part I of the EIAO, which specifies “*A dredging operation which is less than 500 m from the nearest boundary of an existing or planned bathing beach*”.¹

1.2 Purpose of the Manual

1.2.1 Binnies Hong Kong Limited was commissioned by DSD to undertake the Environmental Impact Assessment (EIA) Study of the Project. An EIA Study addressing the requirements of the Hong Kong Environmental Impact Assessment Ordinance (EIAO) has been prepared. This Environmental Monitoring and Audit (EM&A) Manual (the Manual) is a supplementary document to the EIA Report.

1.2.2 This Manual has been prepared in accordance with the EIA Study Brief (No. ESB-334/2020) and Annex 21 of the Technical Memorandum of Environmental Impact Assessment Process (Annex 21 of EIAO-TM). The purpose of this Manual is to provide information, guidance and instruction to personnel charged with environmental duties and those responsible for undertaking EM&A work during construction and operation of the Project. It provides systematic procedures for monitoring and auditing the environmental performance of the Project. This Manual contains the following information:

- Appropriate background information on the construction of the Project with reference to relevant technical reports;
- Responsibilities of the Contractor(s), Engineer or Engineer’s Representative (ER), Environmental Team (ET), and the Independent Environmental Checker (IEC) with respect to the EM&A requirements during the implementation of the Project;
- Project organisation;
- Requirements with respect to the construction and operational programme schedule and the necessary EM&A programme to track the varying environmental impact;
- Descriptions of the parameters to be monitored and criteria through which performance will be assessed including monitoring frequency and methodology, monitoring locations (typically, the location of sensitive receivers as listed in the EIA), monitoring equipment lists, event contingency plans for exceedances of established criteria and schedule of mitigation and best practice methods for reduced adverse environmental impacts;

¹ Based on the latest information during the preparation of this EIA, the EIAO (Amendment of Schedule 2 and 3) Order 2023 (Order) is expected to be effective on June 30, 2023. The Project is still a designated project by virtue of Item C.12(a)(iii) under the proposed amendment of Schedule 2 and 3 to the Ordinance and the scope of this EIA study remains unchanged.

- Procedures for undertaking on-site environmental performance audits as a means of ensuring compliance with environmental criteria;
- Details of the methodologies to be adopted including field, laboratory and analytical procedures, and details on quality assurance and quality control (QA/QC) programme;
- Preliminary definition of Action and Limit (A/L) levels;
- Establishment of Event and Action plans (EAPs);
- Requirements for reviewing pollution sources and working procedures required in the event of exceedances of applicable environmental criteria and/or receipt of complaints;
- Requirements for presentation of EM&A data and appropriate reporting procedures; and
- Requirements for review of EIA predictions and the effectiveness of the mitigation measures and the EM&A programme.

1.3 Project Description

Project Scope

- 1.3.1 The Project comprises the drainage improvement works as briefly described in the following:

Tai Tei Tong

- (a) Construction of flood walls (about 580m);
- (b) Reconstruction of gabion walls (about 280m);
- (c) River reprofiling (about 1000m²);
- (d) Modification of agricultural weir; and
- (e) Construction of fish ladders and associated works (about 510m²).

Nam Bin Wai, Chung Hau, Ling Tsui Tau and Ma Po Tsuen

- (a) Construction of access across Pak Ngan Heung River (about 15m);
- (b) Construction of stormwater pumping station and the associated drainage works (about 1150m);
- (c) Construction of diversion box culvert from Tai Tei Tong River to Luk Tei Tong Bypass Channel (about 180m); and
- (d) Construction of tidal gate at River Silver and other associated works.

Luk Tei Tong River (South) and Luk Tei Tong Bypass Channel

- (a) Reconstruction of gabion walls (about 290m);
- (b) Construction of box culvert (about 10m);
- (c) Construction of mechanical penstock; and
- (d) River revitalisation and associated works.

1.3.2 Location of the Project Site and its Environs of the recommended design scheme is shown in **Figure 1.1**.

Construction Programme

1.3.3 The construction works are expected to last for around 51 months (Approximate 4.25 years). Avoidance of excessive concurrent construction works is considered during the preparation of preliminary construction programme. Detail construction sequence will be reviewed and confirmed based on the site condition. The preliminary construction programme for the Project is enclosed in **Appendix 1.1**.

1.4 Objectives of this EM&A Manual

1.4.1 The broad objective of this Manual is to define the procedures of the EM&A programme for monitoring the environmental performance of the Project during design, construction and operation. The construction and operational impacts arising from the implementation of the Project are described in the EIA Report. The EIA Report also specifies mitigation measures and good construction practices that will be needed to comply with the environmental criteria or further minimise the potential impacts. These mitigation measures and their implementation requirements are presented in **Appendix 1.2**.

1.4.2 The main objectives of the EM&A programme are to:

- Provide baseline information against which any short- or long-term environmental impacts of the projects can be determined;
- Provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- Monitor the performance of the Project and the effectiveness of mitigation measures;
- Verify the environmental impacts identified in the EIA;
- Determine Project compliance with regulatory requirements, standards and government policies;
- Take remedial action if unexpected results or unacceptable impacts arise; and
- Provide data to enable an environmental audit to be undertaken at regular intervals.

1.4.3 The EIA Study indicates that an EM&A programme will be required for the pre-construction, construction and post-construction/ operation phases of this Project. A summary of the requirements for each of the environmental parameters is detailed in **Table 1.1**.

Table 1.1 - Summary of EM&A Parameters

Parameter	Phase		
	Pre-Construction	Construction	Post-Construction / Operation
Air Quality	-	<ul style="list-style-type: none"> • Site Inspection and Audit 	-
Noise	<ul style="list-style-type: none"> • Baseline Monitoring 	<ul style="list-style-type: none"> • Site Inspection and Audit • Impact Monitoring 	Commissioning test for fixed plant noise sources
Water Quality	<ul style="list-style-type: none"> • Baseline Monitoring 	<ul style="list-style-type: none"> • Site Inspection and Audit • Impact Monitoring 	<ul style="list-style-type: none"> • Post-construction Monitoring
Waste Management	-	<ul style="list-style-type: none"> • Site Inspection and Audit 	-
Ecology	<ul style="list-style-type: none"> • Ecological Survey • Translocation of Fauna of Conservation Importance (if necessary) 	<ul style="list-style-type: none"> • Site Inspection and Audit • Post-translocation survey (if necessary) 	-
Cultural Heritage	-	<ul style="list-style-type: none"> • Site Inspection and Audit • Vibration Monitoring (if necessary) 	-
Landscape and Visual	<ul style="list-style-type: none"> • Tree Preservation and Removal Proposal (TPRP) 	<ul style="list-style-type: none"> • Site Inspection and Audit 	<ul style="list-style-type: none"> • Landscape Establishment

1.5 Scope of the EM&A Programme

1.5.1 The scope of this EM&A programme is to:

- Establish baseline noise levels at specified locations and implement monitoring requirements for noise monitoring programme during construction;
- Establish baseline water quality levels for water quality monitoring and implement monitoring requirements for water quality monitoring programme during construction and post-construction;
- Conduct update ecological survey before construction. Translocate fauna species of conservation importance to suitable recipient site and monitor the effectiveness of translocation via post-translational survey if necessary;
- Implement landscape and visual monitoring and audit during construction and post-construction;

- Implement inspection and audit requirements for air quality, noise, water quality, waste management, ecology, cultural heritage and landscape and visual impacts;
- Liaise with, and provide environmental advice (as requested or when otherwise necessary) to construction site staff on the significance and implications of the environmental monitoring data;
- Identify and resolve environmental issues and other functions as they may arise from the works;
- Check and quantify the Contractor(s)'s overall environmental performance, implementation of Event and Action Plans (EAPs), and remedial actions taken to mitigate adverse environmental effects 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 verify that necessary mitigation measures are identified and implemented, and to undertake additional ad hoc monitoring and auditing as required by special circumstances;
- Evaluate and interpret 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 predicted in the EIA;
- Manage and liaise with other individuals or parties concerning other environmental issues deemed to be relevant to the construction process;
- Conduct regular site inspections and audits of a formal or informal nature to assess:
 - The level of the Contractor's general environmental awareness;
 - The Contractor's implementation of the recommendations in the EIA and their contractual obligations;
 - The Contractor's performance as measured by the EM&A;
 - the need for specific mitigation measures to be implemented or the continued usage of those previously agreed; and
 - to advise the site staff of any identified potential environmental issues
- Produce monthly EM&A reports which summarise EM&A 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.

1.6 Organisation & Structure of the EM&A

1.6.1 The EM&A will require the involvement of the Project Proponent (DSD), Engineer Representative (ER), Environmental Team (ET), Independent Environmental Checker (IEC) and the Contractor(s). The roles and responsibilities of the various parties involved in the EM&A process are further expanded in the following section.

Project Organisation

1.6.2 An ET shall be established prior to the commencement of construction of the Project to provide specialist advice on implementation of environmental responsibilities.

1.6.3 The ET shall be an independent party from the IEC and the Contractor which will have previous relevant experience with managing similarly sized EM&A programmes and the ET Leader will be a recognised environmental professional, with a minimum of seven (7) years relevant experience in EM&A or environmental management. The ET Leader will be responsible for, and in charge of, the ET; and will be the person responsible for executing the EM&A requirements, and to provide advice (if required) on environmental clauses for Contract Specifications of the Project.

1.6.4 An IEC shall be employed prior to commencement of the construction of Project to verify and validate/ audit the environmental performance of the Contractor(s) and works of the ET, and to maintain strict control of the EM&A process. The IEC will have previous relevant experience with checking and auditing similarly sized EM&A programmes and the IEC will be a recognised environmental professional, with a minimum of seven years relevant experience in EM&A or environmental management.

Role and Responsibility

1.6.5 Roles and responsibilities of DSD and their ER, Contractor(s), the ET and the IEC are detailed in Sections 1.6.6 through 1.6.10.

1.6.6 Roles and responsibilities of DSD include but not limited to the following:

- Establish an ET to undertake monitoring, laboratory analysis and reporting of environmental monitoring data, and site inspection of construction works; and
- Employ an IEC to audit and verify the overall environmental performance of the works and to assess the effectiveness of the ET in their duties.

1.6.7 Roles and responsibilities of ER of DSD include but not limited to the following:

- Supervise the Contractor's activities and confirm that the requirements in the EM&A Manual and the Contract Documents are fully complied with;
- Develop appropriate contract clauses to confirm that the Contractor(s) will have qualified professionals to interface with the DSD/ ER/ ET/ IEC to fulfil the EIA/ EP requirements;
- Inform the Contractor(s) when action is required to reduce impacts in accordance with the EAPs;

- Adhere to the procedures for carrying out complaint investigation; and
- Participate in joint site inspections and audits undertaken by the ET and IEC.

1.6.8 Roles and responsibilities of ET include but not limited to the following:

- Monitor various environmental parameters as required in this Manual;
- Implement EM&A programme;
- Assess the EM&A data and review the success of the EM&A programme in determining the adequacy of the mitigation measures implemented and the validity of the EIA predictions as well as identify any adverse environmental impacts before they arise;
- Carry out weekly site inspection to investigate the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt issues.
- Review the Contractor's working programme and methodology, and comment as necessary;
- Review and prepare reports on the environmental monitoring data and site environmental conditions;
- Report on the environmental monitoring results and conditions to the IEC, Contractor(s), ER, DSD and EPD;
- Recommend suitable mitigation measures to the Contractor(s) in the case of exceedance of A/L levels in accordance with the EAPs; and
- Adhere to the procedures for carrying out complaint investigation.

1.6.9 Roles and responsibilities of IEC include but not limited to the following:

- Review and audit the implementation of the EM&A programme and the overall level of environmental performance being achieved;
- Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor in accordance to Event and Action Plan.
- Arrange and conduct monthly independent site audits of the works;
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring stations, monitoring procedures and locations of sensitive receivers;
- Audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;

- On an as needed basis, audit the Contractor's construction methodology and agree the appropriate, reduced impact alternative in consultation with DSD, ER, ET and the Contractor(s);
- Adhere to the procedures for carrying out complaint investigation;
- Review the effectiveness of environmental mitigation measures and project environmental performance including the proposed corrective measures;
- Review EM&A report submitted by the ET leader and feedback audit results to ET by signing off relevant EM&A proformas; and
- Report the findings of site audits and other environmental performance reviews to DSD, ER, ET, EPD and the Contractor(s).

1.6.10 Roles and responsibilities of Contractor(s) include but not limited to the following:

- Implement the EIA recommendations and requirements;
- Work within the scope of the construction contract and other regulatory requirements;
- Provide assistance to the ET in carrying out environmental monitoring and site inspections;
- Submit proposals on mitigation measures in case of exceedances of the A/L levels in accordance with the EAPs;
- Implement measures to reduce impact where A/L levels are exceeded;
- Implement the corrective actions instructed by DSD/ ER/ ET/ IEC;
- Participate in the site inspections and audits undertaken by the ET and IEC, as required, and undertake any corrective actions instructed by DSD/ ER/ ET/ IEC; and
- Adhere to the procedures for carrying out complaint investigation.

1.7 Structure of this EM&A Manual

1.7.1 The remainder of this Manual is organized as follows:

- Section 2 lists the EM&A general requirements;
- Section 3 describes the EM&A requirements for air quality;
- Section 4 provides the EM&A requirements for noise;
- Section 5 provides the EM&A requirements for water quality;
- Section 6 describes the EM&A requirements for waste management;

- Section 7 describes the EM&A requirements for ecology;
- Section 8 describes the EM&A requirements for cultural heritage;
- Section 9 describes the EM&A requirements for landscape and visual;
- Section 10 describes the scope of environmental site inspection and audit; and
- Section 11 details the reporting requirements for the EM&A programme.

2. EM&A GENERAL REQUIREMENT

2.1 Introduction

2.1.1 This section describes the general requirements of the EM&A programme for the Project. The scope of the programme is developed with reference to the findings and recommendations of the EIA Report.

2.2 Construction Phase EM&A

General

2.2.1 Potential environmental impacts, which were identified during the EIA process and are associated with the construction phase of the Project, will be addressed through the monitoring and controls specified in this Manual and in the construction contracts.

2.2.2 During the construction phase of the Project, noise, water quality will be subject to EM&A, whilst environmental audit being undertaken for air quality, construction waste management, ecological and landscape and visual as recommended in the EIA. Monitoring of the effectiveness of the mitigation measures will be achieved through the environmental monitoring programme as well as through site inspections and audits. The inspections and audits will include within their scope, mechanisms to review and assess the Contractor(s)'s environmental performance, ensuring that the recommended mitigation measures have been properly implemented, and that the timely resolution of received complaints are managed and controlled in a manner consistent with the recommendations of the EIA Report.

Environmental Monitoring

2.2.3 The environmental monitoring work throughout the Project period will be carried out in accordance with this EM&A and reported by the ET. Monitoring works will cover noise, water quality and ecology and will form an important part of the whole EM&A programme.

Action and Limit (A/L) Levels

2.2.4 A/L Levels are defined levels of impact recorded by the environmental monitoring activities which represent levels at which a prescribed response is required. These Levels are quantitatively defined later in the relevant sections of this Manual and described in principle below:

- Action Levels: levels beyond which there is a clear indication of a deteriorating environmental conditions for which appropriate remedial actions are likely to be necessary to prevent environmental quality from falling outside the Limit Levels, which would be unacceptable; and
- Limit Levels: statutory and/or agreed contract limits stipulated in the relevant pollution control ordinances, EIAO-TM, Hong Kong Planning Standards and Guidelines (HKPSG) 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 plant and working methods.

Event and Action Plans

- 2.2.5 The purpose of the EAPs is to provide, in association with the monitoring and audit activities, procedures for ensuring that if any significant environmental incident occurs, the cause will be quickly identified and remediated. This also applies to the exceedances of A/L Levels identified in the EM&A programme.

