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Development of the Loop: Eastern Connection Road – Investigation, Design and Construction

Environmental Monitoring and Audit Manual

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1. INTRODUCTION

1.1 Background

- 1.1.1 The development of the Loop was one of the ten major infrastructure projects for economic growth in Hong Kong announced in the 2007-08 Policy Address. In March 2008, the “Hong Kong-Shenzhen Joint Task Force on Boundary District Development” under the “Hong Kong/Shenzhen Co-operation Meeting” agreed to conduct a joint comprehensive study on the development of the Loop. A Planning and Engineering Study jointly undertaken by the HKSAR Government and Shenzhen Municipal People’s Government (SZMG) commenced in 2009 and completed in 2013.
- 1.1.2 In January 2017, the “Memorandum of Understanding on Jointly Developing the Loop by Hong Kong and Shenzhen” (the MOU) was signed by the HKSAR Government and the SZMG, agreeing to jointly develop the Loop as the Hong Kong-Shenzhen Innovation and Technology Park (the Park), setting up a key base for scientific research, as well as relevant higher education, cultural and creative industries and other complementary facilities.
- 1.1.3 According to the MOU, the HKSAR Government is responsible for the construction of the infrastructure within the Loop (including site formation and infrastructural facilities) and the provision of supporting infrastructural facilities outside the Loop which are necessary to the development of the Loop and its surrounding areas. The Park will be developed in two phases. On 8 January 2021, the Finance Committee of the Legislative Council approved funding for Public Works Programme Item No. 7856CL “Development of the Loop – Main Works Package 1 (MWP1) – site formation and infrastructure works”. The site formation and construction of infrastructure works under MWP1 commenced in July 2021. The first batch of land parcels for building works of the Park was handed over to the Hong Kong Shenzhen Innovation and Technology Park Limited (HSITPL) in December 2021.
- 1.1.4 MWP1 covered the site formation and infrastructure works for substantial part of the Loop, including site formation for the entire Park, major carriageways/footpaths/cycle tracks within the Park and those connecting to the areas on the west and southwest, etc. The project of Development of the Loop – Main Works Package 2 is needed for the provision of the remaining infrastructure and facilities to support Phase 2 development of the Park and strengthening the external transport link of the Park.
- 1.1.5 The Central Government promulgated in August 2023 the “Development Plan for Shenzhen Park of Hetao Shenzhen-Hong Kong Science and Technology Innovation Co-operation Zone”, setting out the development positioning of the Shenzhen Park. The Chief Executive has set out in the 2023 Policy Address that the HKSAR Government will render its full support and work with the Shenzhen Municipal Government to foster the synergistic development of the Hong Kong Park (i.e. the Park hereinbefore) and the Shenzhen Park. The Hong Kong Park will be developed in two phases from west to east. The preliminary planning for its first phase has been completed. The HSITPL will commence relevant planning works of the Phase 2 development.
- 1.1.6 To strengthen the external transport links of the Park, it is proposed to construct a link road between the eastern part of the Park and the Kwu Tung North New Development Area (KTN NDA) via the Ma Tso Lung area. The Project is also considered necessary for supporting Phase 2 development of the Park from traffic point of view.

- 1.1.7 In 2023, AECOM Asia Company Limited (AECOM) was commissioned by Civil Engineering and Development Department (CEDD) to undertake the assignment of Agreement No. CE35/2023 (HY) Development of the Loop: East Connection Road – Investigation, Design and Construction (hereafter called “the Project”).
- 1.1.8 The Project comprises the following which are classified as Designated Project (DP) elements under Part I, Schedule 2 of the EIAO. The DPs elements of this Project is summarised in **Table 1.1**.

Table 1.1 Schedule 2 Designated Projects in this Project

| Schedule 2 Designated Project | | Designated Project Element under this Project |
|-------------------------------|---|--|
| Item A.9 | A carriageway for motor vehicles fully enclosed by decking above and by structure on the sides for more than 100 m. | The road sections under this Project comprises of construction of an underpass carriageway of about 800m. |
| Item I.1 | A drainage channel or river training and diversion works located less than 300 m from the nearest boundary of an existing or planned conservation area. | The construction of underpass will require 50% flow contraction by cofferdams. Treated runoff or diverted runoff will be discharged to the Meander (i.e. the old Shenzhen river section) which is less than 300m from the nearest boundary of the “Conservation Area” under the Approved Lok Ma Chau Loop OZP No. S/LMCL/2, Approved Ma Tso Lung and Hoo Hok Wai OZP No. S/NE-MTL/3 and the Approved San Tin Technopole OZP No. S/STT/2. |
| Item Q.1 | Earthworks, dredging works and other building works partly or wholly in an existing conservation area | The part of the alignment under this Project, involving earthworks for the construction of the ECR (e.g. earthworks for construction of underpass and formation of slopes), will be within the “Conservation Area” under the Approved Lok Ma Chau Loop OZP No. S/LMCL/2, Approved Ma Tso Lung and Hoo Hok Wai OZP No. S/NE-MTL/3 and the Approved San Tin Technopole OZP No. S/STT/2. |

1.2 Location and Scope of the Project

- 1.2.1 The location and scope of the Project is shown in **60722948/A10/EM&A/FIGURE 1.1**. The EIA study covers a section within the Loop, a section near Ping Hang, Horn Hill and Tse Koo Hang, and a section at the north and at the south of Shun Yee San Tsuen at Ma Tso Lung.
- 1.2.2 The scope of the Project comprises the construction of connection roads (in form of at-grade road, depressed road, underpass and viaduct) connecting the eastern part of the Loop to KTN NDA via Ma Tso Lung Area, and provision of associated environmental

mitigation works, noise mitigation, landscape and other ancillary works. The details are as follows:-

- (a) Construction of single 4-lane two-way carriageway, in form of at-grade road, depressed road, underpass and viaduct, of a total length of approximately 2.5 km;
- (b) Provision of E&M plant room and drainage pumping room to support the operation of depressed road and underpass;
- (c) Modification of existing Border Road; and
- (d) Associated street furniture, traffic aids, drainage, water, utilities, lightings, electrical and mechanical works, slopes, retaining walls and landscaping works.

1.3 Construction Programme

1.3.1 The construction works of the Project will tentatively commence in Q1 / Q2 2027 and tentatively completed by Q4 2031.

1.4 Purpose of this Manual

1.4.1 The purpose of this Environment Monitoring and Audit (EM&A) Manual is to guide the setups of an EM&A programme to ensure compliance with the EIA study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify and further need for additional mitigation measures of remedial action. This Manual outlines the monitoring and audit programme for the construction and operation phases of the Project. It aims to provide systematic procedures for monitoring, auditing and minimising environmental impacts associated with construction works and operational activities.

1.4.2 Hong Kong environmental regulations have served as environmental standards and guidelines in the preparation of the Manual. In addition, the EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the EIAO-TM.

1.4.3 This Manual contains the following information:

- Responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), Environmental Team (ET) and Independent Environment Checker (IEC) with respect to the environmental monitoring and audit requirements during the course of the Project;
- Project organisation for 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;

- The rationale on which the environmental monitoring data will be evaluated and interpreted;
- Definition of Action and Limit levels;
- Establishment of Event and Action plans;
- Requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints;
- Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures; and
- Requirements for review of EIA predictions and the effectiveness of the mitigation measures / environmental management systems and the EM&A programme.

1.4.4 For the purpose of this manual, the ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the EM&A requirements.

1.4.5 This Manual is a dynamic document that should be reviewed regularly and updated as necessary during the construction and operational of the Project. The Contractor should regularly review the mitigation measures and project implementation schedule in **Appendix B** with respect to the design developments and construction methodology.

1.5 Project Organisation

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

Engineer or Engineer's Representative (ER)

1.5.2 The ER is responsible for overseeing the construction works and for ensuring that the works undertaken by the Contractor in accordance with the specification and contractual requirements. The duties and responsibilities of the Engineer with respect to EM&A may include:

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- Participate in joint site inspection undertaken by the ET; and
- Adhere to the procedures for carrying out complaint investigation.
- The Engineer may delegate some of his power to the ER, who is his representative on site, in order to meet the site supervision needs.

The Contractor

1.5.3 The Contractor shall report to the ER. The duties and responsibilities of the Contractor are:

- Work within the scope of the contract and other tender conditions with respect to 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 monitoring and auditing;
- Provide information / advice to ET regarding works activities which may contribute, or be continuing to the generation of adverse environmental condition(s);
- Submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event and Action Plans;
- Implement measures to reduce impact where Action and Limit levels are exceeded until the events are resolved;
- Implement the corrective actions instructed by the ER;
- Accompany joint site inspection undertaken by the ET; and
- Adhere to the procedures for carrying out complaint investigation.

Environmental Team (ET)

1.5.4 The ET Leader and the ET shall be employed to conduct the EM&A programme and ensure the Contractor's compliance with the project's environmental performance requirements during construction. The ET Leader shall be an independent party from the Contractor and have relevant professional qualifications or have sufficient relevant EM&A experience subject to approval of the ER and the Environmental Protection Department (EPD). The ET shall be led and managed by the ET leader. The ET leader shall possess at least 7 years of experience in EM&A and/or environmental management.

1.5.5 The duties and responsibilities of the ET are:

- Monitor various environmental parameters as required in this EM&A Manual;
- Analyse the EM&A 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;

- Audit and 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 ER and 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 Plans;
- Advice to the Contractor on environmental improvement, awareness, enhancement matters, etc. on site;
- Timely submission of the EM&A report to the Project Proponent and the EPD; and
- Adhere to the procedures for carrying out complaint investigation in accordance with Section 15 of this Manual.

Independent Environmental Checker (IEC)

1.5.6 The IEC shall be an independent party from the Contractor and the Environmental Team and possess at least 7 years' experience in EM&A and/or environmental management.

1.5.7 The duties and responsibilities of the IEC are:

- Review the EM&A works performed by the ET (at least at monthly intervals);
- Carry out random sample check and audit the monitoring activities and results (at least at monthly intervals);
- Conduct random site inspection;
- Review the EM&A reports submitted by the ET;
- Review the effectiveness of environmental mitigation measures and project environmental performance;
- Review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
- Check the mitigation measures that have been recommended in the EIA and this Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- Adhere to the procedures for carrying out complaint investigation.

