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Environmental Monitoring and Audit Manual  
for Proposed Residential cum Passive Recreational Development  
within "Recreation" ("REC") Zone and "Residential (Group C)" Zone  
at Various Lots in DD 104, Yuen Long, N.T.

(Final Report)

Prepared by  
**ENVIRON Hong Kong Limited**

**in association with**

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## Table of Contents

<b>1.</b>	<b>INTRODUCTION</b>	<b>1-1</b>
1.1	Background	1-1
1.2	Objectives of this EM&A Programme	1-1
1.3	Content of this EM&A Manual	1-2
<b>2.</b>	<b>PROJECT DESCRIPTION</b>	<b>2-1</b>
2.1	The Project Site and Its Environs	2-1
2.2	Implementation of the Project	2-1
2.3	Environmental Monitoring and Audit Requirements	2-1
<b>3.</b>	<b>PROJECT ORGANISATION</b>	<b>3-1</b>
<b>4.</b>	<b>AIR QUALITY</b>	<b>4-1</b>
4.1	Introduction	4-1
4.2	Air Quality Parameters	4-1
4.3	Monitoring Equipment	4-1
4.4	Laboratory Measurement / Analysis	4-2
4.5	Proposed Monitoring Locations	4-3
4.6	Baseline Monitoring	4-4
4.7	Impact Monitoring	4-5
4.8	Event and Action Plan for Air Quality	4-5
4.9	Measures During Detailed Design	4-6
4.10	Construction Mitigation Measures	4-6
4.11	Recommended Operational Phase Mitigation Measures	4-9
<b>5.</b>	<b>NOISE</b>	<b>5-1</b>
5.1	Noise Parameters	5-1
5.2	Monitoring Equipment	5-1
5.3	Monitoring Locations	5-1
5.4	Baseline Monitoring	5-2
5.5	Impact Monitoring	5-2
5.6	Event and Action Plan for Construction Noise	5-3
5.7	Noise Mitigation Measures	5-4
5.8	Operational Phase	5-7
<b>6.</b>	<b>WATER QUALITY MONITORING</b>	<b>6-1</b>
6.1	Introduction	6-1
6.2	EM&A Requirements	6-1
6.3	Control/ Mitigation Measures Addressing Water Quality Impact	6-1
6.4	Water Quality Parameters	6-5
6.5	Monitoring Equipment	6-5
6.6	Laboratory Measurement / Analysis	6-6
6.7	Proposed Monitoring Locations	6-7

6.8	Baseline Monitoring	6-8
6.9	Impact Monitoring	6-9
6.10	Event and Action Plan for Water Quality	6-9
<b>7.</b>	<b>SEWERAGE AND SEWAGE TREATMENT</b>	<b>7-1</b>
7.1	Introduction	7-1
7.2	EM&A Requirements	7-1
<b>8.</b>	<b>WASTE MANAGEMENT</b>	<b>8-1</b>
8.1	General Requirements	8-1
8.2	During Detailed Design	8-1
8.3	Waste Management Measures During Construction	8-1
8.4	Waste Management Measures During Operation	8-5
8.5	Site Audit	8-5
<b>9.</b>	<b>LANDSCAPE AND VISUAL</b>	<b>9-1</b>
9.1	Introduction	9-1
9.2	Mitigation Measures	9-1
9.3	Design Phase Audit	9-5
9.4	Baseline Monitoring	9-6
9.5	Construction and Operation Phase Audit	9-6
<b>10.</b>	<b>ECOLOGICAL MITIGATION</b>	<b>10-1</b>
10.1	Introduction	10-1
10.2	Mitigation Measures During the Construction Phase	10-1
10.3	Mitigation Measures During the Operational Phase	10-1
10.4	Monitoring Requirements	10-1
10.5	Fisheries Impacts	10-3
<b>11.</b>	<b>SITE ENVIRONMENTAL AUDIT</b>	<b>11-1</b>
11.1	Site Surveillance	11-1
11.2	Environmental Compliance with Legal and Contractual Requirements	11-2
11.3	Environmental Complaints	11-2
11.4	Documentation	11-3
<b>12.</b>	<b>REPORTING</b>	<b>12-1</b>
12.1	General	12-1
12.2	Baseline Monitoring Report	12-1
12.3	Monthly EM&A Reports	12-2
12.4	First Monthly EM&A Report	12-2
12.5	Subsequent Monthly EM&A Reports	12-4
12.6	Quarterly EM&A Summary Reports	12-6
12.7	Final EM&A Summary Reports	12-7
12.8	Forms to be Adopted	12-8
12.9	Data Keeping	12-8
12.10	Interim Notifications of Environmental Quality Limit Exceedances	12-8

### List of Tables

TABLE 4-1	LOCATIONS OF AIR QUALITY MONITORING STATIONS _____	4-3
TABLE 4-2	ACTION AND LIMIT LEVELS FOR AIR QUALITY _____	4-5
TABLE 4-3	EVENT/ACTION PLAN FOR AIR QUALITY _____	4-5
TABLE 5-1	LOCATIONS OF CONSTRUCTION NOISE MONITORING STATIONS _____	5-1
TABLE 5-2	ACTION AND LIMIT LEVELS FOR CONSTRUCTION NOISE _____	5-3
TABLE 5-3	EVENT AND ACTION PLAN FOR CONSTRUCTION NOISE MONITORING _____	5-3
TABLE 5-4	INVENTORY OF QPMES _____	5-4
TABLE 6-1	WATER QUALITY PARAMETERS _____	6-5
TABLE 6-2	LOCATIONS OF WATER QUALITY MONITORING STATIONS _____	6-7
TABLE 6-3	TYPICAL ACTION AND LIMIT LEVELS FOR WATER QUALITY _____	6-10
TABLE 6-4	EVENT AND ACTION PLAN FOR WATER QUALITY MONITORING _____	6-10
TABLE 9-1	PROPOSED LANDSCAPE ENHANCEMENT/MITIGATION MEASURES – CONSTRUCTION PHASE _____	9-1
TABLE 9-2	PROPOSED VISUAL ENHANCEMENT/MITIGATION MEASURES – CONSTRUCTION PHASE _____	9-2
TABLE 9-6	EVENT/ACTION PLAN FOR DESIGN PHASE _____	9-6
TABLE 9-7	CONSTRUCTION/OPERATION AUDIT CHECKLIST _____	9-8
TABLE 9-8	EVENT/ACTION PLAN FOR CONSTRUCTION/OPERATION PHASE _____	9-9
TABLE 10-1	SUMMARY OF THE ECOLOGICAL BASELINE UPDATE FOR THE CURRENT PROJECT _____	10-2
TABLE 10-2	SUMMARY OF CONSTRUCTION AND OPERATIONAL PHASE ECOLOGICAL MONITORING FOR THE CURRENT PROJECT _____	10-3

### List of Figures

Figure 1-1	Location of the Project Site
Figure 2-1	Master Layout Plan of the Proposed Development
Figure 3-1	Typical Construction Phase Environmental Monitoring and Audit Procedure
Figure 4-1	Construction Phase Air Quality Monitoring Stations
Figure 5-1	Construction Phase Noise Monitoring Stations
Figure 5-2	Locations of Construction Phase Temporary Noise Barriers
Figure 5-3	Summary of Proposed Noise Mitigation Measures at the time of Operation of this Project
Figure 6-1	Construction Phase Water Quality Monitoring Stations
Figure 6-2	Proposed Drainage System
Figure 6-3	Construction Site Drainage Condition
Figure 7-1	Proposed Sewer Connection
Figure 9-1	Landscape and Visual Mitigation Measures Plan - Southern Site Plan
Figure 9-2	Landscape and Visual Mitigation Measures Plan - Northern Site Plan
Figure 11-1	Preliminary Site Inspection, Deficiency and Action Report System
Figure 11-2	Complaint – Response Procedures

### List of Appendices

Appendix I	EM&A Implementation Schedule
Appendix II	Sample EM&A Proforma and Record Forms
Appendix III	Tentative Construction Programme of the Project

## **1. INTRODUCTION**

### **1.1 Background**

- 1.1.1 The Project Site comprises various lots in D.D. 104 near Fairview Park, Mai Po, Yuen Long. It has an area of about 9 ha. The site is sandwiched between Yau Pok Road and Fairview Park. **Figure 1-1** presents the location of the Project Site. A cycle track connecting North West New Territories with North East New Territories – Tuen Mun to Sheung Shui Section is to be constructed by the Government at the eastern boundary of the Project site beside Yau Pok Road.
- 1.1.2 The Project Site is primarily zoned “Recreation” (“REC”) with a small portion in the southern tip of the site zoned “Residential (Group C)” (“R(C)”) on the Approved Mai Po and Fairview Park Outline Zoning Plan (OZP) No. S/YL-MP/6 (Subject OZP). According to the Notes of the Subject OZP, the planning intention of the “REC” zone is primarily for recreational developments for the use of the general public. It encourages the development of active and/or passive recreation and tourism/eco-tourism. Uses in support of the recreational developments may be permitted subject to planning permission. Whereas, the planning intention of the “R(C)” zone is primarily for low-rise, low-density residential developments.
- 1.1.3 According to Item P of Part 1, Schedule 2 of the EIAO, the Project is classified as a “Designated Project” since it is a residential development cum passive recreational uses other than New Territories Exempted House within the Deep Bay Buffer Zone 2.
- 1.1.4 As part of the Environmental Impact Assessment (EIA) study for the Project, a Manual for guiding the setup of an Environmental Monitoring and Audit (EM&A) programme to check the implementation of the relevant environmental mitigation measures recommended in the EIA, is required. The EM&A programme will be useful in providing a means to verify the effectiveness and adequacy of the mitigation measures recommended in the EIA such that additional mitigation measures or remedial action, if deemed necessary, can be formulated.
- 1.1.5 As part of the EIA study for the Project, ENVIRON Hong Kong Limited (the Consultant) has been commissioned as the lead consultant to prepare this EM&A Manual.
- 1.1.6 Through the EIA study for the Project, a number of environmental mitigation measures are recommended to be implemented during the design, construction, and operational phases of the Project. These mitigation measures and their implementation requirements are summarised in the Implementation Schedule contained in **Appendix I** of this EM&A Manual.
- 1.1.7 This Manual provides systematic procedures for the carrying out of recommended monitoring and auditing works for checking of potential environmental impacts which may arise from the project. Mitigation measures recommended in the EIA Report for each key environmental aspect are also summarised and presented.
- 1.1.8 Environmental regulations currently enforced in Hong Kong pertaining to air quality, noise and waste, etc. and the recommendations given in the EIA study report for the Project have been observed in the preparation of this Manual.

### **1.2 Objectives of this EM&A Programme**

- 1.2.1 The main objectives of the EM&A programme include:
- Provision of a database on baseline environmental quality for subsequent checking of any short or long term environmental impacts arising from the Project;
  - Provision of information at an early stage for identification of potential problem areas and formulation of additional environmental mitigation measures where necessary should any of the environmental control measures or practices fail to

achieve the target standards;

- Monitoring the performance of the Project from an environmental viewpoint and the sufficiency and effectiveness of the implemented mitigation measures;
- Verification of the environmental impacts predicted in the EIA Study for the Project;
- Determination of compliance of the Project with relevant regulatory standards, requirements and guidelines;
- Taking remedial action should unexpected problems or unacceptable impacts are identified;
- Provision of baseline and compliance monitoring data to assist the carrying out of effective environmental audits.

### **1.3 Content of this EM&A Manual**

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

- Duties of various parties involved 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 I**) of the environmental mitigation measures recommended in the EIA report for the Project;
- Record forms (**Appendix II**) to be adopted where applicable during the construction phase of the Project.

1.3.2 The EM&A Manual shall be regarded as an evolving document that should be updated when necessary in order to maintain its relevance during the detailed design stage and/or the construction phase (e.g. when alternative monitoring locations are proposed). The updated EM&A Manual shall be submitted to the ER and EPD for agreement.

## **2. PROJECT DESCRIPTION**

### **2.1 The Project Site and Its Environs**

- 2.1.1 **Figure 1-1** presents the location of the Project Site. The site has an area of about 9 ha. It is bounded by Ngau Tam Mei Drainage Channel and Yau Pok Road to its immediate east and Fairview Park to its immediate south, southwest and northwest. Between the eastern boundary of the site and Yau Pok Road, a cycle track linking the existing local cycle track networks of Yuen Long to Sheung Shui will be constructed by the Government under PWP Item 259RS with an Environmental Permit (EP) obtained.
- 2.1.2 Several existing residential developments including Palm Springs, Royal Palms, Yau Mei San Tsuen and Wo Shang Wai are located to the further north of the Project Site. Further to the east of the site across the Ngau Tam Mei Drainage Channel and Kam Pok Road is an area designated by the Government for residential use under “Residential (Group D)” (“R(D)”) and “Village Type Development” (“V”) zoning. Residential developments have been approved by the Town Planning Board (TPB) for the “R(D)” sites in this area, whereas existing villages such as Chuk Yuen Tsuen, Tai Yuen Villa, Hang Fook Gardens and Ha San Wai Tsuen, and some open storage uses are witnessed in the “V” zone.
- 2.1.3 The Project comprises a residential development in the Southern Portion, and a landscape pond, landscaped open area and some passive recreational and supporting uses in the Northern Portion of the site. Northern Portion of the Project Site will replace the existing wasteland with a landscaped open area, landscape pond and some passive recreational uses (e.g. boardwalk, sitting area, children’s play area, hobby farm, etc., permitted as of right within the current “REC” zone) and supporting facilities (e.g. toilet, management office, bike kiosk and eating place) complementary to the Government’s cycle track project to be implemented at the eastern boundary of the site and compatible with the nearby rural and natural landscape. The Southern Portion of the Project Site will replace the existing wasteland with a residential development and ancillary uses (e.g. a residents’ clubhouse and swimming pool). A total of 106 houses [with 2 residential storeys (6.6m) above basement carpark] are proposed for this portion of the site. The proposed development is compatible with the existing Fairview Park residential development on the adjoining “R(C)” site and the planned residential developments on the adjacent “R(D)” sites.

### **2.2 Implementation of the Project**

- 2.2.1 **Appendix III** shows the tentative construction programme of the Project. Construction activities are planned to commence in year 2017 for completion in spring 2020.
- 2.2.2 As discussed in Section 2.1, the proposed development is for residential purpose with a landscape pond, landscaped open area and some passive recreational and supporting uses. According to the current preferred scheme, the Project Site will be divided into two portions, with the Northern Portion proposed for the said landscape pond, landscaped open area and some passive recreational and supporting uses, and the Southern Portion for the residential development.

### **2.3 Environmental Monitoring and Audit Requirements**

- 2.3.1 The EIA study has identified the likely environmental impacts during construction and operational phases of the Project. These impacts can be minimised to acceptable levels with the implementation of environmental mitigation measures and environmental monitoring and audit (EM&A) requirements. An EM&A Implementation Schedule of the environmental mitigation measures recommended in the EIA Report is also provided in **Appendix I**. To ensure the environmental acceptability of the proposed development, monitoring and audit requirements have been identified and are described in details in the subsequent sections.
- 2.3.2 The following areas, identified in the EIA for this Project, will require EM&A during the



construction or operational phase:

- Air Quality;
- Noise Impact;
- Water Quality;
- Sewerage;
- Waste Management;
- Landscape and Visual; and
- Ecology.

