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**Table of Content**

<b>1.</b>	<b>INTRODUCTION</b>	<b>1-1 to 1-8</b>
1.1	Purpose of the Manual	
1.2	Project Description	
1.3	Location and scope of Project	
1.4	The Type of Designated Project Covered in the Study	
1.5	Possible Impact on the Environment	
1.6	Objectives of EM&A programme	
1.7	The Scope of the EM&A Programme	
1.8	Construction Programme	
1.9	Project Organisation	
1.10	Structure of EM&A Manual	
<b>2.</b>	<b>AIR QUALITY</b>	<b>2-1 to 2-6</b>
2.1	Introduction	
2.2	Air Quality Parameters	
2.3	Monitoring Equipment	
2.4	Monitoring Locations	
2.5	Baseline Monitoring	
2.6	Impact Monitoring	
2.7	Compliance Assessment	
2.8	Event and Action Plan (EAP)	
<b>3.</b>	<b>WATER QUALITY</b>	<b>3-1 to 3-14</b>
3.1	Introduction	
3.2	Water Quality Parameters	
3.3	Monitoring Equipment	
3.4	Construction phase Monitoring	
3.5	Baseline Monitoring	
3.6	Impact Monitoring	
3.7	Action and Limit Level	
3.8	Operation Phase Monitoring	
3.9	Action and Limit Level	
3.10	Event and Action Plan	
<b>4.</b>	<b>ECOLOGY</b>	<b>4-1 to 4-9</b>
4.1	Introduction	
4.2	Ecological Mitigation Measures and Implementations	
4.3	Monitoring and Audit for Ecology	
<b>5.</b>	<b>WASTE MANAGEMENT</b>	<b>5-1 to 5-3</b>
5.1	Introduction	
5.2	Waste Control and Mitigation Measures	
<b>6.</b>	<b>CULTURAL HERITAGE</b>	<b>6-1 to 6-3</b>
6.1	Introduction	
6.2	Cultural Heritage Requirements for EM&A	
<b>7.</b>	<b>LAND CONTAMINATION</b>	<b>7-1 to 7-4</b>
7.1	Introduction	
7.2	Potential Areas Recommended for Further Investigation	

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<b>7.3</b>	<b>Preparation of Contamination Assessment Plan</b>	
<b>7.4</b>	<b>Health and Safety</b>	
<b>7.5</b>	<b>Mitigation Measures for Land Contamination during Construction Stage</b>	
<b>7.6</b>	<b>Potential for Future Land Contamination</b>	
<b>8.</b>	<b>LANDSCAPE AND VISUAL IMPACT MITIGATION MEASURES</b>	<b>8-1 to 8-4</b>
<b>8.1</b>	<b>General</b>	
<b>8.2</b>	<b>Baseline Monitoring</b>	
<b>8.3</b>	<b>Construction and Operation Phase Audit</b>	
<b>8.4</b>	<b>Construction areas</b>	
<b>8.5</b>	<b>Tree Preservation, planting and buffer areas</b>	
<b>8.6</b>	<b>Shrub and ground cover planting</b>	
<b>8.7</b>	<b>Engineering infrastructure: bridges, desalination plant, pumping stations and water tanks</b>	
<b>8.8</b>	<b>Buildings: Extension of existing, halfway houses and rain shelters</b>	
<b>9</b>	<b>SITE ENVIRONMENTAL AUDIT</b>	<b>9-1 to 9-2</b>
<b>9.1</b>	<b>Site Inspection</b>	
<b>9.2</b>	<b>Compliance with Legal and Contractual Requirements</b>	
<b>9.3</b>	<b>Environmental Complaints</b>	
<b>10.</b>	<b>REPORTING</b>	<b>10-1 to 10-7</b>
<b>10.1</b>	<b>General</b>	
<b>10.2</b>	<b>Baseline Monitoring Report</b>	
<b>10.3</b>	<b>Monthly EM&amp;A Report</b>	
<b>10.4</b>	<b>Quarterly EM&amp;A Summary Report</b>	
<b>10.5</b>	<b>Final EM&amp;A Review Report</b>	
<b>10.6</b>	<b>Data Keeping</b>	

List of Figures

<u>1.1</u>	<u>Location of the Proposed project</u>
<u>1.2</u>	<u>Master Layout Plan of the proposed third golf course</u>
<u>1.3</u>	<u>Project Organisation and Lines of Communication</u>
<u>2.1</u>	<u>Proposed Air Quality Monitoring locations</u>
<u>3.1</u>	<u>Proposed Water Quality Monitoring Locations (Construction phase)</u>
<u>3.2</u>	<u>Proposed Water Quality Monitoring Locations (Operational phase)</u>
<u>4.1</u>	<u>Proposed Ecology Monitoring Locations</u>
<u>4.2</u>	<u>Proposed coral transplantation locations</u>
<u>4.3</u>	<u>Location of coral and seagrass monitoring (Sites D2, D3 and C)</u>
<u>4.4</u>	<u>Control Site for Natural Coral Monitoring</u>
<u>6.1</u>	<u>Area of Construction Works requiring a Watching Brief</u>
<u>7.1</u>	<u>Proposed Sampling Locations for Land Contamination</u>

List of Appendix

<u>Appendix A</u>	<u>Implementation Schedule</u>
<u>Appendix B</u>	<u>Sample Data Sheet, Complaint Log and Interim Notification Exceedances</u>

## **1. Introduction**

### **1.1 Purpose of the Manual**

- 1.1.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the set up of an EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the monitoring and audit programme for the construction and operation phases of the “Proposed Extension of Public Golf Course at Kau Sai Chau, Sai Kung” (hereafter referred as “the Project”). It aims to provide systematic procedures for monitoring, auditing and minimising environmental impacts associated with construction works and operation activities.
- 1.1.2 The environmental laws, ordinances, regulations of Hong Kong and the Hong Kong Planning Standards and Guidelines have served as environmental standards and guidelines in the preparation of this Manual. In addition, the EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the Technical Memorandum on the EIA Process (EIAO-TM), issued by the Environmental Protection Department (EPD). Reference has also been made to the EPD’s “Environmental Monitoring and Audit Guidelines for Development Projects in Hong Kong”.

### **1.2 Project Description**

#### ***Background to the Study***

- 1.2.1 In mid-1990, the Hong Kong Jockey Club (HKJC) proposed providing a public golf course at Kau Sai Chau as a recreational golf facility, which also has the effect of restoring the land degraded by its use as an artillery range. In late 1995, the first 18-hole golf course was opened to the public, followed by a second 18-hole golf course, driving range and associated support facilities nine months later. Since opening, utilisation of the golf courses has increased considerably. Utilisation of tee-times is almost 100% on weekends/public holidays and 72% on weekdays when there is good weather (annual average utilisation is 80%). With the two existing courses in heavy demand, the Hong Kong Jockey Club has decided to expand the existing facilities by building a third golf course with supporting facilities.
- 1.2.2 The Project Proponent has therefore decided to make a proposal to enlarge the existing facility into an area that, like the original facility, is a site degraded by former use as an artillery firing range. The Project will provide additional golfing capacity for the existing public golf course on Kau Sai Chau.
- 1.2.3 Historically, Kau Sai Chau was used as a military firing range, and on the Project site there is still visible evidence of this former activity where the thin scrubland cover has been exposed and there has been extensive washout. The existing (36-hole) golf course was the subject of an EIA, although this was before the enactment of the EIA Ordinance (EIAO) (Cap 499) and the project was classed as being “exempted” under the EIAO, i.e. works carried out before the EIAO. This EIA identified environmental mitigation for incorporation into the design and operation phases of the project, including EM&A requirements for construction and operation phases and a “Turf Grass Management Plan”. There has been ongoing EM&A since the course was opened to the public.

### 1.3 Location and Scope of Project

1.3.1 The location of the Project is Kau Sai Chau, Port Shelter, Northeast New Territories east of Sai Kung (Figure 1.1). The Project is more closely defined as being on the east side of Kau Sai Chau immediately south of the existing public golf course. The Project site is currently unzoned and comprises an approximately 300 m wide and 1.5 km strip of undulating scrubland. The site is bounded to the west by steep rugged uplands (upto 210 m) and incised valleys and to the south and east by steep rocky coastline. North of the site is the existing Kau Sai Chau Public Golf Course that occupies the northern half of the Island.

1.3.2 The Project comprises the following (Figure 1.2):

- Construction of a third 18-hole public golf course on the east side of the island, south of the existing golfing area;
- A new irrigation lake to collect surface runoff from new 18-hole golf course. Water stored at the new irrigation lake can also be diverted to existing reservoir for tertiary treatment and recycling;
- A new desalination plant adjacent to the existing pier serve as an additional irrigation water supply for the new golf course during dry season; and
- Expansion of existing administration and maintenance buildings.

### 1.4 The Type of Designated Project Covered in the Study

1.4.1 The Project is a Designated Project according to **Item O1** of Part I, Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO), since it is an **outdoor golf course**. The extension of the existing 36-hole golf course on the east side of Kau Sai Chau can be considered as self-contained for construction activities, but cumulative impact of the three courses for turfgrass management and increased patronage must be considered for the operation phase.

### 1.5 Possible Impact on the Environment

#### *Overview of the Project*

1.5.1 Based on experience gained during the construction and operation of the original course, the current proposal includes design measures to avoid or minimize environmental impacts. Therefore, the golf course design will propose adopting/modifying/enhancing the same approach used in the existing courses in several fundamental areas:

- utilization of treated sewage effluent as a water resource for irrigation. This theme would be continued for the proposed third golf course;
- the closed low flow drainage system is designed to collect all of the surface runoff from the proposed proposed third golf course. This water will be diverted back to the existing irrigation reservoir for recycling as irrigation for the proposed third golf course;
- no potable water would be used for irrigation purposes. A desalination plant will be used as a irrigation alternatives during dry season;
- thorough mitigation measures will be proposed in the EIA and EM&A Manual, and will be sufficient to control any silty water runoff during earthworks of the proposed third golf course.
- “turfgrass sods”, rather than growing from seeds, will be used during course establishment to reduce the period when open earth is exposed;

- implementation of the turf grass management plan ensures an integrated approach to turf problems and minimal use of pesticides, thereby protecting water quality during the operation phase of the golf course;
- recycled waste will be used as organic fertilizers used on the golf courses;
- a buffer zone of 20 m will be adopted generally for sensitive streams;
- movement of material will be contained in catchments. Wetland landscaping features (lakes/marshes) and the reservoir will be used as construction and operation run-off water retention and sediment settlement areas; and
- players will use electric golf carts to move around the course (the provision of golf cart tracks rather than walking routes leads to reduced earthworks).

## 1.6 Objectives of EM&A programme

1.6.1 The construction and operation impacts resulting from the implementation of the Project are specified in the EIA Report. The EIA Report also specifies mitigation measures which need to be implemented to ensure compliance with the required environmental criteria. These mitigation measures and their implementation requirements are presented in the Implementation Schedule (Appendix A). The EIA recommends that environmental monitoring will be necessary to assess the effectiveness of measures implemented to mitigate potential environmental impacts during construction of the Project. Regular environmental auditing during construction is also recommended to ensure that potential impacts are adequately addressed through the implementation of the mitigation measures defined in this EIA Report.

1.6.2 This Manual provides the EM&A requirements recommended in the EIA Report to ensure compliance with the specified mitigation measures. The main objectives of the EM&A programme are to:

- provide a database against which any short or long term environmental impacts of the project can be determined;
- provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- monitor the performance of the Project and the effectiveness of mitigation measures;
- verify the environmental impacts predicted in the EIA Study;
- determine Project compliance with regulatory requirements, standards and government policies;
- define remedial action to be taken if unexpected problems or unacceptable impacts arise; and
- provide data against which environmental audits may be undertaken.

## 1.7 The Scope of the EM&A Programme

1.7.1 The scope of the EM&A programme is to:

- implement monitoring inspection and audit requirements;
- implement inspection requirements for mitigation measures;
- liaise with and provide environmental advice (as requested or when otherwise necessary) to construction site staff on the comprehension and consequences of the environmental audit;
- identify and resolve environmental issues and other functions as they may arise from the construction works;
- check and quantify the Contractor's overall environmental performance, and remedial actions to be 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, as well as to undertake additional *ad hoc* monitoring and auditing as required by special circumstances;
- evaluate and interpret all 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 which are 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 general environmental awareness;
  - the Contractor's implementation of the recommendations in the EIA;
  - the Contractor's performance as 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.

1.7.2 This Manual contains the following information:

- responsibilities of the contractor carrying out the works (the Contractor), the engineer (the Engineer) and his/her representative (the Engineer's Representative (ER)), the environmental team (the Environmental Team (ET)) and the independent checker (the Independent Checker (Environment) (IC(E))) with respect to the environmental monitoring and audit requirements during the course of the Project;
- project organisation for the Project;
- the basis for, and description of the broad approach underlying the EM&A programme;
- requirements with respect to the construction programme schedule and the necessary environmental monitoring and audit programme to track the varying environmental impacts;
- details of the methodologies to be adopted, including all field laboratories and analytical procedures, and details on quality assurance and quality control programme;
- the rationale on which the environmental monitoring data will be evaluated and interpreted;
- definition of Action and Limit levels;
- establishment of Event and Action plans;
- requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints;
- requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures;
- requirements for review of EIA predictions and the effectiveness of the mitigation measures/environmental management systems and the EM&A programme.

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

## 1.8 **Construction Programme**

- 1.8.1 The tentative construction programme is starting from Jan 2006 to July 2007.
- 1.8.2 This programme is for the ET Leader to get an initial idea of the projection of the works. The ET leader shall make reference to the actual works progress and programme during the construction stage to schedule the EM&A works, and the Contractor shall provide the respective information to the ET Leader for formulating the EM&A schedule. The construction programme and related EM&A schedule shall be updated in the baseline/monthly report submissions as necessary.

## 1.9 **Project Organisation**

- 1.9.1 The Environmental Team (ET) shall be employed by the Project Proponent to undertake the EM&A works and shall not be in any way an associated body of the Contractor. The Independent Checker (Environment) (IC(E)) shall be engaged by the Project Proponent to audit the work of the ET. The IC(E) shall not be in any way an associated bodies of the Contractor or the ET. The ET Leader and the IC(E) shall have relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the Environmental Protection Department (EPD).
- 1.9.2 The ET Leader shall possess at least 7 years of EM&A experience and have the relevant professional qualifications. The IC(E) shall have the same experience and professional qualifications as for the ET Leader.
- 1.9.3 The IC(E) shall be employed by the Project Proponent prior to commencement of construction of the Project. The role of the IC(E) shall be independent from the management of construction works, but shall be empowered to audit the environmental performance of construction.
- 1.9.4 The Project organisation and lines of communication with respect to environmental protection works is shown in Figure 1.3.
- 1.9.5 The responsibilities of respective parties are as follows:

### ***The Contractor***

- 1.9.6 The term "Contractors" should be taken to mean all construction contractors, operators and sub-contractors, working on site at any one time. Other than reporting to the Engineer, the Contractors should:
- work within the scope of the relevant contract and other tender conditions;
  - participate in the site inspections undertaken by the ET, as required, and undertake any correction actions instructed by the Engineer;
  - provide information/advice to the ET regarding works activities which may contribute, or be continuing to the generation of adverse environmental conditions;
  - implement measures to reduce impact whenever Action and Limit Levels are exceeded; and
  - take responsibility and strictly adhere to the guidelines of the EM&A programme and complementary protocols developed by their project staff.

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### ***Environmental Team***

- 1.9.7 The ET leader and the ET should not be in any way an associated body of the Contractor. The ET should be led and managed by the ET leader. The ET leader should have relevant education, training, knowledge, professional qualifications and at least 7 years experience in EM&A for environmental management works subject to approval of the ER's Representative and the Director of Environmental Protection (DEP).
- 1.9.8 Suitably qualified staff should be included in the ET, and resources for the implementation of the EM&A programme should be allocated in time under the Contract, to enable fulfilment of the project's EM&A requirements as specified in the EM&A Manual.
- 1.9.9 The ET leader and the ET are employed to conduct the EM&A programme and ensure the Contractor's compliance with the project's environmental performance requirements during construction and operation of the Project. The duties are:
- sampling, analysis and statistical evaluation of monitoring parameters with reference to the EIA study final report on *Proposed Extension of Public Golf Course at Kau Sai Chau, Sai Kung* recommendations and requirements;
  - environmental site surveillance;
  - audit of compliance with environmental protection, and pollution prevention and control regulations;
  - monitor the implementation of environmental mitigation measures;
  - monitor compliance with the environmental protection clauses/specifications in the Contract;
  - review construction and operation programme and comment as necessary;
  - review construction and operation methodology and comment as necessary;
  - complaint investigation, evaluation and identification of corrective measures;
  - liaison with Independent Checker (Environment) (IC(E)) on all environmental performance matters, and timely submission of all relevant EM&A proforma for the approval by IC(E);
  - advice to the Contractor on environment improvement, awareness, enhancement matters, etc., on site and
  - timely submission of the EM&A report to the project proponent and the DEP.

### ***Engineer or Engineer's Representative***

- 1.9.10 The term Engineer, or Engineer's Representative (ER), refers to the organisation responsible for overseeing the construction works or operation of the Project and 'monitoring' the works undertaken by various Contractors, and for ensuring that they are undertaken by the Contractors in accordance with the specification and contractual requirements. The ER should:
- Monitor the Contractors' compliance with contract specifications, including the implementation and operation of environmental mitigation measures and ensure their effectiveness, and other aspects of the EM&A programme;
  - Comply with the agreed Event and Action Plan in the event of any exceedance;
  - Provide assistance to the ET as necessary in the implementation of the environmental monitoring and auditing programme; and
  - Instruct the Contractors to follow the agreed protocols or those in the Contract Specifications in the event of exceedances or complaints.



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***Independent Checker (Environment)***

- 1.9.11 The IC(E) should advise the ER on environmental issues related to the Project. The role of the IC(E) should be independent from the management of construction and operation activities, but he/she should be empowered to audit the environmental performance of construction and operation.
- 1.9.12 The IC(E) should be employed prior to commencement of construction of the Project. The IC(E) should have at least 7 years experience in EM&A or environmental management. The appointment of the IC(E) is subject to the approval of the ER.
- 1.9.13 The IC(E) should audit the overall EM&A programme including the implementation of all environmental mitigation measures, submissions relating to EM&A, and any other submission required under the this Manual.
- 1.9.14 In addition, the IC(E) should be responsible for verifying the environmental acceptability of permanent and temporary works, and relevant design plans.
- 1.9.15 The IC(E) should arrange and conduct monthly general site inspections of the work site during the construction period. The IC(E) should ensure the impact monitoring is conducted according to the prescribed schedule at the correct locations.
- 1.9.16 The IC(E) should report the findings of the site inspections and other environmental performance reviews to DSD and EPD.
- 1.9.17 Appropriate resources should also be allocated under the Contractor and the ER to fulfil their duties specified in this Manual.
- 1.9.18 The main duty of the IC(E) is to carry out environmental audit of the construction and operation of the Project; this should include, inter alia, the followings:
- review and audit all aspects of the EM&A programme;
  - validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
  - carry out random sample check and audit on monitoring data and sampling procedures, etc;
  - conduct random site inspection;
  - audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
  - review the effectiveness of environmental mitigation measures and project environmental performance;
  - on a needs basis, audit the Contractor's construction methodology and agree the least impact alternative in consultation with the ET leader and the Contractor;
  - check complaint cases and the effectiveness of corrective measures;
  - review and audit in an independent, objective and professional manner in all aspects of the EM&A programme;
  - validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
  - carry out random sample check and audit on monitoring data and sampling procedures, etc;
  - conduct random site inspection;
  - audit the EIA recommendations and requirement against the status of implementation of environmental protection measures on site;
  - review the effectiveness of environmental mitigation measures and project environmental performance;

- on a need basis, verify and certify the environmental acceptability of the permit holder's construction methodology (both temporary and permanent works), relevant design plans and submissions under the environmental permit. Where necessary, the IC(E) shall seek the least impact alternative in consultation with Environmental Team (ET) leader and the permit holder;
- verify the investigation results of complaint cases and the effectiveness of corrective measures;
- verify EM&A report that has been certified by the ET leader; and
- feedback audit results to ET/Permit Holder according to Event/Action Plan in the EM&A Manual.

