



EIA Report Volume IV: EM&A Manual

Mai Po Nature Reserve Infrastructure Upgrade Project

Revision 7.3 – Final
Prepared for World Wide Fund For Nature Hong Kong
20 October 2021

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1 INTRODUCTION

1.1 Project Background

- 1.1.1 Since 1983, the World Wide Fund for Nature Hong Kong (WWF) has been managing 211.7ha of the 372.1ha Mai Po Nature Reserve (MPNR). Classified as a Biodiversity Management Zone under the Mai Po Inner Deep Bay Ramsar Site Management Plan, MPNR offers benefits to wildlife and the local community through education, recreation and conservation initiatives.
- 1.1.2 Development of MPNR commenced in the 1980s with the setting-up of nature reserve and associated infrastructure, including the Mai Po Education Centre and the launch of schools programmes. From 1990 to 2000, MPNR further developed its management, education and training programmes at the adjacent Peter Scott Field Studies Centre (PSFSC).
- 1.1.3 Public visits to MPNR began in 1985. By the early 1990s, visitor numbers were in excess of 35,000 per year, hitting a peak of over 45,000 in 2002, and stabilizing at around 40,000 per year for the remainder of that decade. Due to the commencement of operations at Hong Kong Wetland Park, the number of visitors to MPNR dropped to 24,000 per year. The Project Proponent targets a return to visitor numbers, anticipated at 32,000 per year by 2023.
- 1.1.4 The aim of the Project is to provide a unique experience in educational recreation, groom local scientists and contribute to a greater understanding of the unique Mai Po environment through cutting-edge research in ecology. It is crucial to transform MPNR into a 21st Century Nature Classroom in order to facilitate this unique learning experience and effectively manage this important, world-class living ecosystem.
- 1.1.5 The Project Site and its environs are shown on *Figure 1-1*.

1.2 Project Description

- 1.2.1 Within the Project Site, the Mai Po Nature Reserve Infrastructure Upgrade Project will comprise the following components, which are shown on *Figure 1-2*:
- 1. Construction of New Tower Hide 2 (TH2).** This is a new three-storey tower hide on the bund between Gei Wai No. 19/20, with a footprint of 60m² and a Gross Floor Area (GFA) of 145m². TH2 will be used primarily by more serious bird watchers. Components for TH2 will be prefabricated off-site and assembled on-site without the need for on-site concrete mixing. The work will also involve constructing a path leading towards the hide from bund #18/19. A new boardwalk will be constructed on existing bunds and will be around 156m long and 1.65m wide, connecting to an existing concrete footpath between gei wai nos. 18 and 19.
 - 2. Construction of New Tower Hide 3 (TH3).** This is a new three-storey tower hide on the bund between Gei Wai No. 7/8, east of the Existing Tower Hide 1 (TH1), with a footprint of 60m² and a GFA of 145m² (same design as TH2). TH3 will cater for groups of casual visitors and school groups on short trips. Components for TH3 will be pre-fabricated off-site and assembled on-site without the need for on-site concrete mixing. The work will also involve constructing an access path leading towards the hide from bund #9. A new boardwalk will be constructed on the bund between gei wai nos. 7 and 9 and will be around 85m long and 1.65m wide, connecting to the main boardwalk.
 - 3. Construction of New Boardwalks.** There are two existing narrow concrete footpaths that due to age are in a poor state of repair – cracked and in some places subsiding, which make access challenging for some visitors. To allow universal access for all visitors, these footpaths will be widened.
 - a. Construction of New Boardwalks Above Existing Paths:**
 - i.** The main concrete footpath, running between the MPNR entrance and the Mai Po Education Centre (MPEC) is around 1.5m wide and about 921m long. The new boardwalk will be up to 1.65m wide and, space permitting, there will also be a number of passing bays.

- ii. The footpath to TH1 is around 1.5m wide and about 66m long. The new boardwalk will be will be 1.65m wide.
- b. Construction of New Boardwalks for Education Areas (EAs):
 - i. The boardwalk replacing the main footpath will be further widened at six locations into EAs that provide seating and informative signboards to provide opportunities for interactive public education. The boardwalks forming these EAs range from 1.4m to 10m in length and range from 1.0m to 3.5m in width (in addition to the 1.65m boardwalk replacing the main footpath).

1.3 Purpose of the Manual

- 1.3.1 The purpose of this EM&A Manual (hereinafter refer to as the “Manual”) is to guide the setup of an EM&A programme to ensure compliance with the recommendations in the EIA study to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the monitoring and audit programme for the construction phase of the Project (monitoring and audit programme for the operation phase of the Project is not required).
- 1.3.2 The Manual provides specific information, guidance and instruction to personnel in charged with environmental responsibilities and undertaking environmental monitoring and auditing works for the Project. It also provides systematic procedures for monitoring, auditing and minimizing environmental impacts associated with the construction activities.
- 1.3.3 This Manual contains the following information:
- EM&A organisation.
 - Responsibilities of the Employer’s Representative (ER), the Contractor, the Environmental Team (ET) and the Independent Environmental Checker (IEC) with respect to the environmental monitoring and audit requirements.
 - 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 impacts.
 - Details of the methodologies to be adopted, including all field laboratories and analytical procedures, and details on quality assurance and quality control programme.
 - Definition of Action and Limit levels.
 - Establishment of Event and Action 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.
 - Requirements for review of EIA predictions and the effectiveness of the mitigation measures/environmental management systems and the EM&A programme.
- 1.3.4 This Manual is a living document which shall be reviewed periodically and updated if necessary during the course of implementing the Project.

1.4 Project Organisation

- 1.4.1 Involvement of relevant parties in a collaborative and interactive manner is essential for the implementation of the recommended EM&A programme. The following sections outline the primary responsibilities and duties of the key EM&A programme participants.
- 1.4.2 The proposed project organisation and lines of communication with respect to EM&A works are shown in **Figure 1-3**.

Employer's Representative (ER)

- 1.4.3 The ER shall appoint an appropriate individual, who shall:
- Monitor the Contractor's compliance with the contract specifications, including the EM&A programme, and the effective implementation and operation of environmental mitigation measures in a timely manner.
 - Ensure that impact monitoring is conducted at the correct locations at the correct frequency as identified in the Manual.
 - Instruct the Contractor to follow the agreed protocols or those in the Contract in the event of exceedances or complaints.
 - Review the programme of works with a view to identifying any potential environmental impacts before they arise.
 - Check that mitigation measures that have been recommended in the EIA Report, this Manual and contract documents, or as required, are correctly implemented in a timely manner, when necessary.
 - Verify the environmental acceptability of permanent and temporary works, relevant design plans and submissions.
 - Comply with the agreed Event Contingency Plan in the event of any exceedance.

The Contractor

- 1.4.4 The Contractor shall report to the ER. The duties and responsibilities of the Contractor are:
- Work within the scope of the construction 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 and IEC in carrying out monitoring and auditing.
 - Participate in the site inspections undertaken by ET and IEC as required, and undertake correction actions.
 - Provide information to the ET and IEC regarding works activities which may contribute, or be contributing to, the generation of adverse environmental conditions.
 - Submit proposals on mitigation measures in case of exceedance of Action and Limit levels in accordance with the Event/Action Plans.
 - Implement measures to reduce impact where Action and Limit levels are exceeded.
 - Adhere to the procedures for carrying out complaint investigation.
- 1.4.5 The Contractor shall also participate in the environmental performance review undertaken by the ER and undertaken any corrective actions as instructed by the ER.

Environmental Team (ET)

- 1.4.6 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 shall not be in any way an associated body of the ER, the Contractor or the IEC for the Project. The ET shall be an independent party from the IEC and have relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the ER and the environmental Authority (the Environmental Protection Department, EPD). The ET shall be led and managed by the ET leader.
- 1.4.7 The ET leader shall possess at least 7 years' experience in EM&A and/or environmental management and shall be an Accredited Monitoring Professional (AMP) under the Hong Kong Institute of Environmental Impact Assessment (HKIEIA) and a Qualified Environmental Professional under the Hong Kong Institute of Qualified Environmental Professionals (HKIQEP).

- 1.4.8 The duties and responsibilities of the ET are:
- Monitor various environmental parameters as required in this Manual.
 - Analyse the environmental monitoring and audit data and review the success of EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising.
 - Carry out regular site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems; carry out ad hoc site inspections if significant environmental problems are identified.
 - 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.
 - Advise to the Contractor on environmental improvement, awareness, enhancement matters, etc. on site.
 - Adhere to the procedures for carrying out complaint investigation in accordance with **Section 9** of this Manual.