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

2. AIR QUALITY IMPACT

2.1 Introduction

- 2.1.1 Potential air quality impacts arising from the construction and operation phases of the Project on air sensitive receivers (ASRs) were addressed in the EIA Report. With implementation of the recommend control measures specified in the *Air Pollution Control (Construction Dust) Regulation* and the *Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation* together with the recommended control measures and good site practices, no adverse air quality impact and odour impact from the project during construction phase would be anticipated. Nonetheless, monitoring and audit programme for the construction phase air quality impacts should be conducted to check compliance with the legislative requirements and ensure the proper implementation of the air quality control measures. Implementation schedule of mitigation measures is presented in **Appendix B**.
- 2.1.2 No adverse air quality impact was predicted during the operation phase of the Project, thus mitigation measure is deemed not necessary. No EM&A requirement is considered necessary during the operational phase.
- 2.1.3 This section presents the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of air quality impact during the construction phase of the Project.

2.2 Monitoring Parameters

- 2.2.1 For regulatory purpose, the concentration of particulate matters including 24-hour average Respirable Suspended Particulates (RSP) concentrations and 24-hour average Fine Suspended Particulate (FSP) concentrations are recommended to be monitored and audited at the proposed monitoring locations during the construction phase. To ensure that any deteriorating air quality could be readily detected and timely action could be undertaken, 1-hour average RSP concentrations should also be monitored at the proposed monitoring locations during the construction phase.
- 2.2.2 Monitoring and audit of the abovementioned RSP and FSP concentrations shall be carried out by the ET. Should any deteriorating air quality be detected, timely action shall be undertaken to rectify such situation.

2.3 Monitoring Equipment

- 2.3.1 The abovementioned parameters should be monitored continuously by air sensor at monitoring stations specified in the following section. The air sensor to be employed should meet the purpose of the monitoring which is 1-hour RSP, 24-hour RSP and 24-hour FSP concentrations in the ambient air. The air sensor should have a resolution of at least $1 \mu\text{g}/\text{m}^3$, an accuracy of $\pm 10\%$ to standard particles, equipped with a shelter to protect the sensor and capable of operating continuously for a 7 days period. It should be capable of detection of PM_{10} and $\text{PM}_{2.5}$, while size specification would be optional subject to the environmental management strategy of the site. Particulates is typically measured using an optical approach where light scattered by a particle is used to estimate the particle mass concentration. The measurement range and detection limit of the air sensor should be able to measure the full range of particulates commonly found in the ambient, e.g. $0 - 1000 \mu\text{g}/\text{m}^3$. The accuracy of a sensor, in terms of precision and bias, should also be evaluated during selection of air sensor, according

to the manufacturer’s specification, evaluation reports and published literature. Whether the air sensor has calibrated upon purchase, when and how collocation should be performed and how to correct the measurement should be consulted with the sensor manufacturer and fully understood before the air monitoring. Other factors, such as response time, durability, enclosure, ease of use, power supply, any data display, data transmission, data access, data handling and cost should also be considered when selecting air sensor. Guidelines on the use of air sensor refer to *The Enhanced Air Sensor Guidebook 2022, USEPA*, or for further technical details at USEPA’s Air Sensor Toolbox website.

- 2.3.2 Generally, air sensors should be placed at least 1.5 metres above ground and away from any obstruction, vegetation or emission source which would interfere with the measurement. Other factors of the monitoring location, such as security, availability of power supply, reliable communication (cellular, Wi-Fi, etc.), should also be considered.

On-site Calibration and Quality Control

- 2.3.3 To ensure accuracy of the measurement, monitoring equipment, including the air sensors, should be calibrated regularly. The calibration should be conducted by collocating the air sensor and a Transfer Standard (TS).
- 2.3.4 A TS is another particulate matter (PM) monitor that is at least as capable as the air sensor to be calibrated. Another sensor that has just been calibrated may serve the purpose provided its performance is known to be stable during the subsequent collocation period to be used as TS. Right before each on-site calibration, the TS itself needs to be calibrated e.g. collocating with an PM reference monitor - such as the Federal Reference Method (FRM) or the Federal Equivalent Method (FEM) PM monitor at the accredited laboratories or research institutes - that has been calibrated against traceable standard. The TS/reference monitor collocation should last at least seven days.
- 2.3.5 The TS with known performance characteristics will visit and collocate with each air sensor for calibration. During collocation, the TS should be placed near the subject sensor (<1 m if practicable) so that both devices would be monitoring under the same environment, i.e. the same pollution sources and weather conditions. The TS is then turned on to warm-up for 30–60 minutes. The collocation period starts after the warm-up and TS is then left running with the subject sensor for at least three hours. The measurements from the sensor to be calibrated and the TS during the collocation period will be statistically analysed. The response of the sensor should be adjusted if its performance during on-site calibration does not meet the evaluation criteria as shown in **Table 2.1**.

Table 2.1 Recommended Performance Metrics and Target Values for On-site Checking of PM Monitoring Equipment

| Performance Metric | | | Target Value |
|---|-----------|--|--------------|
| Tier 1 – Linear regression of minute average measurements | Bias | Slope | 0.75 – 1.25 |
| | Linearity | Coefficient of Determination (R ²) | >0.70 |

| Performance Metric | | | Target Value |
|---|-------|--------------------------------|---|
| Tier 2 – Root mean squared error of minute average measurements | Error | Root Mean Squared Error (RMSE) | <8 $\mu\text{g}/\text{m}^3$ for RSP and <5 $\mu\text{g}/\text{m}^3$ for FSP |

2.3.6 On-site calibration of the monitoring equipment shall be conducted by ET and agreed by IEC on the following approach:

- Prepare a TS for PM monitoring, which has been calibrated against a PM reference monitor (i.e. the FRM or FEM PM monitor).
- The inlets of the TS and the subject sensor shall be collocated at the same height with a horizontal separation distance of <1 m.
- Warm-up the transfer standard on-site for 30-60 minutes.
- Collocated monitoring shall be conducted in a continuous period to collect at least 180 valid minute average measurements. The valid data rate shall be at least 80% during the collocation period.
- The collected minute average measurement results should be statistically analysed using the two-tier approach as presented in **Table 2.1**.

2.3.7 During Tier 1 checking, linear regression of the minute average measurements from the sensors and the TS should be performed. The slope and coefficient of determination (R^2) from the linear regression should be calculated and meet the target values in **Table 2.1**. If these criteria are not met due to narrow range of PM concentration ($>30 \mu\text{g}/\text{m}^3$ and $>25 \mu\text{g}/\text{m}^3$ as recommended span range for RSP and FSP, respectively) during the collocation period, the Tier 2 checking on root mean squared error shall be determined and compared against the target value in **Table 2.1**. If the monitoring equipment fails to meet both Tiers 1 and 2 target values, the monitoring equipment needs to be re-calibrated or replaced.

2.3.8 The collocated monitoring of TS and each air sensor on the field should be carried out every month. If a sensor failed in 3 consecutive collocated monitoring, the sensor should be checked or maintained to improve its performance, or it should be replaced.

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

- The wind sensors shall be installed on masts at an elevated level 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;
- The wind data shall be captured by a data logger. The data recorded in the data logger shall be downloaded for analysis simultaneously;

- The wind data monitoring equipment shall be re-calibrated at least once every six months; and
- Wind direction should be divided into 16 sectors of 22.5 degrees each.

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

Construction Dust Monitoring Plan

2.3.11 Before commencing the air monitoring, the ET should formulate a construction dust monitoring plan with air sensor and submit to IEC to seek their feedback and consent. The plan should be aligned with the EM&A Manual and verified by IEC. The plan should include but not limited to the followings:

- Details on the pollutants and environmental parameters to be monitored;
- Describe the equipment and measurement method to be used;
- Address the criteria for placing air sensors;
- Discuss the monitoring locations selected and rationale;
- Describe the criteria for selecting air sensors and test to determine if they are working properly;
- Determine the collocation location and establish the calibration and/or collocation and data correction methods;
- Identify types of data that may be used in the data analysis, including nearby reference monitor data, weather data, etc. for monitoring;
- List the procedures to maintain and operate air sensors, including site visits, routine maintenance, emergency maintenance, daily data review, periodic collocations, etc.;
- Describe the QC procedures to be performed;
- Describe how the data are processed, stored and adjusted;
- Describe the ownership of the data and who is granted access to it;
- Describe how the air monitoring data to be managed, tracing the path of data generation in the field to the final data use and end storage;
- Describe the procedures to verify and validate data during collection period;
- Describe the methods to produce meaningful figures and visualisation; and
- Describe how the monitoring results will be used.

2.3.12 The ET is responsible for the provision of monitoring equipment and should provide sufficient number of air sensors for the field work and TS for carrying out continuous on-site monitoring and ad-hoc monitoring or collocation.

2.3.13 If the ET proposes alternative dust monitoring equipment / wind data monitoring equipment / methodology after the approval of this Manual, agreement from the IEC and EPD should be sought. The instrument should also be calibrated regularly following the requirements specified by the equipment manufacturers.

2.4 Monitoring Locations

2.4.1 The selected construction dust monitoring stations are air sensitive receivers located in the vicinity of construction sites and covered different wind directions to capture the potential worst-case impact from the construction of the Project (illustrated in **60722948/A10/EM&A/FIGURE 2.1**). The proposed construction dust monitoring stations during construction phase are listed in **Table 2.2** and are illustrated in **60722948/A10/EM&A/FIGURE 2.2**. The ET should agree with IEC on the position of the air sensor for installation. The considerations for the positioning of air sensor refer to **Section 2.3**, the air monitoring plan with sensors and the feedbacks from IEC.

Table 2.2 Proposed Construction Dust Monitoring Stations

| Monitoring Station ID | ASR ID in EIA Report | ASR Description | Approximate Distance from the Nearest Project Site Boundary (m) |
|-----------------------|----------------------|--|---|
| AM01 | A01 | Temporary Structure to the South of Lamp Post VG3160 | 5 |
| AM02 | A02 | Lok Ma Chau Operation Base Lok Ma Chau Division Hong Kong Police Force | 5 |
| AM03 | A03 | Village House in DD96 1427 | 65 |
| AM04 | A07 | Temporary Structure to the Northeast of Lamp Post VA4082 | 20 |
| AM05 | A12 | 1 Ma Tso Lung Shun Yee San Tsuen Block E | 5 |
| AM06 | A13 | Temporary Structure to the East of Lamp Post N4001 | 10 |
| AM07 | A15 | 1 Ma Tso Lung Shun Yee San Tsuen Block A | 20 |
| AM08 | A21 | 5 Ma Tso Lung Shun Yee San Tsuen Block D | 10 |

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

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

- i. Monitoring at ASRs close to the major site activities which are likely to have air quality impacts;
- ii. Monitoring as close as possible to the ASRs as defined in the EIAO-TM;
- iii. Assurance of minimal disturbance to the occupants and working under a safe condition during monitoring; and
- iv. Take into account the prevailing meteorological conditions.

