Halcrow China Limited

AGREEMENT NO. CE 59/2005 (EP)
Development of a Bathing Beach at Lung Mei, Tai Po
Environmental, Drainage and Traffic Impact Assessments - Investigation

Environmental Monitoring & Audit Manual

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The Government of Hong Kong Special Administrative Region
Civil Engineering and Development Department
Port Works Division

Halcrow

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1. INTRODUCTION

1.1 Purpose of the Manual

This Environmental Monitoring and Audit (EM&A) Manual ("the Manual") is prepared by Halcrow China Limited and ERM-Hong Kong, Limited (ERM) on behalf of the Civil Engineering and Development Department (CEDD). The Manual is a companion document of the EIA Study of the Development of a Bathing Beach at Lung Mei, Tai Po (hereafter referred to as the Project).

The Manual has been prepared in accordance with the *EIA Study Brief* (No. ESB-138/2006) and the *Technical Memorandum of the Environmental Impact Assessment Process* (*EIAO TM*). The purpose of the Manual is to provide information, guidance and instruction to personnel charged with environmental duties and those responsible for undertaking EM&A work during construction and operation. It provides systematic procedures for monitoring and auditing of potential environmental impacts that may arise from the works.

The EM&A Manual comprises descriptions of the key elements of the EM&A programme including:

- Appropriate background information on the construction of the Project with reference to relevant technical reports;
- Organisational arrangements, hierarchy and responsibilities with regard to the management of environmental performance during the construction phase. The EM&A team, the Contractor team and the Engineer Representative are included;
- A broad construction programme indicating those activities for which specific mitigation is required and providing a schedule for their timely implementation;
- Descriptions of the parameters to be monitored and criteria through which performance will be assessed including: monitoring frequency and methodology, monitoring locations (typically, the location of sensitive receivers as listed in the EIA), monitoring equipment lists, event contingency plans for exceedances of established criteria and schedule of mitigation and best practice methods for reduced adverse environmental impacts;
- Procedures for undertaking on-site environmental performance audits as a means of ensuring compliance with environmental criteria; and
- Reporting procedures.

The EM&A Manual will be a dynamic document which will undergo a series of revisions, as needed, to accommodate the progression of the construction programme.

1.2 Project Description

1.2.1 Background to the Study

The ex-Provisional Regional Council (ex-PRC) considered that one swimming pool complex in Tai Po was insufficient and hence suggested developing a bathing beach at Lung Mei, Tai Po. Therefore, on 12 May 1998, the Culture, Recreation and Sports Committee of ex-PRC approved funding for the Architectural Services Department (ArchSD) to study the feasibility of developing an artificial beach at Lung Mei. The Feasibility Study, which commenced in December 1999 and completed in mid-2001, concluded that it was technically viable to construct a bathing beach at Lung Mei, Tai Po.

There is no beach facility in the east region of the New Territories, except in the Sai Kung District, which is very far from Tai Po District. Moreover, the existing swimming facility in the Tai Po areas could not satisfy the demand for a bathing beach. Therefore, the public has been requesting repeatedly to the LCSD for a beach development in the Tai Po District.

In light of the above, the Tai Po District Council (TPDC) strongly requested for the development of a bathing beach at Lung Mei and members of the TPDC urged for early implementation of the Project. In a Legislative Council case conference on 20 April 2004, Members requested the Government to accord priority to this Project.

Lung Mei is adjacent to a prominent leisure area, Tai Mei Tuk, with well-established facilities for holiday-makers and water-based recreation activities, which has attracted many visitors, in particular during public holidays. It is anticipated that the proposed bathing beach would complement the facilities already provided in the Tai Mei Tuk area.

1.2.2 The Proposed Project Site

The Project will involve the construction and operation of a bathing beach at Lung Mei, Tai Po. The beach will provide a facility for visitors for leisure and recreation. The Project will include the following facilities:

- Construction of a 200m long beach with two groynes, which includes dredging and sandfilling;
- Construction of two culverts at the eastern and western side of the beach, to collect and divert surface runoff from upstream locations; and,
- Construction of associated beach building facilities, kiosk and a car park for visitors.

The Project constitutes a Designated Project by virtue of Items C.2 and C.12 of Part I of Schedule 2 under the *EIAO*. The following elements of the Project addressed in this EIA Report are classified as Designated Projects under the *Environmental Impact Assessment Ordinance* (*Cap. 499*) (*EIAO*).

- Dredging operation which is less than 500m from the nearest boundary of an existing Site of Special Scientific Interest, Coastal Protection Area, Conservation Area and Country Park.

1.2.3 Objectives of EM&A

The objectives of carrying out the EM&A for the Project include:

- Providing baseline information against which any short or long term environmental impacts of the projects can be determined;
- Providing an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- Monitoring the performance of the Project and the effectiveness of mitigation measures;
- Verifying the environmental impacts identified in the EIA;
- Determining Project compliance with regulatory requirements, standards and government policies;
- Taking remedial action if unexpected results or unacceptable impacts arise; and
- Providing data to enable an environmental audit to be undertaken at regular intervals.

EM&A procedures are required during the design, construction, post-construction and operational phases of the project implementation and a summary of the requirements for each of the environmental parameters is detailed in *Table 1.1* below.

1.2.4 **Table 1.1 Summary of EM&A Requirements**

Parameter	**EM&A Phase**			
	Design Phase [1]	**Construction Phase**	**Post-Construction Phase**	**Operation Phase**
Air Quality	-	Yes	-	-
Noise	-	Yes	-	-
Water Quality	-	Yes	Yes	Yes
Waste	-	Yes	-	-
Ecology	- [2]	-	Yes	-
Fisheries	-	-	-	-
Landscape and Visual	Yes	Yes	Yes	Yes

Notes:

[1] EM&A requirements in the design phase shall include confirmation on the compliance for environmental designs which were specified in the EIA Report and the EP for all parameters.

[2] Although pre- construction monitoring may overlap the design phase, the focus of this monitoring will be to provide additional information on which to assess potential impacts through construction.

1.3 Scope of EM&A

The scope of this EM&A programme is to:

- establish baseline air quality, noise and water quality levels at specified locations;
- implement monitoring and site audit requirements for air quality, noise, water quality and ecology monitoring programme;
- liaise with, and provide environmental advice (as requested or when otherwise necessary) to construction site staff on the significance and implications of the environmental monitoring data;
- identify and resolve environmental issues and other functions as they may arise from the works;
- check and quantify the Contractor(s)'s overall environmental performance, implementation of Event and Action Plans (EAPs), and remedial actions taken to mitigate adverse environmental effects as they may arise from the works;
- conduct monthly reviews of monitored impact data as the basis for assessing compliance with the defined criteria and to ensure that necessary mitigation measures are identified and implemented, and to undertake additional *ad hoc* monitoring and auditing as required by special circumstances;
- evaluate and interpret environmental monitoring data to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards, and to verify the environmental impacts predicted in the EIA;
- manage and liaise with other individuals or parties concerning other environmental issues deemed to be relevant to the construction process;
- conduct regular site inspections of a formal or informal nature to assess:
  - the level of the Contractor(s)'s general environmental awareness;
  - the Contractor(s)'s implementation of the recommendations in the EIA and their contractual obligations;
  - the Contractor(s)'s performance as a measured by the EM&A;
  - the need for specific mitigation measures to be implemented or the continued usage of those previously agreed;
  - to advise the site staff of any identified potential environmental issues; and,
  - submit monthly EM&A reports which summarise project monitoring and auditing data, with full interpretation illustrating the acceptability or otherwise of any environmental impacts and identification or assessment of the implementation status of agreed mitigation measures.

1.4 Works Programme and Works Location

The construction works are anticipated to commence in 2008. The preliminary construction programme is given in *Appendix A*. It should be noted that the Tolo Harbour Sewerage of Unsewered Areas Stage I Phase IIC (Agreement No. CE 18/94) will carry out works connecting the unsewered areas from Ting Kok village to Lung Mei village, which are in the vicinity of the bathing beach development. The sewerage construction works is scheduled to be completed prior to the operation of this Proposed Bathing Beach Development project. With the implementation of the sewerage connection (expect to be 60% connection rate) and the gazette of the Tolo Harbour Sewerage of Unsewered Areas Stage I Phase IIC (Agreement No. CE 18/94) including Lung Mei area, as part of the Sewerage Master Plan Works for Tolo Harbour Catchment, the water quality at Lung Mei will be improved and guaranteed, and facilitating the operation of this bathing beach.

The locations of works are shown in *Figure 1.1*. The Sensitive Receivers in the vicinity of the proposed project are presented in *Figure 1.1*.

1.5 Organisation of the EM&A

1.5.1 General

The Contractor will appoint an Environmental Team (ET) to conduct the monitoring and auditing works and to provide specialist advice on undertaking and the implementation of environmental responsibilities.

The ET will have previous relevant experience with managing similarly sized EM&A programmes and the Environmental Team Leader (ET Leader) will be a recognised environmental professional, preferably with a minimum of seven years relevant experience in impact assessments and impact monitoring programmes.

To maintain strict control of the EM&A process, CEDD will appoint independent environmental consultants to act as an Independent Environmental Checker (IEC) to verify and validate the environmental performance of the Contractor(s) and his Environmental Team. The IEC will have previous relevant experience with checking and auditing similarly sized EM&A programmes and the IEC will be a recognised environmental professional, preferably with a minimum of seven years relevant experience in impact assessments and impact monitoring programmes.

1.5.2 Project Organisation

The roles and responsibilities of the various parties involved in the EM&A process are further expanded in the following sections and in *Figure 1.2*.

The ET Leader will be responsible for, and in charge of, the Environmental Team; and will be the person responsible for executing the EM&A requirements.

Engineer Representative (ER)

ER will:

- monitor the Contractor's compliance with contract specifications, including the effective implementation and operation of environmental mitigation measures and other aspects of the EM&A programme;
- instruct the Contractor to follow the agreed protocols or those in the Contract Specifications in the event of exceedances or complaints;
- comply with the agreed Event and Action Plans in the event of any exceedance;
- liaise with the IEC and assist as necessary in the implementation of the EM&A program; and
- participate in joint site inspections undertaken by the ET and IEC.

The Contractor

The Contractor will:

- work within the scope of the construction contract and other tender conditions;
- provide assistance to the ET in carrying out monitoring;
- submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event and Action Plans;
- implement measures to reduce impact where Action and Limit levels are exceeded;
- implement the corrective actions instructed by ER/ET/IEC;
- participate in the site inspections undertaken by the ET and the IEC, as required, and undertake any corrective actions instructed by ER/ET/IEC; and
- adhere to the procedures for carrying out complaint investigation.

Environmental Team (ET)

The ET will:

- monitor various environmental parameters as required in this EM&A Manual;
- assess the EM&A data and review the success of the EM&A programme determining the adequacy of the mitigation measures implemented and the validity of the EIA predictions as well as identify any adverse environmental impacts before they arise;

- carry out regular site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt issues;
- review the Contractor's working programme and methodology, and comment as necessary;
- review and prepare reports on the environmental monitoring data, site environmental conditions and audits;
- report on the environmental monitoring and audit results and conditions to the IEC, Contractor(s), EPD and ER;
- recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans;
- adhere to the procedures for carrying out complaint investigation; and,
- the ET Leader will keep a contemporaneous log-book and record each and every instance or circumstance or change of circumstances which may affect the environmental impact assessment and every non-conformance with the recommendations of the EIA Reports or the EPs.

The ET will be led and managed by the ET Leader. The ET leader will have relevant education, training, knowledge, experience and professional qualifications and the appointment will be subject to the approval of the Director of Environmental Protection and ER. Suitably qualified staff will be included in the ET, and the ET should not be in any way an associated body of the Contractor or the Independent Environmental Checker (IEC) for the Project.

Independent Environmental Checker (IEC)

The IEC will:

- review and monitor the implementation of the EM&A programme and the overall level of environmental performance being achieved;
- arrange and conduct monthly independent site inspections/audits of the works;
- validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring stations, monitoring procedures and locations of sensitive receivers;
- carry out random sample check and audit on monitoring data and sampling procedures, etc;
- audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;

- on needed basis, audit the Contractor(s)'s construction methodology and agree the appropriate, reduced impact alternative in consultation with ER, the ET and the Contractor;
- provide specialist advice to ER and the Contractor on environmental matters;
- check complaint cases and the effectiveness of corrective measures;
- check that the necessary mitigation measures recommended in the EIA, EP and Contract documents, or as subsequently required, are effectively implemented;
- review EM&A report submitted by the ET leader and feedback audit results to ET by signing off relevant EM&A proformas;
- report the findings of site inspections/ audits and other environmental performance reviews to ER, ET, EPD and the Contractor(s); and

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

1.6 Structure of the EM&A

The remainder of the Manual is set out as follows:

- *Section 2* sets out the EM&A general requirements;
- *Section 3* sets out the EM&A requirement for construction phase air quality;
- *Section 4* sets out the EM&A requirement for noise;
- *Section 5* details the requirements for water quality;
- *Section 6* details the requirements for waste management;
- *Section 7* details the requirements for ecology;
- *Section 8* details the requirements for fisheries;
- *Section 9* sets out the EM&A requirements for landscape and visual;
- *Section 10* describes the scope and frequency of site environmental auditing; and
- *Section 11* details the reporting requirements for the EM&A.

Appendix E presents the Implementation Schedule.

2. EM&A GENERAL REQUIREMENTS

2.1 Introduction

In this section, the general requirements of the EM&A programme for the Project are presented with reference to the relevant findings from the EIA Report that has formed the basis of the scope and content of the programme.

2.2 Construction Phase EM&A

General

The environmental issues, which were identified during the EIA process and are associated with the construction phase of the Project, will be addressed through the monitoring and controls specified in this EM&A Manual and in the construction contracts. *Appendix E* lists out the measures required during the construction and operational phases of the project.

During the construction phases of the Project, air quality, noise quality, water quality, waste, ecology and landscape and visual will be subject to EM&A, with environmental monitoring being undertaken for air quality, noise, water quality and ecology. Monitoring of the effectiveness of the mitigation measures will be achieved through the environmental monitoring programme as well as through site inspections. The inspections will include within their scope, mechanisms to review and assess the Contractor(s)'s environmental performance, ensuring that the recommended mitigation measures (*Appendix E*) have been properly implemented, and that the timely resolution of received complaints are managed and controlled in a manner consistent with the recommendations of the EIA Report.

Environmental Monitoring

The environmental monitoring work throughout the Project period will be carried out in accordance with this EM&A and reported by the ET. Monitoring works will comprise of quantitative assessment of physical parameters such as air quality, noise and water quality impacts which also form an important part of the whole monitoring programme. The monitoring programme will be conducted at the chosen representative sensitive receivers in the vicinity of the construction site.