Independent Environmental Checker (IEC)

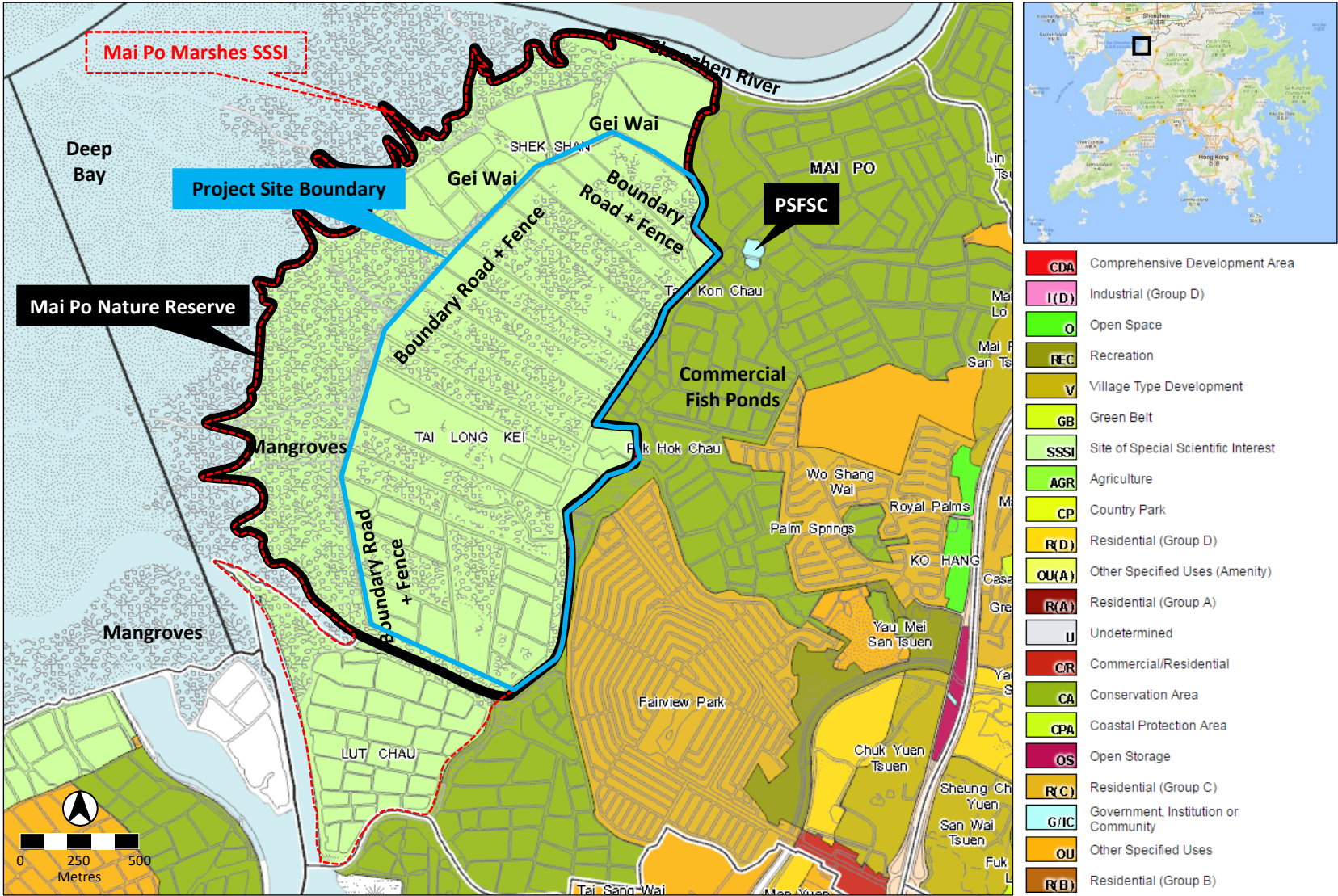
- 1.4.9 The IEC shall advise the ER on environmental issues related to the Project. The IEC shall not be in any way an associated body of the ER, the Contractor or the ET for the Project. The IEC shall be empowered to audit from an independent viewpoint the environmental performance during the construction of the Project.
- 1.4.10 The IEC shall possess at least 7 years' experience in EM&A and/or environmental management and shall be an AMP under the HKIEIA and a Qualified Environmental Professional under the HKIQEP.
- 1.4.11 The IEC shall be responsible for the duties defined in this Manual, and shall audit the overall EM&A programme, including the implementation of all environmental mitigation measures, submissions required in this Manual, as well as any other relevant submissions required under the Environmental Permit (EP). The IEC shall be responsible for verifying the environmental acceptability of permanent and temporary works, relevant design plans and submissions under the EP. The IEC shall verify the logbook prepared and kept by the ET Leader. The IEC shall notify EPD by fax, within 24 hours of receipt of notification from the ET Leader, of any such instance or circumstance or change of circumstances or non-compliance with the EIA Report or the EP, which might affect the monitoring or control of adverse environmental impact.
- 1.4.12 The duties and responsibilities of the IEC are:
- Review and audit in an independent, objective and professional manner in all aspects of the EM&A programme.
 - Validate and confirm the accuracy of monitoring results, appropriateness of monitoring equipment, monitoring locations with reference to the locations of the nearby sensitive receivers, and monitoring procedures.
 - Carry out random sample check and audit on monitoring data and sampling procedures, etc.
 - Conduct random site inspection (at least once a month).
 - Audit the EIA recommendations and EP requirements against the status of implementation of environmental protection measures on site.
 - Review the effectiveness of environmental mitigation measures and Project environmental performance.

- On an as needed basis, verify and certify the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plans and submissions under the EP. When necessary, the IEC agree in consultation with the ET Leader and the Contractor the least impact alternative.
- Verify investigation results of complaint cases and the effectiveness of corrective measures.
- Verify EM&A reports submitted and verified by the ET Leader.
- Feedback audit results to ER/ET by signing accordingly to the Event/Action Plans specified in this Manual.

1.5 Project Programme

- 1.5.1 The construction programme must accommodate planned draining of gei wai for desilting, as per the *MPNR Management Plan 2019-2024*. Specifically, the planned draining of Gei Wai No. 20e and Gei Wai Nos. 7 and 8a for the construction of footings/substructure for TH2 and TH3, respectively.
- 1.5.2 Based on best available information, the Project programme shown in **Figure 1-4** assumes that the Project will be constructed from mid-April 2022 to mid-May 2022 and early-September 2022 to mid-October 2022, a total period of about three months.

Figure 1-1 Statutory Plan Showing Location of Project and its Environs



Source: Extract from the approved Mai Po and Fairview Park OZP No. S/YL-MP/6, from PlanD Statutory Planning Portal 2.

Figure 1-2 Project Elements (Indicative Plan Only)



Source: Google Earth Pro

Figure 1-3 EM&A Organisation

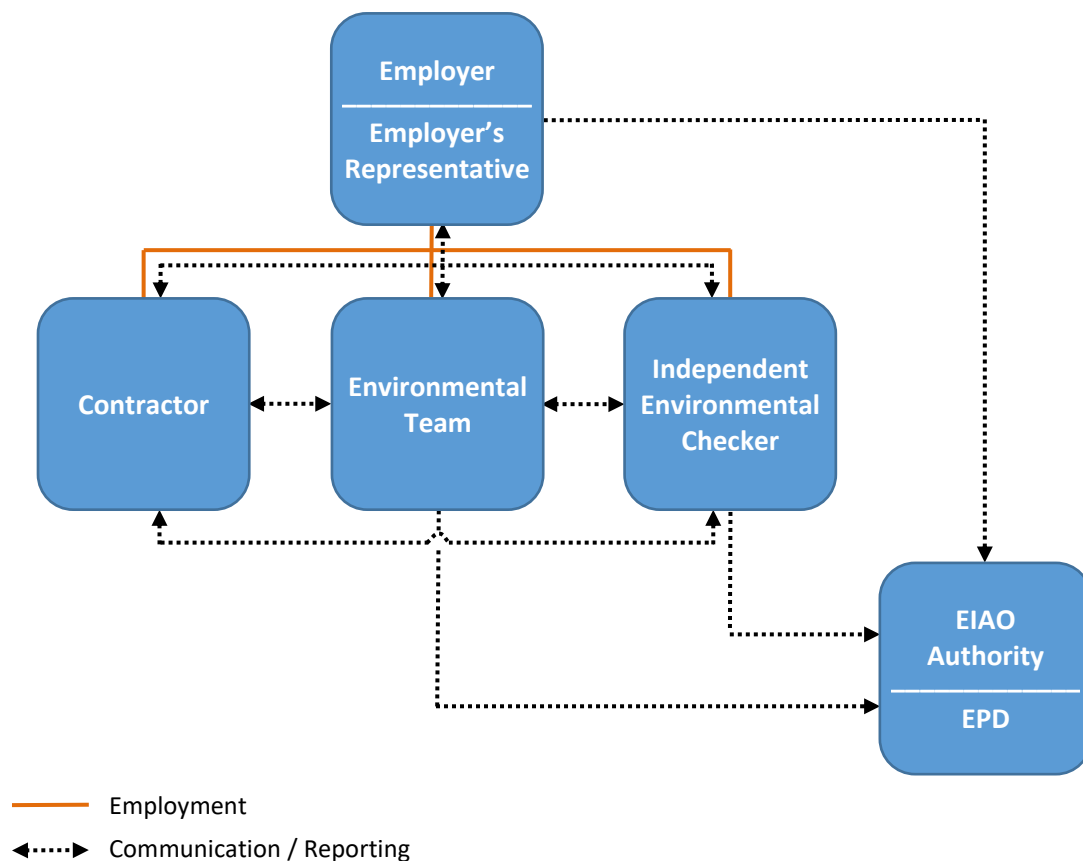


Figure 1-4 Project Programme

Project Activity	2022											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
New TH2 (including Boardwalk Access)												
Foundation Works (Phase 1)												
Superstructure Works (Phase 2)												
Roof, Cladding and Interior Works upto Handover												
New TH3 (including Boardwalk Access)												
Foundation Works (Phase 1)												
Superstructure Works (Phase 2)												
Roof, Cladding and Interior Works upto Handover												
New Boardwalk (including EAs)												
Construction (Part 1 - North)												
Construction (Part 2 - Centre)												
Construction (Part 3 - South)												
Vehicular Movement (Site-wide)												
Construction Vehicles												
Other Projects												
Planned MPNR Management Plan Maintenance Activities in 2022 - NOT Concurrent												
Drain Down of gei wai												
Habitat management												
Gei Wai Refill												

- Key:**
- Dry season during which there will be no outdoor Works for the Project within MPNR
 - Outdoor Works for the Project within MPNR
 - Works for Other Projects (including the planned drain-down and re-fill of gei wai i #7, 8a, 19, 20e)

2 AIR QUALITY

2.1 Introduction

2.1.1 Potential air quality impacts arising from the construction phase of the Project were assessed in **Chapter 3 of the EIA Report**. With the implementation of dust suppression measures, no adverse air quality impact from the Project is anticipated at off-site Air Sensitive Receivers (ASRs) during construction. No air quality monitoring is therefore deemed necessary. Nevertheless, regular site environmental audit is recommended to ensure the implementation of the recommended mitigation measures.