Site Inspections & Audits

- 2.2.6 In addition to noise, water quality monitoring as a means of assessing the ongoing performance of the Contractor(s), the ET will undertake site inspections of on-site practices and procedures weekly. The primary objective of the inspection programme will be to assess the effectiveness of the environmental controls established by the Contractor(s) and the implementation of the environmental mitigation measures recommended in the EIA Report. The IEC will undertake monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET.
- 2.2.7 Whilst the inspection and audit programme will complement the monitoring activity, the criteria against which inspections/ audits to be undertaken will be derived from the Clauses within the Contract Documents which seek to enforce the recommendations of the EIA Report and the Manual.
- 2.2.8 The findings of site inspections and audits will be made known to the Contractor(s) at the time of the inspection and audit to enable the rapid resolution of identified non-conformities. Non-conformities, and the corrective actions undertaken, will also be reported in the monthly EM&A Reports.
- 2.2.9 **Section 10** of this Manual presents details of the scope and frequency of on-site inspections and defines the range of issues that the audit protocols will be designed to address.

Enquiries, Complaints and Requests for Information

- 2.2.10 Enquiries, complaints and requests for information may occur from a wide range of individuals and organisations including members of the public, Government departments, the press and television media and community groups.
- 2.2.11 Enquiries, complaints and requests for information concerning the environmental effects of the construction works, irrespective of how they are received, will be reported to DSD and the ER and directed to the ET which will set up procedures for the handling, investigation and storage of such information. The following steps will then be followed:
- 1) The ET Leader will notify DSD and the ER of the nature of the enquiry.
 - 2) An investigation will be initiated to determine the validity of the complaint and to identify the source(s) of the issue.

- 3) The Contractor(s) will undertake the following steps, as necessary:
 - investigate and identify source(s) of the issue;
 - if considered necessary by DSD following consultation with the ER and IEC, undertake additional monitoring to verify the existence and severity of the alleged complaint;
 - liaise with ER, ET and IEC to identify remedial measures;
 - implement the agreed mitigation measures;
 - repeat the monitoring to verify effectiveness of mitigation measures; and
 - repeat review procedures to identify further practical areas of improvement if the repeat monitoring results continue to substantiate the complaint.
- 4) The outcome of the investigation and the action taken will be documented on a complaint log. A formal response to each complaint received will be prepared by the Contractor(s) within five working days and submitted to DSD, in order to notify the concerned person(s) that action(s) has been taken.
- 5) Enquires which trigger this process will be reported in the monthly EM&A Reports which will include results of inspections and audits undertaken by the Contractor(s), and details of the measures taken, and additional monitoring results (if deemed necessary). It should be noted that the receipt of complaint or enquiry will not be, in itself, a sufficient reason to introduce additional mitigation measures.

2.2.12 A sample of complaint log is provided in **Appendix 2.1** as reference.

2.2.13 The complainant will be notified of the findings, and audit procedures will be put in place to verify that the issue does not recur.

Reporting

2.2.14 Baseline and impact monitoring, monthly and final reports will be prepared by the ET on behalf of DSD and certified by the ET Leader and verified by the IEC. The monthly EM&A Reports will be prepared and submitted within 2 weeks of the end of each reporting month.

Cessation of EM&A

2.2.15 The cessation of EM&A programme is subject to the satisfactory completion of the Final EM&A Report, agreement with the IEC and approval from EPD.

2.3 Operation Phase EM&A

2.3.1 Based on recommendation from the EIA, audit of landscape and visual impacts are required during the operation phase of the Project.

- 2.3.2 DSD will manage the operation and maintenance of the Project through Contractor(s). The Contractor(s) shall ensure that all conditions of the EP, including operation phase EM&A, are fulfilled. The ET and IEC commissioned by DSD will undertake the EM&A as per requirements listed in **Section 1.6.8** and **Section 1.6.9**, respectively, during operation phase.

3. AIR QUALITY IMPACT

3.1 Construction Phase

3.1.1 Adverse air quality impact associated with the construction of the Project is not expected with the implementation of the recommended mitigation measures. ET should conduct weekly site inspections to ensure that the recommended mitigations are properly implemented to reduce the air quality impacts from the Project. IEC should undertake monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET.

3.1.2 Since the recommended mitigation measures can readily mitigate the potential air quality impact, air quality monitoring during the construction phase of the Project is considered not necessary.

3.1.3 The findings of the site inspections and audits will be reported in the Monthly Environmental Monitoring and Audit Report.

3.2 Operation Phase

3.2.1 Adverse air quality impact associated with the operation of the Project is not expected with the implementation of the recommended mitigation measures. Hence, EM&A will not be required during operation of the Project.

3.3 Mitigation Measures

3.3.1 The mitigation measures recommended for air quality are summarised in **Appendix 1.2**.

4. NOISE IMPACT

4.1 Construction Phase

- 4.1.1 Construction noise monitoring is recommended to ensure compliance with the noise criteria at the Noise Sensitive Receivers (NSRs). Monitoring requirements are detailed below. ET should conduct weekly site inspections to ensure that the recommended mitigations are properly implemented to reduce the noise impacts from the Project. IEC should undertake monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET.

Construction Noise Parameters

- 4.1.2 Due to the utilization of Powered Mechanical Equipment (PME) during the construction phase of the Project, potential noise impact to the NSRs in the vicinity of the Project Site is expected.
- 4.1.3 Noise measurements should be carried out in accordance with the guidelines given in Annex – General Calibration and Measurement Procedures of Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM).
- 4.1.4 Construction noise level should be measured in terms of A-weighted equivalent continuous sound pressure level (L_{eq}) during the construction phase to check for compliance against limits. $L_{eq(30min)}$ should be used as the monitoring parameter for the construction period between 0700 – 1900 hours on normal working weekdays. Supplementary information for data auditing (statistical results such as L_{10} and L_{90}) should also be obtained for reference. A sample data record sheet is shown in **Appendix 4.1** for reference.

Monitoring Equipment

- 4.1.5 As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications should be used for carrying out the noise monitoring. Immediately prior to, and following, each noise measurement the accuracy of the sound level meter should be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB. Noise measurements should generally not be made in the presence of fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding 10m/s. The wind speed should be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

Monitoring Locations

- 4.1.6 The noise monitoring locations have been shown in **Figure 4.1** and **Table 4.1**. The status and location of NSR may change before commencement of construction. If such cases exist, the ET Leader should propose updated noise level monitoring locations and

seek approval from the ER and the updated locations must be agreed by the IEC and the EPD.

Table 4.1 - Proposed Construction Noise Monitoring Location

Monitoring Station / NSR ID	Description	Type of Use
N3	5 Ma Po Tsuen	Residential
N7	39K Mui Wo Chung Hau St	Residential
N11	Mui Wo School	Educational Institution
N16	9 Ma Po Tsuen	Residential

4.1.7 When proposing alternative monitoring location, it should be chosen based on the following criteria:

- locations that are close to the major site activities which are likely to be affected by elevated noise levels;
- close to the noise sensitive receivers; and
- for monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

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

Baseline Noise Monitoring

4.1.9 Baseline noise monitoring shall be conduct prior to the commencement of construction works. The baseline noise levels should be measured daily for at least 14 consecutive days at a minimum logging interval of 30 minutes during daytime between 0700-1900. The L_{eq} , L_{10} and L_{90} should be recorded at the specified intervals. A schedule for the baseline monitoring should be submitted to the IEC for approval before the baseline monitoring starts.

4.1.10 There should not be any construction activities in the vicinity of the monitoring stations during the baseline monitoring. Any non-project related construction activities in the vicinity of the monitoring stations during the baseline monitoring should be noted and the source and location of such activities should be recorded.

4.1.11 In exceptional cases, when baseline monitoring data obtained are insufficient or questionable, the ET should liaise with the IEC and EPD to agree on an appropriate set of data to be used as the baseline reference.

Impact Monitoring for Construction Noise

- 4.1.12 Weekly noise monitoring should be carried out at all the designated monitoring stations to obtain one set of 30-minute measurements between 0700-1900 hours during normal weekdays. General construction work carrying out during restricted hours is controlled by CNP system under the NCO. The proposed monitoring schedule should be submitted to ER, the IEC and EPD at least 1 week before the first day of the monitoring month. The ER, IEC and EPD should be notified immediately of any changes in schedule.
- 4.1.13 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in **Appendix 4.2** shall be carried out. This additional monitoring should be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

Event and Action Plan for Construction Noise Monitoring

- 4.1.14 The Action and Limit levels for construction noise are defined in **Table 4.2**. Should non-compliance of the noise quality criteria occur, actions in accordance with the Action Plan in **Appendix 4.2** should be carried out.

Table 4.2 - Action and Limit Level for Construction Noise Monitoring

Time Period	Action Level	Limit Level
0700 – 1900 hrs on normal weekdays	When one documented complaint is received	75 dB(A) for residential 65 / 70 dB(A) for education institution*

* Reduced to 65dB(A) during school examination period.

4.2 Operation Phase

- 4.2.1 According to the EIA, no unacceptable noise impact is anticipated during operation phase of the Project.
- 4.2.2 Commissioning test should be conducted prior to operation the Project to ensure compliance of the operation noise levels with the stipulated noise standard. The commissioning test plan should be prepared and certified by ET, verified by the IEC and agreed with EPD at least 1 month prior to the commencement of commissioning test. The commissioning test report to confirm the compliance of the operation noise levels with the stipulated noise standard shall be prepared and certified by ET, verified by the IEC and agreed with EPD at least 1 month after the commissioning test complete.

4.3 Mitigation Measures

- 4.3.1 The mitigation measures recommended for noise impact are summarised in **Appendix 1.2**.

5. WATER QUALITY IMPACT

5.1 Construction Phase

5.1.1 In accordance with the recommendations of the EIA, water quality EM&A is required during the construction phase of the Project. In addition, baseline water quality monitoring will be required prior to the commencement of construction activities. The following Section provides details of the water quality monitoring to be undertaken by the ET to identify any potential water quality impacts on the receiving waters. The water quality monitoring programme will be carried out to allow any deteriorating water quality to be readily detected and timely action taken to rectify the situation. The status, location of water quality sensitive receivers and water quality monitoring locations may change before the commencement of construction. If such case exist, the ET Leader should propose updated water quality monitoring stations and seek approval from the ER and the updated stations must be agreed by the IEC and EPD.

Sampling & Testing Methodology

5.1.2 The parameters that have been selected for measurement in situ and in the laboratory are those that were either determined in the EIA to be those with the most potential to be affected by the construction works or are a standard check on water quality conditions. Parameters to be measured in the construction phase are listed in **Table 5.1**.

Table 5.1 - Parameters measured in the Construction Phase Water Quality Monitoring

Parameters	Unit	Abbreviation	Baseline ⁽¹⁾	Impact ⁽²⁾	Post-construction ⁽³⁾
In situ measurements					
Dissolved Oxygen	mg/L	DO	✓	✓	✓
Water Temperature	°C	-	✓	✓	✓
pH	-	-	✓	✓	✓
Turbidity	NTU	-	✓	✓	✓
Salinity	PPT	-	✓	✓	✓
Laboratory measurements					
Suspended Solids	mg/L	SS	✓	✓	✓

Remark:

1. Baseline monitoring shall be undertaken at all designated monitoring stations including control stations, three times per week, at mid-flood and mid ebb tides for at least four weeks prior to commencement of construction works. The interval between 2 sets of monitoring shall not be less than 36 hours.
2. Impact monitoring should be undertaken at all designated monitoring stations three times per week, at mid-flood and mid-ebb tides during the construction.
3. Post-construction monitoring will comprise sampling on three times a week for four weeks after completion of the construction works. The monitoring requirements will be the same as the impact monitoring.

5.1.3 Measurement shall be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above seabed/ riverbed, except where the water depth less than 6m, the mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station will be monitored. In addition to the water quality parameters, other

relevant data will also be measured and recorded in Water Quality Monitoring Logs, including the location of the sampling stations, time, weather conditions, sea / river conditions, water depth, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results. A sample data record sheet is shown in **Appendix 5.1** for reference.

Monitoring Equipment

5.1.4 For water quality monitoring, the following equipment will be used:

- **Dissolved Oxygen and Temperature Measuring Equipment** - The instrument will be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and will be operable from a DC power source. It will be capable of measuring: dissolved oxygen levels in the range of 0 - 20 mg L⁻¹ and 0 - 200% saturation; and a temperature of 0 - 45 degrees Celsius. It shall have a membrane electrode with automatic temperature compensation complete with a cable of not less than 35 m in length. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary (e.g. YSI model 59 DO meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).
- **pH Measuring Equipment** – A portable pH meter capable of measuring a range between 0.0 and 14.0 shall be provided to measure pH under the specified conditions (e.g. Orion Model 250A or an approved similar instrument).
- **Turbidity Measurement Equipment** - The instrument will be a portable, weatherproof turbidity-measuring unit complete with cable, sensor and comprehensive operation manuals. The equipment will be operated from a DC power source, it will have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU (for example Hach 2100P or an approved similar instrument). The meter should be calibrated in order to establish the relationship between NTU units and the levels of SS. The turbidity measurement should be carried out on a split water sample from the same water sample collected for suspended solids analysis.
- **Salinity Measurement Instrument** - A portable salinometer capable of measuring salinity in the range of 0 - 40 ppt will be provided for measuring salinity of the water at each monitoring location.
- **Positioning Device** – A hand-held Global Positioning System (GPS) with way point bearing indication or other equivalent instrument of similar accuracy will be provided and used during monitoring to ensure the monitoring team is at the correct location before taking measurements.
- **Water Depth Gauge** - A portable, battery-operated echo sounder will be used for the determination of water depth at each designated monitoring station.

- **Water Sampling Equipment** - A water sampler, consisting of a PVC or glass cylinder of not less than two litres, which can be effectively sealed with cups at both ends, will be used (e.g. Kahlsico Water Sampler 13SWB203 or an approved similar instrument). The water sampler will have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth.
- **Current Velocity and Direction** – No specific equipment is recommended for measuring the current velocity and direction. ET shall seek IEC approval of the proposed equipment prior to deployment.
- **Backup Equipment** – Sufficient stocks of spare parts shall be maintained for replacement when necessary. Backup equipment shall also be available so that can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

Sampling / Testing Protocols

- 5.1.5 All in situ monitoring instruments will be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at three months intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes will be checked with certified standard solutions before each use.
- 5.1.6 On-site calibration of field equipment shall follow the “Guide to On-Site Test Methods for the Analysis of Waters”, BS 1427: 2009. Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when equipment is under maintenance, calibration etc.
- 5.1.7 Water samples for SS measurements should be collected in high density polythene bottles, packed in ice (cooled to 4° C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.
- 5.1.8 Three replicate samples should be collected from each of the monitoring events for in situ measurement and lab analysis. It is recommended to take three replicates at each sampling station from each independent sampling event for all parameters in order to ensure a robust statistically interpretable data set.

Laboratory Measurement and Analysis

- 5.1.9 All laboratory work shall be carried out in a HOKLAS accredited laboratory. Sufficient volume of each water sample shall be collected at the monitoring stations for carrying out the laboratory analyses. Using chain of custody forms, collected water samples will be transferred to an HOKLAS accredited laboratory for immediate processing. The analysis shall commence within 24 hours after collection of the water samples and ET shall report the testing results to DSD, ER, IEC and Contractor within 5 working days after the sampling event. Analytical methodology and sample preservation of other parameters will be based on the latest edition of Standard Methods for the Examination of Waste and Wastewater published by APHA, AWWA and WPCF and methods by

USEPA, or suitable method in accordance with requirements of HOKLAS or another internationally accredited scheme. The submitted information should include pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch etc), detection limits and accuracy. The QA/QC details shall be in accordance with requirements of HOKLAS or another internationally accredited scheme.

5.1.10 Parameters for laboratory measurements, their standard methods and their detection limits are presented in **Table 5.2**.

Table 5.2 - In-situ/Laboratory Measurement, Standard Methods and Corresponding Detection Limits of Marine Water Quality Monitoring

Parameters	Standard Methods	Unit	Reporting Limit	Precision
Dissolved Oxygen	Instrumental, CTD	mg/L	0.1	±25%
Water Temperature	Instrumental, CTD	°C	0.1	±25%
pH	Instrumental, CTD	-	0.1	±25%
Turbidity	Instrumental, CTD	NTU	0.1	±25%
Salinity	Instrumental, CTD	ppt	0.1	±25%
Suspended Solids	APHA 2540D	mg/L	0.5	-

*Note: The testing methods, Quality Assurance/Quality Control (QA/QC) details, detection limits and accuracy shall be submitted to EPD for approval prior to the commencement of monitoring programme.