Action and Limit Levels

Action and Limit (A/L) Levels are defined levels of impact recorded by the environmental monitoring activities which represent levels at which a prescribed response is required. These Levels are quantitatively defined later in the relevant sections of this manual and described in principle below:

Action Levels: beyond which there is a clear indication of a deteriorating ambient environment for which appropriate remedial actions are likely to be necessary to prevent environmental quality from falling outside the Limit Levels, which would be unacceptable; and

Limit Levels: statutory and/or agreed contract limits stipulated in the relevant pollution control ordinances, HKPSG or Environmental Quality Objectives established by the EPD. If these are exceeded, works will not proceed without appropriate remedial action, including a critical review of plant and working methods.

Event and Action Plans

The purpose of the Event and Action Plans (EAPs) is to provide, in association with the monitoring and audit activities, procedures for ensuring that if any significant environmental incident (either accidental or through inadequate implementation of mitigation measures on the part of the Contractor) does occur, the cause will be quickly identified and remedied, and the risk of a similar event recurring is reduced. This also applies to the exceedances of A/L criteria identified in the EM&A programme

Site Inspections

In addition to monitoring of air quality, noise, water quality and ecology as a means of assessing the ongoing performance of the Contractor, the ET will undertake site inspections and audits of on-site practices and procedures twice per month. The primary objective of the inspection and audit programme will be to assess the effectiveness of the environmental controls established by the Contractor and the implementation of the environmental mitigation measures recommended in the EIA Report and EM&A Manual. The IEC will undertake monthly site inspection and audit to assess the performance of the Contractor.

Whilst the audit and inspection programme will undoubtedly complement the monitoring activity with regard to the effectiveness of controlling impacts to air quality, noise, water quality and ecology, the criteria against which the audits will be undertaken will be derived from the Clauses within the Contract Documents which seek to enforce the recommendations of the EIA Report and the established management systems.

The findings of site inspections and audits will be made known to the Contractor at the time of the inspection to enable the rapid resolution of identified non-conformities. Non-conformities, and the corrective actions undertaken, will also be reported in the monthly EM&A Reports.

Section 10 of this Manual presents details of the scope and frequency of on-site inspections and defines the range of issues that the audit protocols will be designed to address.

Enquiries, Complaint and Requests for Information

Enquiries, complaints and requests for information may occur from a wide range of individuals and organisations including members of the public, Government departments, the press and television media and community groups.

Enquiries concerning the environmental effects of the construction works, irrespective of how they are received, will be reported to CEDD/ER and directed to the ET which will set up procedures for the handling, investigation and storage of such information. The following steps will then be followed:

1) The ET Leader will notify CEDD/ER of the nature of the enquiry.

2) An investigation will be initiated to determine the validity of the complaint and to identify the source of the issue.

3) The Contractor will undertake the following steps, as necessary:
   - investigate and identify source of the issue;
   - if considered necessary by CEDD/ER following consultation with the IEC, undertake additional monitoring to verify the existence and severity of the alleged complaint;
   - liaise with EPD to identify remedial measures;
   - liaise with the IEC to identify remedial measures;
   - implement the agreed mitigation measures;
   - repeat the monitoring to verify effectiveness of mitigation measures; and
   - repeat review procedures to identify further practical areas of improvement if the repeat monitoring results continue to substantiate the complaint.

4) The outcome of the investigation and the action taken will be documented on a complaint log (*Appendix B*). A formal response to each complaint received will be prepared by the Contractor within five working days and submitted to ER, in order to notify the concerned person(s) that action has been taken.

5) Enquires which trigger this process will be reported in the monthly reports which will include results of inspections undertaken by the Contractor, and details of the measures taken, and additional monitoring results (if deemed necessary). It should be noted that the receipt of complaint or enquiry will not be, in itself, a sufficient reason to introduce additional mitigation measures.

The complainant will be notified of the findings, and audit procedures will be put in place to ensure that the issue does not recur.

Reporting

Baseline, construction phase and post-construction phase monitoring, monthly, quarterly and final reports will be prepared and certified by the ET Leader and verified by the IEC. The reports will be submitted to the Contractor, ER and EPD. The monthly reports will be prepared and submitted within two weeks of the end of each calendar month.

Cessation of EM&A

The cessation of EM&A programme is subject to the satisfactory completion of the EM&A Final Review Report, agreement with the IEC and approval from EPD.

2.3 Operational Phase EM&A

Ecology, water quality and landscape & visual monitoring will be required during the post-construction and/or operational phase of the Project. Details are described in the corresponded sections.

3. CONSTRUCTION PHASE AIR QUALITY

3.1 Background

Whilst fugitive dust impacts are not anticipated, a construction dust monitoring programme is recommended to ensure compliance with the relevant criterion during the construction works. Monitoring of dust levels, in terms of Total Suspended Particulates (TSP), should be conducted every six days throughout the construction period at ASRs A4 (No. 101 Lung Mei Tsuen) and A6 (No. 79 Lo Tsz Tin Tsuen). *Figure 3.1* shows the locations of the construction phase air quality monitoring.

In accordance with the recommendations of the EIA, mitigation measures have been proposed during the construction phase of the Project. Details of the mitigation measures are presented in *Appendix E* - Implementation Schedule.

3.2 Air Quality Parameters

1-hour and 24-hour TSP levels shall be measured to indicate the impacts of construction dust on air quality. The TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), *Appendix B*. Upon approval of the ER, 1-hour TSP levels can 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. 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 any other local atmospheric factors affecting or affected by site conditions etc. shall be recorded down in detail. A sample data sheet is shown in *Appendix C*.

3.3 Monitoring Equipment

High volume sampler (HVS) in compliance with the following specifications shall be used for carrying out the 1-hr and 24-hr TSP monitoring:

a) 0.6-1.7 m^3/min (20-60 SCFM) adjustable flow range;
b) equipped with a timing/control device with +/- 5 minutes accuracy for 24 hours operation;
c) installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;
d) capable of providing a minimum exposed area of 406 cm^2 (63 in^2);
e) flow control accuracy: +/- 2.5% deviation over 24-hr sampling period;
f) equipped with a shelter to protect the filter and sampler;
g) incorporated with an electronic mass flow rate controller or other equivalent devices;
h) equipped with a flow recorder for continuous monitoring;
i) provided with a peaked roof inlet;
j) incorporated with a manometer;
k) able to hold and seal the filter paper to the sampler housing at horizontal position;

l) easy to change the filter; and
m) capable of operating continuously for 24-hr period.

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.

Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognized 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 shall be converted into standard temperature and pressure condition. 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 in *Appendix C*.

If the ET Leader 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 instrument is capable of achieving a comparable result as that of 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.

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

a) the wind sensors shall be installed on masts at an elevated level 10 m above ground so that they are clear of obstructions or turbulence caused by the buildings;
b) the wind data shall be captured by a data logger. The data recorded in the data logger shall be downloaded periodically for analysis at least once a month;
c) the wind data monitoring equipment shall be re-calibrated at least once every six months; and
d) wind direction shall be divided into 16 sectors of 22.5 degrees each.

3.4 Laboratory Measurement/Analysis

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 shall be HOKLAS accredited or other internationally accredited laboratory.

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. IEC shall conduct regular audit to the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET Leader 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.

Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pin holes, and shall be conditioned in a humidity controlled chamber for over 24-hr and be pre-weighed before use for the sampling.

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.

All the collected samples shall be kept in a good condition for 6 months before disposal.

The status and locations of dust sensitive receivers may change after issuing this manual. If such cases exist, the ET Leader shall propose updated monitoring locations and seek approval from ER and agreement from the IEC. When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:

a) at the site boundary or such locations close to the major dust emission source;
b) close to the sensitive receptors; and
c) take into account the prevailing meteorological conditions.

The ET Leader shall agree with the ER in consultation with the IEC the position of the HVS for installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:

a) a horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;
b) no two samplers shall be placed less than 2 metre apart;
c) 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;
d) a minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
e) a minimum of 2 metre separation from any supporting structure, measured horizontally is required;
f) no furnace or incinerator flue is nearby;
g) airflow around the sampler is unrestricted;
h) the sampler is more than 20 metres from the dripline;
i) any wire fence and gate, to protect the sampler, shall not cause any obstruction during monitoring;

j) permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
k) a secured supply of electricity is needed to operate the samplers.

3.5 Baseline Monitoring

The ET Leader shall carry out baseline monitoring at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works to obtain daily 24-hr TSP samples. 1-hr sampling shall also be done at least 3 times per day while the highest dust impact is expected. Before commencing the baseline monitoring, the ET leader shall inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results. During the baseline monitoring, there shall not be any construction or dust generation activities in the vicinity of the monitoring stations. 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 the IEC.

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.

Ambient conditions may vary seasonally and shall be reviewed at three monthly intervals. 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 shall be at times when the contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, shall be revised. The revised baseline levels and air quality criteria shall be agreed with the IEC and EPD.

3.6 Impact Monitoring

The ET Leader shall carry out impact monitoring during the course of the Works. For regular impact monitoring, the sampling frequency of at least once in every six-days, shall be strictly observed at all the monitoring stations for 24-hr TSP monitoring. For 1-hr TSP monitoring, the sampling frequency of at least three times in every six-days shall be undertaken when the highest dust impact occurs. Before commencing the baseline monitoring, the ET leader shall inform the IEC of the impact monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the impact monitoring results.

The specific time to start and stop the 24-hr TSP monitoring shall be clearly defined for each location and be strictly followed by the field operator. In case of non-compliance with the air quality criteria, more frequent monitoring exercise, as specified in the Action Plan, 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.

3.7 Event and Action Plan for Air Quality

The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET Leader shall compare the impact monitoring results with air quality criteria set up for 24-hour TSP and 1-hour TSP. *Table 3.1* shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance of the air quality criteria occur, actions in accordance with the Action Plan in *Table 3.2* shall be carried out.

In addition to the dust monitoring, regular site audits (at a frequency of not less than once every two weeks) are recommended to ensure that appropriate dust control measures are implemented and good site practices are adopted throughout the construction period.

Table 3.1 Action and Limit Levels for Air Quality Monitoring

Parameters	Action	Limit
24 Hour TSP Level in $\mu g\ m^{-3}$	For baseline level <200 $\mu g\ m^{-3}$, Action Level = (Baseline level * 1.3 + Limit Level/2); For baseline level >200 $\mu g\ m^{-3}$, Action Level = Limit Level	260
1 Hour TSP Level in $\mu g\ m^{-3}$	For baseline level <384 $\mu g\ m^{-3}$, Action Level = (Baseline level * 1.3 + Limit Level/2); For baseline level >384 $\mu g\ m^{-3}$, Action Level = Limit Level	500

Table 3.2 Event and Action Plan for Air Quality

EVENT	ACTION			
	ET	IEC	ER	Contractor
Action Level Exceedance for One Sample	1. Identify source(s) of impact; 2. Inform the IEC and the ER; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily	1. Check monitoring data submitted by ET; 2. Check Contractor's working method	1. Notify Contractor	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate
Action Level Exceedance for Two or More Consecutive Samples	1. Identify source(s) of impact; 2. Inform the IEC and ER; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Discuss with IEC and Contractor on remedial action required; 6. If exceedance continues, arrange meeting with IEC and ER; 7. If exceedance stops, cease additional monitoring	1. Checking monitoring data 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	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented	1. Submit proposals for remedial actions to IEC within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate

EVENT	ACTION			
	ET	IEC	ER	Contractor
Limit Level Exceedance for One Sample	1. Identify source(s) of impact; 2. Inform the EPD and the ER; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of results	1. Check monitoring data 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. Supervise implementation of remedial measures	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented	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. Amend proposal if appropriate

EVENT	ACTION			
	ET	IEC	ER	Contractor
Limit Level Exceedance for Two or More Consecutive Samples	1. Notify IEC, ER, Contractor and EPD; 2. Identify source(s) of impact; 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 action 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

ET – Environmental Team, IEC – Independent Environment Checker, ER – Engineer Representative

4. NOISE IMPACT

4.1 Construction Phase

Noise monitoring is recommended during the construction phase to ensure compliance with the noise criterion at the NSRs. Weekly noise monitoring should be undertaken at the representative NSRs (N1 – N4) (*Table 4.1* and *Figure 4.1*). Regular site audits at the frequency of twice a month should be conducted to ensure that the recommended mitigation measures are properly implemented during the construction stage.

In accordance with the recommendations of the EIA, mitigation measures have been proposed during the construction phase of the Project. Details of the mitigation measures are presented in *Appendix E* - Implementation Schedule.

Table 4.1 Locations for Construction Noise Monitoring

NSR	Location
N1	Village house - No. 165A Lung Mei
N2*	Village house - No. 103 Lung Mei
N3	Village house - No. 70 Lo Tsz Tin
N4	Village house - No. 79 Lo Tsz Tin

* Noise monitoring should be conducted at N2a (i.e House No. 101 Lung Mei) if it is changed to residential use during construction phase.

4.1.1 Noise Parameters

The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq(30\ min)}$ shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, $L_{eq(5\ min)}$ shall be employed for comparison with the NCO criteria.

As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference. A sample data record sheet is shown in *Appendix C* for reference.

4.1.2 Monitoring Equipment

As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB. Noise measurements should not be made in accordance with standard acoustical principles and practices in relation to weather conditions.

The ET Leader is responsible for the availability of 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.

4.1.3 Monitoring Locations

The noise monitoring locations have been shown in *Table 4.1* and *Figure 4.1*. The status and locations of noise sensitive receivers may change after issuing this manual. If such cases exist, the ET Leader shall propose updated monitoring locations and seek approval from ER and agreement from the IEC and EPD of the proposal.

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

a) at locations close to the major site activities which are likely to have noise impacts;
b) close to the noise sensitive receivers (N.B. For the purposes of this section, any domestic premises, hotel, hostel, temporary housing accommodation, hospital, medical clinic, educational institution, place of public worship, library, court of law, performing art centre shall be considered as a noise sensitive receiver); and
c) for monitoring locations located in the vicinity of the sensitive receivers, care shall be taken to cause minimal disturbance to the occupants during monitoring.

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 the ground. If there is a 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 +3 dB(A) shall be made to the free field measurements. 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.

4.1.4 Impact Monitoring

Weekly noise monitoring shall be carried out at all the designated monitoring stations to obtain one set of 30-minute measurement between 0700-1900 hours.

General construction work carrying out during restricted hours is controlled by CNP system under the NCO.

In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in *Table 4.3* 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.

4.1.5 Event and Action Plan for Noise

The Action and Limit levels for construction noise are defined in *Table 4.2*. Should non-compliance of the noise quality criteria occur, actions in accordance with the Action Plan in *Table 4.3* shall be carried out.

