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1 INTRODUCTION

1.1 Background

1.1.1 The Hong Kong-Zhuhai-Macao Bridge (HZMB), when completed, will enhance accessibility between the Hong Kong International Airport (HKIA) and the Pearl River Delta (PRD). To capitalise on the HZMB, the Airport Authority Hong Kong (AAHK) is planning to introduce a hassle-free bonded vehicle service between existing HKIA and the PRD West through Hong Kong Boundary Crossing Facilities (HKBCF), similar to the bonded ferry service plying between the HKIA's SkyPier and nine ports in the PRD, which would substantially strengthen HKIA's capability in extending its catchment area to PRD West. To meet this demand, the AAHK plans to construct the Intermodal Transfer Terminal (ITT) adjacent to the SkyPier and it is necessary to build a bonded connection between the ITT and the HKBCF to enable intermodal transfer of HKIA's air passengers to/from the HZMB without the need to go through Hong Kong's immigration clearance. The provision of land connection between ITT and HKBCF has been proposed by the AAHK.

1.1.2 After thorough considerations, AAHK decided to provide the land connection in the form of a bridge, namely Bonded Vehicular Bridge, to provide a direct and effective linkage between the ITT and the HKBCF (hereafter referred to as the "Project"). The location of the Project is shown in **Figure 1.1**. AAHK plans that only air transit passengers by bonded vehicles will be permitted to access the area, and no public vehicle will be allowed to access the Bonded Vehicular Bridge.

1.1.3 The Project comprises the following Designated Project (DP) under Part I of Schedule 2 to the Environmental Impact Assessment Ordinance (EIAO).

- Item A.8 - A road or railway bridge more than 100 m in length between abutments; and
- Item C.3(a) - Reclamation works resulting in 5% decrease in cross sectional area calculated on the basis of 0.0 mPD in a sea channel.

1.1.4 An application for an Environmental Impact Assessment (EIA) Study Brief under section 5(1)(a) of the EIAO was submitted on 30 August 2017 with a Project Profile (No. PP-556/2017) for the Project. An EIA Study Brief (No. ESB-302/2017) was issued by Environmental Protection Department (EPD) on 10 October 2017.

1.2 Project Description

1.2.1 The Project site is situated between the HKBCF Island and the HKIA, at the south of the existing SkyPier on the Airport Island. The Bonded Vehicular Bridge serves as a land connection between the HKBCF Island and ITT building next to the SkyPier to be built by AAHK. Part of the bridge is located in the marine area (marine section) and part on the HKBCF Island (land section). Location of the Project site and layout are shown in **Figure 1.1**. The marine section of the site is situated in a marine area between HKIA and HKBCF Island.

1.2.2 The Bonded Vehicular Bridge serves as a dedicated direct vehicular access connecting the ITT of HKIA and HKBCF Island. The Project scale is anticipated to be small, the bridge's marine section is approximately 360 m in length, supported by bridge concrete piers. The Bridge's land section spans over the HKBCF Island with a total length of approximately 210 m. In additional, AAHK incorporates environmental friendly initiatives by using 100% electrical vehicles, hence, there will be no air pollutants emission during operation of the Project.

1.2.3 The construction works of the Project will tentatively commence in 2020 for completion in 2022.

1.3 Purpose of this Manual

1.3.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual (hereinafter refer to as the "Manual") is to guide the setup of an EM&A programme to ensure compliance with the recommendations in the EIA study, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the proposed monitoring and audit programme for the Project.

1.3.2 The Manual provides specific information, guidance and instruction to personnel in charged with environmental responsibilities and undertaking environmental monitoring and auditing works for the Project. It also provides systematic procedures for monitoring, auditing and minimising environmental impacts associated with the Project.

1.3.3 Hong Kong environmental regulations have served as environmental standards and guidelines in the preparation of this Manual. In addition, the Manual has been prepared in accordance with the requirements stipulated in Clause 3.5 of the EIA Study Brief (No. ESB-302/2017) and Annex 21 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)

1.3.4 The Manual contain the following information:

- Project organisation for the EM&A works;
- Responsibilities of the Contractor, the Project Manager (PM) or Project Manager's Representative (PMR) of AAHK, Environmental Team (ET) and Independent Environmental Checker (IEC) with respect to the environmental monitoring and audit requirements during the course of the Project;
- The basis for, and description of the broad approach underlying the EM&A programme;
- Requirements with respect to the construction programme schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
- Details of the methodologies to be adopted, including all field laboratories and analytical procedures, and details on quality assurance and quality control programme;
- Definition of Action and Limit levels;
- Establishment of Event and Action Plan;
- Requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints;
- Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures; and
- Requirements for review of EIA predictions and the effectiveness of the mitigation measures / environmental management systems and the EM&A programme.

1.4 Project Organisation

1.4.1 Involvement of relevant parties in a collaborative and interactive manner is essential for the implementation of the recommended EM&A programme. The following sections outline the primary responsibilities and duties of the key EM&A programme participants. The proposed project organisations and lines of communication with respect to environmental protection works are shown in **Appendix A**.

Project Manager of Airport Authority Hong Kong

1.4.2 The Project Manager (PM) or PM's Representative of AAHK is responsible for overseeing the construction works and for ensuring that the works are undertaken by the Contractor in accordance with the specification and contract requirements. The duties and responsibilities of the AAHK / PM with respect to the EM&A comprise the following:

- Monitor the contractor's compliance with the contract specifications, the requirements in the Environmental Permit (EP) and EM&A Manual, and the effective implementation and operation of environmental mitigation measures in a timely manner;
- Employ the Environmental Team (ET) to conduct the EM&A works and an Independent Environmental Checker (IEC) to audit the results of the EM&A works carried out by the ET;
- Review the programme of works with a view to identifying any potential environmental impacts before they arise;
- Check that mitigation measures that have been recommended in the EIA Report, this document and contract documents, or as required, are correctly implemented in a timely manner, when necessary;
- Oversee the implementation of the agreed Event and Action Plan in the event of any exceedance; and
- Instruct the Contractor to follow the agreed protocols or those in the contract specifications in the event of exceedance or complaints.