### **3. PROJECT ORGANISATION**

- 3.1.1 The key parties in a typical EM&A programme include the Contractor, the Engineer<sup>1</sup> or the Engineer's representative<sup>1</sup> (hereinafter referred to as the ER), the Project proponent (PP), the Environmental Team (ET), the Independent Checker (Environment) (IEC), and the Environmental Protection Department (EPD). Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibility, as required in the EIA, this EM&A Manual, as well as the Project Environmental Permit (EP) for the duration of the Project.
- 3.1.2 A typical construction phase environmental monitoring and audit procedure is enclosed in **Figure 3-1** for reference. The main duties and responsibilities of each party shall include but not be limited to the followings:

#### Environmental Team

- 3.1.3 An Environmental Team (ET) shall be appointed to carry out the recommended EM&A works for the Project. Suitably qualified staff shall be included in the ET, and resources for the implementation of the EM&A programme shall be allocated in time, to enable fulfilment of the Project EM&A requirements as specified in the EIA, this EM&A Manual, and the Project Environmental Permit. The ET shall be headed by an ET Leader<sup>2</sup> in fulfilling the EM&A duties.
- 3.1.4 The ET Leader shall plan, organise and manage the implementation of the EM&A programme specified in the EIA, EM&A Manual, and to ensure that the EM&A works are undertaken to the required standards. The ET Leader shall have relevant experience and professional qualifications and possesses at least 7 years experience in EM&A or environmental management subject to the approval of the ER and the Director of Environmental Protection (DEP).
- 3.1.5 The ET Leader shall be responsible for the implementation of the EM&A programme in accordance with the EM&A requirements specified in this Manual. The ET Leader shall keep a contemporaneous log-book of each and every instance or circumstance or change of circumstances which may affect the EIA and each and every non-compliance with the Environmental Permit or the recommendations in the EIA report. This log-book shall be kept readily available for inspection by the IEC, and DEP or his authorized officers. The ET shall not be in any way an associated body of the IEC or the Contractor for the Project.
- 3.1.6 The board categories of works of the ET comprise the followings:
- Sampling, analysis and statistical evaluation of monitoring parameters with reference to the EIA study recommendations and requirements as well as that required in the EM&A Manual;
  - Analyse the EM&A data and review the success of EM&A programme to cost effectively confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
  - Schedule the environmental site audit/ surveillance;
  - Audit of compliance with environmental protection, and pollution prevention and control regulations;

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<sup>1</sup> For the purpose of this manual, the "Engineer" shall refer to the Engineer as defined in the Contract and the Engineer's Representative (ER), in cases where the Engineer's powers have been delegated to the ER, in accordance with the Contract.

<sup>2</sup> The Environmental Team (ET) leader, who shall be responsible for and in charge of the ET, refers to the person delegated the role of executing the environmental monitoring and audit requirements.

- Monitor the implementation of environmental mitigation measures;
- Monitor compliance with the environmental protection clauses/specifications in the Contract;
- Review construction programme and comment as necessary;
- Review work methodologies and comment as necessary;
- Complaint investigation, evaluation and identification of corrective measures in accordance with the procedure mentioned in the EM&A Manual;
- Liaison with the Project IEC on all environmental performance matters, and timely submission of all relevant EM&A proforma for IEC's approval;
- Advice to the Contractor on environmental improvement, awareness, enhancement matters, etc., on site;
- Advise on suitable mitigation measures in case of exceedance of Action and Limit levels in accordance with the Event and Action Plans; and
- Timely submission of the EM&A report to the Project Proponent and the DEP.

3.1.7 In the event of any exceedance in action/ limit levels, the ET shall immediately inform the IEC, Engineer/ ER and the Contractor and adhere to the procedures specified in the relevant Event and Action Plan of this EM&A Manual, so that appropriate remedial action can be undertaken by the Contractor promptly. The ET is also responsible for the preparation of the EM&A reports for submission to IEC, the Contractor and the ER, and EPD. The ET shall assist the Contractor and the ER in formulating any necessary corrective actions and/ or additional mitigation measures, and liaising with relevant Government Departments where necessary.

#### Independent Checker (Environment)

3.1.8 The Independent Checker (Environment) (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 Contractor or the ET for the Project. The IEC shall be empowered to audit from an independently viewpoint the environmental performance of construction. The IEC shall be a person who has at least 7 years' experience in EM&A or environmental management subject to approval of the ER and the DEP. The IEC shall be responsible for the duties defined in the EIA, this EM&A Manual, and shall audit the overall EM&A programme, including the implementation of all environmental mitigation measures, submissions required in this EM&A Manual, and any other submissions required under the Environmental Permit. The IEC shall be responsible for verifying the environmental acceptability of permanent and temporary works, relevant design plans and submissions under the Environmental Permits. The IEC shall verify the log-book prepared and kept by the ET Leader. The IEC shall notify DEP by fax, within 24 hours of each and every occurrence, change of circumstances or non-compliance with the EIA Report or the Environmental Permit, which might affect the monitoring or control of adverse environmental impact.

3.1.9 The main duty of the IEC is to carry out independent environmental audit of the Project. This shall include, inter alia, the followings:

- Review and audit in an independent, objective and professional manner 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;
  - Audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
  - Review the effectiveness of environmental mitigation measures and project environmental performance;
  - On a need basis, verify and audit the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plans and submissions under the environmental permit. Where necessary, the IEC shall 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 report submitted by the ET Leader;
  - Adhere to the procedure for carrying out complaint investigation in accordance with the procedure mentioned in the EM&A Manual; and
  - Feedback audit results to ET/ER according to the Event/ Action Plans specified in this EM&A Manual and by signing off relevant EM&A proformas.

#### The Contractor

- 3.1.10 The Contractor is responsible for providing assistance to the ET in carrying out the monitoring and EM&A duties, and providing requested information to the ET in the event of any exceedance in the environmental criteria (action/ limit levels) specified in this Manual or other current environmental standards, and to rectify unacceptable practices. The Contractor shall adhere to the procedure for carrying out complaint investigation in accordance with the procedure mentioned in the EM&A Manual. The Contractor shall 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. The Contractor shall submit the proposals on mitigation measures in case of exceedances of Action and Limit level in accordance with the Event and Action Plans, and implement the measures to reduce the impact. The Contractor shall report to the ET on the actions taken targeting at environmental protection for inclusion in the monthly report to be prepared by the ET.

#### The Engineer/ Engineer's Representative (ER)

- 3.1.11 The ER shall be responsible for overseeing the operations of the Contractor and the ET. He shall advise, co-ordinate and give instruction when appropriate for efficient implementation of any specific environmental mitigation measures identified to be required by the contractor, and/or outstanding EM&A works required to be carried out by ET in consultation with the IEC. The ER shall supervise the Contractor's activities and ensure that the requirements in the EIA Report and EM&A Manual are fully complied with. He shall inform the Contractor when action is required to reduce impacts in accordance with the Event/ Action Plans. He shall review the EM&A Reports submitted by the ET and follow up the recommendations. He shall ensure that the Contractor is implementing the environmental controls and mitigation measures as set out in the EIA report and EM&A Manual, as well as additional measures necessary for compliance with the relevant environmental standards. The Engineer shall adhere to the procedure for carrying out complaint investigation in accordance with the procedure mentioned in the EM&A Manual.

## **4. AIR QUALITY**

### **4.1 Introduction**

4.1.1 The Contractor shall follow the Air Pollution Control (Construction Dust) Regulation to implement dust mitigation measures during construction to minimise the dust impact to the nearby air sensitive receivers and to ensure the effectiveness of the implementation of dust mitigation measures recommended in the final EIA report and this EM&A Manual.

### **4.2 Air Quality Parameters**

4.2.1 According to the Project EIA report, with the proposed mitigation measures the relevant air quality criteria can be complied with, thus there will be no adverse impacts on ASRs during construction period and no environmental monitoring and audit (EM&A) will be necessary. Nevertheless, in order to ensure the effectiveness of implementation of mitigation measures, an environmental monitoring and audit (EM&A) program is proposed to be carried out during construction to monitoring the short-term impacts.

4.2.2 Monitoring and audit of Total Suspended Particulate (TSP) levels shall be carried out by the ET during the construction phase to ensure that any deteriorating air quality could be readily detected and timely action taken to rectify the situation.

4.2.3 1-hour TSP levels shall be measured according to the recommended programme. 1-hour TSP levels shall be measured by following the standard high volume sampling method as set out in Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B.

4.2.4 Upon approval of the ER, 1-hour TSP levels can alternatively be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts. However, the ET should submit sufficient information to the IEC and the ER to prove that the instrument is capable of achieving a comparable result as that a High Volume Sampler (HVS) and maybe used for 1-hr sampling.

4.2.5 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and other special phenomena and work progress of the concerned site etc. shall be recorded down in details, where appropriate. A sample data sheet is shown in **Appendix II**.

### **4.3 Monitoring Equipment**

4.3.1 Regarding the high volume sampling method, High Volume Sampler (HVS) in compliance with the following specifications shall be used for carrying out the 1-hour and 24-hour TSP monitoring:

- 0.6-1.7 m<sup>3</sup>/min. (20-60 SCFM) adjustable flow range;
- Equipped with a timing/control device with  $\pm 5$  minutes accuracy for 24 hours operation;
- Installed with elapsed-time meter with  $\pm 2$  minutes accuracy for 24 hours operation;
- Capable of providing a minimum exposed area of 406 cm<sup>2</sup> (63 in<sup>2</sup>);
- Flow control accuracy:  $\pm 2.5\%$  deviation over 24-hr sampling period;
- Equipped with a shelter to protect the filter and sampler;
- Incorporated with an electronic mass flow rate controller or other equivalent devices;
- Equipped with a flow recorder for continuous monitoring;
- Provided with a peaked roof inlet;

- Incorporated with a manometer;
  - Able to hold and seal the filter paper to the sampler housing at horizontal position;
  - Easy to change the filter; and
  - Capable of operating continuously for 24-hr period.
- 4.3.2 If the ET proposes to use a direct reading dust meter to measure 1-hr TSP levels, he shall submit sufficient information to the IEC to prove that the instruments is capable of achieving a comparable result as that the HVS and may be used for the 1-hr sampling. The instrument shall also be calibrated regularly, and the 1-hr sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.
- 4.3.3 During the course of the project, the ET is responsible for provision of the monitoring equipment. He shall ensure that sufficient number of HVSs with an appropriate calibration kit, and direct reading dust meters are available for the carrying out of baseline monitoring, regular impact monitoring and ad hoc monitoring.
- 4.3.4 The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc. shall be clearly labelled.
- 4.3.5 Initial calibration of HVSs shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by the concerned parties such as the IEC. All the data should be converted into standard temperature and pressure condition.
- 4.3.6 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded down in the data sheet. Sample forms are provided in **Appendix II**.
- 4.3.7 Wind data monitoring equipment shall also be provided and set up at a conspicuous location for logging wind speed and wind direction near to the dust monitoring locations. The location for equipment installation shall be proposed by the ET and agreed with the ER and IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed:
- The wind sensors should be installed on masts at an elevated level 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;
  - The wind data should be captured by a data logger and to be downloaded for processing at least once a month;
  - The wind data monitoring equipment should be re-calibrated at least once every six months; and
  - Wind direction should be divided into 16 sectors of 22.5 degrees each.
- 4.3.8 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from the IEC.

#### **4.4 Laboratory Measurement / Analysis**

- 4.4.1 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments, to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited or other internationally accredited laboratory.
- 4.4.2 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the ER in consultation with the IEC. Measurement performed by the laboratory shall be

demonstrated to the satisfaction of the ER and the IEC. The IEC shall conduct regular audit to the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for his reference.

- 4.4.3 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pinholes, and shall be conditioned in a humidity controlled chamber for over 24-hr and be pre-weighed before use for the sampling.
- 4.4.4 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper is then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.
- 4.4.5 All the collected samples shall be kept in a good condition for 6 months before disposal.

**4.5 Proposed Monitoring Locations**

- 4.5.1 The air quality impact assessment presented in the EIA report indicated that the nearby air sensitive receivers (ASRs) would not be subjected to adverse dust impact when recommended dust mitigation measures are properly applied onsite. The dust mitigation measures have been recommended and shall be implemented by the Contractor in accordance with the requirements under the Air Pollution Control (Construction Dust) Regulation. The Contractor shall be responsible for the design and implementation of the dust mitigation measures.
- 4.5.2 **Figure 4-1** shows the locations of the proposed air quality monitoring locations identified for the air quality monitoring during construction. Table 4-1 summarizes the locations of air quality monitoring stations.

**Table 4-1 Locations of Air Quality Monitoring Stations**

Monitoring Station ID	Representing ASR in EIA Report	Location
AM1	A30	Fairview Park
AM2	A01A, A13	Fairview Park
AM3	A05A, A05B	Fairview Park
AM4	A06/ A28	Fairview Park

- 4.5.3 The selection of the above monitoring locations has taken into account the air quality assessment results presented in the EIA report and the availability of the monitoring locations. Since most of the ASRs assessed in the EIA which are worst affected by the construction works, are private residential development at existing Fairview Park, access permission to these locations is unlikely be granted by the property owner. As such, nearby public area and school that are in adjacent to the concerned ASRs have been selected for the monitoring.
- 4.5.4 Before commencement of monitoring, the ET Leader shall review the status and availability of monitoring locations which may change after issuing this Manual, and availability of continuous electricity supply for the HVS. If such cases exist, the appointed ET Leader may propose alternative monitoring locations taking into consideration of the latest status, availability and/or accessibility of the various possible monitoring locations. The alternative monitoring locations proposed by the ET shall be approved by the ER and agreed by IEC. When alternative monitoring locations are proposed, the following criteria should be followed as far as practicable:



- At the site boundary or such locations close to the major dust emission sources;
  - Close to the sensitive receptors; and
  - Take into account the prevailing meteorological conditions.
- 4.5.5 The ET Leader shall agree with the ER in consultation with the IEC on the position of the HVSs for installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:
- A horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
  - No two samplers should be placed less than 2 meter apart;
  - The distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
  - A minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
  - A minimum of 2 metre separation from any supporting structure, measured horizontally is required;
  - No furnace or incinerator flue is nearby;
  - Airflow around the sampler is unrestricted;
  - The sampler is more than 20 metres from the dripline;
  - Any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;
  - Permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
  - A secured supply of electricity is needed to operate the samplers.

#### **4.6 Baseline Monitoring**

- 4.6.1 Baseline monitoring shall be carried out by the appointed ET Leader at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works to obtain hourly TSP samples. 1-hr sampling shall also be done at least 3 times per day during daytime when the highest dust impact is expected. The ET Leader should inform the IEC, ER and DEP on the baseline monitoring programme before commencement such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.
- 4.6.2 During the baseline monitoring, there should not be any dust generation construction activities in the vicinity of the monitoring stations arising from the Site.
- 4.6.3 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the ER and agreed with IEC.
- 4.6.4 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to ER for approval.
- 4.6.5 If the ET Leader considers that the ambient conditions have been changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be carried out at times when the contractor's activities are not generating dust in the proximity of the monitoring station. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with the IEC and DEP.



#### 4.7 Impact Monitoring

- 4.7.1 The ET Leader shall carry out impact monitoring during the course of the construction works at the recommended dust monitoring stations.
- 4.7.2 For 1-hr TSP monitoring, a sampling frequency of at least three times in every six-days shall be undertaken during the hours when the highest dust impact is predicted to occur based on the nature of the construction works.
- 4.7.3 In case of non-compliance with the air quality criteria, more frequent monitoring exercise, as specified in the following section, shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified.

#### 4.8 Event and Action Plan for Air Quality

- 4.8.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP. Table 4-2 shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance of the air quality criteria occurs, the ET shall undertake the relevant action in accordance with the Action Plan in Table 4-3.