Table 4.2 Action and Limit Levels for Construction Noise Monitoring

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one documented compliant is received	75* dB(A)

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

Table 4.3 Event and Action Plan for Noise

EVENT	ACTION			
	ET	IEC	ER	Contractor
Action Level	1. Notify IEC and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC and Contractor; 4. Discuss with the Contractor and formulate remedial measures; 5. Increase monitoring frequency to check mitigation effectiveness	1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor 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. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures are properly implemented	1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals
Limit Level	1. Notify IEC, ER, EPD and Contractor; 2. Identify source; 3. Carry out investigation; 4. Report the results of investigation to the IEC and Contractor; 5. Discuss with the Contractor and formulate remedial measures; 6. Increase monitoring frequency to check mitigation effectiveness	1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor 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. Require Contractor to propose remedial measures for the analysed noise problem; 4. Ensure remedial measures are properly implemented	1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals

ET – Environmental Team, IEC – Independent Environment Checker, ER – Engineer Representative

4.2 Operation Phase

Results of operational noise assessment indicate that the NSRs will not be affected by fixed plant noise sources and therefore operational phase noise monitoring is not required.

5. WATER QUALITY IMPACT

In accordance with the recommendations of the EIA, mitigation measures have been proposed during the construction phase of the Project. Details of the mitigation measures are presented in *Appendix E* - Implementation Schedule.

In accordance with the recommendations of the EIA, water quality EM&A is required during dredging and sandfilling activities. In addition, baseline water quality monitoring will be required prior to the commencement of construction activities. The following Section provides details of the water quality monitoring to be undertaken by the ET to verify the distance of sediment plume dispersion and to identify whether the potential exists for any indirect impacts to occur to ecological sensitive receivers. The water quality monitoring programme will be carried out to ensure that any deteriorating water quality is readily detected and timely action taken to rectify the situation. The status and locations of water quality sensitive receivers and the marine works location may change after issuing this Manual. If required, the ET in consultation with the Contractor(s) will propose updated monitoring locations and seek approval from the ER, the IEC and EPD.

5.1 Construction Phase

Water Quality Parameters Measurements of Dissolved Oxygen (DO) concentration (mg L^{-1}), DO saturation (%), Salinity (mg L^{-1}), Temperature (ºC) and Turbidity (NTU) will be taken in situ by the ET at monitoring stations identified below. Water samples for the measurements of SS (mg L^{-1}) and chlorophyll-*a* (µg L^{-1}) will also be collected for laboratory analysis. In addition to the water quality parameters, other relevant data will also be measured and recorded in Water Quality Monitoring Logs (*Appendix C*), including the location of the sampling stations, water depth, time, weather conditions, sea conditions, tidal stage, current direction and speed, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results. Observations on any special phenomena and work underway at the construction site at the time of sampling will also be recorded.

For water quality monitoring, the following equipment will be supplied and used by the ET. The use of similar equipment is subject to prior approval from the IEC.

5.1.1 Monitoring Equipment and Methodology

For water quality monitoring, the following equipment should be supplied and used by the environmental contractor.

- ***Dissolved Oxygen and Temperature Measuring Equipment*** - The instrument should be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and should be operable from a DC power source. It should be capable of measuring: dissolved oxygen levels in the range of 0–20 mg L^{-1} and 0-200% saturation; and a temperature of 0-45 degrees Celsius.

It should have a membrane electrode with automatic temperature compensation complete with a cable of not less than 35 m in length. Sufficient stocks of spare electrodes and cable should be available for replacement where necessary (for example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

- ***Turbidity Measurement Equipment*** – 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 (e.g. Hach model 2100P or an approved similar instrument).

- ***Salinity Measurement Instrument*** - A portable salinometer capable of measuring salinity in the range of 0-40 ppm should be provided for measuring salinity of the water at each monitoring location.

- ***Water Depth Detector*** - A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. A detector affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme, is preferred.

- ***Current Velocity and Direction*** – No specific equipment is recommended for measuring the current velocity and direction. However, the contractor should seek approval of their proposed equipment with the client prior to deployment.

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

- ***Water Sampling Equipment*** - A water sampler, consisting of a transparent PVC or glass cylinder of not less than two litres, which can be effectively sealed with cups at both ends, should be used (Kahlsico Water Sampler 13SWB203 or an approved similar instrument). The water sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth.

All *in situ* monitoring instruments should be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use.

For the on-site calibration of field equipment, the *BS 1427: 1993, Guide to Field and On-Site Test Methods for the Analysis of Waters* should be observed. Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment should also be made available so that monitoring can proceed uninterrupted even when equipment is under maintenance, calibration etc.

Water samples for SS and chlorophyll-*a* measurements should be collected in high density polythene bottles, packed in ice (cooled to 4° C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.

All laboratory work should be carried out in a HOKLAS accredited laboratory. Water samples of about 1,000 mL should be collected at the monitoring and control stations for carrying out the laboratory determinations. The determination work should start within the next working day after collection of the water samples. The analysis shall commence within 24 hours after collection of the water samples. The analyses should follow the standard methods as described in APHA *Standard Methods for the Examination of Water and Wastewater, 19th Edition* or later, unless otherwise specified (APHA 2540D for SS).

The submitted information should include pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch etc), detection limits and accuracy. The QA/QC details should be in accordance with requirements of HOKLAS or another internationally accredited scheme.

5.1.2 Monitoring Stations

The monitoring station locations have been established to identify potential impacts to water quality sensitive receivers which are shown in *Figure 5.1*.

Prior to, during and after the dredging and sandfilling works, water quality sampling will be undertaken at stations situated around the dredging area and at the sensitive receivers. The monitoring at those stations is to ensure the dredging and sandfilling works of the Project will not cause deterioration in water quality outside the impact (mixing) zone, in particularly at the nearby sensitive areas (shown in *Figure 5.1*).

- **R1** is a Reference Station located to the south of the dredging/sandfilling area, which is not supposed to be impacted by the dredging/sandfilling works. R1 is a representative station for the background water quality for Tolo Harbour as it is at the channel where the water exchange between the enclosed Plover Cove and Tolo Harbour take place;

- **R2** is a Reference Station located to the southwest of the dredging/sandfilling area, which is not supposed to be impacted by the dredging/sandfilling works. R2 is a representative station for the background water quality in the Plover Cove region;

- **I1, I2** and **I3** are the Impact Stations just outside the mixing zone, which is unlikely to be impacted by the dredging/sandfilling works;

- **FCZ1** represents the Sensitive Receiver located at the Yim Tin Tsai East Fish Culture Zone, which is about 1.5 km to the southwest of the dredging/sandfilling area. Deterioration of water quality at this station is not anticipated;

- **M1** represents the Sensitive Receiver located at the Ting Kok SSSI, which is about 800 m to the west of the dredging/sandfilling area. Deterioration of water quality at this station is not anticipated;

- **W1** represents the Sensitive Receiver located at the Water Sport Centre, which is about 250 m to the southeast of the dredging/sandfilling area, which is unlikely to be impacted by the dredging/sandfilling works.

- **G1** is the Gradient Station to assist in the identification of the source of any impact.

The suggested co-ordinates of these monitoring stations are listed in *Figure 5.1*.

The monitoring stations will be sampled during Baseline Monitoring (prior to the dredging works), Impact Monitoring (during dredging and sandfilling works) and Post Construction Monitoring (after completion of sandfilling work).

5.1.3 Monitoring Frequency

For baseline, impact and post-project monitoring, monitoring should be undertaken 3 days per week, at mid-flood and mid-ebb tides, with sampling/ measurement at the designated stations. The intervals between 2 consecutive sets of monitoring should not be less than 36 hours except where there are exceedances of Action and/or Limit Level, in which case monitoring frequency should be increased. The tidal range for each of the flood and ebb tide should not be less than 0.5 m.

The water quality sampling will be undertaken within a 3-hour window of 1.5 hour before and 1.5 hour after mid flood and mid-ebb tides. The Environmental Team will be responsible for liaison with the engineering contractor to confirm whether dredging/sandfilling works are being undertaken during the water quality sampling.

Measurements shall be taken at 3 water depths: 1m below water surface, mid-depth and 1m above sea bed, except where the water depth less than 6m, the mid-depth station may be omitted. Should the water depth be less than 3 m, only the mid-depth station will be monitored. The ET Leader shall seek approval from the IEC and DEP on all the monitoring stations.

Replicates *in-situ* measurements and samples collected from each independent sampling event are required for all parameters to ensure a robust statistically interpretable dataset.

5.1.4 Baseline Monitoring

Baseline Monitoring will comprise sampling 3 days a week, at mid-flood and mid-ebb tides, for at least 4 weeks prior to the commencement of the dredging works. There shall not be any marine construction activities in the vicinity of the monitoring stations during the baseline monitoring. The monitoring will be undertaken at the specified eight stations in total, as shown in *Figure 5.1*. The intervals between 2 consecutive sets of monitoring should not be less than 36 hours. The baseline monitoring schedule should be provided to EPD for agreement at least 2 weeks prior to commencement of the baseline monitoring work.

5.1.5 Impact Monitoring

Impact Monitoring will comprise sampling 3 days a week, at mid-flood and mid-ebb tides, during the dredging and sandfilling works. The monitoring will be undertaken at the specified eight stations as the Baseline Monitoring stations, as shown in *Figure 5.1*. The intervals between 2 consecutive sets of monitoring should not be less than 36 hours except where there are exceedances of Action and/or Limit Levels, in which case the monitoring frequency may be increased. The monitoring results should be included in the EM&A reports.

5.1.6 Post-Project Monitoring

Upon the completion of the sandfilling works, Post-project Monitoring shall be conducted for 4 weeks in the same manner as the Baseline Monitoring.

5.1.7 Compliance / Action Event Plan

Water quality monitoring results will be evaluated against Action and Limit levels shown in *Table 5.1*.

Table 5.1 Action and Limit Levels for Water Quality (based on the Results of the Baseline Report)

Parameter	Action Level	Limit Level
SS in mg L^{-1} (depth-averaged [a]) [c]	95%-ile of baseline data, or 20% exceedance of value at any impact station and sensitive receiver compared with corresponding data from reference stations at the same tide of the same day	99%-ile of baseline data, or 30% exceedance of value at any impact station and sensitive receiver compared with corresponding data from reference stations at the same tide of the same day and specific sensitive receiver water quality requirements
Chlorophyll-*a* in µg L^{-1} [c]	Surface, Middle and Bottom 95%-ile of baseline data	Surface, Middle and Bottom 10µg L^{-1} or 99%-ile of baseline data
DO in mg L^{-1} [b] [d]	Surface and Middle 5%-ile of baseline data for surface and middle layer Bottom 5%-ile of baseline data for bottom layers	Surface and Middle 4mg L^{-1} or 1%-ile of baseline for surface and middle layer Bottom 2mg L^{-1} or 1%-ile of baseline data for bottom layer
Turbidity in NTU (depth-averaged [a]) [c]	95%-ile of baseline data, or 20% exceedance of value at any impact station and sensitive receiver compared with corresponding data from reference stations at the same tide of the same day	99%-ile of baseline data, or 30% exceedance of value at any impact station and sensitive receiver compared with corresponding data from reference stations at the same tide of the same day

Notes:
(a) "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
(b) For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
(c) For SS, chlorophyll-*a* and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
(d) Both Action and Limit Levels for DO (surface and middle) in the FCZ1 (*Figure 5.1*) are less than 5 mg L^{-1}.

It should be noted that all Action/Limit levels presented in *Table 5.1* may be revised based on the baseline data to be collected in advance of construction works. If deemed necessary, the ET in consultation with the Contractor(s) will propose revised Action Limit levels and seek approval from ER, the IEC and EPD.

Actions to be taken in the event that the Action or Limit Levels are exceeded are shown in *Table 5.2*.

Table 5.2 Event and Action Plan for Water Quality

EVENT	ACTION			
	ET	**IEC**	**ER**	**Contractor**
Action Level being exceeded by one sampling day	1. Repeat *in-situ* measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform the IEC and the Contractor; 4. Check monitoring data, all plant, equipment and the Contractor's working methods; 5. Discuss mitigation measures with the IEC and the Contractor;	1. Discuss with the ET and the Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by the Contractor; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with the IEC on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented.	1. Inform the ER and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with the ET and the IEC and propose mitigation measures to the IEC and ER; 6. Implement the agreed mitigation measures.

EVENT	ACTION			
	ET	IEC	ER	Contractor
Action Level being exceeded by more than one consecutive sampling days	1. Repeat *in-situ* measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform the IEC and the Contractor; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with the IEC and the Contractor; 6. Ensure mitigation measures are implemented;	1. Discuss with the ET and the Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by the Contractor accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with the IEC on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented; 3. Assess effectiveness of the implemented mitigation measures.	1. Inform the ER and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with the ET and the IEC and propose mitigation measures to the IEC and ER within 3 working days; 6. Implement the agreed mitigation measures.
Limit Level being exceeded by one consecutive sampling day	1. Repeat *in-situ* measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform the IEC, the Contractor and the DEP; 4. Check monitoring data, all plant, equipment and the Contractor's working methods; 5. Discuss mitigation measures with the IEC, the ER and the Contractor; 6. Ensure mitigation measures are implemented.	1. Discuss with the ET / Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by the Contractor and advise the ER accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with the IEC, the ET and the Contractor on the proposed mitigation measures; 2. Request the Contractor to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures.	1. Inform the ER and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with the ET, the IEC and the ER and propose mitigation measures to the IEC and the ER within 3 working days; 6. Implement the agreed mitigation measures.

EVENT	ACTION			
	ET	IEC	ER	Contractor
Limit Level being exceeded by more than one consecutive sampling days	1. Repeat *in-situ* measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform the IEC, the Contractor and DEP; 4. Check monitoring data, all plant, equipment and Contractor's working methods; 5. Discuss mitigation measures with the IEC, the ER and the Contractor; 6. Ensure mitigation measures are implemented;	1. Discuss with ET and Contractor on the mitigation measures; 2. Review proposals on mitigation measures submitted by the Contractor and advise the ER accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Discuss with the IEC, the ET and the Contractor on the proposed mitigation measures; 2. Request Contractor to critically review working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess effectiveness of the implemented mitigation measures; 5. Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the marine work until no exceedance of Limit Level.	1. Inform the ER and confirm notification of the non-compliance in writing; 2. Rectify unacceptable practice; 3. Check all plant and equipment; 4. Consider changes of working methods; 5. Discuss with the ET, the IEC and the ER and propose mitigation measures to the IEC and the ER within 3 working days; 6. Implement the agreed mitigation measures; 7. As directed by the ER, slow down or stop all or part of the construction activities.

5.2 Post-Construction Phase

The Post-Construction Phase is defined as after completion of construction works but before the operation of the beach. No sewage and wastewater generated from the beach building facilities will be discharged into the beach or marine environment, water quality impact due to sewage and wastewater discharge from the beach building facilities is not anticipated (refer to EIA Report Section 6).

