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1. INTRODUCTION

1.1 Project Background

- 1.1.1 The Drainage Master Plan Studies for the Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai Drainage Basin (YLDMP) were completed in 1998 respectively. The majority of the improvement works in Yuen Long and Kam Tin recommended under the YLDMP Study have been completed. Since completion of the DMP Studies, there were changes in developments within the areas and new development proposals and town planning studies were commissioned. In addition, some new flooding complaints were received on the upstream areas of the drainage basins, indicating that further improvement to the drainage systems were required.
- 1.1.2 Drainage Services Department (DSD) commissioned the “Review of Drainage Master Plans in Yuen Long and North Districts – Feasibility Study” (the DMP Review Study) in 2008 so that the new development scenarios could be incorporated and the effectiveness of the previously recommended works could also be assessed.
- 1.1.3 The Review Study completed in end 2011 identified that some areas in Yuen Long District could not meet the required flood protection level according to the latest land use changes and future developments taking into account various factors, including sedimentation at the downstream main channels, mangrove growth at river estuaries, updated extreme sea level statistics at Tsim Bei Tsui and projected Climate Change impacts, in the hydraulics analysis. To account for the severity and extent of possible flooding and the works implementation time, the Review Study proposed drainage improvement works in Yuen Long District.
- 1.1.4 In August 2016, the Development Bureau signed out a Project Definition Statement (PDS) to justify and define the scope of the “Yuen Long Barrage Scheme” (YLBS). The Technical Feasibility Study (TFS) completed by DSD that confirms the feasibility of the Project and was approved by DEVB in September 2016 and the Project was subsequently included in Cat B under PWP Item No. 4178D in October 2017. Details of the Project are provided in *Section 1.3* below.

1.2 Purpose of the Manual

- 1.2.1 Black & Veatch Hong Kong Limited (BV) was commissioned by DSD to undertake the Environmental Impact Assessment (EIA) Study of the Project (the Assignment). 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 The Manual has been prepared in accordance with the EIA Study Brief (No. ESB-307/2018) and the *Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM)*. The purpose of the 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), 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;
- 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 scope of the Project includes reviewing the proposed drainage works and developing detailed designs for the YLBS. In retaining the technical feasibility and resilience towards climate change, the flood protection scheme also comprises revitalisation of the nullah in tandem with blue-green infrastructures. A location plan of the Project is shown in [Figure 1.1](#). The proposed layout of the YLBS is provided in [Figure 1.2](#).

1.3.2 The scope, description and scale of the Project are summarised in *Table 1.1*.

Table 1.1 Summary of Project Scope

Proposed Works	Description and Scale of Works
Construction of Pumping Stations	A pumping station, housing in two structures, are located at the western and eastern banks of the downstream YLN. With a total footprint of approx. 3,300 m ² , the pumping station is also equipped with low flow pumps to be operated during dry season.
Construction of Tidal Barrier	The tidal barrier would be divided into bays, whereby each segment can be opened at various angles at the operator's discretion. Upon completion, the gates would span across YLN at a width of approx. 50 m.
Construction of E&M Control Room	The E&M control room, with a footprint of approx. 1,300 m ² , houses all the E&M apparatus & facilities for public enjoyment among other ground level open areas.
Construction of Link Bridge	The link bridge provides an access for maintenance personnel between Wang Lok Street and Shan Pui Ho East Road and utility crossings. With intermediate piers, the bridge would be situated downstream of the pumping station, which spans approx. 110 m across the nullah.
Local Widening and Deepening of YLN	The proposed works at YLN would widen the nullah by 10 m on each side and deepen its bottom to facilitate flow intake to the pumping station. Inflow-guiding structures would be constructed to direct flow towards the pumping station.
Construction & Modification of Parapet Walls	An additional height of approx. 200 mm at the top of the existing parapet walls along KTR and additional parapet walls along YLN and Sham Chung River (SCR) would be constructed. The extent of works is approx. 3,000 m in total for both banks of KTR and approx. 800 m in total for both banks at YLN & SCR.
Refinements to the existing intersection of YLN & YLBF	The proposed works will involve minor excavation and concreting works at the existing concrete diversion structure, resulting in the diversion of additional flow to YLBF for the barrage's operation at the downstream.
Revitalisation of YLN	With the completion of YLBS, there exists revitalisation opportunities within YLN. At a length of approx. 2,100 m, vegetation & landscape components would be introduced to enhance the nullah's biodiversity and social connectivity.
Decommissioning of the Existing Low Flow Pumping Station (LFPS) & Inflatable Dam	The function of the existing Kau Hui LFPS and the associated existing inflatable dam that spans approx. 75 m across YLN would be replaced by the tidal barrier of the barrage, thus would be decommissioned.

Construction Programme

- 1.3.3 The construction programme for the Project is tentatively expected to commence in fourth quarter of 2022 for completion in late 2029. The Project will be constructed in sections as shown in [Figure 1.1](#). The tentative key milestone dates are tabulated in ***Table 1.2*** below.

Construction Works

- 1.3.4 Construction of the proposed Project comprises the following key activities:
- Construction of the Barrage scheme;
 - Modification of flow diversion structures in the intersection of Yuen Long Nullah (YLN) and Yuen Long Bypass Floodway (YLBFB);
 - Modification of parapet wall along YLN, SCR and KTR; and
 - Revitalisation Works in YLN.
- 1.3.5 Construction of the barrage generally involves common civil engineering construction activities such as site clearance, excavation, formwork, substructure and superstructure construction, concreting, landscaping and E&M installation. Revitalisation of YLN involves smaller scale construction activities such as breaking of nullah bed, excavation and landscaping.

1.4 Objectives of the EM&A

- 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 the Implementation Schedule of Mitigation Measures (see [Annex A](#)).
- 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 operation phases of this Project. A summary of the requirements for each of the environmental parameters is detailed in **Table 1.3**.