**Table 4-2 Action and Limit Levels for Air Quality**

Parameters	Action	Limit
1 Hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$ , Action level = (Baseline level x 1.3 + Limit level) / 2; For baseline level $> 384 \mu\text{g}/\text{m}^3$ , Action level = Limit level;	500 $\mu\text{g}/\text{m}^3$

**Table 4-3 Event/Action Plan for Air Quality**

EVENT	ACTION			
	ET Leader	IEC	ER	CONTRACTOR
<b>ACTION LEVEL</b>				
Exceedance for one sample	<ol style="list-style-type: none"> <li>Identify source, investigate the causes of exceedance and propose remedial measures</li> <li>Inform ER, IEC and Contractor</li> <li>Repeat measurement to confirm finding</li> <li>Increase monitoring frequency to daily</li> </ol>	<ol style="list-style-type: none"> <li>Check monitoring data submitted by ET</li> <li>Check Contractor's working method</li> </ol>	<ol style="list-style-type: none"> <li>Notify Contractor</li> </ol>	<ol style="list-style-type: none"> <li>Rectify any unacceptable practice</li> <li>Amend working methods if appropriate</li> </ol>
Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>Identify source, investigate the causes of exceedance and propose remedial measures</li> <li>Inform ER, IEC and Contractor</li> <li>Repeat measurements to confirm findings</li> <li>Increase monitoring frequency to daily</li> <li>Discuss with IEC and Contractor on remedial actions</li> <li>If exceedance continues, arrange meeting with IEC and ER</li> <li>If exceedance stops, cease additional monitoring</li> </ol>	<ol style="list-style-type: none"> <li>Checking monitoring data submitted by ET</li> <li>Check Contractor's working method</li> <li>Discuss with ET Leader and Contractor on possible remedial measures</li> <li>Advise the ER on the effectiveness of the proposed remedial measures</li> <li>Supervisor implementation of remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>Confirm receipt of notification of failure in writing</li> <li>Notify Contractor</li> <li>Ensure remedial measures properly implemented</li> </ol>	<ol style="list-style-type: none"> <li>Submit proposals for remedial actions to IEC within 3 working days of notification</li> <li>Implement the agreed proposals</li> <li>Amend proposal if appropriate</li> </ol>
<b>LIMIT LEVEL</b>				
Exceedance for one	<ol style="list-style-type: none"> <li>Identify source, investigate the causes of exceedance</li> </ol>	<ol style="list-style-type: none"> <li>Checking monitoring data</li> </ol>	<ol style="list-style-type: none"> <li>Confirm receipt of notification of</li> </ol>	<ol style="list-style-type: none"> <li>Take immediate action to avoid</li> </ol>

EVENT	ACTION			
	ET Leader	IEC	ER	CONTRACTOR
sample	and propose remedial measures 2. Inform ER, EPD, IEC and Contractor 3. Repeat measurement to confirm finding 4. Increase monitoring frequency to daily 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results	submitted by ET 2. Check Contractor's working method 3. Discuss with ET and Contractor on possible remedial measures 4. Advise the ER on the effectiveness of the proposed remedial measures 5. Supervisor implementation of remedial measures	failure in writing 2. Notify Contractor 3. Ensure remedial measures properly implemented	further exceedance 2. Submit proposals for remedial actions to IEC within 3 working days of notification 3. Implement the agreed proposals 4. Amend proposal if appropriate
Exceedance for two or more consecutive samples	1. Identify source, investigate the causes of exceedance and propose remedial measures 2. Notify ER, EPD, IEC and Contractor 3. Repeat measurement to confirm findings 4. Increase monitoring frequency to daily 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results 8. If exceedance stops, cease additional monitoring	1. Discuss amongst ER, ET and Contractor on the potential remedial actions 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly 3. Supervise the implementation of remedial measures	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented 4. Ensure remedial measures properly implemented 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IEC within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated

#### 4.9 Measures During Detailed Design

- 4.9.1 In regard to the odour control during the operational phase, the sewage generated by the proposed development will be discharged to the planned public sewerage system at Yau Pok Road, which is to be constructed under PWP No. 4235DS by Hong Kong SAR Government Drainage Services Department (DSD). The Project will not have population intake until the commissioning of the planned local public sewerage works.
- 4.9.2 The layout of the facilities for the proposed development will be carefully planned such that the refuse collection point (a potential odour source) will be away from the residential area as far as possible but will be close to the main access area connecting the main road. During the detailed design phase, the minimisation of odour at the refuse collection point will be considered to further reduce any localized impact.

#### 4.10 Construction Mitigation Measures

- 4.10.1 The EIA report has recommended various dust control and mitigation measures. The following measures are specifically recommended in the EIA for implementation together with those presented in the Air Pollution Control (Construction Dust) Regulation. An implementation schedule is provided in **Appendix II**.
- 4.10.2 Good site management practices are important in reducing potential air quality impacts. As a general guidance, the contractor shall maintain high standard of housekeeping to prevent emission of fugitive dust emission. Loading, unloading, handling and storage of fuel, raw materials, products, wastes or by-products should be carried out in a

manner so as to minimise the release of visible dust emission. Dusty materials should be covered to prevent erosion and dust could be suppressed by regular site watering. For example, site watering twice a day could reduce dust contribution from exposed area by 50%. Increasing the watering frequency would achieve higher dust suppression efficiency. Based on the assessment in the EIA, it is recommended that the active works areas within the construction site should be watered 8 times a day during day time from 0800 to 1800 hours.

- 4.10.3 The speed of the trucks travelling on haul roads within the Project Site will be controlled at 10 kph or below in order to reduce dust impact and for safe movement around the Project Site. Any piles of materials accumulated on or around the work areas shall be cleaned up regularly. Cleaning, repair and maintenance of all plant facilities within the work areas shall be carried out in a manner without generating fugitive dust emissions. The material shall be handled properly to prevent fugitive dust emission before cleaning.
- 4.10.4 It is expected that no concrete batching will be required for the Project works, and concrete will be brought to the site in “ready-mixed” state or in pre-cast elements instead. However, if concrete batching is required at the site, the plant should be cleaned and watered regularly as a good practice. Cement and other fine grained materials delivered in bulk should be stored in enclosed silos fitted with high level alarm indicator. Wet mix batching process is preferred over dry mix batching. A specified process licence shall be obtained from the authority which will give guidelines on dust mitigation measures required as terms and conditions.
- 4.10.5 All relevant dust control measures stipulated in the Air Pollution Control (Construction Dust) Regulation would be fully implemented. Mitigation measures include:
- The designated haul road should be hard paved to minimise fugitive dust emission;
  - During the site formation works, the active works areas should be water sprayed with water browser or sprayed manually eight times during day-time from 0800 to 1800 hours including holidays. The Contractor(s) should ensure that the amount of water spraying is just enough to dampen the exposed surfaces without over-watering which could result in surface water runoff;
  - Dump trucks for transporting dusty materials 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 as soon as possible;
  - Dusty materials remaining after a stockpile is removed should be wetted with water;
  - The area where vehicle washing takes place 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;
  - The Contractor(s) shall only transport adequate amount of fill materials to the Project Site to minimise stockpiling of fill materials on-site, thus reducing fugitive dust emission due to wind erosion;
  - Should temporary stockpiling of dusty materials be required, it shall 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 shall 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 vehicle 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; and
  - Use of effective dust screens, sheeting or netting to be provided to enclose dry scaffolding which may be provided from the ground floor level of the building or if a canopy is provided at the first floor level, from the first floor level, up to the highest level (maximum three floors high for this Project) of the scaffolding where scaffolding is erected around the perimeter of a building under construction.
- 4.10.6 In order to minimize potential cumulative dust impacts, the Contractor(s) shall carry out site formation works for the Northern Portion and Southern Portion of the Project Site separately without overlapping in construction programme. In addition, to minimise dust emission, the site formation works is expected to carry out in phases (i.e. different zones), and there will be only one zone under construction in any one time. Once construction for a zone is completed, the works area will be compacted, covered by tarpaulin sheet and hydroseeded before construction of another zone. Watering will also be applied on regular basis. Thus, there will be no cumulative construction dust impacts. Works area shall be properly covered at the end of working day to minimise wind erosion.
- 4.10.7 Additional mist spraying system can also be installed as far as possible upon site hoarding surrounding the site boundary to further suppress the dust level (Appendix 3-10 of the EIA report refers). The mist spraying system will operate continuously during working hours to keep the exposed surface wet at all time so as to avoid dust emission. Since the concerned soil surface is wet all the time to compensate any evaporation of water, there will be no dust emission and the dust level can be further reduced.
- 4.10.8 No excavation of pond sediment is expected during the construction and no significant odour impact due to excavation of sediment is therefore anticipated. However, as a precautionary measure, should any excavation of sediment be required during the construction, the following measures shall be implemented:
- Exposed surface shall be immediately filled by filling materials;
  - All malodorous excavated material, if any, should be placed as far as possible from any ASRs;
  - The stockpiled malodorous materials should be removed from Project Area within 24 hours or as soon as practicable;
  - The stockpiled malodorous materials should be covered entirely by plastic tarpaulin sheets;
  - Odour patrol during excavation of pond sediments to examine the effectiveness of the above control measures; and
  - Should disposal of excavated sediment be required, it shall follow the requirements stated in Buildings Department's PNAP No. 252 for "Management Framework for Disposal of Dredged/ Excavated Sediment".
- 4.10.9 The effectiveness of the above control measures shall be checked as part of the EM&A programme. An implementation schedule of the above is provided in **Appendix I**. If the measures adopted and implemented by the contractor are found not be sufficient, the Contractor shall liaise with the ET Leader and IEC on the implementation of some other mitigation measures. The additional mitigation measures shall be approved by

the ER before implementation.

#### **4.11 Recommended Operational Phase Mitigation Measures**

- 4.11.1 The proposed development can satisfy the HKPSG requirements in terms of buffer distance from nearby roads. Thus, no adverse air quality impacts due to vehicular emissions are anticipated.
- 4.11.2 No specific mitigation measures are required during the operational phase.

## 5. NOISE

### 5.1 Noise Parameters

- 5.1.1 The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (LAeq). LAeq(30 min.) shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, LAeq(5 min) shall be employed for comparison with the NCO criteria.
- 5.1.2 As supplementary information for data auditing, statistical results such as L<sub>10</sub> and L<sub>90</sub> shall also be obtained for reference. A sample data record sheet is shown in **Appendix II** for reference.

### 5.2 Monitoring Equipment

- 5.2.1 As referred to in the Technical Memorandum issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement, the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration levels before and after the noise measurement agrees to within 1.0dB.
- 5.2.2 Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions.
- 5.2.3 The ET Leader is responsible for the availability of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled.

### 5.3 Monitoring Locations

- 5.3.1 The proposed locations for noise monitoring during the construction phase are shown in Table 5-1 below, while their geographical locations are also provided in **Figure 5-1**.

**Table 5-1 Locations of Construction Noise Monitoring Stations**

Monitoring Station ID	Corresponding NSR in EIA Report	Representative for
NM1	N1	Fairview Park
NM2	N10	Bethel High School
NM3	N4	Fairview Park
NM4	N5	Fairview Park
NM5	N6 /N20	Fairview Park

**Remark:** \* Noise monitoring is only required if the concerned planned development site is already occupied at the time of construction of the Project. ET Leader shall propose the monitoring location at the sensitive receiver location with agreement with the IEC, ER and DEP.

- 5.3.2 The selection of the above monitoring locations has taken into account the noise impact assessment results presented in the EIA report and the availability of the monitoring locations. Since most of the NSRs assessed in the EIA which are worst affected by the construction works, are private residential development (with private garden) at existing Fairview Park, access permission to these locations is unlikely be granted by the property owner. As such, nearby public area and school that are in

adjacent to the concerned ASRs have been selected for the monitoring.

- 5.3.3 The status and availability of monitoring locations may change after issuing this Manual. If such cases exist, the appointed ET Leader may propose alternative monitoring locations taking into consideration of the latest status, availability and/or accessibility of the various possible monitoring locations. The alternative monitoring locations proposed by the ET shall be approved by the ER and agreed by IEC. When alternative monitoring locations are proposed, the following criteria should be followed as far as practicable:
- At locations close to the major site activities which are likely to have noise impacts;
  - Close to the noise sensitive receivers; and
  - For monitoring locations located in the vicinity of the sensitive receivers, care shall be taken to cause minimal disturbance to the occupants during monitoring.
- 5.3.4 The monitoring station shall normally be at a point 1m from the exterior of the sensitive receivers building facade and be at a position 1.2m above ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3dB(A) shall be made to free field measurement data. The ET Leader shall agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

#### **5.4 Baseline Monitoring**

- 5.4.1 Baseline monitoring shall be carried out by the ET prior to the commencement of the construction works. The baseline monitoring shall be carried out daily for a period of at least 14 consecutive days prior to the commissioning of the construction works. The ET Leader should inform the IEC, ER and DEP on the baseline monitoring programme before commencement such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.
- 5.4.2 There shall not be any construction activities in the vicinity of the stations during the baseline monitoring.
- 5.4.3 In exceptional cases, such as insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with IEC and EPD for agreement on an appropriate set of data to be used as the baseline reference and submit to the ER for approval.

#### **5.5 Impact Monitoring**

- 5.5.1 Noise monitoring shall be carried out at all the designated monitoring stations during the construction phase of the Project. The monitoring frequency shall depend on the scale of the construction activities. The following is an initial guide on the regular monitoring frequency for each station on a per week basis when noise generating activities are underway
- (a) one set of measurement between 0700-1900 hours on normal weekdays (i.e. Monday to Saturday);
- 5.5.2 General construction work carrying out during restricted hours is controlled by Construction Noise Permit (CNP) system under the NCO. Without a valid construction noise permit (CNP) issued by EPD under Noise Control Ordinance (NCO), no



construction work shall be carried out during restricted hours<sup>3</sup>. Once a valid CNP for the construction activities is issued by EPD, the ET Leader shall be appointed to carry out additional noise measurements and the IEC shall also be appointed to carry out additional site investigations and audits during the restricted hours specified in the CNP. Generally speaking, one set of measurement shall at least include 3 consecutive Leq(5min) results for construction works to be carried out during restricted hours or following the requirement specified in the CNP.

5.5.3 Moreover, the ET Leader shall propose an additional noise monitoring schedule certified by the IEC to the ER for approval before the commencement of the construction works during the restricted hours.

5.5.4 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Event and Action Plan shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

**5.6 Event and Action Plan for Construction Noise**

5.6.1 The Action and Limit Levels for construction noise are defined in Table 5-2. In case that a valid CNP is issued by EPD, the Action Level is the same as the non-restricted hours and the Limit Level shall be the same as the standard stated in the CNP.

5.6.2 Should non-compliance of the criteria occurs, actions in accordance with the Action Plan as shown in Table 5-3 should be carried out.

**Table 5-2 Action and Limit Levels for Construction Noise**

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one documented complaint is received	75 <sup>+</sup> dB(A)
Restricted hours		Same as CNP

\* Reduce to 70dB(A) for schools and 65dB(A) during school examination periods.

**Table 5-3 Event and Action Plan for Construction Noise Monitoring**

EVENT	ACTION			
	ET Leader	IEC	ER	CONTRACTOR
<b>ACTION LEVEL</b>				
Action Level	<ol style="list-style-type: none"> <li>1. Notify ER, IEC and Contractor</li> <li>2. Carry out investigation</li> <li>3. Report the results of investigation to the ER, IEC and Contractor</li> <li>4. Discuss with the IEC and Contractor, and formulate remedial measures</li> <li>5. Increase monitoring frequency to check mitigation effectiveness</li> </ol>	<ol style="list-style-type: none"> <li>1. Review the analysed results submitted by the ET</li> <li>2. Review the proposed remedial measures by the Contractor and advise the ER accordingly</li> <li>3. Supervise the implementation of remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing</li> <li>2. Notify Contractor</li> <li>3. Require Contractor to propose remedial measures for the analysed noise problem</li> <li>4. Ensure remedial measures are properly implemented</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit noise mitigation proposals to IEC</li> <li>2. Implement noise mitigation proposals</li> </ol>
Limit Level	<ol style="list-style-type: none"> <li>1. Notify IEC, ER, EPD and Contractor</li> <li>2. Identify source</li> <li>3. Repeat measurement to confirm findings</li> <li>4. Increase monitoring frequency to daily</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst ER, ET, and Contractor on the potential remedial actions</li> <li>2. Review Contractor's remedial actions</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing</li> <li>2. Notify Contractor</li> <li>3. Require Contractor to propose remedial measures for the</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance</li> <li>2. Submit proposals for remedial actions to IEC within 3</li> </ol>

<sup>3</sup> All days during the evening 1900 to 2300 hours, and the night-time, 2300 to 0700 hours, and all hours of the general holidays including Sundays



EVENT	ACTION			
	ET Leader	IEC	ER	CONTRACTOR
	5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented  6. Inform IEC, ER and EPD the causes & actions taken for the exceedances  7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results  8. If exceedance stops, cease additional monitoring	whenever necessary to assure their effectiveness and advise the ER accordingly  3. Supervise the implementation of remedial measures	analysed noise problem  4. Ensure remedial measures are properly implemented  5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated	working days of notification  3. Implement the agreed proposals  4. Resubmit proposals if problem still not under control  5. Stop the relevant portion of works as determined by the ER until the exceedance is abated

## 5.7 Noise Mitigation Measures

5.7.1 The EIA report has recommended various construction noise control and mitigation measures. These are summarised below for easy reference. An implementation schedule is also provided in **Appendix I**. The Contractor shall be responsible for the design and implementation of these recommended measures.

5.7.2 Noise emissions from construction sites can be minimised by adopting a number of practicable noise mitigation options, such as:

- Use of quiet/silenced equipment (QPMEs);
- Use of movable noise barriers to shield construction activities;
- Erecting temporary noise barriers and Provision of Noise Enclosure;
- Phasing of the Construction Activities during Site Formation; and
- Good site practice and noise management.

### Selecting Quiet/ Silenced PME

5.7.3 Quiet types of equipment for use in construction activities are available in Hong Kong. EPD's quality powered mechanical equipment (QPME) inventory is reviewed and proposed to be used wherever possible as a noise mitigation measure. It is advised that the Contractor should diligently seek equivalent models of quiet/ silenced PMEs.