5.2.1 E. coli Monitoring

Monitoring for *E. coli* is recommended at the outfall of the eastern culvert and western channel within six weeks after the completion of construction works. The purpose of the monitoring is to investigate the characteristics of *E. coli* loading in the box culvert/channel and to establish relationship with *E. coli* levels at the beach. Samples will be collected at the locations specified in *Figure 5.2* at/near the outlet of the outfall when no influx of seawater occur (e.g. during low tide). During the same tide, *E. coli* samples should be collected at EPD's routine beach monitoring stations. The sampling team should confirm the locations of EPD's routine monitoring stations prior to the commencement of any sampling events. In some occasions, it is not practicable to take the samples at EPD's routine monitoring stations, for example, the water is too shallow. Then the sampling team should determine the nearest sampling locations which should be as close to EPD's stations as possible. The coordinates of all the sampling locations should be recorded.

E. coli samples should be stored in cool box (4°C) during the sampling and transportation and should be delivered to the HOKLAS accredited laboratory, or equivalent, to determine the *E. coli* content in the sample.

Other water quality parameters, i.e., pH, Dissolved Oxygen (DO) concentration (mg L^{-1}), DO saturation (%), Salinity (mg L^{-1}), Temperature (ºC) and Turbidity (NTU) should be taken in situ by the sampling team at same monitoring stations as for *E.coli* measurements. Observations such as and weather and beach conditions, should also be recorded.

Sampling should be conducted twice per week within six weeks after the completion of construction works.

5.2.2 Progress of DSD's Village Sewerage Projects

Implementation programme of the village sewerage projects should be monitored to achieve the target sewerage connection rate to communal sewers before the beach is put into operation.

5.3 Operation Phase

5.3.1 Routine Monitoring of Beach Water Quality

EPD has well established a comprehensive water quality monitoring programme for all gazetted beaches to detect any deterioration of beach water quality, which will also be implemented in this Lung Mei bathing beach.

EPD's current monitoring programme requires all gazetted beaches are monitored at least three times per month during bathing seasons. During non-bathing seasons, gazetted beaches are monitored once per month. The monitoring data assists to detect any deterioration of beach water quality. In case the beach water quality tends to be deteriorated, EPD will continue monitoring of the beach water quality and provide Leisure and Cultural Services Department (LCSD) the monitoring data. In case the beach water quality tends to be deteriorated, LCSD will decide the most appropriate method of improving the beach water quality.

In case the beach water quality at Lung Mei tends to be deteriorated and becomes not desirable for swimming, LCSD will close the beach temporarily until the beach water quality becomes suitable for swimming. EPD will continue monitoring the beach water quality and provide LCSD the monitoring results.

5.3.2 Red Tides

In the event of red tide that may occur naturally, similar to the practice adopted for other gazetted beaches by LCSD, Lung Mei beach may be closed to swimmers in accordance with the relevant procedures.

6. WASTE MANAGEMENT

6.1 Construction Phase

In order to ensure that the construction contractor has implemented the recommendations of the EIA Report, regular site audits will be conducted of the waste streams, to determine if wastes are being managed in accordance with the approved procedures and the site Waste Management Plan. The audits will look at all aspects of waste management including waste generation, storage, recycling, transport and disposal. An appropriate audit programme will be undertaken with the first audit conducted at the commencement of the construction works. Routine weekly site inspections will also include waste management.

6.2 Operational Phase

As it is not expected that large quantities of waste will be generated from the operation of the bathing beach and no adverse environmental impacts will arise with the implementation of good waste management practices. Waste monitoring and audit programme for the operational phase of the proposed beach development will not be required.

7. ECOLOGY

7.1 Construction Phase

To undertake a one day-time search of the Common Rat Snake within the land based Proposed Beach Development just before the commencement of the construction works. All recorded Common Rat Snake will be caught by hand and translocated to the shrubland at the north of the Study Area, immediately after the search. The Common Rat Snake search and translocation works will be undertaken by a qualified ecologist.

For the mitigation measures and monitoring requirement to minimise the water quality impact to the marine ecology during the construction phase of the Project, details should be referred to *Section 1.5* and *Appendix E*.

Good construction site practices (*Appendix E*) should be adopted to minimise the potential ecological impacts during the construction phase of the Project.

7.2 Operation Phase

Due to the loss of some mangrove plants and seedlings recorded within the Proposed Beach Development, EIA has recommended mangrove seedling planting should be implemented before the operation of the beach. The mangrove seedling planting location is proposed along the diverted eastern box culvert (Figure 10.19 of EIA Report Section 10) with a total of approximately 382 mangrove seedlings to be provided. The planting mix is proposed to be at a ratio 1:1:1 for *Aegiceras corniculatum, Avicennia marina* and *Kandelia obovata.* Detailed mangrove planting proposal providing information of planting methodology, recipient site, planting species and mix, implementation programme, post-planting monitoring and personal involved shall be submitted to and approved by EPD and AFCD. Mangrove seedling planting would be undertaken and supervised by a suitably qualified botanist/ horticulturist.

After planting, 1 year monitoring will be undertaken to check the performance and health conditions of the planted individuals on a monthly basis. Remedial actions will be discussed with AFCD in the event of unsuccessful mangrove seedling planting and follow an approved Event and Action Plan as indicated in *Table 7.1*.

Table 7.1 Event and Action Plan for Mangrove Seedling Planting

Monitoring Criteria	Event	Action	
		Environmental Team Leader/ Environmental Manager (employed by CEDD)	CEDD
Mangrove Seedling Survival	More than 25% of mortality of mangrove seedling recorded during the establishment of planting.	1. Notify CEDD and check with horticulturist to find out the cause of the event(s).	1. Identify and report the cause(s) of the event.
		2. Undertake bi-weekly monitoring to observe the growth performance of the seedling. The normal monitoring schedule will be resumed if the cause(s) of the event have been identified.	2. Notify relevant government departments (ie EPD and AFCD).
	More than 50% of mortality of mangrove seedling recorded during the establishment of planting.	1. Notify CEDD and check with horticulturist to find out the cause of the event(s).	1. Identify and report the cause(s) of the event.
		2. Undertake weekly monitoring to observe the growth performance of the seedling. The normal monitoring schedule will be resumed if the cause(s) of the event have been identified.	2. Submit proposals to relevant government departments (ie EPD and AFCD) for remedial action and implement the action to solve the event.

8. FISHERIES

8.1 Construction Phase

In accordance with the recommendation of the EIA regarding fisheries impact assessment, EM&A is not required during the construction phase of the Project. However, water quality monitoring will be conducted at Yim Tin Tsai Fish Culture Zone to monitor any water quality changes during the dredging and sandfilling works.

8.2 Operational Phase

In accordance with the recommendation of the EIA regarding fisheries impact assessment, EM&A is not required during the operation phase of the Project.

9. LANDSCAPE AND VISUAL IMPACT

9.1 General

The EIA has recommended that EM&A for landscape and visual resources is undertaken during both construction and initial operational phases (post –construction) of the project. The implementation and maintenance of landscape mitigation measures (*Appendix E*) should be checked to ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other project works and operational requirements are resolved at the earliest practical date and without compromise to the intention of the mitigation measures.

9.2 Construction and Post-construction Phase

A specialist Landscape Sub-Contractor should be employed for the implementation of landscape construction works and subsequent maintenance operations during a 12-month establishment period. A Registered Landscape Architect should be employed to supervise the specialist Landscape Sub-contractor for the implementation of landscape works, both hard and soft, involved.

Measures undertaken by both the Contractor(s) and the specialist Landscape Sub-Contractor during the construction phase and first year post-construction will be audited by the Registered Landscape Architect of the ET, to ensure compliance with the intended aims of the measures. Site inspections should be undertaken at least once every two weeks throughout the landscaping plants establishment period when planting works are being undertaken.

A tree survey should be prepared, for DLO submission, and for the purpose of existing trees protection. Removal of existing trees should be minimized. The Contractor should consider employing a certified arborist when sizable and valuable existing tree(s) protection of transplant is required.

Post-construction phase auditing will be restricted to the 12-month establishment works of the landscaping proposals and thus only the items in the list below related to this period are relevant to the post-construction audit; the remainder are for the construction phase site inspections. The broad scope of the audit/inspections is detailed below but should also be undertaken with reference to the more specific checklist provided in *Table 9.1*.

- the extent of the agreed works areas should be regularly checked during the construction phase. Any trespass by the Contractor(s) outside the limit of the works, including any damage to existing trees will 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;
- existing trees and vegetation within the study area which are not directly affected by the works are retained and protected to the extent safely practical;
- the methods of protecting existing vegetation proposed by the Contractor(s) are acceptable and enforced;

- preparation, lifting transport and re-planting operations for any transplanted trees;
- landscaping works are carried out in accordance with the specifications;
- the planting of new trees, shrubs, groundcover, climbers, ferns, grasses and other plants, together with the replanting of any transplanted trees are carried out properly and within the right season; and
- necessary horticultural operations and replacement planting are undertaken throughout the Establishment Period to ensure the healthy establishment and growth of both transplanted trees and newly established plants.

Table 9.1 Construction/Post-Construction Phase Audit Checklist

NSR	Location
Advance planting	Monitoring of implementation and maintenance of planting, and against potential incursion, physical damage, fire, pollution, surface erosion, etc.
Protection of trees to be retained	Identification and demarcation of trees / vegetation to be retained, erection of physical protection (e.g. fencing), monitoring against potential incursion, physical damage, fire, pollution, surface erosion, etc.
Clearance of existing vegetation	Identification and demarcation of trees / vegetation to be cleared, checking of extent of works to reduce damage, monitoring of adjacent areas against potential incursion, physical damage, fire, pollution, surface erosion, etc.
Transplanting of trees	Identification and demarcation of trees / vegetation to be transplanted, monitoring of extent of pruning / lifting works to reduce damage, timing of operations, implementation of the stages of preparatory and translocation works, and maintenance of transplanted vegetation, etc.
Plant supply	monitoring of operations relating to the supply of specialist plant material (including the collecting, germination and growth of plants from seed) to ensure that plants will be available in time to be used within the construction works.
Soiling, planting, etc.	Monitoring of implementation and maintenance of soiling and planting works and against potential incursion, physical damage, fire, pollution, surface erosion, etc.
Architectural design and treatment of all structures (where practicable), retaining walls, elevated road structures and other engineering works.	Implementation and maintenance of mitigation measures, to ensure conformity with agreed designs.
Erection of Site Hoardings/Fences	Erection of site hoardings/fences during the construction phase to reduce visual impacts.
Establishment Works	Monitoring of implementation of maintenance operations during Establishment Period

In the event of non-compliance from the Environmental Permit, EIA Study, EM&A Manual and Landscape Plan, the responsibilities of the relevant parties is detailed in the Event /Action plan provided on *Table 9.2*.

Table 9.2 Event and Action Plan for Landscape and Visual Monitoring during Construction Phase

EVENT	ACTION			
	ET	IEC	ER	Contractor
Non-compliance on one occasion	1. Identify Source 2. Inform the Contractor(s), IEC and ER 3. Discuss remedial actions with the IEC, ER and the Contractor(s) 4. Monitor remedial actions until rectification has been completed	1. Check report 2. Check the Contractor(s)'s working method 3. Discuss with the ET and the Contractor(s) on practical remedial measures 4. Advise ER on effectiveness of proposed remedial measures. 5. Check implementation of remedial measures.	1. Notify Contractor(s) 2. Ensure remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake any necessary replacement
Repeated Non-compliance	1. Identify Source 2. Inform the Contractor(s), IEC and ER 3. Increase monitoring frequency 4. Discuss remedial actions with the IEC, ER and the Contractor(s) 5. Monitor remedial actions until rectification has been completed 6. If non-compliance stops, cease additional monitoring	1. Check monitoring report 2. Check the Contractor(s)'s working method 3. Discuss with the ET and the Contractor(s) on practical remedial measures 4. Advise ER on effectiveness of proposed remedial measures 5. Supervise implementation of remedial measures.	1. Notify the Contractor(s) 2. Ensure remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake any necessary replacement

ET – Environmental Team, IEC – Independent Environment Checker, ER – Engineer Representative, DEP – Director of Environmental Protection

9.3 Mitigation Measures

The Landscape and Visual Assessment of the EIA recommended a series of mitigation measures for the construction and operation phase to ameliorate the landscape and visual impacts of the project. Details of the recommended mitigation measures are included within the Implementation Schedule provided in *Appendix E*.

9.4 Audit Requirement

Implementation of the mitigation measures for landscape and visual resources recommended by the EIA will be monitored through the site audit programme. *Section 10* of this EM&A Manual sets out the requirements of the auditing programme.

10. SITE ENVIRONMENT AUDIT

10.1 Site Inspections

Site inspections provide a direct means to assess and ensure the Contractor's environmental protection and pollution control measures are in compliance with the contract specifications. The site inspection will be undertaken routinely by the ET to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented in accordance with the EIA. In addition, the ET will be responsible for defining the scope of the inspections, detailing any deficiencies that are identified, and reporting any necessary action or additional mitigation measures that were implemented as a result of the inspection.

Regular site inspections will be carried out twice a month. The areas of inspection will not be limited to the site area and should also include the environmental conditions outside the site which are likely to be affected, directly or indirectly, by the site activities. The ET will make reference to the following information while conducting the inspections:

- the EIA and EM&A recommendations on environmental protection and pollution control mitigation measures;
- ongoing results of the EM&A programme;
- work progress and programme;
- individual works methodology proposals;
- the contract specifications on environmental protection;
- the relevant environmental protection and pollution control laws; and
- previous site inspection results.

A monthly waste management audit will be carried out as part of the site audit programme.

The Contractor(s) will update the ET with relevant information on the construction works prior to carrying out the site inspections. The site inspection results will be submitted to the IEC, ER and the Contractor within 24 hours. Should actions be necessary, the ET will follow up with recommendations on improvements to the environmental protection and pollution control works and will submit these recommendations in a timely manner to the IEC, ER and the Contractor. They will also be presented, along with the remedial actions taken, in the monthly EM&A report.

The Contractor will follow the procedures and time frame stipulated in the environmental site inspection for the implementation of mitigation proposal and the resolution of deficiencies in the Contractor' EMS. An action reporting system will be formulated and implemented to report on any remedial measures implemented subsequent to the site inspections.

Ad hoc site inspections will also be carried out by the ET and IEC if significant environmental issues 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.

10.2 Compliance with Legal and Contractual Requirements

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

In order that the works are in compliance with the contractual requirements, the works method statements submitted by the Contractor to CEDD/ER for approval will be sent to the ET for review.

The ET will also review the progress and programme of the works to check the regulatory compliance.

The Contractor will regularly copy relevant documents to the ET so that the checking and auditing work can be carried out. The relevant documents are expected to include at a minimum the updated Work Progress Reports, the updated Works Programme, the application letters for different licence/permits under the environmental protection laws and all valid licences/permits. The site diary will also be available for the ET inspection upon request.