2.2 Mitigation Measures

2.2.1 Mitigation measures to prevent dust impacts have been recommended in the **Section 3.7 of the EIA Report**. All the recommended mitigation measures are detailed in the implementation schedule in **Appendix A**. Appropriate parties have been identified to be responsible for the design and implementation of these mitigation measures.

2.3 Audit Requirements

2.3.1 Regular inspection and audit of each works area shall be conducted during the construction phase of the Project to ensure that the recommended air quality mitigation measures are properly implemented. When there are ongoing construction works within the Project Site, the ET shall carry out inspections once per week and the IEC shall carry out audits jointly with the ET once every two weeks.

2.3.2 Inspection findings shall be logged in a site monitoring report with any discrepancies or concerns regarding the implementation and effectiveness of mitigation measures highlighted.

3 NOISE

3.1 Introduction

3.1.1 Potential noise impacts arising from the construction phase of the Project were assessed in **Chapter 4 of the EIA Report**. Based on the assessment results, and with the implementation of recommended noise control measures, no adverse noise impact from the Project is anticipated at off-site Noise Sensitive Receivers (NSRs) during construction. No noise monitoring is therefore deemed necessary for NSRs. Nevertheless, regular site environmental audit is recommended to ensure the implementation of the recommended mitigation measures.

3.2 Mitigation Measures

3.2.1 Mitigation measures to prevent construction phase noise impacts have been recommended in the EIA Report. All the recommended mitigation measures are detailed in the implementation schedule in **Appendix A**. Appropriate parties have been identified to be responsible for the design and implementation of these mitigation measures.

3.3 Audit Requirements

- 3.3.1 Regular inspection and audit of each works area shall be conducted during the construction phase of the Project to ensure the recommended noise mitigation measures are properly implemented. When there are ongoing construction works within the Project Site, the ET shall carry out inspections once per week and the IEC shall carry out audits jointly with the ET once every two weeks.
- 3.3.2 Inspection findings shall be logged in a site monitoring report with any discrepancies or concerns regarding the implementation and effectiveness of mitigation measures highlighted.

4 WATER QUALITY

4.1 Introduction

- 4.1.1 Potential water impacts arising from the construction of the Project were assessed in **Chapter 5 of the EIA Report**. It was identified that Deep Bay, the gei wai, Shan Pui River, commercial fishponds and SSSIs adjacent to and within the Site and the natural watercourses running through the Study Area as Water Sensitive Receivers (WSRs).
- 4.1.2 The EIA Report therefore recommended a series of stringent mitigation measures to be implemented at each works site to ensure that no contaminated run-off enters the fishponds or gei wai, and from there potentially into Deep Bay.
- 4.1.3 With the implementation of water pollution control measures no adverse water quality impact from the Project is anticipated during construction. Nevertheless, as a precautionary measure and to demonstrate that the “Zero Water Pollution” approach is working, it is proposed to carry out water quality EM&A before, during and (if required) after the foundation works at TH2 and TH3.

4.2 Monitoring

Parameters, Equipment and Analysis

- 4.2.1 The following parameters are related to construction activity:
- Water depth – to be measured in-situ
 - pH – to be measured in-situ
 - Temperature in °C – to be measured in-situ
 - Salinity in mg/L – to be measured in-situ
 - Turbidity in NTU – to be measured in-situ
 - Dissolved Oxygen (DO) in % saturation and mg/L – to be measured in-situ
 - Suspended Solids (SS) in mg/L – to be determined in a laboratory
 - Oil and Grease (O&G) in mg/L – to be determined in a laboratory
- 4.2.2 Equipment provided by the ET to measure the above parameters shall include:
- Portable, battery-operated echo sounder shall be used for the determination of water depth at each designated monitoring station.
 - Portable pH Meter, which shall be checked, calibrated and certified before use by a HOKLAS laboratory.
 - DO and Temperature Measuring Equipment capable of measuring DO in the range of 0 to 20 mg/L and 0 to 200% saturation; and temperature of 0 to 45°C, which shall be checked, calibrated.
 - Portable salinometer capable of measuring salinity in the range of 0-40 mg/l shall be provided for measuring salinity of the water and certified before use by a HOKLAS laboratory.
 - Turbidity Measurement Equipment capable of measuring turbidity between 0-1000 NTU and certified before use by a HOKLAS laboratory.
 - A high density 1L capacity polythene bottle shall be used to collect a water sample from just below the water surface for SS measurements while water sample for O&G measurement shall be collected in glass bottles and preserved by addition of H₂SO₄. At least two replicate samples should be collected from each location. After fully filling the bottles, they shall be cooled to 4°C without being frozen.
- 4.2.3 All in-situ monitoring equipment shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes shall 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.

- 4.2.4 The water samples shall be delivered to a HOKLAS laboratory as soon as possible for analysis, which shall start the next working day after collection of samples. Analyses shall follow standard methods as described in *APHA Standard Methods for the Examination of Water and Wastewater, 19th Edition*, unless otherwise specified (APHA 2540D for SS and APHA 5520C for O&G). The submitted information should include pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch, etc.), detection limits and accuracy. The QA/QC details shall be in accordance with requirements of HOKLAS.
- 4.2.5 In addition to the water quality parameters, other relevant data should also be measured and recorded in field logs, including coordinates of the sampling stations, the location of construction works at the time of sampling, sampling depth, weather conditions, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results, etc.

Monitoring Locations

- 4.2.6 Monitoring shall be carried out adjacent to the sluice gates connecting MPNR to Deep Bay that are closest to the tower hides works areas, i.e. Sluice Gate 7 (closest to TH3) and Sluice Gate 19 (closest to TH2). Sluice Gate 7 and Sluice Gate 19 are the only connection of Gei Wai 7 and Gei Wai 19 to Deep Bay. These locations are show **Figure 4-1** and indicative co-ordinates of these monitoring locations are listed in **Table 4-1**. Samples to be taken at the sluice gate shall be at the depth of 1m below water surface. For stations with a water depth of less than 1m, monitoring shall be carried out at the mid-depth. Water sampling shall not be taken if water depth is less than 0.25m.

Table 4-1 Co-ordinates of the Water Quality Monitoring Locations (HK Grid)

LOCATION	EASTING	NORTHING
Sluice Gate 7	822107	839868
Sluice Gate 19	821344	838681

Baseline Monitoring

- 4.2.7 Baseline water quality monitoring at Sluice Gate 7 and Sluice Gate 19 shall be carried out three times per week, with a minimum interval of 36 hours, for a period of four weeks prior to the commencement of foundation works at TH2 and TH3. EPD shall be advised two weeks prior to the start of baseline monitoring. A *Baseline Monitoring Report* shall be prepared by the ET, verified by the IEC and then submitted to EPD within two weeks after completion of monitoring. Baseline conditions for water quality shall be established and agreed with DEP prior to the commencement of works.

Precautionary Monitoring

- 4.2.8 Precautionary water quality monitoring at Sluice Gate 7 and Sluice Gate 19 shall be carried out three times per week, with a minimum interval of 36 hours, when foundation works are carried out at TH2 and TH3. Each month that foundation works are carried out at TH2 and TH3, a *Monthly EM&A Report* shall be prepared by the ET, verified by the IEC and then submitted to EPD within two weeks after the end of the month.

Post-construction Monitoring (if Needed)

- 4.2.9 If, at the completion of foundation works, the final week of precautionary monitoring shows more than two consecutive exceedances of Action and/or Limit Levels attributable to the Project, then post-construction monitoring at Sluice Gate 7 and/or Sluice Gate 19 (as needed) shall be carried out three times per week until readings return to baseline levels. Upon completion of post-construction monitoring, a *Final Summary EM&A Report* will be prepared by ET, verified by the IEC and then submitted to EPD within two weeks after completion of monitoring.

Action and Limit Levels and Event/Action Plan for Precautionary Monitoring

- 4.2.10 Precautionary monitoring results shall be evaluated against Action and Limit levels shown in **Table 4-2**, with action being taken as per the Event/Action Plan shown in **Table 4-3**. Please note that the Event/Action Plan relates only to exceedances that are directly attributable to the construction works of this Project, over which the installation contractor has control. The advice of the IEC shall be sought in case of any concern.

