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1. INTRODUCTION

1.1 Purpose of the Environmental Monitoring and Audit Manual

1.1.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the setup of an EM&A programme to ensure the effective implementation of mitigation measures recommended in the Environmental Impact Assessment (EIA) report, relevant environmental protection, and pollution prevention and control legislation. The EM&A programme will be used to assess the effectiveness of the implementation of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial actions.

1.1.2 This Manual outlines the monitoring and audit programme for the construction phase of the proposed Project, namely "Phase III Redevelopment of The Hong Kong Federation of Youth Groups Jockey Club Sai Kung Outdoor Training Camp" (hereinafter referred to as "the Project"). It aims to provide systematic procedures for monitoring, auditing and minimizing the environmental impacts associated with the construction works.

1.1.3 The EM&A requirements are prepared in accordance with the requirements stipulated in Annex 21 of the Technical Memorandum on EIA Process (EIAO-TM) and the EIA Study Brief (ESB-215/2010). Reference has also been made to EPD's "Environmental Monitoring and Audit Guidelines for Development Projects in Hong Kong".

1.1.4 Findings, recommendations and requirements of the EIA, all relevant requirements under the Environmental Impact Assessment Ordinance (EIAO) and other environmental legislation, the Hong Kong Planning Standards and Guidelines (HKPSG) are adopted in the preparation of this Manual.

1.1.5 The recommended EM&A programme in this Manual contains the following information :

- Duties of the Environmental Team (ET) in the environmental monitoring and audit programme;
- Information on project organisation, construction schedule and activities;
- Information on the tentative construction programme and the necessary environmental monitoring and audit programme to track the varying environmental impacts;
- Definition of Action and Limit levels, and establishment of Event and Action Plans;
- Requirements of reviewing pollution sources and work procedures in the event of non-compliance of the environmental criteria;
- Requirements of presentation of environmental monitoring and audit data and appropriate reporting procedures;
- An Implementation Schedule (**Appendix A**) of the environmental mitigation measures recommended in the EIA report for the Project;
- Record forms (**Appendix B**) to be adopted where applicable during the construction phase of the Project.

1.2 Project Background

1.2.1 The project "Phase III Redevelopment of The Hong Kong Federation of Youth

Groups Jockey Club Sai Kung Outdoor Training Camp (hereinafter referred to as the “Project”) is to redevelop the existing Jockey Club Sai Kung Outdoor Training Camp and increase the number of dormitories and canteen capacity in order to meet the increasing public demand. The redevelopment works include the following major components: construct seven dormitory buildings comprising a total of 19 units on the lower portion of the slope southeast of the existing buildings; construct a new canteen block at the centre of the camp comprising a dining hall, a cafeteria, activity rooms and a drop off point for arrival of visitors; construct of two platform decks for outdoor activities; and construct a new wastewater treatment and reuse system.

1.2.2 Earthworks and building works partly or wholly within an existing Country Park is classified as a designated project under Item Q.1 of Part I, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499). The reuse of treated sewage effluent from a treatment plant is classified as a designated project under Item F.4 of Part I, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499). The Project, which incorporates these two features, thus falls under the remit of the EIAO.

1.2.3 An EIA study has been undertaken to provide information on the nature and extent of environmental impacts arising from the construction of the Project and related activities taking place concurrently and to contribute to decisions on the overall acceptability of the Project.

1.3 Project Location and Scope

1.3.1 The Project Site is located at the southern extremity of Tai Mong Tsai, at the foothill of Cheung Shan and is accessed via Tai Mong Tsai Road (**Figure 1.1**). The site lies between the wooded slopes of Cheung Shan and Tai Mong Tsai Road to the northeast, and the channel with a wooded slope at the opposite end of the study area to the southwest. The channel is the estuary of Tai Mong Tsai Stream, which flows to Inner Port Shelter. The Project Site is currently occupied by camp facilities/buildings, landscape amenity areas and vegetated slopes.

1.3.2 The Project has three major components: 1) one new canteen block at the center of the existing camp site; 2) seven three-storey dormitories and adventure facilities on the hillside southeast of the existing camp site, and 3) two platform decks near the existing slipway to provide ground-level open area for outdoor activities. The capacity of the camp site would be increased to about 460 bed spaces and dining services would be expanded to serve 350 people. A wastewater reuse system would also be installed for re-use of wastewater generated from the new canteen kitchen for irrigation and toilet flushing. The total footprint of Phase III redevelopment is about 0.65 ha. The Master Layout Plan is shown in **Figure 1.2**.

1.3.3 In terms of zoning, the Project area is covered by the Outline Zoning Plan S/SK-TMT/4 - Tai Mong Tsai & Tsam Chuk Wan. Zones within the Project Site include Recreation and Country Park. Part of the Project would be confined to the existing camp site (Recreation Zone), while the rest would like within Country Park Zone. The Coastal Protection Area located upstream of the Project Site would be avoided. After the proposed redevelopment, the camp would continue to provide the aforementioned services to the general public. This supports the functions of the Country Parks, which are “designated for the purposes of nature conservation, countryside recreation and outdoor education” (AFCD 2010). Therefore, no rezoning will be proposed under the

Project; and there would be no reduction in the extent of the Sai Kung West Country Park. Within the Country Park boundaries, “all uses and developments require the consent of Country and Marine Parks Authority, and approval from Town Planning Board is not required” (TPB 2010).

1.4 Project Implementation Programme

1.4.1 The construction works are proposed to commence in February 2011 and to be completed in 15 months, by April 2012. The tentative construction programme is summarised in **Figure 1.3**.

1.5 Project Organisation

1.5.1 The proposed project organisation is shown in **Figure 1.4**. The responsibilities and qualifications of respective parties are listed as below.

Project Proponent (The Hong Kong Federation of Youth Groups)

1.5.2 The Project Proponent is The Hong Kong Federation of Youth Groups and will assume overall responsibility for the project.

The Contractor

1.5.3 The main duties of the Contractor are summarised below:

- Provide assistance to ET in carrying out monitoring;
- 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;
- Discuss with the ET, IEC and ER on any additional mitigation measures identified to be required by the ET and implement the agreed measures to alleviate any identified environmental impact to acceptable levels;
- Report to the ET on the actions taken targeting at environmental protection for inclusion in the monthly report to be prepared by the ET
- Adhere to the procedure for carrying out complaint investigation in accordance with **Section 8.3** of this Manual

The Engineer or Engineer Representative (ER)

1.5.4 The ER is to be employed by project proponent, and his main duties are summarised below:

- Supervise the Contractors activities and ensure that the requirements in this Manual are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans; and
- Review the EM&A Reports submitted by the ET and follow up the recommendations
- Adhere to the procedure for carrying out complaint investigation in accordance with **Section 8.3** of this Manual

The Environmental Team (ET)

1.5.5 The ET is to be employed by project proponent/contractor. The ET Leader shall have relevant professional qualifications and at least 7 years of experience in EM&A or environmental management subject to approval of the ER and the EPD. The ET shall not be in any way an associated body of the Contractor and the IEC.