Monitoring Locations

5.1.11 The monitoring stations have been established to identify potential water quality impacts to WSRs are shown in **Figure 5.1** and detailed in **Table 5.3** below. The locations and suitability of the proposed monitoring stations in **Table 5.3** are for reference only and shall be reviewed and proposed by the ET and confirmed with the IEC and the EPD before commencement of Baseline Monitoring. In case, the water depth at the monitoring locations not sufficient to take samples at different depths during dry season or due to tidal action, water sample(s) should only be taken at mid-depth. Water sampling works should be conducted with caution to avoid disturbing the bottom sediment.

Table 5.3 - Location of Water Quality Monitoring Stations

Station	Easting	Northing	Description
LTT1	817307	813629	Upstream to works area along Luk Tei Tong River Serve as control station for LTT3
LTT2	817038	813970	Upstream to works area along Luk Tei Tong Bypass Channel Serve as control station for LTT3
LTT3	817381	813942	Downstream to works area along Luk Tei Tong River
TTT1	816876	814305	Upstream to works area along Tai Tei Tong River Serve as control station for TTT2.

Station	Easting	Northing	Description
TTT2	817388	814156	Downstream to works area along Tai Tei Tong River
PNH1	817366	814304	Upstream to works area along Pak Ngan Heung River Serve as control station for PNH2.
PNH2	817437	814170	Downstream to works area along Pak Ngan Heung River
RS1	817520	814102	Upstream to works area along River Silver Serve as impact station for work at River Silver in flood tide.
RS2	817862	814211	Downstream to works area along River Silver Serve as impact station for work at River Silver in ebb tide.
RS3	817957	814219	Outside of River Silver Serve as control station for work at River Silver.

5.1.12 The status, location of water quality sensitive receivers and water quality monitoring locations may change before the commencement of construction. If such case exist, the ET Leader should proposed updated water quality monitoring stations and seek approval from the ER and the updated stations must be agreed by the IEC and EPD.

Baseline Monitoring

5.1.13 Baseline conditions for water quality shall be established and agreed with the IEC and the EPD prior to the commencement of works. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed impact and control monitoring stations. The baseline conditions shall normally be established by measuring the water quality parameters specified above.

5.1.14 The measurements shall be taken at all designated monitoring stations including control stations, 3 times per week, at mid-flood and mid ebb tides for at least four weeks prior to commencement of construction works. The interval between 2 sets of monitoring shall not be less than 36 hours. ET shall seek approval from the ER, IEC and EPD on the alternative proposal prior to commencement of baseline monitoring.

5.1.15 No construction activities shall be on-going in the vicinity of the stations during the baseline monitoring. The ET shall be responsible for undertaking the baseline monitoring and submitting the results within 10 working days from the completion of the baseline monitoring work.

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

5.1.17 The baseline monitoring schedule shall be issued to the IEC and EPD at least 1 week prior to the commencement of baseline monitoring.

Impact Monitoring

- 5.1.18 During periods when there are construction works conducted under this Project, impact monitoring should be undertaken at the specified monitoring stations as shown in **Figure 5.1** and **Table 5.3** three times a week. Monitoring at each station would be undertaken three times per week, at mid-flood and mid-ebb tides during the course of construction works. Proposed water quality monitoring schedule shall be issued to the IEC and EPD on or before the first day of the monitoring month. EPD shall be notified immediately for any change in scheduled. The interval between two sets of monitoring would not be less than 36 hours. The monitoring frequency would be increased in the case of exceedances of Action/Limit Levels if considered necessary by ET. Monitoring frequency would be maintained as far as practicable.
- 5.1.19 The monitoring location/position, time, water depth, water temperature, salinity, weather conditions, site conditions, special phenomena and work underway at the works site will be recorded.

Post-construction Monitoring

- 5.1.20 Post-construction Monitoring will comprise sampling at all designed monitoring stations 3 times per week, at mid-flood and mid-ebb tides for four weeks after completion of the construction works. The interval between 2 sets of monitoring shall not be less than 36 hours. Post-construction monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD one week prior to the commencement of post-construction monitoring.

Event and Action Plan for Water Quality Monitoring

- 5.1.21 The Action and Limit level for water quality monitoring are defined in

- 5.1.22 **Table 5.4.** Should the monitoring results of the water quality parameters at any designated monitoring stations indicate that the water quality criteria are exceeded, actions in accordance with the Action Plan in **Appendix 5.2** should be carried out.

Table 5.4 - Action and Limit Level for Water Quality

Parameter ⁽³⁾	Action Level	Limit Level
Dissolved Oxygen in mg/L ⁽¹⁾	<p><u>Surface & Middle</u> 5%-ile of baseline data for surface and middle layer</p> <p><u>Bottom</u> 5%-ile of baseline data for bottom layer.</p>	<p><u>Surface & Middle</u> 4mg/L or 1%-ile of baseline data for surface and middle layer</p> <p><u>Bottom</u> 2mg/L or 1%-ile of baseline data for bottom layer</p>
Turbidity in NTU ⁽²⁾	95%-ile of baseline data or 120% of upstream control station's turbidity recorded on the same day	99%-ile of baseline data or 130% of upstream control station's turbidity recorded on the same day
Suspended Solids in mg/L ⁽²⁾	95%-ile of baseline data or 120% of upstream control station's SS at the same tide of the same day	99%-ile of baseline data or 130% of upstream control station's SS recorded on the same day

Notes:

- (1) For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- (2) For DO, non-compliance of the water quality limits occurs when the monitoring result is lower than the limits.
- (3) In addition to the DO, SS and turbidity, other relevant data shall also be recorded, including monitoring location / position, time, water depth, pH value, salinity, temperature, tidal stages, current velocity and direction, sea conditions, weather conditions and any special phenomena or work activities undertaken around the monitoring and works area that may influence the monitoring results.

Construction Site Inspection and Audit

5.1.23 ET should conduct weekly site inspections to ensure that the recommended mitigations are properly implemented to reduce the water quality impacts from the Project. IEC should undertake monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET.

5.1.24 The ET weekly site inspections and IEC monthly site audits should be carried out based on the recommended mitigation measures for water quality impact as detailed in **Appendix 1.2**. If the recommended mitigation measures are not fully or properly implemented, deficiency shall be recorded and reported to ER and DSD. Follow-up actions should be carried out to:

- Investigate the problems and the causes;
- Issue action notes to the Contractor on the deficiency;
- Implement remediation and corrective action immediately;
- Re-inspect the site condition upon completion of the remedial and corrective actions; and
- Record the event and discuss with the Contractor for preventive actions.

5.2 Operation Phase

5.2.1 Unacceptable water quality impacts are not expected with appropriate preventive and mitigation measures. Hence, EM&A will not be required during operation of the Project.

5.3 Mitigation Measures

5.3.1 The mitigation measures recommended for water quality impact are summarised in **Appendix 1.2**.

6. WASTE MANAGEMENT

6.1 Construction Phase

6.1.1 It is recommended that ET should conduct weekly site inspections of the waste management practices would 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 and audits will investigate all aspects of waste management including waste generation, storage, handling, recycling, transportation and disposal. IEC should undertake monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET.

6.1.2 The findings of the inspections and audits will be reported in the monthly Environmental Monitoring and Audit Report.

6.2 Operation Phase

6.2.1 As the operation of the Project will generate minimal quantity of waste, EM&A will not be required during the operation phase of the Project.

6.3 Mitigation Measures

6.3.1 The mitigation measures recommended for waste management issue are summarised in **Appendix 1.2**.

7. ECOLOGICAL

7.1 Construction Phase

- 7.1.1 The assessment presented in **Chapter 7** of the EIA indicates that unacceptable construction phase impacts and operation phase impacts are not expected to occur to terrestrial ecological resources. ET should conduct weekly site inspections to ensure that the recommended mitigations are properly implemented to reduce the ecological impacts from the Project. IEC should undertake monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET.
- 7.1.2 The findings of the inspections and audits will be reported in the monthly Environmental Monitoring and Audit Report.

Translocation of Fauna Species of Conservation Importance

- 7.1.3 An update ecological survey shall be conducted by a qualified ecologist as part of the ET with focus to the presence of the herpetofauna and freshwater community prior to commencement of construction at the affected watercourse(s). Should species of conservation importance be found within the surveyed watercourse section(s), a Translocation Plan should be prepared. Translocation should be conducted to move the individuals from the works area to suitable recipient sites. The Translocation Plan should be prepared by the qualified ecologist as a part of the ET, certified by the IEC and submitted to AFCD within one month upon completion of the update aquatic survey to agree the detailed translocation procedures including the identified receptor site(s). Agreement from relevant authorities (e.g. AFCD and EPD) should be sought prior to conducting the translocation work. The translocation work should be conducted as close to the commencement of the relevant site works as possible, following the agreed Translocation Plan. Upon the completion of the translocation work, post-translocation survey should be conducted at the recipient site to monitor the effectiveness of translocation.

Protection of Identified Night Roosting Site

- 7.1.4 As a precautionary measure, construction works at the works area of stormwater drain near Mui Wo Municipal Services Building during night-time from 17:00 to 07:00 should be avoided to minimize potential disturbance to the Ardeids. In addition, strong artificial lighting should not be used in the area at night to avoid disturbance to the roosting ardeids. Lighting required for safety purpose should keep minimal and pointed inward. Clear signs should be erected on site to alert all site staff and workers about the requirement.

7.2 Operation Phase

- 7.2.1 It is predicted that the impacts will mainly arise during the construction phase, as no major activities would be conducted during the operational phase. The routine maintenance and the operation of the completed drainage channel and pumping station would not cause any significant ecological impact. No operational phase monitoring is considered necessary.

7.3 Mitigation Measures

7.3.1 The mitigation measures recommended for ecological impact are summarised in **Appendix 1.2**.

8. CULTURAL HERITAGE

8.1 Construction Phase

Archaeology

- 8.1.1 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 A&M Ordinance (Cap. 53) are discovered during the course of works.

Built Heritage

- 8.1.2 Any vibration and building movement induced from the proposed works adjacent to the seven (7) graded historic sites/ buildings/ structures, which located over 70m from the Project Boundary, should be strictly monitored to ensure no disturbance and/ or physical damages made to them during the course of works. Monitoring proposal for them, including checkpoint locations, installation details, response actions for each of the Alert/ Alarm/ Action (3As) levels and frequency of monitoring should be submitted for AMO's consideration. Installation of monitoring checkpoints shall be carried out in great care and adequate protection shall be provided so as to avoid unnecessary disturbance/ damage to nearby historic fabrics. Photo records of monitoring checkpoints shall be submitted upon installation for AMO's records; Monitoring records should be submitted to AMO on regular basis and alert AMO should the monitoring reach Alert/ Alarm/ Action levels; and pre and post condition survey should be carried out to record conditions of the heritage sites and survey reports should be submitted for AMO's record.
- 8.1.3 Apart from 2 agricultural weirs (HB- 22 and HB-76), potential direct impact to the built heritage items identified is not anticipated due to adequate separate distance between the proposed works and built heritage items. HB-22 and HB-76 are located within works area of the proposed river reprofiling work and fish ladder works at Tai Tei Tong River. Modification of the agricultural weirs and construction of fish ladder are proposed on site in order to achieve beneficial ecological impact like improvement of the river hydraulic performance and fish movement. Although the modification works will bring direct impact to the weirs, the impact would be acceptable with mitigation measures. It is recommended that cartographic and photographic records be conducted to record the weirs prior to commencement of modification works.

8.2 Operation Phase

Archaeology

- 8.2.1 No excavation works of the Project will be involved in operational phase, therefore no adverse archaeological impact is anticipated. Thus, no EM&A is required.

Built Heritage

- 8.2.2 No direct and indirect impacts are anticipated from the proposed works in the operational phase. No EM&A is required.

8.3 Mitigation Measures

- 8.3.1 The mitigation measures recommended for cultural heritage impact are summarised in **Appendix 1.2**.

9. LANDSCAPE AND VISUAL

9.1 Construction Phase

- 9.1.1 The landscape and visual mitigation measures proposed shall be incorporated in the Construction Contract.
- 9.1.2 ET should conduct weekly site inspections to ensure that the proposed mitigation measures and good site practices proposed to manage and mitigate landscape and visual impacts, are implemented. IEC should undertake monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET.

9.2 Operation Phase

- 9.2.1 A specialist landscape subcontractor should be employed for the implementation of tree and landscape works and subsequent maintenance operations during the establishment period.
- 9.2.2 Site audits should be undertaken bi-monthly for 12 months establishment period during the operation phase to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives.
- 9.2.3 After the 12-months establishment period for soft landscaping, standard maintenance will be required to ensure mitigation measures to retain their full efficacy.

9.3 Mitigation Measures

- 9.3.1 The mitigation measures recommended for landscape and visual impact are summarised in **Appendix 1.2**.

10. CONSTRUCTION SITE INSPECTION AND AUDIT

10.1 Site Inspection and Audit

- 10.1.1 ET should conduct weekly site inspections to ensure that the proposed mitigation measures and good site practices proposed to manage and mitigate landscape and visual impacts, are implemented. IEC should undertake monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET..
- 10.1.2 The ET Leader should be responsible for formulating the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspection works. The ET Leader should submit a proposal on the site inspection, deficiency and action reporting procedures to the Contractor for agreement and to the IEC and ER for approval.
- 10.1.3 Regular site inspections should be carried out at once per week. The areas of inspection should not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situation outside the works area which is likely to be affected, directly or indirectly, by the construction activities of the Project. The ET Leader should make reference to the following information in conducting the inspection:
- a) Recommendations in the EIA study on environmental protection and pollution control mitigation measures;
 - b) On-going result of the EM&A programme;
 - c) Works progress and programme;
 - d) Individual works methodology proposals (which should include proposal on associated pollution control measures);
 - e) The contract specifications on environmental protection;
 - f) Relevant environmental protection and pollution control laws; and
 - g) Previous site inspection results.
- 10.1.4 The Contractor should update the ET Leader with all relevant information of the construction contract for the ET Leader to carry out the site inspections. The inspection and its associated recommendations on improvements to the environmental protection and pollution control works should be submitted to the ER, Contractor and IEC within 24 hours, for reference and for taking immediate action. The Contractor should follow the procedures and time-frame as stipulated in the environmental site inspection, deficiency and action reporting system formulated by the ET Leader to report on any remedial measures subsequent to the site inspections.

10.1.5 The ET should also carry out ad hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

10.2 Compliance with Legal & Contractual Requirements

10.2.1 In order to ensure that all construction site works are in compliance with the environmental requirements, all the works method statements submitted by the Contractor to the ER for approval should be sent to the ET Leader for vetting.

10.2.2 The ET Leader should also review the progress and programme of the construction works in order to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented.

10.2.3 The Contractor should regularly copy relevant documents to the ET Leader so that the inspection can be carried out smoothly. The document should include but not limited to the Work Progress Reports, updated Works Programme, and application letters for different licences/ permits under the environmental protection laws, and copies of all the valid licences/ permits held at that time. The site diary should also be available for the ET Leader's inspection upon request.

10.2.4 After the document review, the ET Leader should advise the ER, Contractor and IEC of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for their 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 may not cope with the works programme or may result in potential violation of environmental protection and pollution control requirements, the ET Leader also advise the Contractor and the ER accordingly.

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

10.3 Environmental Complaints

24-hour Dedicated Hotline for Public Complaints and Enquiries

10.3.1 The Contractor should set up a 24-hour hotline dedicated to the Project to receive and respond to complaints or enquires from the public, media, and community groups in the vicinity of the site throughout the construction period of the Project. The Contractor should display conspicuously the telephone number of the 24-hour hotline on the construction site(s) at all vehicular site entrances/ exits or at a convenient location for public information at all times.