## 1.10 **Structure of the EM&A Manual**

1.10.1 The remainder of the Manual is set out as follows:

- *Section 2* details the requirements for air quality monitoring;
- *Section 3* details the requirements for water quality monitoring;
- *Section 4* details the requirements for ecology impact monitoring,
- *Section 5* details the requirements for waste management;
- *Section 6* details the requirements for cultural heritage;
- *Section 7* details the requirements for land contamination;
- *Section 8* describes the scope and frequency of site auditing; and
- *Section 9* details the EM&A reporting requirements.

1.10.2 The EM&A Manual is an evolving document that should be updated to maintain its relevance as the Project progresses. The primary focus for these updates will be to ensure the impacts predicted and the recommended mitigation measures remain consistent and appropriate to the manner in which the works are to be carried out.

## **2. AIR QUALITY**

### **2.1 Introduction**

2.1.1 This section presents the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of air quality impacts during the construction phase of the Project. No operation phase air quality monitoring is recommended.

2.1.2 The objectives of the air quality monitoring shall be:

- to identify the extent of construction dust impacts on sensitive receivers;
- to determine the effectiveness of mitigation measures to control fugitive dust emission from activities during construction phase;
- to audit the compliance of the Contractor with regard to dust control, contract conditions and the relevant dust impact criteria;
- to recommend further mitigation measures if found to be necessary; and
- to comply with Action and Limit (A/L) Levels for air quality as defined in this Manual.

### **2.2 Air Quality Parameters**

2.2.1 The criteria against which ambient air quality monitoring shall be assessed are the Hong Kong Air Quality Objectives (AQOs) for Total Suspended Particulates (TSP):

- 24-hour TSP level of  $260 \mu\text{g m}^{-3}$ ; and
- 1-hour TSP level of  $500 \mu\text{g m}^{-3}$ .

2.2.2 These levels are not to be exceeded at Air Sensitive Receivers (ASRs).

### **2.3 Monitoring Equipment**

2.3.1 The TSP levels shall be measured by following the standard method as set out in High Volume Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA.

2.3.2 Air samples shall be drawn at a controlled rate through a high volume sampler (HVS) fitted with a conditioned, pre-weighed filter paper. After sampling for 24-hours, the filter paper with retained particles is collected and returned to the laboratory for drying in a desiccator followed by accurate weighing. 24-hour average TSP levels are calculated from the ratio of the mass of particulates retained on the filter paper to the total volume of air sampled.

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

2.3.4 HVS in compliance with the following specifications shall be used for carrying out the 1-hour and 24-hour monitoring:

- 0.6 - 1.7 m<sup>3</sup> per minute (20 - 60 standard cubic feet per minute) adjustable flow range;
- equipped with a timing/control device with  $\pm 5$  minutes accuracy for 24 hours operation;
- installed with elapsed-time meter with  $\pm 2$  minutes accuracy for 24 hours operation;
- capable of providing a minimum exposed area of 406 cm<sup>2</sup> (63 in<sup>2</sup>);

- flow control accuracy:  $\pm 2.5\%$  deviation over 24-hour sampling period;
- incorporated with an electronic mass flow rate controller or other equivalent devices;
- equipped with a flow recorder for continuous monitoring;
- provided with a peaked roof inlet;
- incorporated with a manometer;
- able to hold and seal the filter paper to the sampler housing at horizontal position;
- filter can be changed easily; and
- capable of 24-hour continuous operation.

2.3.5 The ET shall be responsible for the provision of the monitoring equipment. ET shall ensure that sufficient number of HVS's with appropriate calibration kit are available for carrying out the baseline, regular impacts monitoring and ad-hoc monitoring. The HVS's shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals in accordance with requirements stated in the manufacturers operating manual and as described below. All the equipment, calibration kit, filter papers, etc., shall be clearly labelled.

2.3.6 The flow rate of each HVS with mass flow controller shall be calibrated using an orifice calibrator. Initial calibration of the dust monitoring equipment shall be conducted upon installation and prior to commissioning. One point flow rate calibration shall be carried out every two months. Five-point calibration shall be carried out every six months.

2.3.7 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 on the data sheet.

## 2.4 Monitoring Locations

2.4.1 One representative air sensitive receiver is proposed for monitoring during the construction phase of the Project (Table 2.1, Figure 2.1). Prior to commencement of the EM&A programme, the ET shall discuss and agree with the Engineer, IC(E) and EPD on the proposed air quality monitoring location.

**Table 2.1**  
**Air Quality Monitoring Location**

Identification Number	Location
GCA B1	Kau Sai Chau Public Golf Course Administration Building

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

- at the site boundary or such locations close to the major dust emission source;
- close to the sensitive receivers; and
- prevailing meteorological conditions.

2.4.3 When positioning the HVS's, the following shall be noted:

- a horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;
- samplers shall be placed at least 2 m apart;

- the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
- a minimum 2m horizontal separation from walls, parapets and penthouses is required for rooftops samplers;
- a minimum 2m horizontal separation from any supporting structure is required;
- no furnace or incinerator flue should be nearby;
- airflow around the sampler should be unrestricted;
- the sampler should be more than 20m from the dripline;
- any wire fence and gate to protect the sampler, shall not cause any obstruction during monitoring;
- permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the samplers.

## 2.5 **Baseline Monitoring**

- 2.5.1 Baseline monitoring shall be carried out to determine the ambient 1-hour and 24-hour TSP levels at the designated monitoring locations, as shown in Table 2.1, prior to the commencement of the Project works. During baseline monitoring, there shall not be any construction or dust generating activities in the vicinity of the monitoring stations.
- 2.5.2 TSP baseline monitoring shall be carried out for a continuous period of at least two weeks under typical weather conditions, with the 24-hour and three 1-hour ambient measurements taken daily at each monitoring location. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources shall also be recorded throughout the baseline monitoring period.
- 2.5.3 In case 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 monitoring locations shall be approved by the Engineer and agreed with the IC(E).
- 2.5.4 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the IC(E) and EPD to agree on an appropriate set of data to be used as a baseline reference and submit such data to the Engineer for approval.
- 2.5.5 The baseline monitoring will provide data for the determination of the appropriate Action levels with the Limit levels set against statutory or otherwise agreed limits.
- 2.5.6 Baseline checking of ambient TSP levels shall be carried out every six months at each monitoring location, when no dusty works activities are in operation. If the ET considers that significant changes in the ambient conditions have arisen, the baseline monitoring exercise may, upon consultation and agreement with the Engineer, the IC(E) and the EPD, be repeated to update the baseline levels and air quality criteria.

## 2.6 **Impact Monitoring**

- 2.6.1 The monthly schedule of the compliance and impact monitoring programme shall be drawn up by the ET one month prior to commencement of the scheduled construction period. For regular impact monitoring, a sampling frequency of at least once in every six days shall be strictly observed at all of the monitoring stations for 24-hour TSP monitoring. In case of complaints, 1-

hour TSP monitoring shall be conducted at least three times in every six days when the highest dust impacts are likely to occur. The impact monitoring programme is summarised in Table 2.2.

**Table 2.2**  
**Air Quality Impact Monitoring Programme (TSP)**

Sampling duration	Frequency
1 hour	<ul style="list-style-type: none"> <li>3 times every 6 days (as required in case of complaints)</li> </ul>
24 hours	<ul style="list-style-type: none"> <li>Once every 6 days</li> </ul>

2.6.2 Before commencing the monitoring, the ET shall inform the IC(E) of the impact monitoring programme such that the IC(E) can conduct on-site audits to ensure the accuracy of the impact monitoring results.

## 2.7 Compliance Assessment

2.7.1 Action and Limit (A/L) levels that provide an appropriate framework for the interpretation of monitoring results have to be agreed between ET, IC(E), EPD and the Engineer before commencement of air monitoring. The air quality monitoring data shall be checked against the agreed A/L levels. Recommended A/L levels are listed in Table 2.3.

**Table 2.3**  
**Action and Limit Levels for Air Quality**

Parameter	Action Level <sup>(1)</sup>	Limit Level
TSP (24 hour average)	<ul style="list-style-type: none"> <li>BL ≤ 200 µg m<sup>-3</sup>, AL = (BL * 1.3 + LL)/2</li> <li>BL &gt; 200 µg m<sup>-3</sup>, AL = LL</li> </ul>	260 µg m <sup>-3</sup>
TSP (1 hour average)	<ul style="list-style-type: none"> <li>BL ≤ 384 µg m<sup>-3</sup>, AL = (BL * 1.3 + LL)/2</li> <li>BL &gt; 384 µg m<sup>-3</sup>, AL = LL</li> </ul>	500 µg m <sup>-3</sup>

(1) BL = Baseline level, AL = Action level, LL = Limit level.

## 2.8 Event and Action Plan (EAP)

2.8.1 The EAP is based on the principle of prescriptive procedures and actions associated with the measurement of certain defined levels of air pollution, as recorded by the environmental monitoring process, and the agreed A/L levels. In cases these A/L levels are exceeded, the ET, the IC(E), the Engineer and the Contractor shall carry out the relevant actions prescribed in the EAP in Table 2.4.

**Table 2.4**  
**Event / Action Plan for Air Quality**

EVENT	ACTION			
	ET	IC(E)	Engineer	CONTRACTOR
<b>ACTION LEVEL</b>				
1. Exceedance for one sample	<ol style="list-style-type: none"> <li>1. Identify source, investigate the causes of complaint and propose remedial measures;</li> <li>2. Inform IC(E) and Engineer;</li> <li>3. Repeat measurement to confirm finding;</li> <li>4. Increase to daily monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method.</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify Contractor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Rectify any unacceptable practice;</li> <li>2. Amend working methods if appropriate.</li> </ol>
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>1. Identify source;</li> <li>2. Inform IC(E) and Engineer;</li> <li>3. Advise Engineer on effectiveness of proposed remedial measures;</li> <li>4. Repeat measurements to confirm findings;</li> <li>5. Increase to daily monitoring;</li> <li>6. Discuss with IC(E) and Contractor remedial actions required;</li> <li>7. If exceedance continues, arrange meeting with IC(E) and Engineer;</li> <li>8. If exceedance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method;</li> <li>3. Discuss with ET and Contractor possible remedial measures;</li> <li>4. Advise ET on the effectiveness of proposed remedial measures;</li> <li>5. Supervise implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm in writing receipt of notification of exceedance;</li> <li>2. Notify Contractor;</li> <li>3. Supervise proper implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit proposals for remedial measures to Engineer within three working days of notification;</li> <li>2. Implement agreed proposals;</li> <li>3. Amend proposal if appropriate.</li> </ol>
<b>LIMIT LEVEL</b>				
1. Exceedance for one sample	<ol style="list-style-type: none"> <li>1. Identify source, investigate causes of exceedance and propose remedial measures;</li> <li>2. Inform IC(E), Engineer, Contractor and EPD;</li> <li>3. Repeat measurement to confirm finding;</li> <li>4. Increase to daily monitoring;</li> <li>5. Assess effectiveness of</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method;</li> <li>3. Discuss with ET and Contractor possible remedial measures;</li> <li>4. Advise Engineer on effectiveness of proposed remedial measures;</li> <li>5. Supervise implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm in writing receipt of notification of exceedance;</li> <li>2. Notify Contractor;</li> <li>3. Supervise proper implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IC(E) within three working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Amend proposals if appropriate.</li> </ol>

EVENT	ACTION			
	ET	IC(E)	Engineer	CONTRACTOR
	Contractor's remedial actions and keep IC(E), EPD and Engineer informed of results.			
2 Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>1. Notify IC(E), Engineer, Contractor and EPD;</li> <li>2. Identify source;</li> <li>3. Repeat measurement to confirm findings;</li> <li>4. Increase to daily monitoring;</li> <li>5. Carry out analysis of Contractor's working procedures to determine possible mitigation measures to be implemented;</li> <li>6. Arrange meeting with IC(E) and Engineer to discuss remedial actions to be taken;</li> <li>7. Assess effectiveness of Contractor's remedial actions and keep IC(E), EPD and Engineer informed of results;</li> <li>8. If exceedance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst Engineer, ET, and Contractor the potential remedial actions;</li> <li>2. Review Contractor's remedial actions whenever necessary to assure their effectiveness, and advise Engineer accordingly;</li> <li>3. Supervise implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of exceedance in writing;</li> <li>2. Notify Contractor;</li> <li>3. In consultation with the IC(E), agree with the Contractor the remedial measures to be implemented;</li> <li>4. Supervise proper implementation of remedial measures;</li> <li>5. If exceedance continues, consider what portion of the works is responsible and instruct the Contractor to stop that portion of work until exceedance has abated.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IC(E) within three working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Resubmit proposals if problem still not under control;</li> <li>5. Stop the relevant portion of works as instructed by Engineer until the exceedance is abated.</li> </ol>



### 3. WATER QUALITY

#### 3.1 Introduction

3.1.1 The water quality assessment in the EIA Report concludes that impacts to the marine and freshwater quality are not expected provided the Contractor implement the recommended mitigation measures. This section presents the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of marine and fresh water quality impacts during the construction phase of the Project. Operation phase monitoring of water quality is recommended.

3.1.2 The objectives of the water quality monitoring programme are as follows:

- to determine the effectiveness of the construction and operation phase controls and mitigation measures employed, and the need for supplementary mitigation measures; and
- to check compliance with relevant WQO.

#### 3.2 Water Quality Parameters

3.2.1 The ET shall be responsible for monitoring the parameters as shown below during the construction phase of the Project to ensure that any deterioration of water quality would be readily detected and timely rectifying action can be undertaken.

##### *Construction Phase Monitoring*

3.2.2 The water quality parameters which need to be monitored are as follows:

- Marine water quality - dissolved oxygen (DO), temperature, turbidity, suspended solids (SS), pH and salinity
- Stream water quality - dissolved oxygen (DO), temperature, turbidity, suspended solids (SS) and pH

3.2.3 Additional water quality parameters are required to monitor marine and stream water quality when the permanent low flow drainage system is not yet completed but turf establishment has to be in place during construction phase. The ET Leader shall be responsible for liaison with the Contractor on the turf establishment programme.

3.2.4 Additional marine and stream water quality monitoring parameters include nitrate nitrogen (NO<sub>3</sub>-N), nitrite nitrogen (NO<sub>2</sub>-N), ammonia nitrogen (NH<sub>3</sub>-N), total phosphate (TP) and selected pesticides parameters. The ET Leader shall be responsible for confirming with the Project Proponent and the Contractor the actual pesticides used during the turf establishment before the required pesticides testing are carried out.

3.2.5 The ET Leader shall propose the additional monitoring parameters for approval by IC(E), Engineer, EPD and AFCD, and shall submit such information for approval at least 2 weeks before the turf establishment period.

3.2.6 In association with the water quality parameters, relevant data including monitoring location/position, time, weather conditions, and any special phenomena and work underway at the construction site shall also be measured.

3.2.7 A sample monitoring record sheet and data format are shown in Appendix B.

### 3.3 Monitoring Equipment

- 3.3.1 The equipment listed below shall be supplied by the ET and approved by the IC(E) and the Engineer for water quality monitoring.

#### Dissolved Oxygen and Temperature Measuring Equipment

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

- dissolved oxygen levels in the range of 0 - 20 mg L<sup>-1</sup> and 0 - 200% saturation; and
- a temperature of 0 - 45 degrees Celsius.

- 3.3.3 It shall have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary. (For example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

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

#### Turbidity Measurement Instrument

- 3.3.5 Turbidity shall be measured *in situ* by the nephelometric method. The instrument shall be portable and weatherproof turbidity measuring instrument using a DC power source complete with cable, sensor and comprehensive operation manuals. It shall have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU (for example, Hach model 2100P or an approved similar instrument). The cable shall not be less than 25m in length. The meter shall be calibrated in order to establish the relationship between NTU units and the levels of suspended solids.

#### Suspended solids

- 3.3.6 A water sample at least 2.5L in capacity with messenger and using a 10m line should be collected. Samples should be submitted to HOKLAS accredited laboratory as soon as possible for gravimetric analysis for suspended.

#### Sampler

- 3.3.7 A water sampler is required. It shall comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, which can be effectively sealed with latex cups at both ends. The sampler shall have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (for example, Kahlsico Water Sampler or an approved similar instrument).

#### Water Depth Detector

- 3.3.8 A portable, battery-operated echo sounder shall be used for the determination of water depth at each designated monitoring station. This unit can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

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Salinity

- 3.3.9 A portable salinometer capable of measuring salinity in the range of 0 - 40 parts per thousand (ppt) shall be provided for measuring salinity of the water at each monitoring location.

pH

- 3.3.10 The instrument shall consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It shall be readable to 0.1pH in a range of 0 to 14. Standard buffer solutions of at least pH 7 and pH 10 shall be used for calibration of the instrument before and after use. Details of the method shall comply with APHA, 19<sup>th</sup> ed. 4500-HTB.

Flow Rate Meter

- 3.3.11 A portable, battery-operated flow meter should be used for the determination of water depth at each designated monitoring location and record in m<sup>3</sup>/s. A hand held or meter fixed to the underside of the survey boat may be used.

Sample Containers and Storage

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

Monitoring Position Equipment

- 3.3.13 A hand-held or boat-fixed type digital Differential Global Positioning System (DGPS) with way point bearing indication or other equipment instrument of similar accuracy, shall be provided and used during marine water monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

Calibration of In-Situ Instruments

- 3.3.14 All *in situ* monitoring instruments shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring programme. Responses of sensors and electrodes shall be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.
- 3.3.15 Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

Laboratory Analysis

- 3.3.16 All laboratory work shall be carried out in a HOKLAS accredited laboratory. Water samples of about 1,000 ml shall be collected at the monitoring and control stations for carrying out the laboratory determinations. The determination work shall start within 24 hours after collection of the water samples. The analyses shall follow the standard methods according to APHA Standard Methods for the Examination of Water and Wastewater, 19<sup>th</sup> Edition, or an equivalent method approved by EPD.

**Table 3.1**  
**Methods and Detection Limits for Laboratory Analysis**

<b>Parameter</b>	<b>Recommended Method</b>	<b>Detection Limit</b>
Suspended Solids	APHA 2540 D	0.1 mg/L
Nitrate Nitrogen	APHA 4500-NO <sub>3</sub> <sup>-</sup>	0.01 mg/L
Nitrite Nitrogen	APHA 4500-NO <sub>2</sub> <sup>-</sup>	0.01 mg/L
Ammonia Nitrogen	APHA 4500-NH <sub>3</sub> (D)	0.01 mg/L
Total Inorganic Nitrogen	APHA 4500-N <sub>org</sub>	0.01 mg/L
Total phosphorus	ASTM D515-88B	0.1 mg/L
Chlorpyrifos*	APHA Standard Methods or equivalent	0.5 µg/L
Imazaquin*	APHA Standard Methods or equivalent	0.5 µg/L
Glyphosate*	APHA Standard Methods or equivalent	0.5 µg/L
Oxadiazon*	APHA Standard Methods or equivalent	0.5 µg/L
2,4-D/Mecoprop*	APHA Standard Methods or equivalent	0.5 µg/L
Chlorothalonil*	APHA Standard Methods or equivalent	0.5 µg/L
Mancozeb*	USEPA 8206A	0.5 µg/L
Iprodione*	USEPA 8206A	0.5 µg/L
Fosetyl Aluminum*	APHA Standard Methods or equivalent	0.5 µg/L
Chlorpyrifos*	USEPA 8080 & 8082 SW-846	0.5 µg/L
Fipronil*	APHA Standard Methods or equivalent	0.5 µg/L
Imidachloprid*	APHA Standard Methods or equivalent	0.5 µg/L

Notes:

APHA: American Public Health Association. Standard Methods for the Examination of Water and Wastewater Ed 19  
ASTM: Annual Book of American Society for Testing and Materials Standards, Vol 11.01 & 11.02.