2.4.4 The ET shall agree with the IEC on the position of the instrument. When positioning the instrument, the following points shall be noted:

- i. a horizontal platform with appropriate support to secure the instrument against gusty wind shall be provided;
- ii. general housekeeping, cleaning works and other preventative maintenance activities such as checking the operating status of individual monitoring equipment should be carried out to ensure the proper operation of the system;
- iii. the distance between the sensor and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sensor;
- iv. a minimum of 2 metres separation from walls, parapets and penthouses is required for rooftop sensors;
- v. a minimum of 2 metres of separation from any supporting structure, measured horizontally is required;
- vi. no furnace or incinerator flue is located nearby the sensors;
- vii. airflow around the sensor is unrestricted;
- viii. the sensor is more than 20 metres from the dripline;
- ix. any wire fence and gate, to protect the sensor, shall not cause any obstruction during monitoring;
- x. permission must be obtained to set up the sensor and to obtain access to the monitoring stations; and
- xi. a secured supply of electricity is needed to operate the sensor.

2.4.5 Subject to site conditions and monitoring results, and with IEC and EPD endorsement, the ET Leader may decide whether additional construction dust monitoring stations should be included, or any construction dust monitoring stations could be removed / relocated during any stage of the construction phase.

2.5 Impact Monitoring

2.5.1 During construction phase of the Project, the ET shall carry out continuous impact monitoring in terms of 1-hour average RSP concentration, 24-hour rolling average RSP concentration and 24-hour rolling average FSP concentration, with air sensors throughout the construction phase of the Project at the designated construction dust

monitoring stations when there are project-related construction activities being undertaken within a radius of 500m from the construction dust monitoring stations.

2.6 Event and Action Plan

- 2.6.1 The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour and 24-hour average RSP, and 24-hour average FSP. **Table 2.3** shows the air quality criteria, namely Action and Limit levels to be used. However, Action and Limit Levels may subject to change based on the prevailing Air Quality Objectives (AQOs) implemented at the time of monitoring. Should non-compliance of the action and /or limit level occur, action in accordance with the Action Plan in **Table 2.4** shall be carried out.

Table 2.3 Action and Limit Levels for Air Quality (Construction Dust)

| Parameter | Action Level | Limit Level |
|-------------------------------------|-------------------------|--------------------------|
| RSP (1 hour average) | 128 μgm^{-3} | Not Applicable |
| 24-hour RSP level (rolling average) | Not Applicable | 75 μgm^{-3} |
| 24-hour FSP level (rolling average) | Not Applicable | 37.5 μgm^{-3} |

Table 2.4 Event and Action Plan for Construction Air Quality Impact (RSP and FSP monitoring)

| Event | Action | | | |
|---|--|--|---|---|
| | ET | IEC | ER | Contractor |
| Exceedance for one 1-hour RSP concentration | <ol style="list-style-type: none"> 1. Notify IEC and ER; 2. Check the monitoring data and error messages to confirm if the performance of the monitoring equipment is normal; 3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures; 4. Assess effectiveness of Contractor's remedial measures and keep IEC and ER informed of the results until exceedance stops. | <ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Advise ER and ET on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures. | <ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consultation with IEC and ET, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures are properly implemented. | <ol style="list-style-type: none"> 1. Identify sources of exceedance and discuss with ER, ET and IEC on possible remedial measures; 2. Implement remedial measures; 3. Amend working methods if appropriate. |

| Event | Action | | | |
|---|--|--|---|---|
| | ET | IEC | ER | Contractor |
| Exceedance for two or more consecutive 1-hour RSP concentration | <ol style="list-style-type: none"> 1. Notify IEC and ER; 2. Check the monitoring data and the performance of the monitoring equipment (refer to Appendix C); 3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures; 4. Discuss with IEC and Contractor on possible remedial measures required; 5. Assess effectiveness of Contractor's remedial measures and keep IEC and ER informed of the results until exceedance stops. 6. Notify EPD if the exceedance is confirmed to be related to the Project. | <ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method and verify the performance of the monitoring equipment to be checked by ET (refer to Appendix C); 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise ER and ET on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures. | <ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consultation with IEC and ET, agree with the Contractor on the proposal for remedial measures to be implemented; 4. Ensure the proposal for remedial measures are properly implemented. | <ol style="list-style-type: none"> 1. Identify the sources and discuss with ER, ET and IEC on possible remedial measures; 2. Submit a proposal for remedial measures to ER, IEC and ET within 2 working days of notification of exceedance for agreement; 3. Implement the agreed proposal; 4. Amend proposal if appropriate. |

| Event | Action | | | |
|---|---|---|--|---|
| | ET | IEC | ER | Contractor |
| Limit level exceedance for one 24-hr rolling average RSP concentration record or/and one 24-hr rolling average FSP concentration record | <ol style="list-style-type: none"> 1. Notify IEC, ER, Contractor and EPD; 2. Check the monitoring data and the performance of the monitoring equipment (refer to Appendix C); 3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures; 4. Discuss with IEC, ER and Contractor on possible remedial measures required; 5. Assess effectiveness of Contractor's remedial measures and keep IEC and ER informed of the results until exceedance stops. 6. Notify EPD if the exceedance is confirmed to be related to the Project. | <ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; and verify the performance of the monitoring equipment to be checked by ET (refer to Appendix C); 3. Discuss with ER, ET and Contractor on the possible remedial measures; 4. Advise ER and ET on the effectiveness of the proposed remedial measures; 5. Review Contractor's remedial measures whenever necessary to assure their effectiveness and advise ER and ET accordingly; 6. Supervise the implementation of remedial measures | <ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consultation with the IEC and ET, agree with the Contractor on the proposal for remedial measures to be implemented; 4. Ensure the proposal for remedial measures are properly implemented; 5. If exceedance continues, identify what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. | <ol style="list-style-type: none"> 1. Identify the sources and discuss with ER, ET and IEC on possible remedial measures; 2. Take immediate action to avoid further exceedance; 3. Submit a proposal for remedial measures to ER, IEC and ET within 2 working days of notification of exceedance for agreement; 4. Implement the agreed proposal; 5. Review and resubmit proposals if the problem is still not under control; 6. Stop the relevant portion of works as determined by ER until the exceedance is abated. |

2.7 Mitigation Measures

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

2.8 Audit Requirements

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

3. NOISE IMPACT

3.1 Introduction

- 3.1.1 The EIA has considered the potential noise impacts associated with the construction and operation phases of the Project.
- 3.1.2 Construction noise mitigation measures would be required to reduce noise levels to the stipulated standard. A Construction Noise Management Plan (CNMP), which contains a quantitative construction noise impact assessment, noise mitigation measures, monitoring and audit programme, event and action plan and implementation schedule. is required to be submitted to the Director of the Environmental Protection (DEP) before tender invitation. The Contractor is required to undertake those mitigation measures in CNMP and implement properly.
- 3.1.3 There would be no adverse road traffic noise impact anticipated from the Project with implementation of the proposed mitigation measures of low noise road surfacing on the part of the Project roads, and at-receiver mitigation measures, such as acoustic window/acoustic balcony at the planned NSRs. A Road Traffic Noise Mitigation Plan, taking into account the latest design of the planned NSRs at Ma Tso Lung, should be submitted to review the necessary noise mitigation measures before the commencement of construction of the Project. Road traffic noise levels will be monitored at representative NSRs during the first year after road opening/population intake.
- 3.1.4 No adverse fixed noise impact would be anticipated from the proposed Pumping Station. The specification, mitigation measures, shall make reference to the latest implementation schedule as stated in the Fixed Noise Source Management Plan (FNMP) and corresponding quantitative fixed noise assessment to be submitted and agreed with DEP. Nevertheless, as part of the design process, monitoring of operational noise from the proposed fixed plants during the testing and commissioning stage and monitoring and audit requirements would be required in the recommendations in the FNMP to verify the compliance of the EIAO-TM criteria.
- 3.1.5 In this section, the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of noise impacts during construction phase and operation phase of the Project are presented.

3.2 Monitoring Requirement and Equipment

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

- 3.2.3 The ET is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled. The equipment installation location shall be proposed by the ET Leader and agreed with the IEC and EPD.
- 3.2.4 The noise monitoring station shall normally be at a point 1 m from the exterior of the sensitive receivers building façade and be a position 1.2 m above the ground. The ET shall agree with the IEC on the monitoring position and the corrections as required according to standard acoustic principles.
- 3.2.5 The details of monitoring equipment for construction noise monitoring will be identified in the CNMP(s) before the tender invitation.

3.3 Monitoring Parameters for Construction Noise

- 3.3.1 The construction noise levels should be measured in terms of the 30-minute A-weighted equivalent continuous sound pressure level (Leq (30-min)). Leq (30-min) should be used as the monitoring parameter for the time period between 0700 and 1900 hours on any day not a general holiday.
- 3.3.2 Supplementary information for data auditing and statistical results such as L₁₀ and L₉₀ should also be obtained for reference. Sample noise field data sheets are shown in **Appendix D** of this Manual for reference. The ET Leader may modify the data record sheet for this EM&A programme but the format of which should be agreed by the IEC.

3.4 Baseline and Impact Monitoring for Construction Noise

- 3.4.1 Baseline noise monitoring shall be carried out daily at the monitoring stations to be designated in the CNMP(s) as appropriate for at least 2 weeks prior to the commencement of the construction works. During the baseline monitoring, there shall not be any construction activities in the vicinity of the monitoring stations .
- 3.4.2 During impact monitoring, construction noise monitoring should be carried out at the designated monitoring stations between 0700 and 1900 hours on any day not a general holiday when there are Project-related construction activities being undertaken within a radius of 300 m from the monitoring stations.
- 3.4.3 As discussed in **Section 3.1.2**, a CNMP should be submitted to EPD before tender invitation and before the commencement of construction works. Subject to the contractual arrangement, land resumption status and construction programme as well as the assessment findings of quantitative construction noise impact assessment, the details of the construction noise monitoring requirements and audit programme, action and limit levels, event and action plan and implementation schedule should be derived and included in the CNMP(s) for agreement with EPD.

3.5 Monitoring Parameters for Operation Road Traffic Noise

- 3.5.1 The ET should carry out monitoring of road traffic noise after the works under Contract are completed and upon commencement of operation of the Project. The noise monitoring should be carried out during the first year of the operation phase. The road traffic noise during operation of the Project should be measured in terms of the A-

weighted equivalent of L_{10} (1-hr). During the traffic noise measurement, traffic count including traffic volume, percentage of heavy vehicles as defined in Calculation of Road Traffic Noise (CRTN) and traffic speed should also be undertaken concurrently. Supplementary information for data auditing and statistical results such as L_{eq} and L_{90} should also be obtained for reference.