- 1.5.6 The main duties of ET are summarised below:
- Monitor the various environmental parameters as required in this 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 site inspections to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and anticipate environmental issues for proactive action before problems arise;
 - Audit on the environmental monitoring data and the site environmental conditions;
 - Prepare and submit the EM&A reports to the Project Proponent and EPD;
 - 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;
 - Assist the Contractor and the Engineer/ ER in formulating any necessary corrective actions and/ or additional mitigation measures, and liaising with relevant Government Departments where necessary
 - Adhere to the procedures for carrying out complaint investigation in accordance with **Section 8.3**.

Independent Environmental Checker (IEC)

- 1.5.7 The IEC is to be employed by project proponent / engineer to audit the results of the EM&A works carried out by the ET. The IEC shall have relevant professional qualifications and at least 7 years of experience in environmental monitoring and audit (EM&A) or environmental management subject to approval of the ER and the EPD. The IEC shall not be in any an associated body of the Contractor or the ET.

- 1.5.8 The main duties of IEC are summarised below:
- Check, review, verify the EM&A works performed by the ET;
 - Conduct random site inspection and audit the monitoring activities and results;
 - Evaluate the EM&A reports submitted by the ET;
 - Review the proposals for mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
 - Adhere to the procedures for carrying out complaint investigation in accordance with **Section 8.3**

1.6 Structure of the EM&A Manual

- 1.6.1 Following this chapter, the remainder of the EM&A Manual is set out as follows:
- Chapter 2 sets out EM&A requirements for noise ;
 - Chapter 3 sets out EM&A requirements for water quality
 - Chapter 4 sets out EM&A requirements for air quality
 - Chapter 5 sets out EM&A requirements for ecology ;
 - Chapter 6 sets out EM&A requirements for landscape and visual;
 - Chapter 7 sets out EM&A requirements for waste management ;
 - Chapter 8 details the EM&A reporting requirements

2. CONSTRUCTION NOISE MONITORING

2.1 Introduction

- 2.1.1 Potential noise impacts arising from the construction and operation of the Project have been evaluated.
- 2.1.2 During construction phase, construction noise impacts arising from the use of Powered Mechanical Equipment (PME) has been assessed comprehensively and the noise impact to the surrounding noise sensitive receiver would be well complied with the day-time noise criteria. Adverse construction noise impact is therefore not expected.
- 2.1.3 The operational impact of general traffic noise and noisy equipment of the proposed wastewater reuse system has been evaluated. Noise protection measures and design for the Project include maximising distance of the new dormitory (NSR-D) from road, installation of air conditioners for the buildings of NSR-D, and enclosure of noisy equipment for the wastewater reuse system. Therefore, it is anticipated that no operational impact from traffic noise and fixed noise source would be generated.
- 2.1.4 Construction and operational noise monitoring of the Project is therefore considered not necessary. Weekly site audits are required to ensure that the recommended noise impact control and mitigation measure are properly implemented.

2.2 Audit Requirement

- 2.2.1 It is recommended that audits shall be carried out by the Environmental Team on a weekly basis to ensure that the recommended mitigation measures are carried out by the Contractor. Special attention shall be paid to the enforcement of construction noise control measures during construction process. The ET should consider the programme and site for construction works in determining the location to carry out the auditing.

2.3 Noise Mitigation Measures

- 2.3.1 The EIA report has recommended various construction noise control and mitigation measures. These are summarised below for easy reference. The Contractor shall be responsible for the design and implementation of these recommended measures.
- Contractor shall comply with and observe the Noise Control Ordinance (NCO) and its current subsidiary regulations;
 - Before the commencement of any work, the Contractor shall submit to the Engineer for approval the method of working, equipment and sound-reducing measures intended to be used at the Project Site;
 - Contractor shall devise and execute working methods that will minimise the noise impact on the surrounding environment, and shall provide experienced personnel with suitable training to ensure that these methods are implemented;
 - Only well-maintained plant and equipment should be operated on-site;
 - Plant/equipment should be serviced regularly during the construction programme;
 - Machines that may be in intermittent use should be shut down or

- throttled down to a minimum between work periods;
- Silencers and/or mufflers on construction equipment should be utilised and should be properly maintained during the construction programme;
 - Noisy activities should be scheduled to minimise exposure of nearby NSRs to high levels of construction noise. For example, noisy activities should be scheduled for midday or at times coinciding with periods of high background noise (such as during peak traffic hours);
 - Noisy equipment such as emergency generators shall always be sited as far away as possible from noise sensitive receivers;
 - Mobile plant/equipment should be sited as far away from NSRs as possible; and
 - Material stockpiles and other structures should be effectively utilised as noise barriers, where practicable.

3. WATER QUALITY

3.1 Introduction

- 3.1.1 Potential water quality impacts arising from the construction and operation of the Project have been evaluated.
- 3.1.2 Due to the small scale of the Project, water quality impact during construction phase arising from the site runoff and sewage generated from construction workforce would be minimized with the implementation of good site practice. No adverse construction water quality impact is anticipated.
- 3.1.3 The increase of wastewater with the operation of the redevelopment Project is expected. However, it is anticipated that the advanced water treatment technology of the existing sewage treatment plant and the proposed wastewater reuse system would be capable to treat the additional wastewater and complied with the corresponding water quality objective, legislation and requirement.
- 3.1.4 Construction and operational water quality monitoring of the Project is therefore considered not necessary. Weekly site audits are required to ensure that the recommended water quality impact control and mitigation measure are properly implemented.

3.2 Audit Requirement

- 3.2.1 It is recommended that audits shall be carried out by the Environmental Team on a weekly basis to ensure that the recommended mitigation measures are carried out by the Contractor. Special attention shall be paid to the enforcement of site runoff control measures during construction process. The ET should consider the programme and site for construction works in determining the location to carry out the auditing.

3.3 Water Quality Mitigation Measure

- 3.3.1 The EIA report has recommended mitigation measures during the construction and operational phases of the Project. The Best Management Practices (BMPs) will be implemented in controlling water pollution during the construction phase. The guidelines for handling and disposal of construction site discharges as detailed in EPD's ProPECC Note PN1/94 "Construction Site Drainage" will be followed. The water pollution control measures that are considered most relevant to this Project are listed below which should be implemented by the Contractor during the execution of the site formation and road works, where practicable:

Runoff from Construction Site

- High loading of suspended solids (SS) in construction site runoff shall be prevented through proper site management by the contractor;
- The boundary of critical work areas shall be surrounded by sandbags, ditches, or embankments. Accidental release of soil or refuse onto the adjoining land should be prevented by the provision of site hoarding or earth bunds at the site boundary. These facilities should be constructed in advance of site formation works and

roadworks;