After reviewing the document, the ET will advise the IEC, ER and the Contractor of any non-compliance from the contractual and legislative requirements on environmental protection and pollution control for follow-up actions. The ET will also advise the IEC, the Contractor and ER on the current status on licence/permit applications and any environmental protection and pollution control preparation works that may not be suitable for the works programme or may result in potential nonconformity of environmental protection and pollution control requirements.

Upon receipt of the advice, the Contractor will undertake immediate action to remedy the situation. The ET, IEC and ER will follow up to ensure that appropriate action will be taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

10.3 Environmental Complaints

The complaints handling procedure will be as follows. The ET will undertake the following procedures upon receipt of a complaint:

(i) log complaint and date of receipt into the complaint database and inform the IEC immediately;
(ii) investigate the complaint and discuss with the Contractor and ER to determine its validity and to assess whether the source of the issue is due to works activities;

(iii) if a complaint is considered valid due to the works , the ET will identify mitigation measures in consultation with the Contractor, ER and IEC;
(iv) if mitigation measures are required, the ET will advise the Contractor accordingly;
(v) review the Contractor's response on the identified mitigation measures and the updated situation;
(vi) if the complaint is transferred from EPD, an interim report will be submitted to EPD on the status of the complaint investigation and follow-up action within the time frame assigned by EPD;
(vii) undertake additional monitoring and audit to verify the situation if necessary and ensure that any valid reason for complaint does not recur;
(viii) report the investigation results and the subsequent actions on the source of the complaint for responding to complainant. If the source of complaint is EPD, the results should be reported within the time frame assigned by EPD; and
(ix) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

During the complaint investigation work, the ET, Contractor and ER will cooperate with the IEC in providing the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor will promptly carry out the mitigation measures. ER/CEDD will approve the proposed mitigation measures and the ET and IEC will check that the measures have been carried out by the Contractor.

10.4 Log Book

The ET Leader will keep a contemporaneous log-book of each and every instance or circumstance or change of circumstances which may affect the environmental impact assessment and every non-compliance from the recommendations of the EIA Reports or the Environmental Permit. The ET Leader will notify the IEC within one working day of the occurrence of any such instance or circumstance or change of circumstance. The ET Leader's log-book will be kept readily available for inspection by persons assisting in supervision of the implementation of the EIA Reports recommendations (such as ER, IEC and Contractor) and the EPs or by EPD or his authorised officers.

11. REPORTING

11.1 General

Reports can be provided in an electronic medium upon agreeing the format with EPD. The monitoring data (baseline, impact and operational) will also be made available through a dedicated internet website that would be agreed with relevant authority.

Types of reports that the ET Leader will prepare and submit include baseline monitoring report, monthly EM&A report, quarterly EM&A summary report and final EM&A review report. In accordance with *Annex 21* of the *EIAO-TM*, a copy of the monthly, quarterly summary and final review EM&A reports will be made available to the Director of Environmental Protection.

11.2 Design Phase Audit

The Design Phase Audit Report will provide the means for ER to certify that the completed environmental design elements have been completed in accordance with the EIA requirements. The ET will include in the report a signed off proforma (see *Appendix C*) to confirm that there are no outstanding environmental measures, identified as requiring design phase audit, that require further action. The IEC will confirm that the report meets these requirements.

11.3 Baseline Monitoring Report

In respect of the construction phase EM&A works, the ET will prepare and submit a Baseline Environmental Monitoring Report at least 2 weeks before commencement of the works for the Project. Copies of the Baseline Environmental Monitoring Report will be submitted to the following: the Contractor, the IEC, ER, EPD, as appropriate. The ET will liaise with the relevant parties on the exact number of copies required.

The baseline monitoring reports for the construction phase will include at least the following:

(i) up to half a page executive summary.
(ii) brief project background information.
(iii) drawings showing locations of the baseline monitoring stations.
(iv) 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; and
- quality assurance (QA)/quality control (QC) results and detection limits.

(v) details on influencing factors, including:
- major activities, if any, being carried out on the site during the period;
- weather conditions during the period; and
- other factors which might affect the results.

(vi) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis will conclude if there is any significant difference between control and impact stations for the parameters monitored;

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

(viii) comments, recommendations and conclusions.

11.4 Monthly EM&A Reports

11.4.1 Construction Phase

The results and findings of the construction phase EM&A work required in this Manual will be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report will be prepared and submitted within 2 weeks of the end of each reporting month, with the first report due the month after construction commences. Each monthly EM&A report will be submitted to the following parties: the Contractor(s), the IEC, ER and the EPD, as well as to other relevant departments as required. Before submission of the first EM&A Report, the ET will liaise with the parties on the exact number of copies and format of the reports in both hard copy and electronic medium.

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

11.4.2 Post-Construction Phase

The post-construction phase landscape EM&A will be reported on a bi-monthly basis for a period of one year after completion of the project. The ET will prepare post-construction phase EM&A Reports on a bi-monthly (once every two months) basis to be submitted within two weeks of the end of the reporting period. The reports will be submitted to the Contractor(s), IEC, ER and EPD, as appropriate.

Monitoring for *E. coli* is recommended at the various locations including the outfalls of the culvert/channel and at the beach during within 6 weeks after the completion of the construction works (*Figure 5.2*). The purpose of the monitoring is to investigate the characteristics of *E. coli* loading in the box culverts and to establish relationship with *E. coli* levels in the beach. Samples will be collected at/near the outlet of the box culverts when no influx of seawater occur (e.g. during low tide).
Sampling should be conducted twice per week within six weeks after the completion of construction works. The ET will prepare the EM&A Report on *E. coli* monitoring

results to be submitted within two weeks of the end of the last monitoring event. The EM&A Report will be submitted to the Contractor(s), IEC, ER and EPD and LCSD, as appropriate.

11.5 Contents of the First Monthly EM&A Report

(i) 1-2 pages executive summary, comprising:
- breaches of AL levels;
- complaint Log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- forecast of impact predictions.

(ii) Basic project information including a synopsis of the project organisation, programme and management structure, and a drawing of the Project area showing the environmentally sensitive receivers and the locations of monitoring and control stations, programme, management structure and the work undertaken during the month.

(iii) Environmental Status, comprising:
- works undertaken during the month with illustrations (such as location of works, daily dredging/filling rates, percentage fines in the fill material used); and
- drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(iv) A brief summary of EM&A requirements including:
- 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; and
- environmental requirements in contract documents.

(v) Advice on the implementation of environmental protection, mitigation and pollution control measures as recommended in the Project EIA study report and summarised in the updated implementation schedule.

(vi) Monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
- name of laboratory and equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency, and duration; and

(vii) Graphical plots of trends of monitored parameters over the past four reporting periods for representative monitoring stations annotated against the following:
- major activities being carried out on site during the period;
- weather conditions during the period; and
- any other factors which might affect the monitoring results;

(viii) Advice on the solid and liquid waste management.

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

(x) A review of the reasons for and the implications of non-compliance including a review of pollution sources and working procedures.

(xi) 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.

(xii) A summary record of complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints.

(xiii) A summary record of notifications of summons, successful prosecutions for breaches of environmental protection/pollution control legislation and actions to rectify such breaches.

(xiv) A forecast of the works programme, impact predictions and monitoring schedule for the next one month; and

(xv) Comments, recommendations and conclusions for the monitoring period.

11.6 Contents of the Subsequent Monthly EM&A Report

(i) Title page.

(ii) Executive summary (1-2 pages), including:
- breaches of Action and Limit levels;
- complaint log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- forecast of impact predictions.

(iii) Contents page.

(iv) Environmental status, comprising:
- drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- summary of non-compliance with the environmental quality performance limits; and
- summary of complaints.

(v) Environmental issues and actions, comprising:
- review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies);
- description of the actions taken in the event of non-compliance and deficiency reporting;
- recommendations (should be specific and target the appropriate party for action); and
- implementation status of the mitigatory measures and the corresponding effectiveness of the measures.

(vii) Appendices, including:
- action and limit levels;
- graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following: major activities being carried out on site during the period; weather conditions during the period; and any other factors which might affect the monitoring results;
- monitoring schedule for the present and next reporting period;
- cumulative complaints statistics; and
- details of complaints, outstanding issues and deficiencies.

11.7 Quarterly EM&A Summary Report

The ET Leader will submit Quarterly EM&A Summary Reports for the construction phase EM&A works only. These reports should contain at least the following information:

(i) Up to half a page executive summary.

(ii) Basic project information including a synopsis of the Project organisation, programme, contacts of key management, compliance with EP condition (status of submission) and a synopsis of work undertaken during the quarter.

(iii) A brief summary of EM&A requirements including:
- monitoring parameters;
- environmental quality performance limits (Action and Limit levels); and
- environmental mitigation measures, as recommended in the Project EIA study final report.

(iv) Advice on the implementation of environmental protection and pollution control/mitigation measures as recommended in the Project EIA study report and summarised in the updated implementation schedule.

(v) Drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(vi) Graphical plots of the trends of monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:

- the major activities being carried out on site during the period;
- weather conditions during the period; and
- any other factors which might affect the monitoring results.

(vii) Advice on the solid and liquid waste management.

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

(ix) An Impact Prediction Review will be prepared to compare project predictions with actual impacts for the purpose of assessing the accuracy of predictions on the EIA study. The review will focus on the comparison between the EIA study prediction with the EM&A monitoring result. If any excessive variation was found, a summary of investigation and follow up procedure taken will be addressed accordingly.

(x) A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures.

(xi) An assessment of the construction impacts on suspended solids, including but not limited to, a comparison of the difference between the quarterly mean and the 1.3 times the ambient mean value, the latter being defined as a 30% increase of the baseline data or EPD data, using appropriate statistical procedures. Suggestions of appropriate mitigation measures will be made if the quarterly assessment analytical results demonstrate that the quarterly mean is significantly higher than the 1.3 ambient mean value (p <0.05).

(xii) A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance.

(xiii) A summarised record of complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken.

(xiv) Comments (eg effectiveness and efficiency of the mitigation measures), recommendations (eg any improvement in the EM&A programme) and conclusions for the quarter.

(xv) Proponents' contacts for the public to make enquiries.

11.8 Annual/Final Review EM&A Reports

An annual EM&A report will be prepared by the ET at the end of each construction year during the course of the project. A Final Review EM&A report will be prepared by the ET at the end of each of the construction and operational phases. The annual/Final Review EM&A reports will contain at least the following information:

(i) Executive Summary (1-2 pages).

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

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

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

- environmental mitigation measures as recommended in the project EIA study final report;
- environmental impact hypotheses tested;
- environmental quality performance limits (Action and Limit Levels);
- monitoring parameters; and
- Event-Action Plans.

(v) A summary of the implementation status of environmental protection and pollution control/mitigation measures as recommended in the project EIA study report and summarised in the updated implementation schedule.

(vi) Graphical plots and the statistical analysis of the trends of monitored parameters over the course of the projects including the post-project monitoring (or the past twelve months for annual reports) for monitoring stations annotated against the following:

- 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

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

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

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

(x) A summary record of complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken.

(xi) A summary record of notifications of summonses and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches investigation, follow-up actions taken and results.

(xii) A comparison of the EM&A data with the EIA predictions with annotations and explanations for any discrepancies, including a review of the validity of EIA predictions and identification of shortcomings in the EIA recommendations.

(xiii) A review of the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness, including cost effectiveness;

(xiv) A review of the success of the EM&A programme, including a review of the effectiveness and efficiency of the mitigation measures, and recommendations for any improvements in the EM&A programme.

(xv) A clear cut statement on the environmental acceptability of the project with reference to specific impact hypotheses and a conclusion to state the return to ambient and/or the predicted scenario as the EIA findings.

11.9 Data Keeping

The site documents such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the EM&A Reports for submission. However, the documents will be kept by the ET Leader and be ready for inspection upon request. Relevant information will be clearly and systematically recorded in the documents. The monitoring data will also be recorded in magnetic media, and the software copy will be available upon request. The documents and data will be kept for at least one year after the completion of the operational phase EM&A works.

11.10 Electronic Reporting of EM&A Information

To enable the public inspection of the Baseline Monitoring Report and monthly EM&A Reports via the EIAO Internet Website and at the EIAO Register Office, electronic copies of monthly EM&A Reports will be prepared by the ET in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF, version 4.0 or later), unless otherwise agreed by EPD and will be submitted at the same time as the hard copies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the EM&A Reports will be included in the beginning of the document. Hyperlinks to figures, drawings and tables in the EM&A Reports will be provided in the main text where the respective references are made. Graphics in the reports will be in interlaced GIF format unless otherwise agreed by EPD. The content of the electronic copies of the monthly EM&A Reports must be the same as the hard copies.

Environmental monitoring data will be made available to the public via the internet access in the form of a website, in the shortest practical time and in no event later 2 weeks after the relevant environmental monitoring data are analysed and validated. The internet address and the environmental monitoring data will be made available to the public via the EIAO Internet Website and the EIAO Register Office.

The internet website as described above will enable user friendly public access to the monitoring data and with features capable of:

- providing access to environmental monitoring data collected since the commencement of works;
- searching by data;
- searching by types of monitoring data (water quality);
- hyperlinks to relevant monitoring data after searching; and
- or otherwise as agreed by EPD.