5.7.4 Table 5-4 presents the QPMEs assumed in the EIA report that are likely required during the construction works of the Project, quiet/silenced plant with SWL similar to or less than those presented in the below table, shall be adopted by the Contractor as far as possible.

**Table 5-4 Inventory of QPMEs**

Quiet Type PME	Reference	SWL per unit, dB(A)
Asphalt Paver	VOLVO model. No. ABG5770 (EPD-01226)	104
Breaker, Excavator mounted	EPD *	115
Bulldozer	Komatsu model D21A-8	102
Dump Truck	EPD *	105
Excavator	KATO model HD820V (EPD-01233)	99

Quiet Type PME	Reference	SWL per unit, dB(A)
Lorry	EPD *	105
Mobile Crane	Hitachi Sumitomo SCX700, 132kW	101
Excavator, mini-robot mounted	EPD *	94
Poker, Vibratory, Hand-held	EPD *	102
Power Rammer (Petrol)	Dynapac model LT700 (EPD-00536)	107
Road Roller	HITACHI model CP220-3 (EPD-01183)	97
Roller, vibratory	SAKAI model SW250-1 (EPD-00509)	95

Remark:

The list of QPMEs is based on Appendix 4-4A of the EIA report. Please refer to Appendix 4-4A for the construction plants assumed during each construction phase.

QPMEs are based on EPD's quality powered mechanical equipment (QPME) inventory (available at: <http://www.epd.gov.hk/cgi-bin/npg/qpme/index.pl?lang=eng>).

\* EPD website: [http://www.epd.gov.hk/epd/english/application\\_for\\_licences/guidance/files/OtherSWLe.pdf](http://www.epd.gov.hk/epd/english/application_for_licences/guidance/files/OtherSWLe.pdf)

#### Use of Temporary Noise Barriers

- 5.7.5 Besides from QPMEs, additional noise mitigation measures in terms of movable noise barriers are also proposed to shield construction plants from NSRs and acoustic shielding material should also be provided to shield the piling machine (i.e. Continuous Flight Auger).
- 5.7.6 The movable noise barriers/ acoustic shielding materials should have sufficient surface density of at least 10 kg/m<sup>2</sup> or material providing equivalent acoustic performance to block the line of sight from the sensitive receivers. There should not be any gaps and openings at the noise barriers and site hoardings to avoid noise leakage. The design of the noise barriers shall be proposed by the work contractor(s), and approved by the Engineers Representative (RE) and the Environmental Team.
- 5.7.7 In addition to the above-mentioned noise mitigation measures, fixed temporary noise barrier is also proposed in adjacent to the Bethel High school (N10 in EIA report) in order to alleviate the elevated construction noise level over there.
- 5.7.8 In order to ensure construction noise is controlled throughout the construction period, fixed noise barriers shall be erected before the commencement of construction works. It is estimated that 9m high temporary fixed noise barriers (with top level at 14.4mPD level) shall be sufficient to shield the concerned school from construction activities within the Project Site. Also, standard site hoarding of 3m tall will also be erected along the site boundary. Since site hoarding will be erected along the site boundary, the concerned noise barrier may be combined with the site hoarding.
- 5.7.9 **Figure 5-2** shows the indicative location of the proposed temporary noise barriers during the construction phase. Since site hoarding will be erected along the site boundary, the concerned noise barrier may be combined with the site hoarding. The exact alignment and design is subject to the contractor(s) and the prior approval from the ER. To minimize potential impact, erection of temporary fixed noise barriers will be carried out section by section and precast units will be used for the foundation of the noise barrier. These noise barriers shall be erected before the commencement of construction works.
- 5.7.10 A short section of fixed temporary noise barrier (5.5m tall above a site formation level of 5.4mPD) (i.e. dotted green line as shown in **Figure 5-2**), is also proposed in adjacent to N4 in order to alleviate the cumulative construction noise level over there in order to alleviate cumulative noise due the approved projects of public sewer and cycle track. The temporary fixed noise barriers should have sufficient surface density of at least 10

kg/m<sup>2</sup> or material providing equivalent acoustic performance. There should not be any gaps and openings at the noise barriers to avoid noise leakage and can be combined with the site hoarding of Project Site. It shall be noted that the concerned noise barrier will only be required should there be concurrent construction activities with the approved projects of public sewer and cycle track. This is also stated in **Figure 5-2** as well.

- 5.7.11 The temporary fixed noise barriers should have sufficient surface density of at least 10 kg/m<sup>2</sup> or material providing equivalent acoustic performance. There should not be any gaps and openings at the noise barriers and site hoardings to avoid noise leakage. The design of the noise barriers shall be proposed by the work contractor(s), and approved by the Engineers Representative (ER) and the ET Leader.

Other Recommended Noise Mitigation Measures

- 5.7.12 It is also recommended that good housekeeping activities shall also be carried out to further minimise the potential construction noise impact, and these are summarised below. The following good site practices are also recommended for incorporation into the contractual requirements:

- 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 plants should be operated on-site;
- Plants 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;
- Silencer and mufflers on construction equipment should be utilised and should be properly maintained during the construction programme;
- Noisy activities can be scheduled to minimise exposure of nearby NSRs to high levels of construction noise. For example, noisy activities can 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;
- Provision of mobile noise barriers in adjacent to construction plants (e.g. Continuous Flight Auger) shall also be considered by the Contractor(s) where necessary;
- Mobile plants should be sited as far away from NSRs as possible; and
- Material stockpiles and other structures should be effectively utilised as noise barrier, where practicable.
- The contractor(s) is also encouraged to arrange construction activities with care so that concurrent construction activities are avoided as much as possible. The contractor(s) should closely liaise with the school so that noisy activities are not undertaken during school's examination period. With the above noise mitigation measures in place and good site practices, residual noise impact at the school would be temporary and unacceptable noise impact is not expected.
- Similar to other EIA projects, EM&A will be carried out for this Project during the Project construction phase in order to monitor the construction noise level and to verify the effectiveness of the noise mitigation measures. Should unacceptable

construction noise level be identified during the construction noise monitoring, necessary actions following the standard Event and Action Plan specified in this EM&A Manual, will be required by various parties.

## **5.8 Operational Phase**

- 5.8.1 The EIA has proposed 2.5m to 4m tall noise barriers along portion of the southern and south-eastern site boundary in order to alleviate road traffic noise impacts (**Figure 4-3B** in EIA report refers). Fixed glazing or blank façade is also proposed for residential buildings R100 and R94.
- 5.8.2 While, noise impacts due to operation of a petrol filling station have also been assessed in the EIA. It is found that a section of 4m to 4.5m tall noise barrier will be required between the petrol filling station and the Project Site in order to provide noise shielding to the proposed houses at the rear (**Figure 4-4C** in EIA report refers). As boundary noise barriers are also proposed at the same location due to road traffic noise, the concerned 4.5m tall barrier can be combined with those proposed for road traffic noise to serve both purposes.
- 5.8.3 For industrial sites to the east of the Project Site, the EIA study has found that the operation of the identified industrial sites will not have adverse impact on the Project Site, and no mitigation measure is therefore necessary.
- 5.8.4 With the above noise mitigation measures, noise impact assessment results have shown that the relevant noise criteria would be complied with and there will be no adverse noise impact. To summarise the above findings in the EIA, the following figures have summarised the above proposed noise mitigation measures:
- **Figure 5-3** summarises noise mitigation measures that are required during operational phase;

## **6. WATER QUALITY MONITORING**

### **6.1 Introduction**

- 6.1.1 The Project Site is surrounded by existing road networks to the south and east directions; existing residential development at Fairview Park to the west; and agricultural activities in the north. Ngau Tam Mei Drainage Channel (NTMDC) is also situated to the further east of the Project Site.
- 6.1.2 The water quality assessment in the EIA indicated that no adverse impacts on water quality would be expected from the construction phase, with proper implementation of the recommended environmental mitigation measures.
- 6.1.3 In order to ensure proper implementation of mitigation measures, regular water quality monitoring and site auditing programme is proposed to be carried out during the construction phase.

### **6.2 EM&A Requirements**

- 6.2.1 The Contractor shall adopt the Best Management Practices (BMPs) given in the Practice Notes for Professional Persons on “Construction Site Drainage” (ProPECC PN 1/94)) in controlling water pollution during the construction phase. During the operational phase, the control measures recommended in the EIA shall be implemented.
- 6.2.2 Water quality monitoring at designated locations at the nearby inland water bodies are proposed to be carried out during the construction phase to monitor any sub-standard water discharge into the nearby water bodies from the Site.
- 6.2.3 Regular environmental audits in accordance with Section 1 of this Manual shall be undertaken during the construction works to ensure the proper implementation of the mitigation measures for potential construction water quality impact.
- 6.2.4 The environmental audit shall be undertaken by the ET during construction and shall include a walk over of the active works area and surroundings. It shall include: visual inspection of the implementation of the runoff and drainage control measures from the works area; inspections of water quality surrounding the site and the project discharge areas. In particular, any brown coloured water or suspended solids laden discharge shall be noted and considered to be unacceptable, triggering the Event and Action Plan.
- 6.2.5 The environmental audit shall include a review of the effectiveness of measures to minimise surface runoff and their effectiveness for reducing erosion and retaining suspended solids laden runoff within the site. The following will be included during the review:
- Inspection of the effectiveness of silt removal facilities and erosion and sediment control structures to ensure proper and efficient operation at all times and particularly during rainstorms;
  - Inspection of the effectiveness of control measures to prevent soil erosion and sediment laden run-off from the Site;
  - Inspection of the effectiveness of collection, handling, storage and disposal of materials to ensure they do not enter the nearby stormwater drainage system; and
  - Review of the Contractor’s compliance with discharge license requirements.

### **6.3 Control/ Mitigation Measures Addressing Water Quality Impact**

- 6.3.1 The EIA report has recommended mitigation measures during the construction and operational phases of the Project. In particular, the following mitigation measures are

required to be implemented. The implementation schedule for the recommended mitigation measures is also presented in **Appendix I**.

### **During Detailed Design Stage**

- 6.3.2 The drainage system shall be designed to avoid any case of flooding with provision of sand trap. The proposed schematic drainage system is shown in **Figure 6-2**. The proposed new drainage channels and pipes surrounding the Project Site shall collect surface runoff within the Site for direct discharge into the Ngau Tam Mei Drainage Channel and Fairview Park Nullah after passing through sand traps. The drainage outlet of the indoor car parks shall be connected to foul sewers via petrol interceptors or similar facilities.
- 6.3.3 Water in the proposed landscaped pond shall be self-contained with no outlet connecting to nearby channel/inland water. During operation, pond water will be contained within the pond and there shall be no discharge from the pond. Surface runoff from the adjacent area shall be diverted away from the pond area by drainage channels in order to avoid overflow of the pond under extreme weather condition (e.g. heavy rainfall).

### **Construction Phase**

- 6.3.4 Control of potential water quality impact arising from the construction works shall be implemented based on the following principles:
- Minimisation of runoff;
  - Prevention or minimisation of the likelihood of the identified pollutants being in contact with rainfall or runoff; and
  - Measures to abate pollutants in the stormwater runoff.
- 6.3.5 During the construction of landscape water pond in the Northern Portion of the Project Site, proper temporary drainage system (e.g. following those in the Practice Notes for Professional Persons on "Construction Site Drainage" (ProPECC PN 1/94)) shall be constructed to divert surface runoff away from the existing abandoned pond for discharge into the Fairview Nullah or NTMDC through sand traps.
- 6.3.6 Site formation works near the existing abandoned pond should be carried out during dry season as far as possible. Water contained at the existing abandoned pond shall be temporarily drained to the newly constructed pond to avoid draining of pond water.
- 6.3.7 Besides, the Best Management Practices (BMPs) given in the ProPECC PN 1/94 shall be implemented in controlling water pollution during the whole construction phase. The main practices provided in the above-mentioned document (i.e. ProPECC PN 1/94) are also summarized in the following paragraphs 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 ditches or embankment. Accidental release of soil or refuse into the adjoining land should be prevented by the provision of site hoarding or earth bunds, etc. 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, earth 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 are 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 protected by crushed rock, gravel or other granular materials to minimise discharge of contaminated runoff;
- Slow down water run-off flowing across exposed soil surfaces;
- Plant workshop/ maintenance areas 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) 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 provide with locks and be sited on hard surface;
- Chemical waste arising from 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;
- Appropriate peripheral drainage system shall be constructed along the Project Site boundary to divert away surface runoff in accordance with requirements stipulated in ProPECC PN 1/94 to collect surface runoff and discharge it into the nearby existing stormwater drains nearby roadside of Yau Pok Road, and via which into the existing NTMDC. An indicative peripheral drainage system, which is subject to detailed design, is shown in **Figure 6-3**;
- Temporary drains, sedimentation basins, sand traps and similar facilities shall be provided during the construction works in accordance with the ProPECC PN 1/94; and
- The Contractor shall apply for a discharge licence under the WPCO and the discharge shall comply with the terms and conditions of the licence.

#### Wastewater from Construction Site

- Sewage generated from the construction workforce should be contained in chemical toilets before connection to public foul sewer becomes available. 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 are leaving the site area;

- Section of the road between the wheel washing bay and the public road should be paved with backfill to reduce vehicle tracking of soil and to prevent site run-off from entering public road drains;
- Although use of bentonite in diaphragm wall and bore-pile construction is not expected, in case bentonite slurries is generated it should be reconditioned and reused as far as practicable. Spent bentonite should be kept in a separate slurry collection system for disposal at a marine spoil grounds subject to obtaining a marine dumping licence from EPD. If used bentonite slurry is to be disposed of through public drainage system, it should be treated to meet the respective applicable effluent standards for discharges into sewers, storm drains or the receiving waters.

#### 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.

### **Operational Phase**

#### Residential and Passive Recreational Development

- 6.3.8 All domestic sewage generated will be discharged to the public sewerage at Yau Pok Road as the Project will not have population intake until the commissioning of the planned local public sewerage works.
- 6.3.9 The drainage system shall be designed to avoid any case of flooding with provision of sand trap. The proposed schematic drainage system is shown in **Figure 6-2**. The proposed new drainage channels and pipes surrounding the Project Site shall collect surface runoff within the Site for direct discharge into the Ngau Tam Mei Drainage Channel and Fairview Park Nullah after passing through sand traps. The drainage outlet of the indoor car parks shall be connected to foul sewers via petrol interceptors or similar facilities.
- 6.3.10 Regular cleaning and sweeping of the access road and other paved areas are suggested so as to minimise exposure of pollutants to stormwater.
- 6.3.11 Stormwater gullies and ditches provided among the residential development will be regularly inspected to ensure these facilities function properly.
- 6.3.12 Soft landscaping will be provided around the residential development where practicable. In the event of emergency (e.g. car accident) where there is a major spillage of oil, chemical or fuel, dispersants or firefighting foam, etc., a system of contaminant bunding is recommended as far as practicable.
- 6.3.13 The sewage generated by the club house and swimming pool in the Southern Portion as well as the food and beverage and public toilets in the Northern Portion of the Project Site is proposed to be discharged into the public sewerage system at Yau Pok Road. The discharge from these facilities shall apply for a discharge licence under the WPCO, and the discharge shall comply with the terms and conditions of a licence as well as the standards for effluents specified in the TM-Effluents.

#### Proposed Landscape Pond

- 6.3.14 Water quality of the landscaped pond shall be checked regularly and managed where necessary to ensure the effectiveness of the water circulating system and the self-sustainability of the pond. Water in the proposed landscape pond shall be self-contained with no outlet connecting to nearby channel/inland water. The concerned landscape pond will be water sealed so that there is no seepage of water into underground. During operation, pond water will be contained within the pond and there shall be no discharge from the pond. Surface runoff from the adjacent area shall be



diverted away from the pond area by drainage channels in order to avoid overflow of the pond under extreme weather condition (e.g. heavy rainfall). There will be no chemicals/ pesticides to be applied during operation.

**Mitigation Implementation Schedule**

- 6.3.15 The implementation schedules of mitigation measures for water quality control during construction and operational phases are presented in **Appendix I**.
- 6.3.16 The effectiveness of these water quality control measures shall be implemented by the Contractor and checked by the ET during the construction phase. If the above measures are not sufficient to restore the water quality to an acceptable levels, the Contractor (during construction) or the project proponent (during operational phase) shall liaise with the ET Leader, propose to ER, and IEC for approval, on the implementation of some other mitigation measures.