- Consideration should be given to plan construction activities to allow the use of natural topography of the Project Site as a barrier to minimise uncontrolled non-point source discharge of construction site runoff;
- Temporary ditches or earthen bunds should be provided to facilitate directed and controlled discharge of runoff into storm drains via sand/ silt removal facilities such as sand traps, silt traps and sediment retention basin. Oil and grease removal facilities should also be provided where appropriate, for example, in area near plant workshop/ maintenance areas;
- Sand and silt removal facilities, channels and manholes should be maintained and the deposited silt and grit should be removed regularly by the contractor, and at the onset of and after each rainstorm to ensure that these facilities area functioning properly;
- Slope exposure should be minimised where practicable especially during the wet season. Exposed soil surfaces should be protected from rainfall through covering temporarily exposed slope surfaces or stockpiles with tarpaulin or the like;
- Haul roads should be hard paved by laying crushed rock, gravel or other granular materials to minimise discharge of contaminated runoff;
- Water run-off flow rates should be slowed across exposed soil surfaces through use of sandbags;
- Plant workshop/ maintenance areas, if any, should be bunded and constructed on a hard standing. Sediment traps and oil interceptors should be provided at appropriate locations;
- Manholes (including newly constructed ones), if any, should be adequately covered or temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system;
- Construction works should be programmed to minimise soil excavation works where practicable during rainy conditions;
- Chemical stores should be contained (bunded) to prevent any spills from contact with water bodies. All fuel tanks and/ or storage areas should provided with locks and be sited on hard surface;
- Chemical waste arising from the construction of the Project Site should be properly stored, handled, treated and disposed of in compliance with the requirements stipulated under the Waste Disposal (Chemical Waste) (General) Regulation;
- Drainage facilities must be adequate for the controlled release of storm flows.

Wastewater from Construction Site

- Sewage generated from the construction workforce should be contained in chemical toilets until connection to public foul sewer can be provided. Chemical toilets should be provided at a minimum rate of about 1 per 50 workers. The facility should be serviced and cleaned by a specialist contractor at regular intervals;

- Vehicle wheel washing facilities should be provided at the site exit such that mud, debris, etc. deposited onto the vehicle wheels or body can be washed off before the vehicles leave the Project site;
- The section of the road between the wheel washing bay and the public road should be hard paved with backfill to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains.

Oils and Solvents

- Spillage of fuel oils or other polluting fluids should be prevented at source. It is recommended that all stocks should be stored inside proper containers and sited on sealed areas, preferably surrounded by bunds.

3.3.2 During the operational phase, apart from the online monitoring and control system for the wastewater quality, regular sampling programme will be devised to further safeguard and ensure that the quality of the treated effluent is suitable for reuse. Should the treated effluent not meet the required standards for irrigation and flushing or in case of breakdown of the wastewater system, a contingency plan would be triggered. The wastewater reuse system will be shut down. The canteen wastewater from Phase III will be held in the new holding tank for the MBR. The new holding tank has a capacity of 15m³ and a minimum storage time of half day capacity. The canteen wastewater will then be diverted to the existing sewage treatment plant via the coarse screen chamber, and it will be held in the equalisation holding tank, with a capacity of 96m³, for screening and treatment. The existing sewage treatment plant (with maximum treatment capacity of 152.7m³/d) for Phase I & II has a daily flow of 35m³ per day, so it has a spare capacity of more than 50%, which is adequate to treat the canteen wastewater. The treated effluent for direct discharge will not undergo any chlorination process. During this period, both irrigation system and flushing system will use the fresh water from city main as water source. The water reuse system would be fully inspected for problem fixing before re-operation.

4. AIR QUALITY

4.1 Introduction

4.1.1 Potential air quality impacts arising from the construction and operation of the Project have been evaluated.

4.1.2 During construction phase, unacceptable impacts from the criteria pollutants (such as NO_x, SO₂ and CO) are unlikely as significant level of emission due to diesel or petroleum fuelled machinery operating on site is not anticipated in considering the small scale of the Project. Adverse construction dust impact is not expected with the low truck transportation and the implementation of good site practice stipulated in the Air Pollution Control (Construction Dust) Regulation.

4.1.3 Operational odour impact may be raised from the proposed wastewater reuse system during operational phase. With enclosure of the existing sewage treatment plant and adoption of aerobic wastewater treatment process by the new wastewater reuse system, no adverse odour impact is anticipated.

4.1.4 Construction dust monitoring and operational odour monitoring of the Project is therefore considered not necessary. Weekly site audits are required to ensure that the recommended air quality impact control and mitigation measure are properly implemented.

4.2 Audit Requirement

4.2.1 It is recommended that audits shall be carried out by the Environmental Team on a weekly basis to ensure that the recommended mitigation measures are carried out by the Contractor. Special attention shall be paid to the enforcement of dust control measures during construction process. The ET should consider the programme and site for construction works in determining the location to carry out the auditing.

4.3 Dust Mitigation Measures

4.3.1 The EIA report has recommended various dust control and mitigation measures. The following measures are specifically recommended for implementation together with those presented in the Air Pollution Control (Construction Dust) Regulation:

- The designated haul road should be hard paved;
- The site should be water sprayed four times a day during site formation work of the residential portion of the Project Site;
- Dump truck beds for material transport should be totally enclosed using impervious sheeting;
- any excavated dusty materials or stockpile of dusty materials should be covered entirely by impervious sheeting or sprayed with water so as to maintain the entire surface wet, and recovered or backfilled or reinstated within 24 hours of the excavation or unloading;
- The stockpiled malodorous materials, if any, should be placed as far as possible from any ASRs and removed from Project Site as soon as possible, and they should be covered entirely by plastic tarpaulin sheets;
- Dusty materials remaining after a stockpile is removed should be wetted with water;

- The vehicle washing area and the section of the road between the washing facilities and the exit point should be paved with e.g. concrete, bituminous materials or hardcore or similar;
- Stockpile of dusty materials to be either covered entirely by impervious sheeting, placed in an area sheltered on the top and the 3 sides; or sprayed with water so as to maintain the entire surface wet;
- All dusty materials to be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty material wet;
- Vehicle speed to be limited to 10 kph except on completed access roads;
- The portion of road leading only to a construction site that is within 30 m of a designated vehicle entrance or exit should be kept clear of dusty materials;
- Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction sites;
- The load of dusty materials carried by vehicles leaving a construction site should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle;
- The working area of excavation should be sprayed with water immediately before, during and immediately after (as necessary) the operations so as to maintain the entire surface wet.

5. ECOLOGY

5.1 Introduction

5.1.1 The EIA has recommended ecological mitigation measures to be undertaken during construction phase of the Project. This section defines the EM&A requirements to ensure the proposed ecological impact mitigation measures are effectively implemented. The purposes of ecological monitoring and audit are:

- To verify the accuracy of the predictions of the ecological assessment study;
- To detect unpredicted ecological impacts arising from the proposed project;
- To monitor the effectiveness of the mitigation measures; and
- To recommend action plans in response to unpredicted impacts, and/ or failed mitigation

5.1.2 The performance of monitoring and audit from an ecological prospective should be integrated with the overall monitoring and audit plan for the project as a whole.

5.2 Monitoring and Audit during Construction Phase

5.2.1 According to the EIA, ecological mitigation measures include transplantation of *Aquilaria sinensis*, mangrove and woodland compensatory planting and good site practice. **Figure 5.1** shows the location of woodland and mangrove compensatory planting sites.