Table 1.3 Summary of EM&A Parameters

Parameter	Phases		
	Pre-Construction Phase	Construction Phase	Operation Phase
Air Quality	-	SI	-
Noise	M	M + SI	-
Water Quality	M	M + SI	-
Waste	-	SI	-
Ecology	M	M + SI	-
Cultural Heritage	SI ^(c)	SI	-
Landscape and Visual	SI ^(d)	SI	SI
Notes:			
(a) M – Environmental monitoring			
(b) SI - Site inspection			
(c) Prior to construction, condition survey before commencement of construction works.			
(d) Prior to construction, vegetation survey and photographic record of the Project Site at the time of the Contractor's possession.			

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;
- Establish baseline ecological condition for ecological monitoring during construction;
- Establish condition survey of heritage buildings and structures for vibration monitoring during construction;
- Establish baseline landscape and visual resources for landscape and visual monitoring and audit during 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), ET, 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 DSD will establish an ET to conduct the site inspection and monitoring and, to provide specialist advice on implementation of environmental responsibilities.

1.6.3 The ET 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 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 DSD will appoint an IEC 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.

Roles & Responsibilities

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 DSD will:

- 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 The ER of DSD will:

- 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 undertaken by the ET and IEC.

1.6.8 The Contractor(s) are responsible to:

- 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 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.

1.6.9 The ET will:

- Monitor various environmental parameters as required in this Manual;
- 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 regular 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.

1.6.10 The IEC will:

- Review and audit the implementation of the EM&A programme and the overall level of environmental performance being achieved;
- 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).

Key Contact Information

1.6.11 Key contact information, to be updated when details are available, will be provided in a similar format as in ***Table 1.4***.

Table 1.4 Contact Information - to be completed prior to commencement of construction

Name	Position	Telephone	Facsimile	E-mail
DSD – EP Holder				
To be confirmed				
ER				
To be confirmed				
Contractor(s)				
To be confirmed				
ET				
To be confirmed				
IEC				
To be confirmed				

1.7 Structure of the EM&A Manual

1.7.1 The remainder of the 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 audit requirements for waste management and land contamination;
- *Section 7* describes the audit requirements for ecology;
- *Section 8* describes the audit requirements for fisheries;
- *Section 9* describes the audit requirements for cultural heritage;
- *Section 10* describes the audit requirements for landscape and visual;
- *Section 11* describes the scope and frequency of environmental site inspection; and
- *Section 12* details the reporting requirements for the EM&A programme.
- [Annex A](#) includes the implementation schedule of recommended mitigation measures.
- [Annex B](#) provides a construction phase noise monitoring field record sheet.
- [Annex C](#) provides sample complaint log.
- [Annex D](#) provides sample template for interim notifications of environmental quality limits exceedances

2. EM&A GENERAL REQUIREMENTS

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, ecology will be subject to EM&A, whilst environmental audit being undertaken for air quality, construction waste management, cultural heritage 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. The inspections 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 (EAPs)

- 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 and ecological 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 every week. 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 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 11* 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 (see [Annex C](#)). 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 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 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

2.2.13 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 two weeks of the end of each calendar month.

Cessation of EM&A

2.2.14 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 1.6.9* and *Section 1.6.10*, respectively, during operation phase.

3. AIR QUALITY

3.1 Introduction

3.1.1 According to the EIA, no unacceptable air quality impact is anticipated during both construction and operation phases of the Project. Therefore, no dust and odour monitoring is considered necessary during the construction and operation phases.

3.1.2 Regular environmental site audit is required during the construction phase to ensure the proper implementation of control measures. Detailed site audit requirements are specified in *Section 11*.

3.2 Site Inspection

3.2.1 Weekly site inspection will be undertaken by the ET to ensure that control measures as proposed in the EIA Report are properly implemented to reduce potential air quality impacts during construction.

3.3 Mitigation Measures

3.3.1 The mitigation measures recommended for dust and odour control are summarised in [Annex A](#).

4. NOISE

4.1 Introduction

4.1.1 In accordance with the recommendations of the EIA, mitigation measures to control impacts from noise generating works have been proposed for the construction phase of the Project.

4.2 Construction Phase

4.2.1 Construction noise monitoring is recommended to ensure compliance with the noise criteria at the Noise Sensitive Receivers (NSRs). Monitoring requirements are detailed below.

Construction Noise Parameters

4.2.2 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.

4.2.3 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).

4.2.4 Construction noise level should be measured in terms of a weighted equivalent continuous sound pressure level (Leq) during the construction phase to check for compliance against limits. Leq (30min) should be used as the monitoring parameter for the construction period between 0700 – 1900 hours on normal working days. For all other time periods, Leq (5min) should be measured for comparison with the Noise Control Ordinance (NCO) criteria. Supplementary information for data auditing (statistical results such as L10 and L90) should also be obtained for reference.

Monitoring Equipment

4.2.5 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 5 m s^{-1} or wind with gusts exceeding 10 m s^{-1} . The wind speed should be checked with a portable wind speed meter capable of measuring the wind speed in m s^{-1} .

Monitoring Locations

- 4.2.6 The noise monitoring locations have been shown in [Figure 4.1](#) and [Table 4.1](#). The status and location of noise sensitive receiver (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 ID	NSR ID	Description	Minimum Distance away from the Project (m)	Type of Use
CN1	SPCH1	Shan Pui Chung Hau Tsuen	11	Residential
CN2	CCHS1	Caritas Yuen Long Chan Chun Ha Secondary School	10	Educational
CN3	MTN1	Ma Tin Tsuen	11	Residential

- 4.2.7 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.

- 4.2.8 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 baseline monitoring and the impact monitoring should be carried out at the same position.

4.3 Baseline Monitoring

- 4.3.1 The ET should carry out baseline noise monitoring prior to the commencement of any construction works. The baseline monitoring should be measured for a continuous period of at least 14 consecutive days at a minimum logging interval of 30 minutes for day-time and 15 minutes (as three consecutive Leq(5min) readings) for evening, holidays and night-time. A schedule of the baseline monitoring should be submitted to the ER, IEC and EPD for agreement before commencement of baseline monitoring.