Environmental Protection Department

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

The Contractor

1.4.4 The Contractor shall report to the AAHK / PM. The duties and responsibilities of the Contractor comprise the following:

- Work within the scope of the contraction contract and other tender conditions with respect to EIA recommendations and environmental requirements;
- Operate and strictly adhere to the guidelines and requirements in this EM&A programme and contract specifications;
- Provide assistance to ET in carrying out relevant environmental monitoring and auditing;
- Participate in the site inspections undertaken by ET as required, and undertake correction actions;
- Provide information / advice to ET regarding works activities which may contribute, or be continuing to the generation of adverse environmental conditions;
- Submit proposals on mitigation measures in case of exceedance of Action and Limit levels in accordance with the Event / Action Plans;
- Implement measures to reduce environmental impacts where Action and Limit levels are exceeded until the events are resolved; and
- Adhere to the procedures for carrying out complaint investigation.

Environmental Team (ET)

1.4.5 The ET Leader and the ET shall be employed by AAHK / PM to conduct the EM&A programme and ensure the Contractor's compliance with the project's environmental performance requirements during construction. The ET Leader or the ET shall be an independent party from the IEC and the Contractor and have relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the AAHK

/ PM and EPD. The ET shall be led and managed by the ET Leader. The ET Leader shall possess at least 7 years' experience in EM&A.

1.4.6 The duties and responsibilities of the ET are:

- Monitor various environmental parameters as required in this EM&A Manual;
- Analyse the environmental monitoring and audit data and review the success of EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
- Carry out regular site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems; carry out ad hoc site inspections if significant environmental problems are identified;
- Prepare monitoring and audit reports on the environmental monitoring data and site environmental conditions;
- Report on the environmental monitoring and audit results to the IEC, Contractor, the AAHK / PM and the EPD or its delegated representative;
- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plan;
- Submit the EM&A report(s) to the AAHK / PM, IEC and EPD timely;
- Advice to the Contractor on environmental improvement, awareness, enhancement matters, etc. on site; and
- Adhere to the procedures for carrying out complaint investigation in accordance with Section 9 of this Manual.

Independent Environmental Checker (IEC)

1.4.7 The IEC shall advise the AAHK / PM on environmental issues related to the Project and shall be empowered to audit from an independent viewpoint the environmental performance during the construction of the Project. The IEC shall be employed by the AAHK / PM prior to the commencement of the construction of the Project. The IEC shall not be in any way an associated body of the Contractor or the ET for the Project. The IEC shall be a person who has relevant professional qualifications in environmental control and at least 7 years' experience in EM&A.

1.4.8 The IEC shall be responsible for the duties defined in this Manual, and shall audit the overall EM&A programme, including the implementation of all environmental mitigation measures, submissions required in this Manual, as well as any other relevant submissions required under the Environmental Permit (EP). The IEC shall be responsible for verifying the environmental acceptability of permanent and temporary works, relevant design plans and submissions under the EP. The IEC shall verify the logbook prepared and kept by the ET Leader. The IEC shall notify EPD by fax, within 24 hours of receipt of notification from the ET Leader of any such instance or circumstance or change of circumstances or non-compliance with the EIA Report or the EP, which might affect the monitoring or control of adverse environmental impact.

1.4.9 The main duties of the IEC are to carry out independent environmental audit of the Project. This shall include, inter alias, the followings:

- Review and audit at not less than monthly intervals in an independent, objective and professional manner in all aspects of the EM&A programme;
- Validate and confirm the accuracy of monitoring results, appropriateness of monitoring equipment, monitoring locations with reference to the locations of the nearby sensitive receivers, and monitoring procedures;

- Carry out random sample check and audit on monitoring data and sampling procedures, etc.;
- Conduct random site inspection (at least once a month);
- Audit the EIA recommendations and EP requirements against the status of implementation of environmental protection measures on site;
- Review the effectiveness of environmental mitigation measures and Project environmental performance;
- On an as needed basis, verify and certify the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plants and submissions under the EP. When necessary, the IEC agree in consultation with the ET Leader and the Contractor the least impact alternative;
- Verify investigation results of complaint cases and the effectiveness of corrective measures;
- Verify EM&A reports submitted and certified by the ET Leader;
- Feedback audit results to AAHK / PM and ET by signing accordingly to the Event / Action Plan specified in the Manual; and
- Report the works conducted, and the findings, recommendations and improvements of the site inspection, after reviewing ET's and Contractor's works, to the AAHK / PM on a monthly basis.

1.5 Structure of the EM&A Manual

1.5.1 Following this introductory section, the remainder of the Manual is set out as follows:

- Section 2 – Sets out EM&A requirement for air quality;
- Section 3 – Sets out EM&A requirement for noise;
- Section 4 – Sets out EM&A requirement for water quality;
- Section 5 – Sets out EM&A requirement for waste management;
- Section 6 – Sets out EM&A requirement for marine ecology;
- Section 7 – Sets out EM&A requirement for landscape and visual impact;
- Section 8 – Sets out EM&A requirement for cultural heritage;
- Section 9 – Describes scope and frequency of environmental site audits and sets out the general requirements of the EM&A programme; and
- Section 10 – Details the EM&A reporting requirements.