Table 4-2 Action and Limit Levels for Water Quality

PARAMETER	ACTION LEVEL	LIMIT LEVEL
DO in mg/L	5 th percentile of baseline data	1 st percentile of baseline data
SS in mg/L	95 th percentile of baseline data	99 th percentile of baseline data
Turbidity in NTU	95 th percentile of baseline data	99 th percentile of baseline data

Table 4-3 Event / Action Plan for Water Quality

EVENT	CONTRACTOR / ET	IEC	ER
Action Level Exceedance	<ol style="list-style-type: none"> Repeat sampling event. Inform EPD and AFCD and confirm notification of the non-compliance in writing. Discuss with contractor and the IEC the most appropriate method of reducing water quality pollution during construction and agree with EPD. Repeat measurements after implementation of mitigation for confirmation of compliance. If non-compliance continues, increase measures in Step 3 and repeat measurement in Step 4. If non-compliance occurs a third time, suspend construction works and continue sampling until normal water quality resumes. 	<ol style="list-style-type: none"> Discuss with Contractor/ET on the mitigation measures Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Discuss with IEC on the proposed mitigation measures; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures.
Limit Level Exceedance	Suspend construction works and undertake Steps 1-4 immediately. Construction works should only continue when the water quality shows compliance again.	Undertake Steps 1-3 immediately	Undertake Steps 1-3 immediately and consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction works until no exceedance of Limit level.

4.3 Mitigation Measures

- 4.3.1 Mitigation measures to prevent construction phase water quality impacts have been recommended in the EIA Report. All the recommended mitigation measures are detailed in the implementation schedule in **Appendix A**. Appropriate parties have been identified to be responsible for the design and implementation of these mitigation measures.

4.4 Audit Requirements

- 4.4.1 Regular inspection and audit of each works area shall be conducted during the construction phase of the Project to ensure the recommended water quality mitigation measures are properly implemented. When there are ongoing construction works within the Project Site, the ET shall carry out inspections once per week and the IEC shall carry out audits jointly with the ET once every two weeks.
- 4.4.2 Inspection findings shall be logged in a site monitoring report with any discrepancies or concerns regarding the implementation and effectiveness of mitigation measures highlighted. The audits should examine all aspects of on-site water pollution prevention, including the following:
- **Perimeter Bund.** A perimeter bund shall be constructed around the work sites for TH2 and TH3 to ensure that any runoff generated from these sites is discharged only into the adjacent drained gei wai and not into any other water-filled gei wai that are hydraulically connected to each other and to Deep Bay. Runoff is therefore prevented from entering other water-filled gei wai and Deep Bay and so potential pollution of these water bodies is avoided.
 - **Off-site Pre-fabrication.** The majority of construction components shall be pre-fabricated off-site to avoid any impacts associated with construction on-site. With this approach, the construction activities will mainly involve assembly of pre-fabricated components.
 - **Off-site Concrete Mixing.** One of the main sources of contaminated runoff from construction sites is concrete washings from concrete mixing on site. To avoid this problem, all concrete will be mixed off-site and brought into each works area only when needed and only in the quantities required, so that there is no need to store (or dispose of) any surplus concrete. Any concrete spilled within the works area will be immediately cleaned up and removed from the works area.
 - **Off-site Maintenance/Repair of Plant.** Plant, equipment and vehicles shall not be maintained or repaired within any works area in the Project Site. Instead, all such servicing shall be undertaken off-site, such that any resulting oil, chemical waste or other polluting substances can be handled and treated off-site in an appropriate manner.
 - **Extreme Care When Re-fuelling Plant.** In the event that non-mobile plant and equipment require re-fuelling, and it is not practicable to move off-site for re-fuelling, then re-fuelling shall be carried out with extreme care. Drip trays shall be provided at any fuel connection point, e.g. between the delivery pipe and the fuel tank. Any spilled fuel shall be collected and taken off-site for proper treatment/disposal.
 - **Covering Materials, Plant and Equipment.** Materials, plant or equipment that could give rise to contaminated runoff during extreme rainfall will be protected by storing above ground level and also by being covered, either by tarpaulin or by small gazebos that can be erected and folded up within a few minutes.
 - **Provision of Chemical Toilets.** Each works area will be provided with at least one chemical toilet for use by workers. Sewage collected in these chemical toilets will be treated off-site by the toilet provider.
 - **Bunded, Covered Construction C&D Material Storage Areas.** Each works area will be provided one bunded and covered area for the temporary storage of C&D material – one section for inert C&D material and one area for C&D waste. These areas will be emptied frequently, using construction material delivery vehicles that are empty on their return journey. All inert C&D material and C&D waste will be transported off-site for recycling or treatment as appropriate.
 - **Waterproof General Waste Receptacles.** Each works area will be provided with at least one set of waterproof waste receptacles – one for recyclable waste and one for non-recyclable waste. These areas will be emptied frequently.
- 4.4.3 In addition to the above, the Construction Contractor shall be audited on his implementation of good site practice on the design construction, operation and maintenance of relevant mitigation measures specified in *ProPECC PN 1/94* for construction site drainage.

Figure 4-1 Locations for Water Quality Monitoring



Source: Google Earth Pro

5 WASTE MANAGEMENT

5.1 Introduction

- 5.1.1 Potential waste management implications arising from the construction phase of the Project were assessed in **Chapter 6 of the EIA Report**.
- 5.1.2 Waste management during the construction phase will mainly be the responsibility of the Contractor, who shall implement the mitigation measures recommended in the EIA Report in order to minimise waste or resolve the issues associated with the management of waste. The Contractor should also ensure that all wastes produced during the construction phase are handled, stored and disposed of in accordance with good waste management practices, relevant legislation and waste management guidelines.

5.2 Mitigation Measures

- 5.2.1 With the proper handling, storage and disposal of wastes arising from the construction of the Project, it is anticipated that the potential adverse environmental impacts would be avoided or minimised. During site inspections, the ER, ET and IEC should pay special attention to the issues relating to the waste management and check whether the Contractor has implemented the recommended good site practices and other mitigation measures listed in **Appendix A**. Appropriate parties have been identified to be responsible for the design and implementation of these mitigation measures.
- 5.2.2 The Contractor should submit a Waste Management Plan (WMP) prior to the commencement of construction work, in accordance with ETWB TC(W) No 19/2005 to provide an overall framework of waste management and reduction.

5.3 Audit Requirements

- 5.3.1 Regular inspection and audit of each works area shall be conducted during the construction phase of the Project to ensure the recommended waste mitigation measures are properly implemented. When there are ongoing construction works within the Project Site, the ET shall carry out inspections once per week and the IEC shall carry out audits jointly with the ET once every two weeks.
- 5.3.2 Inspection findings shall be logged in a site monitoring report with any discrepancies or concerns regarding the implementation and effectiveness of mitigation measures highlighted. The audits should examine all aspects of on-site waste management practices, including the following:
- The Construction Contractor's documents, including licenses, permits, disposal and recycling records, shall be regularly inspected to ensure they comply with legislation and contract requirements.
 - Review of the Construction Contractor's Waste Management Plan (WMP) prepared in accordance with *ETWB TC(W) No. 19/2005* to be submitted to the Engineer for approval before the commencement of any construction work.
 - Implementation of mitigation measures listed in *Practice Note for Registered Contractors No. 17 Control of Environmental Nuisance from Construction Sites* and compliance with the particular specification listed in *Part B of Annex 2 to Appendix C of ETWB TC(W) No. 19/2005* in relation to the use of dump trucks.
 - Implementation of a trip-ticket system in accordance with *DevB TC(W) No. 6/2010 and the Waste Disposal (Charges for Disposal of Construction Waste) Regulation* and the Demolition Contractor's regular submission of chits.
 - Provision of suitable enclosed bins or compaction units (separate from C&D Material) in an enclosed and covered area to be used for the temporary storage of general refuse prior to its removal from Site by a reputable waste contractor.

6 ECOLOGY

6.1 Introduction

6.1.1 Potential ecological impacts arising from the construction phase of the Project were assessed in **Chapter 7 of the EIA Report**. Mitigation measures have been recommended to minimise potential direct and indirect impacts to ecology and biodiversity. With the implementation of appropriate mitigation measures, no unacceptable ecological impact is anticipated.

6.2 Mitigation Measures

- 6.2.1 Mitigation measures to prevent potential construction phase direct and indirect ecological impacts have been recommended in the EIA Report and are detailed in the implementation schedule in **Appendix A**. Appropriate parties have been identified to be responsible for the design and implementation of these mitigation measures.
- 6.2.2 The three project elements will be assembled/constructed over a two-month period between mid-April and mid-October, thus avoiding impacts on the high number of waterbirds and wetland-dependent species present in the dry season.
- 6.2.3 Adequate site checks in the works area and in the vicinity of the footprint of all project elements will be conducted by a suitably qualified ecologist prior to commencement of works to search for substantive usage of the habitat by flora and/or fauna of conservation concern, e.g. the presence of an otter holt. If roosting or breeding species are found appropriate measures should be taken to avoid adverse impact, including adjustments to the timing of the works.
- 6.2.4 It is proposed to reduce the potential for disturbance impacts during the construction phase on species using adjacent habitats by installing a 2m-high solid, opaque screen around works areas. In addition, planting bamboo using the native species *Bambusa tuldoidea* (青稈竹, 花眉竹) a minimum of 2m-high and of sufficient depth to provide an effective screen will be provided along the access path to the new Tower Hides to reduce disturbance during the operational phase. It may be necessary to install artificial screens in the early phase while the natural screen planting reaches acceptable height/depth. Monitoring and Audit requirements regarding these measures are detailed in **Chapter 8** of this Manual.
- 6.2.5 All construction activity for TH2 and its associated access path, including the passage of construction vehicles, will cease two hours before sunset, this means 4pm in the wet season construction period, to avoid impacts on nocturnal roost sites and associated pre-roost gatherings of Collared Crow in the vicinity of Pond 20.
- 6.2.6 All construction activity for TH3 and the footpath will cease one hour before sunset to avoid impacts on ardeid roost or pre-roost sites in the vicinity.
- 6.2.7 Ahead of construction, ET checks will be conducted during the breeding season to check for the presence of breeding ardeids within 500m of the footprint of project elements. These checks should be carried out two weeks prior to construction commencing and the day before. Should any egret be discovered in the vicinity of works areas, the need for mitigation measures shall be assessed in consultation with AFCD.
- 6.2.8 Adequate site checks along haul roads and in the works area and in the immediate vicinity should be conducted prior to the commencement of works at TH2 and TH3 to detect substantive use of adjacent habitat by species of conservation concern. If roosts or breeding species are found, appropriate measures should be taken to avoid adverse impact, including adjustments to the timing of works.