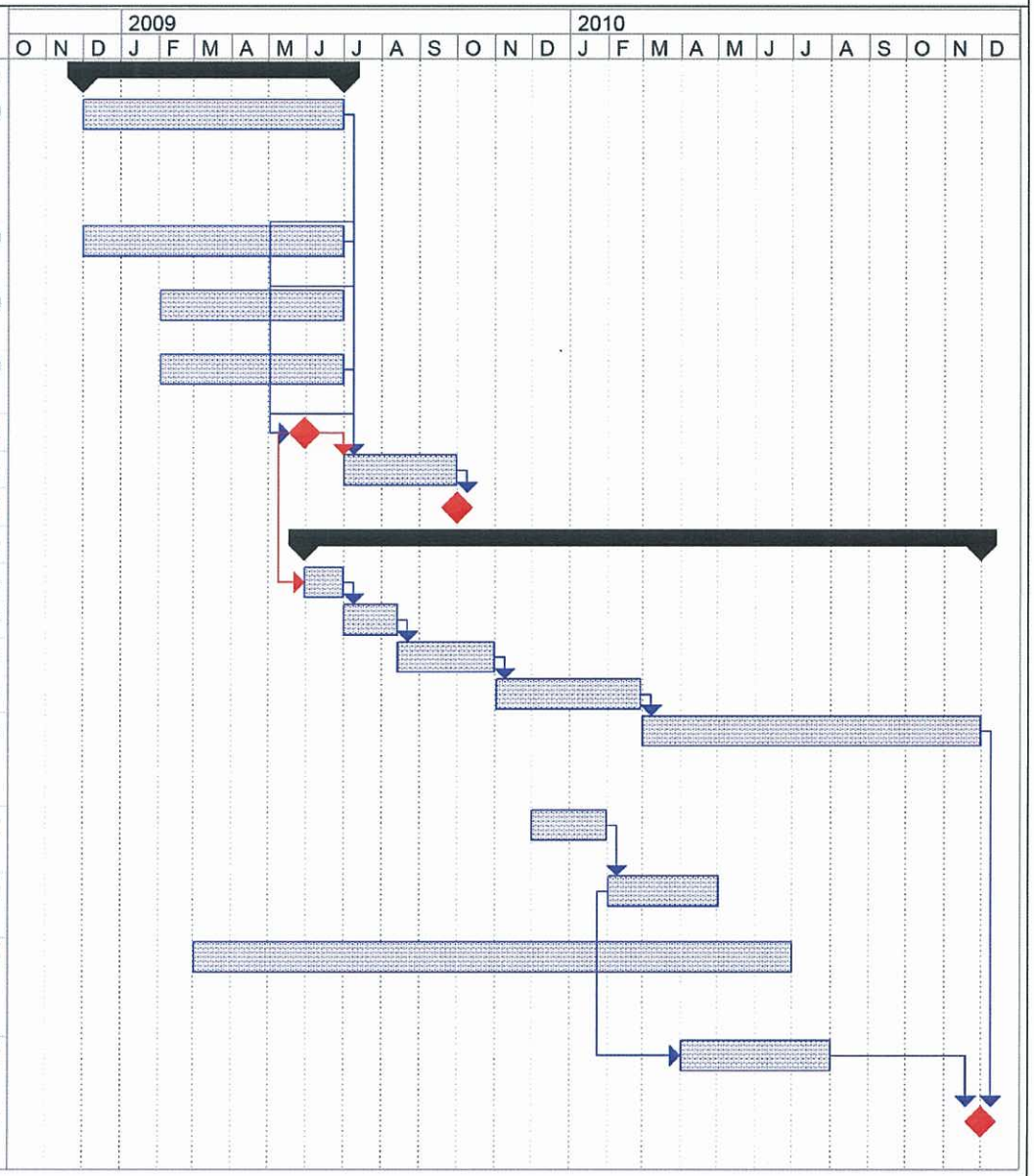
Details of suitable real time reporting of monitoring data for the project will be agreed with EPD prior to commencement of the works at the site.

11.11 Interim Notification of Environmental Quality Limit Exceedances

With reference to Event/Action Plans, when the environmental quality limits are exceeded, the ET will notify the Contractor(s), ER and EPD as appropriate within 24 hours of the identification of the exceedance. The notification will be followed up with each party 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 D.*

Tentative Construction Programme for Development of a Bathing Beach at Lung Mei, Tai Po

ID	Task Name	Duration	Start	Finish
1	**Construction Works on Land**	**7 months**	**12/08**	**06/09**
2	Site Formation, including Seawall/Retaining Wall (with dredging of foundation), Tree Transplant and Backfilling	7 months	12/08	07/09
3	Road Widening and roadworks construction at Ting Kok Road	7 months	12/08	07/09
4	Drainage Works and connection to existing main drainage	5 months	02/09	07/09
5	Sewerage works and sewerage Connection to Existing Trunk Sewer	5 months	02/09	07/09
6	**Handover Building Site Area to ArchSD**	**-**	**06/09**	**06/09**
7	**Car Park Paving**	**3 months**	**07/09**	**10/09**
8	**Handover Car Park to ArchSD**	**-**	**10/09**	**10/09**
9	**Building Works by ArchSD**	**18 months**	**06/09**	**12/10**
10	Mobilization	1 month	-	-
11	Sheet Piling	1.5 months	-	-
12	Foundation and Tanking	2.5 months	-	-
13	Superstructure	4 months	-	-
14	Landscape Works, Building Finishes & Internal Fitting-out (including slippage due to inclement weather)	9 months	-	-
15	**Dredging for Beach and Groyne Construction**	**2 months**	**12/09**	**1/10**
16	**Rock Filling of Groynes**	**3 months**	**02/10**	**04/10**
17	**Box Culvert Construction and River Diversion with Tree Transplant & Landscaping Works**	**16 months**	**03/09**	**07/10**
18	**Sand Filling for Beach Construction**	**4 months**	**04/10**	**7/10**
19	**Overall Completion**	**-**	**12/10**	**12/10**



Client: CEDD, CIVIL ENGINEERING AND DEVELOPMENT DEPARTMENT	Consulting Engineer: Halcrow China Ltd.; ERM Environmental Resources Management as sub-consultant	Agreement No.: CE 59/2005(EP)	ENVIRONMENTAL MONITORING AND AUDIT MANUAL
Project Title: DEVELOPMENT OF A BATHING BEACH AT LUNG MEI, TAI PO	Figure Title: PRELIMINARY CONSTRUCTION PROGRAMME	**APPENDIX A**	
Checked: PS	Scale: -	Rev.: 1	
Designed: -	Drawn: -	Date: 08/03/2007	

COMPLAINT LOG Ref:_____

Log Ref	Date/Location	Complainant/ Date of Contact	Details of Complaint	Investigation/Mitigation Action	File Closed

Filed by Environmental Team Leader: _____ Date: _____

Data Record Sheet for TSP Monitoring

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (min.)	
	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Qsi	Pi (mmHg)	
	Ti (^oC)	
	Hi (in.)	
	Qsi (Std. m^3)	
Final Flow Rate, Qsf	Pf (mmHg)	
	Tf (^oC)	
	Hf (in.)	
	Qsf (Std. m^3)	
Average Flow Rate (Std. m^3)		
Total Volume (Std. m^3)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final Wt. of Filter (g)		
Measured TSP Level (ug/m^3)		

Name & Designation Signature Date

Field Operator:

Laboratory Staff:

Checked by:

Field Record Sheet for Noise Monitoring

Monitoring Location		
Description of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Time Length (min.)		
Noise Meter Model / Identification		
Calibrator Model / Identification		
Measurement Results	L_{90} (dB(A))	
	L_{10} (dB(A))	
	L_{EQ} (dB(A))	
Major Construction Noise Source(s) during Monitoring		
Other Noise Source(s) during Monitoring		
Remarks		

Name & Designation Signature Date

Recorded by:

Checked by:

Data Record Sheet for Water Quality Monitoring

Location (Monitoring Station)							
Date							
Start Time (hh:mm)							
Weather							
Sea Condition							
Tide Mode							
Water Depth (m)							
Monitoring Depth		Surface		Middle		Bottom	
Salinity (ppt)							
Temperature (^{o}C)							
DO Saturation (%)							
DO (mg/L)							
Turbidity (NTU)							
SS Sample Identification							
SS (mg/L)							
Chlorophyll-*a* (mg/L)							
Observed Construction Activities	<100m from location						
	>100m from location						
Other Observations							

Name & Designation Signature Date

Recorded by:

Checked by:

Note: The SS and chlorophyll-*a* results are to be filled up once they are available from the laboratory.

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

---

Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

Location Plan

Prepared by : _____

Designation : _____

Signature : _____

Date : _____

Appendix E Implementation Schedule

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
Air Quality – Construction Phase										
4.5.1	-	<u>Dust Control</u> a Vehicle washing facilities should be provided at the designated vehicle exit point; b Every vehicle should be washed to remove any dusty materials from its body and wheels immediately before leaving the worksite; c The load carried by the trucks should be covered entirely to ensure no leakage from the vehicles; d Hoarding of not less than 2.4 m high from ground level should be provided along the entire length of that portion of the site boundary adjoining a road or other area accessible to the public except for a site entrance or exit; e The main haul road should be kept clear of dusty materials and should be sprayed with water so as to maintain the entire road surface wet at all the time;	To ensure dust emission is controlled and compliance with relevant statutory requirements	Project Site / During construction	Contractor		✓			*Air Pollution Control (Construction Dust) Regulations*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
		f The stockpile of dusty materials should be either covered entirely by impervious sheets; place in an area sheltered on the top and three sides; or sprayed with water to maintain the entire surface wet at all the time;								
		g Belt conveyor system should be enclosed on the top and two sides;								
		h The height of the belt conveyor should be kept as low as possible to avoid delivery at height; and								
		i All the exposed area should be kept wet always to minimise dust emission.								
4.5.1	-	<u>Air Quality Control</u>								
		a All dump trucks entering or leaving the Project Site should be provided with mechanical covers in good service condition; and	To ensure air quality standards compliance with relevant statutory requirements	Project Site / During construction	Contractor		✓			*ETWC TC No 19/2005*
		b Ultra-low-sulphur diesel (ULSD) should be used for all construction plant on site.								

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
4.7.1	-	EM&A Requirements								
		Regular site audits (at a frequency of not less than once every two weeks) are recommended.	To ensure that appropriate dust control measures are implemented and good site practices are adopted	Project Site / During construction	ET and Contractor		✓			*Air Pollution Control (Construction Dust) Regulations*
4.7.1	3.0-3.7	Implementation of a construction dust monitoring in every six days	To ensure compliance with the relevant criterion during the construction works.	ASRs A4 (No. 101 Lung Mei Tsuen) and A6 (No. 79 Lo Tsz Tin tsuen) / during construction	ET and Contractor		✓			*Air Pollution Control (Construction Dust) Regulations*
Noise – Design Phase										
5.4.2 (Table 5.7)		The maximum allowable SWLs presented in Table 5.7 of the EIA Report should be included in the tender specification to ensure the assumptions for the operational noise impact assessment remain valid. The suppliers of equipment should guarantee the specified SWLs, with the characteristics of tonality, impulsiveness and intermittency accounted for, by providing certificate of measurement and verify the SWL during testing and commissioning in accordance with international standard procedures. If necessary, the suppliers should apply attenuation measures (eg use of silencers) to achieve the guaranteed noise levels during the detailed design stage.	To reduce the operational noise impact.	Project Site / During design	CEDD/LCSD	✓				*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
Noise – Construction Phase										
5.6.1		Site hoardings at the particular work site boundary may be provided for achieving screening effect, provided that the hoardings have no openings or gaps and meet the same specifications for movable noise barriers. The proposed movable noise barriers should be at least 3m high with a surface density of not less than 7 kg m^{-2}, which could provide a minimum of 5 dB(A) attenuation. Skid footing of movable noise barriers should be located at a distance not more than a few metres of stationary plant and mobile plant such that the NSRs would not have direct line of sight to the plant. The length of the barriers should also be at least five times greater than its height.	To reduce the construction noise impact.	Project Site / During construction	ET and Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.12)	-	The following Quiet Powered Mechanical Equipment (PME) should be used during the construction Phase. • Mobile Crane, SWL listed in the data base of quality powered mechanical equipment prepared by the Noise Control Authority, 107 dB(A); • Tracked Loader, British Standard 5228 – Table C3, Reference No. 16, 104 dB(A);	To reduce the construction noise impact.	Project Site / During construction phase	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
		• Pneumatic breaker, British Standard 5228 – Table C2, Reference No. 10, 110 dB(A); • Concrete Lorry Mixer British Standard 5228 – Table C6, Reference No. 23, 100 dB(A); and • Excavator British Standard 5228 - Table C3, Reference No. 97, 105 dB(A).								
5.7.1 (Table 5.13)	-	<u>Construction Works on Land</u> Movable noise barrier should be provided for excavator and mobile crane; Timber sawing machine should be operated behind site hoarding/ movable noise barrier; and Concrete lorry mixer should be operated behind site hoarding/movable noise barrier.	To reduce the construction noise impact.	Project Site / During the Site Formation, construction of seawall, ramp, staircase, retaining walls, sump tanks for grey water system and superstructure foundation	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.13)	-	Timber sawing machine should be operated behind movable noise barrier; and Movable noise barrier should be provided for excavator and mobile crane.	To reduce the construction noise impact.	Project Site / During the localised road widening works along Ting Kok Road	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
5.7.1 (Table 5.13)	-	<u>Car Park Paving</u> Movable noise barrier should be provided for excavator.	To reduce the construction noise impact.	Project Site / During the car park paving	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.13)	-	<u>Building Works</u> Movable noise barrier should be provided for excavator, mobile crane and earth auger; and Timber sawing machine should be operated behind site hoarding/ movable noise barrier.	To reduce the construction noise impact.	Project Site / During foundation and tanking works	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.13)	-	Movable noise barrier should be provided for mobile crane; and Timber sawing machine should be operated behind site hoarding/ movable noise barrier.	To reduce the construction noise impact.	Project Site / During superstructure works	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.13)	-	Movable noise barrier should be provided for mobile crane.	To reduce the construction noise impact.	Project Site / During building finishes & internal fitting-out	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.13)	-	<u>Rock filling for the Groynes</u> Movable noise barrier should be provided for excavator and derrick lighter.	To reduce the construction noise impact.	Project Site / During the construction of gabion channel	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
5.7.1 (Table 5.13)	-	<u>Box Culvert Construction</u> Movable noise barrier should be provided for excavator.	To reduce the construction noise impact.	Project Site / During the construction of gabion channel	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.13)	-	Movable noise barrier should be provided for excavator, mobile crane; and Concrete lorry mixer should be operated behind site hoarding/movable noise barrier.	To reduce the construction noise impact.	Project Site / During the construction of western culvert	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.13)	-	Concrete lorry mixer should be operated behind site hoarding/movable noise barrier.	To reduce the construction noise impact.	Project Site / During the construction of eastern culvert	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.13)	-	Site hoarding should be provided for work site.	To reduce the construction noise impact.	Project Site / During the construction of 90m box culvert	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
5.7.1 (Table 5.13)	-	<u>Sand Filling</u> Movable noise barrier should be provided for excavator.	To reduce the construction noise impact.	Project Site / During the construction of gabion channel	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
5.7.1	-	<u>Good Site Practice</u>								
		Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;	To reduce the construction noise impact.	Project Site / Throughout the construction period	Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*
		Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction programme;								
		Mobile plant, if any, should be sited as far from NSRs as possible;								
		Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;								
		Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and								
		Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.								
5.9.1	4.1	<u>EM&A Requirements</u>								
		Implementation of weekly construction noise monitoring at the representative NSRs.	To ensure compliance with the relevant criterion during the construction works.	N1, N2/N2a , N3 & N4/ Throughout the construction period	ET and Contractor		✓			*Noise Control Ordinance* (NCO) and *Annex 5* of the *EIAO-TM*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
Noise – Operational Phase										
5.9.2	-	<u>EM&A Requirements</u> No noise monitoring is required during operational phase.	-	-	-					-
Water Quality – Construction Phase										
6.6.1	-	<u>Dredging and Sandfilling Operations</u> Sandfilling works should be carried out after the completion of groyne construction.	To further minimise the SS level during sandfilling works	Project Site / During sandfilling	Contractor		✓			-
6.6.1 and Figure 6.20	-	A movable cage type / metal frame type silt curtain will be deployed around the dredging area next to the grab dredger prior to commencement of dredging works.	To further minimise the SS level during the dredging and sandfilling works	Project Site / During dredging and sandfilling	Contractor		✓			*Annex 6 of the EIAO-TM*
6.6.1 and Figure 6.21	-	Standing type silt curtains will be deployed around the proposed sandfilling extent prior to commencement of sandfilling works.	To further minimise the SS level during the dredging and sandfilling works	Project Site / During dredging and sandfilling	Contractor		✓			*Annex 6 of the EIAO-TM*
6.6.1	-	A hourly dredging rate of a closed grab dredger (with a minimum grab size of 3 m^3) should be less than 31 m^3 hr^{-1}, with reference to the maximum rate for dredging, which was derived in the EIA.	To further minimise the SS level during the dredging works	Project Site / During dredging	Contractor		✓			-
6.6.1	-	A daily filling rate should be less than 1,000 m^3 day^{-1}, which was defined in the EIA.	To further minimise the SS level during the sandfilling works	Project Site / During sandfilling	Contractor		✓			-