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

3.6 Monitoring Locations for Operation Road Traffic Noise

3.6.1 Representative Noise Sensitive Receivers (NSRs) (illustrated in **60722948/A10/EM&A/FIGURE 3.1**) that are mostly affected were identified in the EIA Report are selected as the noise monitoring locations in this Manual, with their locations listed in **Table 3.1** and shown in **60722948/A10/EM&A/FIGURE 3.2**. The locations for operation noise monitoring shall be defined during detailed design on the basis of the status of the most up-to-date information on proposed developments surrounding the Project.

Table 3.1 Proposed Road Traffic Noise Monitoring Station during Operation Phase of the Project

| Station | NSR ID in EIA Report | NSR Description |
|---------|----------------------|---|
| OTM1 | MTLRLPR | Village Houses near the junction of Ma Tso Lung Road and Liu Pok Road |
| OTM2 | MTLR | Village Houses near Ma Tso Lung Road |
| OTM3 | MTLST | Ma Tso Lung San Tsuen |
| OTM4 | MTLSYST | Ma Tso Lung Shun Yee San Tsuen |
| OTM5 | PH | Village Houses near Ping Hang |
| OTM6 | TKH | Village Houses near Tse Koo Hang |
| OTM7 | MTLRS | Village Houses near the Southern Area of Ma Tso Lung Road |

Note:

- (1) Monitoring station at NSR should, where practicable, be positioned as close as possible to the Project roads, subject to future liaison and agreement with respective NSR.
- (2) For NSRs under MTL project (i.e. MTL_RES6), the building layout is currently unavailable at the time of this EM&A manual. The monitoring station locations will be identified once the relevant information is confirmed and monitoring will be conducted after the first year of population intake.

3.7 Operation Fixed Noise Sources

3.7.1 Representative NSR for operation phase for Fixed Noise Sources has been identified in EIA Report and is summarised in **Table 3.2**. The location of Fixed Noise Monitoring Points (FNP) will be determined based on the findings of the FNMP.

Table 3.2 Representative Noise Sensitive Receivers (NSRs) for Fixed Noise Sources

| NSR ID in EIA Report | NSR Description |
|----------------------|-------------------------------|
| PH1 | Village Houses near Ping Hang |

3.8 Mitigation Measures

Construction Phase

- 3.8.1 Mitigation measures including good site practices, use of quality powered mechanical equipment and quieter construction methods, and use of temporary movable noise barriers, noise insulating fabric or noise enclosure were recommended in the EIA Report. The implementation schedule for the recommended mitigation measures is presented in **Appendix B**.
- 3.8.2 Construction Noise Management Plan(s) (CNMP(s)) should be prepared based on the best available information before the tender invitation and the commencement of construction of the project, subject to the contract arrangement of the Project and agreement with EPD. The CNMP(s) should include the proposed/exact inventory of noise sources, quantitative construction noise impact assessment, listing of the quieter construction method/equipment, review the effectiveness and practicality of all proposed mitigation measures for minimising the construction noise impact, implementation schedule of the mitigation measures (including implementation party, location, timing of implementation), and the details of the construction noise impact monitoring and audit program. The CNMPs should be prepared by a Certified Noise Modelling Professional as recognised by the HKIQEP, or equivalent.

Operation Phase

Road Traffic Noise

- 3.8.3 Direct noise mitigation measures such as LNRS and at-receiver mitigation measures, such as acoustic window/acoustic balcony have been proposed to alleviate the traffic noise impact on the representative NSRs. Additionally, alternative design strategies such as further setbacks, extended podium, optimised building orientation, architectural features, special building design, and screening by noise tolerant building can be considered and evaluated in appropriate manner. The implementation schedule for the recommended mitigation measures is presented in **Appendix B**.
- 3.8.4 A detailed Noise Impact Assessment (NIA) or Environmental Assessment Study (EAS) for the planned residential site shall be undertaken by the future developer / project proponent during detailed design stage. The NIA or EAS should be conducted in accordance with Chapter 9 of the Hong Kong Planning Standards and Guidelines (HKPSG), and explore direct at-receiver mitigation measures to ensure compliance with relevant criteria based on their building layouts. As the requirements of the NIA would need to be incorporated into the respective Planning or Lease Conditions to become binding, the project proponent of MTL Project agreed that CEDD will make requests to relevant authorities for incorporating the requirements of NIA or EAS in future housing development, through land lease mechanism or otherwise, where appropriate.

Fixed Noise

- 3.8.5 Potential fixed noise impact arising from the proposed fixed noise sources would be anticipated. To avoid the potential fixed noise impact, direct mitigation measures of quieter fixed plant, enclosing the fixed plant within reinforced concrete building or acoustic enclosure with openings directed away from NSRs, use of silencer, installation of acoustic louvre, installation of noise barrier, and installation of noise enclosure, etc. were recommended to minimise the potential fixed noise sources impact from the proposed fixed noise sources, such that the fixed noise level would comply with the criteria at the NSR.
- 3.8.6 The mitigation measures as recommended in the EIA Report for the fixed plant associated with the Project is also presented in **Appendix B**. These measures should be reviewed and refined by the ER and ET Leader if there are any major design changes during the detailed design phase such that the recommended measures are adequate for alleviating the potential operational fixed noise impacts.
- 3.8.7 Fixed Noise Source Management Plan (FNMP) should be submitted to EPD for agreement before the tender invitation and the commencement of the construction of proposed fixed noise source. FNMP should contain quantitative fixed noise source impact assessment with reference to the updated plant inventories of the fixed noise source, recommended noise mitigation measures, recommended commissioning test requirements and recommended environmental monitoring and audit programme. To ensure full implementation of the recommended mitigation measures, the FNMP would also contain the mitigation measures implementation schedule, implementation party, implementation location and implementation timing. The FNMP for the proposed fixed noise sources should also contain fixed noise sources commissioning test plan to ensure compliance with the noise criteria stipulated in the EIA Report and the NCO.

3.9 Audit Requirements

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

4. WATER QUALITY IMPACT

4.1 Introduction

4.1.1 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 nearby Water Sensitive Receivers (WSRs) as a result of the construction works. Weekly site inspection and audit will also be conducted to ensure that the recommended mitigation measures recommended in the EIA Report are properly implemented during the construction stage. Details of the mitigation measures are presented in the EIA Report. Relevant mitigation measures are presented in in **Appendix B**.

4.1.2 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. No water quality monitoring and audit programme specific to the operation phase is proposed for the Project. Appropriate remedial actions should be taken in case the environmental performance criteria are exceeded. Detailed monitoring requirements as presented in the following sections.

4.2 Monitoring Parameters

4.2.1 Dissolved oxygen (DO), turbidity and suspended solids (SS) levels should be monitored at designated marine water quality monitoring stations during construction of the Project. DO and turbidity should be measured in-situ whereas SS should be determined by laboratory.

4.2.2 Measurements shall be taken at three water depths, including 1 m below water surface, mid-depth and 1 m above seabed, except where the water depth is less than 6 m, in which case the mid-depth station may be omitted. If the water depth is less than 3 m, only the mid-depth station will be monitored.

4.2.3 Enough replicates *in-situ* measurements and water samples collected from each independent monitoring event are required for all parameters to ensure a robust statistically interpretable dataset.

4.2.4 In addition to the water quality parameters as shown in **Section 4.2.1**, other relevant data shall also be recorded, including monitoring location/position, time, water depth, pH value, salinity, temperature, tidal stages, weather conditions and any special phenomena (provide photographs if appropriate) or work activities undertaken around the monitoring and works area that may influence the monitoring results. A sample data record sheet is shown in **Appendix D** for reference.

4.3 Sampling Procedures and Monitoring Equipment

Dissolved Oxygen and Temperature Measuring Equipment

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

- a DO level in the range of 0 - 20 mg L⁻¹ and 0 - 200% saturation; and

- a temperature of 0 - 45 degree Celsius.

4.3.2 It shall have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables shall 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.

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

Salinity Measuring Equipment

4.3.4 A portable salinometer capable of measuring salinity in the range of 0-40 ppt shall be provided for measuring salinity of the water at each monitoring location.

Turbidity Measuring Equipment

4.3.5 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 photoelectric 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.

pH Measuring Equipment

4.3.6 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 American Public Health Association (APHA), 19th ed. 4500-HTB or equivalent methods subject to approval of EPD.

Water Sampling Equipment

4.3.7 A water sampler is required. It shall comprise a transparent Polyvinyl Chloride (PVC) cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler shall 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).

Sample Containers and Storage

4.3.8 Water samples for SS measurements shall be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and delivered to the laboratory and analysed as soon as possible after collection. Sufficient volume of samples shall be collected to achieve the required detection limit.

Positioning Device

- 4.3.9 A hand-held Global Positioning System (GPS) with way point bearing indication or other equivalent instrument of similar accuracy will be provided and used during monitoring to ensure the monitoring team is at the correct location before taking measurements.

Water Depth Detector

- 4.3.10 A portable, battery-operated echo sounder will be used for the determination of water depth at each designated monitoring station.

Back-up Equipment

- 4.3.11 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

- 4.3.12 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. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.
- 4.3.13 For on-site calibration of field equipment, the “*Guide to Field and On-Site Test Methods for the Analysis of Waters*” (BS 1427:1993) 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 some equipment is under maintenance, calibration, etc.

Laboratory Analysis

- 4.3.14 Analysis of SS level shall be carried out in a HOKLAS or other international accredited laboratory. Sufficient water samples shall be collected at the monitoring stations for carrying out the necessary laboratory analysis. The analysis shall commence within 24 hours after collection of the water samples. The analyses shall follow the standard methods described in APHA Standard Methods for the Examination of Water and Wastewater, 19th edition or other approved methods. 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 shall 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. Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis shall 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 shall have comprehensive quality assurance and quality control

programmes. The laboratory shall prepare to demonstrate the programmes to EPD or his representatives when requested.

4.4 Monitoring Locations

4.4.1 The monitoring stations have been established to identify potential water quality impacts to WSRs (**60722948/A10/EM&A/FIGURE 4.1**). Locations of the monitoring stations are shown in **60722948/A10/EM&A/FIGURE 4.2** with the coordinates presented on **Table 4.1**. The upstream monitoring stations will act as control stations. Monitoring at the control stations is for comparing the water quality from potentially impacted sites with the ambient water quality.