- 4.3.2 During the baseline monitoring, there should not be any construction activities in the vicinity of the monitoring stations. Any non-Project related construction activities in the vicinity of the stations during the baseline monitoring should be noted and the source(s) and location(s) be recorded.
- 4.3.3 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the Engineer's Representative (ER), IEC and EPD to agree on an appropriate set of data to be used as a baseline reference.

4.4 Impact Monitoring for Construction Noise

- 4.4.1 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 working days. 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.
- 4.4.2 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in **Table 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.

4.5 Event and Action Plan for Noise

- 4.5.1 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 **Table 4.3** should be carried out.

Table 4.2 Action and Limit Levels for Construction Noise Monitoring

Time Period	Action Level	Limit Level
0700 – 1900 hrs on normal weekdays	When one documented compliant is received	<ul style="list-style-type: none"> ▪ 75 dB(A) for residential ▪ 70 dB(A) for schools and 65dB(A) during school examination periods

Table 4.3 Event and Actions for Construction Noise Monitoring

Event	Action			
	ET	IEC	ER	Contractor
When Action Level is reached/exceeded	1. Notify IEC, DSD, EPD, ER and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, DSD, EPD, ER and	1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and	1. Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be	1. Submit noise mitigation proposals to ER, ET and IEC; 2. Implement noise mitigation proposals

Event	Action			
	ET	IEC	ER	Contractor
	Contractor; 4. Discuss with the Contractor and formulate remedial measures; 5. Increase monitoring frequency to check mitigation effectiveness	advise the ER accordingly; 3. Supervise the implementation of remedial measures	implemented.	
When Limit Level is reached/exceeded	1. Notify IEC, DSD, EPD, ER and Contractor; 2. Identify source; 3. Carry out investigation; 4. Report the results of investigation to the IEC, DSD, EPD, ER and Contractor; 5. Discuss with the Contractor and formulate remedial measures; 6. Increase monitoring frequency to check mitigation effectiveness	1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; 3. Supervise the implementation of remedial measures	1. Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures.	1. Submit noise mitigation proposals to ER, ET and IEC; 2. Implement noise mitigation proposals

4.5.2 In addition, regular environmental site audit is required to ensure the implementation of practical noise control measures, including good site practice, use of quiet PMEs and adoption of mobile noise barriers. Detailed site audit specifications are included in *Section 11* of this EM&A Manual.

4.6 Operation Phase

4.6.1 According to the EIA, no unacceptable noise impact is expected during operation of the Project. Therefore, operational noise monitoring is not considered necessary.

4.7 Mitigation Measures

4.6.2 The mitigation measures recommended for noise reduction and control are summarised in [Annex A](#).

5. WATER QUALITY

5.1 Introduction

5.1.1. In accordance with the recommendations of the EIA, mitigation measures have been proposed during the construction phase of the Project to ensure that unacceptable water quality impacts do not occur at the downstream Water Sensitive Receivers (WSRs) as a result of the construction works. Details of the mitigation measures are presented in Section 6 of the EIA Report.

5.1.2. In addition to the recommended mitigation measures, water quality monitoring should be undertaken during the construction phase of the Project to determine the environmental performance of the Project in terms of its water quality impacts. Appropriate remedial actions should be taken in case the environmental performance criteria are exceeded. Detailed monitoring requirements are presented in the following sections.

5.1 Construction Phase Monitoring

Water Quality Monitoring Parameters

5.2.1 Water quality parameters are chosen for monitoring with consideration of the potential water quality impacts from the construction of the Project (i.e. release of polluted water with high suspended sediment (SS) load from the construction works). This would ensure that potential impacts from construction activities of the Project can be readily detected and timely action could be undertaken to rectify the situation. Water quality parameters to be measured are shown in *Table 5.1*.

Table 5.1 Water Quality Monitoring Parameters and Frequency during the Construction Phase

Parameters	Unit	Monitoring Frequency		
		Baseline monitoring	Impact monitoring	Post Project monitoring
<i>In – situ Measurement</i>				
pH	-	3 days per week for 4 weeks prior to the commencement of construction works	3 days per week throughout the construction period	3 days per week for 4 weeks after the completion of construction works
Water temperature	°C			
Turbidity	NTU			
Dissolved Oxygen (DO)	mg/L			
Dissolved Oxygen (DO)	% saturation			
Salinity	‰			
<i>Laboratory Analysis</i>				
Suspended Solids (SS)	mg/L			

Notes:

For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb.

5.2.2 In addition to the water quality parameters, other relevant data should also be measured and recorded in field logs, including the coordinates of the sampling stations and the location of construction works at the time of sampling, tidal stages,

water depth, sampling depth, weather conditions, flowrate (m³/day), special phenomena (provide photographs if appropriate) and work activities undertaken around the monitoring and works area that may influence the monitoring results.

Water Quality Monitoring Equipment

- 5.2.3 For water quality monitoring, the following equipment should be supplied and used by the environmental contractor.
- 5.2.4 **Dissolved Oxygen, Temperature and Salinity Measuring Equipment** - The instrument should be a portable, weatherproof measuring instrument complete with cable, sensor, comprehensive operation manuals, and should be operable from a DC power source. It should be capable of measuring: dissolved oxygen levels in the range of 0–20 mg/L¹ and 0-200% saturation; a temperature of 0-45 °C; and a salinity of 0-35 ppt.
- 5.2.5 It should 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 cable should be available for replacement where necessary (for example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).
- 5.2.6 **Turbidity Measurement Instrument** - Turbidity should be measured *in situ* by the nephelometric method using an instrument that is portable and weatherproof using a DC power source with cable, sensor, and comprehensive operation manuals. This instrument should have a photometric sensor capable of measuring turbidity between 0 - 1000 NTU (e.g. Hach model 2100P or other approved instrument of similar type). 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.
- 5.2.7 **pH Measuring Equipment** - A portable pH meter capable of measuring a range between 0.0 and 14.0 should be provided to measure pH under the specified conditions (e.g. Orion Model 250A or an approved similar instrument).
- 5.2.8 **Electromagnetic Flow Meter** - A hand-held digital electromagnetic flow meter (e.g. model Flo-mate 2000 or other approved similar instrument) should be provided and used to measure water flow rate during water quality monitoring. The measurement should be conducted at fixed sampling points and water depth throughout the monitoring programme.
- 5.2.9 **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.
- 5.2.10 **Water Depth Gauge** - A portable, battery-operated echo sounder will be used for the determination of water depth at each designated monitoring station.