\* : subject to changes

- 3.3.17 ET leader shall liaise with Project Proponent and confirm the type of the pesticide to be applied at the golf course. ET leader shall update the monitoring parameter, detection limit and analytical method accordingly. The ET Leader should report and seek agreement from IC(E), ER and EPD before changing the monitoring parameter.
- 3.3.18 For each of the testing methods, details shall be submitted to the Director of Environmental Protection (DEP) or his representatives for approval prior to the commencement of the monitoring programme. The submitted information should include pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch etc), detection limits and accuracy. The QA/QC details shall be in accordance with requirements of HOKLAS or another internationally accredited scheme. The QA/QC results shall be reported. EPD may request the laboratory to carry out analysis of known standards provided by EPD for quality assurance. Additional duplicate samples may be required by EPD for inter-laboratory calibration. Remaining samples after analysis shall be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or non-standard methods are proposed, details of method verification should, if required, be submitted to the EPD. In any case, sample testing shall have comprehensive quality assurance and quality control programmes. The laboratory shall be prepared to demonstrate the quality control programmes to the EPD or their representative if and when required.

### 3.4 Monitoring Locations

- 3.4.1 The water monitoring locations (Figure 3.1) are summarized in Table 3.2. The status and locations of sensitive receivers may be subject to change, and if so, the ET Leader shall propose updated monitoring locations and seek agreement from the Engineer, IC(E), EPD and AFCD (if required).
- 3.4.2 The ET shall conduct the construction phase water quality monitoring while the Project Proponent shall conduct the operational phase EM&A. Prior to the commencement of the construction EM&A programme, the ET Leader shall discuss and agree with the Engineer, the ET, IC(E), EPD and if required AFCD on the proposed water quality monitoring locations. The Project Proponent or operator of the golf course shall liaise with EPD and if required AFCD on the monitoring requirements during the operational phase.

**Table 3.2**  
**Construction Phase Water Quality Monitoring Locations**

Identification Number	Location	Co-ordinates		Monitoring parameters
		Y	X	
<i>Marine Water (9 stations)</i>				
TTC	Tai Tau Chau Fish Culture Zone	851482	825428	DO, Temp., Turbidity, SS, pH and Salinity (both mid-flood and mid-ebb tides and at three water depths).
KLW	Kai Lung Wan Fish Culture Zone	848994	825499	
KS	Kau Sai Fish Culture Zone	850892	822544	
M_BP	Temporary barging point	851269	825098	
M_RO1	Desalination plant south of the existing pier	849395	828057	Additional parameters are required when the low flow drainage system is not completed include NO <sub>3</sub> -N, NO <sub>2</sub> -N, NH <sub>3</sub> -N, TP and selected pesticides.
M_Marsh	Discharge point at the existing marsh	850639	825810	
M_Coral	Marine water of Port Shelter	851735	824279	
M_A	Water Control Station of Port Shelter	849821	826997	
M_B	Water Control Station of Port Shelter	852643	822470	
<i>Fresh Water (7 stations)</i>				
F_UA, F_DA	Upstream and downstream of stream A	856762 (UA) 850898 (DA)	824317 (UA) 824510 (DA)	DO, Temp., Turbidity, SS and pH (at mid-water depth).
F_UB, F_DB	Upstream and downstream of stream B	851142 (UB) 851132 (DB)	824021 (UB) 824196 (DB)	
F_UC, F_DC	Upstream and downstream of stream C	851339 (UC) 851515 (DC)	823962 (UC) 823688 (DC)	Additional parameters are required when the low flow drainage system is not completed include NO <sub>3</sub> -N, NO <sub>2</sub> -N, NH <sub>3</sub> -N, TP and selected pesticides.
F_Inland M	Downstream of the existing marsh (Inland)	850434	825818	

Note: Monitoring location A (M\_A) can make cross reference to PM4 and Monitoring location B (M\_B) can make cross reference to PM9.

- 3.4.3 When proposed, alternative monitoring locations shall be chosen based on the following criteria:
- at locations close to and preferably at the boundary of the mixing zone of major site activities which are likely to have water quality impacts as indicated in the EIA;
  - close to sensitive receivers which are directly or likely to be affected; and
  - care shall be taken to cause minimal disturbance to the sensitive receivers during monitoring.
- 3.4.4 Control stations are necessary to compare the water quality from potentially impacted sites with the ambient water quality. Control stations shall be located within the same body of water as the impact monitoring stations but shall be outside the area of influence of the works and, as far as practicable, not affected by any other works.

*Site Record*

- 3.4.5 In addition to the water quality parameters for both marine and stream water quality, other relevant data including monitoring location/position, time, weather conditions, sea conditions (where appropriate), tidal stage (where appropriate), special phenomena and work activities at the construction site shall also be measured and recorded. A sample data sheet is shown in Appendix B.

### **3.5 Baseline Monitoring**

- 3.5.1 Baseline conditions for water quality shall be established and agreed upon with EPD prior to commencement of site works. Baseline conditions shall normally be established by measuring the water quality parameters specified in Section 4.2. Measurements shall be taken at all designated monitoring locations including control stations, 3 days per week, for a period of 4 consecutive weeks prior to commencement of works. The interval between of monitoring shall not be less than 36 hours. Baseline monitoring schedule shall be submitted to EPD at least one week prior to commencement of baseline monitoring. The purpose of the baseline monitoring is to establish ambient conditions without any discharge from the Project.
- 3.5.2 There shall be no construction works in the vicinity of the stations during baseline monitoring.
- 3.5.3 In exceptional cases when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from IC(E) and EPD on an appropriate set of data to be used as baseline reference.
- 3.5.4 For marine water quality, where appropriate, measurements shall be taken at both mid-flood and mid-ebb tides and at three water depths (1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth is less than 6 m, in which case 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 status and locations of water sensitive receivers and the marine activities are subject to change, and any necessary changes in the monitoring locations shall be reviewed and approved by IC(E), EPD and if required AFCD before commencement of monitoring.
- 3.5.5 For the stream course, measurements shall be taken at mid-water depth. The status and locations of water sensitive receivers and the works activities may be subject to change, and if so, the ET Leader shall propose with justification for changes to monitoring locations or other requirements of the EM&A water quality monitoring programme, and seek approval from the IC(E), EPD and, if required, AFCD.

### 3.6 Impact Monitoring

- 3.6.1 For construction phase marine monitoring, dredging works for submarine intake and outfall of desalination plant and temporary pier construction would need to be monitored. For land-based constructions monitoring of sensitive streams, it should be carried out. Additional water quality parameters are required to monitor marine and stream water qualities when the permanent low flow drainage system is not yet completed but turf establishment has to be in place during construction phase, monitoring should be also be carried. The proposed permanent low drainage system will be completed in one year. Construction sequence are starting at southern zone (Holes 11-16 between Mar 06 to Jul 06), then northern zone (Holes 3-9 between Jul 06 to Oct 06) and finally (Holes 1, 2, 10, 17, 18 between Oct 06 to Mar 07).
- 3.6.2 During the construction phase of marine and stream works, monitoring shall be undertaken three days per week, at mid-flood and mid-ebb tides, with sampling/measurement at the designated monitoring stations. The interval between 2 monitoring events should not be less than 36 hours. Proposed water quality monitoring schedule shall be submitted to EPD on or before the first day of the monitoring month. EPD shall also be notified immediately for any changes in schedule by fax.
- 3.6.3 During the construction phase, impact monitoring shall be carried out three days per week during the first three months. If exceedances are not record during the three-month period, the monitoring frequency can then be reduced to once per week, with sampling/measurement at the designated monitoring stations. However, the ET Leader should report and seek agreement from IC(E), ER and EPD before changing the monitoring frequency.
- 3.6.4 Upon a completion of all construction activities, a post construction monitoring exercise on marine and stream water qualities shall be carried out. Measurements shall be taken at all designated monitoring locations including control stations, 3 days per week, for a period of 4 consecutive weeks prior to commencement of works. Monitoring location at RO (Fig 3.2) shall be carried out on bi-monthly basis after the post construction monitoring (This is serve supplementary data for the coral monitoring).

### 3.7 Action and Limit Level

- 3.7.1 The water quality criteria, namely Action and Limit levels, are shown in Table 3.3. These criteria should be applied to ensure that any deterioration of water quality is readily detected and timely rectifying action is taken. Should the water quality parameters monitoring results at any designated impact monitoring station exceed the water quality criteria, actions in accordance with the Event and Action Plan in Table 3.4 shall be carried out.

**Table 3.3**  
**Action and Limit Levels for Water Quality Monitoring**

Parameters	Action	Limit
DO in mg L <sup>-1</sup> (Surface, Middle & Bottom)	<b>Marine Water</b> <u>Surface and Middle</u> 5 percentile of baseline data for surface and middle layer <u>Bottom</u> 5 percentile of baseline data for bottom layer	<b>Marine Water</b> <u>Surface and Middle</u> 1 percentile of baseline data for surface and middle layer or 5 mg/L for FCZs <u>Bottom</u> 1 percentile of baseline data for bottom layer or 2 mg/L for FCZs
DO in mg L <sup>-1</sup> (mid-depth)	<b>Inland Water</b> 5 percentile of baseline data	<b>Inland Water</b> 4 mg/L

Parameters	Action	Limit
SS in mg L <sup>-1</sup> (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Turbidity in NTU (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Salinity in ppt (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Ammonia Nitrogen (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Nitrate Nitrogen (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Nitrite Nitrogen (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
TIN in mg L <sup>-1</sup> (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Total Phosphate in mgL <sup>-1</sup> (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Pesticides in µg/L <sup>-1</sup> (depth-averaged)	Level of detection limit	Level of detection limit
Chlorpyrifos*	Level of detection limit	Level of detection limit
Imazaquin*	Level of detection limit	Level of detection limit
Glyphosate*	Level of detection limit	Level of detection limit
Oxadiazon*	Level of detection limit	Level of detection limit
2,4-D/Mecoprop*	Level of detection limit	Level of detection limit
Chlorothalonil*	Level of detection limit	Level of detection limit
Mancozeb*	Level of detection limit	Level of detection limit
Iprodione*	Level of detection limit	Level of detection limit
Fosetyl Aluminum*	Level of detection limit	Level of detection limit

Notes:

1. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
  2. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
  3. All figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.
  4. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
- \* Monitored pesticides are subjected to change. For any pesticides being monitored, the AL and LL should be less than the level of detection limit

**Table 3.4**  
**Event and Action Plan for Water Quality**

Event	ET Leader	IC(E)	Engineer	Contractor
<b>ACTION LEVEL</b>				
Action level being exceeded by one sampling day	Repeat <i>in situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IC(E) and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E) and Contractor; Repeat measurement on next day of exceedance.	Discuss mitigation measures with ET and Contractor ; Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; Assess effectiveness of implemented mitigation measures.	Discuss proposed mitigation measures with IC(E); Make agreement on mitigation measures to be implemented. Assess effectiveness of the implemented mitigation measures.	Inform the Engineer and confirm in writing notification of the non-compliance; Rectify unacceptable practice; Check all plant and equipment; Consider changes in working methods; Discuss with ET and IC(E) and propose mitigation measures to IC(E) and Engineer; Implement agreed mitigation measures.
Action level being exceeded by more than two	Repeat <i>in situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of	Discuss mitigation measures with ET and Contractor ; Review proposals on mitigation	Discuss the proposed mitigation measures with IC(E); Make agreement on mitigation measures	Inform Engineer and confirm in writing notification of the non-compliance; Rectify unacceptable



Event	ET Leader	IC(E)	Engineer	Contractor
consecutive sampling days	impact; Inform IC(E) and Contractor; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E) and Contractor; Ensure mitigation measures are implemented; Prepare to increase to daily monitoring; Repeat measurement on next day of exceedance.	measures submitted by Contractor and advise the Engineer accordingly; Assess effectiveness of implemented mitigation measures.	to be implemented; Assess effectiveness of implemented mitigation measures.	practice; Check all plant and equipment; Consider changes in working methods; Discuss with ET and IC(E) and propose mitigation measures to IC(E) and Engineer within three working days; Implement agreed mitigation measures.
<b>LIMIT LEVEL</b>				
Limit level being exceeded by one sampling day	Repeat <i>in situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IC(E) Contractor and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E), Engineer and Contractor; Ensure mitigation measures are implemented; Increase to daily monitoring until no exceedance of Limit level.	Discuss mitigation measures with ET and Contractor; Review proposals on mitigation measures submitted by Contractor and advise the Engineer accordingly; Assess effectiveness of implemented mitigation measures.	Discuss proposed mitigation measures with IC(E), ET and Contractor; Request Contractor to critically review the working methods; Make agreement on mitigation measures to be implemented; Assess effectiveness of implemented mitigation measures.	Inform Engineer and confirm in writing notification of the non-compliance; Rectify unacceptable practice; Check all plant and equipment; Consider changes in working methods; Discuss with ET, IC(E) and Engineer and propose mitigation measures to IC(E) and Engineer within three working days; Implement agreed mitigation measures.
Limit level being exceeded by more than two consecutive sampling days	Repeat <i>in situ</i> measurement to confirm findings; Identify reasons for non-compliance and source(s) of impact; Inform IC(E), Contractor and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E), Engineer and Contractor; Ensure mitigation measures are implemented; Increase to daily monitoring until no exceedance of Limit level for two consecutive days.	Discuss mitigation measures with ET and Contractor; Review proposals on mitigation measures submitted by Contractor and advise Engineer accordingly; Assess effectiveness of implemented mitigation measures.	Discuss proposed mitigation measures with IC(E), ET and Contractor; Request Contractor to critically review working methods; Make agreement on mitigation measures to be implemented; Assess effectiveness of implemented mitigation measures; Consider and if necessary instruct Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit	Inform Engineer and confirm in writing notification of the non-compliance; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Discuss with ET, IC(E) and Engineer and propose mitigation measures to IC(E) and Engineer within three working days; Implement agreed mitigation measures; As directed by the Engineer, slow down or stop all or part of the

Event	ET Leader	IC(E)	Engineer	Contractor
			level.	construction activities until no exceedance of Limit level.

### 3.8 Operation Phase Monitoring

3.8.1 Monitoring and auditing for marine and freshwater qualities are necessary during the operation phase of the proposed third golf course. This is to ensure the compliance of water quality to relevant WQO standards at Port Shelter, EPD guideline values and discharge standards. The monitoring programme would be required to ensure the implementation of recommended water quality mitigation measures proposed in the EIA report, to assess the effectiveness of these measures and to identify any further need for the additional mitigation measures or remedial action during operation phase of the third golf course. This is the preliminary operation phase EM&A requirement. A 2-year of monitoring period for the operation phase is proposed. A review shall be conducted 2 months before the completion of the 2-year monitoring programme by the Project Proponent to determine whether such monitoring shall be continued. Monitoring should be carried out on bi-weekly basis for the first 12 months, after when the frequency will be reviewed. The review results shall be submitted to EPD, AFCD (if required) and all the relevant parties. Any amendment on the monitoring programme shall be agreed by EPD and if required AFCD.

#### *Marine Water Quality*

3.8.2 The Project Proponent shall carry out the operation phase marine water quality monitoring. The following is the general guidelines based on the existing golf course EM&A manual. During the operation phase, water quality monitoring programme shall include the following three tasks:

- Marine water quality monitoring;
- Effluent monitoring from desalination plant; and
- Water quality monitoring at marine sensitive receivers.

#### *Effluent Quality for the Desalination Plant*

3.8.3 It is proposed that effluent from the proposed desalination plant under normal operation be monitored. Samples shall be taken from 1m below the surface to ensure that the surface scum is not included in the sample. Parameters to be monitored include pH, temperature, turbidity, suspended solids, DO and salinity discharged from the desalination plant. A valid discharge licence shall be obtained from EPD prior to the discharge of effluent from the desalination plant, and the monitoring frequency, locations and parameters specified in the discharge licence shall be fully considered during the monitoring.

3.8.4 In addition, the outfall of desalination plant shall be monitored at the designated location (RO) as shown in Figure 3.2 at least once every 2 weeks during the first 3 months after commissioning of the desalination plant. Monitoring frequency after then should be agreed with EPD. During the operation phase of the desalination plant, the final effluent before discharge via the submarine outfall should be monitored against the effluent discharge standard as given in the discharge licence under the Water Pollution Control Ordinance (WPCO). ECD of EPD should be consulted in advance for settling limits for future desalination plant.

3.8.5 The effluent results reflect whether the effluent quality is in compliance with the discharge licence requirements. In case of non-compliance, suitable actions shall be undertaken to notify the plant operator of the non-compliance and to identify the sources of exceedance. The

operating conditions of the treatment systems shall be investigated. Corrective and remedial actions shall be implemented to improve the effluent quality. The monitoring team shall also increase monitoring frequency until the effluent quality is in compliance with the discharge licence requirements. All non-compliance and propose preventive measures shall be documented.

*Marine and Stream Water Quality Monitoring (including lakes and existing reservoir)*

- 3.8.6 The water monitoring locations (Figure 3.2) are summarized in Table 3.5. The status and location of sensitive receiver may change after issuing this manual. If such cases exist, the Project Proponent shall propose updated monitoring locations and seek agreement from the EPD and AFCD (if required) two months before monitoring.

**Table 3.5**  
**Operation Phase Water Quality Monitoring Locations**

Identification Number	Location	Co-ordinates		Monitoring parameters
		Y	X	
<i>Marine Water (9 stations)</i>				
TTC	Tai Tau Chau Fish Culture Zone	851482	825428	pH, temperature, DO, SS, turbidity, salinity, nitrate nitrogen (NO <sub>3</sub> -N), nitrite nitrogen (NO <sub>2</sub> -N), ammonia nitrogen (NH <sub>3</sub> -N), total phosphate (TP), Chlorophyll-a and specific pesticides.
KLW	Kai Lung Wan Fish Culture Zone	848994	825499	
KS	Kau Sai Fish Culture Zone	850892	822544	
M_RO1	Desalination plant south of the existing pier	849395	828057	
M_RO2	Desalination plant north of the existing pier	849198	828290	
M_Marsh	Discharge point at the existing marsh	850639	825810	
M_Coral	Marine water of Port Shelter	851735	824279	
M_A	Water Control Station of Port Shelter	849821	826997	
M_B	Water Control Station of Port Shelter	852643	822470	
<i>Fresh Water (6 stations)</i>				
F_DA	Upstream and downstream of stream A	850898 (DA)	824510 (DA)	pH, temperature, DO, SS, turbidity, salinity, nitrate nitrogen (NO <sub>3</sub> -N), nitrite nitrogen (NO <sub>2</sub> -N), ammonia nitrogen (NH <sub>3</sub> -N), total phosphate (TP), Chlorophyll-a and specific pesticides.
F_DB	Upstream and downstream of stream B	851132 (DB)	824196 (DB)	
F_DC	Upstream and downstream of stream C	851515 (DC)	823688 (DC)	
F_Inland M	Downstream of the existing marsh (Inland)	850434	825818	
F_lake 1D	Irrigation Lake 1D	851450	824498	
F_Filter	Filter effluent point at Hole 5	-	-	

Note: Monitoring location A (M\_A) can make cross reference to PM4 and Monitoring location B (M\_B) can make cross reference to PM9.

- 3.8.7 The parameters to be monitored under the water quality monitoring programme shall include pH, temperature, DO, SS, turbidity, salinity, nitrate nitrogen (NO<sub>3</sub>-N), nitrite nitrogen (NO<sub>2</sub>-N), ammonia nitrogen (NH<sub>3</sub>-N), total phosphate (TP), Chlorophyll-a and specific pesticides. The typical types of pesticides to be applied at the golf course will be decided by the Project Proponent before commencement of the golf course operation. Project Proponent shall update the monitoring parameters, detection limits and analytical methods accordingly. The ET Leader

- should report and seek agreement from IC(E), ER and EPD before changing the monitoring parameter.
- 3.8.8 Frequency of the water monitoring programme should be on bi-weekly basis and should cover the effects of different tidal status (at least one for high tide and one for low tide) for marine quality monitoring.
- 3.8.9 Other relevant data including monitoring location/position, time, water depth, temperature, weather conditions and any special phenomena or work underway at the golf course shall also be recorded.
- 3.8.10 Additional duplicate samples may be required by EPD for inter-laboratory calibration. Remaining samples after analysis shall be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or non-standard methods are proposed, details of method verification may also need to be submitted to EPD. In any case, the sample testing shall have comprehensive quality assurance and quality control programmes. The laboratory shall be prepared to demonstrate the programme to the DEP or his representatives when so requested.
- 3.8.11 The post construction monitoring data for marine and stream water qualities shall be used as the baseline values during the operation phase of the proposed third golf course. Guideline value from the existing golf course shall be used for the irrigation lake 1D and existing reservoir during the first 6 months of operation phase as shown in the Table 3.6.