5.2.2 Impacts to the protected tree *Aquilaria sinensis* have been minimised by adjustment of layout. Of the 8 nos. of *Aquilaria sinensis* recorded within the site formation boundary, 3 will be retained and 5 will be transplanted. Transplanting would be implemented by a qualified landscape contractor appointed by the Project proponent. The landscape contract should also cover 2 years of maintenance to ensure survival of the planting during the establishment period at both sites. Monthly site inspection should be carried out by the landscape auditor of the ET (see 6.3.2) for the first three month after planting and quarterly thereafter for two years. Survival and growth of representative species should be observed and recorded with photo records.

5.2.3 Loss of the small mangrove area under the Platform Deck at Area B would be mitigated by planting mangrove droppers on the sandflat near existing established mangrove stands. An area of 0.01 ha along the intertidal zone on the existing sandflat would be replanted with mangrove. Mangrove planting has been one of the activities organised by the camp and campers can also participate in the compensatory mangrove planting. A total area of 160m² at the intertidal zone was planted with *Kandelia* droppers during conservation education activities by campers between March and April 2010 when the droppers were ripe. This can be considered as advance implementation of mangrove compensation. Mangrove planting will be carried out again in March-April 2011. A planting plan will be prepared by the Camp Operator with the assistance of ET, including identification of locations on the sandflat suitable for plantings, collection of droppers, organisation of campers for the activities and scheduling of planting. The ET will oversee the planting activities and monitor survival and growth of the mangroves quantitatively for the first three months and quarterly thereafter for one year. The mangrove seedlings

planted at each stand will be sampled, and height and percentage survival measured. Monitoring will be verified by the Independent Environmental Checker (IEC).

- 5.2.4 Loss of 0.31 ha of woodland and associated vegetation will be mitigated by compensatory woodland planting. The plant list will include mainly native tree and shrub species which are present in the existing habitats and are valuable to wildlife, e.g. providing food source for birds, bats and butterflies. Species selected would include *Aquilaria sinensis*, *Schefflera heptaphylla*, *Machilus* spp., *Sapium discolor*, *Sapium sebiferum* and *Gordonia axillaris*. Due to limited space within the Project site, only about 0.03 ha of temporary works area would be replanted with native trees. Liaison has been made with AFCD to identify a site of 0.8 ha for compensatory planting in the vicinity of the site (Lui Ta Shek) within Sai Kung West Country Park. About 4,000 no. trees will be planted at 1.5 m spacing on the site. Species to be planted should include native species found in the area and pioneer species with higher survival rates. Both on-site and off-site tree planting would be implemented by a qualified landscape contractor appointed by the Project proponent. The landscape contract should also cover 2 years of maintenance to ensure survival of the planting during the establishment period at both sites. Monthly site inspection should be carried out by the landscape auditor of the ET (see 6.3.2) for the first three month after planting and quarterly thereafter for two years. Survival and growth of representative species should be observed and recorded with photo records.
- 5.2.5 The landscape plan and transplantation plan should be prepared by the Landscape Architect and certified by the ET Leader and verified by the Independent Environmental Checker (IEC) as conforming to the information, requirements and recommendations set out in the approved EIA Report before submission to the relevant authorities.
- 5.2.6 Potential disturbance to the surrounding environment will also be minimised through good site practice and precautionary measures for air and water quality and noise impacts (see Chapters 2, 3 and 4). Weekly site inspections will be carried out by the Environmental Team (ET) to ensure the implementation of good site practices and to identify areas necessary for maintenance, cleaning or repair.

5.3 Event and Action Plans for Ecology during Construction Phase

- 5.3.1 Should non-compliance of the ecological impacts occur, actions in accordance with the action plan stated in [Table 5.1](#) should be carried out.

Table 5.1
Event and Action Plan for Ecological Impact - Construction Phase

Action Level	Environmental Team (ET) Leader	Independent Environmental Checker (IEC)	Camp operator/ Landscape Contractor
Poor survival or health of mangrove planting	<ol style="list-style-type: none"> 1. Identify source 2. Inform the IEC 3. Discuss remedial actions with the IEC and Camp operator 4. Monitor remedial actions until rectification 	<ol style="list-style-type: none"> 1. Check report 2. Discuss with the Camp operator on possible remedial measures 4. Advise the Camp operator on effectiveness of proposed remedial 	<ol style="list-style-type: none"> 1. Amend planting programme and replant as necessary

Action Level	Environmental Team (ET) Leader	Independent Environmental Checker (IEC)	Camp operator/ Landscape Contractor
	has been completed	measures	
Poor survival or health of woodland planting	<ol style="list-style-type: none"> 1. Identify source 2. Inform the IEC 3. Discuss remedial actions with the IEC and Landscape Contractor 4. Monitor remedial actions until rectification has been completed 	<ol style="list-style-type: none"> 1. Check report 2. Discuss with the Landscape Contractor on possible remedial measures 4. Advise the Landscape Contractor on effectiveness of proposed remedial measures 	<ol style="list-style-type: none"> 1. Amend maintenance programme and replant as necessary
Poor survival of transplanted trees	<ol style="list-style-type: none"> 1. Identify source 2. Inform the IEC 3. Discuss remedial actions with the IEC and Landscape Contractor 4. Monitor remedial actions until rectification has been completed 	<ol style="list-style-type: none"> 1. Check report 2. Discuss with the Landscape Contractor on possible remedial measures 4. Advise the Landscape Contractor on effectiveness of proposed remedial measures 	<ol style="list-style-type: none"> 1. Amend maintenance programme and replant as necessary

5.4 Ecological Mitigation Measures

5.4.1 The EIA report has recommended various mitigation measures including avoidance, minimisation and compensation. These are summarised below for easy reference. The Contractor/Camp Operator shall be responsible for the design and implementation of these recommended measures.

- The Project has avoided sensitive habitat such as the stream estuary in Coastal Protection Area and major mangrove/sandflat habitat.
- Impacts on woodland, trees, a plant species of conservation interest *Aquilaria sinensis* and the natural coastline is minimised throughout selection of the current layout option. Individual trees of *Aquilaria sinensis* recorded within the site formation boundary will be preserved or transplanted.
- During construction phase, potential disturbance to the surrounding environment, in particular fauna of conservation interest such as Brown Fish Owl and Short-nosed Fruit Bat will also be minimised through good site practice and precautionary measures for air and water quality and noise impacts. During operation phase, precautionary measures including sensitive light design and well-organised field trips and activities would minimise impacts to the wildlife.
- The supporting pile for the platform deck would be constructed using the mini bore piling method, to avoid the need for dredging. Sand bags will be placed on the periphery of the piling works area to prevent the displaced soil from flowing into the sea. The piling works will be scheduled for low tide periods as possible to minimise water quality impact.
- Compensatory planting and monitoring of 0.01 ha of mangrove droppers on the sandflat near existing established mangrove stands.
- Compensatory planting and monitoring of 0.03 ha of woodland within the Project Site and 0.8 ha of woodland in the vicinity of the site (Lui Ta Shek) within Sai Kung West Country Park. The landscape contract should also

- cover 2 years of maintenance to ensure survival of the planting during the establishment period. Species to be planted should include native species found in the area and pioneer species with higher survival rates.
- Similar to the current practice, nature conservation programmes will also be well planned to minimise impacts on stream and intertidal communities, for example, by limiting the size of organised groups and providing sufficient guidelines for surveying wildlife and vegetation.