- 5.2.11 **Water Sampling Equipment** - A water sampler, consisting of a transparent PVC or glass cylinder of at least 500ml, which can be effectively sealed at both ends, should be used (Kahlsico Water Sampler 13SWB203 or an approved similar instrument). Water samples for SS, BOD₅ measurements should be contained in high density polyethene bottles.
- 5.2.12 **Back-up Equipment** - Sufficient stocks of spare parts should be maintained for replacements when necessary. Back-up monitoring equipment should also be available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

Sampling / Testing Protocols

- 5.2.13 All *in situ* monitoring instruments should be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at-monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use.
- 5.2.14 For the on-site calibration of field equipment, the BS 1427: 1993, Guide to Field and On-Site Test Methods for the Analysis of Waters should be observed. Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment should also be made available so that monitoring can proceed uninterrupted even when equipment is under maintenance, calibration etc.
- 5.2.15 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.
- 5.2.16 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 Analysis

- 5.2.17 All laboratory work should be carried out in a HOKLAS accredited laboratory. Water samples of about 1,000ml should be collected at the monitoring and control stations for carrying out the laboratory determinations. The determination work should start within the next working day after collection of the water samples. The SS laboratory measurements should be provided within 2 days of the sampling event (48 hours). The analyses should follow the standard methods as described in APHA Standard Methods for the Examination of Water and Wastewater, 21st Edition, unless otherwise specified (APHA 2540D for SS).
- 5.2.18 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 should be in accordance with requirements of HOKLAS or another internationally accredited scheme.

Monitoring Locations

5.2.19 The monitoring stations have been established to identify potential water quality impacts to WSRs. Locations of the monitoring stations are shown in [Figure 5.1](#) with the co-ordinates presented on [Table 5.2](#). Descriptions of the monitoring stations are as follows:

- W1 is Impact Station while W2 is Impact Station or Control Station depending on tidal condition. These stations are downstream of the boundary of the Project Site. W1 is located at the Shan Pui River and is approximately 250 m from the boundary of works, while W2 is located near the Mai Po Inner Deep Bay Ramsar Site and is approximately 2 km from the boundary. Water quality monitoring at these two Stations will help to determine any adverse water quality impacts to the nearest Water Sensitive Receivers which may be caused by the Project's construction activities.
- C1 and C2 are Control Stations which are approximately 2km upstream of the Project Site and not supposed to be influenced by the construction works. These stations are not affected by tidal condition of Shan Pui River. Water quality monitoring data collected at C1 and C2 will be used to compare with the Impact Stations' data to determine any adverse water quality impacts as a result of the construction works of the Project.
- Mobile Stations should also be monitored for which the location will be determined in accordance with the boundary and number of the active works area during the time of impact monitoring. The Upstream Mobile Station should be located about 50 m upstream of the active works area while the Downstream Mobile Station should be located about 50 m downstream of the active works area.

Table 5.2 Proposed Water Quality Monitoring Stations for the Construction Phase

Station	Description	Station Nature		Easting	Northing
		Mid-ebb	Mid-flood		
W1	Shan Pui River	Impact Station		821405	835653
W2	Shan Pui River near Mai Po Inner Deep Bay Ramsar Site	Impact Station	Control Station	820935	837158
C1	Kung Um Road Nullah	Control Station*		820526	832515
C2	San Hui Nullah	Control Station*		821130	832847
UM	Yuen Long Nullah	Upstream Mobile Station (Control)*		Located 50 m upstream of the active works area. Location to be determined on-site.	
DM	Yuen Long Nullah	Downstream Mobile Station* (Impact)		Located 50 m downstream of the active works area. Location to be determined on-site.	

Notes:

* Not affected by tidal condition.

The coordinates of the monitoring stations are for reference only. The ET Leader shall propose the exact monitoring locations and coordinates to the IEC and ER for approval before commencement of water sampling.

5.2.20 The locations and suitability of the proposed monitoring stations above 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. The water depth in the Yuen Long Town Nullah and Shan Pui River may not be sufficient to take samples at different depths, especially during dry season or due to tidal action. Therefore, water samples should only be taken at mid-depth. Water sampling works should be conducted with caution to avoid disturbing the bottom sediment.

Monitoring Frequency

5.2.21 As specified in **Table 5.1**, the detailed monitoring frequency requirements are listed below.

Baseline Monitoring

5.2.22 Baseline monitoring should be undertaken three times per week for four weeks at the designated stations except the Mobile Stations prior to the commencement of the construction works. For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb. The interval between two consecutive sets of monitoring should not be less than 36 hours. Baseline monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD two weeks prior to the commencement of baseline monitoring.

Impact Monitoring

5.2.23 Impact monitoring should be undertaken three times per week during the course of construction works. For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb. The interval between two consecutive sets of monitoring should not be less than 36 hours except when there are exceedances of Action and/or Limit Level, in which case monitoring frequency should be increased. The proposed water quality monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD at least two weeks before the first day of the monitoring month. The ER, the IEC and EPD should be notified immediately of any changes in schedule.

Post Project Monitoring

5.2.24 Post Project Monitoring will comprise sampling on three days a week for four weeks after completion of the construction works. The monitoring requirements will be the same as the Baseline Monitoring stated in *Section 5.2.22* above. Post Project monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD two weeks prior to the commencement of Post Project monitoring.