**Table 3.6**  
**Water Quality Monitoring Guideline for proposed third golf course**  
**(applicable to irrigation lake 1D and existing reservoir)**

Parameter (mg/L unless stated)	Guideline value
pH	6.0-9.0 <sup>(1)</sup>
Turbidity (NTU)	-
Dissolved Oxygen	>4 <sup>(1)</sup>
Chlorophyll a (mg/m <sup>3</sup> )	<5 <sup>(1)</sup>
Nitrate N	0.20 <sup>(1)</sup>
Nitrite N	0.20 <sup>(1)</sup>
Ammoniacal N	0.50 <sup>(1)</sup>
Total Kjeldahl N	1.2 <sup>(2)</sup>
Total Phosphate	0.1 <sup>(1)</sup>
Ortho Phosphate	0.05 <sup>(1)</sup>
Conductivity (µS/cm)	<1000 <sup>(1)</sup>

Note: (1) These values are based on professional judgement and knowledge

(2) Based on 90<sup>th</sup> percentile of operational phase monitoring data (1996 to June 1998)

### 3.9 Action and Limit Level

- 3.9.1 The Action and Limit levels for (i) irrigation lake 1D and existing reservoir and (ii) marine and stream water qualities are shown in Table 3.7 and Table 3.8 respectively. These criteria should be applied to ensure that any deterioration of water quality is readily detected and timely rectifying action is taken.

**Table 3.7**  
**Action and Limit Levels for Water Quality Monitoring**  
**(applicable to irrigation lake 1D and existing reservoir)**

Parameter (mg/L unless stated)	Action and Limit Levels
pH	6.0-9.0 <sup>(1)</sup>
Turbidity (NTU)	-
Dissolved Oxygen	>4 <sup>(1)</sup>
Chlorophyll a (mg/m <sup>3</sup> )	<5 <sup>(1)</sup>
Nitrate N	0.20 <sup>(1)</sup>
Nitrite N	0.20 <sup>(1)</sup>
Ammoniacal N	0.50 <sup>(1)</sup>
Total Kjeldahl N	1.2 <sup>(2)</sup>
Total Phosphate	0.1 <sup>(1)</sup>
Ortho Phosphate	0.05 <sup>(1)</sup>
Conductivity (µS/cm)	<1000 <sup>(1)</sup>

Note: (1) These values are based on professional judgement and knowledge

(2) Based on 90<sup>th</sup> percentile of operational phase monitoring data (1996 to June 1998)

**Table 3.8**  
**Action and Limit Levels for Water Quality Monitoring**  
**(applicable to stream and marine water qualities)**

Parameters	Action	Limit
DO in mg L <sup>-1</sup> (Surface, Middle & Bottom)	<b>Marine Water</b> <u>Surface and Middle</u> 5 percentile of baseline data for surface and middle layer <u>Bottom</u> 5 percentile of baseline data for bottom layer	<b>Marine Water</b> <u>Surface and Middle</u> 1 percentile of baseline data for surface and middle layer or 5 mg/L for FCZs <u>Bottom</u> 1 percentile of baseline data for bottom layer or 2 mg/L for FCZs
DO in mg L <sup>-1</sup> (mid-depth)	<b>Inland Water</b> 5 percentile of baseline data	<b>Inland Water</b> 4 mg/L
SS in mg L <sup>-1</sup> (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Turbidity in NTU (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Salinity in ppt (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Ammonia Nitrogen (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Nitrate Nitrogen (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Nitrite Nitrogen (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
TIN in mg L <sup>-1</sup> (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Total Phosphate in mgL <sup>-1</sup> (depth-averaged)	95 percentile of baseline data	99 percentile of baseline data
Pesticides in µg/L <sup>-1</sup> (depth-averaged)	Level of detection limit	Level of detection limit
Chlorpyrifos*	Level of detection limit	Level of detection limit
Imazaquin*	Level of detection limit	Level of detection limit
Glyphosate*	Level of detection limit	Level of detection limit
Oxadiazon*	Level of detection limit	Level of detection limit
2,4-D/Mecoprop*	Level of detection limit	Level of detection limit
Chlorothalonil*	Level of detection limit	Level of detection limit
Mancozeb*	Level of detection limit	Level of detection limit
Iprodione*	Level of detection limit	Level of detection limit
Fosetyl Aluminum*	Level of detection limit	Level of detection limit
Chlorpyrifos*	Level of detection limit	Level of detection limit

Notes:

1. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
  2. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
  3. All figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.
  4. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
- \* Monitored pesticides are subjected to change. For any pesticides being monitored, the AL and LL should be less than the level of detection limit

3.9.2 Action and limit levels for parameters sampled in the proposed lake, existing reservoir, marine and stream water shall be reviewed after the first 6 months of monitoring. Project proponent shall liaise with EPD (or AFCD if necessary) to confirm the action and limit level is still applicable.

### **3.10 Event and action plan**

3.10.1 Should monitoring results of the water quality parameters at any designated monitoring station exceed the water quality criteria, action the proposed actions to be taken shall be as follows:

- inform Golf Course Manager immediately and stop chemical application;
- notify EPD/AFCD;
- review the application and re-evaluate suitability and availability of alternatives to chemical controls, etc.;
- agree remedial measures with Golf Course Manager and inform EPD/AFCD;
- implement the agreed remedial measures immediately; and
- increase monitoring frequency and/or locations to demonstrate effectiveness of the remedial measures.

## **4. ECOLOGY**

### **4.1 Introduction**

4.1.1 The EIA stipulated that EM&A for ecology should be undertaken throughout the construction phase and during the early part of the operation phase of the project to ensure that all mitigation measures are fully complied with. In particular, the objectives of the design audit shall be to ensure that the design process clearly implements the design for ecological mitigation specified in the EIA Report and to ensure that such designs are ecologically feasible and effective. The construction and operational EM&A objectives shall be to ensure that the ecological contract works and construction mitigation procedures recommended are carried out as specified and are effective. The construction and operational phases EM&A will be carried out as part of the site audit programme.

4.1.2 As stated in Annex 16 of the EIA-TM, the purpose of ecological monitoring of the audit are:

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

4.1.3 In general, the performance of monitoring and audit from an ecological prospective will need to be integrated with the overall monitoring and audit plan for the project as a whole. The commencement and program of the engineering works would enable the ecological monitoring program to be prepared based on seasonality factors.

### **4.2 Ecological Mitigation Measures and Implementations**

4.2.1 Some of the proposed works are located on or near sensitive ecological habitats and/or rare or protected flora and fauna species which will need protection.

4.2.2 Design for ecological mitigation specified in the EIA will be incorporated into the final layout plan of the Project. Ecological specifications including establishment of stream buffer zones will be detailed as part of the final layout plan. The final ecological specifications and designs shall be provided to the contractors.

4.2.3 Mitigation measures required for the Project to minimise ecological impacts and to preserve ecological resources will be recommended by the EIA and specified in the Environmental Permit.

4.2.4 Ecological mitigation measures to be implemented during the construction phase include the following:

- Establishment of buffer zones for the natural stream courses during both construction and operational phase.
- Provision of temporary bypass channels or pipes during construction phase for stream courses subject to pipe culverting.
- Protection of water quality of the natural stream courses and temporary bypass channels or pipes.

- Transplantation of coral colonies within the dredging area for the desalination plant.
  - Avoidance of corals when the anchoring points are deployed, and to shift the floating temporary barging point to the location with least corals within the mapping area.
  - Regular site audit of ecological mitigation measures and good site practice.
- 4.2.5 The boundaries of the buffer zones for the natural stream courses will be illustrated in the final layout plan. The buffer zones will be demarcated prior to the commencement of any construction works using flagging and signage to direct the fence installers where to install the fence (Figure 4.1). The buffer zones will be fenced using chain-link fence. There will be no encroachment within the buffer zones. Special caution will be paid at locations for crossings. Buffer zone boundaries will be regularly checked to ensure works are not exceeded and that no damage occurs to the buffer zones. Should buffer zones be encroached (even only once), the fencing at and within 30 m in either direction from the site of encroachment will be replaced with sheet-piling to serve as a physical barrier to personnel, equipment, and sediment.
- 4.2.6 Some sections of stream courses will be routed through culverts at locations of crossings, or into constructed underground channels beneath the fairways. Prior to construction works, temporary bypass channels or pipes will be provided to divert the flow at the sections of natural stream courses to be culverted for crossings or underground channels. The flow will be restored to the original paths and the bypass channels or pipes will be removed after the construction works are finished.
- 4.2.7 Water quality in the natural stream courses and temporary bypass channels or pipes must be protected from sedimentation and pollution by good site practices. Earthworks near natural stream courses should be scheduled to avoid the wet season as far as possible, in particular the period from May to June, which is the key breeding period for aquatic fauna including shrimps.
- 4.2.8 Site runoff should be directed towards regularly cleaned and maintained silt traps and oil/grease separators to minimise the risk of sedimentation and pollution of stream water. The silt and oil/grease separators should be appropriately designed for the local drainage and ground conditions. Temporary drainage systems would be established on different parts of the construction areas in order to reduce the sedimentation of the stream courses.
- 4.2.9 Areas of exposed soil should be minimised to reduce the extent of soil erosion. Spoil heaps should be covered at all times to minimise erosion. Stockpiled materials shall be stored down-gradient from any stream course or up-gradient with a suitably constructed barrier to prevent loss of materials to the stream.
- 4.2.10 For all haulage roads, temporary bridges shall be used to cross all preserved streams and no contact shall be made with the preserved stream or its riparian vegetation.
- 4.2.11 The permanent bridges at Stream A and C would be supported by piers behind the stream banks and would not encroach the stream beds or the stream banks.
- 4.2.12 79 coral colonies were found within the mapping area which covered the dredging area for the desalination plant, all are common in Hong Kong, small in size, and of low ecological value. Prior to the construction works for the desalination plant, the 79 coral colonies within the mapping area will be transplanted to a nearby transplantation site as specified in the EIA (see Figure 4.2).
- 4.2.13 All anchoring points/structures of the floating pier would be located on the shore and/or at least 40m seaward to avoid the coral colonies. The location of the floating pier would be shifted from



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the original location for barging point at Zone 2 and Zone 3 of the mapping area in Site B2, to Zone 5 to further protect corals. Impacts to corals are not expected.

4.2.14 General good site practice will also serve to minimise ecological impacts and disturbance to wildlife.

- All contractors must be notified that introduction of dogs to the island is not allowed and the contractor will be held liable for capture and removal of any dogs or other domestic animals introduced to the island by any of the works personnel.
- Equipment or stockpiles should be placed in works areas only.
- Access routes should be selected on works areas only to minimise disturbance to natural habitats.
- Construction activities should be restricted to works areas that should be clearly demarcated.
- General drainage arrangements should include sediment and oil traps to collect and control construction site run-off.
- Waste skips should be provided to collect general refuse and construction wastes. The wastes should be disposed of timely and properly off-site.
- Open burning on works sites is illegal, and should be strictly prohibited. Temporary fire fighting equipment should be provided in the work areas particularly near stream buffer zones.

4.2.15 The objective of compensatory planting is to mitigate for vegetation loss. As far as possible landscape and compensatory planting should use native plants which bear flowers/fruits attractive to wildlife. The ratio of compensation should follow the mitigation measures specified in the EIA.

### **4.3 Monitoring and Audit for Ecology**

4.3.1 EM&A for ecology would be undertaken throughout the construction and operational phases of the project to ensure compliance with all mitigation measures. The construction and operation EM&A objectives shall be to ensure that the ecological contract works and construction mitigation procedures recommended are carried out as specified and are effective. The construction and operation phase EM&A will be carried out as part of the site audit programme.

4.3.2 As stated in Section 5.5 of Annex 16 of the EIA-TM, the purposes of ecological monitoring and audit programme are:

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

4.3.3 The proper implementation of mitigation measures recommended in the EIA report should be routinely audited during the construction and operational phases of the project.

4.3.4 Construction phase ecological EM&A will check the implementation of the ecological mitigation measures and the ecology contract works, together with auditing the effectiveness of mitigation.

4.3.5 Operation phase EM&A will continue to audit the effectiveness of mitigation measures. The operation phase EM&A shall be undertaken during the Contractor's one-year maintenance period.

- 4.3.6 Ecological monitoring and audit must be integrated with the overall EM&A plan for the project as a whole. The program of the engineering works would enable the ecological monitoring program to be prepared with reference to seasonality, which might influence the frequency or intensity of monitoring sessions. For example, should the programme for earthworks overlap part of a wet season, more frequent monitoring could be warranted during that overlap period to ensure the effectiveness of stream buffer zones.
- 4.3.7 The ecological EM&A programme during construction and operation will be implemented as set out in this manual. Three major components shall be included and samples and measurements shall be taken as set out in the this manual.
- (i) Baseline survey;
  - (ii) Construction phase monitoring; and
  - (iii) Operational phase monitoring

#### ***Baseline Survey***

- 4.3.8 Before commencement of any works on site, or any setting out of works or storage areas, the baseline surveys should be conducted. Baseline survey will consist of a walk-over survey. Special attention should be paid to ecologically sensitive streams to ensure minimum damage to existing vegetation and streams. It may be necessary to rope off and protect specific habitats (e.g. natural stream courses) or species of special interest identified during the EIA study or during the walk-over surveys. The purpose of the baseline survey will be to confirm the pre-works ecological conditions, with reference to the written descriptions and habitat maps included in the EIA Report.
- 4.3.9 Prior to the commencement of all construction works, a baseline survey of natural corals would be conducted. At each of the Site C, B2, Site D2 (on the bedrock 80m to the south of the existing ferry pier)(Figure 4.3) and a Control Site near the AFCD's Coral Buoy at Sharp Island (Figure 4.4), 20 selected natural coral colonies would be tagged by the marine ecologist(s) to be approved by AFCD. Each of the tagged coral colonies will be identified to species level and photographed. Information on location, size and general condition of the surrounding environment will be recorded. Other information shall also be recorded such as the survey date, time, climate, sea and tidal conditions. Photos of the tagged corals would be used for AFCD approval on coral selection. No less than 15 colonies would be selected for monitoring. Priority shall be given to the largest and undamaged colonies as those colonies are likely to be more prone to sedimentation. Tags on the excluded coral colonies will be removed at the first impact monitoring. Seagrass beds were discovered at Site D3 during the EIA study (200 m south of the existing pier, at the estuary of Stream D). A baseline survey will also be conducted for seagrass at site D3 before the commencement of any construction works. The extent of the seagrass beds, the coverage percentage and health conditions of seagrasses will be recorded. Site D2 will also be checked for the presence of seagrass individuals during the baseline monitoring. If seagrasses are also found in Site D2 in the baseline monitoring, the monitoring programme on seagrasses during construction and operation phases will expand to cover seagrasses at Site D2.

#### ***Construction and Operation Phase EM&A***

- 4.3.10 The implementation of mitigation measures and ecology contract works, the Contractor's compliance with the project's environmental performance requirements, and the effectiveness of site mitigation measures during both construction and operation will be monitored and audited as detailed in the EP by the EM&A programme. Detailed monitoring plans shall be developed and agreed prior to commencement of construction works.

- 4.3.11 The ecological monitoring and auditing will be conducted by a qualified ecologist(s) who has a suitable background in natural history and a professional qualification in ecology or botany, and to be approved by AFCD. The mitigation measures shall be audited as part of the site audit programme.

**Table 4.1**  
**Monitoring and Audit during the Construction Phase and the Mitigation Measures**

Monitoring parameter	Frequency/Duration and/or responses
<p>Checking the intactness of buffer zones for streams</p> <p>Monitoring the compliance of operators in protecting demarcated areas.</p> <p>Checking for other unauthorised clearing, trampling etc.</p> <p>Checking the site for introduced dogs or other domestic animals</p>	<p>Once per week during construction phase.</p> <p>Any encroachment onto the stream buffer zones will be promptly reported to the ER/ET and corrective measures will be implemented immediately.</p> <p>Unauthorized encroachment onto natural vegetation will be promptly reported to the ET/ER. Affected soils or other substrates will promptly be restored to pre-disturbance contours and hydroseeded. If shrubs or trees are damaged, native shrubs and/or trees will be replanted to compensate for losses.</p> <p>Introduced dogs or other domestic animals will be immediately removed from the island or surrendered to the golf course superintendent for subsequent transfer to AFCD personnel.</p>
<p>Checking the conditions of the water in the streams, temporary bypass channels or pipes, and construction sites for all stream crossings.</p>	<p>Contractor shall inspect all construction sites for potential erosion, sedimentation, and visible pollution (i.e. hydrocarbon sheen) in streams/channels once a week and after Amber, Red or Black Rain Storm event, Cyclone and Typhoon Warnings as announced by the Hong Kong Observatory.</p> <p>Additional measures to prevent erosion and run off by contractor before the onset of rainfall include installation of additional sediment traps at appropriate locations by contractor as determined by the ET/ER.</p> <p>When hydrocarbon pollution is detected, the source should be discovered and removed. Visual inspection should be undertaken daily for 3 days or until the visible sheen is not present at the affected stream.</p> <p>Besides the regular water quality monitoring for stream courses (at mid-water depth at both the upstream and downstream locations of Stream A, B &amp; C, at least once a week upon the completion of all construction activities, see Water Quality section of this manual), stream crossings and related temporary bypass channels or pipes shall be inspected weekly to ensure stream banks are protected from disturbance and streams are protected from sedimentation.</p>
<p>Monitoring aquatic fauna</p>	<p>Streams B, C, and D will be monitored monthly during the construction phase to determine the status of <i>Caridina trifasciata</i> (shrimp) and <i>Nanhaipotamon hongkongensis</i> (freshwater crab). Stream condition will be recorded with reference to the protective buffer zone. Encroachment onto the buffer zone will be reported to the ER/ET. Sheet piling will be</p>

Monitoring parameter	Frequency/Duration and/or responses
	installed at the buffer zone perimeter as needed to prevent further encroachment. Stream sedimentation will be reported to the ER/ET, the agent causing sedimentation will be discovered, and sedimentation will be stopped.
Fuel or chemical spill.	<p>Immediate bunding of spill by Contractor.</p> <p>Ensure remedial measures (including cleanup of the spill, inspection of other chemical storage sites, and review of the handling procedures for chemicals) properly implemented.</p> <p>Monitoring of spill and drainage channel/ waterway (if present) for contaminants. Daily for five days after incidents.</p> <p>Assessment of the spill and further action as determined by the ER/ET.</p>
Stream buffer zones Temporary bypass channels or pipes New constructed underground channels	Audit compliance once at the end of the contract.
Transplanted corals	The transplanted coral colonies will be regularly checked by qualified marine ecologist(s) to be approved by AFCD quarterly for 1 year after transplantation. The presence, survival, and health conditions of the transplanted coral colonies will be recorded by the number on the plastic tags. The general conditions of the transplantation sites will also be reported.
Natural corals	<p>All coral monitoring works should be conducted by experienced marine ecologist(s) to be approved by AFCD. Natural corals would be monitored as a precautionary measure. Prior to the commencement of all construction works, a baseline monitoring on natural corals would be conducted. At each of the Site C, B2, Site D2 (on the bedrock 80m south of the existing ferry pier) and a Control Site near AFCD's Coral Buoy at Sharp Island, 20 selected natural coral colonies would be tagged by the marine ecologist(s) to be approved by AFCD. Each of the tagged coral colonies shall be identified to species level and photographed. Information on location, size and general condition of the surrounding environment will be recorded. Other information shall also be recorded such as the survey date, time, climate, sea and tidal conditions. Photos of the tagged corals would be used for AFCD approval on coral selection. No less than 15 colonies would be selected for monitoring. Priority will be given to the largest and undamaged colonies because those colonies are likely to be more susceptible to impacts of sedimentation. Tags on the excluded coral colonies will be removed at the first impact monitoring.</p> <p>Impact monitoring frequencies would be changed at different stages. For the natural colonies at Site D2 (on the bedrock) and the Control Site, monitoring will be conducted weekly at the first two weeks of dredging works for the desalination plant pipelines. If no exceedance was recorded, the monitoring schedule would be changed to biweekly till the pipeline construction works are finished. The presence, survival, and health conditions of the coral colonies will be recorded. For the natural colonies at Site C, B2 and the Control Site, monitoring will be conducted monthly for the first three months of the construction phase. If no exceedance was recorded, the monitoring schedule would be changed to quarterly during the rest of the construction phase. For each monitored coral colony, the percent of sediment coverage, the colour and the thickness of the</p>

Monitoring parameter	Frequency/Duration and/or responses
	sediment, the bleaching effect and live/dead ratio (the health status of coral colony) shall be recorded. The action and limit level for the monitoring and the Event Action Plan are provided in Table 4.3 below.
Seagrass	Seagrasses at Site D3, and at Site D2 (if seagrasses was found at Site D2 during the baseline monitoring), would be monitored in conjunction with the coral monitoring at Site D2 (natural corals on bedrock). The construction phase monitoring schedule would be the same as for coral monitoring at Site D2, weekly during the first two weeks of dredging works, and then biweekly till the pipeline construction works are finished. The extent of the seagrass beds, the coverage percentage and health conditions of seagrasses will be recorded. As the natural coral colonies to be monitored at Site D2, which will have an Event Action Plan as present in the EM&A Manual, would be closer to the desalination than the seagrass beds, no action and limit level for seagrasses would be required.