**6.4 Water Quality Parameters**

- 6.4.1 The ET should carry out spot check to ensure that the Contractor has undertaken all recommended control measures to prevent direct contact of pollutants with rainwater or runoff, and measures to abate contaminants in the stormwater runoff.
- 6.4.2 The parameters shown in Table 6-1 are recommended to be recorded/ monitored in the routine monitoring programme.

**Table 6-1 Water Quality Parameters**

Phase	Water Quality Parameters
Construction	<ul style="list-style-type: none"> <li>• Temperature (°C)</li> <li>• pH (pH unit)</li> <li>• Turbidity (NTU)</li> <li>• Water Depth (m)</li> <li>• Dissolved oxygen (DO) (mg/L and % of saturation)</li> <li>• Suspended solids (SS) (mg/L)</li> </ul>

- 6.4.3 It is recommended to carry out sampling at least three times per week to measure turbidity, suspended solids, dissolved oxygen, pH, and water temperature at the control and impact monitoring locations recommended below. The monitoring frequency required shall be reviewed after the first three months and regularly thereafter.
- 6.4.4 In association, other relevant data such as monitoring locations/positions, time, water depth, water temperature, weather conditions, and any special phenomena and work underways should be recorded. A sample monitoring record sheet is shown in **Appendix II** for reference.

**6.5 Monitoring Equipment**

- 6.5.1 All monitoring equipment shall be provided by the ET and approved by the ER in consultation with the IE(C).

**Dissolved Oxygen and Temperature Measuring Equipment**

- 6.5.2 The instrument shall be a portable, weather proof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and use a DC power source. It should be capable of measuring:
  - a dissolved oxygen level in the range of 0-20 mg/l and 0-200% saturation; and
  - a temperature of 0-45° C.
- 6.5.3 It shall have a membrane electrode with automatic temperature compensation

complete with a cable. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary (e.g. YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

#### Turbidity Measurement Instrument

- 6.5.4 The instrument shall be a portable, weatherproof turbidity-measuring instrument complete with comprehensive operation manual. The equipment shall use a DC power source. It shall have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU and be complete with a cable (e.g. Hach model 2100P or an approved similar instrument).

#### Suspended Solids

- 6.5.5 A water sampler comprises a transparent PVC cylinder, with a capacity of not less than 2 litres and can be effectively sealed with latex cups at both ends. The sampler shall also have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (e.g. Kahlsico Water Sampler or an approved similar instrument).
- 6.5.6 Water samples for suspended solids measurement should be collected in high density polythene bottles, packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory as soon as possible after collection. The SS determination shall follow APHA 17ed 2540D or equivalent methods subject to approval of DEP.

#### pH Meter

- 6.5.7 Measurement of pH level will be recorded in-situ by a pH meter which shall consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. The range of pH value shall be 0 to 14 with 0.1 as the base unit.

#### Checking and Calibration of Equipment

- 6.5.8 All in-situ monitoring instrument shall be checked, calibrated accordingly before use. The DO meter shall be calibrated by a laboratory accredited under HOKLAS or any other international accreditation scheme, 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.
- 6.5.9 For the on-site calibration of field equipment, the BS 127:1993, "Guide to Field and on-site test methods for the analysis of waters" shall be observed.
- 6.5.10 Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

### **6.6 Laboratory Measurement / Analysis**

- 6.6.1 Water samples for suspended solids (SS) analysis should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen), delivered to the laboratory, and analysed as soon as possible after collection within 24 hours.
- 6.6.2 Analysis of SS shall be carried out in a HOKLAS or other internationally accredited laboratory. The detection limit of SS shall be 2 mg/L or better. The SS determination shall follow APHA 17ed 2540D or equivalent methods subject to approval of DEP.

- 6.6.3 The testing laboratory shall be HOKLAS accredited (or if not, approved by the ER) and comprehensive quality assurance and control procedures in place in order to ensure quality and consistency in results.
- 6.6.4 If a site laboratory is set up, or a non-HOKLAS and non-international accredited laboratory, is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control may require to be submitted to the DEP. The ET Leader shall provide the ER and IEC with one copy of the relevant chapters of the "Standard Methods for the Examination of Water and Wastewater" updated edition and any other relevant document for his reference.

### 6.7 Proposed Monitoring Locations

- 6.7.1 It is recommended to establish control and impact monitoring stations to monitor water quality impact during construction phase. The impact monitoring stations have been selected at locations in vicinity to the construction site that may potentially be affected during the construction phase. Water quality at these locations shall be monitored during the construction. The control stations have been selected such that they are located within the same water body as the impact monitoring stations but are located outside the area of influence of the works. Data collected from the control stations enables a comparison of the water quality at the potentially impacted site with the ambient water quality.
- 6.7.2 The proposed water quality monitoring stations are shown in Table 6-2. The control stations (C1 to C3) are set at the upstream locations, while monitoring stations W1 to W5 are the corresponding impact stations at the downstream locations of the nearby water courses surrounding the Site. **Figure 6-1** presents the locations of the water quality monitoring stations.

**Table 6-2 Locations of Water Quality Monitoring Stations**

Phase	Monitoring Station ID	Description of Monitoring Station	Purpose of the Monitoring Station *	Coordinates of the Monitoring Station **
Construction Phase	C1	Fairview Park Nullah	Serve as the control station at upstream location of construction site and impact station W1.	823198.0 837066.5
	W1	Fairview Park Nullah	Serve as the impact station at downstream location of construction site and control station C1.	823289.2 837491.9
	C2	Fairview Park Nullah	Serve as the control station at upstream location of construction site and impact station W2.	823498.5 837875.0
	W2	Fairview Park Nullah	Serve as the impact station at downstream location of construction site and control station C2.	823322.0 837551.5
	C3	Ngau Tam Mei Drainage Channel	Serve as the control station at upstream location of construction site and impact station W3.	823968.4 837780.4
	W3	Ngau Tam Mei Drainage Channel	Serve as the impact station at downstream location of construction site and control station C3	823297.0 837074.5

**Remark:** \* With regard to the above control and impact monitoring stations, the ET Leader shall check the tidal condition at the water quality monitoring locations before each sampling in order to identify water flow direction (e.g. with reference to the tidal information from Hong Kong Observatory and the on-site observation on water flow direction). The tidal condition and water flow direction shall be taken into account in analysing the water sampling results. In case it is identified that the water flow direction is influenced by tidal condition, the ET Leader shall determine which station would represent the control station (upstream of construction site and outside the area of influence of the works) and which station would represent the impact station (downstream of construction site).

influenced by the works). The ET Leader shall report above findings in the EM&A report.

\*\* HK-Grid 1980 coordinates provided for reference only. Before commencement of water sampling, the ET Leader shall propose the exact monitoring locations and coordinates to the IEC and ER for approval.

- 6.7.3 The status and availability of monitoring locations may change after issuing this Manual. If such cases exist, the appointed ET Leader may propose alternative monitoring locations taking into consideration of the latest status, availability and/or accessibility of the various possible monitoring locations. The ET shall seek approval from the IEC, ER and DEP on the alternative monitoring locations proposed prior to the commencement of the baseline and construction phase sampling programme.
- 6.7.4 When alternative monitoring locations are proposed, they should be chosen based on the following criteria:
- at locations close to and preferably at the boundary of the mixing zone of the major site activities, which are likely to have water quality impacts;
  - close to the sensitive receptors which are directly or likely to be affected;
  - for monitoring locations located in the vicinity of the sensitive receptors, care should be taken to cause minimal disturbance during monitoring; and
  - control station shall be selected at a location to allow a comparison of the water quality at the potentially impacted site with the ambient water quality. The control station shall be selected such that it is located within the same body of water as the impact monitoring station but is located outside the area of influence of the works.
- 6.7.5 Given that the proposed water quality monitoring stations are mostly shallow water courses nearby, it is expected that water samples shall be collected at mid-depth level only. However, in case alternative monitoring stations are proposed by the ET, measurement shall be taken at 3 water depths, except where the water depth less than 6 m, the mid-depth station may be omitted. Should the water depth be less than 3 m, only the mid-depth station shall be monitored.
- 6.7.6 Enough replicates in situ measurements and sample collected from each independent sampling event are required for all parameters to ensure a robust statistically interpretable dataset.
- 6.7.7 The Contractor shall also submit the wastewater effluent discharge plan as stipulated in the Water Discharge License to the ET and the IEC in order to better monitor the effluent discharge of the construction site.
- 6.7.8 In addition to the above water quality monitoring, and as part of the environmental audit programme, the ET shall walk over of the active works area and the surroundings, and carry out regular visual inspections during the construction phase. The visual inspection shall include the implementation of the runoff and drainage control measures from the works area; inspections of water quality surrounding the site and the project discharge areas. This would prevent potential impacts on nearby environs and ensure that the mitigation measures recommended in the EIA are properly implemented. In particular, any brown coloured water or suspended solids laden discharge is considered to be unacceptable, and will trigger the Event and Action Plan.

## **6.8 Baseline Monitoring**

- 6.8.1 Baseline conditions of water quality should be established by the ET and agreed with IEC and DEP. The purposes of the baseline monitoring are to establish ambient conditions prior to the commencement of the works, to demonstrate the suitability of the proposed control and impact monitoring stations, and for establishment of the action and limit levels.
- 6.8.2 The baseline conditions should be established by measuring the water quality parameters specified in section 6.4 above. The measurements shall be taken at all the

designated control and monitoring stations assigned in Section 6.7, 3 days a week, for a period of 4 weeks prior to the commencement of construction works. The interval between two sets of monitoring shall not be less than 36 hours, and the baseline monitoring schedule shall be submitted to DEP and IEC at least one week prior to the commencement of the baseline monitoring. Alternative proposal including the sampling frequencies proposed by the ET should be agreed with IEC and DEP in prior.

- 6.8.3 There shall not be any major construction activities in the vicinity of the stations during the baseline monitoring.
- 6.8.4 In exceptional cases when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from EPD on an appropriate set of data to be used as baseline reference.

### **6.9 Impact Monitoring**

- 6.9.1 During the course of the construction works, impact monitoring shall be undertaken three days per week, with sampling/measurement at the designated control and impact monitoring stations. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit levels, in which case the monitoring frequency shall be increased.
- 6.9.2 Given that the proposed water quality monitoring stations are mostly shallow water courses nearby, it is expected that water samples shall be collected at mid-depth level. If the water depth is very limited that sampling of water will disturb the sediment at the bottom of the water quality monitoring location, the water sampling can be omitted subject to the ETL's professional advice and agreed with the IEC and DEP. Record of the condition of the monitoring location shall be taken and reported to justify the decision of not carrying out the sampling. In that case, visual inspection shall be carried out 3 days per week (Section 6.7.8 refers) and the results shall be submitted by the ETL and reported in the EM&A report.
- 6.9.3 Upon completion of all construction activities, a post project monitoring exercise on water quality shall be carried out for four weeks in the same manner as the baseline monitoring. The results of the monitoring shall be presented in the Final EM&A Summary Report.
- 6.9.4 Proposed water quality monitoring schedule shall be faxed to EPD at least 1 week before the first day of the monitoring month. EPD shall also be notified immediately for any changes in schedule by fax.

### **6.10 Event and Action Plan for Water Quality**

- 6.10.1 The water quality criteria, namely Action and Limit levels shall be based on the results of baseline monitoring, the Water Quality Objectives, or based on the results of statistical analysis on the difference between impact monitoring results and the control station. The Action and Limit Levels for water quality is presented in Table 6-3. Should non-compliance of the action or limit levels occur, the ET and Contractor should review and identify the potential source(s) of impact, devise and implement appropriate mitigate measures in a collaborative manner.
- 6.10.2 When the monitoring results of the water quality parameters at any designated monitoring stations exceed the water quality criteria, the actions in accordance with the Event and Action Plan specified in Table 6-4 shall be carried out.

**Table 6-3 Typical Action and Limit Levels for Water Quality**

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

**Remark:** The proposed water quality monitoring stations are mostly shallow water courses nearby, it is expected that water samples shall be collected at mid-depth level only (Section 6.9.2 refers). However, action and limit levels for other water depths are also provided in the above table in case alternative monitoring stations are proposed by the ET.

**Table 6-4 Event and Action Plan for Water Quality Monitoring**

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
<b>ACTION LEVEL</b>				
Action level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Identify source(s) of impact;</li> <li>2. Inform IEC, contractor and ER;</li> <li>3. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>4. Discuss mitigation measures with IEC and Contractor; and</li> <li>5. Repeat measurement on next day of exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures.</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC on the proposed mitigation measures; and</li> <li>2. Make agreement on the mitigation measures to be implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice, if any;</li> <li>3. Check all plant and equipment;</li> <li>4. Consider changes of working methods;</li> <li>5. Discuss with ET and IEC and propose mitigation measures;</li> <li>6. Implement the agreed mitigation measures.</li> </ol>
Action level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> <li>1. Identify source(s) of impact;</li> <li>2. Inform IEC, contractor and ER;</li> <li>3. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>4. Discuss mitigation measures with IEC, ER and Contractor;</li> <li>5. Ensure mitigation measures are implemented;</li> <li>6. Prepare to increase the monitoring frequency to daily;</li> <li>7. Repeat measurement on next day of exceedance.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with ET and Contractor on the mitigation measures.</li> <li>2. Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; and</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC on the proposed mitigation measures; and</li> <li>2. Make agreement on the mitigation measures to be implemented.</li> <li>3. Assess the effectiveness of the implemented mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment and</li> <li>4. Consider changes of working methods;</li> <li>5. Discuss with ET and IEC and propose mitigation measures to IEC and ER within 3 working days;</li> <li>6. Implement the agreed mitigation measures.</li> </ol>



*EIA for Residential cum Passive Recreational Development within REC Zone and R(C) Zone  
at Various Lots in DD 104, Yuen Long, N.T*

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
<b>Limit Level</b>				
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> <li>1. Repeat measurement on next day of exceedance to confirm findings;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IEC, contractor, ER and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Ensure mitigation measures are implemented; and</li> <li>6. Discuss mitigation measures with IEC, ER and Contractor;</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor's working methods;</li> <li>2. Discuss with ET and Contractor on possible mitigation measures; and</li> <li>3. Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Discuss with IEC, ET and Contractor on the proposed mitigation;</li> <li>3. Request Contractor to critically review the working methods;</li> <li>4. Make agreement on mitigation measures to be implemented; and</li> <li>5. Ensure mitigation measures are properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>2. Rectify unacceptable practice;</li> <li>3. Check all plant and equipment and consider changes of working methods;</li> <li>4. Discuss with ET, IEC and ER and propose mitigation measures to ER and IEC within 3 working days; and</li> <li>5. Implement the agreed mitigation measures.</li> </ol>
Limit level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> <li>1. Repeat measurement on next day of exceedance to confirm findings;</li> <li>2. Identify source(s) of impact;</li> <li>3. Inform IEC, contractor, ER and EPD;</li> <li>4. Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>5. Discuss mitigation measures with IEC, ER and Contractor;</li> <li>6. Ensure mitigation measures are implemented; and</li> <li>7. Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET and Contractor's working methods.</li> <li>2. Discuss with ET and Contractor on possible mitigation measures;</li> <li>3. Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly; and</li> <li>4. Supervise the implementation of mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>2. Request Contractor to critically review the working methods;</li> <li>3. Make agreement on the mitigation measures to be implemented;</li> <li>4. Ensure mitigation measures are properly implemented; and</li> <li>5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Inform the ER and confirm notification of the non-compliance in writing;</li> <li>2. Take immediate action to avoid further exceedance;</li> <li>3. Discuss with ET, IEC and ER and propose mitigation measures to ER and IEC within 3 working days;</li> <li>4. Implement the agreed mitigation measures;</li> <li>5. Resubmit proposals of mitigation measures if problem still not under control; and</li> <li>6. As directed by the ER, to slow down or to stop all or part of the construction activities until no exceedance of Limit level.</li> </ol>

## **7. SEWERAGE AND SEWAGE TREATMENT**

### **7.1 Introduction**

- 7.1.1 The sewage generated from the Southern Portion and Northern Portion of the Project Site will be separately conveyed to two terminal manholes located at the eastern boundary of the Site and it will further drain to the proposed trunk sewer at Yau Pok Road via two new 150mm gravity sewers. The tentative location of terminal manholes and the new 150mm gravity sewers are shown in **Figure 7-1**.
- 7.1.2 The proposed development will not have population intake until the commissioning of all the aforesaid public sewerage works for connection.
- 7.1.3 All the sewers and sewerage facilities within the proposed development before the terminal manholes will be constructed, operated and maintained by the owners of the Site. The sewers outside the development connecting the terminal manholes to the future public sewer works will be maintained by DSD subject to their agreement in the detailed design stage.
- 7.1.4 The sewage generated by the club house and swimming pool in the Southern Portion as well as the food and beverage and public toilets in the Northern Portion of the Project Site is proposed to be discharged into the public sewerage system at Yau Pok Road. The discharge from these facilities shall apply for a discharge licence under the WPCO, and the discharge shall comply with the terms and conditions of a licence as well as the standards for effluents specified in the TM-Effluents.