Event and Action Plan

5.2.25 Water quality monitoring results will be evaluated against Action and Limit Levels shown in **Table 5.3**.

Table 5.3 Action and Limit Level for Water Quality Monitoring during the Construction Phase of the Project (based on the result of the Baseline Report)

Parameter	Action Level	Limit Level
SS in mg/L ⁽¹⁾	95%-ile of baseline data, or 20% exceedance of value at any impact station compared with corresponding data from control station on the same day	99%-ile of baseline data, or 30% exceedance of value at any impact station compared with corresponding data from control station on the same day
DO in mgL ⁻¹ ⁽²⁾	5%-ile of baseline data	4 mg/L or 1%-ile of baseline data
Turbidity in NTU ⁽¹⁾	95%-ile of baseline data, or 20% exceedance of value at any impact station compared with corresponding data from control station on the same day	99%-ile of baseline data, or 30% exceedance of value at any impact station compared with corresponding data from control station 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.

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

5.2.27 In addition to monitoring, regular environmental site audit is required to ensure the proper implementation of good site practices, construction runoff pollution prevention measures, drainage and sewage control measures. Detailed site audit specifications are included in *Section 11* of this EM&A Manual.

Table 5.4 Event and Action Plan for Water Quality Monitoring during the Construction Phase of the Project

Event	Action			
	ET Leader	IEC	ER	Contractor
Action Level being exceeded	<ul style="list-style-type: none"> Repeat 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 	<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 	<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

Event	Action			
	ET Leader	IEC	ER	Contractor
	DSD, IEC, ER and Contractor; <ul style="list-style-type: none"> Repeat measurement on next day of exceedance. 	mitigation measures.		propose mitigation measures to ET, IEC and ER; <ul style="list-style-type: none"> Implement the agreed mitigation measures.
Limit Level being exceeded	<ul style="list-style-type: none"> Repeat 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.

5.2 Mitigation Measures

5.2.2 The mitigation measures recommended for water quality are summarised in [Annex A](#).

6. WASTE MANAGEMENT AND LAND CONTAMINATION

6.1 Waste Management

Construction Phase

- 6.1.1 Construction and demolition (C&D) materials will inevitably be produced during the construction phase of the Project. Waste generated during construction works includes construction and demolition materials, sediment, chemical waste, general refuse and floating refuse. Waste types, quantities and timing have been estimated and mitigation measures have been proposed in terms of avoidance-minimisation-reuse-recycling-disposal hierarchy.
- 6.1.2 Potential for reuse of inert C&D material (public fill) from the Project will be rigorously explored during the detailed design stage in an effort to minimise off-site disposal. Provided that there is strict control of C&D materials generated from construction works and that all arising materials are stored, handled, transported and disposed of in accordance with the recommended mitigation measures, potential impact is not expected.
- 6.1.3 The recommended waste management measures as presented in [Annex A](#) shall be enforced by incorporating them into an Environmental Management Plan (EMP) to be prepared by the Contractor. Environmental audit would be necessary to ensure the implementation of proper waste management practices during construction.
- 6.1.4 Auditing should be carried out periodically to determine if waste is being managed in accordance with the relevant environmental legislation and standards (e.g. Waste Disposal Ordinance) and the EMP. The audits should examine all aspects of waste management including waste generation, storage, recycling, treatment, transportation, and disposal. The general site inspections including waste management issues will be undertaken weekly by ET to check all construction activities for compliance with all appropriate environmental protection and pollution control measures, including those set up in the EMP. Meanwhile, waste management audit should also be carried out on monthly basis by the IEC.

Operation Phase

- 6.1.5 Unacceptable impacts related to waste management are not expected during operation of the Project. As such, environmental monitoring is considered not necessary during operation of the Project.

6.2 Land Contamination

- 6.2.1 Based on desk-top review and site walkover conducted in the EIA, the presence of contaminated land is not expected. As such, environmental monitoring audit for land contamination is considered not necessary.

7. ECOLOGY

7.1 Introduction

7.1.1 Potential ecological impacts arising from the construction and operational phases of the Project were assessed in the EIA Report. Mitigation measures have been recommended to minimize the potential indirect impacts to the nearby sensitive wetland habitats and associated wildlife, particularly waterbirds. With the implementation of appropriate mitigation measures, no unacceptable adverse residual impacts would be anticipated. Nonetheless, EM&A is considered necessary during construction of the Project and the requirements are described below.

7.2 Mitigation Measures

7.2.1 The mitigation measures recommended for ecology are summarized in [Annex A](#).

7.3 Construction Phase Monitoring and Audit

7.3.1 Utilization of the wetland habitats by birds was recorded within the 500m assessment area, where a number of avifauna of conservation importance (particularly overwintering waterbirds) and the recognized sites of conservation importance (including the Ramsar Site, Priority Site, WCA, WBA, SSSI and CA) were recorded, should be monitored monthly during the construction phase.

7.3.2 The area within 100m from the Project boundary should be monitored monthly during the construction phase to check the location and status of any active night roost.

Baseline Ecological Monitoring of Birds

7.3.3 The result of the ecological field surveys conducted for the EIA study, which were conducted monthly over a 12-month period between July 2019 and July 2020, will be adopted as the baseline for the evaluation of utilization of the wetland habitats by birds nearby the Project Site and effectiveness of the proposed mitigation measures during the ecological monitoring. The ET should review the applicability of the results of baseline surveys conducted for the EIA and conduct verification surveys as necessary.

7.3.4 A Baseline Bird Survey Report should be submitted to relevant Government departments.

Pre-construction Survey of Ardeid Night Roost

7.3.5 A pre-construction survey should be conducted to record and verify the status and locations of any active ardeid night roost within 100m of the Project Site boundary. It should also suggest a location as close to the night roost as practicable for monitoring

of noise level during construction. The findings of the pre-construction surveys will serve as a reference for the evaluation of usage of ardeid night roost identified and effectiveness of the proposed mitigation measures during the construction phase ecological monitoring. A Report on Pre-construction Survey of Ardeid Night Roost should be submitted to relevant Government departments.