2 AIR QUALITY

2.1 Introduction

2.1.1 Potential air quality impacts arising from the construction and operational phases of the Project were addressed in the EIA Report, no adverse air quality impact from the Project would be anticipated with the implementation of dust suppression measures during construction phase and the provision of electric vehicles to provide hassle-free bonded cross-boundary bus trips during operational phase. No specific air quality monitoring is therefore considered necessary for both construction and operational phases of the Project. Nevertheless, regular site environmental audit is recommended to ensure the implementation of the recommended mitigation measures during construction phase.

2.2 Mitigation Measures

2.2.1 Mitigation measures for construction phase air quality impacts have been recommended in the EIA Report. All the recommended mitigation measures are detailed in the implementation schedule in **Appendix B**. The Contractor should be responsible for the design and implementation of the mitigation measures.

2.3 Audit Requirements

2.3.1 Regular site inspection and audit at least once per week should be conducted during the construction phase of the Project to ensure the recommended mitigation measures are properly implemented.

3 NOISE

3.1 Introduction

3.1.1 Potential noise impacts arising from the construction and operational phases of the Project were assessed in the EIA Report. The assessment results indicated that no adverse noise impact generated from the construction and operation of the Project. No specific noise monitoring is therefore considered necessary for both construction and operational phases. Nevertheless, regular site environmental audit is recommended to ensure the implementation of the recommended mitigation measures during construction phase.

3.2 Mitigation Measures

Construction Phase

3.2.1 Since no existing and planned NSRs which rely on opened windows for ventilation is identified within the assessment area, it is predicted that there will be no adverse noise impact generated from the construction and operation of the Project. Nonetheless, good site practice and the noise control requirements stated in EPD's "Recommended Pollution Control Clauses for Construction Contracts" were recommended to minimise the potential noise nuisance during construction phase. Details of the recommended good site practices are presented in **Appendix B**.

3.3 Audit Requirements

3.3.1 Regular site environmental audit at least once per week during the construction phase of the Project should be conducted to ensure good site practices as listed in **Appendix B** and the noise control requirements stated in EPD's "Recommended Pollution Control Clauses for Construction Contracts" are implemented properly to further minimise the potential noise nuisance during construction phase of the Project.

4 WATER QUALITY

4.1 Introduction

4.1.1 Potential water quality impacts arising from the construction and operational phases of the Project were identified and assessed in the EIA Report. No adverse water quality impacts from the Project would be expected during the construction and operational phases of the Project. Nevertheless, water quality monitoring and audit is recommended during construction phase to ensure that all the recommended mitigation measures are properly implemented. No monitoring or audit is required during operational phase.

4.1.2 Details of the water quality monitoring and audit programme and the Event and Action Plan are provided below.

4.2 Construction Phase EM&A

Monitoring Parameters

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

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

Monitoring Schedule and Stations

4.2.3 The proposed water quality monitoring schedule should be submitted to EPD at least two weeks before the first day of the monitoring month. EPD should also be notified immediately for any changes in schedule. The monitoring stations proposed in this section are indicative subject to further review before construction phase. The locations of monitoring stations may change after issuing this Manual. The proposed monitoring locations should be submitted four weeks before commencement of baseline monitoring for EPD approval.

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

- close to the sensitive receptors which are directly or likely to be affected;
- for monitoring locations located in the vicinity of the sensitive receptors, care shall be taken to cause minimal disturbance during monitoring;
- two or more control stations which shall be at representative locations of the Project site in its undisturbed condition. Control stations shall be located, as far as practicable, both upstream and downstream of the works area.

4.2.5 It is proposed to monitor the water quality at three locations in the sea channel between the HKIA and the HKBCF (M1, M2 and M3) and two control stations (C1 and C2). As the water flow direction in the sea channel is dominated by the tidal forcing from the northern entrance of the sea channel, impact stations (M1, M2 and M3) are assigned in the sea channel close to the construction site to measure any elevation of pollutant levels (e.g. SS level) due to the Project. Control stations (C1 and C2) are assigned north of the entrance of the sea channel to compare the water quality from potentially impacted sites with the ambient water quality during monitoring. The proposed marine water quality monitoring stations are listed in **Table 4.1** and its locations are shown in **Appendix C**.

Table 4.1 Proposed Marine Water Quality Monitoring Stations for Baseline and Construction Phase Monitoring

Station	Descriptions	Easting	Northing
M1	Impact Station	812423	819635
M2	Impact Station	812630	820068
M3	Impact Station	812670	820400
C1	Control Station – West	812419	820670
C2	Control Station – East	813072	820595

Monitoring Requirements

4.2.6 Baseline, impact and post-construction monitoring shall be conducted. The following requirements should be followed for baseline, impact and post-construction monitoring.

- Measurement should be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above sea bed, except where the water depth less that 6m, the mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station will be monitored. The ET should agree with EPD on all the monitoring stations.
- Duplicate in-situ measurements and water samples collected from each independent monitoring event are required for all parameters to ensure a robust statistically interpretable dataset.
- No sampling should be carried out when typhoon signal No. 3 or above or black rainstorm signal is hoisted.
- At each measurement depth, two consecutive measurements would be taken. The probes would be retrieved out of the water after the first measurement and then redeployed for the second measurement. When the difference in value between the first and second measurement of on-site parameters is more than 25% of the value of the first reading, the reading shall be discarded and further readings shall be taken.

Baseline Monitoring

4.2.7 Baseline conditions for marine water quality should be established and agreed with EPD prior to the commencement of works. The purpose of the baseline monitoring is to establish ambient conditions prior to the commencement of the marine construction works and to demonstrate the suitability of the proposed monitoring stations. The baseline monitoring report should be submitted to EPD at least 4 weeks before the commencement of marine works for agreement. The baseline monitoring report should be certified by the ET Leader and verified by IEC before submission to EPD.