6. LANDSCAPE AND VISUAL

6.1 Introduction

6.1.1 The EIA has recommended landscape and visual mitigation measures to be undertaken during construction and operation phases of the Project. This section defines the EM&A requirements to ensure the proposed landscape and visual impact mitigation measures are effectively implemented.

6.1.2 The construction phase EM&A of the landscape and visual environment and mitigation works shall be carried out as part of the site audit programme. Specific EM&A during operation phase of the Project is not required as long as the proposed mitigation measures in the EIA and as depicted in the Landscape Plan are fully implemented.

6.2 Baseline Monitoring

6.2.1 Baseline changes with respect to the landscape and visual environments should be carried out in reference to the recorded baseline conditions of the site as described in the EIA. The monitoring should in particular record changes of each landscape resource, landscape character area and the view conditions of each visually sensitive receiver. Parameters used to describe changes in each of the above should be the same as in the EIA.

6.2.2 The baseline monitoring should be conducted as a one-off site survey prior to commencement of any construction works.

6.3 Monitoring and Audit

6.3.1 Monitoring and audit should be undertaken during the construction phase of the Project to ensure and check that the implementation and maintenance of landscape and visual mitigation measures are being properly carried out. Site inspections should be undertaken at least once every two weeks through the construction period.

6.3.2 A landscape auditor (as a member of the ET) shall be employed to review Contractor's submission and proposals and to monitor and audit the Contractor's landscape works in particular to ensure the existing trees retained on-site are being well preserved, tree transplanting and felling operations are being undertaken in accordance with the requirements, procedures and specifications as stipulated in the contract and the approvals granted by concerned authorities, and all the newly planted vegetations are being maintained properly during the establishment period.

6.3.3 In particular, the extent of the agreed works areas should be regularly checked during the construction phase. Any trespass by the Contractor outside the limit of the works, including any damage to existing trees, woodland and vegetation should be noted.

6.3.4 The landscape auditor should also audit the proposed operation phase mitigation measures in the EIA to ensure they are fully implemented by the Contractor within the Project design and construction.

6.4 Event and Action Plans

6.4.1 Should non-compliance of the landscape and visual impacts occur, actions in accordance with the action plan stated in [Table 6.1](#) should be carried out.

Table 6.1
Event and Action Plan for Landscape and Visual Impact - Construction Phase

Action Level	Environmental Team (ET) Leader	Independent Environmental Checker (IEC)	Engineer's Representative (ER)	Contractor
Non-conformity on one occasion	<ol style="list-style-type: none"> 1. Identify source 2. Inform the IEC and the ER 3. Discuss remedial actions with the IEC, the ER and the Contractor 4. Monitor remedial actions until rectification has been completed 	<ol style="list-style-type: none"> 1. Check report 2. Check the Contractor's working method 3. Discuss with the ER and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures 	<ol style="list-style-type: none"> 1. Notify the Contractor 2. Ensure remedial measures are properly implemented 	<ol style="list-style-type: none"> 1. Amend working methods 2. Rectify damage and undertake remedial measures or any necessary replacement
Repeated Non-conformity	<ol style="list-style-type: none"> 1. Identify source 2. Inform the IEC, the ER and EPD 3. Increase monitoring (site audit) frequency 4. Discuss remedial actions with the IEC, the ER and the Contractor 5. Monitor remedial actions until rectification has been completed 6. If exceedance stops, cease additional monitoring (site audit) 	<ol style="list-style-type: none"> 1. Check report 2. Check the Contractor's working method 3. Discuss with the ER and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures 5. Supervise implementation of remedial measures 	<ol style="list-style-type: none"> 1. Notify the Contractor 2. Ensure remedial measures are properly implemented 	<ol style="list-style-type: none"> 1. Amend working methods 2. Rectify damage and undertake remedial measures or any necessary replacement

6.5 Landscape and Visual Mitigation Measures

6.5.1 A comprehensive range of landscape and visual mitigation measures (LMM) and landscape framework have been developed in conjunction with the site planning and phasing of the site works. These measures are described below and summarised in [Table 6.2](#).

6.5.2 Recommended landscape mitigation measures at construction stage are:

- LMM1 - Minimizing construction area and contractor's temporary works area to avoid unnecessary impacts to landscape resources and minimize visual intrusion.
- LMM2 - Site hoarding designed sensitively in both color and form to screen views to the construction works.

- LMM3 - Preservation of existing tree to be retained on area not affected by the proposed development.
- LMM4 - Demarcation of the tree protection zone for retention of trees
- LMM5 - Operational time restrictions to limit after dark welding and lighting.

6.5.3 To minimize the impact on landscape and visual features, proper provision of mitigation measures during the design stage would result in a visually more compatible design when viewed at adjacent environment. Subject to the detailed design, possible mitigation measures to be considered during design stage should include:

- LMM6 - Selection of fast-growing mix of native trees and shrubs in compensation for vegetation removal and disturbance.
- LMM7 - Landscape treatment such as green roof, vertical greening and screen planting including climber plants to screen and soften surface of built structures and mitigate the landscape and visual impact.
- LMM8 - Staggered built form with building height corresponding to the natural sloping landform to enhance visual quality.
- LMM9 - Sensitive treatment and design to external finishes of the built structure to ensure element with colour, texture and tonal quality being compatible to the existing landscape context.
- LMM10 - Maintenance of planting works upon completion.

6.5.4 To mitigate the loss of 232 trees, 150 nos. of standard size trees and 125 nos. of whip trees shall be planted within site. Therefore, the number of loss tree will be compensated with a ratio of not less than 1:1. In addition, 4000 nos. of tree whip shall be planted within nearby AFCD Country Park area as off-site compensatory planting.

6.6 Landscape Plan

6.6.1 As details of the proposed planting cannot be ascertain at the EIA stage, it is recommended that a detailed Landscape Plan be submitted before commencement of planting or landscape works of the Project. The Landscape Plan should include the locations, size, number and species of plantings, design details, implementation programme, maintenance and management schedules, and drawings in scale of 1:1000 showing the landscape and visual mitigation measures. The Landscape Plan should be certified by the ET Leader and verified by the Independent Environmental Checker (IEC) as conforming to the information, requirements and recommendations set out in the approved EIA Report before submission to the relevant authorities.

6.6.2 The implementation schedule for the recommended mitigation measures is presented in **Appendix A**.

- 6.6.3 If the above measures are not sufficient to restore the impacts to acceptable levels upon the advice of ET Leader, the Contractor shall liaise with the ET Leader on some other mitigation measures, endorsed by IEC and propose to ER for approval, and implement the mitigation measures.