Ecological Monitoring of Birds

- 7.3.6 Monthly ecological monitoring, focusing on avifauna species of conservation importance, and overwintering waterbirds utilising wetland habitats along Shan Pui River and Kam Tin River within 500m from the Project boundary should be conducted during construction phase. For the surveys overlooking the tidal mudflats and mangroves in the Shan Pui River and Kam Tin River, the tidal level at the time of the survey should be taken into consideration and the surveys should be taken when the tidal level is generally 1.5m or below.
- 7.3.7 Avifaunal communities should be surveyed quantitatively along transects and at selected point count locations. All birds heard or seen along the transects should be identified to species level and counted. Noise level should also be recorded. Any changes in site condition or disturbances detected or observed at the monitoring locations, including both construction and non-construction related activities, during each impact monitoring visit should also be recorded.
- 7.3.8 The monitoring results should be compared to pre-construction baseline condition during the dry and wet seasons as summarized in the Baseline Bird Survey Report.
- 7.3.9 The ecological monitoring should be undertaken by experienced ecologist(s) with relevant working experience. Should any unpredicted indirect ecological impacts arising from the proposed Project be detected, remedial measures should be developed and implemented by the Contractor. The monitoring results with comparison to pre-construction baseline condition should be reported in the monthly EM&A Reports.

Ardeid Night Roost Monitoring

- 7.3.10 Monthly monitoring of the area within 100m from the Project boundary should be conducted during the construction phase to check the status and location of any active ardeid night roost. The night roost survey should be conducted from one hour before sunset to one hour after sunset. Direct observation should be made from a vantage point which enables an unobstructed view over the area. The species, abundance and time of all ardeids observed at the night roosts during the survey should be recorded, as well as the noise levels. Any changes in site condition or disturbances detected or observed at the monitoring locations, including both construction and non-construction related activities, during each monitoring visit should also be recorded.

- 7.3.11 The ecological monitoring should be undertaken by experienced ecologist(s) with relevant working experience. The usage of the ardeid night roost should be reviewed and analyzed, and if any significant decline is identified, the cause of the decline, with reference to any changes in site condition or disturbances detected, should be reviewed to identify any unpredicted indirect ecological impacts arising from the proposed Project. Remedial measures should be developed and implemented by the Contractor as necessary. On the other hand, if the active night roost is found to have relocated to 100m away from the project boundary naturally, subject to further consultation and agreement with AFCD/EPD, restriction on working hours (i.e. no construction works with PME within 100m from the night roost after 17:00 during wet season and after 16:30 during dry season) can be ceased. The monitoring results and evaluation of the usage of the ardeid night roost should be reported in the monthly EM&A Reports.
- 7.3.12 Site audits should be undertaken on weekly basis to check the proper implementation and maintenance of recommended mitigation measures during construction phase of the Project.

7.4 Operation Phase Monitoring and Audit

- 7.4.1 As the potential impacts to ecology during operational phase are all considered minor or insignificant, operational phase monitoring and audit are not required. Monitoring of the effectiveness of the revitalisation will be formulated during the Detailed Design Stage.

8. FISHERIES

8.1 Introduction

8.1.1 As no unacceptable adverse fisheries impacts are anticipated during construction or operational phases, no specific monitoring programme for fisheries is required. Regular audits should be undertaken to ensure the effectiveness of the mitigation measures and good site practices recommended during construction phase for further controlling the water quality impacts, as these measures also serve to protect fisheries resources.

8.2 Mitigation Measures

8.2.1 The mitigation measures recommended for fisheries impact (i.e. water quality mitigation measures) are summarised in [Annex A](#).

9. CULTURAL HERITAGE

9.1 Introduction

9.1.1 According to the cultural heritage impact assessment, indirect impacts such as vibration, contact with equipment, access issues may arise, mitigation and audit during construction phase will be required for four heritage structures as listed below.

- Village house (HB-17)
- Village house (HB-18)
- Village God Shrine (HB-30)
- Buddhist Stone Tablet (HB-31)

9.2 Mitigation Measures

9.2.1 Mitigation measures have been recommended as summarised in [Annex A](#) for the protection, and secure and safe public access during the construction phase of four, indirectly affected built heritage sites.

Condition Survey (CS)

9.2.2 A condition survey should be carried out by qualified building surveyor or engineer of the Contractor in advance of works for the identified buildings / structures that may be affected by ground-borne vibration. The Condition Survey Report should contain descriptions of the structure, identification of fragile elements, an appraisal of the condition and working methods for any proposed monitoring and precautionary measures that are recommended.

9.2.3 The Condition Survey Report for the identified buildings / structures must be submitted to AMO for comment before construction activities commence. The location of proposed monitoring points in the building should avoid damaging the historic fabric and agreed by the owner and AMO. The Contractor should implement the approved monitoring and precautionary measures.

Vibration Monitoring (VM)

9.2.4 Vibration monitoring by the Contractor should be undertaken during the construction works to ensure that safe levels of vibration are not exceeded. An Alert, Alarm and Action (AAA) vibration limit set at 5 / 6 / 7.5 mm/s for heritage buildings (PNAP APP-137- Appendix A) should be adopted. The AAA vibration limit for the buildings to be graded by Antiquities Advisory Board (AAB) should be determined by the future grading. The Condition Survey Report should highlight if the limit should be lowered after the detailed study of the condition of the buildings and structures. A monitoring schedule, the location of monitoring equipment, the frequency of monitoring, reporting requirements and event / action plan should be included in the

Condition Survey Report. The location of any monitoring equipment in the building must be approved by the owner and AMO before installation. Reinstatement to all affected areas is required. Results of the vibration monitoring should be submitted to ET, IEC and ER within agreed timeframe for audit.

Provision of Buffer Zones (BZ)

- 9.2.5 A buffer zone should be provided by the Contractor to separate the building or structure from the construction works. The buffer zone should be clearly marked out by temporary fencing, if temporary fencing is not appropriate signage may be used to identify the heritage item to be avoided. The buffer zone should be made at least 1m from the proposed works or if this is not possible as large as the site restrictions allow.