**Table 4.2**  
**Monitoring and Audit during the Operation Phase and the Mitigation Measures**

Monitoring parameter	Frequency/Duration and/or responses
Natural corals	Monitoring of the natural colonies at Site C, Site D2 (on the bedrock 80m south of the existing pier) and the Control Site, would be conducted during the first two years of the operation phase. The monitoring schedule during the first three months would be monthly. If no exceedance was recorded, the monitoring schedule would be changed to semi-annually, i.e. once in dry season and once in wet season. The survival, and health conditions of the coral colonies will be recorded. For each monitored coral colony, the percent of sediment coverage, the colour and the thickness of the sediment, the bleaching effect and live/dead ratio (the health status of coral colony) shall be recorded. The need of any further monitoring will be reviewed according to the monitoring results after the second year monitoring. All tags on the monitored corals must be removed after the monitoring. The action and limit level for the monitoring and the Event Action Plan are provided in Table 4.3 below.
Seagrass	During operation phase, the seagrass monitoring would be conducted in conjunction with the coral monitoring at Site D2 (natural corals on bedrock). Seagrasses at Site D3, and at Site D2 (if seagrasses was found at Site D2 during the baseline monitoring), would be monitored during the first two years of the operation phase. The monitoring schedule during the first three months would be monthly. After that, the monitoring schedule would be changed to semi-annually, i.e. once in dry season and once in wet season. The extent of the seagrass beds, the coverage percentage and health conditions of seagrasses will be recorded. As the natural coral colonies to be monitored at Site D2, which will have an Event Action Plan as present in the EM&A Manual, would be closer to the desalination than the seagrass beds, no action and limit level for seagrasses would be required. The need of any further monitoring will be reviewed according to the monitoring results after the second year monitoring.

**Table 4.3 Action and Limit level and Event Action Plan for natural corals monitoring**

<b>Parameters</b>	<b>Action Level</b>	<b>Limit Level</b>
Sedimentation	a 15% increase in the percentage of sedimentation on the hard corals occurs at more than 20% of the tagged coral colonies at one or more monitoring sites	a 25% increase in the percentage of sedimentation on the hard corals occurs at more than 20% of the tagged coral colonies at one or more monitoring sites
Bleaching	a 15% increase in the percentage of bleaching of hard corals occurs at more than 20% of the tagged coral colonies at one or more monitoring sites	a 25% increase in the percentage of bleaching of hard corals occurs at more than 20% of the tagged coral colonies at one or more monitoring sites
Mortality	a 15% increase in the percentage of partial mortality of corals occurs at more than 20% of the tagged coral colonies at one or more monitoring sites	a 25% increase in the percentage of partial mortality of corals occurs at more than 20% of the tagged coral colonies at one or more monitoring sites

<b>Action</b>	<b>Action Level</b>	<b>Limit Level</b>
Construction phase	If the Action Level is exceeded the ET Leader should inform all parties (Contractor, Project Proponent, EPD, AFCD and IEC). The data from the water quality monitoring should also be reviewed. If the water quality monitoring shows no attributable effects of the installation works, then the Action Level is not triggered. If the water quality data indicate exceedances (for SS and/or turbidity) the ET Leader should discuss with the Contractor the most appropriate method of reducing suspended solids during dredging (e.g. reduce the rate of dredging), and/or control sedimentation during earth works (e.g. check the intactness and effectiveness of the temporary drainage system and stream buffer zone). This mitigated method should then be enacted on the next working day.	If the Limit Level is exceeded the ET Leader should inform all parties (Contractor, Project Proponent, EPD, AFCD and IEC) immediately. Should the Limit Level be exceeded, the contractor should stop dredging and/or earth works immediately and work out the solution according to the requirements of EPD and AFCD. The ET Leader should inform the Contractor to suspend dredging and/or earth works until an effective solution is identified. Once the solution has been identified and agreed with all parties dredging and/or earth works may commence
Operation phase	If the Action Level is exceeded the ET Leader should inform Golf Course Operator, EPD, and AFCD. The data from the water quality monitoring should also be reviewed. If the water quality monitoring shows no attributable effects of the installation works, then the Action Level is not triggered. If the water quality data indicate exceedances (salinity and/or pesticides) the ET Leader should discuss with the Golf Course Operator the most appropriate method of reducing salinity (e.g. reduce the daily operation time of the desalination plant), and/or control chemicals from runoff (e.g. reduce the frequency and quantity of chemical applied, check the intactness and effectiveness of the closed drainage system and stream buffer zone).	If the Limit Level is exceeded the ET Leader should inform all parties Golf Course Operator, EPD, and AFCD immediately. Should the Limit Level be exceeded, the Golf Course Operator should stop the operation of the desalination plant and/or the application of chemicals immediately and work out the solution according to the requirements of EPD and AFCD. The operation of the desalination plant and/or the application of chemicals would be suspended until an effective solution is identified.

<b>Action</b>	<b>Action Level</b>	<b>Limit Level</b>
	This mitigated method should then be enacted on the next working day.	

## 5. Waste Management

### 5.1 Introduction

5.1.1 Waste management would be the Contractor's responsibility to ensure that all wastes produced during the construction works for Project are handled, stored and disposed of in accordance with good waste management practices and EPD's regulations and requirements.

5.1.2 Waste materials generated during construction activities, such as construction and demolition (C&D) materials and general refuse, are recommended to be audited at regular intervals (at least quarterly) to ensure that proper storage, transportation and disposal practices are being implemented. This monitoring of waste management practices would ensure that these solid wastes generated during construction are not disposed of in nearby streams or other parts of the Project. The audits shall also check that any chemical wastes generated during maintenance of construction equipment and vehicles are not stored within the sites of the Project. The Contractor would be responsible for the implementation of any mitigation measures to minimise waste and redress problems arising from the waste materials.

### 5.2 Waste Control and Mitigation Measures

5.2.1 Mitigation measures for waste management for Project are summarised below. With the appropriate handling, storage and removal of waste arising during the construction works as defined below, the potential to cause adverse environmental impacts would be minimised. During the site inspections, the ET shall pay special attention to the issues relating to waste management and check whether the Contractor has implemented the recommended good site practices and other mitigation measures.

#### *Good Site Practices*

5.2.2 Provided that good site practices are followed strictly, adverse impacts from waste management are not expected to arise. Recommendations for good site practices during construction activities include:

- ◆ nomination of approved personnel, such as a site manager, to be responsible for good site practices and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility;
- ◆ training of site personnel in proper waste management and chemical waste handling procedures;
- ◆ provision of sufficient waste disposal points and regular collection for disposal;
- ◆ appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;
- ◆ regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;
- ◆ a Waste Management Plan should be prepared and submitted to the Engineer for approval. One may make reference to ETWB TCW No.15/2003 for details; and
- ◆ a recording system for the amount of waste generated, recycled and disposed (including the disposal sites) should be proposed.

5.2.3 In order to monitor the disposal of C&D material at public filling areas and to control fly tipping, a trip-ticket system should be included as one of the contractual requirements to be implemented by the ET undertaking the EM&A work. One may make reference to ETWB TCW No. 31/2004 for details. The roles of the IC(E) are also detailed in this technical circular.



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### ***Waste Reduction Measures***

- 5.2.4 Good management and control can prevent the generation of significant amounts of waste. Waste reduction is best achieved at the planning and design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include:
- ◆ segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal;
  - ◆ separate labelled bins shall be provided to segregate aluminium cans from other general refuse generated by the work force, and to encourage collection of by individual collectors;
  - ◆ any unused chemicals or those with remaining functional capacity shall be recycled;
  - ◆ maximising the use of reusable steel formwork to reduce the amount of C&D material;
  - ◆ proper storage and site practices to minimise the potential for damage or contamination of construction materials; and
  - ◆ plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste.
- 5.2.5 In addition to the above good site practices and waste reduction measures, specific mitigation measures for identified waste which may arise are recommended below to minimise environmental impacts during handling, transportation and disposal of these wastes.

### ***Construction and Demolition Material***

- 5.2.6 To minimise impact from collection and transportation of C&D material for off-site disposal, the excavated soft spoil from the Project should be reused on-site as backfill material as far as practicable. Suitable areas should be designated within the works site boundaries for temporary stockpiling of C&D material. Within stockpile areas, the following measures should be taken to control potential environmental impacts or nuisance:
- ◆ covering material during heavy rainfall;
  - ◆ locating stockpiles to minimise potential visual impacts; and
  - ◆ minimizing land take of stockpile areas as far as possible.
- 5.2.7 When disposing of C&D material at a public filling area, it shall be noted that the material shall only consist of soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt. The material shall be free from marine mud, household refuse, plastic, metals, industrial and chemical waste, animal and vegetable matter, and other material considered to be unsuitable by the Filling Supervisor at the public filling area.

### ***Chemical Wastes***

- 5.2.8 If chemical wastes are produced at the construction site, the Contractor would be required to register with the EPD as a Chemical Waste Producer and to follow the guidelines stated in the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. Good quality containers compatible with the chemical wastes should be used. Appropriate labels should be securely attached on each chemical waste container indicating the corresponding chemical characteristics of the chemical waste, such as explosives, flammable, oxidizing, irritant, toxic, harmful, corrosive, etc. The Contractor shall use a licensed collector to transport and dispose of the chemical wastes generated at the Chemical Waste Treatment Centre at Tsing Yi, or other licensed facility, in accordance with the Waste Disposal (Chemical Waste) (General) Regulation. No chemical waste should be allowed to be stored within the site of Project. All chemical wastes should be removed from the site at the first instance.

***General Refuse***

- 5.2.9 General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse, separately from C&D material, from the site.

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## 6. CULTURAL HERITAGE

### 6.1 Introduction

- 6.1.1 The archeological impact assessment conducted in the EIA concluded that some potential for archaeological material remains at the Wan Chai Archaeological Site and a watching brief is recommended during the construction phase. A watching brief is a process whereby a qualified and licensed archaeologist monitors the excavation works during the construction phase in areas identified (and agreed with the Antiquities and Monuments Office (AMO)) to be of archaeological potential. The watching brief methodology is set out below. The archaeologist conducting the watching brief should obtain a licence prior to commencement of works as stipulated in Section 12 of the Antiquities and Monuments Ordinance (Cap. 53). The granting of the licence may take up to 8 weeks after the submission of the licence to the Antiquity Authority.
- 6.1.2 The built heritage impact conducted for the EIA has identified that the impacts to several graves can be mitigated with the implementation of buffer zone and preservation by record. The northern coastal section of the Kap Lo Kok Study Area of the proposed golf course extension is currently very heavily overgrown and parts of it were not accessible during the field survey. The area has the potential to contain as of yet unidentified historical graves and it is recommended that during the construction phase, that if during the course of works a grave is found that the AMO is contacted immediately and that works stop in the immediate vicinity of the grave until it can be inspected by AMO staff.

### 6.2 Cultural Heritage Requirements for EM&A

#### *Wan Chai Archaeological Site*

- 6.2.1 A watching brief should be undertaken by a qualified and licenced archaeologist during excavation works at the construction phase in the identified area marked on Figure 7.1. A qualified archaeologist should inspect the site at an interval of not less than once a month when there is excavation work on site. A construction programme should be provided to the archaeologist so that an inspection schedule can be arranged. The archaeologist should be notified no less then 2 working days prior to any changes on the commencement of the excavation works so arrangements can be made to monitor the works. The ET and IC(E) should facilitate arrangements and liaise between the archaeologist and construction contractor.
- 6.2.2 Monitoring is a form of mitigation which is required when engineering works impact on areas that have been assessed as having archaeological potential and where conventional testing methods are deemed insufficient. The range of archaeological resources that require monitoring include both historical and prehistoric material and features.
- 6.2.3 The watching brief process entails the observation of the engineering works by qualified archaeologists in order to identify any archaeological material or features revealed during the excavation phase of the works schedule. Upon identification of such material or features the archaeologists will require immediate access to the excavation area for recording of the material/features *in situ*, antiquities retrieval and sample collection.
- 6.2.4 These guidelines serve two basic purposes: firstly, that the archaeological resources are adequately recorded and recovered and secondly and, secondly, that appropriate measures are taken on site to minimize delays to the engineering works schedule.

### *Methodology of the Watching Brief*

#### Monitoring personnel

- 6.2.5 Watching brief should be undertaken by a qualified archaeologist, who must apply for a licence under the Antiquities and Monuments Ordinance (Cap. 53) from the Antiquity Authority before the monitoring works commence.

#### Areas to be monitored

- 6.2.6 The areas which require watching brief shall be defined to be submitted by the qualified archaeologist under the project and agreed with AMO prior to commencement of works.

#### Site access

- 6.2.7 Archaeologists should be allowed reasonable access to relevant areas of groundworks, so that deposits can be examined and recorded. Trenches may require temporary shoring and groundworks might need to be temporarily rescheduled, to provide a safe environment for such works. Provision should be made, at the earliest stage of construction programming, for unrestricted archaeological access to areas of groundworks in the identified area of archaeological potential (Figure 6.1).

#### Monitoring and retrieval methodology

- 6.2.8 Table 6.1, below, shows the various categories of archaeological material and features that are most likely to occur in local contexts. Also listed are the recommended type and degree of recording and retrieval required for each category. Upon discovery of any archaeological materials and features, the archaeologist shall report to the AMO immediately.

#### Recording forms for watching brief

- 6.2.9 A set of forms for the recording of any archaeological material identified during the watching brief process must be approved by the AMO. They should include the following:
- Registers to record the finds, special finds, contexts, photographs, drawings, levels and samples
  - Context description forms
  - A daily record form designed specifically for archaeological watching brief. This form must locate clearly the area of works monitored, the nature and extent of the works, summaries of the days findings and cross reference to all register numbers used that day.

#### Safety requirements

- 6.2.10 Archaeologists and staff employed in monitoring must follow the safety procedures enforced by the contractors on site.

#### Mitigation measures

- 6.2.11 The project proponent should allow a flexibility to undertake the contingency arrangements. Should significant archaeological materials be discovered, appropriate mitigation measures will be designed and implemented by the project proponent.

Progress Report

6.2.12 The archaeologist should keep the AMO informed of the progress of watching brief. The archaeologist should submit progress reports every 3 months during the programme of the watching brief.

Watching brief report

6.2.13 The procedures and result of the Watching Brief should be presented in report form, following standards set by the AMO for reports on other types of archaeological field work. This includes details of the overall programme, methodology, sampling strategy, implementation, findings and interpretation. All data, material and records forming the site archive must be submitted to the AMO upon completion of the project.

6.2.14 The monitoring report should contain, as a minimum, the following elements:

- Non-technical summary
- Site location (including maps and relevant drawings) and descriptions
- Context of the project
- Geological and topographical background
- Archaeological and historical background
- General and specific aims of field works monitoring
- Reference to relevant legislation
- Field methodology
- Collection and disposal strategy for artefacts and ecofacts
- Arrangement for immediate conservation of artefacts
- Publication and dissemination proposals
- Archive deposition
- Timetable
- Contingency arrangement (if appropriate)

**Table 6.1**  
**Categories of Archaeological Finds and Recommended Action**

Categories of Archaeological Material	Retrieval Procedure
Human burial <ul style="list-style-type: none"> <li>• Skeleton remains</li> <li>• Items associated with human burial, i.e. grave goods</li> </ul>	Full recording and recovering of human remains and associated features <ul style="list-style-type: none"> <li>• Complete recoding by photography, drawing, written description</li> <li>• Full measurement of burial and surrounding matrix</li> <li>• Retrieval of human remains and associated materials</li> <li>• Retrieval of surrounding soil for further analysis</li> </ul>
Intact features <ul style="list-style-type: none"> <li>• Structural/architectural remains</li> <li>• Undisturbed context, such as hearth, midden, habitation area, assemblages of artefacts and/or environmental material</li> </ul>	Limited recording and recovery of archaeological features <ul style="list-style-type: none"> <li>• Recording and measurement of salient features by photography, drawing and written description</li> <li>• Retrieval of all archaeological material</li> <li>• Retrieval of samples from the surrounding matrix</li> </ul>
Intact artefacts <ul style="list-style-type: none"> <li>• Complete objects such as pottery, metal</li> </ul>	Recovery of artefacts <ul style="list-style-type: none"> <li>• Recovery of objects</li> </ul>

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<b>Categories of Archaeological Material</b>	<b>Retrieval Procedure</b>
objects, stone and bone tools. The objects are complete but isolated and are no part of assemblages or feature.	<ul style="list-style-type: none"><li>• Sampling of the surrounding matrix</li><li>• Proper treatment with cleaning, marking and packing under international acceptable standards</li></ul>
Isolated material <ul style="list-style-type: none"><li>• Sherds, non-human bone, artefact fragments (metal, pottery, glass). There are no complete objects, the material is isolated and fragmentary in nature.</li></ul>	Recovery of artefact fragments/archaeological material <ul style="list-style-type: none"><li>• Recovery of material, such as artefact fragments, environmental material and sampling of surrounding matrix</li></ul>
Deposits with archaeological potential <ul style="list-style-type: none"><li>• Soil deposits which exhibit characteristics associated with archaeological remains in Hong Kong</li></ul>	Sampling of the deposit <ul style="list-style-type: none"><li>• Collection of soil samples from deposits displaying archaeological potential</li></ul>

## 7. LAND CONTAMINATION

### 7.1 Site Inspection

7.1.1 Potentially contaminated sites have been identified based on the preliminary soil test results. As recommended in the EIA Report, further investigation shall be required to determine the presence and extent of contamination before the construction works can take place at the concerned areas. The contamination assessment shall be carried out in accordance with EPD's *ProPECC PN3/94 "Contaminated Land Assessment and Remediation"* and *"Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards, and Car Repair/Dismantling Workshops"*.

7.1.2 The contaminated sites shall be remediated before commencement of any construction works which may disturb the ground. The duration of remediation shall be taken into account by the Project Proponent or the Contractor as part of the construction programme. In all cases, contaminated soil remediation, treatment or disposal must be managed in an environmentally sound manner, including compliance with all relevant legislation and Government requirements.

### 7.2 Potential Areas Recommended for Further Investigation

7.2.1 A preliminary Contamination Assessment Plan (CAP) has been prepared and included in the EIA Report. The CAP recommended that site investigation shall be conducted before construction for the potential contaminated areas encroaching upon the proposed construction work areas. As shown in **Figure 8.1**, soil samples should be taken at 5 sampling points (2, 3, 6, 7 and 8) for further investigation.

**Table 7.1 Proposed Sampling Locations and their Justifications**

ID of Sampling Location	Justification
2	Preliminary site investigation could not be carried out at this point due to access problem.
3	A discrete hotspot of contamination of lead was identified based on the results from the preliminary site investigation.
6	The surrounding area is potentially contaminated with sulphur as identified in the preliminary site investigation.
7	
8	

7.2.2 Based on the results from the preliminary site investigation, the parameters chosen for analysis should include lead and total sulphur.

### 7.3 Preparation of Contamination Assessment Plan

7.3.1 The ET shall review the preliminary CAP and update it if necessary. The update CAP shall be verified by the IC(E) before submitting to EPD for approval. Upon receipt of EPD's approval on the CAP, the actual site investigation for land contamination impact assessment shall be conducted accordingly before commencement of any construction work at the identified contaminated sites. Soil and groundwater samples shall be collected and tested as described in the approved CAP to provide site-specific information for the assessment. The soil and groundwater sampling and testing work may be carried out by the Contractor or other drilling contractors under suitable contractual arrangement by the Project Proponent or ER. The field sampling work shall be supervised by the ET and audited by the IC(E).