Table 4.1 Details of Water Quality Monitoring Station during the Construction Phase

| Station | Description | Station Nature | Easting | Northing |
|---------|---------------------------------------|-----------------|---------|----------|
| CS1 | Upstream Lok Ma Chau Meander | Control Station | 826762 | 842786 |
| CS2 | Upstream Ping Hang Stream | Control Station | 827175 | 842214 |
| CS3 | Upstream Ma Tso Lung Nullah /Stream | Control Station | 827941 | 842619 |
| CS4 | Upstream Ma Tso Lung Nullah /Stream | Control Station | 828468 | 842212 |
| IS1 | Downstream Lok Ma Chau Meander | Impact Station | 826748 | 842390 |
| IS2 | Downstream Ping Hang Stream | Impact Station | 826911 | 842494 |
| IS3 | Downstream Ma Tso Lung Nullah /Stream | Impact Station | 827834 | 842758 |
| IS4 | Downstream Ma Tso Lung Nullah /Stream | Impact Station | 828392 | 842241 |

4.4.2 The status and locations of the above monitoring stations may change after issuing this Manual. If such cases exist, the appointed ET Leader may propose alternative monitoring locations taking into consideration of the latest status, availability and/or accessibility of the various possible monitoring locations. Any change to the monitoring stations shall be justified by the ET Leader, agreed by the ER, verified by the IEC before seeking approval from EPD prior to the implementation of sampling programme.

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

- at locations close to and preferably at the boundary of the site activities as indicated in the EIA report, which are likely to have water quality impacts;
- 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 should be taken to cause minimal disturbance during monitoring; and

- control station shall be selected at a location to allow a comparison of the water quality at the potentially impacted site with the ambient water quality. The control station shall be selected such that it is located within the same body of water as the impact monitoring station but is located outside the area of influence of the works.

4.5 Details of Water Quality Monitoring

Baseline Monitoring

- 4.5.1 Baseline conditions of water quality should be established by the ET and agreed with IEC and EPD. The purposes of the baseline monitoring are to establish ambient conditions prior to the commencement of the works, to demonstrate the suitability of the proposed control and impact monitoring stations, and for establishment of the action and limit levels.
- 4.5.2 The baseline conditions should be established by measuring the water quality parameters including pH, salinity, temperature, DO (in mg/L and % of saturation), turbidity and SS at the proposed monitoring stations as shown in **60722948/A10/EM&A/FIGURE 4.2** (also see **Table 4.1**), 3 days per week, for a period of 4 weeks prior to the commencement of construction works. The interval between two sets of monitoring shall not be less than 36 hours, and the baseline monitoring schedule shall be submitted to DEP and IEC at least one week prior to the commencement of the baseline monitoring. The ET Leader shall seek approval from the ER, IEC and EPD on the alternative proposal prior to its implementation.
- 4.5.3 There shall not be any major construction activities in the vicinity of the stations during the baseline monitoring. The ET shall be responsible for undertaking the baseline monitoring and submitting the results within 10 working days from the completion of the baseline monitoring work.
- 4.5.4 In exceptional cases when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from the ER, IEC and EPD on an appropriate set of data to be used as baseline reference.

Construction Monitoring

- 4.5.5 During the course of the construction works, construction monitoring shall be undertaken 3 days per week, with sampling/measurement at the monitoring stations as shown in **60722948/A10/EM&A/FIGURE 4.2** (also see **Table 4.1**). The ET should carry out spot check to ensure that the Contractor has undertaken all recommended control measures to prevent direct contact of pollutants with rainwater or runoff, and measures to abate contaminants in the stormwater runoff. Parameters to be monitored include pH, salinity, temperature, DO (in mg/L and % of saturation), turbidity and SS. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit levels, in which case the monitoring frequency shall be increased.
- 4.5.6 Requirements as stated in **Section 4.4.2** shall be followed. Any change to the EM&A requirements or programme shall be justified by the ET Leader, agreed by the ER, verified by the IEC before seeking approval from EPD prior to its implementation.

4.5.7 Proposed water quality monitoring schedule shall be submitted to ER, IEC and EPD at least 1 week before the first day of the monitoring month. The ER, IEC and EPD shall also be notified immediately for any changes in schedule.

Post-Project Monitoring

4.5.8 Upon completion of all construction activities, a post project monitoring exercise on water quality shall be carried out for four weeks in the same manner as the baseline monitoring. The results of the monitoring shall be presented in the Final EM&A Summary Report.

4.6 Water Quality Compliance

4.6.1 Construction phase water quality monitoring will be evaluated against Action and Limit Levels. The proposed Action and Limit Levels for water quality is presented in **Table 4.2**. Action and Limit levels are used to determine whether operational modifications are necessary to mitigate impacts to water quality. In the event that the levels are exceeded, appropriate actions in Event and Action Plan (**Table 4.3**) should be undertaken and a review of works will be carried out by the Contractor(s).

4.6.2 Any noticeable change to water quality will be recorded in the monitoring reports and will be investigated and remedial actions will be undertaken to reduce impacts. Particular attention will be paid to the Contractor(s)'s implementation of the recommended mitigation measures.

Table 4.2 Action and Limit Levels for Water Quality

| Parameters | Action Level | Limit Level |
|---|---|---|
| DO in mg/L (Surface, Middle & Bottom) ^b | <u>Surface & Middle</u> 5%-ile of baseline data for surface and middle layers <u>Bottom</u> 5%-ile of baseline data for bottom layer | <u>Surface & Middle</u> 4 mg/L or 1%-ile of baseline data for surface and middle layers <u>Bottom</u> 2 mg/L or 1%-ile of baseline data for bottom layer |
| SS in mg/L (depth-averaged ^a) ^c | 95%-ile of baseline data or 120% of upstream control station's SS recorded on the same day | 99%-ile of baseline data or 130% of upstream control station's SS recorded on the same day |
| Turbidity in NTU (depth-averaged ^a) ^c | 95%-ile of baseline data or 120% of upstream control station's turbidity recorded on the same day | 99%-ile of baseline data or 130% of upstream control station's turbidity recorded on the same day |

Note:

- a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
- b. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- c. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Table 4.3 Event and Action Plan for Water Quality

| Event | Action | | | |
|--|---|--|---|--|
| | ET | IEC | ER | Contractor |
| Action level being exceeded by one sampling day | <ul style="list-style-type: none"> Repeat <i>in-situ</i> measurement on the next day of exceedance to confirm findings; Check monitoring data, equipment and Contractor(s)'s working methods; Identify source(s) of impact and record in notification of exceedance; Inform IEC, ER and Contractor(s). | <ul style="list-style-type: none"> Check monitoring data submitted by ET and Contractor(s)'s working methods; Inform EPD. | <ul style="list-style-type: none"> Confirm receipt of notification of exceedance in writing. | <ul style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Check plant and equipment and rectify unacceptable practice. |
| Action level being exceeded by two or more consecutive sampling days | <ul style="list-style-type: none"> Repeat <i>in situ</i> measurement on the next day of exceedance to confirm findings; Check monitoring data, plant, equipment and Contractor(s)'s working methods; Identify source(s) of impact and record in notification of exceedance; Inform IEC, ER and Contractor(s); | <ul style="list-style-type: none"> Check monitoring data submitted by ET and Contractor(s)'s working methods; Inform EPD; Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; Assess the effectiveness of the | <ul style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented; Ensure additional mitigation measures are properly implemented. | <ul style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Check plant and equipment and rectify unacceptable practice; Consider changes of working methods Discuss with ET and IEC on additional mitigation measures and proposed them to ER within 3 working days; |

| Event | Action | | | |
|---|---|---|--|--|
| | ET | IEC | ER | Contractor |
| | <ul style="list-style-type: none"> • Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented. | <p>implemented mitigation measures.</p> | | <ul style="list-style-type: none"> • Implement the agreed mitigation measures. |
| Limit level being exceeded by one sampling day | <ul style="list-style-type: none"> • Repeat <i>in situ</i> measurement on the next day of exceedance to confirm findings; • Check monitoring data, plant, equipment and Contractor(s)'s working methods; • Identify source(s) of impact and record in notification of exceedance; • Inform IEC, ER and Contractor(s); • Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented. | <ul style="list-style-type: none"> • Check monitoring data submitted by ET and Contractor(s)'s working methods; • Inform EPD; • Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; • Access the effectiveness of the implemented mitigation measures. | <ul style="list-style-type: none"> • Confirm receipt of notification of exceedance in writing; • Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented; • Ensure additional mitigation measures are properly implemented; • Request Contractor(s) to critically review the working methods. | <ul style="list-style-type: none"> • Confirm receipt of notification of exceedance in writing; • Check plant and equipment and rectify unacceptable practice; • Critically review the need to change working methods • Discuss with ET and IEC on additional mitigation measures and proposed them to ER within 3 working days; • Implement the agreed mitigation measures. |
| Limit level being exceeded by two or more consecutive sampling days | <ul style="list-style-type: none"> • Repeat <i>in situ</i> measurement on the next day of exceedance to confirm findings; | <ul style="list-style-type: none"> • Check monitoring data submitted by ET and Contractor(s)'s working methods; | <ul style="list-style-type: none"> • Confirm receipt of notification of exceedance in writing; • Discuss with the IEC on the proposed additional | <ul style="list-style-type: none"> • Confirm receipt of notification of exceedance in writing; |

| Event | Action | | | |
|-------|---|---|---|---|
| | ET | IEC | ER | Contractor |
| | <ul style="list-style-type: none"> • Check monitoring data, plant, equipment and Contractor(s)'s working methods; • Identify source(s) of impact and record in notification of exceedance; • Inform IEC, ER and Contractor(s); • Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented. | <ul style="list-style-type: none"> • Inform EPD; • Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; • Access the effectiveness of the implemented mitigation measures. | <p>mitigation measures and agree on the mitigation measures to be implemented;</p> <ul style="list-style-type: none"> • Ensure additional mitigation measures are properly implemented; • Request Contractor(s) to critically review the working methods. | <ul style="list-style-type: none"> • Check plant and equipment and rectify unacceptable practice; • Critically review the need to change working methods • Discuss with ET and IEC on additional mitigation measures and proposed them to ER within 3 working days; • Implement the agreed mitigation measures. |

4.7 Construction Site Audits

4.7.1 Regular site environmental audit during the construction phase of the Project should be conducted at least once per week 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. Site audits shall include site inspections and compliance audits.