4.2.8 The baseline conditions should be established by measuring water quality parameters as specified in **Section 4.2.1 and 4.2.2** at the designated monitoring stations as shown in **Table 4.1**. The measurement depths shall follow those specified in **Section 4.2.5**. The measurements should be taken at all designated monitoring stations including control station, 3 days per week, at mid-flood and mid-ebb tides, for at least 4 weeks prior to the commencement of marine works. There should not be any marine construction activities in the vicinity of the stations during the baseline monitoring. The interval between 2 sets of monitoring should not be less than 36 hours.

Impact Monitoring

4.2.9 During the marine construction period of the Bonded Vehicular Bridge, impact monitoring should be undertaken 3 days per week, at mid-flood and mid-ebb tides, with sampling/measurement at all designated monitoring stations including control station as specified in **Table 4.1**. The interval between 2 sets of monitoring should not be less than 36 hours except where there are exceedances of Action and/or Limit levels, in which case

the monitoring frequency will be increased. The monitoring parameters and measurement depths shall follow those specified in **Section 4.2.1, 4.2.2** and **4.2.5**. Duplicate water samples should be taken and analysed.

4.2.10 If the impact monitoring data collected at the monitoring stations (i.e. Stations M1, M2 and M3) indicate that the Action or Limit levels as shown in **Table 4.2** are exceeded, analysis should be conducted to identify whether the exceedance is caused by Project activities. If the data analysis results indicate that the exceedance is caused by this Project, appropriate actions including lowering the working rate, or rescheduling of works should be taken and additional mitigation measures should be implemented as necessary.

Post-Construction Monitoring

4.2.11 Upon completion of all marine works, a post-project monitoring should be carried out for 4 weeks in the same manner as the impact monitoring.

Construction Site Audits

4.2.12 Implementation of regular site audits is to ensure that the recommended mitigation measures are to be properly undertaken during construction phase of the Project. It can also provide an effective control of any malpractices and therefore achieve continual improvement of environmental performance on site.

4.2.13 Site audits should include site inspections and compliance audits.

Site Inspections

4.2.14 Site inspections should be carried out by the ET and should be based on the mitigation measures for water pollution control recommended in **Appendix B**. In the event that the recommended mitigation measures are not fully or properly implemented, deficiency should be recorded and reported to the site management. Suitable actions are to be carried out to:

- investigate the problems and the causes;
- issue action notes to the Contractor which is responsible for the works;
- implement remedial and corrective actions immediately;
- re-inspect the site conditions upon completion of the remedial and corrective actions; and
- record the event and discuss with the Contractor for preventive actions.

Compliance Audits

4.2.15 Monitoring of the treated effluent quality from the Project site is required during the construction phase of the Project. The monitoring should be carried out at the pre-determined discharge point. Compliance audits are to be undertaken to ensure that a valid discharge licence has been issued by EPD prior to the discharge of effluent from the Project site. The monitoring frequency and parameters specified in the discharge licence under WPCO should be fully considered during the monitoring.

4.2.16 The implementation schedule for the recommended water quality mitigation measures is presented in **Appendix B**.

Monitoring Equipment

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

Monitoring Position Equipment

4.2.18 A hand-held or boat-fixed type digital Differential Global Positioning System (DGPS) with way point bearing indication or other equipment instrument of similar accuracy, should be provided and used during water quality monitoring to ensure the monitoring vessel is at the correct location before taking measurements. DGPS or the equivalent instrument, calibrated at appropriate checkpoint (e.g. Quarry Bay Survey Nail at Easting 840683.49, Northing 816709.55) should be provided and used to ensure the monitoring station is at the correct position before taking measurement and water samples.

Sampler

4.2.19 A water sampler is required. It should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (for example, Kahlsico Water Sampler or an approved similar instrument).

Water Depth Detector

4.2.20 A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. This unit can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

Dissolved Oxygen and Temperature Measuring Instrument

4.2.21 The instrument should be a portable and weatherproof DO measuring instrument complete with cable and sensor, and use a DC power source. The equipment should be capable of measuring:

- a DO-level in the range of 0 - 20 mg/L and 0 - 200% saturation; and
- a temperature of 0 - 45 degree Celsius with a capability of measuring to ±0.1 degree Celsius.

4.2.22 It should have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables 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).

4.2.23 Should salinity compensation not be built-in to the DO equipment, *in-situ* salinity should be measured to calibrate the DO equipment prior to each DO measurement.

Turbidity Measuring Instrument

4.2.24 Turbidity should be measured in-situ by the nephelometric method. The instrument should be portable and weatherproof using a DC power source complete with cable, sensor and comprehensive operation manuals. It should have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU (for example, Hach model 2100P or an approved similar instrument). The cable should not be less than 25m in length. The meter should be calibrated in order to establish the relationship between NTU units and the levels of suspended solids. The turbidity measurement should be carried out on split water sample collected from the same depths of suspended solids samples.

Salinity Measuring Equipment

4.2.25 A portable salinometer capable of measuring salinity in the range of 0 - 40 parts per thousand (ppt) should be provided for measuring salinity of the water at each monitoring location.

pH Measuring Equipment

4.2.26 The instrument shall consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It shall be readable to 0.1 pH in a range of 0 to 14. Standard buffer solutions of at least pH 7 and pH 10 shall be used for calibration of the instrument before and after use. Details of the method shall comply with APHA, 19th Edition 4500-HTB.