6.3 Monitoring and Audit Requirements

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- 6.3.1 Regular inspection and audit of each works area shall be conducted both prior to and during the construction phase of the Project to ensure the recommended ecological mitigation measures are properly implemented.
 - 6.3.2 To detect substantive use of adjacent habitat by species of conservation concern, adequate site checks in the works area and in the immediate vicinity should be conducted prior to commencement of works at TH2 and TH3.
 - 6.3.3 Throughout the construction period, ET checks will be conducted during the early part of the breeding season (March to May) at works areas.
 - 6.3.4 When there are ongoing construction works within the Project Site, the ET shall carry out inspections once per week and the IEC shall carry out audits jointly with the ET once every two weeks.
 - 6.3.5 Inspection findings shall be logged in a site monitoring report with any discrepancies or concerns regarding the implementation and effectiveness of mitigation measures highlighted.

7 FISHERIES

7.1 Introduction

7.1.1 Potential fisheries impacts arising from the construction phase of the Project were assessed in **Chapter 8 of the EIA Report**. No unacceptable fisheries impact is anticipated.

7.2 Mitigation Measures

7.2.1 No mitigation measures are needed.

7.3 Monitoring and Audit Requirements

7.3.1 Regular inspection and audit of each works area adjacent to fishponds shall be conducted during the construction phase of the Project. When there are ongoing construction works within the Project Site, the ET shall carry out inspections once per week and the IEC shall carry out audits jointly with the ET once every two weeks.

7.3.2 Inspection findings shall be logged in a site monitoring report.

8 LANDSCAPE AND VISUAL

8.1 Introduction

- 8.1.1 Potential landscape and visual impacts arising from the construction phase of the Project were assessed in **Chapter 9 of the EIA Report**. Mitigation measures have been recommended to minimise potential landscape and visual impacts. With the implementation of appropriate mitigation measures, no unacceptable landscape and visual impact is anticipated.

8.2 Mitigation Measures

- 8.2.1 Mitigation measures to prevent construction phase landscape and visual impacts have been recommended in the EIA Report. All the recommended mitigation measures are detailed in the implementation schedule in **Appendix A**. Appropriate parties have been identified to be responsible for the design and implementation of these mitigation measures.

8.3 Monitoring and Audit Requirements

Baseline Monitoring

- 8.3.1 Prior to the commencement of construction works, a *Baseline Landscape and Visual Report* shall be prepared to check, record and report the status of the Landscape Resources (LRs) and Landscape Character Areas (LCAs) within the works areas and the Visually Sensitive Receivers (VSRs) within the visual envelope. The Landscape and Visual Impact Assessment (LVIA) in the EIA Report may be used to formulate the *Baseline Monitoring Report* provided that there have been no significant changes to the status of LR, LCAs and VSRs since the approval of the EIA Report.
- 8.3.2 If there have been significant changes to the status of LR, LCAs and VSRs since the approval of the EIA Report, the recommended landscape and visual mitigation measures should be reviewed to determine if such changes warrant a change in the design of the landscape and visual mitigation measures.

Audit

- 8.3.3 Regular inspection and audit of each works area shall be conducted during the construction phase of the Project to ensure that proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives. When there are ongoing construction works within the Project Site, the ET shall carry out inspections once per week and the IEC shall carry out audits jointly with the ET once every two weeks.
- 8.3.4 The screen planting of bamboo at the access to TH2 and TH3 shall be inspected and audited on a monthly basis by a qualified plant specialist for the first twelve months after planting; on a two-monthly basis during the second twelve months (months 13 to 24 inclusive); and on a quarterly basis for the third twelve months (months 25 to 36 inclusive).
- 8.3.5 Inspection findings shall be logged in a site monitoring report with any discrepancies or concerns regarding the implementation and effectiveness of mitigation measures highlighted.

9 INSPECTION/AUDIT

9.1 Site Inspection/Audit Requirements

9.1.1 Site inspection/audit provides a direct means to trigger and enforce the specified environmental protection and pollution control measures. In conjunction with the Project's contractual environmental requirements, the implementation of pollution control and mitigation measures, and a site deficiency and action reporting system (in accordance with the event contingency plan), site inspection/audit is one of the most effective tools available to enforce environmental protection requirements on site.

9.1.2 In order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented, when there are ongoing construction works within the Project Site the ET shall carry out inspections once per week and the IEC shall carry out audits jointly with the ET once every two weeks.

9.1.3 All observations and results of site inspection/audit will be recorded by the ET on a *Site Inspection/Audit Checklist* that will be passed to the Contractor. If non-compliance is found, the relevant Event/Action Plan shall be implemented.

9.1.4 The *Site Inspection/Audit Checklist* shall be prepared by the ET and verified by the IEC then submitted to the ER for approval. The ET is also responsible for formulation of the environmental site inspection/audit, deficiency and action reporting system.

9.1.5 The areas of inspection/audit shall not be limited to the environmental situation, pollution control and mitigation measures within the site; it will also review the environmental situation outside the site 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/audit:

- Recommendations on pollution control mitigation measures in the EIA Report.
- Works progress, programme and activities currently being carried out within the Site.
- Individual works methodology proposals (which shall include proposals on associated pollution control measures).
- Contract specifications on environmental protection.
- Relevant environmental protection and pollution control laws
- Previous site inspection/audit results.

9.1.6 The Contractor shall regularly update the ET Leader and IEC with relevant information regarding construction works to enable site inspections/audits to be carried out effectively. The inspection /audit results and any associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the ER and the Contractor within 24 hours, for taking action as appropriate. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection/audit, deficiency and action reporting system to report on any remedial measures subsequent to the site inspections/audits.

9.1.7 The inspections/audits carried out by the ET and IEC shall also check the implementation and effectiveness of previously recommended remedial measures.

9.1.8 Ad hoc site inspections/audits shall also be carried out if significant environmental problems are identified. Inspections/audits may also be required subsequent to receipt of an environmental complaint, or as part of the investigation/audit work, as specified in the Event/Action Plan.

9.2 Compliance with Legal and Contractual Requirements

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

- 9.2.2 In order that the works are in compliance with the contractual requirements, all the works method statements submitted by the Contractor to the ER for approval shall be sent to ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.
- 9.2.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated and that the any foreseeable potential for violating the laws can be prevented.
- 9.2.4 The Contractor shall regularly copy relevant documents to the ET Leader so that the checking work can be carried out. These document shall at least include an updated Work Progress Report, updated Works Programme, application letters for various licences/permits and copies of valid licences/permits when issued. The Site Diary shall also be made available for the ET Leader's inspection upon request.
- 9.2.5 The ET Leader shall advise the ER and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works may not be compatible with the works programme or may result in violation of environmental protection and pollution control requirements in due course, he/she shall advise the Contractor and the ER accordingly.
- 9.2.6 Upon receipt of the ET Leader's advice, the Contractor shall undertake immediate action to remedy the situation. The ER shall follow up to ensure that appropriate action has been taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

9.3 Environmental Complaints

- 9.3.1 Complaints shall be referred to the ET Leader for carrying out an investigation. The ET Leader shall undertake the following procedures upon receipt of a complaint:
- Log complaint and date of receipt and inform the ER immediately.
 - Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities.
 - If a complaint is valid and due to works, identify mitigation measures.
 - If mitigation measures are required, advise the Contractor accordingly.
 - Review the Contractor's response on the identified mitigation measures and the updated situation.
 - If the complaint is a referral from EPD, submit an *Interim Complaint Report* to EPD (after endorsement by ER) on status of the complaint investigation and follow-up action within the time frame assigned by EPD.
 - Undertake additional monitoring and audit, if necessary, to verify the situation and ensure that reasons for the original complaint do not recur.
 - Report the investigation results and the subsequent actions to remedy the source of complaint and respond to complainant directly or, if the complaint was a referral from EPD, submit a *Complaint Report* to EPD (after endorsement by ER) on status of the complaint investigation and follow-up action within the time frame assigned by EPD.
 - Record the complaint, investigation, the subsequent actions and the results in the monthly EM&A report.
- 9.3.2 During the complaint investigation, the Contractor and ER shall co-operate with the ET Leader in providing all necessary information and assistance to complete the investigation. If additional mitigation measures are identified in the investigation, the Contractor shall promptly implement these. The ER shall ensure that the measures have been carried out by the Contractor.