### **7.2 EM&A Requirements**

- 7.2.1 As the sewage generated from the Project Site will be discharged into planned public sewers, no adverse impact is anticipated and no EM&A requirement is necessary.



## **8. WASTE MANAGEMENT**

### **8.1 General Requirements**

- 8.1.1 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.
- 8.1.2 The Contractor shall also pay attention to the Waste Disposal Ordinance, the Dumping at Sea Ordinance, the Public Health and Municipal Services Ordinance and the Water Pollution Control Ordinance, and carry out the appropriate waste management work. The relevant licence/permit, such as the effluent discharge licence, the chemical waste producer registration, etc. shall be obtained.
- 8.1.3 Waste management measures have been proposed in the Project EIA report. These measures are also reproduced in **Appendix I**, which shall be implemented for this Project.

### **8.2 During Detailed Design**

- 8.2.1 The demolition and construction work shall be considered in the planning and design stages to reduce the generation of Construction and Demolition (C&D) waste where possible. Landfill disposal shall only be considered as the last resort.
- 8.2.2 Construction methods with minimum waste generation quantity and other environmental impacts shall be considered in the detailed design.
- 8.2.3 Refuse collection chambers (RCC) will be provided for the residential development as well as the passive recreational and supporting uses in the Northern Portion of the Project Site. A licensed waste collector shall be employed to collect domestic waste on daily basis. In order to comply with Building Regulation, mechanical ventilation will be provided. The odour nuisance to the public can be minimized by incorporating the odour absorption system.

### **8.3 Waste Management Measures During Construction**

- 8.3.1 As discussed above, waste management/ control measures are provided in **Appendix I** for implementation. Some of the recommended waste management/ control measures are presented below.
- 8.3.2 The excavated material may be generated during site clearance and site formation stages, which should be sorted on-site and could be reused as part of the filled material, or for the landscape area subject to the satisfaction of engineering requirements, and is subject to detailed design stage. The remaining inert portion and non-inert portion of C&D waste will be disposed of at public fill facility and landfill site, respectively, where necessary. It should be noted that landfill disposal shall only be considered as the last resort.
- 8.3.3 The generation of wastes from these materials shall be minimised as far as practicable through recovery, reuse and/ or recycling. Whenever practicable, the production of construction waste due to over-ordering or as “side-products” of construction activities shall be minimised by the contractor through careful design, planning, good site management, control of ordering procedures, segregation and reuse of materials.
- 8.3.4 Wooden boards can be reused on-site or off-site, though the reusability and quantity of final waste will depend on the quality, size and shape of the boards. Timbers which cannot be reused shall be sorted and stored separately from all inert waste before disposed.
- 8.3.5 Should construction site hoarding be erected, metal fencing or building panels, which are more durable than wooden panels, are recommended to be used as far as

- practicable. Opportunity shall also be sought to re-use any wooden boards used in site fencing on-site or off-site. Concrete and masonry can be crushed and used as fill material if practicable. On-site incineration of wooden waste is prohibited.
- 8.3.6 Cross contamination of inert C&D materials by other waste categories shall be minimised as far as practicable through provision of storage facilities for storage of different categories of waste. Inert materials including soil, rock, concrete, brick, cement plaster/ mortar, inert building debris, aggregates and asphalt should be segregated from and stored separately from other waste categories to ensure proper handling and reuse. The on-site temporary facilities should be equipped with dust control measures where necessary.
- 8.3.7 Spent bentonite slurries, if any, will be handled and disposed of properly in accordance with the requirements set out in the Practice Note for Professional Persons (PN1/94) Construction Site Drainage.
- 8.3.8 In order to avoid dust, odour and erosion impacts, all stockpile areas at the Project Area shall be covered with tarpaulin or impermeable sheets. Any vehicle carrying C&D waste shall have their load covered when leaving the works area. Vehicles shall be routed as far as possible to avoid sensitive receivers in the area.
- 8.3.9 General refuse generated at the construction site shall be stored separately from construction and chemical wastes to avoid cross contamination. A reliable waste collector shall be employed by the Contractor to remove general refuse from the construction site on a daily basis where appropriate to minimise the potential odour, pest and litter impacts.
- 8.3.10 Open burning for the disposal of construction waste or the clearance of the Project Area in preparation for construction work is prohibited under the Air Pollution Control (Open Burning) Regulation.
- 8.3.11 Upon appointment, the main contractor of each construction contract shall prepare and implement a Waste Management Plan (WMP), which shall be developed and incorporated in the Environmental Management Plan (EMP) to be prepared for this Project 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.
- 8.3.12 The EMP shall provide recommendations for appropriate disposal routes if waste cannot be recycled. The EMP shall include the method statement for demolition and transportation of the excavated materials and other construction wastes. The EMP shall be approved before the commencement of construction. All mitigation measures arising from the approved EMP shall be fully implemented.
- 8.3.13 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 practical as possible;
  - Proper treatment and disposal in respect to relevant laws, guidelines and good practice; and
  - Landfill disposal shall only be considered as the last resort.
- 8.3.14 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 submitted to the ER for approval. The contractor shall implement the waste management practices in the EMP throughout the construction

stage of the Project. The EMP shall be reviewed regularly and updated (preferably monthly) by the contractor. The EMP shall take into account the recommended mitigation measures.:

- A waste management policy, organization chart, and responsibility;
- An estimation on the location, type, nature, quality and quantity of different waste streams to be generated from the Project works, and the corresponding waste management methodology;
- A method statement for demolition and transportation of the excavated materials and other construction wastes;
- Potential for recycling or reuse should be explored and opportunities taken if waste generation is unavoidable;
- Recommendations for appropriate disposal routes if waste cannot be recycled;
- A system to control the disposal of C&D materials and C&D waste to public fill reception facilities, sorting facilities and landfills respectively through a trip-ticket system in accordance with the ETWB TC(W) No. 31/2004; and
- A system to record the C&D materials/ C&D waste to be generated, disposed of, reused, and recycled, respectively.

8.3.15 The project proponent/ ER will ensure that the day-to-day operations comply with the approved EMP. The project proponent shall require the contractor to separate public fill from C&D waste for disposal at appropriate facilities. In addition, the project proponent shall record the disposal, reuse and recycling of C&D materials for monitoring purposes.

8.3.16 Based on the above waste management options, a good management and control plan would be formulated. Good management and control can prevent the generation of significant amount of waste. On-site sorting of construction wastes will be recommended. Secondary on-site sorting can be achieved by avoiding the generation of “mixed waste” through good site control. 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.

8.3.17 In addition, the contractor(s) shall be required to reuse inert C&D materials (e.g. excavated soil) or in other suitable construction sites as far as possible, in order to minimize the disposal of C&D materials to public fill reception facilities.

8.3.18 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.

8.3.19 The following additional control/ mitigation 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.

*Waste minimisation*

- 8.3.20 The Contractor shall submit to the Engineer for approval a waste management plan 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 waste management plan.
- 8.3.21 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.
- 8.3.22 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.
- 8.3.23 The reuse and recycling of waste shall be practised as far as possible. The recycled materials shall include paper/cardboard, timber and metal etc.
- 8.3.24 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.
- 8.3.25 The Contractor shall record the amount of wastes generated, recycled and disposed of (including the disposal sites).
- 8.3.26 The Contractor shall implement a trip ticket system in accordance with the ETWB TC(W) No. 31/2004 for public fill, C&D materials and C&D waste to public fill reception facilities, sorting facilities and landfills respectively.
- 8.3.27 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*

- 8.3.28 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*

- 8.3.29 The Contractor shall observe and comply with the Waste Disposal (Chemical Waste)

(General) Regulation for handling, storage and disposal of chemical wastes.

- 8.3.30 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.
- 8.3.31 Chemical waste that could be generated from construction works would primarily arise from chemicals used in operation and maintenance of on-site equipment. These may include fuel, oil, lubricants, cleaning fluids, and solvents arising from leakage or maintenance of on-site equipment and vehicles. Chemical generated from daily operation of the construction works shall be recycled/ reused on-site as far as practicable.
- 8.3.32 If off-site disposal of chemical waste is required, they shall be collected and delivered by licensed contractors and disposed of in strict accordance with the Waste Disposal (Chemical Waste) (General) Regulation.
- 8.3.33 Contractors shall register with EPD as chemical waste producers when disposal of chemical waste is anticipated to be required.
- 8.3.34 Chemical waste materials have to be stored on-site with suitable containers and away from water bodies so that leakage or spillage is prevented during the handling, storage, and subsequent transportation.
- 8.3.35 Handling, storage and disposal of chemical wastes shall be in accordance with the Waste Disposal (Chemical Waste) (General) Regulation and the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.
- 8.3.36 Fossil fuel and used lubricants from trucks and machinery are classified as chemical waste. The Contractor shall register with EPD as a chemical waste producer and observe all the requirements under the storage, labelling, transportation and disposal of chemical waste.
- 8.3.37 The Contractor shall prevent fuel and lubricating oil leakage from plant and storage sites from contaminating the construction site. All compounds in work areas shall be positioned on areas with hard paving and served by drainage facility. Sand/ silt traps and oil interceptors shall be provided at appropriate locations prior to the discharge points.
- 8.3.38 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.

#### **8.4 Waste Management Measures During Operation**

- 8.4.1 Refuse collection chambers (RCC) will be provided for the residential development. In order to comply with Building Regulation, mechanical ventilation will be provided. The odour nuisance to the public can be minimized by incorporating the odour absorption system. With proper management and maintenance of the waste facilities, possible leachate impact from the RCC is not anticipated.
- 8.4.2 Collection bins for used aluminium cans, waste paper and glass bottles should be provided at strategic locations within the residential development area and adjacent to the passive recreational and supporting uses in order to promote and encourage recycling by residents during the operational phase.

#### **8.5 Site Audit**

- 8.5.1 The implementation schedule of the recommended mitigation measures is presented in **Appendix I**.
- 8.5.2 During the site inspections and the document review procedures as mentioned in this manual (Section 11 refers), the ET shall pay special attention to the issues relating to

waste management, and check whether the Contractor has implemented the recommended mitigation measures.

- 8.5.3 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.



## 9. LANDSCAPE AND VISUAL

### 9.1 Introduction

- 9.1.1 The potential impacts on landscape and visual amenity originate from construction works (including site clearance, site formation level and other construction activities). Details of the suggested mitigation measures are given below.
- 9.1.2 It is recommended that EM&A for landscape and visual resources is undertaken during the design, construction and operational phases of the project. The design, implementation and maintenance of landscape mitigation measures should be monitored to ensure that they are fully realised and that potential conflicts between the proposed landscape mitigation measures and any other project works and operational requirements are resolved at the earliest possible stage without compromise to the intent of the mitigation measures. Implementation management and maintenance of the mitigation measures recommended by the EIA will be monitored through the site audit programme.

### 9.2 Mitigation Measures

- 9.2.1 The Landscape and Visual Impact Assessment (LVIA) of the EIA recommended a series of mitigation measures for the construction and operation stages to ameliorate the landscape and visual impacts of the project. The plan of landscape and visual mitigation measures extracted from the EIA report is presented in **Figure 9-1**.
- 9.2.2 The measures for both the construction and operation stages as recommended in the EIA are summarised in **Tables 9-1 to 9-4** below, which shall be adopted during the detailed design, and be built as part of the construction works so that they are in place at the date of commissioning of the Project.
- 9.2.3 An indicative list of species appropriate for mitigation planting is provided in **Tables 9-5** below. The planting list has been provided in Appendix III of this Manual.

**Table 9-1 Proposed Landscape Enhancement/Mitigation Measures – Construction Phase**

ID No.	Landscape Mitigation Measures	Funding Agency	Implementation Agency
CM1	<b>Proper protection of existing trees designated to be retained in-situ</b> Existing trees designated to be retained in-situ will be properly protected. This may include the clear demarcation and fencing-off of tree protection zones, tight site supervision and monitoring to prevent tree damage by construction activities, and periodic arboricultural inspection and maintenance to uphold tree health. A total of around 60 nos. of trees will be retained in-situ.	Project proponent	Project proponent (via Contractor)
CM2	<b>'One-go' Tree Transplanting within Site</b> Affected existing trees designated to be transplanted will be transplanted 'one-go' within the Site instead to an offsite holding nursery as is typically done. The transplanted trees will provide some instant greenery during construction. In total, around 8 nos. of trees will be transplanted.	Project proponent	Project proponent (via Contractor)
CM3	<b>Innovative Construction Method of Pond Expansion</b> Existing abandoned pond (approx. 0.5ha) with pond edge (approx. 0.2ha) will be slightly expanded and enhanced into a larger landscape pond (0.6ha pond and 0.3ha pond edge). Conventional method of pond expansion by excavating at the existing pond edge will substantially pollute the existing pond. An innovative design and	Project proponent	Project proponent (via Contractor)



ID No.	Landscape Mitigation Measures	Funding Agency	Implementation Agency
	construction method will be employed in this project: <i>(1) excavating a new pond at a slightly higher elevation adjacent to the existing pond without breaking the existing pond edge, (2) suitably prepare the surface of the new pond bottom, (3) fill the new pond with water and let it stabilized for several weeks, (4) connect the recirculation system to the existing pond, (5) create a gentle water cascade between the existing pond and the new pond by increasing the new pond water level to flood over and water will be circulated between these two ponds. As a result, two ponds functionally and aesthetically appear as one will be created. (The gentle water cascade will also provide aeration to ensure water quality and details of the construction method of pond will be subject to detailed design).</i>		
CM4	<p>Early Commencement &amp; Completion of the Recreational Ground</p> <p>The proposed basements and houses in the southern portion of the site will require an extensive construction period while the proposed works in the recreational ground in the northern portion of the site is relatively simpler. Upon possession of the site, the proposed works in the recreational ground will be fast-tracked. It is expected that the recreational ground will be properly vegetated within a short period, offsetting the negative impact arising from the construction works in the rest of the Project Site. Approximately 200 nos. of heavy-standard to semi-mature size trees will be planted in the recreational ground. Moreover, there will be around 2 ha of lawn area.</p>	Project proponent	Project proponent (via Contractor)

**Table 9-2 Proposed Visual Enhancement/Mitigation Measures – Construction Phase**

ID No.	Visual Mitigation Measures	Funding Agency	Implementation Agency
CM5	Height of temporary noise barriers along boundary facing Bethel High School and some residences in Fairview Park be to minimum required. Barrier finishes be sensitively selecting and designing to reduce visual impact. Materials to be opaque and non-reflective material with colour blending in with the environment to minimize visual impact and to avoid bird strike.	Project proponent	Project proponent (via Contractor)
CM6	Advance screen planting of fast growing tree and shrub species to noise barriers and hoardings. Trees shall be capable of reaching a height >10m within 10 years.	Project proponent	Project proponent (via Contractor)
CM7	Control of night-time lighting by hooding all lights.	Project proponent	Project proponent (via Contractor)
CM8	Reduction of construction period to practical minimum.	Project proponent	Project proponent (via Contractor)

**Table 9-3 Proposed Landscape Enhancement/Mitigation Measures – Operation Phase**

ID No.	Landscape Mitigation Measures	Funding Agency	Implementa- tion Agency	Managemen t Agency	Maintenance Agency
OM1	<b>Maximizing Tree Preservation Effort</b> Healthy existing trees that are not affected by the proposed development will be retained in-situ. Affected existing trees that are of high to medium amenity value and high to medium survival rate after transplanting will be transplanted.	Project proponent	Project proponent	Project Proponent	Project Proponent
OM2	<b>Provision of New Trees</b> Compensatory tree and shrub planting shall be provided for soft landscape in the proposed development. The tree compensation to tree loss ratio shall be at least 1:1 in term of quantity and quality within the Project Site. Furthermore, a continuous belt of landscape planting, featuring trees and shrubs will be provided along the boundary of the development.	Project proponent	Project proponent	Project Proponent	Project Proponent
OM3	<b>Suitable Design for Recreational Ground</b> The landscape design for the recreational ground in the northern portion of the Site will adopt a rural, naturalistic approach with vast open space to match the original landscape character. Emphasis will be placed on a balanced approach between trees and grass/herbs. Use of native species will be the planting design theme. Natural materials, such as timbers, will be mostly used for landscape hardworks.	Project proponent	Project proponent	Owners Committee	Management Company