Site Inspections

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

4.7.3 Monitoring of the treated effluent quality from the works areas is required during the construction phase of the Project. The monitoring shall be carried out at the pre-determined discharge point. Compliance audits are to be undertaken to ensure that a valid discharge licence has been issued by EPD prior to the discharge of effluent from the Project site. The monitoring frequency and parameters specified in the discharge licence shall be fully considered during the monitoring. All monitoring requirements shall be approved by EPD. The audit results reflect whether the effluent quality is in compliance with the discharge licence requirements. In case of non-compliance, suitable actions shall be undertaken to:

- Notify the site management for the non-compliance;
- Identify the sources of pollution;
- Check the implementation status of the recommended mitigation measures;
- Investigate the operating conditions of the on-site treatment systems;
- Implement corrective and remedial actions to improve the effluent quality;
- Increase monitoring frequency until the effluent quality is in compliance with the discharge licence requirements; and

- Record the non-compliance and propose preventive measures.

5. WASTE MANAGEMENT IMPLICATION

5.1 Introduction

5.1.1 Construction and Demolition (C&D) materials, excavated sediments, chemical waste and general refuse from workforce would be generated during the construction phase. It is the Contractor's responsibility to ensure that all the waste arising from the Project are handled, stored and disposed of in accordance with good waste management practices, relevant legislation and waste management guidelines. Provided that these wastes are handled, transported and disposed of using approved methods and that the recommended good site practices and relevant legislation are strictly followed, adverse environmental impacts would not be expected.

5.1.2 It is expected that minimal amount of chemical waste and general refuse will be generated during the operation phase of the Project. As such, it is considered that there should be no adverse environmental impacts. Monitoring and audit programme for the operation phase of the Project would not be required.

5.2 Mitigation Measures

5.2.1 Mitigation measures for waste management recommended in the EIA Report should form the basis of the site Waste Management Plan (WMP), as part of the Environmental Management Plan (EMP) to be developed by the Contractor in the construction phase. A trip ticket system in accordance with DEVB TCW No. 6/2010 should be in place. **Appendix B** provides the implementation schedule of the recommended mitigation measures during construction phase.

5.2.2 Waste generated during the construction activities should be audited weekly by the ET to determine if waste is being managed in accordance with approved procedures and the site WMP. The audit should look at all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspection, documents including licenses, permits, disposal, trip ticket system, recycling records should be reviewed and audited for compliance with the legislations and contract requirements. In addition, the routine site inspections should check the implementation of the recommended good site practices, waste reduction measures, and other waste management mitigation measures.

5.2.3 With the appropriate handling, storage and removal of waste arisings during the construction of the Project as presented in **Appendix B**, the potential to cause adverse environmental impacts would be minimised. During the site inspections, the ET shall pay special attention to the issues relating to waste management and check whether the Contractor has implemented the recommended good site practices, waste reduction measures and other mitigation measures.

5.3 Audit Requirement

5.3.1 Regular audits and site inspections should be carried out during construction phases by the ER, ET and Contractor to ensure that the recommended good site practices and the recommended mitigation measures listed in **Appendix B** are properly implemented by the Contractor. The audits should concern all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspection, documents including licences, permits, disposal and recycling

records should be reviewed and audited for compliance with the legislation and contract requirements.

- 5.3.2 The requirements of the environmental audit programme are set out in **Section 12** of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

6. LAND CONTAMINATION

6.1 Introduction

- 6.1.1 Based on the findings of desktop review (e.g. a review of historical aerial photographs and relevant information from EPD and Fire Services Department) and a site walkover; no potential land contaminating land use was identified except for Site MTL-001.
- 6.1.2 The area within the Project boundary will remain in operation and potential exists for a change in land use or operations prior to development. It is recommended to re-appraise the whole area within the Project boundary once the Project Site is resumed and fully accessible. If there are land use changes which pose a potential for land contamination, this information should be reported in CAP(s) for potentially contaminated sites.
- 6.1.3 Prior to construction at potentially contaminated sites, the Project Proponent should appoint a consultant to re-appraise the site and update the findings (e.g. locations of hotspots) and sampling and testing requirements presented in the Site Appraisal Report (i.e. **Appendix 7.8** of the EIA Report), once the Project Site is resumed and fully accessible. A contamination assessment plan (CAP) shall be prepared based on the findings in the Site Appraisal Report alongside incorporating the additional assessment and evaluation findings of the site re-appraisal and the updated sampling and testing strategy should be prepared and submitted to EPD for approval prior to conducting any site investigation (SI) works.
- 6.1.4 SI works should be implemented according to the CAP. A Contamination Assessment Report (CAR) detailing the findings and, if contaminated soil and/or groundwater is identified, a Remediation Action Plan (RAP) should be prepared and submitted to EPD for approval. Any contaminated soil and groundwater should be treated according to EPD's approved RAP and a Remediation Report (RR) should be submitted to EPD for agreement after completion of the remediation works. No construction or development works should be carried out on potentially contaminated site prior to EPD approval of the CAP, and CAR and/or RR, if necessary.
- 6.1.5 With reference to the *Preliminary Feasibility Study on Developing the New Territories North*, the *Geochemical Atlas of Hong Kong* published by the Geotechnical Engineering Office of Civil Engineering and Development Department in 1999 and the Hong Kong Environmental Database (HKED) by EPD, natural occurrences of elevated level of arsenic exist over broad areas of the northern New Territories. A separate arsenic assessment and remediation plan should be prepared and submitted to EPD for endorsement

6.2 Construction Phase

- 6.2.1 Remediation works, if necessary, would be carried out based on the recommended further works outlined in Section 7.7 of the EIA report. Mitigation measures as recommended in the future EPD approved RAP should be implemented during the remediation works. The EM&A requirements should be carried out in the form of regular site inspection to ensure the recommended mitigation measures are properly implemented.

6.3 Operation Phase

- 6.3.1 As any contaminated soil / groundwater would be identified and properly treated prior to the construction works at potentially contaminated sites, land contamination during the operation phase is not expected. As such, environmental monitoring and audit during operation phase for land contamination is considered not necessary.

7. ECOLOGICAL IMPLICATION (TERRESTIRAL AND AQUATIC)

7.1 Introduction

7.1.1 Ecological resources were identified as requiring mitigation measures, as outlined in **Section 8** of the EIA Report. These include wetland reinstatement and enhancement, woodland compensation, pre-construction survey with associated transplantation/translocation of species of conservation importance/ breeding and nesting behaviours, provision of temporary aboveground wildlife crossing and permanent wildlife underpass, as well as monitoring on flight path and construction time restrictions. It is recommended that these measures be monitored and audited by qualified ecologist(s) with at least 5 years of relevant experience throughout the construction phase and during the operational phase where necessary as specified in the following sections. This will ensure proper implementation and, where appropriate, monitor the performance of the proposed mitigation measures. Furthermore, a monthly site audit should be carried out throughout the construction phase to ensure that the recommended ecological impact mitigation measures, as well as pollution control measures, are properly implemented. In case of non-compliance, the contractor should be informed and instructed to strengthen the proposed measures accordingly.

7.2 Impact Monitoring

Disturbance Impacts to Wetlands

7.2.1 To assess potential construction phase disturbance, quantitative avifauna monitoring of all wetlands within 100m of the Construction Area of the Project should be conducted using transect surveys. The monitoring frequency should be monthly for 12 months prior to commencement of construction and throughout the construction period until 12 months after completion of works. The monitoring should be carried out by qualified ecologist(s) with at least 5 years of relevant experience.

Monitoring on Flight Path

7.2.2 Given the importance of the flight path corridor and the significance of potential impacts, its use should be monitored to identify any effects of construction activities focusing on the composition of bird species and their abundance using the flight path. The flight path monitoring survey should be conducted monthly, commencing 30 minutes before sunrise and continued for at least 2 hours. The composition of bird species and their abundance, together with the flight height and pathways of all flight lines should be recorded.

Seasonal Active Night Roost

7.2.3 A seasonal night roost at the northern end of Ma Tso Lung Road was identified within the Assessment Area. Pre-construction survey is necessary to confirm the site boundary, as well as the 100m buffer area before commencement of the construction works. The pre-construction survey shall be conducted once per month between October to April by qualified ecologist(s) with at least 5 years of relevant experience.

7.3 Mitigation Measures

Wetland Reinstatement and Enhancement

- 7.3.1 Reinstatement of the EA Zone following completion of the depressed road / underpass sections of the ECR will be reinstated and established by the Project Proponent / the Contractor with reference to the approved Ecological Mitigation / Habitat Creation and Management Plan (CEDD, 2022) and the existing as-built conditions of the EA after the completion of the aboveground works. Monitoring of water level and quality will be carried out by the Contractor during the construction phase. In case of non-compliance, suitable mitigation measures shall be undertaken to meet requirement specified in Table 5.1 and Table 8.1 of CEDD (2022). For underground reinstatement, all existing engineering and associated structures removed during construction will be reinstated upon completion. After construction of the underpass, the excavation cofferdam will be backfilled with compacted materials (compacted fill or rockfill, subject to the Contractor's design) in accordance with the requirements of the General Specification for Civil Engineering Works published by CEDD (CEDD, 2020). As the stone columns within the construction area will no longer be required to support the EA and its earth bund, the relevant geotextile layers and provisions will be reinstated to ensure that the original level of impermeability is maintained, and native plant species will be used for reinstatement. The ecological characteristics and function of the EA will be enhanced and maintained to a condition no less than the existing conditions, after the reinstatement. A reinstatement and monitoring plan for the EA would be prepared by the Contractor and submitted to AFCD and EPD for agreement at least three months prior to commencement of construction works.
- 7.3.2 Offsite Wetland Compensation Areas (OWCAs) would be utilised as a mitigation measure for the direct and indirect impacts during both construction and operation phases on wetland habitats under the Project. The 3.29ha of Ponds 36-38 located outside of the Construction Area of the Project in Area 4 would not be utilised for any construction related activities. This provides an opportunity to enhance the ecological value of these ponds during the Phase 1 construction works. Pond habitat will be retained and, together with the remaining area of Pond 36-38, converted into 4.38 ha ecologically enhanced pond in Area 4 upon completion of construction works in Phase 1. An updated HCMP for the OWCAs and Area 4 would be prepared by the Contractor and submitted to AFCD and EPD for agreement at least three months prior to commencement of construction works.

Woodland Compensation

- 7.3.3 To mitigate the unavoidable loss of woodland arising from the construction and operation of the Project, compensatory planting has been proposed, with the proposed location(s) and detailed design subject to further agreement. A detailed Woodland Compensation Plan shall be prepared by qualified ecologist/botanist with at least 5 years of relevant experience, forming the basis of the compensatory planting. The Plan shall include implementation details, associated management, and monitoring requirements (e.g. methodology, schedule, monitoring frequency and parameters). Upon the completion of planting, monitoring and maintenance works (e.g., irrigation, weeding, pruning, control of pests and diseases, replacement planting and repair of damage) of the compensatory woodland should be implemented. The Woodland Compensation Plan shall be submitted to the relevant authority(ies) for approval at least three months prior to the commencement of site formation works.