Environmental Complaints

10.3.2 Complaints should be referred to the ET Leader for carrying out complaint investigation procedures. The ET Leader should undertake the following procedures upon receipt of any complaint:

- 1) Log complaint and date of receipt onto the complaint database and inform the Contractor, ER, DSD and IEC immediately;
 - 2) Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
 - 3) Identify mitigation measures in consultation with the IEC if a complaint is valid and due to works;
 - 4) Advise the Contractor accordingly if mitigation measures are required;
 - 5) Review the Contractor's response on the identified mitigation measures, and the updated situation;
 - 6) If the complaint is transferred from other sources (e.g. ER, DSD or EPD), submit interim report after endorsement by IEC on status of the complaint investigation and follow-up action within the agreed time frame;
 - 7) Undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;
 - 8) Report the investigation results and the subsequent actions to the complainant (If the source of complaint is from other sources, the results should be reported within the agreed time frame); and
 - 9) Record the complaint, investigation, subsequent actions and results in the monthly EM&A reports.
- 10.3.3 During the complaint investigation work, the Contractor and ER should cooperate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor should promptly carry out the mitigation. The ER should ensure that the measures have been carried out by the Contractor.
- 10.3.4 A sample of complaint log is provided in **Appendix 2.1** as reference.

11. REPORTING

11.1 General

11.1.1 EM&A reports can be provided in an electronic medium upon agreement with DSD and EPD on the format. The monitoring data (baseline and impact) should also be made available through an internet website that is agreed with relevant authority.

11.1.2 The ET Leader should prepare and submit the following reports:

- Baseline Monitoring Report;
- Monthly EM&A Reports; and
- Final EM&A Review Report

11.1.3 In accordance with Annex 21 of the EIAO-TM, the monthly and final review EM&A reports should be made available to the Director of Environmental Protection (DEP).

11.2 Baseline Monitoring Report

11.2.1 The ET should prepare and submit a Baseline Monitoring Report within 10 working days after completion of the baseline monitoring works. Copies of the Baseline Monitoring Report should be submitted to the Contractor(s), the IEC, ER, DSD and EPD as appropriate. The ET should liaise with the relevant parties to confirm the exact number of copies required.

11.2.2 The Baseline Monitoring Report for the construction phase should include the following as a minimum:

- 1) Up to half a page executive summary;
- 2) Brief project background information;
- 3) Drawings showing locations of the baseline monitoring stations;
- 4) Monitoring results (in both hard and diskette copies) together with the following information:
 - a) monitoring methodology;
 - b) name of laboratory and types of equipment used and calibration details;
 - c) parameters monitored;
 - d) monitoring locations (and depth if applicable);
 - e) monitoring date, time, frequency and duration; and
 - f) QA/QC results and detection limits.

- 5) Details on influencing factors, including:
 - a) major activities, if any, being carried out on the site during the period;
 - b) weather conditions during the period; and
 - c) other factors which might affect the results.
- 6) Determination of the A/L 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 monitored parameters;
- 7) Revisions for inclusion in the EM&A Manual; and
- 8) Comments, recommendations and conclusions

11.3 Monthly EM&A Reports

- 11.3.1 The results and findings of the construction phase EM&A work required in this Manual will be recorded in the Monthly EM&A Reports certified by the ET Leader and verified by the IEC. The EM&A report should be prepared and submitted within 2 weeks of the end of each reporting month, with the first report due in the month after construction commenced. Each Monthly EM&A Report should be submitted to the following parties: the Contractor(s), the IEC, ER, DSD and the EPD, as well as to other relevant departments as required. Before submission of the first Monthly EM&A Report, the ET should liaise with the parties on the exact number of copies and format of the reports in both hard copy and electronic medium.
- 11.3.2 The ET Leader should review the number and location of monitoring stations and parameters every six months, or on as needed basis, to cater for any changes in the surrounding environment and the nature of works in progress.
- 11.3.3 Contents of First Monthly EM&A Report shall at least include the following:
 - 1) Executive summary (1-2 pages), comprising:
 - a) breaches of AL levels;
 - b) complaint log;
 - c) notifications of any summons and successful prosecutions;
 - d) reporting changes; and
 - e) forecast of impact prediction.
 - 2) Basic project information including a synopsis of the project organisation, construction programme and management structure;

- 3) Environmental Status, comprising:
 - a) Works undertaken during the month with illustrations; and
 - b) Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring stations.
- 4) A brief summary of EM&A requirements including:
 - a) Monitoring parameters;
 - b) Environmental quality performance limits (A/L levels);
 - c) EAPs;
 - d) environmental mitigation measures, as recommended in the EIA Report; and
 - e) environmental requirements in contract documents.
- 5) Advice on the implementation of environmental protection, mitigation and pollution control measures as recommended in the EIA Report and summarised in the updated implementation schedule.
- 6) Monitoring results (in both hard and diskette copies) together with the following information;
 - a) Monitoring methodology;
 - b) Name of laboratory and equipment used and calibration details;
 - c) Parameters monitored;
 - d) Monitoring location;
 - e) Monitoring date, time, frequency and duration; and
 - f) QA/QC results and detection limit.
- 7) Graphical plots of trends of monitored parameters for representative monitoring stations annotated against the following:
 - a) Major activities being carried out on site during the period;
 - b) Weather conditions during the period; and
 - c) any other factors which might affect the monitoring results.
- 8) Waste generation and disposal record.
- 9) A summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels).

- 10) A review of the reasons for and the implications of non-compliance including a review of pollution sources and working procedures.
- 11) A description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- 12) A summary record of complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints.
- 13) A summary record of notifications of summons, successful prosecutions for breaches of environmental protection/pollution control legislation and actions to rectify such breaches.
- 14) A forecast of the works programme, impact predictions and monitoring schedule for the next one month; and
- 15) Comments, recommendations and conclusions for the monitoring period.

11.3.4 Contents of Subsequent Monthly EM&A Report shall at least include the following:

- 1) Executive summary (1-2 pages), comprising:
 - a) Breaches of A/L levels;
 - b) Complaint log;
 - c) Notifications of any summons and successful prosecutions;
 - d) Reporting changes; and
 - e) Forecast of impact prediction.
- 2) Basic Project Information
 - a) Project organisation including key personnel contact names and telephone numbers;
 - b) Construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
 - c) Management structure, and
 - d) Works undertaken during the report month.
- 3) Environmental status, comprising:
 - a) Drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring stations;

- b) Summary of non-compliance with the environmental quality performance limits; and
 - c) Summary of complaints.
- 4) Environmental issues and actions, comprising:
- a) Review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies);
 - b) Description of the actions taken in the event of non-compliance and deficiency reporting;
 - c) Recommendations (should be specific and target the appropriate party for action); and
 - d) Implementation status of the mitigation measures and the corresponding effectiveness of the measures.
- 5) Monitoring results (in both hard and diskette copies) together with the following information;
- g) Monitoring methodology;
 - h) Name of laboratory and equipment used and calibration details;
 - i) Parameters monitored;
 - j) Monitoring location;
 - k) Monitoring date, time, frequency and duration; and
 - l) QA/QC results and detection limit.
- 6) Appendices, including
- a) A/L Levels;
 - b) Graphical plots of trends of monitored parameters at key stations over the past reporting month 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 which might affect the monitoring results;
 - c) Monitoring schedule for the present and next reporting period;
 - d) Cumulative complaints statistics; and
 - e) Details of complaints, outstanding issues and deficiencies.

11.4 Final EM&A Report

11.4.1 The EM&A programme for construction phase could be terminated upon completion of construction activities that have the potential to cause significant environmental impacts, while the EM&A Programme for operation phase could be terminated upon the completion of operation phase monitoring. The proposed termination by the ET should only be implemented after the proposal has been endorsed by the IEC, the ER and DSD followed by approval from the Director of Environmental Protection.

11.4.2 Final EM&A Review Reports should be prepared by the ET at the end of the construction phase (covering the post-construction monitoring) and by the end of landscape establishment period. The Final EM&A Review Report should contain at least the following information:

- 1) Executive summary (1-2 pages);
- 2) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring stations;
- 3) Basic project information including a synopsis of the project organization, contacts for key management staff and a synopsis of work undertaken during the course of the Project;
- 4) A brief summary of EM&A requirements including:
 - a) Monitoring parameters;
 - b) Environmental quality performance limits (A/L levels); and
 - c) Environmental mitigation measures.
- 5) A summary of the implementation status of environmental protection and pollution control/mitigation measures as recommended in the EIA Report and summarised in the updated Implementation Schedule.
- 6) Graphical plots and the statistical analysis of the trends of monitored parameters over the course of the project including the post-construction monitoring for monitoring stations annotated against the following:
 - a) The major activities being carried out on site during the period;
 - b) Weather conditions during the period; and
 - c) Any other factors which might affect the monitoring results.
- 7) A summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels);
- 8) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;

- 9) A description of the actions taken in the event of non-compliance;
- 10) A summary record of complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- 11) A summary record of notifications of summonses and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches investigation, follow-up actions taken and results;
- 12) A comparison of the EM&A data with the EIA predictions with annotations and explanations for any discrepancies, including a review of the validity of EIA predictions and identification of shortcomings in the EIA recommendations;
- 13) A review of the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness, including cost effectiveness;
- 14) A review of the success of the EM&A programme, including a review of the effectiveness and efficiency of the mitigation measures, and recommendations for any improvements in the EM&A programme; and
- 15) A clear cut statement on the environmental acceptability of the project with reference to specific impact hypotheses and a conclusion to state the return to ambient and/or the predicted scenario as the EIA findings.

11.5 Data Keeping

- 11.5.1 Though documents including the field monitoring records, laboratory analysis records, and site inspection forms are not required to be included in the EM&A Reports for submission, they should be kept by the ET Leader and ready for inspection upon request. Relevant information should be clearly and systematically recorded in the documents.
- 11.5.2 Monitoring data should be recorded in magnetic media, and the software copy should be available upon request. The documents and data should be kept for at least one year after the completion of the construction phase EM&A works.

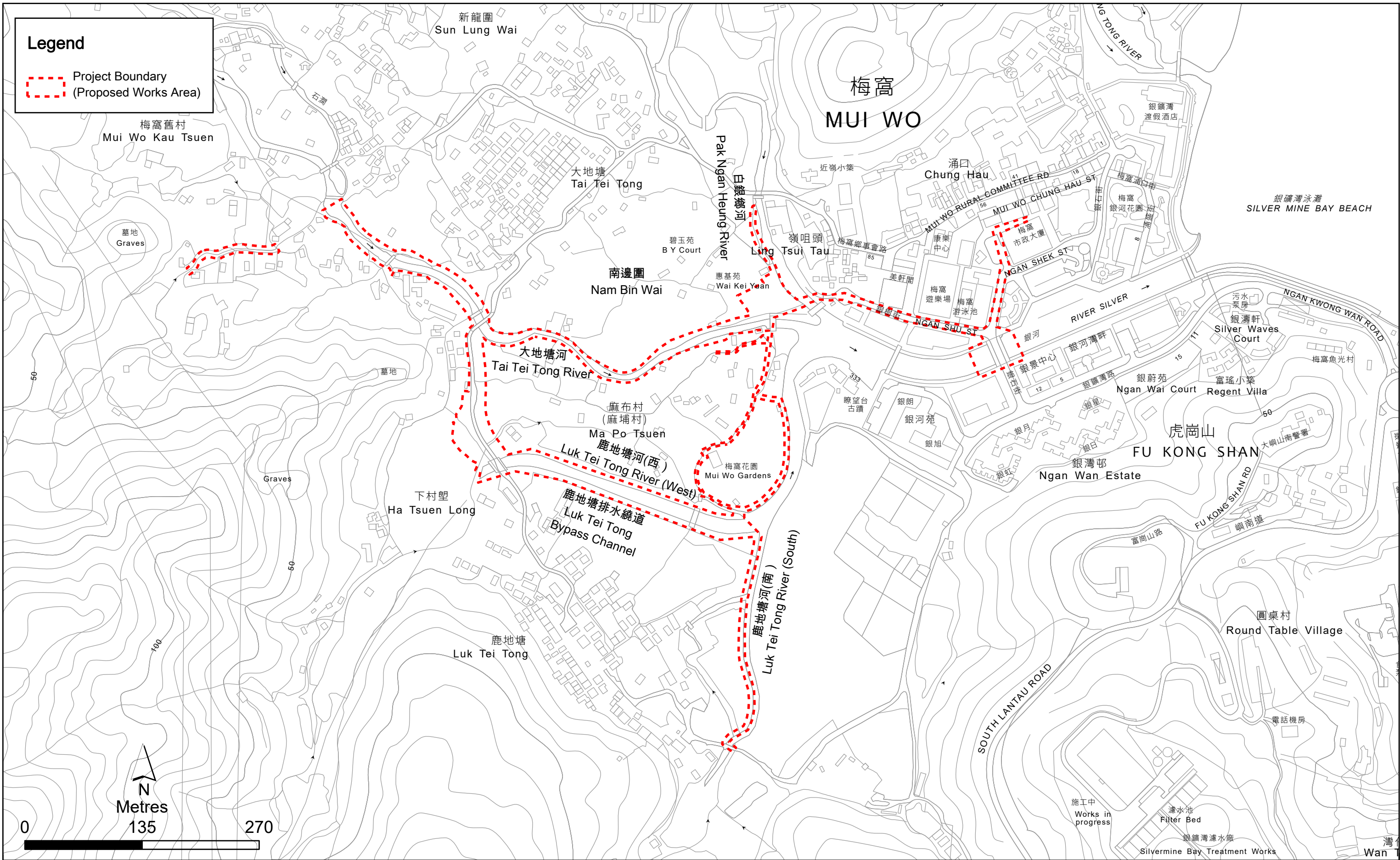
11.6 Electronic Reporting of EM&A Information

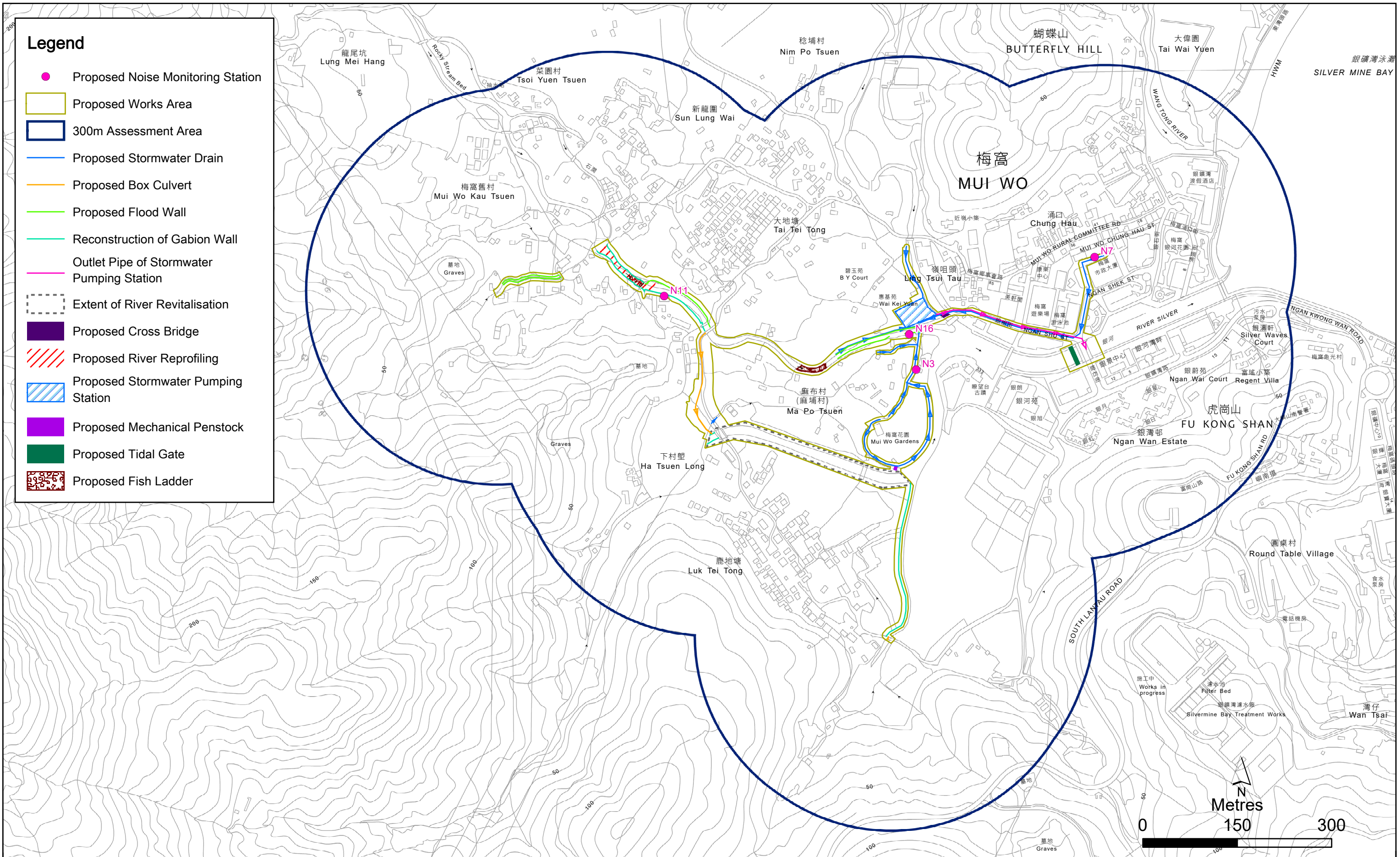
- 11.6.1 To enable the public inspection of the Baseline Monitoring Report and Monthly EM&A Reports via the EIAO Internet Website and at the EIAO Register Office, electronic copies of Monthly EM&A Reports should be prepared in Hyper Text Markup Language (HTML) (latest version) and in Portable Document Format (PDF, version 4.0 or later), unless otherwise agreed by EPD and should be submitted at the same time as the hard copies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the EM&A Reports should be included in the beginning of the document. Hyperlinks to figures, drawings and tables in the EM&A Reports should be provided in the main text where the respective references are made. Graphics in the reports should be in interlaced GIF format unless otherwise agreed by EPD. The content of the electronic copies of the Baseline Monitoring Report, Monthly EM&A Reports and Final EM&A Review Reports must be the same as the hard copies.
- 11.6.2 The environmental monitoring data should be made available to the public via the EIAO Internet Website and the EIAO Register Office.