**Table 9-4 Proposed Visual Enhancement/Mitigation Measures – Operation Phase**

ID No.	Visual Mitigation Measures	Funding Agency	Implementa- tion Agency	Management Agency	Maintenance Agency
OM4	Use appropriate (visually unobtrusive, opaque and non-reflective) building materials and colours in built structures.	Project proponent	Project proponent	Private Owners	Private Owners
OM5	Streetscape elements (e.g. paving, signage, street furniture, lighting etc.) sensitively designed in a manner that responds to the local context, and minimizes potential negative landscape and visual impacts. Lighting units to be directional and minimizing unnecessary light spill.	Project proponent	Project proponent	Owners Committee	Management Company
OM6	<b>Suitable Design and Landscape Treatment of Noise Barrier and Along Boundary</b> Height of permanent noise barriers along boundary be to minimum required. Barrier finishes be sensitively selecting and designing to reduce visual impact. Materials to be opaque and non-reflective material with colour blending in with the environment to minimize visual impact and to avoid bird strike. Screen tree, shrub and climber planting to be provided in front of permanent noise barrier to minimise visual intrusion.	Project proponent	Project proponent	Owners Committee	Management Company

**Table 9-5 Indicative Mitigation Planting Species for Different Areas**

<b>Screen/Buffer Planting (Boundary)</b>	
<p><b><u>Trees</u></b>  <i>Cinnamomum burmannii</i> *  <i>Eucalyptus</i> spp.  <i>Ficus benjamina</i>  <i>Ficus microcarpa</i>*  <i>Garcinia subelliptica</i>  <i>Podocarpus macrophyllus</i>*  <i>Schefflera heterophylla</i>*  <i>Sterculia lanceolata</i>*</p>	<p><b><u>Shrubs / Groundcover</u></b>  <i>Callistemon x hybridus</i> 'Golden'  <i>Ficus microcarpa</i> 'Golden Leaves'  <i>Hibiscus rosa-sinensis</i>  <i>Ligustrum sinense</i>*  <i>Murraya paniculata</i>*  <i>Polyspora axillaris</i>*  <i>Rhaphiolepis indica</i>*  <i>Rhodomyrtus tomentosa</i>*  <i>Rhododendron</i> spp.  <i>Schefflera arboricola</i></p>
<b>Street Trees</b>	
<p><b><u>Trees</u></b>  <i>Araucaria heterophylla</i>  <i>Bischofia javanica</i>*  <i>Chukrasia tabularia</i>  <i>Cinnamomum burmannii</i> *  <i>Cinnamomum camphora</i>*  <i>Elaeocarpus balansae</i>  <i>Terminalia mantaly</i>*</p>	<p><b><u>Shrubs / Groundcover</u></b>  <i>Canna</i> spp.  <i>Codiaeum variegatum</i>  <i>Cuphea hyssopifolia</i>  <i>Dracaena</i> spp.  <i>Duranta erecta</i>  <i>Gardenia jasminoides</i>*  <i>Ixora chinensis</i>*  <i>Ligustrum sinense</i>*  <i>Liriope spicata</i>*  <i>Melastoma malabathricum</i> *)  <i>Rhododendron</i> spp.</p>

<b>Garden and Amenity Planting</b>		
<p><b><u>Trees</u></b></p> <p><i>Bauhinia</i> spp.  <i>Bombax ceiba</i>  <i>Cinnamomum burmannii</i>*  <i>Crateva unilocularis</i>  <i>Delonix regia</i>  <i>Elaeocarpus hainanensis</i>  <i>Lagerstroemia speciosa</i>  <i>Magnolia grandiflora</i>  <i>Michelia x alba</i>  <i>Podocarpus macrophyllus</i>*  <i>Plumeria rubra</i>  <i>Schefflera heptaphylla</i>*  <i>Spathodea campanulata</i></p>	<p><b><u>Shrubs / Groundcover</u></b></p> <p><i>Alpinia zerbumbet</i> 'Variegata'  <i>Asparagus sprengeri</i>  <i>Camellia japonica</i>  <i>Cuphea hyssopifolia</i>  <i>Gardenia jasminoides</i>*  <i>Hibiscus rosa-sinensis</i>  <i>Hymenocallis littoralis</i>  <i>Hypericum chinense</i>  <i>Iris</i> spp.  <i>Ixora chinensis</i>*  <i>Jasminum sambac</i>  <i>Lagerstroemia indica</i>  <i>Lantana</i> spp.</p>	<p><i>Ligustrum sinense</i>*  <i>Liriope spicata</i>*  <i>Osmanthus fragrans</i>  <i>Rhoeo discolor</i>  <i>Rhododendron</i> spp.  <i>Syngonium</i> sp.  <i>Tracheloepermum jasminioides</i>*  <i>Zephyranthes candida</i></p>
<b>Planting Within Pond Area</b>		
<p><b><u>Buffer Tree Mix</u></b></p> <p><i>Celtis sinensis</i>*  <i>Cleistocalyx operculatus</i>*  <i>Ficus microcarpa</i>*  <i>Hibiscus tiliaceus</i>*  <i>Sterculia lanceolata</i>*</p> <p><b><u>Flowering Shrub Mix</u></b></p> <p><i>Gardenia jasminoides</i>*  <i>Ligustrum sinensis</i>*  <i>Melastoma</i> spp.  <i>Raphiolepis indica</i>*  <i>Rhodomyrtus tomentosa</i>*</p>	<p><b><u>Marsh Mix</u></b></p> <p><i>Alternanthera sessilis</i>*  <i>Bacopa monnieri</i>*  <i>Commelina diffusa</i>*  <i>Eleocharis spiralis</i>*  <i>Leersia hexandra</i>*  <i>Ludwigia adscendens</i>*  <i>Ludwigia octovalvis</i>*  <i>Polygonum barbatum</i>*  <i>Polygonum glabrum</i>*  <i>Saururus chinensis</i>*</p>	<p><b><u>Lily Species</u></b></p> <p><i>Nymphaea</i> spp.*</p> <p><b><u>Grassy Bund Mix</u></b></p> <p><i>Paspalum paspaloides</i>*  <i>Cynodon dactylon</i>*</p>

\* Native species

### 9.3 Design Phase Audit

- 9.3.1 The landscape measures proposed within the EIA to mitigate the landscape and visual impacts of the scheme should be embodied in the detailed landscape design drawings and contract documents including the protection of existing trees, the transplanting of existing trees, the retention and minor extension of existing pond and the planting of new trees and shrubs. Designs should be checked to ensure that the measures are fully incorporated and that potential conflicts with civil engineering, structures, lighting, signage, drainage, underground utilities and operational requirements are resolved prior to construction.
- 9.3.2 The design phase EM&A requirements for landscape and visual resources comprise the audit of the detailed landscaping drawings and specifications to be prepared during the detailed design together with ensuring that the design is sensitive to landscape and

visual impacts as required under mitigation measures. Monitoring of design works against the recommendations of the landscape and visual impact assessments within the EIA should be undertaken when the designs are produced to ensure that they fulfill the intentions of mitigation measures.

- 9.3.3 Audits shall be carried out by a Registered Landscape Architect. The landscape auditor shall review the designs at two points in time:
- when the first draft of design drawings is prepared; and
  - when the draft Tender Documents are prepared.
- 9.3.4 The auditor shall liaise with the Landscape Architect and Project Engineer to ensure all measures have been incorporated in the design in a format that can be specified to the Contractor for implementation. In the event of a non-conformity, the Event/Action plan as detailed in **Table 9.6** below should be followed.

**Table 9-6 Event/Action Plan for Design Phase**

Action Level	Landscape Auditor	Project Engineer (PE)	Project Landscape Architect (PLA)
Non Conformity (with Design Standards and Specification)	<ul style="list-style-type: none"> <li>• Identify Source</li> <li>• Inform PE and PLA</li> <li>• Discuss remedial actions with PE, PLA</li> <li>• Verify remedial actions when complete</li> </ul>	<ul style="list-style-type: none"> <li>• Notify PLA</li> <li>• Discuss remedial actions with PLA</li> <li>• Ensure remedial designs are fully incorporated</li> </ul>	<ul style="list-style-type: none"> <li>• Amend designs</li> <li>• Discuss remedial actions with PE</li> </ul>

#### 9.4 Baseline Monitoring

- 9.4.1 Baseline monitoring for the landscape and visual resources will comprise checking and updating of:
- Landscape resources identified in the EIA, elements of particular concern to be re-checked and any changes identified;
  - habitat maps in the EIA (refer to **Figure 8-2**); and
  - landscape and visual impact assessments included in the EIA Report, to include updated photos of any LCAs and LRs which have changed since the EIA was carried out.
- 9.4.2 The landscape and visual baseline will be confirmed with reference to the above.

#### 9.5 Construction and Operation Phase Audit

- 9.5.1 A specialist Landscape Sub-Contractor (on the approved Government list) shall be employed by the Contractor for the implementation of landscape construction works and subsequent maintenance operations during the establishment period. Advance planting and wetland formation will be conducted within the first half of the construction contract. Thus, the establishment works will be undertaken through the latter half of the construction contract and extend throughout the Contractor's one year maintenance period which will fall within the first operational year of the project. The intention is to provide at least a 12 month establishment period for the majority of the landscape works.
- 9.5.2 All measures undertaken by both the Contractor and the specialist Landscape Sub-Contractor during the construction phase and first year of the operational phase shall be audited by a Registered Landscape Architect, as a member of the ET, on a regular

basis to ensure compliance with the intended aims of the mitigation measures. Site inspections should be undertaken at least once every two weeks throughout the construction period and once every two months during the operational phase.

9.5.3 The broad scope of the audit is detailed below but should also be undertaken with reference to the more specific checklist provided in **Table 9.7**. Operational phase auditing will be restricted to the last 12 months of the establishment works of the landscaping proposals and thus only those items below concerning this period are relevant to the operational phase:-

- The extent of the agreed works area should be checked regularly during the construction phase and any trespass by the Contractor beyond the limit of the works, including any damage to existing trees and woodland, shall be noted.
- The progress of the engineering works should be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken.
- All existing vegetation, streams, ponds and other features within the study area which are not directly affected by the works should be retained and protected.
- The methods of protecting existing vegetation proposed by the Contractor should be acceptable and enforced.
- Preparation, lifting, transport and re-planting operations for any transplanted trees should comply with approved methods and relevant standards.
- The design and construction of buildings should conform to requirements of the EIA.
- All landscaping works should be carried out in accordance with the EIA and with approved specifications.
- Planting of new trees, shrubs, groundcover, climbers, grasses and other plants, together with the replanting of any transplanted trees, should be carried out within the right season and according to approved methods and relevant standards.
- All necessary horticultural operations and replacement planting should be undertaken throughout the Establishment Period to ensure the healthy establishment and growth of both transplanted trees and all new plants.

**Table 9-7 Construction/Operation Audit Checklist**

Area of Works	Items to be Monitored
Works Area	Check the extent of the Works to ensure that the Works Area is not exceeded.
Protection of all trees and woodland blocks to be retained	Identify and demarcate trees / vegetation to be retained, erect physical protection (e.g. fencing), monitor against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Streams and ponds	Ensure no run-off into existing streams or ponds.
Clearance of existing vegetation	Identify and demarcate trees / vegetation to be cleared, check extent of works to minimise damage, monitor adjacent areas against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Transplanting of trees	Identify and demarcate trees / vegetation to be transplanted, monitor extent of pruning / lifting works to minimise damage, timing of operations implementation of all stages of preparatory and translocation works, and maintenance of transplanted vegetation, etc.
New buildings	Ensure no buildings are greater than 3 storeys and that finish treatments comply with mitigation requirements.
Boundaries	Ensure hoarding and noise barriers are erected as required.
Night-time lighting	Ensure night-time lighting is directional (away from VSRs), hooded and shielded.
Plant supply	Monitor operations relating to the supply of specialist plant material (including the collection, germination and growth of plants from seed) to ensure that plants will be available in time to be used within the construction works.
Landscape treatments generally	Check that hard / soft landscape designs conform to intent of mitigation measures and agreed designs.
Soiling, planting, etc.	Monitor implementation and maintenance of soiling and planting works against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Establishment Works	Monitor implementation of maintenance operations during Establishment Period.

9.5.4 In the event of non-compliance the responsibilities of the relevant parties are detailed in the Event/Action Plan provided on **Table 9-8** below:



**Table 9-8 Event/Action Plan for Construction/Operation Phase**

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

## **10. ECOLOGICAL MITIGATION**

### **10.1 Introduction**

- 10.1.1 Based on the survey and the impact evaluation findings of the current report, no significant adverse ecological impact is predicted for the loss of the existing habitats which are of “very low” to “low to moderate” ecological values. It was concluded that no specific ecological mitigation measures would be required.
- 10.1.2 However, it is anticipated that mitigation measures undertaken to mitigate for noise (i.e. erection of noise barrier), visual (erection of site hoarding and noise barrier treatment), air (control of dust and general good site practice), water (prevention of site run-off and specific discharge requirement) would provide additional ecological function in screening off construction works and human presence from wildlife, and aid in prevention of severe pollution events and disturbance to adjacent/ watercourses/ water bodies downstream.
- 10.1.3 In order to prevent noise and visual impact, the use of screening materials during the construction will be adopted. A site hoarding will be in place before the peak winter bird season between October and March to ensure that disturbance from the proposed development is minimized. The workers should also be briefed, before the commencement of the works, the sensitivity of the areas, and they should be requested not to disturb any areas nearby. Furthermore, the site boundary should be clearly defined (i.e. fenced with the screening materials mentioned above) and any works beyond the boundary should be strictly prohibited.
- 10.1.4 Standard site practices during the construction phase will be deployed, which will minimize the chance of site run-off and the chance of pollution to watercourses downstream, as well as any dust impact. Further, design elements (by means of opaque, non-reflective materials) to the noise barriers in order to reduce bird collision impact with these structures will be in place. With these, no further mitigation measures during construction phase are necessary.

### **10.2 Mitigation Measures During the Construction Phase**

- 10.2.1 No specific ecological requirement above and beyond the ones stated in **Section 10.1.2** above which are required under other impact assessments.

### **10.3 Mitigation Measures During the Operational Phase**

- 10.3.1 No significant impact is anticipated and thus no specific mitigation measure during the operational phase is to be implemented.
- 10.3.2 During the operational phase, the design elements required to reduce bird collision impact with noise barriers during the construction phase will also be adopted. As such there is no need for further mitigation measure.

### **10.4 Monitoring Requirements**

#### ***Baseline Ecological Monitoring***

- 10.4.1 The ecological data obtained during the EIA process will provide the baseline for the evaluation of effectiveness of the proposed mitigation measures. However, prior to any site clearance and construction activities, a four-month survey is proposed to identify (if any) site condition changes which would affect the reliability of data obtained during the EIA process as a baseline.

**Table 10-1 Summary of the Ecological Baseline Update for the Current Project**

	<b>Ecological Baseline Update</b>
Bird	Monthly for Four months (including between October and March)
Dragonfly & butterfly	Monthly for any four months in the period between March and November
Herpetofauna	Monthly for any four months in the period between April and November

10.4.2 Survey area should follow that of the current submission, with emphasis placed on the immediate surrounding habitats which could be impacted during the construction phase. These include but not limited to:

- Ngau Tam Mei Main Drainage Channel; and
- Agricultural land to the northeast of the Project Site.

10.4.3 Surveys should be undertaken by qualified ecologists and/or professionals in the respective fauna group to be surveyed. Survey methodology should follow that of the current submission and in compliance with the relevant Government technical memorandums.

10.4.4 A Baseline Survey Report is to be submitted to the relevant Government departments.

***Construction Phase Ecological Monitoring***

10.4.5 As a precautionary measure to verify the accuracy of impact assessment and detect any unpredictable impact arising from the proposed development, , regular site visit and faunal survey should be undertaken at the immediate surrounding habitats and identified habitats downstream which might be affected; these should include but not limited to:

- Ngau Tam Mei Main Drainage Channel; and
- Agricultural land to the northeast of the Project Site.