Pre-construction Survey and Transplantation of Flora Species of Conservation Importance

- 7.3.4 Incense trees as a species of conservation importance, should be protected as far as practicable. As a mitigation measure, any unavoidably affected individuals should be conserved on site or, as a last resort, transplanted to nearby suitable habitat(s) prior to commencement of site clearance. A detailed Pre-Construction Vegetation Survey should be carried out by qualified ecologist(s) / botanist(s) with at least 5 years of relevant experience to identify, and record affected individuals prior to the commencement of site clearance works. A protection and transplantation proposal, including subsequent monitoring of the affected individuals, should be prepared and implemented by qualified ecologist(s) / botanist(s) with at least 5 years of relevant experience. The proposal should be submitted to the relevant authority(ies) for approval at least one month prior to commencement of work. Upon the transplantation of the identified individuals, a post-transplantation monitoring should be implemented to monitor the health conditions and survival of the transplanted individuals. Whenever transplantation is not suitable (e.g. due to technical feasibility, poor plant health, form or structural condition, compensatory planting for this species should be proposed.

Pre-construction Survey and Translocation of Fauna Species of Conservation Importance

- 7.3.5 Breeding and nesting behaviour of avifauna species of conservation importance, such as White-throated Kingfisher, Chinese Francolin and Eurasian Eagle Owl, have been recorded or suspected within the Assessment Area. A pre-construction survey shall be undertaken to identify any breeding / nesting activities of these species prior to the commencement of works. Where necessary, nest control measures shall be implemented, including establishing an appropriate exclusion zone to prevent direct injury to breeding pairs, chicks and eggs and minimising disturbance impacts from nearby construction activities.
- 7.3.6 Mammal species of conservation importance with high mobility (i.e. Eurasian Otter, Small Indian Civet, Leopard Cat) should be monitored by transect survey and infrared camera trapping. Transect count would be carried out monthly and the cameras are suggested to be checked monthly. Pre-construction surveys for otter holts or natal dens should be carried out in wetland habitats within 150m of the Construction Area of the Project before the commencement of construction works. Should either be encountered during these surveys or during construction, work in the area will cease until the site has been inspected by an experienced ecologist. Any other mammal species of conservation concern sighted will be reported.
- 7.3.7 Other fauna species of conservation importance (one herpetofauna species Chinese Bullfrog, one freshwater crab species *Somanniathelphusa zanklon* and one freshwater fish species *Gobiopterus macrolepis*) shall also be protected as far as practicable. Individuals of these species shall be translocated to nearby suitable habitats prior to site clearance. A detailed pre-construction survey shall be undertaken by qualified ecologist(s). to identify and record affected individuals before the commencement of clearance works. The Translocation Proposal, pre-construction survey and subsequent monitoring of the affected individuals, shall be prepared and implemented by qualified ecologist(s) with at least 5 years of relevant experience. The Proposal shall be submitted to the relevant authority(ies) for approval at least one month before the commencement of works.

Provision and Monitoring of Temporary Aboveground Wildlife Crossing and Permanent Wildlife Underpass

- 7.3.8 A temporary aboveground wildlife crossing would be provided above the construction area through the fishponds near Ngau Kok Shan to minimise habitat fragmentation during construction phase. In addition, two permanent underpasses would be provided under the at-grade road section of the ECR Alignment. The detailed design of both aboveground wildlife crossing and underpasses would be provided in design stage. To ensure their efficiency, monitoring of the wildlife crossing and underpasses shall be conducted during the construction phase and during the first three years upon establishment, respectively. The conditions of the constructed wildlife crossing / underpasses (e.g. structural integrity, vegetation overgrown, any observable usage) shall be monitored bi-monthly, while any potential usage of the wildlife corridor by mammal species (e.g. Eurasian Otter and Small Indian Civet) should also be recorded (e.g. with the use of camera traps). Maintenance work such as weeding, screening, and repairing broken structure should be conducted by the Contractor and the Project Proponent, where necessary, during the monitoring period for both wildlife crossing and underpasses.

Restriction of Construction Hours of Works

- 7.3.9 Within 100 meters of the existing seasonal active night roost, any noisy construction activities (with the use of Powered Mechanical Equipment (PME)) shall be permitted only between 0900h to 1700h during October to April, to avoid the period of night roost utilisation. Similarly, no aboveground noisy construction activities (with the use of PME) are to be carried out in the sensitive wetland area that fall within the Construction Area of the Project (i.e., Zone 1, Zone 2 and Zone 3) before 0900h and after 1700h throughout the year, unless fully enclosed conditions are achieved through the provision of an appropriate cover or enclosure. This restriction is intended to avoid disturbance during period when flight lines and otters are most active in the region.

Restriction of Structure Height During Construction

- 7.3.10 During the construction phase, no above-ground structures exceeding 15 m above the existing ground level are allowed in Zone 1, Zone 2, and Zone 3 (as illustrated in [60722948/A10/Figure 3.2b](#)) during the period from October to March of the following year to avoid potential impacts on flight paths. The maximum existing ground level in these zones is +5.5mPD; therefore, no above-ground structure may exceed +20.5mPD (i.e., +5.5mPD + 15m).
- 7.3.11 The implementation schedule for the recommended mitigation measures is provided in [Appendix B](#).

8. FISHERIES IMPACT

8.1 Introduction

- 8.1.1 The pond areas to be lost do not account for a significant proportion of the total fishpond area in Hong Kong, therefore the fisheries impact is considered to be negligible. Indirect impacts arising from construction activities and operation of the proposed development would be properly mitigated through standard practices and thus no significant fisheries impact is anticipated. Overall, no unacceptable fisheries impact is predicted from this project. No EM&A requirement is considered necessary for both construction and operation phases.

9. LANDSCAPE AND VISUAL IMPACT

9.1 Introduction

9.1.1 The EIA Report has recommended landscape and visual mitigation measures to be undertaken during both the construction and operational phases of the Project. The design, implementation and maintenance of landscape and visual mitigation measures should be checked to ensure that any potential conflicts between the proposed landscape and visual measures and any other works of the Project would be resolved as early as practicable without affecting the implementation of the mitigation measures.

9.2 Mitigation Measures

9.2.1 The landscape and visual mitigation measures during construction and operational phases as recommended in the EIA Report are summarised in **Appendix B**. The proposed mitigation measures should be incorporated in the detailed landscape and engineering design.

9.2.2 The construction phase mitigation measures should be adopted from the commencement of construction and should be in place throughout the entire construction period. Mitigation measures for the operational phase should be adopted during the detailed design and be built as part of the construction works so that they are in place on commissioning of the Project.

9.2.3 Any potential conflicts among the proposed mitigation measures in terms of design, implementation and maintenance, and the Project works, and operational requirements should also be identified and resolved at early as practicable without affecting the implementation of the mitigation measures. Any changes to the mitigation measures should be incorporated in the detailed design.

9.3 EM&A Requirements

9.3.1 The construction phase EM&A of the mitigation measures shall be carried out as part of the site audit programme. EM&A during operational phase of the Project shall be carried out within the 12-month establishment period of the landscape and visual mitigation measures by the corresponding implementation agency to ensure the proposed mitigation measures in the EIA and as depicted in the Landscape and Visual Mitigation Plan are fully implemented.

9.3.2 All mitigation measures proposed in the EIA and implemented by the Contractor should be audited by a Registered Landscape Architect (RLA), as a member of the ET, on a regular basis to ensure compliance with the intended aims of the measures.

9.3.3 The mitigation measures proposed should be embodied into the detailed engineering design and landscape design drawings and contract document. Site inspection should be undertaken monthly throughout the construction period. In particular, the extent of the agreed works areas should be regularly checked during the construction phase. The landscape auditor should audit the proposed mitigation measures in the EIA to ensure that they are fully implemented during construction and the 12-month establishment period during operational phase.

10. IMPACT OF CULTURAL HERITAGE

10.1 Introduction

- 10.1.1 There is no built heritage within the Project boundary. However, within the 300m assessment area of the Project boundary, there is one grade 2 historic building, namely MacIntosh Fort (Ma Tso Lung) (HB303). Potential indirect impacts, such as ground borne vibration, tilting and settlement, are anticipated during the construction phase.
- 10.1.2 No Site of Archaeological Interest is identified within the assessment area. No archaeological impact would be anticipated during the construction and operation phases.

10.2 Mitigation Measures

- 10.2.1 The recommended mitigation measures as presented in **Appendix B** and summarised below should be implemented to mitigate the impacts on built heritage and potential archaeological resources.

Built Heritage

- 10.2.2 Monitoring of ground-borne vibration, tilting and ground settlement, is proposed to be employed for MacIntosh Fort (Ma Tso Lung) (HB303). Any vibration and building movement induced from the construction works should be strictly monitored to ensure no disturbance and physical damages made to the heritage sites during the course of works.
- 10.2.3 The monitoring for MacIntosh Fort (Ma Tso Lung) (HB303) should be incorporated with a set of Alert, Alarm and Action (3As) system following AMO's monitoring requirements for grade 2 historic building, as well as vibration-sensitive and dilapidated buildings against continuous vibration. The proposed 3As criteria for grade 2 historic building recommended by AMO based on heritage conservation viewpoint during construction phase is presented in **Table 10.1**.
- 10.2.4 A monitoring proposal, including type of monitoring, checkpoint locations, installation details, frequency of monitoring and response actions for each of the 3As level should be submitted to AMO for agreement before commencement of the works. Prior agreement and consent should be sought from the owner(s), stakeholder(s) and relevant Government department(s) for the installation of monitoring points on the built heritages before commencement of the works. AMO should be alerted in case any irregularities are observed.

Archaeological

- 10.2.5 There is no site of archaeological interest within Site Boundary or 300m assessment area. Meanwhile, no archaeological potential has been identified within the Site Boundary. Therefore, no archaeological impact is anticipated from the Project and no mitigation measure are required. As a precautionary measure, pursuant to the Antiquities and Monuments Ordinance (Cap. 53), the project proponent is required to inform the Antiquities and Monuments Office (AMO) immediately in case of discovery of antiquities or supposed antiquities in the course of works, so that appropriate mitigation measures, if needed, can be timely formulated and implemented in agreement with and to the satisfaction of AMO.