10 REPORTING

10.1 Baseline Monitoring Report

10.1.1 The baseline monitoring results, their interpretation and any proposals for the Action/ Limit level parameters shall be presented in the *Baseline Monitoring Report* that will be submitted to the ER for agreement. The *Baseline Monitoring Report* should be supported by baseline monitoring data in electronic format prepared in HTML or PDF format, along with information from the covering monitoring locations, equipment and protocols. The agreed *Baseline Monitoring Report* will then be reissued as a standalone report. The report shall be prepared by the ET and shall be verified by the IEC.

10.1.2 The *Baseline Monitoring Report* shall include at least the following:

- Up to half a page of Executive Summary
- Project background information
- Drawings showing the locations of the baseline monitoring stations
- Monitoring results including graphical plots, together with the following information, as needed:
 - Monitoring methodology
 - Name of the laboratory and types equipment used and calibration details
 - Parameters monitored
 - Monitoring locations
 - Monitoring date, time, frequency and duration
 - QA/QC results and detection limits
- Interpretation of the significance of monitoring results and explanation of any influencing factors, including:
 - Major activities, if any, being carried out in the Project Site
 - Weather conditions
 - Other factors which might affect the monitoring results
- Determination of Action and Limit levels for monitoring parameters, as needed.
- Baseline Landscape and Visual Report
- Any revisions for inclusion in the EM&A programme
- Comments and conclusions

10.2 Monthly EM&A Reports

10.2.1 The results and finding of all EM&A work required in the EM&A programme shall be recorded in the *Monthly EM&A Reports* prepared by the ET Leader. *Monthly EM&A Reports* shall be submitted to the ER within 10 working days of the end of each reporting month after being verified by the IEC. The first report will be submitted in the month after construction works commence. Each *Monthly EM&A Report* shall be submitted to the following parties: the Contractor, the IEC, the ER and EPD.

10.2.2 Before submission of the first *Monthly EM&A Report*, the ET Leader shall liaise with the parties on format of the monthly reports to be submitted as .pdf files via email.

10.2.3 The monthly EM&A Report shall include the following:

- 1-2 pages Executive Summary:
 - Any exceedances of Action and Limit levels
 - Compliant log
 - Notifications of any summons and successful prosecutions
 - Reporting changes
 - Future key issues

- Basic project information:
 - Project organisation, including key personnel contact details
 - Programme
 - Management structure
 - Works undertaken during the month
 - Any updates as needed to the scope of works and construction methodologies
- Brief Summary of EM&A Requirements:
 - All monitoring parameters
 - Environmental quality performance limits (Action and Limit Levels)
 - Event/Action Plan
 - Environmental mitigation measures as recommended in the EIA Report
 - Environmental requirements in contract documents
- Environmental Status:
 - Advice on the status of statutory environmental compliance such as the status of compliance with the EP conditions under the EIAO, submission status under the EP and implementation status of mitigation measures
 - Works undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.)
 - Drawings showing the Project Site, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations)
- Implementation Status: Advice on the implementation status of environmental protection/pollution control/mitigation measures, recommended in the EIA Report
- Monitoring results together the following information:
 - Monitoring methodology
 - Name of laboratory and types of equipment used and calibration details
 - Monitoring parameters
 - Monitoring locations
 - Monitoring date, time, frequency, and duration
 - Weather conditions during the period
 - Any other factors which might affect the monitoring results
 - QA/QC results and detection limits
- Report on any non-compliance, complaints, and any notifications of summons and successful prosecutions:
 - Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
 - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary
 - Record of all notification of summons and successful prosecutions for breaches of current environmental protection/pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary
 - Review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures
 - Description of the actions taken in the event of non-compliance and deficiency reporting
- Others:
 - An account of the future key issues as reviewed from the works programme and work method statements
 - Advice on the solid waste management status

- Record of any project changes from that originally proposed in the EIA Report (e.g. construction methods, programme, mitigation, design changes, etc.)
- Comments (for example, effectiveness and efficiency of the mitigation measures), recommendations (for examples, any improvement in the EM&A programme) and conclusions
- Appendices:
 - Action and Limit levels
 - Graphical plots of trends of the monitoring parameters at key stations over the past four reporting periods (where available) annotated against the following:
 - Major activities being carried out on site during the period
 - Weather conditions during the period
 - 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

10.3 Final Summary EM&A Report

10.3.1 The EM&A programme for construction stage shall be terminated upon the completion of the construction activities. The proposed termination should only be implemented after the proposal has been endorsed by the IEC and the ER followed by approval from the Director of Environmental Protection.

10.3.2 The *Final EM&A Review Report* for construction stage (to be submitted after completion of construction activities) shall be prepared by the ET and shall be verified by the IEC and should contain at least the following information:

- Executive Summary (1-2 pages)
- Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations, if any
- 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 EM&A programme
- A brief summary of EM&A requirements including:
 - Environmental mitigation measures for construction stage, as recommended in the project EIA Report
 - Environmental impact hypotheses tested
 - Environmental quality performance limits (Action and Limit levels)
 - All monitoring parameters
 - Event and Action Plans
- A summary of the implementation status of environmental protection and pollution control/mitigation measures for construction stage, as recommended in the project EIA Report and summarised in the updated implementation schedule
- A summary of the monitoring results over the period of the EM&A programme together with the following information:
 - Monitoring methodology
 - Name of laboratory and types of equipment used and calibration details
 - Monitoring parameters
 - Monitoring locations
 - Monitoring date, time, frequency, and duration
 - Graphical plots of monitored trends over the period of the EM&A programme
 - Any other factors which might affect the monitoring results
 - QA/QC results and detection limits

- A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
- A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate
- A description of the actions taken in the event of non-compliance
- A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up actions taken and results
- A review of the validity of EIA predictions for construction stage and identification of shortcomings in EIA recommendations
- Comments (for example, a review of the effectiveness and efficiency of the mitigation measures, the performance of the environmental management system, and the overall EM&A programme for construction stage)
- Recommendations and conclusions (for example, a review of success of the overall EM&A programme for construction stage to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary)

10.4 Letters Documenting Post-planting Landscape Inspections

10.4.1 Commencing after completion of the planting of the bamboo screen at TH2 and TH3, letter reports shall be prepared by the ET and submitted to the Director of Environmental Protection at the frequency indicated in **paragraph 8.3.5**.

10.5 Data Keeping

10.5.1 Documents such as the monitoring field records, site inspection forms etc. are not required to be included in the monthly EM&A reports for submission. However, all documents and records shall be kept by the ET and be ready for inspection upon request. All documents and data shall be kept by the ET for at least one year after termination of the EM&A programme.

10.6 Interim Notifications of Environmental Quality Limit Exceedances

10.6.1 With reference to the Event and Action Plans, when the environmental quality performance limits are exceeded, and if they are proven to be valid, the ET shall immediately notify the IEC and EPD, as appropriate. The notification should be followed up with advice to the IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals.

10.6.2 A sample template for the interim notification is provided in **Appendix B**.

Appendix A Implementation Schedule for the Project

EIA REPORT REF.	EM&A ACTION REF.	RECOMMENDED MITIGATION MEASURES	OBJECTIVES OF THE MEASURE AND MAIN CONCERNS TO ADDRESS	LOCATION OF MEASURE	WHO TO IMPLEMENT MEASURE?	WHEN TO IMPLEMENT MEASURE?*			STANDARD OR REQUIREMENTS FOR MEASURE TO ACHIEVE?
						D	C	O	
AIR QUALITY									
3.2.6	A.1	Use of approved Non-road Mobile Machinery (NRMM) for all site works areas	To minimise pollutants from exhaust emissions of mobile plant and equipment	All works areas	Construction Contractor		✓		Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation
3.6.2	A.2	Off-site Pre-fabrication of key elements for TH2 and TH3	To reduce air quality impacts associated with construction of new buildings	TH2 and TH3	Engineer + Construction Contractor	✓	✓		Additional measure for minimisation of detrimental impacts to wildlife and the local community
3.7.2	A.3	<ol style="list-style-type: none"> 1. Regular watering to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather 2. Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty materials storage piles near ASRs. 3. Side enclosure of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, spraying with water shall be carried out 4. Tarpaulin covering of all dusty vehicle loads transported to and from the Site 5. Use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry weather 6. Imposition of speed controls for vehicles on Site 7. Establishment and use of vehicle wheel and body washing facilities at the exit of the Site to minimise the fugitive dust emissions generated 8. Site layout should be carefully planned such that machinery and dust causing activities (e.g. 	To reduce fugitive dust emissions from works areas	All works areas	Construction Contractor		✓		Air Pollution Control (Construction Dust) Regulation