- 7.3.2 A Contamination Assessment Report (CAR) shall be prepared by the ET to document the findings of the site investigation. Interpretation of laboratory testing results in accordance with the *ProPECC Note No. 3/94* and comparison of the findings with relevant standards, such as the Dutch guidelines or other international practices as appropriate, shall also be included in the CAR.
- 7.3.3 If land contamination is confirmed, a Remediation Action Plan (RAP) shall be prepared by the ET and drawn up to formulate necessary remedial measures, and, if necessary, potential water quality impact to the river shall be also addressed, in the remediation measures. The subsequent CAR and RAP shall be endorsed by EPD before implementation of any remedial measures. After the completion of the remediation, a Remediation Report should be prepared and submitted to EPD to demonstrate that the clean-up is adequate. Information such as soil treatment records, sampling results, photographs and certification of independent checker should be included in the report.

#### **7.4 Health and Safety**

- 7.4.1 The following measures should be implemented to minimise risks to workers during remediation works such as excavation of soil. These measures will also mitigate against transferring contamination to groundwater, to surface water courses or to the air.
- Site workers should wear gloves, masks, and other protective clothing where exposure to vapours or contaminated soil may be encountered;
  - Contaminated materials should be moved with bulk earthmovers to prevent human contact;
  - Adequate washing facilities should be provided and smoking/eating should be prohibited in the area;
  - Contaminated soils, which have been stockpiled or are being transported, should be covered with tarpaulin; and
  - Leakage of pollutants or leaching from excavated soil should be prevented by storing on an impermeable surface.

#### **7.5 Mitigation Measures for Land Contamination during Construction Stage**

- 7.5.1 Based on the preliminary site investigation results, the site area contains hotspots of contamination of lead and sulphur. The contamination levels of these hotspots should be further assessed during the construction stage with a proper implementation of the CAR and RAP.
- 7.5.2 In addition, since the exact cut areas on site during construction by the Contractor have not been determined at this stage, the Contractor should implement the suitable precautions and preventive measures for the discovery of buried or abandoned ordnance during the construction. Moreover, it is recommended that standard good practice should be implemented during the construction phase in order to minimize any potential exposure to contaminated soils or groundwater. These measures include:
- the Contractor should sweep areas of intended excavations with a metal detector to check for any ordnance underneath the ground prior to any excavation;
  - if any metallic objects are detected in the ground, the Contractor should cease work immediately before confirming the nature of the discovery. For any suspected artillery ordnance, the Hong Kong Police Force should be informed;
  - the use of bulk earth-moving equipment would minimise construction workers' potential contact with contaminated material;
  - exposure to any contaminated material can be minimised by the wearing of appropriate



clothing and personal protective equipment such as gloves (when interacting directly with suspected contaminated material), providing adequate hygiene and washing facilities and preventing smoking and eating during activities with potential exposure;

- stockpiling of contaminated soil should be avoided as far as possible. If unavoidable, the stockpiles of contaminated material should be separated from uncontaminated ones. Moreover, the contaminated material should be properly covered with waterproof material (e.g. tarpaulin sheet) to avoid leaching of contaminants, especially during the rainy season;
- vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates should be sealed to prevent any leakage during transport or during wet conditions;
- only licensed waste haulers should be used to collect and transport any contaminated material to an appropriate disposal site, and procedures should be developed to ensure that illegal disposal of contaminated material does not occur;
- necessary waste disposal permits should be obtained, as required, from the appropriate authorities, in accordance with the *Waste Disposal Ordinance (Cap 354)*, *Waste Disposal (Chemical Waste) (General) Regulation*, as required;
- records of the quantities of wastes generated and disposed of should be maintained;
- adequate washing facilities should be provided on site; and
- in accordance with good construction practice, silt traps should be used to reduce the impact to water bodies caused by suspended solids arising from disturbed or contaminated grounds. Groundwater should be disposed of in accordance with the *Water Pollution Control Ordinance (Cap 358)*.

## 7.6 Potential for Future Land Contamination

7.6.1 The proposed golf course is regarded as a contaminated usage according to Lands Department Technical Circular No. 735A – *Identification of Possible Contamination Sources During Operation Phase*.

7.6.2 The most potentially significant future sources of contamination are:

- The use of turfgrass chemicals (fertilizers and pesticides)
- Accidental spillage of chemicals to be used

### Prevention of Contamination Impact

7.6.3 To prevent the chemicals from contaminating the land, a Turfgrass Management Plan (TMP) will be implemented. The latest version of the HKJC Kau Sai Chau Golf Course “Turfgrass Management Guidelines” is incorporated into the EIA Report.

7.6.4 As indicated in the water quality assessment section, four main chemicals are used for existing golf courses, they are nitrogenous fertilizers, herbicides, fungicides and insecticides. The approach should be to minimize application of fertilizers, and this is also driven by economic requirements to minimize recurrent costs. Healthy growth rates are achieved when the grass is not over-fertilized or over-watered. A balanced programme allows the grass to stand up to wear and develop disease resistance. In line with existing practice, the following mitigation measures will be implemented:

- nutrient status will be monitored every 6 months of the year through the aid of soil and leaf tissue tests which help determine the optimum nutrient provisions for turf grass;
- a slow release fertilizer will be used to help minimize the amount of nitrate leached from the soil;

- application of low quantity of fertilizer is recommended to minimize the leaching due to the active uptake; and
- applications will not be carried out if heavy rain is forecast to minimize the significant nitrogen runoff.

7.6.5 The performance of the TMP will be assessed in terms of the quality of turf produced in time with the stated objectives of water and nutrient conservation and chemical minimization.

#### Spillages

7.6.6 In the event that any spillages occur on the golf courses, the following actions would be taken:

- make every effort to contain the spillage responsibly and safely;
- block drainage downstream flows and divert upstream flows where practicable;
- notify Environmental Protection Department;
- collect samples of downstream water for analysis;
- continue sampling until the impact of the spillage can no longer be detected.

The extent of the contamination (e.g. volume of the contaminated soil) should be identified and confirmed by taken samples of contaminated soil for testing. Remediation action should also be carried out and completed within 3 to 6 months.

#### *Monitoring during Operation Phase*

7.6.7 The land contamination impact can be monitored via the TMP in terms of the quality of turf produced in time with the stated objectives of water and nutrient conservation and chemical minimization.

7.6.8 In addition, routine soil testing for nutrients as described in the TMP will be conducted to ensure that nutrient applications to the golf course are having the desired effect. Adjustments are made to the applications program to amend any soil imbalances or deficiencies in nutrients. To monitor whether there is any land contamination during the operation stage, regular soil sampling and testing (e.g. say for every 6 month or a period agreed by EPD) will be taken according to the two publications issued by EPD (see section 7.1.1) and the certified test results reports should be submitted to EPD for information.

7.6.9 All fertilizers and pesticides will be well-documented including following details:

- location of applications;
- type of fertilizer applied;
- amount applied in kg per hectare;
- date of applications; and
- product applied.

#### *Recommendations*

7.6.10 Provided the above measures are implemented properly, the likelihood of uncontrolled leakage of fertilizers and pesticides giving rise to land contamination is low. If in the future the proposed golf course is decommissioned, contamination testing will be required in order to identify and delineate any contamination that may have occurred.

## **8. Landscape and Visual Impact Mitigation Measures**

### **8.1 General**

Environmental Monitoring and Audit should be undertaken for both the construction and operation phases of the project to ensure and check that the implementation and maintenance of landscape and visual mitigation measures are carried out. The recommended mitigation measures for this project are described in Section 12.10 of the LVIA of the EIA. Conflicts between the proposed landscape and visual mitigation measures and other project works should be resolved at the earliest possible date without compromise to the mitigation intentions of these measures. The construction and operation phase EM&A of the landscape and visual environments and mitigation works shall be carried out as par to the site audit programme.

### **8.2 Baseline Monitoring**

Baseline changes with respect to the landscape and visual environments should be carried out in reference to the recorded baseline conditions of the site as is described in the Section 12 of the EIA. The monitoring shall in particular record changes of each landscape resource, landscape character area and the view conditions of each visually sensitive receiver. Parameters used to describe changes in each of the above shall be the same as in Section 12 of the EIA.

### **8.3 Construction and Operation Phase Audit**

The applicant shall employ a landscape auditor, who shall audit landscape and visual mitigation works. A specialist landscape sub-contractor, who shall in particular be responsible for the protection of retained and the transplantation of existing trees, should carry out the implementation of landscape mitigation works. The contractor shall maintain all soft landscape works for a period of 12 months after implementation. This period shall be the establishment period and will be year one of the operation phase.

The landscape auditor shall be a member of the Environmental team, who shall audit the implementation and maintenance of landscape and visual mitigation measures during the construction phase and the first year of the operation phase. Auditing inspections and reporting shall be undertaken once every two weeks of the construction phase and once every two months of the operation phase. The effectiveness of the mitigation works shall also be audited in order to ensure impact reduction levels are achieved as described in Section 12 of the EIA. The auditing scope shall be on the items listed in Sections 8.4 to 8.8 below.

Sections 8.4 to 8.8 below describe the landscape and visual mitigation measures as per Section 12 of the EIA.

### **8.4 Construction Areas**

- MC 1: Site offices and construction yards:
  - Site offices and the construction yard shall be decommissioned after construction.
  - Haul roads shall be decommissioned and restored with hydroseeding works after construction.
- MC 2: Height of site offices:
  - The height of site offices shall be controlled in order to avoid visual impacts.
- MC 3: Hoarding and screening:

- Where practical the site offices areas, construction yards and storage areas shall be screened using olive green coated hoarding or vegetation around the peripheries of the works area until the completion of relevant construction phases.
- MC 4: Construction plant and building material:
  - Shall be orderly and carefully stored in order to appear neat and avoid visibility from outside where practical;
  - Excess materials shall be removed from site as soon as practical;
  - All construction plant shall be removed from site upon completion of construction works.
- MC 5: Construction light:
  - To be oriented away from the viewing location of VSRs; and
  - All lighting shall have frosted diffusers and reflective covers.
- MC 6: Vegetation:
  - Temporary construction sites shall be restored to standards as good as, or better than, the original condition. In this respect, areas that are not covered by golf course grassing works shall be hydro seeded;
  - The potential for soil erosion shall be reduced at the construction stage by minimizing the extent of vegetation disturbance on site and providing a protective cover over exposed ground; and
  - No plant or building materials shall be stored under the dripline of retained trees and no vehicle movement or other construction activities like washing, concrete mixing etc shall be carried out under the dripline of trees.

## 8.5 Tree Preservation, Planting and Buffer Areas

- MT 1: Compensation for losses:
  - The tree compensation to tree loss ratio shall be between 2:1 and 3:1;
  - At least 700 new trees shall have be of light standard or larger size
- MT 2: The majority of compensation species shall comprise species that already occurs within the LIA boundaries;
- MT 3: Where practical, trees that require removal shall be transplanted on Site;
- MT 4: Planting Works:
  - New trees shall be planted in groups in order to screen visual impacts and to provide additional shade at the administration building, rainshelters and halfway houses.
- MT 5: Tree Planting on Slopes:
  - New slopes with a gradient larger than 30° shall have whip tree planting.
  - Such whip trees shall comprise tree species with shrub-like characteristics, such as *Gordonia axillaries* (大頭茶) and *Raphiolepis indica* (車輪梅);
- MT 6: Tree planting works at the hill where the desalination plant will be located shall be carefully positioned in order to represent its original profile.
- MT 7: Tree Preservation:
  - No tree shall be transplanted or felled without prior approval by relevant Government departments in accordance with WBTC 24/94, WBTC 14/2002 and ETWB 2/2004;
  - All trees that are marked for retention shall be fenced off with a 1.2m high fence around the dripline of trees or larger area;
  - Transplant preparation works shall be carried as soon as possible after commencement of construction. Rootball and crown pruning shall be carried out over at least 1 month.

- MT 8: Buffer Areas
  - For streams the width of the buffer zones will be 20m from the stream bank. The only exception would be the buffer zone in the reach of upper tributary of stream B lying between the two parts of Hole 10, where the buffer will zone will be 5m, the dry tributary of stream B that will be converted to an underground culvert and the secondary tributary of stream A that will also be converted to an underground culvert.
  - No construction activities will be allowed in the buffer zones, except for site formation works, which are required for the construction of bridge footings.

## 8.6 Shrub and Ground Cover Planting

- MS 1: Bulk hydroseeding:
  - Bulk site formation works shall be followed with bulk hydroseeding as soon as practical.
- MS 2: Grassing:
  - In the case of golf course areas, grassing shall be carried out as soon as practical after sanding and shaping; and
  - Sanding, shaping and grassing works shall be phased in sections.
- MS 3: Restoration:
  - In the case of residual areas that were disturbed during construction, which will not be part of the golf course areas, detailed site formation works and shaping shall be followed by hydroseeding and shrub planting as soon as practical; and
  - The hydroseeding mix shall be composed of the following grass species: *Erograstic curvula* *Lolium Perenne* *Neyraudia reynaudiana* *Pennisetum purpureum*; and the following shrub / small tree species: *Gordonia axillaries*, *Rhaphiolepis indica* and *Rhodomyrtus tomentosa*.

## 8.7 Engineering infrastructure: bridges, desalination plant, pumping stations and water tanks

- ME 1: Screening:
  - Bridges and pumping stations shall be screened by tree and shrub planting; and
  - Retaining wall shall be covered with climber plants.
- ME 2: Abutments of bridges shall be surfaced with stone of volcanic origin with a colour and texture similar to that of rock in the surrounding landscape;
- ME 3: Above-ground walls and foundations of pumping stations shall be surfaced with stone of volcanic origin with a colour and texture similar to that of rock in the surrounding landscape;
- ME 4: Above-ground covers of pumping stations shall have an olive green coating;
- ME 5: The desalination plant shall be located within the hill behind the pier. Slope cutting of this hill shall have a natural appearance with hydroseeding cover;
- ME 6: Water tanks shall be located below surface level. Above-ground components shall be coated in olive green.

## 8.8 Buildings: extensions of existing, halfway houses and rain shelters

- MB 1: Extensions of the clubhouse shall have a surface cover that is in visual harmony with the administration building itself;
- MB 2: Shrub planting shall be implemented in front of the new golf cart parking area in order to screen low level views;

- MB 3: Tree and shrub planting shall be implemented on the peripheries of the maintenance building and its extensions; and
- MB 4: Halfway houses and rain shelters shall be surfaced with either stone or beige and olive green paint.

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## **9. SITE ENVIRONMENTAL AUDIT**

### **9.1 Site Inspection**

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

9.1.2 The ET Leader shall be responsible for formulating the environmental site inspection, the deficiency and action reporting system, and for carrying out the site inspection works. Within 21 days of the construction contract commencement, he shall submit a proposal for site inspection and deficiency and action reporting procedures to the Contractor for agreement, and to the ER for approval. The ET's proposal for rectification would be made known to the IC(E).

9.1.3 Regular site inspections shall be carried out at least once per week. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site; it should also review the environmental situation outside the works area which is likely to be affected, directly or indirectly, by the site activities. The ET Leader shall make reference to the following information in conducting the inspection:

- (i) EIA recommendations on environmental protection and pollution control mitigation measures;
- (ii) works progress and programme;
- (iii) individual works methodology proposals (which shall include proposal on associated pollution control measures);
- (iv) contract specifications on environmental protection;
- (v) relevant environmental protection and pollution control laws; and
- (vi) previous site inspection results.

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

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

### **9.2 Compliance with Legal and Contractual Requirements**

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

9.2.2 In order that the works are in compliance with the contractual requirements, all works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for

vetting to see whether sufficient environmental protection and pollution control measures have been included.

- 9.2.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating laws can be prevented.
- 9.2.4 The Contractor shall regularly copy relevant documents to the ET Leader so that works checking can be carried out. The document shall at least include the updated Works Progress Reports, updated Works Programme, any application letters for different licence / permits under the environmental protection laws, and copies of all valid licences / permits. The site diary shall also be available for the ET Leader's inspection upon his request.
- 9.2.5 After reviewing the document, the ET Leader shall advise the IC(E) and Contractor of any non-compliance with contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence / permit application and any environmental protection and pollution control preparation works may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor and the ER accordingly.
- 9.2.6 Upon receipt of the advice, the Contractor shall undertake immediate action to correct the situation. The ER shall follow up to ensure that appropriate action has been taken in order to satisfy contractual and legal requirements.

### **9.3 Environmental Complaints**

- 9.3.1 Complaints shall be referred to the ET Leader for action. The ET Leader shall undertake the following procedures upon receipt of any complaint:
- (i) log complaint and date of receipt onto the complaint database and inform the IC(E) immediately;
  - (ii) investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;
  - (iii) identify mitigation measures in consultation with the IC(E) if a complaint is valid and due to works;
  - (iv) advise the Contractor if mitigation measures are required;
  - (v) review the Contractor's response to identified mitigation measures, and the updated situation;
  - (vi) if the complaint is transferred from the EPD, submit interim report to the EPD on status of the complaint investigation and follow-up action within the time frame assigned by the EPD;
  - (vii) undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;
  - (viii) report investigation results and subsequent actions to complainant (if the source of complaint is transferred from EPD, the results should be reported within the timeframe assigned by the EPD);
  - (ix) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.
- 9.3.2 A sample complaint log form is shown in Appendix B.



## **10 REPORTING**

### **10.1 General**

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

10.1.2 Types of reports that the ET Leader shall 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 shall be made available to the Director of Environmental Protection. A copy of reports should also be submitted to and reviewed by AFCD.

### **10.2 Baseline Monitoring Report**

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

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

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### 10.3 Monthly EM&A Report

10.3.1 The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due one month after construction commences. Each monthly EM&A report shall be submitted to the following parties: the Contractor, the IC(E), the ER, the EPD and the AFCD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.

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

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

10.3.3 The first monthly EM&A report shall include at least the following:

- (i) executive summary (1-2 pages):
  - breaches of Action and Limit levels;
  - complaint log;
  - notifications of any summons and successful prosecutions;
  - reporting changes; and
  - future key issues.
- (ii) basic Project information:
  - Project organisation including key personnel contact names and telephone numbers;
  - programme;
  - management structure; and
  - work undertaken during the month.
- (iii) environmental status:
  - work undertaken during the month with illustrations (such as location of works, daily excavation rate, etc); and
  - drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).
- (iv) a brief summary of EM&A requirements including:
  - all monitoring parameters;
  - environmental quality performance limits (Action and Limit levels);
  - Event-Action Plans;
  - environmental mitigation measures, as recommended in the EIA Report for the Project; and
  - environmental requirements in contract documents.
- (v) implementation status:

advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report for the Project, summarized 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 types of equipment used and calibration details;
  - parameters monitored;
  - monitoring locations;
  - monitoring date, time, frequency, and duration;
  - weather conditions during the period;
  - any other factors which might affect the monitoring results; and
  - QA/QC results and detection limits.
- (vii) report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
  - record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
  - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
  - review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
  - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- (viii) others
- an account of the future key issues for the next three months as reviewed from the works programme and works method statements;
  - advice on the solid and liquid waste management status; and
  - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

### ***Subsequent EM&A Reports***

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

- (i) executive summary (1 - 2 pages):
- breaches of Action and Limit levels;
  - complaints log;
  - notifications of any summons and successful prosecutions;
  - reporting changes; and
  - future key issues.
- (ii) basic Project information:
- Project organisation including key personnel contact names and telephone numbers;
  - programme;
  - management structure; and
  - work undertaken during the month.
- (iii) environmental status:
- work undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and

- 
- drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
- (iv) implementation status:
- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report for the Project, summarized in the updated implementation schedule.
- (v) monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
  - name of laboratory and types of equipment used and calibration details;
  - parameters monitored;
  - monitoring locations;
  - monitoring date, time, frequency, and duration;
  - weather conditions during the period;
  - any other factors which might affect the monitoring results; and
  - QA / QC results and detection limits.
- (vi) report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
  - record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
  - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
  - review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
  - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- (vii) others
- an account of the future key issues for the next three months as reviewed from the works programme and works method statements;
  - advice on the solid and liquid waste management status; and
  - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.
- (viii) appendix
- Action and Limit levels;
  - graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
    - a) major activities being carried out on site during the period;
    - b) weather conditions during the period; and
    - c) any other factors that might affect the monitoring results.
  - monitoring schedule for the present and next reporting period;

- cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- outstanding issues and deficiencies.