Table 10.1 Proposed 3As Limiting Criteria for Vibration, Settlement, Tilting Monitoring for Cultural Heritage Resources

| Alert, Alarm and Action (3As) Values | | | |
|---|---|-------------------|------------------------|
| Item | Vibration (Peak Particle Velocity) | Settlement | Tilting |
| MacIntosh Fort (Ma Tso Lung) (HB303) | 5/6/7.5 mm/s | 6/8/10 mm | 1/2000, 1/1500, 1/1000 |

11. SITE INSPECTION / AUDIT

11.1 Site Inspection

11.1.1 Site inspection provides a direct means to trigger and enforce specified environmental protection and pollution control measures. These shall be undertaken regularly and routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. The site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.

11.1.2 The ET Leader shall be responsible for formulating the environmental site inspection, the deficiency and remedial action reporting system, and for carrying out the site inspection works. He shall submit a proposal for site inspection and deficiency and remedial action reporting procedures to the Contractor for agreement, and to the ER for approval. The ET's proposal for rectification would be made known to the IEC.

11.1.3 Regular site inspections shall be carried out at least once per week. The areas of inspection shall 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 site activities. The ET shall make reference to the following information in conducting the inspection:

- the EIA and EM&A recommendations on environmental protection and pollution control mitigation measures;
- ongoing results of the EM&A program;
- works progress and programme;
- individual works methodology proposals (which shall include proposal on associated pollution control measures);
- contract specifications on environmental protection and pollution prevention control;
- relevant environmental protection and pollution control laws; and
- previous site inspection results undertaken by the ET and others.

11.1.4 The Contractor shall keep the ET Leader updated with all relevant information on the construction contract necessary for him to carry out the site inspections. Inspection results and associated recommendations for improvements to the environmental protection and pollution control works shall be submitted to the IEC and the Contractor within 24 hours for reference and for taking immediate remedial action. The Contractor shall follow the procedures and time-frame stipulated in the environmental site inspection, and the deficiency and remedial action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.

11.1.5 The ET shall 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 and Contractual Requirements

- 11.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.
- 11.2.2 In order that the works are in compliance with the contractual requirements, all works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included. The implementation schedule of mitigation measures is summarised in **Appendix B**.
- 11.2.3 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 any foreseeable potential for violating laws can be prevented.
- 11.2.4 The Contractor shall regularly copy relevant documents to the ET Leader so that works checking could be carried out effectively. The document shall at least include the updated Works Progress Reports, updated Works Programme, any application letters for different license / permits under the environmental protection laws, and copies of all valid licenses / permits. The site diary shall also be available for the ET Leader's inspection upon his request.
- 11.2.5 After reviewing the documentation, the ET Leader shall advise the Contractor of any non-compliance with contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on license / permit application and any environmental protection and pollution control preparation works may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor accordingly.
- 11.2.6 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ER shall follow up to ensure that appropriate action has been taken in order to satisfy contractual and legal requirements.

11.3 Environmental Complaints

- 11.3.1 Complaints shall be referred to the ET Leader for action. The ET Leader shall undertake the following procedures upon receipt of any complaint:
- i. log complaint and date of receipt onto the complaint database and inform the IEC immediately;
 - ii. investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;
 - iii. identify mitigation measures in consultation with the IEC if a complaint is valid and due to works;
 - iv. advise the Contractor if mitigation measures are required;

- v. review the Contractor's response to identified mitigation measures, and the updated situation;
- vi. if the complaint is transferred from the Environmental Protection Department (EPD), submit interim report to the EPD on status of the complaint investigation and follow-up action within the time frame assigned by the EPD;
- vii. undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;
- viii. report investigation results and subsequent actions to complainant (if the source of complaint is identified through EPD, the results should be reported within the timeframe assigned by EPD); and
- ix. record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

11.3.2 During the complaint investigation works, the Contractor and ER 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.

12. REPORTING

12.1 Introduction

12.1.1 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach. All the monitoring data (baseline and impact) shall also be submitted in electronic format.

12.1.2 ET Leader shall submit baseline monitoring report, monthly Environmental Monitoring and Audit (EM&A) report, quarterly EM&A summary report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final review EM&A reports shall be made available to the Director of Environmental Protection.

12.2 Electronic Reporting of EM&A Information

12.2.1 To facilitate public inspection of the baseline monitoring report and various EM&A reports via the EIAO Internet website and at the EIAO register office, electronic copies of these reports shall be prepared in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF version 1.3 or later), unless otherwise agreed by EPD and shall be submitted at the same time as the hardcopies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of these reports shall be included at the beginning of the document. Hyperlinks to all figures, drawings and tables in these reports shall be provided in the main text from where the respective references are made. All graphics in these reports shall be in interlaced GIF format unless otherwise agreed by EPD. The content of the electronic copies of these reports must be the same as the hard copies. The summary of the monitoring data taken shall be included in the various EM&A Reports to allow for public inspection via the EIAO Internet website.

12.3 Baseline Monitoring Report

12.3.1 Baseline Environmental Monitoring Report(s) shall be prepared within 10 working days of completion of the baseline monitoring and then certified by the ET Leader. Copies of the Baseline Environmental Monitoring Report shall be submitted to the Contractor, the IEC, ER and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies they require.

12.3.2 The Baseline Environmental Monitoring Report shall include, but not be limited to the following information:

- i. up to half a page executive summary;
- ii. brief project background information;
- iii. drawings showing locations of the baseline monitoring stations;
- iv. an updated construction programme with milestones of environmental protection / mitigation activities annotated;
- v. monitoring results (in both hard and soft copies) together with the following information:

- monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency and duration; and
 - quality assurance (QA) / quality control (QC) results and detection limits.
- vi. details on influencing factors, including:
- major activities, if any, being carried out on the site during the period;
 - weather conditions during the period; and
 - other factors which might affect results.
- vii. determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored;
- viii. revisions for inclusion in the EM&A Manual; and
- ix. comments, recommendations and conclusions.

12.4 Monthly EM&A Reports

General

12.4.1 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, CEDD 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.

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

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

- i. executive summary (1-2 pages):
- breaches of Action and Limit levels;
 - complaint log;

- notifications of any summons and successful prosecutions;
 - reporting changes; and
 - future key issues.
- ii. basic project information:
- project organisation including key personnel contact names and telephone numbers;
 - construction programme;
 - management structure, and
 - works undertaken during the 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. a brief summary of EM&A requirements including:
- all monitoring parameters;
 - environmental quality performance limits (Action and Limit levels);
 - Event and Action Plan;
 - environmental mitigation measures as recommended in the Final 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 with the following information:
- monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;

- monitoring parameters;
 - monitoring locations (and depth);
 - monitoring date, time, frequency, and duration; and
 - weather conditions during the period.
- vii. graphical plots of the monitored parameters in the month annotated against:
- the major activities being carried out on site during the period;
 - weather conditions that may affect the results;
 - any other factors which might affect the monitoring results; and
 - QA / QC results and detection limits.
- viii. report on non-compliance, complaints, notifications of 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 legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- ix. others:
- 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.);
 - a forecast of the works programme, impact predictions and monitoring schedule for the next three months;

- compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies; and
- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

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

- i. executive summary (1 - 2 pages):
 - breaches of Action Limit levels;
 - complaints 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 including key personnel contact names and telephone numbers; and
 - drawing showing the project area, 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 EIA report.
- v. monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency, and duration;
 - 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 legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- vii. others:
- 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 example, any improvement in the EM&A programme) and conclusions.

viii. appendices

- Action and Limit levels;
- graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - (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;
- outstanding issues and deficiencies

12.4.5 A quarterly EM&A summary report of around five pages shall be produced by the ET Leader and shall contain at least the following information. Apart from these, the first quarterly summary report should also confirm that the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works. Each quarterly EM&A report shall be submitted to the following parties: the IEC, the ER and EPD.

- i. executive summary (1 - 2 pages);
- ii. basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of works undertaken during the quarter;
- iii. a brief summary of EM&A requirements including:
 - monitoring parameters;
 - environmental quality performance limits (AL levels); and
 - environmental mitigation measures, as recommended in the Final EIA report.
- iv. advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the Final EIA report, summarised in the updated implementation schedule;
- v. drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- vi. graphical plots of the trends of monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:

- the major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors which might affect the monitoring results.
- vii. advice on the solid and liquid waste management status;
- viii. a summary of non-compliance (exceedances) of the environmental quality performance limits (AL levels);
- ix. a brief review of the reasons for and the implications of non-compliance, including a review of pollution sources and working procedures;
- x. a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- xi. a summarised record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- xii. a summary record of notifications of summons 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;
- xiii. comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme); recommendations (for example, any improvement in the EM&A programme) and conclusions for the quarter; and
- xiv. proponents' contacts and any hotline telephone number for the public to make enquiries.

12.5 Final EM&A Review Report for Construction Phase

12.5.1 The construction phase EM&A program shall be terminated based on the following basis (a) upon completion of those construction activities that have the potential to result in a significant environmental impact, (b) trends analysis to demonstrate the narrow down of monitoring exceedances due to construction activities and the return of ambient environmental conditions in comparison with baseline data; and (c) no environmental complaint and prosecution involved.

12.5.2 Prior to the proposed termination, it may be advisable to consult relevant local communities (such as village representatives/communities and/or District Boards). The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the Engineer and the Project proponent followed by final approval from the Director of Environmental Protection.

12.5.3 The final EM&A review report for construction phase should be prepared by the ET Leader and contain at least the following information. The final EM&A review report shall be submitted to the following parties: the IEC, the ER and EPD.

- i. executive summary (1 - 2 pages);

- ii. basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;
- iii. a brief summary of EM&A requirements including:
 - monitoring parameters;
 - environmental quality performance limits (Action and Limit levels); and
 - environmental mitigation measures, as recommended in the Final EIA report.
- iv. advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the Final EIA report, summarised in the updated implementation schedule;
- v. drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- vi. graphical plots of the trends of monitored parameters over the course of the project, for all monitoring stations annotated against:
 - the major activities being carried out on site during the period;
 - weather conditions during the period;
 - any other factors which might affect the monitoring results; and
 - the return of ambient environmental conditions in comparison with baseline data.
- vii. compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies;
- viii. provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;
- ix. advice on the solid and liquid waste management status;
- x. a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- xi. a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
- xii. a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- xiii. a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- xiv. review monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);

- xv. a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of breaches, investigation, follow-up actions taken and results;
- xvi. review the practicality and effectiveness of the EIA process and EM&A programme (for example, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme), recommendations (for example, any improvement in the EM&A programme); and
- xvii. a conclusion to state the return of ambient and / or the predicted scenario as per EIA findings.

12.6 Data Keeping

12.6.1 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.

12.7 Interim Notifications of Environmental Quality Limit Exceedances

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