10.4.6 Surveys should be undertaken by qualified ecologists and/or professionals in the respective fauna group to be surveyed. Survey methodology should follow that of the current submission and in compliance with the relevant Government technical memorandums.

10.4.7 The survey shall cover the items listed in **Table 10-2**. Survey findings should be evaluated against the pre-construction baseline. Any adverse ecological impacts not addressed should be identified and, if considered relevant to the current Project, remedial actions should be formulated and undertaken as appropriate. Findings of the surveys, evaluation of the effectiveness of the mitigation measures and/or report on any unforeseen ecological impacts and remedial actions taken should be submitted as part of the EM&A requirement.

***Operational Phase Ecological Monitoring***

10.4.8 No significant impact is anticipated and thus no operational phase ecological monitoring will be required.

**Table 10-2 Summary of Construction and Operational Phase Ecological Monitoring for the Current Project**

	<b>Construction Phase Ecological Monitoring</b>	<b>Operational Phase Ecological Monitoring</b>
Bird	Weekly	Not required
Dragonfly & Butterfly	Once per month between March and November	Not required
Herpetofauna	Once per month between April and November	Not required
Site Inspection	Weekly	Not required

## **10.5 Fisheries Impacts**

- 10.5.1 According to the EIA report, no fisheries impacts are predicted as a result of the proposed Project; hence the development and implementation of a monitoring and audit programme for assessing the effects on fisheries resources and operations is not considered necessary. However, an emergency response plan for any water pollution in the water bodies surrounding the Project Area will be implemented. Also, good site practices will be implemented during the construction phase of the Project. Excavated material and other inert construction wastes produced will be transferred to proper recipients (i.e. public fill or landfill site where appropriate).
- 10.5.2 With the measures for mitigating the impacts from construction activities (as described in Table 14-1 of the submitted EIA report), indirect impacts during the construction phase would be insignificant.
- 10.5.3 During the operation phase, no significant impact is anticipated and thus no specific measure for fisheries impact has to be implemented.

## 11. SITE ENVIRONMENTAL AUDIT

### 11.1 Site Surveillance

- 11.1.1 Site surveillance provides a direct means to trigger and enforce the specified environmental protection and pollution control measures are in compliance with the contract specifications. They shall be undertaken regularly and routinely by ET to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented by the Contractor in accordance with the EM&A recommendations. With well-defined pollution control and mitigation specifications and a well-established site inspection, deficiency and action reporting system, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.
- 11.1.2 The ET Leader is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspections under the EM&A works. He shall, in consultation with the IEC, prepare and submit a proposal on the site inspection, deficiency and action reporting procedures (including any checklists and forms) within 21 days of the construction contract commencement to the Contractor for agreement and to the ER for approval. A preliminary site inspection, deficiency and action reporting system in form of a flow chart is prepared for reference. This is shown in **Figure 11-1** for review and refinement by the ET Leader at the commencement of the Project.
- 11.1.3 Regular site inspections shall be carried out at least once per week for all works areas. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the Site, it should also review the environmental situation outside the site area which is likely to be affected, directly or indirectly, by the site activities. The ET leader shall make reference to the following information in conducting the inspection:
- The EIA recommendations and requirements on environmental protection and pollution control mitigation measures;
  - Works progress and programme, and site plans;
  - Individual construction works methodology proposals (which shall include proposal on associated pollution control measures);
  - The contract specifications on environmental protection and pollution prevention control;
  - The relevant environmental protection and pollution control laws, ProPECC Notes; and
  - Previous site inspection results.
- 11.1.4 The satisfactory implementation of relevant recommended mitigation measures shall be checked during the ET's regular site inspections during the relevant phases of construction works.
- 11.1.5 The Contractor shall update with the ET Leader on all relevant information of the construction contract for him to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be submitted, in a site inspection proforma, to the IEC and the Contractor in a site inspection proforma within 24 hours, for reference and for taking immediate action. The Contractor shall follow the procedures and time frame as stipulated in the environmental site inspection, deficiency and action reporting system formulated by the ET Leader to report on any remedial measures subsequent to the site inspections.
- 11.1.6 *Ad hoc* site inspections shall also be carried out by the ET and/or IEC when significant environmental problems are identified. Inspections may also be required subsequent

to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

## **11.2 Environmental Compliance with Legal and Contractual Requirements**

- 11.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong, which the construction activities shall comply.
- 11.2.2 The ET Leader shall review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented.
- 11.2.3 The Contractor shall regularly copy relevant documents to the ET Leader so that the checking work can be carried out effectively. The document shall at least include the updated Work Progress Reports, the updated Works Programme, the application letters for different licence/permits under the environmental protection laws, and all the valid licence/permit. The site diary shall also be available for the ET's inspection upon his request.
- 11.2.4 After reviewing the document, 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 cope with the works programme or may result in potential violation of environmental protection and pollution control requirements by the works in due course, he shall also advise the Contractor and the ER accordingly. The review shall be copied to IEC for any follow-up action.
- 11.2.5 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ER shall check that appropriate actions have been taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

## **11.3 Environmental Complaints**

- 11.3.1 Complaints received on environmental issues shall be referred to the ET Leader for carrying out complaint investigation procedures. The ET shall undertake the steps given below upon receipt of the complaints. The complaint investigation procedures are also presented in form of a flow chart in **Figure 11-2** for easy reference.
- Log complaint and date of receipt onto the complaint database and inform the IEC 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 in consultation with the IEC;
  - If mitigation measures are required, advise the Contractor accordingly;
  - Review the Contractor's implementation of the identified a required mitigation measures, , and the concurrent situation;
  - If the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;
  - Undertake additional monitoring and audit to verify the compliant if necessary, and ensure that any valid reason for complaint does not recur

through proposed amendments to work methods, procedures, machines and/or equipment, etc;

- Report the investigation results and the subsequent actions to the source of complaint (If the source of complaint is identified through EPD, the results should be reported within the time frame assigned by EPD); and
- Log a record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

11.3.2 The ER shall notify the Project Proponent of any complaints received and keep him well informed of the actions being taken to settle these complaints.

11.3.3 During the complaint investigation work, the Contractor and ER shall co-operate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures (in consultation with the IEC, see Section 11.3 above) are required following the investigation, the Contractor shall promptly carry out the measures. The ER shall ensure that the measures have been carried out by the Contractor.

#### **11.4 Documentation**

11.4.1 All documentation is required to be filed in a traceable and systematically manner and ready for inspection upon request. Site document, such as monitoring field records, laboratory analysis records, meeting minutes, correspondences etc., shall be cross-referenced by the ET Leader and be ready for inspection upon request. All Construction Phase EM&A results and findings shall be documented in the Construction Phase EM&A report prepared by the ET Leader and endorsed by IEC prior to disseminate to the Contractor, ER and EPD.

11.4.2 All documentation to the Director of Environmental Protection shall be in paper form and/or electronic form (in the format in agreement with the Director) upon request. Prior to submission, the water quality data software format shall be agreed with EPD. All documents and data shall be kept for at least one year after the completion of the construction contract. All submissions (reports, data, and correspondences etc.) to the Director of Environmental Protection shall be liable to use freely for the purposes of communicating environmental data and the owner of information shall claim no copyright. Any request to treat all or part of a submission in confidence will be respected, but if no such request is made it will be assumed that the submission is not intended to be confidential.



## **12. REPORTING**

### **12.1 General**

- 12.1.1 The following reporting requirements based upon a paper-documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the ER and EPD. All the monitoring data (baseline and impact) shall also be submitted in diskettes in an agreed format. This would enable a transition from a paper/historic and reactive approach to an electronic/real time proactive approach.

### **12.2 Baseline Monitoring Report**

- 12.2.1 The ET Leader shall 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 shall be submitted to each of the four parties: the Contractor, the IEC, the ER, and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies needed. The format and content of the report, and the representation of the baseline monitoring data to be submitted shall be agreed with EPD.
- 12.2.2 The baseline monitoring report shall include at least the following:
1. Up to half a page executive summary;
  2. Brief project background information;
  3. Drawings showing locations of the baseline monitoring stations;
  4. An updated construction programme with milestones of environmental protection/mitigation activities annotated;
  5. Monitoring results (in both hard and diskette copies) together with the following information:
    - Monitoring methodology;
    - Name of laboratory and types of equipment used and calibration details;
    - Parameters monitored;
    - Monitoring locations (and depth);
    - Monitoring date, time, frequency and duration;
    - QA/QC results and detection limits.
  6. Details on influencing factors, including:
    - Major activities, if any, being carried out on the site during the period;
    - Weather conditions during the period;
    - Other factors which might affect the results.
  7. Determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored;
  8. Revisions for inclusion in the EM&A Manual; and
  9. Comments and conclusions.

### **12.3 Monthly EM&A Reports**

- 12.3.1 The results and findings of all EM&A work required in the Manual shall be recorded and submitted by the ET Leader. Based on this information, a monthly EM&A reports shall be prepared by the ET Leader and endorsed by the IEC, and submitted to EPD within 10 working days of the end of each reporting month, with the first report due in the month after construction commences. A maximum of 4 copies of each monthly EM&A report shall be submitted to each of the four parties: the Contractor, the IEC, the ER and EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium required.
- 12.3.2 The ET Leader shall review the number and location of monitoring stations and parameters to monitor every 6 months or on as needed basis in order to cater for the changes in surrounding environment and nature of works in progress.

### **12.4 First Monthly EM&A Report**

- 12.4.1 The first monthly EM&A report shall include at least but not be limited to the following:
1. Executive Summary (1-2 pages);
    - Breaches of AL levels;
    - Complaint Log;
    - Notifications of any summons and successful prosecutions;
    - Reporting Changes;
    - Future key issues.
  2. Basic Project Information
    - Project organisation including key personnel contact names and telephone numbers;
    - Construction Programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
    - Management structure;
    - Works undertaken during the month.
  3. Environmental Status
    - Works undertaken during the month with illustrations (such as location of works, daily, dredging/filling rates, percentage fines in the fill material used);
    - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
  4. 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 study final report;
    - Environmental requirements in contract documents;

5. Implementation Status
  - Advice on the implementation status of environmental protection and pollution control/mitigation measures including measures for ecological, and the landscape and visual impacts, as recommended in the project EIA study report, summarised in the updated implementation schedule.
6. Monitoring Results (in both hard and diskette copies) together with the following information;
  - Monitoring methodology;
  - Name of laboratory and types of equipment used and calibration details;
  - Parameters monitored;
  - Monitoring locations (and depth);
  - Monitoring date, time, frequency, and duration;
  - Weather conditions during the period;
  - Graphical plots of the monitored parameters in the month annotated against:
  - Major activities being carried out on site during the period;
  - Weather conditions that may affect the results;
  - Any other factors which might affect the monitoring results; and
  - QA/QC results and detection limits.
7. Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
  - Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
  - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
  - Record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, result and summary;
  - Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
  - Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance;
8. Others
  - An account of the future key issues reviewed from the works programme and work method statements;
  - Advice on the solid and liquid waste management status;
  - Submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarizing the EM&A of the period.

## **12.5 Subsequent Monthly EM&A Reports**

12.5.1 The subsequent monthly EM&A reports shall include the following:

1. Executive Summary (1-2 pages)
  - Breaches of AL levels;
  - Complaint Log;
  - Notifications of any summons and successful prosecutions;
  - Reporting Changes;
  - Future key issues.
2. Environmental Status
  - Construction Programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
  - Works undertaken during the month with illustrations including key personnel contact names and telephone numbers;
  - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
3. Implementation Status
  - Advice on the implementation status of environmental protection and pollution control/mitigation measures including measures for ecological, and landscape and visual impacts, as recommended in the project HA study report, summarised in the updated implementation schedule.
4. Monitoring Results to provide monitoring results (in both hard and diskette copies) together with the following information
  - Monitoring methodology;
  - Name of laboratory and types of equipment used and calibration details;
  - Parameters monitored;
  - Monitoring locations (and depth);
  - Monitoring date, time, frequency, and duration;
  - Weather conditions during the period;
  - Graphical plots of the monitored parameters in the month annotated against:
    - Major activities being carried out on site during the period;
    - Weather conditions that may affect the results;
    - Any other factors which might affect the monitoring results;
    - QA/QC results and detection limits.
5. Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
  - Record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
  - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
  - Record of all notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, result 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;
  - A description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
6. Others
- An account of the future key issues reviewed from the works programme and work method statements;
  - Advice on the solid and liquid waste management status.
7. Appendix
- AL 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;
    - Any other factors which might affect the monitoring results
    - Monitoring schedule for the present and next reporting period
    - Cumulative statistics on complaints, notifications of summons and successful prosecutions
    - Outstanding issues and deficiencies

## **12.6 Quarterly EM&A Summary Reports**

12.6.1 The quarterly EM&A summary report, which should generally be around 5 pages (including about 3 pages of text and tables and 2 pages of figures) should contain at least the following listed information. Apart from these, the first quarterly summary report should also confirm that the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

1. Up to half a page executive summary;
2. Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter;
3. 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 study final report;
4. Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation schedule;
5. Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures;
6. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
7. Graphical plots of the trends of monitored parameters over the past 4 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;
8. Advice on the solid and liquid waste management status;
9. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
10. A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
11. For project where measurement of suspended solids is required, quarterly assessment of construction impacts on suspended solids at the project site, including, but not limited to, a comparison of the difference between the quarterly mean and 1.3 times of the ambient mean, which is defined as 30% increase of the baseline data or EPD data, of the related parameters by using appropriate statistical procedures. Suggestion of appropriate mitigation measures if the quarterly assessment analytical results demonstrate that the quarterly mean is significantly higher than the 1.3 on water quality times of the ambient mean ( $p < 0.05$ );
12. A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
13. A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
14. A summary record of all 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;

15. Comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and
16. Proponents' contacts and any hotline telephone number for the public to make enquiries.

## **12.7 Final EM&A Summary Reports**

12.7.1 Upon the completion of construction works and termination of construction phase EM&A programme of this Project, a final EM&A summary report shall be submitted. The final EM&A summary report shall include the following:

1. An executive summary;
2. Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the entire construction period;
3. 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 study final report;
4. Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation status proformas;
5. Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
6. Graphical plots of the trends of monitored parameters over the construction period for representative monitoring stations annotated against:
  - The major activities being carried out on site during the period;
  - Weather conditions during the period;
  - Any other factors which might affect the monitoring results; and
  - The return of ambient environmental conditions in comparison with baseline data.
7. Compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies;
8. Provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;
9. Advice on the solid and liquid waste management status;
10. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
11. A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
12. A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
13. A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
14. Review the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);



15. A summary record of all 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;
16. Review the practicality and effectiveness of the EIA process and EM&A programme (e.g. effectiveness and efficiency of the mitigation measures), recommend any improvement in the EM&A programme; and
17. A conclusion to state the return of ambient and/or the predicted scenario as per EIA findings.

## **12.8 Forms to be Adopted**

12.8.1 To facilitate the management of the EM&A programme for the construction works, the ET Leader shall keep records of EM&A activities during the construction phase of the Project (including those presented in the preceding sections). These records shall be made available for inspection and audit by the ER/ IEC/ EPD during the entire construction phase. Sample record forms are presented in **Appendix II** which should be adopted where applicable, and amended by ET Leader where necessary. These forms are listed as follows:

- Implementation Status Proforma;
- Data Recovery Schedule;
- Site Inspection Proforma;
- Proactive Environmental Protection Proforma;
- Regulatory Compliance Proforma;
- Complaint Log;
- Sample Template for Interim Notifications of Environmental Quality Limits Exceedances;
- Data Sheet for TSP Monitoring;
- Noise Monitoring Field Record Sheet; and
- Water Monitoring Field Record Sheet.

## **12.9 Data Keeping**

12.9.1 The site document such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the monthly EM&A reports for submission. However, the document shall be well kept by the ET and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. The monitoring data shall also be recorded in magnetic media form, and the software copy can be available upon request. The water quality data software format shall be agreed with EPD. All the documents and data shall be kept for at least one year after completion of the construction contract.

## **12.10 Interim Notifications of Environmental Quality Limit Exceedances**

12.10.1 With reference to Event/Action Plans in previous sections, when the environmental quality limits are exceeded, the ET shall immediately notify the ER & EPD, as appropriate. The notification shall be followed up with advice to EPD on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notifications is shown in **Appendix II**.