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
6.6.1	-	Mechanical grabs should be designed and maintained to avoid spillage and should seal tightly while being lifted.	To further minimise the SS level during the dredging works	Project Site / During dredging	Contractor		✓			-
6.6.1	-	Barges or hoppers should have tight fitting seals to their bottom openings to prevent leakage of material.	To further minimise the SS level during the dredging and sandfilling works	Project Site / During dredging and sandfilling	Contractor		✓			-
6.6.1	-	Loading of barges or hoppers shall be controlled to prevent splashing of dredged material to the surrounding water.	To further minimise the SS level during the dredging works	Project Site / During dredging	Contractor		✓			-
6.6.1	-	Barges or hoppers should not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation.	To further minimise the SS level during the dredging and sandfilling works	Project Site / During dredging and sandfilling	Contractor		✓			-
6.6.1	-	Excess material should be cleaned from the decks and exposed fittings of barges or hoppers before the vessel is moved.	To further minimise the SS level during the dredging and sandfilling works	Project Site / During dredging and sandfilling	Contractor		✓			-
6.6.1	-	Adequate freeboard should be maintained on barges to reduce the likelihood of decks being washed by wave action.	To further minimise the SS level during the dredging and sandfilling works	Project Site / During dredging and sandfilling	Contractor		✓			-
6.6.1	-	All vessels should be sized such that adequate clearance is maintained between vessels and the seabed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.	To further minimise the SS level during the dredging and sandfilling works	Project Site / During dredging and sandfilling	Contractor		✓			-
6.6.1	-	The works should not cause foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the Project Site.	To further minimise the SS level during the dredging and sandfilling works	Project Site / During dredging and sandfilling	Contractor		✓			*ProPECC PN 1/94*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
6.6.1	-	<u>Construction Site Runoff</u> The excavation works for the drainage diversions should be carried out to minimise any seawater influx entering the works area and hence to keep the works area dry as much as possible.	To ensure the works area will be kept dry as much as possible and hence avoid construction site runoff	Project Site / During excavation for the drainage diversions	Contractor		✓			-
6.6.1 and Figure 6.21	-	Silt curtains at the inshore waters should be deployed to enclose the works area before the commencement of the excavation works for two drainage diversions until the completion of the diversions.	To avoid any adverse water quality impacts resulting from the site runoff due to heavy rainfall	Project Site / During excavation for the drainage diversions	Contractor		✓			-
6.6.1	-	At the start of site establishment, perimeter cut-off drains to direct off-site water around the site should be constructed and internal drainage works and erosion and sedimentation control facilities implemented. Channels, earth bunds or sand bag barriers should be provided on site to direct stormwater to silt removal facilities. The design of efficient silt removal facilities should be based on the guidelines in *Appendix A1* of *ProPECC PN 1/94*.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*
6.6.1	-	All the surface runoff should be collected by the on-site drainage system and diverted through the silt traps prior to discharge into storm drain.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
6.6.1	-	All exposed earth areas should be completed as soon as possible after earthworks have been completed, or alternatively, within 14 days of the cessation of earthworks, where practicable. If excavation of soil cannot be avoided during the rainy season, or at any time of year when rainstorms are likely, exposed slope surfaces should be covered by tarpaulin or by other means.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*
6.6.1	-	All drainage facilities and erosion and sediment control structures should be regularly inspected and maintained to ensure proper and efficient operation at all times and particularly following rainstorms. Deposited silt and grit should be removed regularly and disposed of by spreading evenly over stable, vegetated areas.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*
6.6.1	-	Measures should be taken to reduce the ingress of site drainage into excavations. If the excavation of trenches in wet periods is necessary, they should be dug and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
6.6.1	-	Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than 50 m^3 should be covered with tarpaulin or similar fabric during rainstorms. Measures should be taken to prevent the washing away of construction materials, soil, silt or debris into any drainage system.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*
6.6.1	-	Manholes (including newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*
6.6.1	-	Precautions to be taken at any time of year when rainstorms are likely, actions to be taken when a rainstorm is imminent or forecasted, and actions to be taken during or after rainstorms are summarised in *Appendix A2* of *ProPECC PN 1/94*. Particular attention should be paid to the control of silty surface runoff during storm events, especially for areas located near steep slopes.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*
6.6.1	-	Oil interceptors should be provided in the drainage system and regularly emptied to prevent the release of oil and grease into the storm water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
6.6.1	-	All temporary and permanent drainage pipes and culverts provided to facilitate runoff discharge should be adequately designed for the controlled release of storm flows. All sediment traps should be regularly cleaned and maintained. The temporary diverted drainage should be reinstated to the original condition when the construction work has finished or the temporary diversion is no longer required.	To minimise the construction site runoff	Project Site / During land based construction works	Contractor		✓			*ProPECC PN 1/94*
6.6.1	-	<u>Sewage Generated by Workforce</u> Sewage from toilets should be collected by a licensed waste collector.	To prevent contamination to nearby environment	Project Site / During land based construction works	Contractor		✓			*Water Pollution Control Ordinance*
6.6.1	-	<u>Storage and Handling of Oil, Other Petroleum Products and Chemicals</u> Waste streams classifiable as chemical wastes should be properly stored, collected and treated for compliance with *Waste Disposal Ordinance or Disposal (Chemical Waste) (General) Regulation* requirements.	To prevent contamination to nearby environment	Project Site / During land based construction works	Contractor		✓			*Waste Disposal Ordinance*
6.6.1	-	All fuel tanks and chemical storage areas should be provided with locks and be sited on paved areas.	To prevent contamination to nearby environment	Project Site / During land based construction works	Contractor		✓			*Waste Disposal Ordinance*
6.6.1	-	The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank to prevent spilled oil, fuel and chemicals from reaching the receiving waters.	To prevent contamination to nearby environment	Project Site / During land based construction works	Contractor		✓			*Waste Disposal Ordinance*

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation Guidelines
						Des	C	O	Dec	
6.6.1	-	Oil leakage or spillage should be contained and cleaned up immediately. Waste oil should be collected and stored for recycling or disposal, in accordance with the *Waste Disposal Ordinance*. The Contractors should prepare guidelines and procedures for immediate clean-up actions following any spillages of oil, fuel or chemicals.	To prevent contamination to nearby environment	Project Site / During land based construction works	Contractor		✓			*Waste Disposal Ordinance*
6.6.1	-	Vehicle and plant servicing areas, vehicle wash bays and lubrication bays should, as far as possible, be located within roofed areas. The drainage in these covered areas should be connected to foul sewers via a petrol interceptor.	To prevent contamination to nearby environment	Project Site / During land based construction works	Contractor		✓			*Waste Disposal Ordinance*
6.9.1 and 11.6.1	5.1	<u>EM&A Requirements</u> Monitoring of marine water quality during the construction phase is considered necessary to evaluate whether any impacts would be posed by these marine works on the surrounding waters during the operation of dredging and filling works.	To ensure the construction works would not arise any impacts to the surrounding waters	Marine water outside the Project Site / During dredging and filling works	ET and Contractor		✓			-

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Water Quality – Post-Construction Phase (After the completion of the construction and before the operation of the beach)										
6.9.2 and 11.6.2	5.2	<u>EM&A Requirements</u> *E. coli* monitoring should be conducted at the outlet of two diverted drains and at EPD's beach water monitoring stations for the identification of pollution loading and to establish relationship between the loading and EPD's beach monitoring programme.	To investigate the pollution loading of *E. coli* and to establish relationship with EPD's beach monitoring data	Two diverted drains and the Bathing Beach/ Within six weeks after the completion of the construction works	ET	Post-Construction Phase (After the completion of the construction and before the operation of the beach)				-
Water Quality – Operational Phase										
6.6.2	-	<u>Surface Runoff from Project Site</u> A petrol interceptor should be provided in the drainage system and regularly emptied to prevent the release of oil and grease into the storm water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain. Where appropriate, the design should follow or of similar functions as stated in the *ProPECC PN 1/94*.	To prevent contamination to nearby environment	Beach Park area / During operation	Operator		✓	✓		*Water Pollution Control Ordinance and ProPECC PN 1/94*
6.6.2	-	Oil leakage or spillage should be contained and cleaned up immediately. Waste oil should be collected and stored for recycling or disposal in accordance with the *Waste Disposal Ordinance.*	To prevent contamination to nearby environment	Beach Building Facility / During operation	Operator		✓	✓		*Waste Disposal Ordinance*

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Waste Management – Construction Phase										
7.6	-	The Contractor should submit the plan to Project Proponent's Engineer Representative for endorsement prior to the commencement of the construction works. The plan should incorporate site-specific factors, such as the designation of areas for the segregation and temporary storage of reusable and recyclable materials.	To ensure that adverse environmental impacts are prevented	Project Site / Contract mobilisation and during construction	Contractor	✓	✓			-
7.6	-	It will be the Contractor's responsibility to ensure that only reputable licensed waste collectors are used and that appropriate measures to reduce adverse impacts, including windblown litter and dust from the transportation of these wastes, are employed.	To ensure that adverse environmental impacts are prevented	Project Site / Contract mobilisation and during construction	Contractor	✓	✓			-
7.6	-	The Contractor must ensure that all the necessary permits or licences required under the Waste Disposal Ordinance are obtained for the construction phase.	To ensure compliance with relevant statutory requirements	Project Site / Contract mobilisation and during construction	Contractor	✓	✓			-
7.6	-	<u>Waste Management Hierarchy</u> • Nomination of approved personnel to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site; • Training of site personnel in proper waste management and chemical handling procedures;	To ensure that adverse environmental impacts are prevented	Project Site / Contract mobilisation and during construction	Contractor	✓	✓			*Waste Disposal (Charges for Disposal of Construction Waste) Regulation;* *Works Bureau Technical Circular No.31/2004; and*

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		• Provision of sufficient waste disposal points and regular collection for disposal; • Appropriate measures to reduce windblown litter and dust transportation of waste by either covering trucks or by transporting wastes in enclosed containers; • Separation of chemical wastes for special handling and appropriate treatment at the Chemical Waste Treatment Centre; • Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors; and • A recording system for the amount of wastes generated/recycled and disposal sites.								*Annex 5 and Annex 6 of Appendix G of ETWBTC No. 19/2005*
	-	<u>Waste Reduction Measures</u> • Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of material and their proper disposal;	To reduce construction waste generation	Project Site / During construction	Contractor		✓			-

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		• Encourage collection of aluminium cans and waste paper by individual collectors during construction with separate labelled bins being provided to allow the segregation of these wastes from other general refuse generated by the workforce; • Any unused chemicals and those with remaining functional capacity be recycled as far as possible; • Use of reusable non-timber formwork to reduce the amount of C&D materials; • Prior to disposal of construction waste, wood, steel and other metals should be separated, to the extent practical for re-use and/or recycling to reduce the quantity of waste to be disposed at landfills; • Proper storage and site practices to reduce the potential for damage or contamination of construction materials; and • Plan and stock construction materials carefully to reduce amount of waste generated and avoid unnecessary generation of waste.							

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7.6.1	-	Dredging Materials								
		The final disposal site for the dredged sediments should be determined by the MFC and a dumping licence should be obtained from EPD prior to the commencement of the dredging works. Uncontaminated sediments should be disposed of at open sea disposal sites designated by the MFC. For contaminated sediments requiring Type 2 confined marine disposal, relevant contract documents should specify the allocation conditions of the MFC and EPD.	To ensure adverse environmental impacts are prevented	Dredging area / During construction	Contractor		✓			*Dumping at Sea Ordinance*
7.6.2	-	Excavated Materials and C&D Waste								
		Management of Waste Disposal The contractor should open a billing account with EPD in accordance with the Waste Disposal (Charges for Disposal of Construction Waste) Regulation for the payment of disposal charges. Every waste load transferred to Government waste disposal facilities such as public fill, sorting facilities, or landfills should require a valid "chit" which contains the information of the account holder to facilitate waste transaction recording and billing to the waste producer. A trip-ticket system should be established in accordance with ETWBTC No. 31/2004 to monitor the reuse of surplus excavated materials off-site and disposal of construction waste and general refuse at transfer stations/landfills, and to control fly-	To properly handle the excavated materials and C&D waste and thus avoid any adverse impacts	Project Site / During construction	Contractor		✓			*Waste Disposal (Charges for Disposal of Construction Waste) Regulation*

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		tipping. The billing "chit" and trip-ticket system should be included as one of the contractual requirements and implemented by the contractor. Regular audits of the waste management measures implemented on-site as described in the Waste Management Plan should be conducted. A recording system (similar to summary table as shown in Annex 5 and Annex 6 of *Appendix G* of ETWBTC No. 19/2005) for the amount of waste generated, recycled and disposed of (including the disposal sites) will be established during the construction phase.								
7.6.2	-	*Reduction of C&D Materials Generation* Public fill and construction waste should be segregated and stored in different containers or skips to facilitate reuse or recycling of the public fill and proper disposal of the construction waste. Specific areas of the work site should be designated for such segregation and storage if immediate use is not practicable. To reduce the potential dust and water quality impacts of site formation works, C&D materials should be wetted as quickly as possible to the extent practicable after excavation/filling.	To reduce the generation of C&D waste	Project Site / During construction	Contractor		✓			-

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7.6.3	-	<u>Chemical Waste</u> The Contractor should register as a chemical waste producer with the EPD. Chemical waste, as defined by Schedule 1 of the Waste Disposal (Chemical Waste) (General) Regulation, should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes. Containers used for the storage of chemical wastes should: • Be suitable for the substance they are holding, resistant to corrosion, maintained in a good condition, and securely closed; • Have a capacity of less than 450 L unless the specifications have been approved by the EPD; and • Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Regulations. The storage area for chemical wastes will: • Be clearly labelled and used solely for the storage of chemical waste; • Be enclosed on at least 3 sides;	To ensure proper handling of chemical waste	Project Site / During construction	Contractor		✓			*Code of Practice on the Packaging, Handling and Storage of Chemical Wastes*

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		• Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest; • Have adequate ventilation; • Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and • Be arranged so that incompatible materials are appropriately separated. Chemical waste should be collected by a licensed chemical waste collector to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility.								