Note: * D = Deign Stage | C = Construction Stage | O = Operation Stage

EIA REPORT REF.	EM&A ACTION REF.	RECOMMENDED MITIGATION MEASURES	OBJECTIVES OF THE MEASURE AND MAIN CONCERNS TO ADDRESS	LOCATION OF MEASURE	WHO TO IMPLEMENT MEASURE?	WHEN TO IMPLEMENT MEASURE?*			STANDARD OR REQUIREMENTS FOR MEASURE TO ACHIEVE?
						D	C	O	
		<ul style="list-style-type: none"> haul roads and stockpiling areas) could be located away from the ASR as far as possible 9. Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs 10. Solid screens are recommended to be erected around any dusty construction activities 							
NOISE									
4.6.3	N.1	Prohibition of works during Restricted Hours	To restrict and reduce noise nuisance during restricted hours.	All works areas	Construction Contractor		✓		NCO
4.6.3	N.2	Prohibition of percussive piling	To restrict and reduce noise nuisance from the use of noisy and heavy piling equipment.	All works areas	Construction Contractor		✓		TM on Noise from Percussive Piling
4.9.1	N.3	<ul style="list-style-type: none"> 1. Adopt <i>Code of Practice on Good Management Practice to Prevent Violation of the NCO</i> 2. Before commencing work, the Contractor shall submit to the Project Engineer the method of working, equipment and noise mitigation measures intended to be used at the Site 3. Devise and execute working methods to minimise the noise impact on the surrounding sensitive uses, and provide experienced personnel with suitable training to ensure that those methods are implemented 4. PME should be kept to a minimum and the parallel use of noisy equipment/ machinery should be avoided 5. Turn off unused equipment 6. Regular maintenance (off-site) of all plant and equipment 	To restrict and reduce noise nuisance from works areas.	All works areas	Construction Contractor		✓		Mai Po Inner Deep Bay Ramsar Site Management Plan Code of Practice on Good Management Practice to Prevent Violation of the NCO (for Construction Industry)

Note: * D = Design Stage | C = Construction Stage | O = Operation Stage

EIA REPORT REF.	EM&A ACTION REF.	RECOMMENDED MITIGATION MEASURES	OBJECTIVES OF THE MEASURE AND MAIN CONCERNS TO ADDRESS	LOCATION OF MEASURE	WHO TO IMPLEMENT MEASURE?	WHEN TO IMPLEMENT MEASURE?*			STANDARD OR REQUIREMENTS FOR MEASURE TO ACHIEVE?	
						D	C	O		
WATER QUALITY										
5.4.17	WQ.1	Foundation works at TH2 and TH3 shall be aligned with the schedule of draining the adjacent gei wai set out in the <i>MPNR Management Plan 2019-2024</i> .	Making use of hydraulic isolation of adjacent gei wai to avoid pollution of other gei wai and Deep Bay	TH2 and TH3 for foundation works	Engineer + Construction Contractor	✓	✓		MPNR Management Plan 2019-2024	
5.4.27	WQ.2	A perimeter bund will be constructed around the work sites for TH2 and TH3 to ensure that any runoff generated from within these sites is discharged only into the adjacent drained gei wai	To ensure pollutants cannot discharge into other water-filled gei wai and so provide a pathway for pollutants to enter Deep Bay	TH2 and TH3 for foundation works	Engineer + Construction Contractor	✓	✓		Additional measure for minimisation of detrimental impacts to wildlife and the local community	
5.4.27	WQ.3	The majority of construction components shall be pre-fabricated off-site to avoid any impacts associated with construction on-site	To achieve zero polluted runoff from works areas by minimising on-site construction of building components	Off-site	Engineer + Construction Contractor	✓	✓			
5.4.27	WQ.4	All concrete will be mixed off-site and brought into each works area only when needed and only in the quantities required, so that there is no need to store (or dispose of) any surplus concrete	To achieve zero polluted runoff from works areas by avoiding concrete mixing, storage and/or disposal on site	Off-site	Construction Contractor		✓			
5.4.27	WQ.5	Any concrete spilled within the works area will be immediately cleaned up and removed from the area	To achieve zero polluted runoff from works areas by immediate cleaning up and removal of spilled concrete	All works areas	Construction Contractor		✓			
5.4.27	WQ.6	Plant, equipment and vehicles shall not be maintained or repaired within any works area in the Project Site	To achieve zero polluted runoff from works areas by handling and treating any resulting oil, chemical waste or other polluting substances off-site in an appropriate manner	Off-site	Construction Contractor		✓			
5.4.27	WQ.7	During re-fuelling, drip trays shall be provided at any fuel connection point. Any spilled fuel shall be collected and taken off-site for proper treatment/disposal	To achieve zero polluted runoff from works areas by carrying out the refuelling with extreme care	All works areas	Construction Contractor		✓			Good Site Practice
5.4.27	WQ.8	Materials, plant or equipment that could give rise to contaminated runoff during extreme rainfall will be	To minimise the quantity of contaminated runoff during	All works areas	Construction Contractor		✓			

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						D	C	O	
		protected by being covered, either by tarpaulin or by small gazebos that can be erected within minutes	extreme rainfall						
5.4.27	WQ.9	Each works area will be provided with at least one chemical toilet for use by workers. Sewage collected in these chemical toilets will be treated off-site	To ensure sewage is collected and treated off-site properly	All works areas	Construction Contractor		✓		
5.4.27	WQ.10	Each works area will be provided one bunded and covered area for the temporary storage of C&D material – one section for inert C&D material and one area for C&D waste. These areas will be emptied frequently, using construction material delivery vehicles that are empty on their return journey	To ensure proper storage of C&D material to avoid polluting adjacent gei wai or fishponds	All works areas	Construction Contractor		✓		
5.4.27	WQ.11	Each works area will be provided with at least one set of waterproof waste receptacles – one for recyclable waste and one for non-recyclable waste. These areas will be emptied frequently	To ensure proper storage of wastes to avoid polluting adjacent gei wai or fishponds	All works areas	Construction Contractor		✓		
5.6.2	WQ.12	<ol style="list-style-type: none"> Perimeter channels at site boundaries shall be provided to intercept storm runoff from outside the works areas so that it will not wash across the works areas and to direct all site runoff only into adjacent drained gei wai For the purpose of preventing soil erosion, exposed slope surfaces shall be covered e.g. by tarpaulin, and temporary access roads shall be protected by crushed stone or gravel Intercepting channels shall be provided (e.g. along the crest/edge of excavation) to prevent storm runoff from washing across exposed soil surfaces. Arrangements shall always be in place to ensure that adequate surface protection measures can be safely carried out well before the arrival of a rainstorm Earthworks final surfaces shall be well compacted and subsequent permanent works 	To minimise the quantity of contaminated runoff and muddy water from works areas by following the good site practice	All works areas	Construction Contractor		✓		ProPECC PN 1/94 Construction Site Drainage

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						D	C	O	
		<p>or surface protection shall be carried out immediately after the final surfaces are formed to prevent erosion. Appropriate drainage like intercepting channels shall be provided where necessary</p> <p>5. Measures shall be taken to minimise the ingress of rainwater into trenches – they shall be dug and backfilled in short sections</p>							
5.5.1	WQ.13	The two new tower hides will not be provided with toilets or washrooms. Runoff from the roof of the tower hides and from the boardwalks will not be contaminated	No wastewater will be generated during operation.	TH2 and TH3	Construction Contractor			✓	Additional measure for minimisation of detrimental impacts to wildlife and the local community
WASTE MANAGEMENT									
6.6.2	WM.1	Preparation of a WMP to manage waste on site	To identify potential environmental impacts from the generation of waste; to recommend appropriate waste handling, collection, sorting, disposal and recycling measures; and to categorise and permit segregation of C&D material (i.e. inert C&D materials, C&D waste, etc.) for off-site reuse, recycling, treatment and/or disposal	All works areas	Construction Contractor		✓		ETWB TC(W) No. 19/2005, Env Mgmt on Construction Sites
6.6.3	WM.2	Waste storage areas should be well maintained and cleaned regularly	To adopt good housekeeping practices and prevent waste materials being blown around by wind, flushed or leached into nearby waters, or creating odour nuisance or pest and vermin problems	All works areas	Construction Contractor		✓		Good Site Practice
6.6.4	WM.3	Store refuse pending removal in receptacles provided with close fitting covers and remove and properly dispose of refuse daily	To avoid waste materials be flushed or leached during inclement weather conditions such as heavy rainfall	All works areas	Construction Contractor		✓		PNRC No. 17 Control of Env Nuisance from Construction Sites

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						D	C	O	
6.6.4	WM.4	Dump trucks shall be fitted with covered box type dump bed and such dump trucks shall comply with the particular specification listed in Part B of Annex 2 to Appendix C of ETWB TC(W) No. 19/2005	To ensure C&D Material will be delivered to the appropriate designated outlets and dump trucks to minimise potential nuisance during transportation of waste	All works areas	Construction Contractor		✓		Part B of Annex 2 to Appendix C of ETWB TC(W) No. 19/2005
6.6.5	WM.5	Establishment of a Trip Ticket System to monitor the disposal of public fill and solid wastes at public filling facilities and landfills, and to control fly-tipping	To monitor the disposal of public fill and solid wastes at public filling facilities and landfills, and to control fly-tipping	Off-site	Construction Contractor		✓		DevB TC(W) No. 6/2010 and Waste Disposal (Charges for Disposal of Constr. Waste) Reg
6.6.6	WM.6	General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the construction contractor to remove general refuse from the Site, separately from C&D materials	To separate general refuses from C&D material and ensure proper disposal	All works areas	Construction Contractor		✓		Good Site Practice
6.6.7	WM.7	<ol style="list-style-type: none"> The Contractor shall observe and comply with the WDO and its subsidiary regulations The Contractor shall submit to the Engineer a WMP with appropriate mitigation measures including allocation of an area for waste segregation and shall ensure that day-to-day site operations comply with the approved WMP The Contractor shall minimise the generation of waste from his work. Avoidance and minimisation of waste can be achieved through changing or improving design and practices, careful planning and good site management The Contractor shall ensure that different types of wastes are segregated on-site and stored in different containers, skips or stockpiles to facilitate reuse/recycling of waste and, as the last resort, disposal at different outlets 	To further minimise the environmental impacts related to waste arising from the Project	All works areas	Construction Contractor		✓		Good Site Practice Waste Disposal (Chemical Waste) (General) Regulation