Table 6.2
Summary of Landscape and Visual Mitigation Measures

LMM	Recommended Landscape and Visual Mitigation Measures	Objectives of the Recommended Measures & Main Concerns	Location / Timing	Requirements or standards for the measure to achieve	Funding/ Implementation Agent	Management and Maintenance Agent
LMM1	Minimising construction area and contractor's temporary works area to avoid unnecessary impacts to landscape resources and minimise visual intrusion.	Preservation of landscape resources and minimisation of visual intrusion	Project area / Commencement of construction	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM2	Site hoarding designed sensitively in both color and form to screen views to the construction works.	Visual enhancement	Project area / Commencement of construction	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM3	Preservation of existing trees to be retained on areas not affected by the proposed development.	Conservation of existing trees; Visual screening	Project area not affected by tree surgery works / Commencement of construction	Comply to LAO PN No. 7/2007	Project Proponent / Contractor	Project Proponent / Contractor
LMM4	Demarcation of the tree protection zone for trees to be retained	Preservation of existing trees	Project area / Commencement of construction and throughout construction period	Demarcation of temporary protective fencing shall be agreed and erected before other works commence	Project Proponent / Contractor	Project Proponent / Contractor
LMM5	Operational time restrictions to limit after-dark welding and lighting.	Limit nighttime glare	Project area / Throughout the construction period	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM6	Selection of a mix of fast growing native trees and	Visual screening; Landscape	Project area / Construction period	Selection and agree on the specified plant	Project Proponent /	Project Proponent /

LMM	Recommended Landscape and Visual Mitigation Measures	Objectives of the Recommended Measures & Main Concerns	Location / Timing	Requirements or standards for the measure to achieve	Funding/ Implementation Agent	Management and Maintenance Agent
	shrubs in compensation for vegetation removal and disturbance.	compensation		species	Contractor	Contractor
LMM7	Landscape treatment such as green roof, vertical greening and screening plantings, including climber plants to screen and soften the surface of built structures and mitigate the landscape and visual impact.	Visual enhancement	Project area / Construction period	Selection and agree on the specified plant species	Project Proponent / Contractor	Project Proponent / Contractor
LMM8	Staggered built form with building height corresponding to the natural sloping landform to enhance visual quality.	To provide an interesting view on the visual receiver and to lower the overwhelming effect that may be created by the proposed building blocks	Commencement of construction and throughout the construction period	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM9	Sensitive treatment and design to external finishes of the built structure to ensure elements' colour, texture and tonal quality are compatible with the existing landscape context.	Visual enhancement	Commencement of construction and throughout the construction period	N/A	Project Proponent / Contractor	Project Proponent / Contractor
LMM10	Maintenance of planting works upon completion.	Landscape compensation	Operation period	Agree on the maintenance requirement and	Project Proponent / Contractor	Project Proponent / Contractor

LMM	Recommended Landscape and Visual Mitigation Measures	Objectives of the Recommended Measures & Main Concerns	Location / Timing	Requirements or standards for the measure to achieve	Funding/ Implementation Agent	Management and Maintenance Agent
				programme		

7. WASTE MANAGEMENT

7.1 General Requirements

- 7.1.1 The contractor is responsible for waste control within the construction site, removal of the waste material produced from the site and implementation of any mitigation measures to minimise waste or redress problems arising from waste generated on the site.
- 7.1.2 Upon appointment, the main contractor of each construction contract should prepare and implement an Environmental Management Plan (EMP) in accordance with ETWB TCW No. 19/2005 – Environmental Management on Construction Sites which should describe the arrangements for avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal of different categories of waste to be generated from the construction activities. Such a management plan should incorporate site specific factors, such as the designation of areas for segregation and temporary storage of reusable and recyclable materials. The EMP should be developed taking into account the recommended control measures given in this section where appropriate. The EMP should provide recommendations for appropriate disposal routes if waste cannot be recycled. The EMP should include the method statement for demolition and transportation of the excavated materials and other construction wastes. The EMP should be submitted to the Engineer for approval. The contractor should implement the waste management practices in the EMP throughout the construction stage of the Project. The EMP should be reviewed regularly and updated (preferably monthly) by the contractor. The EMP should take into account the recommended mitigation measures in the EIA Report.
- 7.1.3 The contractor also should refer to the Construction and Demolition Material Management Plan (C&DMMP) included as part of the EIA to facilitate him in the preparation of the EMP of the contract. The C&DMMP provides the ways to minimize the generation and maximize the reuse of the C&D material at the early stage of the Project.
- 7.1.4 Training of construction staff should be undertaken by the contractor about the concept of site cleanliness and appropriate waste management procedures. The contractor should develop and provide toolbox talk for on-site sorting of C&D materials to enhance worker's awareness in handling, sorting, reuse and recycling of C&D materials. Requirements for staff training should be included in the EMP.
- 7.1.5 Good planning and site management practice should be employed to eliminate over ordering or mixing of construction materials to reduce wastage. Proper storage and site practices will minimise the damage or contamination of construction materials.
- 7.1.6 Where waste generation is unavoidable, the potential for recycling or reuse should be rigorously explored. If waste cannot be recycled, disposal routes described in the EMP should be followed. A recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be implemented. In order to monitor the disposal of C&D material and solid wastes at public filling facilities and landfills and to control fly-tipping, a trip-ticket system should be included. One may make reference to ETWB TCW No. 31/2004 for details.

7.1.7 Regular cleaning and maintenance of the waste storage area should be provided.

7.2 Construction Waste Mitigation Measures

7.2.1 In formulating the EMP in respect to waste management, the following hierarchy should be considered:

- Avoidance and minimization to reduce the potential quantity of C&D materials generated;
- Reuse of materials as practical as possible;
- Recovery and recycling as far as possible; and
- Proper treatment and disposal in respect to relevant laws, guidelines and good practice.

7.2.2 Based on the above waste management options, a management and control plan will be formulated during the detailed design stage. Good management and control can prevent the generation of significant amount of waste. On-site sorting of construction wastes will be recommended. Good site control will include secondary on-site sorting that will avoid the generation of “mixed waste”. Construction wastes shall be sorted to remove contaminants, with the inert materials broken up into small pieces before being transported to Refuse Transfer Station (RTS) for subsequent delivery to landfill sites.

7.2.3 Chemical and oily wastes generated from the construction activities, vehicle and plant maintenance and oil interceptors should be disposed of as chemical waste in strict compliance with the Waste Disposal (Chemical Waste) (General) Regulations.

7.2.4 The demolition and construction work shall be considered in the planning and design stages to reduce the generation of C&D waste where possible. In addition, the project proponent shall require the contractor to reuse inert C&D materials (e.g. excavated soil) or in other suitable construction sites as far as possible, to minimize the disposal of C&D materials to public fill landfills. The project proponent shall encourage the contractor to maximize the use of recycled or recyclable C&D materials, as well as the use of non-timber formwork to further minimize the generation of construction waste.