11.7 Interim Notifications of Environmental Quality Limit Exceedance

- 11.7.1 With reference to EAPs, when the environmental quality limits are exceeded, the ET should notify the IEC, Contractor(s), ER, DSD and EPD as appropriate within 24 hours of the identification of the exceedance. The notification should be followed up with each party on the results of the investigation, proposed remediation action and success of the action taken, with any necessary follow-up proposals. A sample template for the notification is provided in **Appendix 11.1**.

Figures





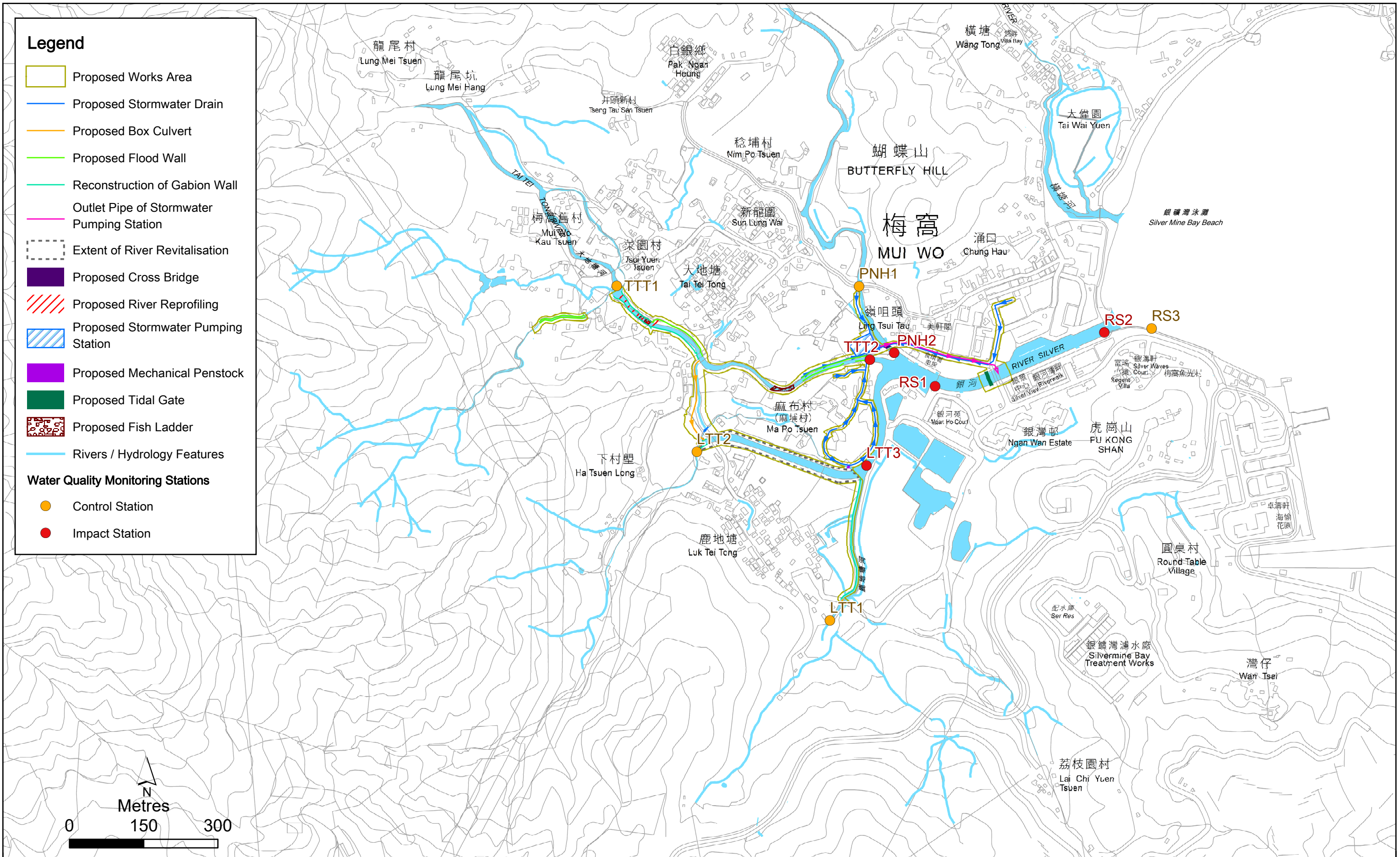


Figure 5.1

Proposed Water Quality Monitoring Locations

Appendices

Appendix 1.1 Construction Programme

Appendix 1.2 Implementation Schedule

Appendix 1.2 – Implementation Schedule

EIA & EM&A Ref. ⁽¹⁾	Environmental Mitigation Measures ⁽¹⁾	Location / Timing of the Measures	Implementation Agent	Implementation Stage ⁽²⁾				Relevant Legislation & Guidelines ⁽³⁾
				D	C	Post-C	O	
Air Quality								
3.8.1	<p>Construction Phase</p> <p>The following dust control measures stipulated in the <i>Air Pollution Control (Construction Dust) Regulation</i> and good site practices will be incorporated into the Contract Specifications and implemented throughout the construction phase:</p> <ul style="list-style-type: none"> • Impervious sheet shall be provided for skip hoist for material transport; • The area where any dusty work take place should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after such work as far as practicable; • All dusty materials should be sprayed with water or a dust suppression chemical immediately prior to any loading, unloading or transfer operation; • Dropping heights for excavated materials should be controlled to a practical height to minimise the fugitive dust arising from unloading; • Temporary stockpiles of dusty materials shall be either covered entirely by impervious sheets or sprayed with water to maintain the entire surface wet all the time; • Stockpiles of more than 20 bags of cement, dry pulverised fuel ash and dusty construction materials shall be covered entirely by impervious sheeting sheltered on top and 3-sides; • All exposed areas shall be kept wet to minimise dust emission; • 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; • Immediately before leaving a construction site, all vehicles should be washed to remove any dusty materials from the bodies and wheels. However, all spraying of materials and surfaces should avoid excessive water usage; • NRMMS shall comply with the prescribed emission standards with a proper label approved by EPD in accordance with the Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation; 	Whole Site / Construction Phase	Contractor(s)		√			<p>Cap. 311R</p> <p>Cap. 311Z</p> <p>Cap. 311I</p> <p>ETWB-TC(W) No 19/2005</p>

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<ul style="list-style-type: none"> • 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 Environment, Transport and Works Bureau Technical Circular (ETWB-TC(W)) No 19/2005 on Environmental Management on Construction Sites; • On-site construction equipment shall be connected to mains electricity supply and the use of diesel generators and diesel-powered equipment shall be avoided as far as practicable to minimise the gaseous emission from these machineries; • The engine of the construction equipment during idling shall be switched off; • Regular maintenance of construction equipment deployed on-site shall be conducted to prevent black smoke emission; • For construction works that are in close distance (i.e. <10m) to the ASRs, adopt at least 2.4m and higher hoarding height close to the ASRs; and • Avoid dusty works and stockpiling near the ASRs with close distance (i.e. <10m). • Excavated river sediment will be reuse on-site, stockpiling of river sediment will be avoided as far as possible. If temporary stockpiling of river sediment is necessary, the excavated sediment will be covered by tarpaulin to avoid potential dust / odour emission. • To minimize the potential odour / dust emissions during excavation and transportation of the sediment, the excavated sediment will be wetted during excavation / material handling and shall be properly covered when placed on trucks or barges. Loading of the excavated sediment to the barge will be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water. 							
3.8.2	<p>Operation Phase</p> <p>If temporary stockpiling of desilted material is necessary, the stockpiles will be covered by tarpaulin to avoid potential odour emission and avoided to be placed near the ASRs with close distance (i.e., <10m). Desilted material shall also be properly covered when placed on trucks or barges.</p>	Whole Site / Operation Phase	Project Proponent			√	-	
Noise Impact								
4.9.2	<p><u>Good Site Practices</u></p> <p>Good site practices and noise management can considerably reduce the potential noise impact of construction activities on nearby NSRs. The noise benefits of these practices can vary according to specific site conditions and operations. Since the effect of the good construction site practices could not be quantified, the mitigated noise levels calculated in the subsequent sections have not taken</p>	Whole Site / Construction Phase	Contractor(s)		√			EIAO-TM GW-TM DA-TM

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<p>account of this effect. The following site practices should be followed during the construction of the Project:</p> <ul style="list-style-type: none"> • Only well-maintained plant will be operated on-site and plant will be serviced regularly during the construction phase; • Silencers or mufflers on construction equipment will be utilized where required and will be properly maintained during the construction phase; • Mobile plant, if any, will be sited as far away from NSRs as possible; • Machines and plant (such as trucks) that may be in intermittent use will be shut down between work periods or will be throttled down to a minimum; • Plant known to emit noise strongly in one direction will, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures will be effectively utilised, wherever practicable, in screening noise from on-site construction activities. • The Project Proponent/ the Contractor will keep close communication with the nearby sensitive receivers on the schedule of the construction works to minimise disturbance to the nearby sensitive receivers. 							
4.9.3	<p><u>Quieter Construction Method / PME</u></p> <p>The use of quiet PME is considered to be a practicable means to mitigate the construction noise impact. Quiet PME is defined as a PME having actual SWL lower than the value specified in the GW-TM. The total SWL of all plant items to be used on-site at each works area will be specified so that flexibility is allowed for the Contractor to select plant items to suit the construction needs. The Contractor shall select plant items with total SWL equal to or lower than the total SWL specified in the plant inventory in Appendix 4.7 in order to meet the relevant noise criteria.</p>	Whole Site / Construction Phase	Contractor(s)		√			EIAO-TM GW-TM DA-TM
4.9.4	<p>The Contractor shall consider quieter construction methods or technologies to reduce the noise at its source if they are technically feasible and applicable for the proposed construction works. These include using mini-excavator and electric poker, sharing the use of noisy PME from other works areas located further away from NSRs, etc.</p> <ul style="list-style-type: none"> • Mini-excavator has been adopted as a mitigation measure to replace traditional excavator in all construction works. • Electric poker has also been adopted to replace traditional type poker in construction of crossing bridge, concreting works for wet wall, superstructure for pumping station, concreting works at outlet channel to River Silver, construction of Manhole, construction of box culvert, modification of agricultural weir and fish ladders, construction of low flow 	Works area as specific in S.4.9.4 / Construction Phase	Contractor(s)		√			EIAO-TM GW-TM DA-TM

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<p>device and concreting works for tidal gate (Items 1.1.2, 1.2.4, 1.2.5, 1.3.3, 1.5.4, 2.3, 3.1.3, 3.1.4 and 4.2).</p> <ul style="list-style-type: none"> For construction of flood walls and reconstruction of gabion wall along Tai Tei Tong River (item 3.1.1) pipe-laying works and backfilling & reinstatement at Ling Tsui Tau, Nam Bin Wai and Ma Po Tsuen (item 1.4.1 and 1.4.2), dump truck and/or concrete lorry mixer from other works areas located further away from NSRs will be used, i.e., dump truck will not be used for item 3.1.1 and item 1.4.2; dump truck and concrete lorry mixer will not be used for item 1.4.1. Material required to delivery or disposal as well as concrete required for casting will be transported manually to / from other works areas located further away from NSRs. 																																				
<p>4.9.5</p>	<p>Sound power levels of quieter equipment are listed in Table below. Other quieter equipment / construction methods not adopted in the assessment shall be considered during the design, tendering and implementation stage of the construction works as appropriate.</p> <table border="1" data-bbox="311 775 1001 1182"> <thead> <tr> <th>QPME / Quiet PME</th> <th>QPME Reference Number</th> <th>Brand</th> <th>Model Number</th> <th>SWL, dB(A)</th> </tr> </thead> <tbody> <tr> <td>Generator, silenced</td> <td>EPD-12580</td> <td>DENYO</td> <td>DCA-25LSKE</td> <td>88</td> </tr> <tr> <td>Air Compressor</td> <td>EPD-07503</td> <td>AIRMAN</td> <td>PDS55S-5C1</td> <td>92</td> </tr> <tr> <td>Roller, vibratory</td> <td>EPD-06779</td> <td>SAKAI</td> <td>HV620</td> <td>94</td> </tr> <tr> <td>Asphalt Paver</td> <td>EPD-12854</td> <td>JOSEPH VOEGELE AG / VOEGELE</td> <td>SUPER 1603-3</td> <td>104</td> </tr> <tr> <td>Crane, mobile</td> <td>EPD-07646</td> <td>Maeda</td> <td>CC1485S-1</td> <td>92</td> </tr> </tbody> </table>	QPME / Quiet PME	QPME Reference Number	Brand	Model Number	SWL, dB(A)	Generator, silenced	EPD-12580	DENYO	DCA-25LSKE	88	Air Compressor	EPD-07503	AIRMAN	PDS55S-5C1	92	Roller, vibratory	EPD-06779	SAKAI	HV620	94	Asphalt Paver	EPD-12854	JOSEPH VOEGELE AG / VOEGELE	SUPER 1603-3	104	Crane, mobile	EPD-07646	Maeda	CC1485S-1	92	<p>Whole Site / Construction Phase</p>	<p>Contractor(s)</p>		<p>√</p>		<p>EIAO-TM GW-TM DA-TM</p>
QPME / Quiet PME	QPME Reference Number	Brand	Model Number	SWL, dB(A)																																	
Generator, silenced	EPD-12580	DENYO	DCA-25LSKE	88																																	
Air Compressor	EPD-07503	AIRMAN	PDS55S-5C1	92																																	
Roller, vibratory	EPD-06779	SAKAI	HV620	94																																	
Asphalt Paver	EPD-12854	JOSEPH VOEGELE AG / VOEGELE	SUPER 1603-3	104																																	
Crane, mobile	EPD-07646	Maeda	CC1485S-1	92																																	
<p>4.9.6</p>	<p><u>Adoption of Temporary Noise Barriers or Noise Enclosure</u> The use of noise barriers will be an effective means to mitigate the noise impact arising from the construction works in the works area, particularly for low-rise NSRs. Temporary Noise Barriers of appropriate height with skid footing should be used and located within a few metres of stationary plant and mobile plant such that the line of sight to the NSR is blocked by the barriers. The length of the barrier should be at least five times greater than its height. It is anticipated that</p>	<p>Whole Site / Construction Phase</p>	<p>Contractor(s)</p>		<p>√</p>		<p>EIAO-TM GW-TM DA-TM</p>																														