#### **10.4 Quarterly EM&A Summary Report**

10.4.1 A quarterly EM&A summary report of around five pages shall be produced and shall contain at least the following information. The quarterly EM&A report shall be prepared and submitted within 10 working days of the end of each reporting quarter.

- (i) executive summary (1 - 2 pages);
- (ii) basic Project information including a synopsis of the project organisation, programme, contacts of key management, and the 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 EIA Report for the Project;
- (iv) advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report for the Project, summarised in the updated implementation schedule;
- (v) drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (vi) graphical plots of any trends 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 following:
  - the major activities being carried out on site during the period;
  - weather conditions during the period; and
  - any other factors which might affect the monitoring results;
- (vii) advice on the solid and liquid waste management status;
- (viii) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- (ix) a brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures;
- (x) a summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance;
- (xi) a summarised record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- (xii) comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme); recommendations (for example, any improvement in the EM&A programme) and conclusions for the quarter; and
- (xiii) proponents' contacts and any hotline telephone number for the public to make enquiries.

## 10.5 Final EM&A Review Report

- 10.5.1 The final EM&A report shall be prepared and submitted within one month after the completion of post-Project monitoring, and it should 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 organisation, contacts of key management, and the 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 EIA Report for the Project;
    - environmental quality performance limits (Action and Limit levels);
    - all 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 EIA Report for the Project, summarised in the updated implementation schedule ;
  - (vi) graphical plots and the statistical analysis of the trends of monitored parameters over the course of the Project, including the post-project monitoring for all monitoring stations annotated against the following:
    - the major activities being carried out on site during the period;
    - weather conditions during the period; and
    - any other factors which might affect the monitoring results;
  - (vii) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
  - (viii) a 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 all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
  - (xi) a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislation, locations and nature of the breaches, investigation, follow-up actions taken and results;
  - (xii) a review of the validity of EIA predictions and identification of shortcomings in EIA recommendations;
  - (xiii) comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and a review of the performance of the environmental management system, that is, of the overall EM&A programme); and
  - (xiv) recommendations and conclusions (for example, a review of success of the overall EM&A programme to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary).

## **10.6 Data Keeping**

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

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

- 10.7.1 With reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader shall immediately notify the IC(E), EPD and AFCD, as appropriate. The notification shall be followed up with advice to IC(E), EPD and AFCD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals.
- 10.7.2 Sample template for the interim notifications is presented in Appendix B.

# **Appendix A**

## **Implementation Schedule**



**A15 IMPLEMENTATION SCHEDULE OF THE PROPOSED MITIGATION MEASURES**

**Table 15.1 Implementation Schedule of Air Quality Measures**

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages**			Relevant Legislation & Guidelines
					D	C	O	
<b>Air Quality - Construction Phase</b>								
4.7.1		<p>In order that nuisance to air sensitive receivers is minimized, it is important to minimize dust emissions from construction activities including cut and fill operations and trucks movements on haul road.</p> <p>Dust control techniques should be considered to control dust to a level not exceeding the AQOs as well as the 1-hour TSP guideline level. These measures include:</p> <ul style="list-style-type: none"> <li>• Adoption of good site practices;</li> <li>• Avoid practices likely to raise dust level;</li> <li>• Frequent cleaning and damping down of stockpiles, dusty areas of the Site and the haul roads;</li> <li>• Reduce the speed of the vehicles (say 10 kph) on the haul road;</li> <li>• Reducing drop height during material handling;</li> <li>• Provision of wheel-washing facilities for Site vehicles leaving the Site;</li> <li>• Regular plant maintenance to minimize exhaust emission;</li> <li>• Sweep up dust and debris at the end of each shift; and</li> <li>• If concrete batching plant or rock crushing plant is planned to used, a license from EPD may be required depending on the total silo capacity since they are specified processes under the APCO. Modern plant should be designed to limit emissions.</li> </ul>	Work site / during construction	All contractors		√		EIAO-TM, APCO, Air Pollution Control (Construction Dust) Regulation
4.7.2		Providing watering four times a day for dust suppression.	Work site / during construction	All contractors		√		EIAO-TM, APCO, Air Pollution Control (Construction Dust)

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages**			Relevant Legislation & Guidelines
					D	C	O	
								Regulation
<b>Air Quality - Operational Phase</b>								
4.8.2		N/A						

\* All recommendations and requirements resulted during the course of EIA Process, including ACE and/or accepted public comment to the proposed project.

\*\* D=Design, C=Construction, O=Operation

N/A Not applicable

**Table 15.2 Implementation Schedule of Water Quality Control Measures**

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
					D	C	O	
<b>Water Quality - Construction Phase</b>								
6.11.4		<p><u>Proposed 18 holes Golf Course Layout Design</u></p> <p>20 m buffer zones on both sides of the streams will be demarcated as a preventative mitigation measure to reduce the disturbance during construction phase of the golf course except for the portions of Streams A which is of low ecological value and an old tributary of Stream B. On one side of part of the Stream B, the buffer zone would be reduced to 5m.</p>	Work site / During the construction period	All contractors		√		ProPECC PN 1/94; WPCO; TM-Effluent Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Water
6.11.5		<p>For the construction activity which is unavoidable near natural streams (within the buffer zone), mainly the construction of crossings, preventative mitigation measures during the construction stage should be follow by the Contractor, they are shown as follows:</p> <ul style="list-style-type: none"> <li>• The proposed works site inside or in the proximity of natural streams should be temporarily isolated, through by placement of sandbags or silt curtains and properly supported by props, to prevent adverse impacts on the stream water qualities;</li> <li>• The natural bottom and existing flow in the stream should be preserved to avoid disturbance to the stream habitats;</li> <li>• No direct and indirect discharge into the natural stream is allowed from any construction work activities;</li> <li>• Stockpiling of construction material, if any, should be properly covered and located away from any natural stream;</li> <li>• Monitor rain forecast closely and cover any exposed spoil when rainstorms are forecated. Debris should be properly disposed of before rainstorm to avoid any inadvertent wash away into the stream; and</li> <li>• Removal of existing vegetation alongside the stream should be avoided. When disturbance to vegetation is unavoidable, all disturbed areas should be hydroseeded or planted with suitable vegetation to blend in with the natural environmental upon completion of works.</li> </ul>						

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
					D	C	O	
6.11.13		<p><u>Runoff and Drainage Management</u></p> <ul style="list-style-type: none"> <li>♦ <b>Diversion of upstream flows around the works areas for stream crossings and underground pipes:</b> To minimize the impact of upstream runoff on the Works area by preventing storm flows reaching the work areas. This will be done through provision of upstream cut-off drains to intercept the flows and divert them around the Works area. It would convey flows to downstream stream courses, or other elements of temporary drainage systems (such as storage facilities).</li> <li>♦ <b>Temporary covering the works areas during severe storm events:</b> Significant rainstorm events can be reasonably well forecast and when heavy rain is predicted, mitigation measures should be provided for the vulnerable areas by using tarpaulins, plastic sheets or other temporary covering to protect works area and minimize damage and erosion. It is recommended not to cover the newly establishment grass areas, and if unavoidable, this should only to be done on a short term basis (less than 24 hours).</li> <li>♦ <b>Silt traps and sedimentation tanks for main discharge routes form works area:</b> Sufficient and suitably sized silt traps and/or sedimentation tanks should be provided at the downstream ends of the systems to remove suspended solids prior to discharge. The discharge water quality shall be compliant with the <i>TM on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters</i> under the WPCO. The required volume of the sedimentation tanks will depend on the catchment area served. Multiple tanks in series may also be required where runoff might be expected to be silty.</li> <li>♦ The design details of the temporary drainage system at turf establishment area follow the same principles of the permanent drainage system. However the component pipes, tanks, lakes and/or pumps may differ in size, shape, location, etc. from that of the permanent system, dependent upon the temporary runoff areas as compared with those of the permanent system. Additionally or alternatively, the temporary drainage system may consist of other</li> </ul>	Work site / During the construction period	All contractors		√		ProPECC PN 1/94; WPCO; TM-Effluent Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Water

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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6.11.14		<p>methods to control soil erosion and/or to facilitate the collection of surface water runoff.</p> <p>The temporary drainage system will function during the period of time in which the permanent system is not yet completed. This circumstance will arise from the fact that the golf holes, inclusive of the permanent drainage system, will be constructed individually. As a result, the permanent drainage system may not be completed in its entirety until connection is made from each respective golf hole area to the lake/reservoir. As the permanent drainage system is completed for each hole, the corresponding temporary system will be decommissioned and reused elsewhere.</p> <p>The temporary drainage system will be in use until the permanent system is functional in a given area. Once the permanent system is functional in a given area, the temporary system will be decommissioned and, wherever possible, the components re-used in another temporary drainage system installed elsewhere. It is anticipated that the maximum duration of use for the temporary drainage system in any given area will be one-year.</p> <p>The storage tanks and/or lakes will be designed to segregate suspended solids (or pollutants as may be the case in plant/equipment storage and refueling areas) as may be necessary by contract requirements and reuse.</p> <ul style="list-style-type: none"> <li>◆ No irrigation, fertilizer and pesticide applications to the turf would be permitted during rainstorm events or when heavy rainstorm is predicted 24 hours before the application.</li> <li>◆ Runoff from materials storage areas, particularly fuel and chemicals storage area should be separated from the main drainage systems (bunded, if necessary) and provided with dedicated facilities throughout the construction period, such as petrol interceptors.</li> </ul> <p>The Contractor shall follow good site practices and be responsible for the design, construction, operation, and maintenance of all the mitigation</p>						

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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		measures as specified in <i>ProPECC PN1/94</i> on construction site drainage through the construction period. These practices include: <ul style="list-style-type: none"> <li>• Temporary ditches should be provided to facilitate run-off discharge into appropriate watercourses, via a silt retention pond.</li> <li>• All drainage facilities and erosion and sediment control structures should be inspected monthly and maintained to ensure proper and efficient operation at all times.</li> <li>• Excavation of soil that cannot be avoided during the wet season, and exposed surface or open stockpiles should be covered with tarpaulin or other means. Other measures that need to be implemented before, during and after rainstorms are summarized in <i>ProPECC PN1/94</i>.</li> <li>• Exposed soil areas should be minimized to reduce potential for increase siltation and contamination of runoff.</li> <li>• Earthwork final surfaces should be well compacted and subsequent permanent work (turf establishment) should be immediately performed.</li> <li>• The Contractor shall contain within the site all surface runoff generated from the construction works, concreting works, dust control and vehicle washing, etc.</li> <li>• The Contractor shall arrange other measures, such as provision of sand bags or temporary diversion systems to prevent washing away of soil, silt or debris into any nearby natural streams. Any runoff shall be diverted into appropriate sediment traps before discharging to the nearby drainage system. The discharge water quality shall be compliant with the <i>TM on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters</i> under the WPCO.</li> <li>• The Contractor shall observe and comply with the Water Pollution Control Ordinance (WPCO) and its subsidiary regulations by implementing environmental protection measures (such as the use of silt traps) and preventing any point or non-point source of pollution.</li> </ul>						

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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6.11.15		<p><u>Concrete bridge construction</u></p> <p>No work is allowed to come into contact with the underlying stream bed during the concrete bridge construction. During the construction of precast concrete bridge, if necessary, precaution measures should be taken to ensure no potentially polluting liquid or solid wastes fall into the stream. This is essential to avoid water quality impacts within ecologically sensitive streams.</p>	Work site / During the construction period	All contractors		√		ProPECC PN 1/94; WPCO; TM-Effluent Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Water
6.11.16		<p>The Contractor shall good site follow practices, including, but no limited to::</p> <ul style="list-style-type: none"> <li>• Construction work area for the precast concrete should be outside the designated stream buffer zone area;</li> <li>• The designated work area for precast concrete work should be covered to minimize the potential water runoff during rain from the construction area;</li> <li>• All water used within the concrete work area should be collected, stored and recycled to reduce resource consumption. Stormwater runoff from the works areas fro precast concreting works should drain under gravity towards a sedimentation basin. The overlying water from the sedimentation basin should be recycled for reuse within the plant. The deposited sediment should be dewatered and the dry matter should require disposal off-site. No water should be discharged outside the boundary of the precast concrete works area;</li> <li>• The use of tarpaulin sheet or other means (water impermeable texture) should be placed beneath precast concrete beam level (must be above the stream bed level) to capture any falling object during installation of precast concrete bridge on the footings or abutments;</li> <li>• Prohibition of any direct and indirect discharge into the streams;</li> <li>• The concrete bridge and footings of abutments must be completely above the high water mark;</li> <li>• All equipment and machinery must be free of leaks or excess oil and grease;</li> <li>• Equipment refueling or servicing or storage of fuel must be undertaken at a minimum of 30 meters from the stream;</li> <li>• Prevent soil and trash from getting into stream during construction by use of silt fence, fiber rolls, gravel bags and other effective</li> </ul>						

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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		means; <ul style="list-style-type: none"> <li>All bare soil (abutment slope or temporary stockpile) must be covered with tarpaulin or other means before forecast rain; and</li> <li>Wash out concrete trucks or pumps only into designated washout pits.</li> </ul>						
6.11.19		<u>Dredging during Construction of Desalination Plant's intake and outfall</u> The intake and outfall pipelines will be constructed by dredging the seabed to form a trench and backfilled with a layer of bedding material (quarry run stone) before putting the pipelines in place. Once in place, the pipelines are covered with layers of rock armour on top of the pipelines to protect the pipelines against damage by wave action. The alternative backfilling material is from rock excavated during site formation if suitable.	Work site / During the construction period	All contractors		√		ProPECC PN 1/94; WPCO; TM-Effluent Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Water
6.11.20		The materials used for the backfilling at the intake and outfall pipelines are stone and rock armour only. Transfer of backfilling materials onto the seabed from barge should be conducted by careful grabbing and unloading to seabed (to minimize sediment migration), thereby minimize impacts on water quality to nearby water sensitive receivers. As a preventative measures, silt curtain will also be required during the backfilling activities. The expected backfilling duration is approximate 2 months.						
6.11.21		The Contractor shall use backhoe for dredging works at a water depth of less than 2m and use close grab dredger for works with water depth of more than 2m. The estimated dredging works is about 50m long (where backhoe should be used for water less than 2m deep) and 70m long (where close grab dredger should be used for water more than 2m deep). Only one dredging method should be used at any one time.						
6.11.22		In order to avoid pollution during dredging, transporting and dumping of marine mud. Pollution avoidance measures shall include but not be limited to the following: <ul style="list-style-type: none"> <li>The maximum daily dredging rate for closed grab dredger should be 45m<sup>3</sup>/day;</li> </ul>						



EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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		<ul style="list-style-type: none"> <li>• The maximum daily dredging rate for backhoe should be 20m<sup>3</sup>/day;</li> <li>• Silt curtain should be installed for any dredging methods to protect the WSRs;</li> <li>• Closed grabs or sealed grabs should only be used for locations with water depths ≥ 2m;</li> <li>• Backhoe should only be used for locations with water depths ≤ 2m;</li> <li>• All equipment should be designed and maintained to minimise the risk of silt and other contaminants being released into the water column or deposited in locations other than designated location;</li> <li>• Mechanical grabs should be designed and maintained to avoid spillage and should seal tightly while being lifted;</li> <li>• No trailing suction hopper dredgers would be deployed for the dredging of marine mud;</li> <li>• All vessels should be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash;</li> <li>• All pipe leakages should be repaired promptly and plant shall not be operated with leaking pipes;</li> <li>• Before moving the vessels which are used for transporting dredged materials excess material should be cleaned from the decks and exposed fittings of vessels and the excess materials should never be dumped into the sea except at the approved locations;</li> <li>• Adequate freeboard should be maintained on barges to ensure that decks are not washed by wave action;</li> <li>• The Contractor should monitor all vessels transporting material to ensure that no dumping outside the approved location takes place. The contractor should keep and produce logs and other records to demonstrate compliance and that journey times are consistent with designated locations and copies of such records should be submitted to the engineer;</li> <li>• All bottom dumping vessels should be fitted with tight fitting seals to their bottom openings to prevent leakage of material;</li> <li>• Loading of barges and hoppers should be controlled to prevent splashing of dredged material to the surrounding water, and vessels should not be filled to a level which will cause overflowing of material or polluted water during loading or transportation; and</li> </ul>						

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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6.11.23		<ul style="list-style-type: none"> <li>The engineer may monitor any or all vessels transporting material to check that no dumping outside the approved location nor loss of material during transportation takes place. The contractor should provide all reasonable assistance to the engineer for this purpose.</li> </ul> <p>In addition, baseline water quality monitoring before commencement of the marine works shall be carried out in the nearby waters to obtain baseline information for subsequence monitoring. Regular and frequent water quality monitoring shall be carried out throughout the whole construction period to ensure the water quality during construction is well within the established environmental guidelines and standards.</p> <p>Silt Curtain</p>						
6.11.24		<p>In order to minimize impacts during the whole construction period of desalination plant's intake and discharge outfall, silt curtains should be utilized to minimize sediment migration. The Contractor shall be responsible for the design, installation and maintenance of the silt curtains to minimize the impacts on the water quality and the protection of water sensitive receivers. The design and specification of the silt curtains shall be submitted by the Contractor to the Engineer for approval. Area of the silt curtain to enclose the works area should be minimized in order to reduce the disturbance of ecological sensitive areas nearby.</p>						
6.11.25		<p>A typical suspended solids reduction of 75% can be achieved with the incorporation of silt curtain. Two-layer silt curtains have generally been used for dredging projects of larger scale to further ensure this reduction. However, as the scale of proposed project is considered small, it is recommended to use single layer silt curtain which can achieve a minimum 75% suspended solids reduction.</p>						
6.11.26		<p>Silt curtains shall be formed from tough, abrasion resistant, permeable membranes, suitable for the purpose, supported on floating booms in such a way as to ensure that the sediment plume shall be restricted to within the limit of the works area.</p>						
6.11.27		<p>The silt curtain shall be formed and installed in such a way that tidal rise and fall are accommodated, with the silt curtains always extending from</p>						

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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6.11.28		<p>the surface to the bottom of the water column. The removal and reinstallation of such curtains during typhoon conditions shall be as agreed with the Director of Marine Department.</p> <p>The Contractor shall regularly inspect the silt curtains and check that they are moored and marked to avoid danger to marine traffic. Any damage to the silt curtain shall be repaired by the Contractor promptly and the works shall be stopped until the repair is effected to the satisfaction of the Engineer.</p>						
6.11.29		<p><u>General Construction Activities</u></p> <p>Debris and refuse generated on-site should be collected, handled and disposed of properly to avoid entering adjacent watercourse. Stockpiles of construction materials should be kept covered when not being used.</p>	Work site / During the construction period	All contractors		√		ProPECC PN 1/94; WPCO; TM-Effluent Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Water
6.11.30	<p>Oils and fuels should only be stored/handled in designated areas with pollution prevention facilities. Oil interceptors need to be regularly inspected and cleaned to avoid wash-out of oil during storm conditions.</p>							
6.11.31	<p>Contractor should provide a safe storage area for chemicals on site. The Contractor is required to register as a chemical waster producer if chemical wastes would be produced from the construction activities.</p>							
6.11.32	<p>All fuel tanks should be provided with locks and be sited on sealed areas within bunds of capacity equal to 110% of the storage capacity of the largest tank.</p>							
6.11.33	<p>Good housekeeping practices and staff training are required to minimize careless spillage and keep the work space in a tidy and clean conditions at all times. Accidental spillage of chemicals in the works area would directly affect the aquatic environment. It is recommended that the Contractor should develop management procedures for chemical and implement an emergency plan to deal with chemical spillage in case of an accident.</p>							