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7.6.4	-	Sewage An adequate number of portable toilets should be provided for the on-site construction workforce during construction phase. All portable toilets should be maintained in a state that will not deter the users from using them. Night soil should be regularly collected by a licensed collector for disposal. The sewage generated from the visitors during operation of the Proposed Beach Development should be discharged to the adjacent foul sewer conveying to Tai Po Sewage Treatment Works for treatment.	To ensure proper handling of sewage	Project Site / During construction	Contractor		✓			-
7.6.5	-	General Refuse General refuse should be stored in enclosed bins or compaction units separately from construction and chemical wastes. A reputable waste collector should be employed to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to reduce odour, pest and litter impacts. The burning of refuse on construction sites is prohibited by law. Recycling bins should be provided at strategic locations to facilitate recovery of aluminium cans and waste paper from the Project Site. Materials recovered should be sold for recycling.	To ensure proper handling of general refuse	Project Site / During construction	Contractor		✓			-

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7.6.6	-	Staff Training Training should be provided to workers on the concept of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling at the beginning of the construction works.	To ensure that adverse environmental impacts are prevented	Project Site / Contract mobilisation and during construction	Contractor	✓	✓			-
7.7	6.1	EM&A Requirements Joint site audits by the Environmental Team and the Contractor should be undertaken on a weekly basis. Particular attention should be given to the Contractor's provision of sufficient spaces, adequacy of resources and facilities for on-site sorting and temporary storage of C&D materials. The C&D materials to be disposed of from the Project Site should be visually inspected. The public fill for delivery to the off-site stockpiling area should contain no observable non-inert materials (e.g., general refuse, timber, etc). The waste to be disposed of at refuse transfer stations or landfills should as far as possible contains no observable inert or reusable/recyclable C&D materials (e.g., soil, broken rock, metal, and paper/cardboard packaging, etc). Any irregularities observed during the weekly site audits should be raised promptly to the Contractor for rectification.	To ensure that adverse environmental impacts are prevented	Project Site / During construction	ET and Contractor		✓			-

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Waste Management – Operational Phase										
7.7	-	EM&A Requirements EM&A is not required during the operation phase of the Proposed Beach Development.	-	-	-					-
Ecology – Construction Phase										
8.10.2	7.1	Measures for Common Rat Snake To undertake a search of the Common Rat Snake within the land based Project Site just before the commencement of the construction works. Due to the small size of the Project Site and given that there are no optimal habitats for Common Rat Snake, one day-time search is considered sufficient. The surveyor(s) should actively search the areas within the Project Site and pay special attention to the leaf litters and rocks. All recorded Common Rat Snake should be caught by hand and translocated to the shrubland at the north of the Study Area, immediately after the search. The Common Rat Snake search and translocation works should be undertaken by a qualified ecologist with relevant experience in faunal translocation works.	To ensure that adverse impacts arising from the Project to Common Rat Snake are prevented	Project Site (land based) / prior to commencement of construction works	ET / Qualified Ecologist	✓				-

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8.10.2	-	<u>Dredging and Sand Filling Operations</u> It is predicted that the sediment plume and the sediment deposition will not be large in extent and no unacceptable water impacts including DO depletion, release of contaminants and nutrients are expected. Although no unacceptable water quality impacts would result, the following good construction site practice and proactive precautionary measures are recommended to ensure dredging and sandfilling operations would be undertaken in such a manner as to avoid any uncontrolled or unexpected incidents during the marine works: • A movable cage type / metal frame type silt curtain should be deployed around the dredging area next to the grab dredger prior to commencement of dredging works; • Standing type silt curtains should be deployed around the proposed sandfilling extent prior to commencement of sandfilling works; and Proper equipment, dredging rate, filling rate and good construction practices should be implemented, details refer to *Section 6.6.1*.	To minimise ecological impacts arising from dredging and sand filling works	Project Site / During dredging and sand filling works	Contractor		✓			-

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8.10.2	-	<u>Measures for Controlling Construction Runoff</u> • Storm water run-off from the construction site should be directed into existing drainage channel via adequately designed sand/silt removal facilities such as sand/silt traps and oil interceptors. Channels, earth bunds or sand bag barriers should be provided on site to properly direct storm water to such silt removal facilities.	To minimise ecological impacts of construction runoff	Project Site / During dredging and filling works	Contractor		✓			-
8.10.2	-	<u>Planting along the Western Drainage Diversion</u> • Provide tree/ shrub/ climber planting along the gabion wall of the new drainage channel. Regular monitoring and removal of the weed plant Mikania micrantha during the establishment and maintenance period.	To provide an ecological habitat	Along gabion wall of the new western drainage channel/ After completion of the gabion	Contractor		✓	✓		-
8.10.2	-	<u>Good Construction Practices</u> • Erect fences along the boundary of the Extension Site before the commencement of works to prevent vehicle movements, and encroachment of personnel, onto adjacent areas; and	To avoid any adverse ecological impacts	Project Site / During construction works	Contractor		✓			-

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		• Regularly check the work site boundaries to ensure that they are not breached and that damage does not occur to surrounding areas.								
Ecology – Operational Phase										
8.10.3	-	A total of approximately 382 mangrove seedlings will be provided. Detailed mangrove seedling planting proposal providing information of planting methodology, recipient sites, planting species and mix, implementation programme, post-planting monitoring and personal involved shall be submitted to and approved by EPD and AFCD. Mangrove seedling planting should be undertaken and supervised by a suitably qualified botanist/ horticulturist. After planting, one year monitoring should be undertaken to check the performance and health conditions of the planted individuals on a monthly basis. Remedial actions should be discussed with AFCD in the event of unsuccessful mangrove seedling planting and follow an approved Event and Action Plan as indicated in Table 8.30 of the EIA Report.	To monitoring the conditions of mangroves after re-planting	Next to Eastern Box Culvert / After plantation works	ET/ Qualified Ecologist			✓		-

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8.10.3 and 8.12.2	7.2	Mangrove seedling planting location is proposed along the outer sides of the groynes and western drainage channel at a level of about 1.2 to 1.6 mPD with a total size of 300 m^2. After planting, one year monitoring will be undertaken to check the performance and health conditions of the planted individuals on a monthly basis. Regular monitoring and removal of the weed plant *Mikania micrantha* during the establishment and maintenance period.	To monitoring the conditions of mangroves after re-planting	Next to Eastern Box Culvert / After plantation works	ET/ Qualified Ecologist/Contractor			✓		-
Fisheries – Construction Phase										
9.10.1	-	<u>EM&A Requirements</u> EM&A is not required during the construction phase of the Project. However, water quality monitoring will be conducted at the Yim Tin Tsai Fish Culture Zone. Details should be referred to the Water Quality Section.	To ensure that no water quality deterioration in the Fish Culture Zone as a result of the dredging and sandfilling works	Details refer to Section 12.6 of the EM&A Manual.	ET and Contractor		✓			*Environmental Impact Assessment Ordinance, Annex 21* of the *EIAO-TM*
Fisheries – Operational Phase										
9.10.2	-	<u>EM&A Requirements</u> EM&A is not required during the operation phase of the Proposed Beach Development.								-

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Landscape and Visual Impact – Construction Phase										
10.5.1	-	<u>Landscape Mitigation</u> A Landscape Plan will be submitted before the commencement of Works.	To provide landscaping work.	Before commencement of construction phase	ET and Contractor	✓				-
10.6.10	-	*Cultivation of areas impacted during construction.* Areas impacted during the construction phase that are not required during the operation phase, are to be cultivated to a depth of 300mm in accordance with accepted Hong Kong practice and guidelines. The cultivation shall involve ripping of compacted soil by mechanical means and the addition gypsum and/or organic fertiliser if required.	To improve the soil allowing plants to thrive	Project Site / During construction	Contractor		✓			-
10.6.10	-	*Car Park Tree Planting.* Advanced trees are to be planted in the car park.	To provide shade to the carpark areas and to reduce the mass of the paved areas	Project Site / During construction	Contractor		✓			-
10.6.10	-	*Tree and shrub planting.* All planting of trees and shrubs is to be carried out in accordance with the relevant best practice guidelines. Plant densities are to be provided in future detailed design documents and are to be selected so as to achieve a finished landscape that matches the surrounding, undisturbed, equivalent landscape types. Regular monitoring and removal of the weed plant *Mikania micrantha* during the establishment and maintenance period.	To improve the appearance of the development	Project Site / During construction	Contractor			✓		-

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10.6.10	-	*Roof Terrace Planting.* Trees, shrubs and climbers shall be established in planters on the roof terraces of the new structures where possible.	To improve the appearance of the development by softening the building element	Project Site / During construction	Contractor		✓			-
10.6.10	-	*Natural Rock Groynes* New rock groynes are needed to contain the sand of the new beach. Natural stones will be used for construction of the Groynes.	To improve the appearance of the development to make the man-made feature be more compatible with the surroundings	Project Site / During construction	Contractor		✓			-
10.6.10	-	*Inter-Tidal Re-generation*. It is likely that a build up of sediment and sand will occur at the outer edges of the rock groyne. This is a natural process and the development proponent has no control over the implementation of this mitigation measure.	To improve the appearance of the development	Adjacent areas	Nil			✓		-
10.6.10	-	*Mangrove Re-generation*. Mangroves of similar species to existing to be manually established by planting of droppings.	To improve the ecological value of the project	Project Site / During post-construction	Contractor		✓			-
10.6.10	-	*Buffer Planting.* Trees and shrubs are to be planted along Ting Kok road to screen the development from the nearby Village/Developed Areas.	To improve the appearance of the development	Project Site / During post-construction	Contractor		✓			-
10.6.10	-	*Early Planting Works* Where technically feasible, new plantings are to be installed during the construction works to reduce landscape impacts.	To improve the appearance of the development	Project Site / During construction	Contractor		✓			-

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10.6.10	-	*Tree Protection/Transplantation.* Where technically feasible, existing trees in the Trees/Backshore Vegetation LR are to be retained. Those trees that cannot be retained that are of value are to be transplanted.	To improve the appearance of the development	Project Site / Before commencement of construction	Contractor	✓				-
10.7.9	-	Visual Mitigation								-
		Design of Structures. The structure shown in the photomontages are to illustrate the mass of the structures only. During the design phase of the development, features such as the location of doors, windows, eaves etc. will be detailed. All of these elements will greatly improve the appearance of the structures. Where possible, built structures will utilise appropriate designs to complement the surrounding landscape. Materials and finishes will also be considered during detailed design.	To reduce visual impacts and improve the appearance of the development	Project Site / During construction	Architect	✓				
10.7.9	-	*Colour Scheme.* Colours for the structures can be used to complement the surrounding area. Lighter colours such as shades of light grey, off-white and light brown may be utilised where technically feasible to reduce the visibility of the structures.	To reduce visual impacts and improve the appearance of the development	Project Site / During construction	Architect	✓				-
10.7.9	-	*Plantings.* In addition to the landscape mitigation plantings proposed in Section 10.5.9 of the EIA report, appropriate new plantings will be installed as appropriate to help integrate the new structures into the surrounding landscape.	To help integrate the new structures into the surrounding landscape	Project Site / During post-construction	Contractor		✓			-

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10.7.9	-	*Colour of Site Hoardings.* In order to mitigate the visual impact of these temporary hoardings, it is recommended that the hoardings be erected at a uniform height, with a uniform colour that complements the existing surrounding landscape.	To mitigate the visual impact of temporary hoardings	Project Site / During construction	Contractor		✓			-
-	9.2	<u>EM&A Requirements</u> A specialist Landscape Sub-Contractor should be employed for the implementation of landscape construction works and subsequent maintenance operations during a 12-month establishment period. A Registered Landscape Architect should be employed to supervise the specialist Landscape Sub-contractor for the implementation of landscape works, both hard and soft, involved. Measures undertaken by both the Contractor(s) and the specialist Landscape Sub-Contractor during the construction phase and first year post-construction will be audited by the Registered Landscape Architect of the ET. Site inspections should be undertaken at least once every two weeks throughout the landscaping plants establishment period when planting works are being undertaken.	To check the implementation and maintenance of landscape mitigation measures and ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other project works and operational requirements are resolved at the earliest practical date and without compromise to the intention of the mitigation measures	Project Site / During construction and post-construction phase	Specialist Landscape Sub-contractor,Registered Landscape Architect and ET		✓			-

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		A tree survey should be prepared, for DLO submission, and for the purpose of existing trees protection. Removal of existing trees to be minimized. The Contractor should consider to employ a certified arborist when sizable and valuable existing tree(s) protection of transplant is required. Post-construction phase auditing will be restricted to the 12-month establishment works of the landscaping proposals. Advance planting- monitoring of implementation and maintenance of planting, and against potential incursion, physical damage, fire, pollution, surface erosion, etc. Protection of trees to be retained- identification and demarcation of trees / vegetation to be retained, erection of physical protection (e.g. fencing), monitoring against potential incursion, physical damage, fire, pollution, surface erosion, etc. Clearance of existing vegetation- identification and demarcation of trees / vegetation to be cleared, checking of extent of works to reduce damage, monitoring of adjacent areas against potential incursion, physical damage, fire, pollution, surface erosion, etc.								

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		Transplanting of trees-identification and demarcation of trees / vegetation to be transplanted, monitoring of extent of pruning / lifting works to reduce damage, timing of operations, implementation of the stages of preparatory and translocation works, and maintenance of transplanted vegetation, etc. Plant supply-monitoring of operations relating to the supply of specialist plant material (including the collecting, germination and growth of plants from seed) to ensure that plants will be available in time to be used within the construction works. Soiling, planting, etc-monitoring of implementation and maintenance of soiling and planting works and against potential incursion, physical damage, fire, pollution, surface erosion, etc. Architectural design and treatment of all structures (where practicable), retaining walls, elevated road structures and other engineering works-implementation and maintenance of mitigation measures, to ensure conformity with agreed designs. Erection of Site Hoardings/Fences - Erection of site hoardings/fences during the construction phase to reduce visual impacts. Establishment Works - monitoring of implementation of maintenance operations during Establishment Period.								

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Landscape and Visual Impact – Operational Phase										
11.10.2	-	*Plant Maintenance*. All installed plant material to be maintained to the relevant Hong Kong standard for the life of the Proposed Beach Development	To improve the appearance of the development.	Proposed Beach Development / During operation	Operator			✓		-