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	the major noise source of all PMEs, including movable and large PMEs, will be located at a level lower than the top of the proposed movable barriers. All movable barriers are expected to provide noise reductions of at least 5 dB(A) for mobile plant such as excavator and roller and 10 dB(A) for stationary plants such as winch. With reference to A Practical Guide for the Reduction of Noise from Construction Works, the noise barrier material should have a superficial surface density of at least 14 kg/m ² , without openings or gap.							
4.9.7	The use of noise enclosure is to cover stationary PMEs, such as generator which will be completely screened. The construction material of the noise enclosure should have a minimum surface density of 14 kg/m ² and without openings or gaps. This can achieve at least a 15 dB(A) noise reduction according to the EIAO Guidance Note No.9/2010.	Whole Site / Construction Phase	Contractor(s)		√			EIAO-TM GW-TM DA-TM
4.9.9	Scheduling of Noisy Activities to Avoid Noise Impact on N11 To minimise the construction noise impact on N11, the use of concrete lorry mixer for modification of agricultural weir & fish ladder (item 3.1.3) should be avoided during examination period of N11. The contractor should keep close communication with the operator of Mui Wo School to obtain the updated schedule of examination at the time of conducting the relevant construction works.	Whole Site / Construction Phase	Contractor(s)		√			EIAO-TM GW-TM DA-TM
4.9.13	Telephone number of the 24-hour hotline will be displayed at all vehicular site entrances/ exits or at a convenient location for public enquiry and information at all times during the construction period.	Whole Site / Construction Phase	Contractor(s)		√			-
4.9.16	<u>Operation Phase</u> Noise reduction design measures should be incorporated into the Design and Contract Specifications to minimise the noise nuisance due to the operation of the proposed stormwater pumping station. The following measures should be included in the detailed design and specifications of the relevant contracts: <ul style="list-style-type: none"> the ventilation fan exhaust should be orientated to face away from the NSRs as far as practical, acoustic louvers are proposed to be adopted at all ventilation fans; quieter equipment should be selected during procurement; and specifications on noise level for all equipment and silencers should be included when ordering equipment. 	Proposed Stormwater Pumping Station / Design Phase and Operation Phase	Project Proponent	√			√	EIAO-TM GW-TM DA-TM
Water Quality Impact								
5.10.1	Land-based construction works as well as works within river channels that cover long or large areas should be conducted by segments / smaller areas to allow better control and limit potential water quality impact.	Whole Site / Construction Phase	Contractor(s)		√			Cap. 358 TM-ICW EIAO-TM

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

								<i>ProPECC PN1/94</i>
5.10.2	<p>The following standard measures and good site practices from ProPECC PN 1/94 Construction Site Drainage are recommended to be implemented to avoid/minimise the potential impacts from construction activities:</p> <ul style="list-style-type: none"> • Excavation works for the drainage improvements should be carried out in dry condition. Containment measures such as cofferdam, bunds and barriers should be provided within the river channel and the excavation works areas. The excavation should be carried out in the dry season (typically from November to March) as far as practicable. • Temporary storage of excavated riverbed material should be provided in the stockpile areas for dewatering by natural ventilation. Runoff from these stockpile areas should be collected for treatment by sedimentation. Coagulant should be considered when necessary. The treated water should be reused on site for water spraying or wheel washing. • The dewatered excavated material should be reused on-site as backfilling material, as far as practicable. • Best Management Practices (BMPs) of mitigation measures in controlling water pollution and good site management, as specified in the ProPECC PN 1/94 "Construction Site Drainage" are followed, where applicable, to prevent runoff with high level of SS from entering the surrounding waters • Manholes should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system and storm runoff being directed into foul sewers. • Diversion of natural stormwater away from work site should be provided as far as possible. The design of temporary on-site drainage should prevent runoff going through site surface, construction machinery and equipment in order to avoid or minimize polluted runoff. • Sedimentation tanks with sufficient capacity, constructed from pre-formed individual cells of approximately 6 to 8 m³ capacities, are recommended as a general mitigation measure which can be used for settling surface runoff prior to disposal. The system capacity shall be flexible and able to handle multiple inputs from a variety of sources and suited to applications where the influent is pumped. • The dikes or embankments for flood protection should be implemented around the boundaries of earthwork areas. Temporary ditches should be provided to facilitate the runoff discharge into an appropriate watercourse, through a silt/sediment trap. The silt/sediment traps should be incorporated in the permanent drainage channels to enhance deposition rates. 	Whole Site / Construction Phase	Contractor(s)		√			<i>ProPECC PN1/94</i> <i>Cap. 358</i> <i>TM-ICW</i> <i>EIAO-TM</i> <i>ProPECC PN1/94</i>

	<ul style="list-style-type: none"> • The design of efficient silt removal facilities should be based on the guidelines in Appendix A1 of ProPECC PN 1/94. The detailed design of the sand/silt traps should be undertaken by the contractor prior to the commencement of construction. • All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas. • Regular monitor the construction plants in areas close to the water courses to avoid potential spillage to the adjacent watercourses. • All open stockpiles of construction materials (for example, aggregates, sand and fill material) should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system. • Install sufficient lateral support to avoid loose soil or mud from slipping into the watercourses. • The precautions to be taken at any time of year when rainstorms are likely together with the actions to be taken when a rainstorm is imminent or forecasted and actions to be taken during or after rainstorms are summarized in Appendix A2 of ProPECC PN 1/94. • All vehicles and plant should be cleaned before leaving a construction site to ensure no earth, mud, debris and the like is deposited by them on roads. An adequately designed and sited wheel washing facility should be provided at every construction site exit where practicable. Wash-water should have sand and silt settled out and removed at least on a weekly basis to ensure the continued efficiency of the process. The section of access road leading to, and exiting from, the wheel-wash bay to the public road should be paved with sufficient backfall toward the wheel-wash bay to prevent vehicle tracking of soil and silty water to public roads and drains. • Construction solid waste, debris and rubbish on site should be collected, handled and disposed of properly to avoid water quality impacts. • Appropriate numbers of chemical toilets will be provided by a licensed contractor to serve the construction workers over the construction sites to prevent direct disposal of sewage into the water environment. No onsite discharge from these chemical toilets will be allowed. • All fuel tanks and chemical storage areas will be provided with locks and be sited on sealed areas. The storage areas will be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank. 							
--	--	--	--	--	--	--	--	--

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<ul style="list-style-type: none"> The contractors shall ensure that leakages or spillages are contained and cleaned up immediately. 							
5.10.3	All runoff and wastewater generated from the works areas should be collected and treated to the meet standards as listed in the TM-DSS under WPCO. The contractor will need to apply to EPD for a discharge licence for discharge of effluent from the construction site under the WPCO.	Whole Site / Construction Phase	Contractor(s)		√			Cap. 358 TM-ICW EIAO-TM ProPECC PN1/94
5.10.4	<p>Control measures outlined under ETWB Technical Circular (Works) No. 5/2005 Protection of Natural Streams/Rivers from Adverse Impacts Arising from Construction Works should be considered:</p> <ul style="list-style-type: none"> The proposed works should preferably be carried out during the dry season (typically from November to March) where flow in the stream/river is low. Temporary access to the works site should be carefully planned and located to minimise disturbance caused to the substrates of streams/river and riparian vegetation by construction plant. The use of less or smaller construction plant may be specified to reduce disturbance to the riverbed where aquatic inhabitants are located. Temporary sewerage system should be designed and installed to collect wastewater and prevent it from entering rivers and streams. 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. 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. The natural bottom and existing flow in the river should be preserved as much as possible to avoid disturbance to the river habitats. If temporary access track on riverbed is unavoidable, this should be kept to the minimum width and length. Temporary river crossings should be supported on stilts above the riverbed. 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. Construction effluent, site run-off and sewage should be properly collected and/or treated. Proper locations for discharge outlets of wastewater treatment facilities well away from the natural streams/river should be 	Whole Site / Construction Phase	Contractor(s)		√		ETWB Technical Circular (Works) No. 5/2005	

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<p>identified. Adequate lateral support may need to be erected in order to prevent soil/mud from slipping into the stream/river, but without unduly impeding the flow during heavy rain.</p> <ul style="list-style-type: none"> Supervisory staff should be assigned to station on site to closely supervise and monitor the works. 							
5.10.5	<p>For sediment removal before the installation of tidal gate at River Silver, cofferdam would be first installed to create dry work area for part of the cross section without significantly impeding the flow to contain any loss of sediment into the water column. No open dredging in river would be conducted.</p>	Whole Site / Construction Phase	Contractor(s)		√			-
5.10.6	<p>The following measures should be implemented to allow proper control, handling and disposal of chemicals, reduce risk of accidental spillage and allow proper clean up of spillage:</p> <ul style="list-style-type: none"> The Contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes as listed in Section 6.5.12. Other applicable measures listed under Sections 6.5.13 to 6.5.15 should be followed on handling of chemical waste. Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport. Chemicals and chemical waste containers should be suitably labelled, to allow handlers to be warned about the potential risk. Chemicals and chemical waste should be stored at secured sheltered location on site with bunded areas or drip tray to control any risk of spillage. An emergency spillage handling procedure to deal with chemical spillage should be prepared according to the Waste Disposal (Chemical Waste) (General) Regulation (Cap. 354C). Adequate training to the staff should be provided. 	Whole Site / Construction Phase	Contractor(s)		√			-
5.10.7	<p>The design of the Project should take into account the guiding principles outlined in Drainage Services Department Practice Note No. 3/2021: Guidelines on Design for Revitalisation of River Channel to ensure the water quality and hydrology of the revitalized rivers suit the intended purpose of the planned beneficial uses.</p>	Whole Site / Operation Phase	Project Proponent				√	-
5.10.8	<p>DSD staff will inspect rivers and other drainage systems after heavy rainstorm and arrange for necessary maintenance.</p>	Whole Site / Operation Phase	Project Proponent				√	-
5.10.9	<p>The following standard measures are recommended to be implemented to avoid/minimise the potential impacts from maintenance works:</p>	Whole Site / Operation Phase	Project Proponent				√	-

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<ul style="list-style-type: none"> • Containment structures such as sandbags barrier should be used for the desilting works area to facilitate a dry and confined working area within the drainage channel. • Channel maintenance works and debris/vegetation clearance should be undertaken in dry condition. Light machinery and hand-held machine should be considered when undertake maintenance desilting works and debris clearance. • Where no maintenance access is available for the channel, temporary access to the works site should be well planned to minimize disturbance caused to the drainage channel and nearby water quality sensitive receivers. • The waste material /dredged materials should be temporary stored away from the channel and cover with tarpaulin sheet. These materials should be disposed of in a timely and appropriate manner. Disposal locations of the materials should be agreed with relevant departments before commencement of the maintenance works/desiltation. • Avoid and minimize the use of concrete or the like. 							
Waste Management								
6.5.3	The Contractor must ensure that all the necessary waste disposal or licences are obtained prior to the commencement of the construction works.	Whole Site / Construction Phase	Contractor(s)		√		<p>Cap. 354 Cap. 354N Cap. 354C Cap. 466 Cap. 28</p>	
<i>Waste Management Hierarchy</i>								
6.5.4-6.5.5	<p>The various waste management options are categorised in terms of preference from an environmental viewpoint. The options considered to be most preferable have the least environmental impacts and are more sustainable in the long term. The hierarchy is as follows:</p> <ul style="list-style-type: none"> • Avoidance and reduction; • Re-use of materials; • Recovery and recycling; and • Treatment and disposal. <p>The above hierarchy is used to evaluate and select waste management options. The aim is to reduce waste generation and reduce waste handling and disposal costs.</p>	Whole Site / Construction Phase	Contractor(s)		√		<p>Cap. 354 Cap. 354N Cap. 354C Cap. 466 Cap. 28 CoP under Cap. 354 WBTC No. 2/93 WBTC No. 2/93B WBTC No. 4/98 WBTC No. 4/98A</p>	

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

6.5.6	<p>The Contractor will consult the relevant authorities for the final disposal of wastes and, as appropriate, implement the good site practices and mitigation measures recommended in this EIA Report and those given below.</p> <ul style="list-style-type: none"> • Nomination of approved personnel to be responsible for 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 proper waste management and chemical handling procedures; • Provision of sufficient waste disposal points and regular collection for disposal; • Appropriate measures to reduce windblown/ floating litter and dust during 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 Chemical Waste Treatment Centre; and • A recording system for the amount of wastes generated, recycled and disposed of and the disposal sites. 	Whole Site / Construction Phase	Contractor(s)		√			<p>WBTC No. 12/2000 WBTC No. 19/2001 WBTC No. 12/2002 ETWB TC(W) No. 19/2005 DEVB TC(W) No. 6/2010 DEVB TC(W) No. 8/2010 DEVB TC(W) No. 2/2011 DEVB TC(W) No. 9/2011 CEDD TC No. 11/2019 PAH 2022 Chapter 4 HKPSG Chapter 9</p>
<u>Waste Reduction Measures</u>								
6.5.7	<p>Good management and control can prevent the generation of 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:</p> <ul style="list-style-type: none"> • Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance re-use or recycling of waste materials and their proper disposal; • Encourage collection of aluminium cans and waste paper by individual collectors during construction with separate labelled bins provided to segregate these wastes from other general refuse 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; • Prior to disposal of C&D materials, wood, steel and other metals will be separated, to the extent practical for re-use and/or recycling to reduce the quantity of waste to be disposed in a landfill; • 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 amount of waste generated and avoid unnecessary generation of waste 	Whole Site / Construction Phase	Contractor(s)		√			<p>WBTC No. 2/93 WBTC No. 2/93B WBTC No. 4/98 WBTC No. 4/98A WBTC No. 12/2000 WBTC No. 19/2001 WBTC No. 12/2002 ETWB TC(W) No. 19/2005 DEVB TC(W) No. 6/2010 DEVB TC(W) No. 8/2010 DEVB TC(W) No. 2/2011 DEVB TC(W) No. 9/2011 CEDD TC No. 11/2019 PAH 2022 Chapter 4 HKPSG Chapter 9</p>

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

<i>Management of Waste Disposal</i>								
6.5.8	The Contractor will open a billing account with the EPD in accordance with the Waste Disposal (Charges for Disposal of Construction Waste) Regulation. Every construction waste or public fill load to be transferred to Government waste disposal facilities (e.g. public fill reception facilities, sorting facilities and landfills) will be provided with a valid "chit" which contains the information of the account holder to facilitate waste transaction recording and billing to the waste producer. 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, particularly on ecological sensitive areas in Mui Wo and South Lantau. 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).	Whole Site / Construction Phase	Contractor(s)		√			Cap. 354N DevB TC(W) No. 6/2010
6.5.9	Recyclables (e.g. plastics, cardboard) generated during the construction phase will be segregated and sent to recycler for recycling as far as practicable.	Whole Site / Construction Phase	Contractor(s)		√			-
6.5.10	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 with the Project Proponent under the Contract for approval prior to implementation	Whole Site / Construction Phase	Contractor(s)		√			ETWB TC(W) No. 19/2005
<i>Measures for Management of C&D Materials</i>								
6.5.11	C&D materials will be segregated on-site into public fill and non-inert C&D materials and stored in different containers or skips to facilitate re-use of the public fill and proper disposal of the non-inert C&D materials. Specific areas within the construction sites will be designated for such segregation and storage, if immediate re-use is not practicable. Prefabrication will be adopted as far as practicable to reduce the C&D materials arising.	Whole Site / Construction Phase	Contractor(s)		√			WBTC No. 2/93 WBTC No. 2/93B WBTC No. 4/98 WBTC No. 4/98A WBTC No. 12/2000 WBTC No. 19/2001 WBTC No. 12/2002 ETWB TC(W) No. 19/2005 DEVB TC(W) No. 6/2010 DEVB TC(W) No. 8/2010

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

								DEVB TC(W) No. 2/2011 DEVB TC(W) No. 9/2011 CEDD TC No. 11/2019 PAH 2022 Chapter 4 HKPSG Chapter 9
6.5.12	The C&D materials generated during the construction phase will be transported by trucks with cover or enclosed containers to minimize the potential environmental impact. All dump trucks for C&D materials transportation and disposal will be equipped with GPS or equivalent system for real time tracking and monitoring of their travel routings and parking locations to prohibit illegal dumping or landfilling of C&D materials. The data collected by GPS or equivalent system relating to travel routings and parking locations of dump trucks engaged will be recorded properly	Whole Site / Construction Phase	Contractor(s)		√			WBTC No. 2/93 WBTC No. 2/93B WBTC No. 4/98 WBTC No. 4/98A WBTC No. 12/2000 WBTC No. 19/2001 WBTC No. 12/2002 ETWB TC(W) No. 19/2005 DEVB TC(W) No. 6/2010 DEVB TC(W) No. 8/2010 DEVB TC(W) No. 2/2011 DEVB TC(W) No. 9/2011 CEDD TC No. 11/2019 PAH 2022 Chapter 4 HKPSG Chapter 9
<i>Measures for Management of Chemical Waste</i>								
6.5.13	The Contractor will register as a chemical waste producer with the EPD. Chemical waste will be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes	Whole Site / Construction Phase	Contractor(s)		√			Cap. 354C CoP under Cap. 354
6.5.14	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 450L unless the specifications have been approved by the EPD; and • Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations. 	Whole Site / Construction Phase	Contractor(s)		√			
6.5.15	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; 	Whole Site / Construction Phase	Contractor(s)		√			