Sample Containers and Storage

4.2.27 Water samples for SS determination should be stored in suitable containers with no preservative added, packed in ice (cooled to 4℃ without being frozen) and delivered to the laboratory and analysed as soon as possible after collection. Sufficient volume of samples should be collected to achieve the detection limit.

Calibration of *in-situ* Instruments

4.2.28 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 three monthly intervals throughout all stages of the water quality monitoring programme. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter should be carried out before measurement at each monitoring location.

4.2.29 For the on-site calibration of field equipment, the BS 127:1993, Guide to Field and On-Site Test Methods for the Analysis of Water should be observed.

4.2.30 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 some equipment is under maintenance, calibration, etc.

Field Log

4.2.31 A sample data record sheet is shown in **Appendix D** for reference.

Laboratory Measurement / Analysis

4.2.32 Analysis of SS level should be carried out in a HOKLAS (or other international accredited laboratory that is HOKLAS-equivalent). Sufficient water samples of not less than 2 litres should be collected at the monitoring stations for carrying out the laboratory SS determination. All samples should be assigned a unique code and accompanied by Chain of Custody (COC) sheets.

4.2.33 The SS determination work should start within 24 hours after collection of the water samples. The SS analyses should follow the standard method APHA 2540D with a detection limit of 1 mg/L as described in APHA Standard Methods for the Examination of Water and Wastewater, 21st Edition, unless otherwise specified.

4.2.34 Detailed testing methods, 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 should be submitted to EPD for approval prior to the commencement of monitoring programme. EPD may also

request the laboratory to carry out analysis of known standards provided by EPD for quality assurance. The testing methods and related proposal should be checked and certified by IEC before submission to EPD for approval.

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

Event and Action Plan

4.2.36 The Action and Limit (AL) Levels for water quality are defined in **Table 4.2**. The actions in accordance with the Event and Action Plan in **Table 4.3** should be carried out if the defined Action and/or Limit levels for water quality are exceeded at any designated monitoring points.

Table 4.2 Action and Limit Levels for Marine Water Quality

Parameters	Action Level	Limit Level
DO in mg/L	Surface and Middle 5 percentile of baseline data Bottom 5 percentile of baseline data	Surface and Middle 4 mg/L, or 1 percentile of baseline data Bottom 2 mg/L, or 1 percentile of baseline data
SS in mg/L	Depth Average 95 percentile of baseline data and 120% of upstream control station at the same tide of the same day	Depth Average 99 percentile of baseline data and 130% of upstream control station at the same tide of the same day
Turbidity in NTU	Depth Average 95 percentile of baseline data and 120% of upstream control station at the same tide of the same day	Depth Average 99 percentile of baseline data and 130% of upstream control station at the same tide of the same day

Note:
1. "Depth Average" is calculated by taking the arithmetic means of reading of all sampling depths.
2. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
3. For turbidity and SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
4. All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.

Table 4.3 Event and Action Plan for Marine Water Quality

Event	Action			
	ET	IEC	AAHK / PM	Contractor
Action level being exceeded by one sampling day	1. Repeat *in-situ* measurement to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC and Contractor; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC and Contractor; 6. Repeat measurement on next day of exceedance.	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise AAHK / PM accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented; 3. Assess the effectiveness of the implemented mitigation measures.	1. Inform the AAHK / PM and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with ET and IEC and propose mitigation measures.
Action level being exceeded by two or more consecutive sampling days	1. Repeat *in-situ* measurement to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC and Contractor; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC and Contractor; 6. Ensure mitigation measures are implemented; 7. Prepare to increase the monitoring frequency to daily; 8. Repeat measurement on next day of exceedance.	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the AAHK / PM accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented; 3. Assess the effectiveness of the implemented mitigation measures.	1. Inform the AAHK / PM and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment 4. Consider changes of working methods; 5. Discuss with ET and IEC and propose mitigation measures to IEC and AAHK / PM within 3 working days; 6. Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	1. Repeat *in-situ* measurement to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, AAHK / PM and Contractor; 6. Ensure mitigation	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the AAHK / PM accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with IEC, ET and Contractor on the proposed mitigation measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures.	1. Inform the AAHK / PM and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with ET, IEC and AAHK / PM and propose mitigation measures to IEC and AAHK / PM within three working days; 6. Implement the agreed

Event	Action			
	ET	IEC	AAHK / PM	Contractor
	measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of limit level.			mitigation measures.
Limit level being exceeded by two or more consecutive sampling days	1. Repeat *in-situ* measurement to confirm findings; 2. Identify reasons for non-compliance and source(s) of impact; 3. Inform IEC, Contractor and EPD; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with IEC, AAHK / PM and Contractor; 6. Ensure mitigation measures are implemented; 7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by Contractor and advise the AAHK / PM accordingly; 3. Assess the effectiveness of implemented mitigation measures.	1. Discuss with IEC, ET and Contractor on the proposed mitigation measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures; 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level.	1. Inform AAHK / PM and confirm notification of non-compliance in writing; 2. Rectify unacceptable practices; 3. Check all plant and equipment; 4. Consider changes of working method; 5. Discuss with ET, IEC and AAHK / PM and propose mitigation measures to IEC and AAHK / PM within 3 working days; 6. Implement the agreed mitigation measures; 7. As directed by the AAHK / PM, to slow down or to stop all or part of the construction activities.

4.3 Mitigation Measures

4.3.1 Mitigation measures for construction phase water quality impacts have been recommended in the EIA Report. All the recommended mitigation measures are detailed in the implementation schedule in **Appendix B**. The Contractor should be responsible for the design and implementation of the mitigation measures.

4.4 Audit Requirements

4.4.1 Regular site inspection and audit at least once per week should be conducted during the construction phase of the Project to ensure the recommended mitigation measures are properly implemented.