7.2.5 The following additional control/measures are recommended to be followed by the Contractor:

- Storage of different waste types – different types of waste should be segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. An on-site temporary storage area equipped with required control measures (e.g. dust) should be provided;
- Trip-ticket system – in order to monitor the proper disposal of non-inert C&D waste to landfills and to control fly-tipping, a trip-ticket system should be included as one of the contractual requirements and audited by the Environmental Team;
- Records of Wastes – a recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed;
- Training – The contractor should provide his workers with proper training of appropriate waste management procedure to achieve waste reduction as far as practicable and cost-effective through recovery, reuse and recycling and avoid contamination of reusable C&D materials;

- Incorporate the “Recommended Pollution Control Clauses for Construction Contracts” in respect to removal of waste material from the construction site into the contract of the contractor.

7.2.6 The relevant construction waste pollution clauses for construction contracts include the following information.

Waste Minimisation

7.2.7 The Contractor shall submit to the Engineer for approval an EMP with appropriate mitigation measures including the allocation of an area for waste segregation and shall ensure that the day-to-day site operations comply with the approved EMP.

7.2.8 The Contractor shall minimise the generation of waste from his work. Avoidance and minimisation of waste generation can be achieved through changing or improving design and practices, careful planning and good site management.

7.2.9 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 as appropriate.

7.2.10 The reuse and recycling of waste shall be practised as far as possible. The recycled materials shall include paper/cardboard, timber and metal etc.

7.2.11 The Contractor shall ensure that Construction and Demolition (C&D) materials are sorted into public fill (inert portion) and C&D waste (non-inert portion). The 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. The C&D waste which comprises metal, timber, paper, glass, junk and general garbage shall be reused or recycled and, as the last resort, disposal of at landfills.

7.2.12 The Contractor shall record the amount of wastes generated, recycled and disposed of (including the disposal sites).

7.2.13 The Contractor shall use a trip ticket system for the disposal of C&D materials to any designated public filling facility and/or landfill.

7.2.14 Training shall be provided for workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.

Waste Nuisance Control

7.2.15 The Contractor shall not permit any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the Project Area onto any adjoining land or allow any waste matter (or refuse) which is not part of the final product from waste processing plants to be deposited anywhere within the Project Area (or onto any adjoining land). He shall arrange removal of such matter from the Project Area [or any building erected or to be erected thereon] in a proper manner to the satisfaction of the Engineer in consultation with the Director of Environmental Protection.

Chemical Waste Control

- 7.2.16 The Contractor shall observe and comply with the Waste Disposal (Chemical Waste) (General) Regulation.
- 7.2.17 The Contractor shall apply for registration as chemical waste producer under the Waste Disposal (Chemical Waste) (General) Regulation when chemical waste is produced. All chemical waste shall be properly stored, labelled, packaged and collected in accordance with the Regulation.

7.3 Operational Phase Waste Management Measures

- 7.3.1 Screening and sludge will follow the existing disposal regime. The screening and sludge will be transported and properly disposed at landfills. The silt will be contained inside sealed bags to prevent leakage of foul water during transportation. With these measures and practices properly implemented, the cumulative environmental impact during operation stage would be negligible.
- 7.3.2 Kitchen waste compost machine will be installed in the kitchen of the new canteen block to convert some of the kitchen waste to compost for fertilization purpose. It is expected that the generation of kitchen waste would be reduced. A kitchen consultant would be involved in the detailed design of the machine.
- 7.3.3 It is also recommended that collection bins for used aluminium cans, waste paper and glass bottles should be provided at strategic locations of the residential development area to promote and encourage recycling by campers during the operational phase.

7.4 Site Audit

- 7.4.1 The implementation schedule of the recommended mitigation measures is presented in **Appendix A**.
- 7.4.2 During the site inspections and the document review procedures as mentioned in this manual, the ET shall pay special attention to the issues relating to waste management, and check whether the Contractor has implemented the recommended mitigation measures.
- 7.4.3 Auditing should be carried out periodically to determine if waste is being managed in accordance with prescribed waste management procedures and the EMP. The audits should examine all aspects of waste management including waste generation, storage, recycling, treatment, transportation, and disposal. The general site inspections including waste management issues will be undertaken weekly by the ET to check all construction activities for compliance with all appropriate environmental protection and pollution control measures, including those set up in the EMP. Meanwhile, waste management audit will also be carried out as part of the monthly audit by the IEC.

8. ENVIRONMENTAL AUDITING

8.1 Site Inspection

8.1.1 Site inspection provides a direct means to initiate and enforce specified environmental protection and pollution control measures. Site inspection is one of the most effective tools to enforce the environmental protection requirements in works areas. Site inspections should be undertaken routinely to inspect construction activities to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented.

8.1.2 The ET Leader should be responsible for formulating the environmental site inspection, the deficiency and action reporting system, and for carrying out the site inspection works. He / she should submit a proposal for site inspection and deficiency and 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.

8.1.3 Site inspections should be carried out once per week. The areas of inspection should not be limited only to the environmental situation, pollution control and mitigation measures within the site, but rather should also review conditions outside the works area where there is a potential for direct or indirect impacts from site activities. The ET Leader should make reference to the following information in conducting the inspection:

- (i) The EIA and EM&A recommendations on environmental protection and pollution control mitigation measures;
- (ii) Ongoing results of the EM&A programme;
- (iii) Work progress and programme;
- (iv) Individual work methodology proposals (which shall include proposal on associated pollution control measures);
- (v) Contract specifications on environmental protection;
- (vi) Relevant environmental protection and pollution control laws; and
- (vii) Previous site inspection results undertaken by the ET and others.

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

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

8.2 Compliance with Legal and Contractual Requirements

8.2.1 Construction activities in Hong Kong must comply with contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws.

8.2.2 To ensure that construction works comply with contractual requirements on

environmental aspects, all works method statements submitted by the Contractor to the ER for approval should be sent to the ET Leader for determination of the adequacy of environmental protection and pollution control measures. The implementation schedule of mitigation measures is summarised in **Appendix A**.

- 8.2.3 The ET Leader should also review the progress and programme of the works to ensure that environmental laws have not and will not be violated, and that any potential for violating laws is avoided.
- 8.2.4 The Contractor should regularly copy relevant documents to the ET Leader so that works can be checked as planned and scheduled. The documents should at least include the updated Works Progress Reports, updated Works Programme, any application letters for different licences / permits under the environmental protection laws, and copies of all valid licences/ permits. The site diary should also be available for inspection upon request by the ET Leader.
- 8.2.5 After reviewing the documentation, the ET Leader should report cases of non-compliance with contractual or statutory requirements on environmental protection and pollution control to the IEC and the Contractor for their follow-up actions. If the ET Leader's review concludes that the current status on licence / permit application and any environmental protection and pollution control preparation works might result in non-compliance with environmental protection and pollution control requirements, he / she will also advise the Contractor and the ER accordingly.
- 8.2.6 Upon receipt of the advice, the Contractor should undertake immediate action to correct the non-compliant situation. The ER should follow up to ensure that appropriate action has been taken to satisfy contractual and legal requirements.