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<ul style="list-style-type: none"> • Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest; • Have adequate ventilation; • Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and • Be arranged so that incompatible materials are appropriately separated. 							
6.5.16	<p>Chemical waste will be disposed of:</p> <ul style="list-style-type: none"> • Via a licensed waste collector; and • To a facility licensed to receive chemical waste, such as the CWTC which also offers a chemical waste collection service and can supply the necessary chemical waste storage containers. 	Whole Site / Construction Phase	Contractor(s)		√			
<i>Measures for Management of General Refuse</i>								
6.5.17	General refuse will be stored in enclosed bins separately from C&D materials and chemical wastes. General refuse will be delivered separately from C&D materials and chemical wastes for offsite disposal on a daily basis to reduce odour, pest and litter impacts.	Whole Site / Construction Phase	Contractor(s)		√			Cap. 354 Cap. 354N Cap. 132
6.5.18	Recycling bins will be provided at strategic locations within the construction site to facilitate recovery of recyclable materials (including aluminium can, waste paper, glass bottles and plastic bottles) from the construction site. Materials recovered will be sold for recycling.	Whole Site / Construction Phase	Contractor(s)		√			ETWB TC(W) No. 19/2005 HKPSG Chapter 9
<i>Measures for Management of Excavated Sediments</i>								
6.5.19	The sediment will be excavated, handled, transported and disposed of in a manner that would minimize adverse environmental impacts. For minimization of sediment disposal, beneficial reuse will be considered on site as far as practicable during the construction stage before the disposal of excavated sediment	Whole Site / Construction Phase	Contractor(s)		√			Cap. 466 ETWB TC(W) No. 34/2002
6.5.20	Requirements of the Air Pollution Ordinance (Construction Dust) Regulation, where relevant, should be adhered to during excavation, transportation and disposal of the sediment.	Whole Site / Construction Phase	Contractor(s)		√			
6.5.21	The workers will wear appropriate personal protective equipment (PPE) when handling contaminated sediment to minimize the exposure to contaminated materials. Adequate washing and cleaning facilities will also be provided on site.	Whole Site / Construction Phase	Contractor(s)		√			
6.5.22	Stockpiling of contaminated sediment will be avoided as far as possible. If temporary stockpiling of contaminated sediment is necessary, the excavated sediment will be covered by tarpaulin and the area should be placed within earth bunds or sand bags to prevent leachate from entering the ground, nearby drains and surrounding water bodies. The stockpiling areas for contaminated sediment	Whole Site / Construction Phase	Contractor(s)		√			Cap. 466 ETWB TC(W) No. 34/2002

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	should be paved with impermeable linings to avoid contamination to underlying soil or groundwater. Separate and clearly defined areas should be provided for stockpiling of contaminated and uncontaminated materials. Leachate, if any, should be collected and discharged according to the Water Pollution Control Ordinance (WPCO).							
6.5.23	In order to minimize the potential odour / dust emissions during excavation and transportation of the sediment, the excavated sediment will be wetted during excavation / material handling and shall be properly covered when placed on trucks or barges. Loading of the excavated sediment to the barge will be controlled to avoid splashing and overflowing of the sediment slurry to the surrounding water	Whole Site / Construction Phase	Contractor(s)		√			Cap. 466 ETWB TC(W) No. 34/2002
6.5.23	To ensure disposal space is allocated for the Project, the Project Proponent will obtain agreement from MFC on the rationale for sediment removal and the allocation of the disposal site. The Contractor, on the other hand, will apply for the marine dumping permit under DASO from EPD for the sediment disposal.	Whole Site / Construction Phase	Contractor(s)		√			Cap. 466 ETWB TC(W) No. 34/2002
<i>Staff Training</i>								
6.5.24	At the commencement of the construction works, training will be provided to workers on the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, re-use and recycling.	Whole Site / Construction Phase	Contractor(s)		√			ETWB TC(W) No. 19/2005 DEVB TC(W) No. 8/2010,
Ecological Impact								
<i>Avoid Direct and Indirect Impacts to Ecologically Sensitive Habitats</i>								
7.10.2	The Project site has been selected based on environmental and other considerations (refer to Chapter 2). Potential impacts to the identified Night Roosting Site for ardeid have been avoided to the maximum extent practicable by adopting suitable Project's alignment/ works area. The Project site has also avoided encroaching onto Fung Shui Woods, Country Parks, and other ecologically sensitive receivers.	Whole Site / Design Phase	Project Proponent	√				-
<i>Minimisation of Habitat Disturbance and Impacts to Fauna Species of Conservation Importance</i>								
7.10.3	Unavoidable impacts to natural terrestrial habitats have been minimised by taking appropriate and practicable measures such as restriction of river reprofiling works at Tai Tei Tong River to dry season as far as practicable and confining works in specific area during daytime hours.	River reprofiling works at Tai Tei Tong River / Design Phase	Project Proponent	√	√			-
7.10.4	While the Project has avoided to affect any flora species of conservation importance recorded within the Assessment Area, as discussed in Sections 7.9.9 to 7.9.13, fauna species of conservation importance including Hong Kong Newt, Neon Goby, Akihito's Neon Goby, Scaly Neon Goby, Small Snakehead, Dark-	Whole Site / Construction Phase	Contractor(s)		√			-

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	margined Flagtail, Emerald Cascader (Larva) and Greasyback Shrimp were recorded within the works area.							
7.10.5	To avoid the potential direct impact on these species, prior to commencement of construction at the affected watercourse(s), an update ecological survey should be conducted with focus to the presence of the herpetofauna and freshwater community. The survey should be conducted by a qualified ecologist as part of the Environmental Team (ET) and cover the stretch of the watercourse 5m upstream and downstream of the works area. Should species of conservation importance be found within the surveyed watercourse section(s), a Translocation Plan should be prepared. Translocation should be conducted to move the individuals from the works area to suitable recipient sites.	Affected watercourse(s) / Design Phase	Contractor(s)	√				
7.10.6	The Translocation Plan should be prepared by the qualified ecologist as a part of the ET, certified by the Independent Environmental Checker (IEC) and submitted to AFCDC within one month upon completion of the update aquatic survey to agree the detailed translocation procedures including the identified receptor site(s). Agreement from relevant authorities (e.g. AFCDC and EPD) should be sought prior to conducting the translocation work.	Affected watercourse(s) / Design Phase	Contractor(s)		√			-
7.10.7	The translocation work should be conducted as close to the commencement of the relevant site works as possible, following the approved Translocation Plan. Upon the completion of the translocation work, post-translocation survey should be conducted at the recipient site to monitor the effectiveness of translocation.	Whole Site / Construction Phase	Contractor(s)		√			-
<u>Minimization of disturbance to Tai Wai Yuen night roost</u>								
7.10.8	As discussed in Sections 7.9.28 to 7.9.29, Tai Wai Yuen night roost was observed actively in use by Ardeids in October 2021 to August 2022. The night roost was 250 m away from the works area of the proposed stormwater drain near Mui Wo Municipal Services Building. As a precautionary measure, construction works at the works area of stormwater drain near Mui Wo Municipal Services Building during night-time from 17:00 to 07:00 should be avoided to minimize potential disturbance to the Ardeids. In addition, strong artificial lighting should not be used in the area at night to avoid disturbance to the roosting ardeids. Lighting required for safety purpose should keep minimal and pointed inward. Clear signs should be erected on site to alert all site staff and workers about the requirement.	Drainage works near Mui Wo Municipal Services Building / Construction Phase	Contractor(s)		√			-
<u>Measures and Good Site Practice for Minimization of Physical Disturbance to the Surrounding Habitats</u>								
7.10.9	The following construction phase mitigation measures are proposed to reduce predicted disturbance impacts and impact of water pollution to an acceptable level: <ul style="list-style-type: none"> Restriction of river reprofiling works at Tai Tei Tong River under the Project to dry season as far as practicable; 	River reprofiling works at Tai Tei Tong River and Whole site /	Contractor(s)		√			-

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<ul style="list-style-type: none"> Implementing measures to minimise magnitude of construction runoff and to avoid/ minimise the potential impact of spillage events, if any, and Appropriate measures including the provision of temporary movable toilets should be adopted. Controlled wastewater discharge to the nearby water bodies will be implemented in accordance with the guidelines stipulated in Environmental Protection Department (EPD)'s Practice Note for Professional Persons on Construction Site Drainage (ProPECC PN1/94) during the construction works to properly control site run-off and drainage and to minimise the potential water quality impact. 	Pre-Construction Phase						
7.10.10	<p>Good site practice should also be adopted to minimize potential disturbances to the surrounding habitats, including:</p> <ul style="list-style-type: none"> Avoid any damage and disturbance, particularly those caused by filling and illegal dumping to the surrounding habitats, especially wetland habitats and any watercourses; Excavated materials will be covered and/or properly disposed of as soon as possible to avoid being washed into nearby water bodies; Regularly check the site boundaries to ensure that they are not breached and that no damage occurs to surrounding ecologically sensitive habitats (e.g. woodlands, marsh and watercourses); Prohibit and prevent open fires within the site boundary during construction and provide temporary firefighting equipment in the works area; Reinstate temporary work sites/disturbed areas, immediately after completion of the construction works; and Only well-maintained plant to be operated on-site and plant to be serviced regularly during the construction program. 	Whole Site / Construction Phase	Contractor(s)		√			-
<u>Mitigation measures for operation phase</u>								
7.10.11	<p>As discussed in Section 7.9.31 to 7.9.34, there will be no major works such as dredging to be carried out during routine maintenance works in the operation phase. Hydrology and hydraulics would not be affected by the drainage improvement works of Project. Nevertheless, good site practice in Section 7.10.12 should be followed during maintenance work, and also, the following measures are recommended to minimise potential impacts resulting from operational phase activities:</p> <ul style="list-style-type: none"> For maintenance desilting of the re-profiled river channels, temporary barrier walls shall be used to provide a dry zone for desilting work; The implementation of de-silting and other activities that could disturb aquatic fauna should be scheduled section by section and the works will be confined in a small works zone which is isolated from the rest of the channel by temporary 	Whole Site / Operation Phase	Project Proponent				√	-

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<p>barrier walls to ensure some areas of relatively undisturbed habitat remain available for resident aquatic fauna at all times; and</p> <ul style="list-style-type: none"> Waste material produced during de-silting should be disposed of in a timely and appropriate manner 							
7.10.12	<p>In addition, DSD commits to implement blue-green elements, including revitalised river channel as suggested in DEVB TC(W) No. 9/2020 Blue-Green Drainage Infrastructure, to the drainage channel design and that ecological enhancement features for restoring natural stream habitat will be incorporated into this Project. The Project will be beneficial in the long term with the drainage efficiency enhancement and the incorporation of environmental friendly drainage structures into the proposed works including greening works and fish ladders (i.e. which will aid fish migration and perpetuate fish population in the area) to enhance rivers ecological connectivity and wildlife movement.</p>	Whole Site / Construction and Operation Phase	Project Proponent Contractor(s)		√		√	DEVB TC(W) No. 9/2020
Landscape and Visual Impact								
Table 8.10 – CM1	<p>Minimise Disturbance – temporary structures and construction works should be planned with care to minimise disturbance to vegetation including riparian vegetation along the river as well as existing built structures. The footprint of the Project should be kept to a practical minimum and form, textures and colours selected to be as compatible with the existing surroundings as possible.</p>	Whole Site / Construction Phase	Project Proponent Contractor(s)	√	√			EIAO-TM DEVB TCW No.04/2020
Table 8.10 – CM2	<p>Tree Protection and Preservation – Trees/ woodland within the Works Area will be protected and preserved as far as possible in accordance with DEVB TC(W) No. 04/2020. For example, the Project will be designed to avoid tree felling wherever possible.</p>	Whole Site / Construction Phase	Project Proponent Contractor(s)	√	√			EIAO-TM DEVB TCW No.04/2020
Table 8.10 – CM3	<p>Tree Transplantation – Should removal of trees be unavoidable due to construction impacts, trees will be transplanted or felled according to Clause 3.97 of the General Specification of Civil Engineering Works – Section 3 Landscape Softworks and Establishment Works, including ensuring transplanted trees are treated with establishment works immediately after transplanting works, for a period of no less than 12 months.</p> <p>At the detailed design stage the tree transplantation plan should be refined to ensure the locations proposed to receive the transplanted tree is suitable. Established trees of value are to be re-located where practically feasible. The transplant planting will be included in a detailed landscape design and planting plan, which is recommended to be implemented as early as practicable in the Project timeline.</p>	Whole Site / Construction Phase	Project Proponent Contractor(s)		√			EIAO-TM DEVB TCW No.04/2020
Table 8.10 – CM4	<p>Compensatory Tree Planting - Where loss of existing trees is unavoidable, compensatory planting of trees should be provided in accordance with DEVB TC(W) No. 04/2020 to compensate for those trees felled. Implementation of</p>	Whole Site / Construction Phase	Project Proponent Contractor(s)		√			EIAO-TM DEVB TCW No.04/2020

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	<p>compensatory tree planting will be of a ratio not less than 1:1. Plants will have 12 months to establish.</p> <p>At the detailed design stage the tree compensation and transplantation plan should be refined to confirm the separation distance of the heavy standard compensatory trees and ensure the outlined areas are sufficient for the planting necessary to compensate for the affected trees. The selection of planting species shall be made with reference to the species identified in the Tree Survey and be predominantly native to Hong Kong or the South China region. The compensatory planting will be applied along the proposed river alignment. But the actual implementation will be subject to detailed landscape design and planting plan, and recommended to be implemented as early as practicable in the Project timeline.</p>							
Table 8.10 – CM5	<p>Buffer Planting – Tall screen/buffer trees shall be planted to screen the Luk Tei Tong Bypass Channel and proposed stormwater pumping station. This measure may additionally form part of the compensatory planting and will improve compatibility with the surrounding environment.</p>	Luk Tei Tong Bypass Channel and Proposed Stormwater Pumping Station / Construction Phase	Project Proponent Contractor(s)		√			EIAO-TM DEVB TCW No.04/2020
Table 8.10 – CM6	<p>Natural Bedding Substrate – River sediment and / or boulders excavated during river reprofiling works are to be reused at Tai Tei Tong River as natural bedding substrate.</p>	Tai Tei Tong River / Construction Phase	Project Proponent Contractor(s)		√			DSD Practice Note No. 3/2021
Table 8.10 – CM7	<p>Screening – Stockpiles of materials should be covered or hoarding erected where possible to reduce undesirable views of the construction site, having consideration for safety and security. It is proposed that screening (via decorative hoarding) be compatible with the surrounding environment and where possible, non-reflective, recessive colours be used. Hoarding should be taken down at the end of the construction period.</p>	Whole Site / Construction Phase	Project Proponent Contractor(s)		√			DSD Practice Note No. 3/2021
Table 8.10 – CM8	<p>Light Control – The guidelines in “Charter on External Lighting” and “Guidelines on Industry Best Practices for External Lightning Installations” promulgated by ENB for glare control will be implemented.</p>	Luk Tei Tong Bypass Channel and Proposed Stormwater Pumping Station / Construction Phase	Project Proponent Contractor(s)		√			DSD Practice Note No. 3/2021
Table 8.10 – CM9	<p>River Revitalization and Landscape Work for Infrastructure – River Revitalization work in terms of planting and provision of leisure facilities will be conduct along Luk Tei Tong Bypass Channel to enhance ecological and amenity value of the surrounding. Native species will be selected for planting and landscape works as far as possible. Environmental friendly material and nature colour will be selected for leisure facilities and other associated facilities / hard landscape. Green roof</p>	Luk Tei Tong Bypass Channel and Proposed Stormwater Pumping Station / Construction Phase	Contractor(s)		√			