5 WASTE MANAGEMENT IMPLICATION

5.1 Introduction

5.1.1 Potential waste management implication arising from the construction and operational phases of the Project were addressed in the EIA Report. Waste management during the construction phase will mainly be the responsibility of the Contractor, who should implement the mitigation measures recommended in the EIA report in order to minimise waste or resolve the issues associated with the management of wastes. The Contractor should also ensure that all wastes produced during the construction phase are handled, stored and disposed of in accordance with good waste management practices, relevant legislation and waste management guidelines. Adverse environmental impacts would not be expected.

5.2 Mitigation Measures

5.2.1 With the proper handling, storage and disposal of wastes arising from the construction of the Project, it is anticipated that the potential adverse environmental impacts would be avoided or minimised. During site inspections, the PM and ET should pay special attention to the issues relating to the waste management and check whether the Contractor has implemented the recommended good site practices and other mitigation measures as listed in **Appendix B**. The Contractor should submit a Waste Management Plan (WMP) prior to the commencement of construction work, in accordance with PNAP No. 243 (ADV-19) so as to provide an overall framework of Waste Management and Reduction.

5.3 Audit Requirements

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

5.3.2 During operational phase, only limited amount of wastes would be generated and no adverse waste impact would be anticipated with the implementation of the good waste management practices. No monitoring or audit is required during operational phase.

6 MARINE ECOLOGY

6.1 Introduction

6.1.1 Potential ecological impacts arising from the construction and operational phases of the Project were assessed in the EIA Report. Mitigation and precautionary measures have been recommended to further minimise potential direct and indirect impacts to ecological resources. With the implementation of appropriate marine ecological measures, no unacceptable marine ecological impact would be anticipated.

6.2 Mitigation Measures and Precautionary Measures

6.2.1 The recommended mitigation measures for alleviating marine ecological impacts arising from construction works include vessel speed limit control on all construction-related vessels and the implementation of good site practices and water quality measures to minimise disturbance to marine fauna near works area, as listed in **Appendix B**. Indirect disturbance to marine habitats and fauna during operation phase will be minimal under the establishment of a proper surface water drainage system to collect road runoff**.**

6.2.2 Coral translocation is recommended as a precautionary measure to further reduce the direct impact on the 23 coral colonies recorded at REA2 near the bridge foundation works.

6.3 Monitoring and Audit Requirements

6.3.1 There will be a water quality monitoring programme during the construction phase of the project to ensure that all the recommended water quality measures and best management practices are properly implemented. Details are discussed in **Section 4** of this Manual.

6.3.2 All marine species of conservation importance (e.g. hard coral *Oulastrea crispata*) should be protected as far as practicable. Twenty three gorgonian coral colonies (*Guaiagorgia* sp.) recorded in Rapid Ecological Assessment (REA) transect REA 2 should be translocated to nearby suitable habitat(s) as a precautionary measure. A detailed Coral Translocation Proposal, including description of methodology (e.g. pre-translocation survey, identification/ proposal of coral recipient site(s)) and post-translocation monitoring programme, should be prepared and subject to agreement with the authority before commencement of the coral translocation. All the precautionary pre-translocation survey, translocation exercises and precautionary post-translocation monitoring should be conducted by experienced marine ecologist(s) with at least 5 years relevant experience.

6.3.3 A speed limit of 10 knots should be strictly enforced on all construction-related vessels based upon a precautionary approach to avoid vessel collision to Chinese White Dolphins.

6.3.4 Precautionary post-translocation coral monitoring surveys would be conducted on translocated corals. The results of the post-translocation monitoring should be reviewed with reference to findings of the pre-translocation survey and the data from original colonies at the recipient site.

7 LANDSCAPE AND VISUAL IMPACT

7.1 Introduction

7.1.1 Potential landscape and visual impacts arising from the construction and operational phases of the Project were assessed and landscape and visual mitigation measures were recommended in the EIA Report. This section defines the audit requirements to confirm the recommended landscape and visual impact mitigation measures in the EIA Report are effectively implemented.

7.2 Baseline Monitoring

7.2.1 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 by the PM. The approved photographic record shall be submitted to the AAHK / PM, ET, IEC and EPD for record.

7.3 Mitigation Measures

7.3.1 The landscape and visual mitigation measures should be incorporated in the detailed design. The mitigation measures during construction and operation phases as recommended in the EIA Report are presented in **Appendix B**. Where feasible, the construction phase mitigation measures should be implemented as early as possible in order to minimise the landscape impacts in the construction stage while the mitigation measures for the operation phase should be adopted during the detailed design and be built as part of the construction works so that they are in place before commissioning of the Project.

7.3.2 Any potential conflicts among the proposed mitigation measures, the Project works and operational requirement should also be identified and resolved as early as practicable. Any changes to the mitigation measures should be incorporated in the detailed design.

7.4 Audit Requirements

7.4.1 Site audits should be undertaken during the construction phase of the Project to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives. Site inspections should be undertaken by the ET at least once every month during the construction period.

8 IMPACT ON CULTURAL HERITAGE

8.1 Introduction

8.1.1 Given no cultural heritage resource is identified within the works area, no impact is anticipated to cultural heritage resource during construction and operational phases of the Project. Therefore, no monitoring and audit programme on cultural heritage would be required.

9 SITE INSPECTION / AUDIT

9.1 Site Inspection Requirements

9.1.1 Site inspections/audits provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They shall be undertaken routinely, at least once per week, to inspect/audit the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. With reference to the Project's contractual environmental requirements, pollution control and mitigation specifications and a well-established site inspection/audit, deficiency and action reporting system in accordance with the event contingency plan of the EM&A programme, the site inspection/audit would be one of the most effective tools used to enforce the environmental protection requirements on the construction site. A site inspection/audit checklist, to be used for undertaking site inspection/audit, will be prepared by the ET and submitted to the IEC for agreement, and to the AAHK / PM for approval.