Provision of Safe Public Access (SPA)

- 9.2.6 Any proposed works in close proximity to buildings or structures used by the public have the potential to create an unsafe environment for members of the public.
- 9.2.7 The Contractor should ensure that safe public access if possible, through provision of clearly marked paths separated from the construction works areas is provided for any such affected cultural heritage structure.

9.3 Monitoring and Audit

Construction Phase

- 9.3.1 The ET, IEC and ER should audit the vibration monitoring, relevant buffer zone requirements and access conditions during the construction phase at least once a month. In the event of exceedance, the event / action plan according to the Condition Survey Report should be followed.

Operation Phase

- 9.3.2 No impact to heritage resources is expected during operation of the Project. As such, monitoring is considered not necessary during operation phase.

10. LANDSCAPE AND VISUAL

10.1 Introduction

10.1.1 The EIA Report has recommended the EM&A for landscape and visual resources is undertaken during both the construction and operational phases of the Project. The implementation and maintenance of landscape mitigation measures is a key aspect of this and shall be checked to ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other project works and operational requirements are resolved at the earliest possible date and without compromise to the intention of the mitigation measures. In addition, implementation of the mitigation measures recommended by the EIA shall be monitored through the construction phase site audit programme.

10.2 Baseline Monitoring

10.2.1 Baseline monitoring for the landscape and visual resources shall comprise a one off survey to be conducted prior to commencement of any construction works. The commencement date of baseline monitoring shall be agreed between the ET / IEC / DSD / ER to ensure timely submission of the baseline monitoring report to Environmental Protection Department (EPD) and relevant authorities.

10.2.2 This includes a vegetation survey of the entire site area and within compounds undertaken on an “area” basis. Representative vegetation types shall be identified along with typical species composition. An assessment of landscape character shall be made against which future change can be monitored. The landscape resources and elements of particular concern are to be noted.

10.2.3 A photographic record of the site at the time of the contractor’s possession of the site shall be prepared by the contractor and approved the DSD / ER. The approved photographic record shall be submitted to the DSD, ET, IEC and EPD for record.

10.2.4 The landscape and visual baseline shall be determined with reference to the Landscape Resources and Landscape Character Area maps included in the EIA Report.

10.3 Monitoring and Audit Requirements

10.3.1 An approved landscape contractor shall be employed by the contractor for the implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period. The establishment works shall be undertaken throughout the contractor’s one year maintenance period which will be within the first operation year of the Project.

10.3.2 All measures undertaken by both the contractor and the landscape contractor during the construction phase and first year of the operation phase shall be audited by a landscape architect, as a member of the ET, on a regular basis to ensure compliance with the intended aims of the measures. Site inspections shall be undertaken at least once every two months during the operation phase.

10.3.3 The broad scope of the audit is detailed below. Operation phase auditing will be restricted to the 12-months establishment works of the landscaping proposals, with the DSD taking over the maintenance and monitoring after this period, and thus only the items below concerning this period are relevant to the operation phase:

- The extent of the agreed works areas shall be regularly checked during the construction phase. Any trespass by the contractor outside the limit of works, including and damage to existing trees and woodland all noted and remedial action determined.
- The progress of the engineering works all be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken.
- All existing trees and vegetation within the study area which are not directly affected by the works shall be retained and protected.
- The methods of protecting existing vegetation proposed by the contractors shall be acceptable and enforced.
- All landscaping works shall be carried out in accordance with the specifications.
- The planting of trees and shrubs shall be carried out properly and within the right season as far as practical.
- The species and mix of the new trees and shrubs to be planted shall be suitable.
- The newly planted trees, shrubs, aquatics and grasses shall be maintained throughout the establishment period, particularly in respect of the following:
 - Regular watering, weeding and fertilising of all tree, shrub and aquatic planting;
 - Firming up of trees after periods of strong winds;
 - Regular checks for eradication of pests, fungal infection, etc.;
 - Pruning of dead or broken branches; and
 - Prompt replacement of dead plants.

10.4 Monitoring Programme

10.4.1 The design, implementation and maintenance of landscape and visual mitigation measures shall be checked to ensure that any potential conflicts between the proposed landscape measures and any other works for the project would be resolved as early as practical without affecting the implementation of the mitigation measures.

10.4.2 Site inspection and audit shall be undertaken as necessary in the construction and operation phases as per *Table 10.1* below.

Table 10.1 Monitoring Programme for Landscape and Visual

Stage	Monitoring Task	Monitoring Report	Form of Approval	Frequency
Detailed Design	Checking of design works against the recommendations of the landscape and visual impact assessments within the EIA shall be undertaken during detailed design and tender stage, to ensure that they fulfil the intention of the mitigation measures. Any changes to the design, including design changes on site shall also be checked.	Report by detailed design engineer / ER confirming that the design conforms to requirements of EP	Approved by DSD or EPD as appropriate	At the end of the Detailed Design Phase
Construction	Checking of the contractor's operations during the construction period.	Report on Contractor's compliance, by ET	Counter signature of report by IEC, ER	Weekly
Establishment Works	Checking of the planting works during the twelve-month Establishment Period after completion of the construction works.	Report on Contractor's compliance, by ET	Counter signature of report by IEC, ER	Every two months
Long Term Management (10 year)	Monitoring of the long-term management of the planting works in the period up to 10 years after completion of the construction works.	Report on Compliance by ET or Maintenance Agency as appropriate	Counter signature of report by Management Agency	Annually

Notes:

ET - Environmental Team

EP - Environmental Permit

ER – Engineer Representative

IEC – Independent Environmental Checker

Construction Phase and Establishment Period

10.4.3 An implementation programme will be prepared as required by EIAO-TM. Reference will be made to the DEVB TC(W) No. 6/2015 on Maintenance of Vegetation and Hard Landscape Features which defines the management and maintenance responsibilities for natural vegetation and landscape works, including both soft works and hard works, and authorities for tree preservation and felling. The format of the preliminary arrangement of implementation programme is listed in *Table 10.2* below.