8.3 Environmental Complaints

- 8.3.1 Complaints should be referred to the ET Leader for action. The ET Leader should undertake the following procedures upon receipt of any complaint:
- (i) log the 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) if the complaint is valid and due to works, identify mitigation measures in consultation with the IEC;
 - (iv) advise the Contractor if mitigation measures are required;
 - (v) review the Contractor's response to the identified mitigation measure(s) and the updated situation;
 - (vi) if the complaint is transferred from EPD, submit an interim report to EPD on the status of the complaint investigation and follow-up action within the time frame assigned by EPD;
 - (vii) undertake additional monitoring and audit to verify the situation as needed and review that circumstances leading to the complaint do not recur;
 - (viii) report investigation results and subsequent actions to the complainant (if the source of complaint is EPD, the results should be reported within the timeframe assigned by the EPD); and

- (ix) record the complaint, investigation, any resulting corrective actions and results of those actions in the monthly EM&A reports.

9. REPORTING

9.1 General

9.1.1 The EM&A reports shall be submitted on paper and digitally according to the specification of the ER and EPD. All the monitoring data (baseline and impact) shall also be submitted on CD-ROM.

9.1.2 The ET Leader should prepare and submit reports to include baseline monitoring report, monthly 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 should be made available to the Director of Environmental Protection.

9.2 Baseline Monitoring Report

9.2.1 The ET Leader should prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report should be submitted to the Contractor, the IEC, the ER and EPD. The ET Leader should liaise with the relevant parties on the number of copies they require. The report format and baseline monitoring data format should be agreed with EPD prior to submission.

9.2.2 The baseline monitoring report should include at least the following:

- (i) up to half a page executive summary;
- (ii) brief project background summary;
- (iii) drawings showing locations of the baseline monitoring stations;
- (iv) monitoring results (both hard and soft copies) together with the following information:
 - monitoring methodology;
 - types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations;
 - monitoring date, time, frequency and duration; and
 - quality assurance (QA) / quality control (QC) results and detection limits;
- (v) details of influencing factors, including:
 - major activities carried out on the site during the period;
 - weather conditions during the period; and
 - other factors which might affect results;
- (vi) determination of the action and limit levels for each monitoring parameter and statistical analysis of the baseline data, the analysis should conclude if there is any significant difference between control and impact stations for the parameters monitored;
- (vii) revisions for inclusion in the EM&A Manual; and
- (viii) comments, recommendations and conclusions.

9.3 Monthly EM&A Report

- 9.3.1 The results and findings of all EM&A work required in this Manual should be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report should be prepared and submitted within 10 working days of the end of each reporting month, with the first report due the month after construction commences. Each monthly EM&A report should be submitted to the following stakeholders: Contractor, IEC, ER, and EPD. Before submission of the first EM&A report, the ET Leader should liaise with these stakeholders on the required number of copies and format of the monthly reports in both hard copy and electronic medium.
- 9.3.2 The ET leader should review the number and location of monitoring stations and parameters every six months, or as needed, to adapt the program to any changes in the surrounding environment and the nature of works in progress.

9.4 First Monthly EM&A Report

- 9.4.1 The first monthly EM&A report should include at least 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:
 - works undertaken during the month with illustrations (such as location of works); and
 - drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations);
 - (iv) a brief summary of EM&A requirements including:
 - all monitoring parameters;
 - environmental quality performance limits (Action and Limit levels);
 - Event-Action Plans;
 - environmental mitigation measures, as recommended in the project EIA Final 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 project EIA Final Report;
- (vi) monitoring results (in both hard and soft copies) together with the following information:
 - monitoring methodology;
 - name of types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations;
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period;
 - any other factors which might affect the monitoring results; and
 - QA/QC results and detection limits;
- (vii) report on non-compliance, complaints, and notifications of summons and successful prosecutions:
 - record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-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 noncompliance;
- (viii) 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; and
 - comments (for example, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

9.5 Subsequent Monthly EM&A Reports

9.5.1 Subsequent monthly EM&A reports should include the following:

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

- notifications of any summons and successful prosecutions;
 - reporting changes; and
 - future key issues.
- (ii) environmental status:
- works undertaken during the month with illustrations (such as location of works); and
 - drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
- (iii) implementation status:
- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA;
- (iv) monitoring results (in both hard and soft copies) together with the following information:
- monitoring methodology;
 - name of types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations;
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period;
 - any other factors which might affect the monitoring results; and
 - QA / QC results and detection limits.
- (v) report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (action and limit levels);
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-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 noncompliance.
- (vi) 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; and

- comments (for example, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.
- (vii) appendix
 - 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:
 - major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors that might affect the monitoring results.
 - monitoring schedule for the present and next reporting period;
 - cumulative statistics on complaints, notifications of summons and successful prosecutions; and
 - outstanding issues and deficiencies.

9.6 Quarterly EM&A Summary Reports

9.6.1 A quarterly EM&A summary report of around five pages should be produced and should contain at least the following information.

- (i) up to half a page executive summary;
- (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 (action and limit levels); and
 - environmental mitigation measures, as recommended in the project EIA Final Report;
- (iv) advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the project EIA Final 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 any trends in 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 (action and limit levels);

- (ix) a brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures;
- (x) a summary description of actions taken in the event of non-compliance and any follow-up procedures related to any 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) comments (for example, a review of the effectiveness and efficiency of the mitigation measures); recommendations (for example, any improvement in the EM&A programme) and conclusions for the quarter; and
- (xiii) proponents' contacts and any hotline telephone number for the public to make enquiries.

9.7 Final EM&A Review Report

9.7.1 The final EM&A report should include the following information:

- (i) an executive summary;
- (ii) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (iii) basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the entire construction period;
- (iv) 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 project EIA Final Report;
 - Event-Action Plans.
- (v) a summary of the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA Report, summarised in the updated implementation schedule;
- (vi) graphical plots of the trends of monitored parameters over the construction period for representative monitoring stations, including the post-project monitoring 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) a summary of non-compliance (exceedances) of the environmental quality performance limits (action and limit levels);
- (viii) a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
- (ix) a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;

- (x) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- (xi) 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;
- (xii) a review of the validity of EIA predictions and identification of shortcomings in EIA recommendations; and
- (xiii) comments (for example, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme);
- (xiv) recommendations and conclusions (for example, a review of success of the overall EM&A programme to cost-effectively identify deterioration and to initiate prompt effective mitigation action when necessary).

9.8 Data Keeping

9.8.1 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms) are required to be included in the monthly EM&A reports. However, any such document should be well kept by the ET Leader and be ready for inspection upon request. All relevant information should be clearly and systematically recorded in the document. Monitoring data should also be recorded in magnetic media form, and the soft copy must be available upon request. Data format should be agreed with EPD. All documents and data should be kept for at least one year following completion of the construction contract.

9.9 Interim Notifications of Environmental Quality Limit Exceedances

9.9.1 With reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader should immediately notify the IEC and EPD, as appropriate. The notification should be followed up with advice to IEC 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 B**.