9.1.2 The ET is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspection works. The proposal for rectification, if any, should be prepared by the Contractor and submitted to the ET Leader and IEC.

9.1.3 Regular site inspections shall be carried out at least once per week and led by the AAHK / PM and attended by the ET and Contractor during construction phase. All observations and results will be recorded in the data record sheets, which will pass to the Contractor. If non-compliance is found on site, the Event / Action Plan will be implemented.

9.1.4 The areas of inspection shall not be limited to the environmental condition, pollution control and mitigation measures within the site, it should also review the environmental condition outside the site area which is likely to be affected, directly or indirectly, by the site activities. During inspection, the ET shall make reference to the following information in conducting the inspection/audit.

- The EIA Report and EM&A recommendations on environmental protection and pollution control mitigation measures;
- The requirements of the EM&A Manual and conditions of the Environmental Permit;
- Works progress and programme;
- On-going results of the EM&A programme;
- Individual works methodology proposals (which shall include proposal on associated pollution control measures);
- The contract specifications on environmental protection;
- The relevant environmental protection and pollution control laws; and
- Previous site inspection/audit results undertaken by the ET and others.

9.1.5 The Contractor shall keep to update the AAHK / PM and ET Leader with all relevant environmental information of the construction contract for him to carry out the site inspections. The site inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be recorded by the Contractor and submitted to the ET and AAHK / PM within 24 hours, for reference and for taking immediate action in an agreed time-frame. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection/audit, deficiency and action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections/audits. Weekly site inspection should be carried out to check the implementation status of the recommended environmental mitigation measures throughout construction period.

9.1.6 The AAHK / PM, ET and Contractor should 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 Event and Action Plan for EM&A programme.

9.2 Compliance with Legal and Contractual Requirements

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

9.2.2 In order that the works are in compliance with the contractual and statutory requirements, all the works method statements should be submitted by the Contractor to the AAHK / PM for approval and to the ET Leader of vetting to see whether sufficient environmental protection and pollution control measures have been included.

9.2.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated and that the any foreseeable potential for violating the laws can be prevented.

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

9.2.5 After reviewing the documentation, the ET Leader shall advise the AAHK / PM and the Contractor of any non-compliance with the contractual and statutory requirements on environmental protection and pollution control for them to take follow-up actions as appropriate. 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 follow-up actions may still result in potential violation of environmental protection and pollution control requirements, the ET should provide further advice to the Contractor to take remedial action to resolve the problem.

9.2.6 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ET shall follow up to ensure that appropriate action has been taken by the Contractor in order to fulfil the contractual and statutory requirements.

9.3 Environmental Complaints

9.3.1 Complaints shall be referred to the ET Leader for carrying out complaint investigation procedures. The following procedures shall be undertaken upon receipt of the any environmental complaints:

- The ET Leader to log complaint and date of receipt onto the complaint database and inform the IEC and AAHK / PM immediately;
- The ET Leader to investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
- The ET Leader to identify remedial measures in consultation with the IEC and AAHK / PM if a complaint is valid and due to construction works of Project;
- The Contractor to implement the remedial measures as identified by ET Leader and agreed with IEC and AAHK / PM. Any additional monitoring frequency and stations, where necessary, for checking the effectiveness of the remedial measures should be proposed by ET Leader and agreed with IEC and AAHK / PM;
- The ET and IEC to review the effectiveness of the Contractor’s remedial measures and the updated situation;

- The ET/Contractor to undertake additional monitoring and audit to verify the situation if necessary, and oversee that circumstance leading to the complaint do not recur;
- If the complaint is a referral from EPD, the ET Leader to prepare interim report on status of the complaint investigation and follow-up action stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, after endorsement by IEC and AAHK / PM, for submission to EPD within the time frame assigned by EPD;
- The ET undertake additional monitoring and audit to verify the situation if necessary, and review that any valid reason for complaint does not recur;
- The ET report the investigation results and the subsequent actions to the source of complaint for responding to complainant (If the source of complain is a referral from EPD, the result should be reported within the time frame assigned by the EPD); and
- The ET record the details of the complaint, results of the investigation, subsequent actions taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports. (If the source of complain is a referral from EPD, the result should be reported within the time frame assigned by the EPD).

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

10 REPORTING

10.1 Introduction

10.1.1 The types of reports that the ET Leader should prepare and submit including Baseline Environmental Monitoring Report, Monthly EM&A Reports and Final EM&A Review Report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final review EM&A reports should be submitted to the EPD. The exact details of the frequency, distribution and time frame for submission should be agreed with the IEC, AAHK / PM and EPD prior to commencement of works.

10.1.2 Reports can be provided in an electronic medium upon agreeing the format with the AAHK / PM and EPD. All monitoring data (baseline and impact) should be submitted in electronic medium.

10.2 Baseline Environmental Monitoring Report

10.2.1 The ET should prepare and submit a Baseline Environmental Monitoring Report at least one month before commencement of construction works. Copies of the Baseline Environmental Monitoring Report should be submitted to the IEC, AAHK / PM and EPD. The ET should liaise with the relevant parties on the exact number of copies of copies require.