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						D	C	O	
		<p>5. The reuse and recycling of waste shall be practised as far as possible. The recycled materials shall include paper/cardboard, timber and metal, etc.</p> <p>6. The Contractor shall ensure that C&D materials are sorted into public fill (inert portion) and C&D waste (non-inert portion). Public fill, which comprises soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt, shall be reused in earth filling, reclamation or site formation works. C&D waste, which comprises metal, timber, paper, glass, junk and general refuse, shall be reused, recycled or, as the last resort, disposed of at landfill</p> <p>7. The Contractor shall record the amount of waste generated, recycled and disposed of</p> <p>8. The Contractor shall use a trip ticket system for the disposal of C&D materials to any designated PFRFs and/or landfill</p> <p>9. Training shall be provided for workers about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling</p> <p>10. The Contractor shall not permit any sewage, wastewater or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the Site onto any adjoining land or allow any waste matter that is not part of the final product from waste processing plants to be deposited anywhere within the Site or onto any adjoining land. He shall arrange removal of such matter from the site in a proper manner to the satisfaction of the Engineer</p>							

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						D	C	O	
		11. The Contractor shall observe and comply with the Waste Disposal (Chemical Waste) (General) Regulation							
6.6.8	WM.8	<ol style="list-style-type: none"> 1. Construction material, stockpiles, chemical and waste storage/recycling facilities should be immediately moved to secured area 2. Construction material, stockpiles and waste storage/recycling facilities should be covered by an impermeable sheeting, if necessary 3. Intercepting channels will be provided at the edge of the excavated area to prevent storm runoff from washing across the exposed surface 	To adopt additional control measures when inclement weather (e.g. heavy rain, typhoon, etc.) is forecast	All works areas	Construction Contractor		✓		Good Site Practice
6.6.9	WM.9	Visitors will be encouraged to bring their own reusable water bottles and food containers, rather than single-use containers, and free drinking water for visitors will be provided at the MPEC. No waste receptacles are provided within MPNR and visitors will be encouraged to take their waste home with them	To minimise the amount of waste generated by visitors to MPNR	Throughout MPNR	WWF			✓	Additional measure for minimisation of detrimental impacts to wildlife and the local community
Table 6-3	WM.10	Inert C&D Material: PFRF at Tuen Mun Area 38	To ensure proper management and treatment of inert C&D material	Off-site	Construction Contractor		✓		
Table 6-3	WM.11	C&D Waste (non-inert): Segregation + recycling by local recyclers / residual waste to NENT Landfill	To ensure proper management and treatment of C&D waste (non-inert)	Off-site	Construction Contractor		✓		
Table 6-3	WM.12	C&D Waste (vegetation): Vegetation shall be composted on-site	To ensure proper management and treatment of C&D waste (veg)	On-site	WWF		✓		
Table 6-3	WM.13	General Refuse: Segregation + off-site recycling by local recyclers/residual waste to NWNT RTS	To ensure proper management and treatment of general refuse	Off-site	Construction Contractor		✓		
ECOLOGY									
7.9.3	E.1	The three project elements will be assembled/constructed over a two-month period between mid-April and mid-October	To avoid impacts on the high number of waterbirds and wetland-dependent species present in the dry season	All works areas	Construction Contractor		✓		Additional measure for minimisation of detrimental impacts to wildlife and the

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						D	C	O	
7.9.4	E.2	Adequate site checks in the works area and in the vicinity of the footprint of all project elements will be conducted by a suitably qualified ecologist prior to commencement of works to search for substantive usage of the habitat by flora and/or fauna of conservation concern, e.g. the presence of an otter holt	To avoid impacts on mammals, in particular Eurasian Otter	All works areas	ET		✓		local community
7.9.6	E.3	Install a 2m-high solid, opaque screen around works areas	To mitigate disturbance to species using adjacent habitats	All works areas	Construction Contractor		✓		
7.9.6	E.4	Provide screen planting using native bamboo species <i>Bambusa tuldooides</i> (青稈竹, 花眉竹) to the access path to the new Tower Hides to reduce disturbance during the construction and operational phase (see also LV.6, below)	To mitigate disturbance to species using adjacent habitats	Access to THs	Construction Contractor +WWF		✓	✓	
7.9.7	E.5	All construction activity for TH2 and its associated access path, including the passage of construction vehicles, will cease two hours before sunset, this means 4pm in the wet season construction period	To avoid impacts on nocturnal roost sites and associated pre-roost gatherings of Collared Crow in the vicinity of Pond 20	TH2	Construction Contractor		✓		
7.9.8	E.6	Ahead of construction, ET checks will be conducted during the breeding season. These checks should be carried out two weeks prior to construction commencing and the day before. Should any egret be discovered in the vicinity of works areas, the need for mitigation measures shall be assessed in consultation with AFCD	To check for the presence of breeding ardeids within 500m of the footprint of project elements	All works areas	ET		✓		
7.9.9	E.7	All construction activity for footpath and TH3 will cease one hour before sunset	To prevent disturbance to nearby ardeid pre-roost and roost activities	TH3 and footpath	Construction Contractor		✓		
7.9.11	E.8	Adequate site checks along haul roads and in the works area and in the immediate vicinity should be conducted prior to the commencement of works at TH2 and TH3	To detect substantive use of adjacent habitat by species of conservation concern. If roosts or breeding species are found,	TH2 and TH3	ET		✓		

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						D	C	O	
			appropriate measures should be taken to avoid adverse impact, including adjustments to the timing of works						
7.9.12	E.9	Prior to any tree pruning or felling works, a careful check should be conducted by an experienced ecologist to ensure that bats or active bird nests are not present	To avoid disturbance to bat and bird species nesting in trees	All works areas	ET		✓		
7.9.14	E.10	Desilting channels at gei wai 19, reconnecting gei wai 19a with gei wai 19b, and merging the six sub-ponds (20a to 20f) of gei wai 20 (for TH2); and enhancement of gei wai 8a through reprofiling and connection of gei wai 8a with gei wai 7 (for TH3).	To provide habitat enhancement to offset the loss of very small areas of gei wai bund and pond bund due to construction of the new TH2, TH3 and boardwalk path	TH2 and TH3	Construction Contractor +WWF		✓		
FISHERIES									
8.3.19	F.1	Contingency plan when construction works are in the vicinity of commercial fish ponds: 1. Identification of potential emergency situations – consult with WWF and owners of the ponds. 2. Emergency response team 3. Emergency response procedures 4. List of emergency telephone hotlines 5. Location and type of emergency equipment 6. Training plan and testing for effectiveness	To prevent perforated liner and damaged/destabilized pond bunds	In the vicinity of commercial fish ponds	Construction Contractor		✓		Additional measure for minimisation of detrimental impacts to wildlife and the local community
LANDSCAPE AND VISUAL									
9.7.4	LV.1	CM1: Construction lighting control: to ensure no night time lighting at all works areas.	To restrict and reduce light pollution during night time.	All works areas	Construction Contractor		✓		Additional measure for minimisation of detrimental impacts to wildlife and the local community
9.7.4	LV.2	CM2: All existing trees and vegetation outside the works footprints shall be properly preserved and	To protect the landscape quality of the existing trees and vegetation.	All works areas	Construction Contractor		✓		DevB TCW No. 7/2015

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						D	C	O	
		protected.							
9.7.4	LV.3	CM3: All the construction materials shall be properly stored at the designated locations within the works areas.	To ensure proper storage of construction materials and enhance tidiness on site.	All works areas	Construction Contractor		✓		Good Site Practice
9.7.4	LV.4	CM4: Erection of screen hoarding for TH2 and TH3 (where appropriate, hoardings with surface treatment/ colour suitable to the rural context shall be used).	To minimise potential impact on landscape / visual quality during construction of TH2 and TH3.	All works areas	Construction Contractor		✓		Additional measure for minimisation of detrimental impacts to wildlife and the local community
9.7.5	LV.5	OM1: Suitable/responsive design of the proposed Boardwalks and Bird-watching Hides	To enhance overall landscape / visual quality by fitting in with the surrounding natural landscapes.	TH2 and TH3, New Boardwalks	Design Consultant/ WWF	✓			
9.7.5	LV.6	OM2: Provide screen planting using native bamboo species <i>Bambusa tuldooides</i> (青稈竹, 花眉竹) to the access to the new Tower Hides to soften the appearance of the hard elements of the Project.	To enhance overall landscape / visual quality by fitting in with the surrounding natural landscapes.	Access to THs	Construction Contractor		✓	✓	

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Appendix B Sample Template for Interim Notification

Incident Report on Action Level or Limit Level Non-compliance

To _____

Attention _____

Fax No. _____

Project	Mai Po Nature Reserve Infrastructure Upgrade Project	
EP No.		
Date and Time		
Monitoring Location		
Parameter		
Action & Limit Levels		
Measured Level		
Reason for Non-compliance		
Action to be Taken		
Remarks		

Prepared by _____

Signature _____

Designation _____

Date _____

local people
global experience

SMEC is recognised for providing technical excellence and consultancy expertise in urban, infrastructure and management advisory. From concept to completion, our core service offering covers the life-cycle of a project and maximises value to our clients and communities. We align global expertise with local knowledge and state-of-the-art processes and systems to deliver innovative solutions to a range of industry sectors.