Table 10.2 Preliminary Funding, Implementation, Management and Maintenance Proposal

Landscape and Visual Mitigation Measure ID No.	Funding Agency	Implementation Agency	Management Agency	Maintenance Agency
<i>Construction Phase</i>				
CM1 – CM9	Contractor	Contractor	-	-
<i>Operation Phase</i>				
OM1, OM2, OM5, OM6, OM7, OM8, OM10	DSD	DSD	DSD	DSD
OM3 – OM4	DSD	DSD	HAD / HyD / LCSD	HAD / HyD / LCSD
OM9	DSD	DSD	DSD / HAD / LCSD	DSD / HAD / LCSD

10.4.4 The implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period must be supervised by a qualified Landscape Resident Site Staff (Registered Landscape Architect or Professional Member of the Hong Kong Institute of Landscape Architects).

10.4.5 Measures to mitigate landscape and visual impacts during construction shall be checked and monitored by a Registered Landscape Architect to ensure compliance with the intended aims of the measures.

10.4.6 The progress of the engineering works shall be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken.

10.4.7 The planting works shall be monitored during the first 10 years of the operation phase of the project. Any areas of vegetation which fails to establish, shall be corrected by the relevant management and maintenance parties at the earliest opportunity. The maintenance requirement of the planting works stated under the Ten-Year Management Programme is included in the monitoring requirement.

10.5 Event and Action Plan

10.5.1 Should non-compliance of the landscape and visual impacts occur, actions in accordance with the Event and Action Plan stated in *Table 10.3* below shall be carried out.

Table 10.3 Event and Action Plan for Landscape and Visual

Action Level	Action			
	ET	IEC	ER	Contractor
Design Check	Check final design conforms to the requirements of EP and prepare report.	Check report. Recommend remedial design if necessary.	Undertake remedial design if necessary.	-
Non-conformity on one occasion	Identify source. Inform IEC and DSD / ER. Discuss remedial actions with IEC, DSD / ER and Contractor. Monitor remedial actions until rectification has been completed.	Check report. Check Contractor's working method. Discuss with ET and Contractor on possible remedial measures. Advise DSD / ER on effectiveness of proposed remedial measures. Check implementation of remedial measures.	Notify Contractor. Ensure remedial measures are properly implemented.	Amend working methods to prevent recurrence of non-conformity. Rectify damage and undertake additional action necessary.
Repeated Non-conformity	Identify source. Inform IEC and DSD / ER. Increase monitoring frequency. Discuss remedial actions with IEC, DSD / ER and Contractor. Monitor remedial actions until rectification has been completed. If non-conformity stops, cease additional monitoring.	Check monitoring report. Check Contractor's working method. Discuss with ET and Contractor on possible remedial measures. Advise DSD / ER on effectiveness of proposed remedial measures. Supervise implementation of remedial measures.	Notify Contractor. Ensure remedial measures are properly implemented.	Amend working methods to prevent recurrence of non-conformity. Rectify damage and undertake additional action necessary.

Notes:

ET - Environmental Team

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ER – Engineer Representative

IEC – Independent Environmental Checker

10.6 Mitigation Measures

10.6.1 The mitigation measures recommended for landscape and visual impact are summarised in [Annex A](#).

11. CONSTRUCTION SITE AUDIT

11.1 Site Inspection

11.1.1 Site inspection should be undertaken regularly in order to inspect the construction activities and ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented.

11.1.2 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.

11.1.3 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.

11.1.4 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 results 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.

11.1.5 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.

11.2 Compliance with Legal & Contractual Requirements

11.2.1 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.

11.2.2 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.

11.2.3 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.

11.2.4 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.

11.2.5 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.

11.3 Environmental Complaints

24-hour Dedicated Hotline for Public Complaints and Enquiries

11.3.1 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

11.3.2 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.

11.3.3 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.

A sample Complaint Log is provided in [Annex C](#).

12. REPORTING

12.1 General

12.1.1 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.

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

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

12.1.3 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).

12.2 Baseline Monitoring Report

12.2.1 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.

12.2.2 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.

12.3 Monthly EM&A Reports

12.3.1 The results and findings of the construction phase EM&A work required in this Manual will be recorded in the Monthly EM&A Reports prepared by the ET Leader. The EM&A report should be prepared and submitted within 2 weeks of the end of each reporting month, with the first report due 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.

12.3.2 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.

12.3.3 Contents of First Monthly EM&A Report should 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 predictions.
- (2) Basic project information including a synopsis of the project organisation, 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 and control 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 locations (and depth); and
 - e. monitoring date, time, frequency, and duration;
- (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) Advice on the solid and liquid wastes management.
- (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.

12.3.4 Contents of the Subsequent Monthly EM&A Reports shall at least include the following:

- (1) Executive summary (1-2 pages), including:
 - 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 predictions.
- (2) Environmental status, comprising:
 - a. drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

- b. summary of non-compliance with the environmental quality performance limits; and
 - c. summary of complaints.
- (3) 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.
- (4) 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.

12.4 Final EM&A Review Report

12.4.1 A Final EM&A Review Report should be prepared by the ET at the end of the construction phase. The Final EM&A Review Reports 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 and control 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. environmental mitigation measures as recommended in the EIA Report;
 - b. environmental impact hypotheses tested;
 - c. environmental quality performance limits (A/L Levels);
 - d. monitoring parameters; and
 - e. EAPs.
- (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-project 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.
- (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.

12.5 Data Keeping

12.5.1 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.

12.5.2 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.

12.6 Electronic Reporting of EM&A Information

12.6.1 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) (version 4.0 or later) 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 Monthly EM&A Reports must be the same as the hard copies.

12.6.2 The environmental monitoring data should be made available to the public via the EIAO Internet Website and the EIAO Register Office.

12.6.3 The internet website as described above will enable user-friendly public access to the monitoring data and with features capable of:

- providing access to environmental monitoring data collected since the commencement of works;
- searching by data;
- searching by types of monitoring data;
- hyperlinks to relevant monitoring data after searching; and
- or otherwise as agreed by EPD.

12.7 Interim Notifications of Environmental Quality Limit Exceedances

12.7.1 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 [Annex D](#).

END OF TEXT