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

(i) Up to half a page of executive summary:

(ii) Brief description of project background information;

(iii) Drawings showing locations of the baseline monitoring stations;

(iv) Monitoring results (in both hard and soft copies) together with the following information:

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

(v) Details of influencing factor, including:

- Major activities, if any, being carried out on the Project site during the period
- Weather conditions during the period
- Other factors which might affect the monitoring results

(vi) Determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data;

(vii) Revisions for inclusion in the EM&A Manual; and

(viii) Comments and conclusions.

10.3 Monthly EM&A Reports

10.3.1 The results and finding of all EM&A works required in the Manual should be recorded in the monthly EM&A reports prepared by the ET and endorsed by the IEC. The first Monthly EM&A Report should be prepared and submitted to EPD in the month after the major construction works commence with the subsequently Monthly Reports due in 10 working days of the end of each reporting month. Copies of each monthly EM&A report shall be submitted to the parties: Contractor, IEC, AAHK / PM and EPD. Before submission of the first monthly EM&A Report, the ET shall liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium.

10.3.2 The first monthly EM&A Report shall be included at least the following:

(i) 1-2 pages executive summary:

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

(ii) Basic project information:

- Project organization including key personnel contact names and telephone numbers;
- Construction programme;
- Management structure; and
- Works undertaken during the reporting month.

(iii) Environmental status:

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

(iv) Summary of EM&A requirement:

- All monitoring parameters;
- Environmental quality performance limits (Action and Limit Levels);
- Event and Action Plan;
- Environmental mitigation measures as recommended in the EIA Report; and
- Environmental requirements in contract documents.

(v) Implementation Status:

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

(vi) Monitoring results (in both hard and electronic copies) together the following information:

- Monitoring methodology;

- Name of laboratory and types of equipment used and calibration details;
- Monitoring parameters;
- Monitoring locations (and depth); and
- Monitoring date, time, frequency and duration.

(vii) Graphical plots of monitored trends over the past four reporting periods and the following information:

- Major activities being carried out on site during the period;
- Weather condition during the period; and
- Other factor which might affect the monitoring results.

(viii) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:

- Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- Record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- Review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(ix) Others

- An account of the future key issues as reviewed from the works programme and work method statements;
- Advice on the solid and liquid waste management status;
- Record of any project changes from the originally proposed as described in the EIA Report (e.g. construction methods, mitigation proposals, design changes, etc.); and
- Comments (for example, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions.

10.3.3 The subsequent Monthly EM&A Reports shall include at least the following:

(i) 1-2 pages executive summary;

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

(ii) Basic project information:

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

(iii) Environmental Status

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

(iv) Implementation status

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

(v) Monitoring results (in both hard and soft copies) together with the following information:

- Monitoring methodology;
- Name of laboratory and types of equipment used and calibration details;
- Monitoring parameters;
- Monitoring locations;
- Monitoring date, time, frequency, and duration;
- Weather conditions during the period;
- Any other factors which might affect the monitoring results; and
- QA / QC results and detection limits.

(vi) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:

- Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- Record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- Review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(vii) Others

- An account of the future key issues as reviewed from the works programme and work method statements;
- Advice on the solid and liquid waste management status;
- Record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.); and
- Comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions.

(viii) Appendices

- Action and Limit levels;
- Graphical plots of trends of the monitoring parameters at key stations over the past four reporting periods 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 that might affect the monitoring results.
- Monitoring schedule for the present and next reporting period;
- Cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- Outstanding issues and deficiencies.

10.4 Final EM&A Review Report

10.4.1 The EM&A programme for construction stage should be terminated upon the completion of the construction activities, and / or the completion of post-construction monitoring requirements.

10.4.2 The proposed termination should only be implemented after the proposal has been endorsed by the IEC and AAHK / PM followed by final approval from the Director of Environmental Protection.

10.4.3 The ET Leader should prepare and submit the Final EM&A Review Report should contain at least the following information:

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

(ii) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

(iii) Basic project information including a synopsis of the project organization, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;

(iv) A brief summary of EM&A requirements including:

- Environmental mitigation measures for construction stage, as recommended in the project EIA Report;
- Environmental impact hypotheses tested;
- Environmental quality performance limits (Action and Limit levels);
- All monitoring parameters; and

- Event and Action Plan.

(v) A summary of the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report, summarised in the updated implementation schedule;

(vi) Graphical plots and the statistical analysis of the trends of monitoring parameters over the course of the Project, including the post-project monitoring for all monitoring stations annotated against:

- The major activities being carried out on site during the reporting period;
- Weather conditions during the reporting period; and
- Any other factors which might affect the monitoring results;

(vii) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

(viii) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;

(ix) A description of the actions taken in the event of non-compliance;

(x) A summary record of all complaints received, liaison and consultation undertaken, actions and follow-up procedures taken;

(xi) A review of the validity of EIA predictions and identification of shortcomings of the recommendations proposed in EIA Report;

(xii) Comments (for example, a review of the effectiveness and efficiency of the mitigation measures, the performance of the environmental management system, and the overall EM&A programme); and

(xiii) Recommendations and conclusions (for example, a review of success of the overall EM&A programme to cost-effectively identify deterioration and to initiate prompt effective mitigation action when necessary).

10.5 Data Keeping

10.5.1 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms etc.) are required to be included in the EM&A reporting documents. However, any such documents should be properly maintained by the ET and be ready for inspection upon request. All relevant information should be recorded in electronic format, and the software copy must be available upon request. All document and data should be kept for at least one year after completion of the construction contract.

10.6 Interim Notifications of Environmental Quality Limit Exceedances

10.6.1 With reference to the Event and Action Plan, when the environmental quality performance limits are exceeded and if they are proven to be valid, the ET should immediately notify the IEC, AAHK / PM and EPD, as appropriate. The notification should be followed up with advice to the IEC, AAHK / PM and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notification is presented in **Appendix E**.