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	and corresponding landscape work such as planting of climbers, shrubs and bamboo would be carried out for proposed stormwater pumping station in order to enhance the greenery of proposed structure. A minimum 20% greenery is proposed for the areas within the proposed stormwater pumping station boundary. Vertical planting is also proposed for the boundary fence of the proposed stormwater pumping station. Please refer to Figure 8.11 – Landscape and Visual Mitigation Plan for their location and Figure 8.13a for the section.							
Table 8.11 – OM1	Colours of Structures - Colours for the structures e.g. fences should be chosen to complement the surrounding area. Lighter colours such as shades of light grey, off-white and light brown may be utilised where technically feasible to reduce the visibility of the structures.	Luk Tei Tong Bypass Channel and Proposed Stormwater Pumping Station / Operation Phase	Project Proponent Contractor(s)				√	EIAO-TM
Table 8.11 – OM2	Tree Transplantation – Should removal of trees be unavoidable due to construction impacts, trees will be transplanted or felled according to Clause 3.97 of the General Specification of Civil Engineering Works – Section 3 Landscape Softworks and Establishment Works, including ensuring transplanted trees are treated with establishment works immediately after transplanting works, for a period of no less than 12 months. At the detailed design stage the tree transplantation plan should be refined to ensure the locations proposed to receive the transplanted tree is suitable. Established trees of value are to be re-located where practically feasible. The transplant planting will be included in a detailed landscape design and planting plan, which is recommended to be implemented as early as practicable in the Project timeline.	Whole Site / Operation Phase	Project Proponent Contractor(s)				√	EIAO-TM
Table 8.11 – OM3	Compensatory Tree Planting - Where loss of existing trees is unavoidable, compensatory planting of trees should be provided in accordance with DEVB TC(W) No. 04/2020 to compensate for those trees felled. Implementation of compensatory tree planting will be of a ratio not less than 1:1. Plants will have 12 months to establish. At the detailed design stage the tree compensation and transplantation plan should be refined to confirm the separation distance of the heavy standard compensatory trees and ensure the outlined areas are sufficient for the planting necessary to compensate for the affected trees. The selection of planting species shall be made with reference to the species identified in the Tree Survey and be predominantly native to Hong Kong or the South China region. The compensatory planting will be applied along the proposed river alignment. But the actual implementation will be subject to detailed landscape design and planting plan and recommended to be implemented as early as practicable in the Project timeline.	Whole Site / Operation Phase	Project Proponent Contractor(s)				√	EIAO-TM

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

Table 8.11 – OM4	Buffer Planting – Tall screen/buffer trees shall be planted to screen the Luk Tei Tong Bypass Channel and proposed stormwater pumping station. This measure may additionally form part of the compensatory planting and will improve compatibility with the surrounding environment.	Luk Tei Tong Bypass Channel and Proposed Stormwater Pumping Station / Operation Phase	Project Proponent Contractor(s)				√	EIAO-TM
Table 8.11 – OM5	Natural Bedding Substrate – River sediment and / or boulders excavated during river reprofiling works are to be reused at Tai Tei Tong River as natural bedding substrate.	Tai Tei Tong River / Operation Phase	Project Proponent Contractor(s)				√	EIAO-TM
Table 8.11 – OM6	Light Control – The guidelines in “Charter on External Lighting” and “Guidelines on Industry Best Practices for External Lightning Installations” promulgated by ENB for glare control will be implemented.	Proposed Stormwater Pumping Station / Operation Phase	Project Proponent Contractor(s)				√	EIAO-TM
Table 8.11 – OM7	River Revitalization and Landscape Work for Infrastructure – River Revitalization work in terms of planting and provision of leisure facilities will be conducted along Luk Tei Tong Bypass Channel to enhance ecological and amenity value of the surrounding. Native species will be selected for planting and landscape works as far as possible. Environmental friendly material and nature colour will be selected for leisure facilities and other associated facilities / hard landscape. Green roof and corresponding landscape work such as planting of climbers, shrubs and bamboo would be carried out for proposed stormwater pumping station in order to enhance the greenery of proposed structure. A minimum 20% greenery is proposed for the areas within the proposed stormwater pumping station boundary. Vertical planting is also proposed for the boundary fence of the proposed stormwater pumping station. Please refer to Figure 8.11 – Landscape and Visual Mitigation Plan for their location and Figure 8.13a for the section.	Luk Tei Tong Bypass Channel and Proposed Stormwater Pumping Station / Operation Phase	Project Proponent Contractor(s)				√	EIAO-TM
Cultural Heritage								
Archaeological Mitigation Measures								
9.6.1	Chung Hau SAI is found within the CHAA, at a distance of about 20m from the proposed works area of the Project. No excavation works of the project will exist in or adjacent to the SAI, therefore no adverse archaeological impact due to the proposed development is anticipated and thus, no mitigation measure is required.	Whole Site / Construction Phase	Project Proponent Contractor(s)				√	Cap. 53
9.6.2	As mentioned in Sections 9.4.15 to 9.4.21, no archaeological potential area has been identified within proposed works area of the Project, no archaeological impact arising from the proposed work is anticipated. Therefore, no mitigation measure is required.	Whole Site / Construction Phase	Project Proponent Contractor(s)				√	Cap. 53
9.6.3	As a precautionary measure, the project proponent and his/her contractor are required to inform AMO immediately when any antiquities or supposed	Whole Site /	Project Proponent				√	Cap. 53

Drainage Improvement Works

in Mui Wo

Environmental Monitoring and Audit Manual

	antiquities under the A&M Ordinance (Cap. 53) are discovered during the course of works.	Construction Phase	Contractor(s)																				
<u>Built Heritage Mitigation Measures</u>																							
9.6.6	<p>Seven (7) graded historic sites/buildings/structures identified in the CHAA are located over 70m from the boundary of Works Area. Due to adequate separate distance between the proposed works and graded historic sites/buildings/structures, no impact is anticipated. However, Special attention should be paid to avoid adverse physical impact arising from the proposed works to these graded historic sites/buildings/structures. Design proposal, method of works and choice of machinery should be targeted to minimize adverse impacts to them. Any vibration and building movement induced from the proposed works should be strictly monitored to ensure no disturbance and physical damages made to them during the course of works. Monitoring proposal for the heritage sites, including checkpoint locations, installation details, response actions for each of the Alert/ Alarm/ Action (3As) levels and frequency of monitoring should be submitted for AMO's consideration. Recommended 3As levels for these graded historic sites/buildings/structures are as shown below:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Type of Monitoring for</th> <th>Alert</th> <th>Alarm</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Vibration (PPV)</td> <td>5mm/s</td> <td>6mm/s</td> <td>7.5mm/s</td> </tr> <tr> <td>Settlement</td> <td>6mm</td> <td>8mm</td> <td>10mm</td> </tr> <tr> <td>Tilting</td> <td>1/2000</td> <td>1/1500</td> <td>1/1000</td> </tr> </tbody> </table> <p>Installation of monitoring checkpoints shall be carried out in great care and adequate protection shall be provided so as to avoid unnecessary disturbance / damage to nearby historic fabrics. Photo records of monitoring checkpoints shall be submitted upon installation for AMO's records; Monitoring records should be submitted to AMO on regular basis and alert AMO should the monitoring reach Alert/ Alarm/ Action levels; and pre and post condition survey should be carried out to record conditions of these graded historic sites/buildings/structures and survey reports should be submitted for AMO's record.</p>	Type of Monitoring for	Alert	Alarm	Action	Vibration (PPV)	5mm/s	6mm/s	7.5mm/s	Settlement	6mm	8mm	10mm	Tilting	1/2000	1/1500	1/1000	Retaining wall and buildings of Yuen's Mansion / Construction Phase	Contractor(s)		√		
Type of Monitoring for	Alert	Alarm	Action																				
Vibration (PPV)	5mm/s	6mm/s	7.5mm/s																				
Settlement	6mm	8mm	10mm																				
Tilting	1/2000	1/1500	1/1000																				
9.6.7	<p>Apart from two agricultural weirs (HB- 22 and HB-76), potential direct impact to the built heritage items identified and listed in Table 9.2 is not expected to be anticipated due to adequate separate distance between the proposed works and built heritage items. HB- 22 and HB-76 are located within works area of the proposed river reprofiling work and fish ladder works at Tai Tei Tong River. Modification of the agricultural weirs and construction of fish ladder are proposed on site in order to achieve beneficial ecological impact like improvement of the</p>	HB-22 and HB-76 / Construction Phase	Project Proponent Contractor(s)		√																		

Drainage Improvement Works

in Mui Wo

	<p>river hydraulic performance and fish movement. The existing agricultural weirs (HB-22 and HB-76) are constructed with concrete and have already undergone various modification and repair works. For instance, HB-22 was modified with wide steps at downstream in 1960s and a further modification in 1970s; while HB-76 underwent significant modification in the early of 1990s, only two concrete block and floor steps remained on site. Hence, their cultural heritage significance are considered relatively low due to high level of modifications underwent. Therefore, although the modification of the agricultural weir and construction of fish ladder of this project will bring direct impact to the weirs, the impact would be acceptable with mitigation measures. It is recommended that cartographic and photographic records be conducted to record the weirs prior to commencement of modification works.</p>							
--	---	--	--	--	--	--	--	--

(1) Unless otherwise stated, the reference refers to the relevant section of the EIA Report.

(2) Implementation Stage "D" denoted as "Design Phase", "C" denoted as "Construction Phase", "Post-C" denoted as "Post-Construction Phase" and "O" denoted as "Operation Phase".

Appendix 2.1 Sample of Complaint Log

Appendix 2.1 – Sample of Complaint Log

Log Ref.	Date	Location	Complainant / Date of Contact	Detail of Complaint	Investigation / Mitigation Action	Close Date

**Appendix 4.1
Sample of Data Record Sheet
(Construction Noise Impact)**

Appendix 4.1 – Sample of Data Record Sheet (Construction Noise Impact)

Monitoring Location		
Description of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Time Length (min.)		
Noise Meter Model / Serial No.		
Calibrator Model / Serial No.		
Measurement Results Unit: dB (A)	L ₁₀	
	L ₉₀	
	L _{eq}	
Major Construction Noise Source(s) during Monitoring		
Other Noise Source(s) during Monitoring		
Remark		

	Name	Signature	Date
Recorded by	_____	_____	_____
Checked by	_____	_____	_____

**Appendix 4.2
Event and Action Plan for
Construction Noise Impact**

Appendix 4.2 – Event and Action Plan for Construction Noise Impact

Event	Action			
	ET	IEC	ER	Contractor(s)
When Action Level is reached/exceeded	<ol style="list-style-type: none"> Investigate the complaint and propose remedial measures; Report the results of investigation to the IEC, ER and Contractor; Discuss with the ER and Contractor on the remedial measures required; and Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> Review the investigation results submitted by the ET; and Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor. 	<ol style="list-style-type: none"> Notify the Contractor, ET, IEC and confirm receipt of notification of complaint in writing; Review and agree on the remedial measures proposed by the Contractor; and Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> Submit noise mitigation proposals to the ER, IEC and ET within three working days of notification for agreement; and Implement noise mitigation proposals
When Limit Level is reached/exceeded	<ol style="list-style-type: none"> Repeat measurement to confirm exceedance; If exceedance is confirmed, notify the Contractor, IEC, EPD and ER; Identify source and investigate the causes of exceedance; Increase monitoring frequency; Carry out analysis of Contractor’s working procedures to determine possible mitigation to be implemented; Discuss with the IEC and ER on the remedial measures to be taken; Review the effectiveness of Contractor’s remedial measures and keep IEC, EPD and ER informed of the results; and If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> Check monitoring data submitted by the ET; Check the Contractor’s working method; Discuss with the ER, ET and Contractor on the potential remedial measures; and Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor. 	<ol style="list-style-type: none"> Confirm receipt of notification of failure in writing; In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; Supervise the implementation of remedial measures; and 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"> Identify source and investigate the causes of exceedance; Take immediate action to avoid further exceedance; Submit proposals for remedial measures to the ER, IEC and ET within three working days of notification for agreement; Implement the agreed proposals; Revise and resubmit proposals if problem still not under control; and Stop the relevant portion of works as determined by the ER until the exceedance is abated.

**Appendix 5.1
Sample of Data Record Sheet
(Water Quality Impact)**

Appendix 5.1 – Sample of Data Record Sheet (Water Quality Impact)

Monitoring Location				
Description of Location				
Coordinates of the Sampling Locations				
Date of Monitoring				
Measurement Time (hh:mm)				
Equipment Model / Serial No				
Weather condition				
Tidal Condition				
Water Flow				
Flow rate				
Water depth				
Sampling Level		Surface	Middle	Bottom
Sampling Depth (in meter)				
Parameters	Dissolved Oxygen (mg/L)			
	Dissolved Oxygen Saturation (%)			
	Water Temperature (°C)			
	pH			
	Turbidity (NTU)			
	Salinity (ppt)			
Construction Activities				
Other Activities				
Photo Record				
Remark				

Name

Signature

Date

Recorded by

Checked by

**Appendix 5.2
Event and Action Plan for
Water Quality Impact**

Appendix 5.2 – Event and Action Plan for Water Quality Impact

Event	Action			
	ET Leader	IEC	ER	Contractor
Action Level being exceeded	<ul style="list-style-type: none"> Repeat in-situ measurement to confirm findings; Identify source(s) of impact; Inform DSD, IEC, Contractor, ER and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with DSD, IEC, ER and Contractor; Repeat measurement on next day of exceedance. 	<ul style="list-style-type: none"> Discuss with DSD, ET, ER and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; Make agreement on the mitigation measures to be implemented. 	<ul style="list-style-type: none"> Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment Consider changes of working methods; Discuss with ET, IEC and ER and propose mitigation measures to ET, IEC and ER; Implement the agreed mitigation measures.
Action Level being exceeded by more than one consecutive sampling days	<ul style="list-style-type: none"> Repeat in-situ measurement to confirm findings; Identify source(s) of impact; Inform the IEC and the Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with the IEC and the Contractor; Ensure mitigation measures are implemented; Prepare to increase the monitoring frequency to daily; Repeat measurement on next day of exceedance 	<ul style="list-style-type: none"> Discuss with the ET and the Contractor on the mitigation measures; Review proposals on mitigation measures submitted by the Contractor and advise the ER accordingly; Assess the effectiveness of the implemented mitigation measures 	<ul style="list-style-type: none"> Discuss with IEC on the proposed mitigation measures; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures 	<ul style="list-style-type: none"> Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with the ET and the IEC and propose mitigation measures to the IEC and ER within 3 working days; Implement the agreed mitigation measures

Event	Action			
	ET Leader	IEC	ER	Contractor
Limit Level being exceeded	<ul style="list-style-type: none"> Repeat in-situ measurement to confirm findings; Identify source(s) of impact; Inform DSD, IEC, Contractor, ER and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with DSD, IEC, ER and Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit Level. 	<ul style="list-style-type: none"> Discuss with DSD, ET, ER and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET, IEC and ER and propose mitigation measures to ET, IEC and ER within 3 working days; Implement the agreed mitigation measures.
Limit Level being exceeded by more than one consecutive sampling days	<ul style="list-style-type: none"> Repeat in-situ measurement to confirm findings; Identify source(s) of impact; Inform the IEC, the Contractor and DEP; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with the IEC, the ER and the Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit Level for two consecutive days 	<ul style="list-style-type: none"> Discuss with ET and Contractor on the mitigation measures; Review proposals on mitigation measures submitted by the Contractor and advise the ER accordingly; Assess the effectiveness of the implemented mitigation measures. 	<ul style="list-style-type: none"> Discuss with the IEC, the ES and the Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures; Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the works until no exceedance of Limit Level 	<ul style="list-style-type: none"> Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with the ET, the IEC and the ER and propose mitigation measures to the IEC and the ER within 3 working days; Implement the agreed mitigation measures; As directed by the ER, slow down or stop all or part of the construction activities

Appendix 11.1
Sample for Notification of Environmental
Quality Limit Exceedances

Appendix 11.1 – Sample Template for Notification Environmental Quality Limit Exceedances

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

	Name / Position	Signature	Date
Prepared by	_____	_____	_____
Checked by	_____	_____	_____