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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6.11.34		Disposal of chemical wastes should be carried out in compliance with the Waste Disposal Ordinance. The chemical waste should be transported to a facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility at Tsing Yi. The Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes details the requirements to deal with chemical wastes.						
6.11.35		<p><u>On-Site Sewage Effluents</u></p> <p>In order to prevent sewage effluents affecting water courses, the following mitigation measures should be provided by the Contractor:-</p> <ul style="list-style-type: none"> <li>• Temporary sanitary facilities, such as portable chemical toilets, should be employed on-site to handle sewage from the workforce;</li> <li>• The toilet facilities should be more than 30 m from any watercourse;</li> <li>• Temporary storage tank should be provided to collect wastewater from kitchens or canteen, if any;</li> <li>• A licensed waste collector should be deployed to clean the chemical toilets on a regular basis which will be and disposed of at government sewage treatment facilities;</li> <li>• Regular environmental audit on the construction site can provide an effective control of any malpractices and can achieve continual improvement of environmental performance on site. It is anticipated that sewage generation during the construction phase of the project would not cause water pollution problem after undertaking all required measures; and</li> <li>• Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment during the construction phase of the project.</li> </ul>	Work site / During the construction period	All contractors		√		ProPECC PN 1/94; WPCO; TM-Effluent Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Water
6.11.36		<p><u>Concrete batching plant</u></p> <p>All water used within the concrete batching plant will be collected, stored and recycled to reduce resource consumption. This includes water used in the concrete batching process, truck cleaning, yard washing and dust suppression spraying. All spent dust suppression effluent will be</p>	Work site / During the construction period	All contractors		√		ProPECC PN 1/94; WPCO; TM-Effluent Standards for Effluents Discharged into

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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6.11.37		collected and recycled. To minimize the potential water quality impacts that may generate from the concrete batching plant, a drainage system should be provided in this site. The batching plant area should be channelled to collect concrete washings for further treatment before reuse on-site and prevent concrete washings from directly entering the any stream or seawater. Site runoff should also be collected through the drainage system. To minimize the generation of contaminated site runoff from concrete production area, the concrete batching plant should be sheltered.  Concrete washings and site runoff should be pumped to a wastewater treatment system with a sedimentation unit for removal of suspended solids such as waste concrete particles, silt and grit in order to achieve the discharge standards. pH adjustment should also be applied if the pH value of the collected concrete washings and site runoff is higher than the pH range specified in the discharge licence. This can be achieved by adding neutralizing regents, i.e. acidic additive. A discharge licence should be applied from EPD for discharge of effluent from the site. Analysis of effluent quality may be required as one of the licensing conditions of the discharge licence. The Contractor should collect effluent samples at the final discharge point in accordance with the required sampling frequency to test the specified water quality parameters. The quality of the discharged effluent should comply with the discharge licence requirements. It is recommended to reuse the treated effluent for dust suppression and general cleaning on site, wherever possible.						Drainage and Sewerage Systems, Inland and Coastal Water
6.11.38		The drainage system should be maintained on a regular basis to remove the deposits on the channels. The sedimentation and pH adjustment systems should also be checked and maintained by competent persons to ensure that the systems are functioning properly at all times.						
6.11.39		The deposited sediment will be dewatered and the dry matter will require disposal off-site. The estimated maximum concentrate batching operation period during construction is 20 months.						
6.11.40		Sand, gravel and other bulk materials will be delivered from the production area by conveyor boats or derrick barges to the temporary barging point, and the material will then be loaded onto dump trucks by						

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location (duration/completion of measures)	Implementation Agent	Implementation Stages**			Relevant Legislation and Guidelines
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6.11.41		loaders and delivered to the on-site storage areas.  Regular environmental inspections should be conducted to check the environmental performance of daily operation. These inspections will ensure proper installation and maintenance of pollution control measures, such as checking of sedimentation basin, wastewater recycling facility and enclosure of stockpiles, and the implementation of other mitigation measures.						
<b>Water Quality - Operation Phase</b>								
6.11.45		Provide runoff filter system and biopesticides application at Hole 5 and Hole 6. Routine water quality monitoring of the filter system effluent water quality on nutrient and pesticides removal performance during the operation of the filter system will be required by the golf course operator to ensure the filter systems function properly.	Golf course/During the operation phase	Golf course operator			√	

\* All recommendations and requirements resulted during the course of EIA/EA Process, including ACE and/or accepted public comment to the proposed project.

\*\* Des - Design, C = Construction, O = Operation

N/A Not applicable

**Table 15.3 Implementation Schedule of Waste Management Measures**

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages**			Relevant Legislation & Guidelines
					D	C	O	
<b>Waste Management - Construction Phase</b>								
7.7.2		Good site practice to minimize solid waste generation, including: <ul style="list-style-type: none"> <li>• nomination of approved personnel, such as a site manager, to be responsible for good site practices, and making arrangements for collection of all wastes generated at the site and effective disposal to an appropriate facility;</li> <li>• training of site personnel in proper waste management and chemical waste handling procedures;</li> <li>• provision of sufficient waste disposal points and regular collection for disposal;</li> <li>• appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;</li> <li>• regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;</li> <li>• a Waste Management Plan should be prepared and should be submitted to the Engineer for approval. One may make reference to ETWB TCW No. 15/2003 for details; and</li> <li>• a recording system for the amount of wastes generated, recycled and disposed (including the disposal sites) should be proposed.</li> </ul>	Work site / During the construction period	All Contractors		√		WDO; Public Health and Municipal Services Ordinance; The Land (Miscellaneous Provisions) Ordinance; ETWB TCW NO. 15/2003.
7.7.4		Good management and control can prevent the generation of significant amounts of waste. Waste reduction is best achieved at the planning and	Work site / During the	All Contractors		√		WDO; Public Health and

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages**			Relevant Legislation & Guidelines
					D	C	O	
		design stage, as well as by ensuring the implementation of good site practices. Recommendations to achieve waste reduction include: <ul style="list-style-type: none"> <li>• segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal;</li> <li>• separate labelled bins shall be provided to segregate aluminium cans from other general refuse generated by the work force, and to encourage collection of by individual collectors;</li> <li>• any unused chemicals or those with remaining functional capacity shall be recycled;</li> <li>• maximising the use of reusable steel formwork to reduce the amount of C&amp;D material;</li> <li>• prior to disposal of C&amp;D waste, it is recommended that wood, steel and other metals shall be separated for re-use and / or recycling to minimise the quantity of waste to be disposed of to landfill;</li> <li>• proper storage and site practices to minimise the potential for damage or contamination of construction materials;</li> <li>• plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste;</li> <li>• minimize over ordering of concrete, mortars and cement grout by doing careful check before ordering.</li> </ul>	construction period					Municipal Services Ordinance; The Land (Miscellaneous Provisions) Ordinance; ETWB TCW NO. 15/2003.
7.7.6		<u>Site Clearance Waste</u> Scrub and other vegetation will be stripped for the tees, fairways, greens	Work site / During the	All Contractors		√		WDO; Public Health and



EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages**			Relevant Legislation & Guidelines
					D	C	O	
7.7.7		and access roads. The normal route for disposal for such material is landfill but in this case it is proposed that vegetation is passed through a "chipper" to break down the material into a medium that can be used as mulch / compost and provide a seed-bank for natural hydroseeding of exposed areas.  Non-inert materials should be kept separate and reused on-site as fill in preference to disposal at public filling areas which are operated by CEDD or disposal at landfill.	construction period					Municipal Services Ordinance ; The Land (Miscellaneous Provisions) Ordinance; ETWB TCW NO. 15/2003.
7.7.8		<u>Excavated Materials</u> Material generated during open cut works, and access route formation will comprise rock and soil and all this material will be reused in the site shaping process. It is anticipated that there will be no material requiring disposal off-site in public filling areas.	Work site / During the construction period	All Contractors		√		WDO; Public Health and Municipal Services Ordinance; The Land (Miscellaneous Provisions) Ordinance; ETWB TCW NO. 15/2003.
7.7.9		<u>Construction and Demolition (C&amp;D) Material</u> The C&D material generated from the site formation and demolition works should be sorted on-site into inert C&D material and C&D waste. In order to minimise the impact resulting from collection and transportation of C&D material for off-site disposal, the excavated material comprising fill material should be reused on-site as backfilling material. C&D waste, such as wood, plastic, steel and other metals should be reused or recycled and, as a last resort, disposed of to landfill. A suitable area(s) should be designated within the site for temporary stockpiling of C&D material and to facilitate the sorting process. The stockpiling/sorting area should be located far away from the identified sensitive receivers.	Work site / During the construction period	All Contractors		√		WDO; Public Health and Municipal Services Ordinance; The Land (Miscellaneous Provisions) Ordinance; ETWB TCW NO. 15/2003.
7.7.10		<u>Site fencing</u> Some site fencing may be required. Attention should be paid to WBTC No. 19/2001 which introduce a new policy requiring the use of metallic site hoardings and signboards in order to reduce the amount of timber used on construction sites.	Work site / During the construction period	All Contractors		√		WBTC No. 19/2001

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages**			Relevant Legislation & Guidelines
					D	C	O	
7.7.12		<u>Chemical Waste</u> Where the construction processes produce chemical waste, the Contractor must register with EPD as a Chemical Waste Producer. Wastes classified as chemical wastes are listed in the <i>Waste Disposal (Chemical Waste) (General) Regulation</i> . These wastes are subject to stringent disposal routes. EPD requires information on the particulars of the waste generation processes including the types of waste produced, their location, quantities and generation rates. A nominated contact person must be provided.	Work site / During the construction period	All Contractors		√		Waste Disposal (Chemical Waste) (General) Regulation
7.7.14		Hard standing surfaces draining via oil interceptors shall be provided in works area compounds. Interceptors will be regularly emptied to prevent release of oils and grease into the surface water drainage system after accidental spillages. The interceptor should have a bypass to prevent flushing during periods of heavy rain. Oil and fuel bunkers should be bunded to prevent discharge due to accidental spillages or breaches of tanks. Waste collected from any grease traps should be collected and disposed of by a licensed contractor.						
7.7.15		Any construction plant which is likely to leak oil, should have absorbent inert material e.g. sand, placed beneath it. This material should be replaced on a regular basis and the contaminated material should be stored in a designated, secure place. Any sand used for soaking oil waste is classified as chemical waste and should be disposed of in accordance with the <i>Waste Disposal (Chemical Waste) (General) Regulations</i> .						
7.7.16		Lubricants and waste oils are likely to be generated during the maintenance of vehicles and mechanical equipment. Used lubricants will be collected and stored in individual containers which are fully labelled. The containers should be stored in a designated secure place. If possible such waste should be sent to oil recycling companies; there are also companies which collect empty oil drums for reuse or refill.						
7.7.17		Oil and lubricant wastes are classified as chemical wastes, and if not recycled, should be collected by licensed collector and should be treated at the Chemical Waste Treatment Centre, Tsing Yi, or other sites licensed for disposal of waste oil. A trip ticket system operates to control the movement of such chemical waste and tickets have to be produced						

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages**			Relevant Legislation & Guidelines
					D	C	O	
7.7.18		upon the request of EPD.  Some paints and solvents are classified as chemical waste and, if used on site, will be subject to the stringent requirements of the <i>Waste Disposal (Chemical Waste) (General) Regulation</i> . Empty paint cans should be recycled or collected as waste. Any dry paint waste should be swept up and collected in containers for disposal.						
7.7.19		No lubricants, oils, solvents or paint products should be allowed to discharge into water courses, either by direct discharge, or as contaminants carried in surface water runoff from the construction site.						
7.7.20		<u>Sewage</u> An adequate number of portable toilets should be provided for the on-site construction workforce. The portable toilets shall be maintained in a state that will not deter the workers from using them.	Work site / During the construction period	All Contractors		√		WDO; Public Health and Municipal Services Ordinance; The Land (Miscellaneous Provisions) Ordinance; ETWB TCW NO. 15/2003.
7.7.21		<u>General Refuse</u> General refuse should be stored in enclosed bins or compaction units separate from C&D material. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D material. An enclosed and covered area is preferred to reduce the occurrence of 'wind blown' light material.	Work site / During the construction period	All Contractors		√		WDO; Public Health and Municipal Services Ordinance; The Land (Miscellaneous Provisions) Ordinance; ETWB TCW NO. 15/2003.
7.7.22		Solid and liquid wastes will be generated by the construction workers during the clearance/construction period. The refuse (mainly non-recyclable materials) will be collected regularly in black refuse bags and delivered to the existing solid waste disposal system and transferred to landfill for disposal.						
7.7.23		<u>Marine Sediments</u> The basic requirements and procedures for dredged mud disposal are specified under the ETWB TCW No. 34/2002. The management of the dredging, use and disposal of marine mud is monitored by the Marine Fill Committee (MFC), while the licensing of marine dumping is the	Marine Dredging area / During the construction period	All Contractors		√		ETWB TCW NO. 34/2002.

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages**			Relevant Legislation & Guidelines
					D	C	O	
7.7.25		responsibility of the Director of Environmental Protection (DEP). The dredged marine sediments will be loaded onto barges and transported to the designated disposal site.  During transportation and disposal of the dredged marine sediments, the following measures should be taken to minimise potential impacts on water quality: <ul style="list-style-type: none"> <li>• Bottom opening of barges shall be fitted with tight fitting seals to prevent leakage of material. Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved.</li> <li>• Monitoring of the barge loading shall be conducted to ensure that loss of material does not take place during transportation. Transport barges or vessels shall be equipped with automatic self-monitoring devices as specified by the DEP.</li> </ul>						
<b>Waste Management - Operation Phase</b>								
		N/A						

\* All recommendations and requirements resulted during the course of EIA Process, including ACE and/or accepted public comment to the proposed project.

\*\* D=Design, C=Construction, O=Operation

N/A Not applicable

**Table 15.4 Implementation Schedule of Ecological Impact Measures**

Ref	EA Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
					Design	Construction	Operation	
<b>Phase</b>								
		<p><u>Terrestrial Ecology</u></p> <p>Temporary drainage system, which would receive flows from all areas subject to earth works, would collect all site runoff. The collected runoff would be retained for turf grass irrigation.</p>	Site / During the construction period	Contractor	√	√		
		<p>Streams to streams have been avoided during the design stage by designating buffer zones. Except tributary A2 and the old tributary B3 where short sections would be culverted, other streams and tributaries will remain intact. Except at crossings, there will be no direct disturbance to the stream bed. To accommodate the construction and golf hole design, the buffer zone of tributary B2 will be reduced from 20m to 5m in one area. The buffer zone at this section of tributary B2 would be temporarily disturbed during site formation, but will be reinstated after construction. Stream C will be totally preserved by 20m buffer zones.</p> <p>A low flow drainage system is proposed to capture runoff by collecting surface water from the majority of the proposed third golf course and pump it back to the existing reservoir for reuse in irrigation. The drainage system design and concept approach for the proposed third golf course is similar to the existing golf course, which has been seen as successful, to minimize the impacts to nearby sensitive receivers.</p>	<p>Site / During the construction period</p> <p>Site / During the construction period</p>	Contractor	√	√		
		<p><u>Marine Ecology</u></p> <p>Five potential sites were surveyed for the desalination plant and the temporary barging point. Two locations were chosen as recommended sites.</p>	Temporary barging point & Dredging area/Design phase	Contractor	√			
		To avoid impacts on hard coral colonies, a floating barging point (Figure 9.8) is proposed to replace the original design (barging point supported by piles) (Figure	Temporary barging point/ During construction phase	Contractor	√	√		

Ref	EA Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
					Design	Construction	Operation	
		9.7). This could avoid any construction or damage on the shallow waters where the corals are located. Impacts on corals would thus be avoided.						
		Two plans of pipeline alignments were considered. The site selection survey results showed that coral colonies and some sparsely distributed seagrass individuals were found about 80 m south of the pier. If pipeline alignment plan 1 were selected, coral colonies and seagrasses there might be impacted. The majority of corals there were also un-transplantable. The second plan was therefore preferred with respect to coral conservation.	g area/ During construction phase	Contractor	√	√		
		A filter system is proposed to further improve the quality of the runoff from Hole 5 and part of the Hole 6. Nutrients and pesticides would be absorbed by the filter system with the effectiveness ranging from 67-96%.	During the construction phase	Course operator	√		√	
<b>Construction Phase</b>								
		<u>Terrestrial Ecology</u> Haul roads would be located on future fairway and cart paths alignments to minimise temporary disturbance of habitats.	e / During the construction period	Contractor		√		
		To compensate loss of trees, a total of 42 trees will be transplanted and 967 trees (more than 3:1 ratio) will be planted on the new golf course (see tree survey reports). 90% of these trees are native, while 76% of these will be light to heavy standard trees, which will provide instant breeding and foraging habitats for birds and butterflies. The use of light to heavy standard trees is more preferable to seedlings as bigger trees provide habitats of higher structural complexity.	e / During the construction period	Contractor		√		
		to streams have been avoided during the design stage by designating buffer zones. Except tributary A2 and the old tributary B3 where short sections would be culverted, other streams and tributaries will remain intact. Except at crossings at the two small pipe	e / During the construction period	Contractor		√		

Ref	EA Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
					D	S	D	
		culverts at the upstream part of tributary B2 and the culvert bridge at the upstream part of tributary B1, there will be no direct disturbance to the stream bed. To accommodate the construction and golf hole design, the buffer zone of tributary B2 will be reduced from 20m to 5m in one area. The buffer zone at this section of tributary B2 would be temporary disturbed during site formation, but will be reinstated after construction. Stream C will be totally preserved by 20m buffer zones.						
		Potential impacts due to site runoff would be reduced by scheduling most of the bulk site formation works during the dry season of 2005-6 in order to avoid excessive erosion.	During the construction period	Factor		√		
		Crossings of existing stream courses where construction works would be conducted, including the underground pipe culvert at tributary A2 and the old tributary B3, the two small pipe culverts at the upstream part of B2 and the culvert bridge at the upstream part of B1, bypass flow channel or pipes would be provided before the commencement of construction and maintain the stream flow until the crossings and the underground pipe culvert are finished.	Crossing/ During the construction period	Factor		√		
		Disturbance of stream bed during the construction of the permanent bridges by using precast unit of the bridge segments transported from other locations and installed to the proposed locations.	Crossing/ During the construction period	Factor		√		
		Best practice. Construction materials must be stored at locations away the stream courses. Site runoff would be desilted in settling ponds to reduce the potential for suspended sediments, organics and other contaminants to enter stream and marine environment.	During the construction period	Factor		√		
		B, C, and D will be monitored monthly during the construction phase to determine the status of <i>Caridina trifasciata</i> (shrimp) and <i>Nanhaipotamon hongkongensis</i> (freshwater crab). Stream condition will be recorded with reference to the protective buffer zone. Encroachment onto the buffer zone will be reported to the ER/ET. Sheet piling will be installed at the buffer	B, C & D/ During the construction phase	Factor		√		

Ref	EA Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
					D	S	D	
		zone perimeter as needed to prevent further encroachment. Stream sedimentation will be reported to the ER/ET, the agent causing sedimentation will be discovered, and sedimentation will be stopped.						
		<u>Ecology</u> temporary drainage system, which would receive flows from all areas subject to earth works, would collect all site runoff. The collected runoff would be retained for turf grass irrigation.	Area / During the construction period	Contractor		√		
		Work for the two pipelines for the desalination plant would require 50 days and would be scheduled to the extent possible from January to April 2006. This would avoid the flowering season for the seagrass <i>Halophila ovalis</i> , i.e. November and December (Fong et al. 2005) and the spawning season for corals, i.e. July to October (Lam 2000; Storlazzi, C. D. 2004).	Dredging area/ during dredging period	Contractor		√		
		Corals within the silt curtain, in particular the 79 colonies identified during the coral mapping survey, (see Appendix A9.2) would be transplanted. Prior to commencement of any marine construction works for the proposed project, the affected coral colonies would be tagged using plastic labels and a number would be assigned to each. The tagged corals in the dredging area at D2 site will be transplanted to the bedrock area about 80 m south of the ferry pier. All these transplantation works should be conducted by experienced marine ecologist(s) and should be completed before the commencement of marine construction works.	Dredging area/Prior to dredging	Contractor		√		
		Silt curtains will be deployed during dredging for the desalination plant. With the deployment of silt curtains around the dredging area for the desalination plant, adverse water quality impacts associated with the dredging and backfilling would be controlled to acceptable levels.	Dredging area/Prior to dredging	Contractor		√		
		Monitoring for transplanted corals: The transplanted coral colonies will be regularly checked by qualified marine ecologist quarterly for 1 year after transplantation. The presence, survival, and health conditions of the coral	Transplantation site/ during the construction phase	Contractor		√		



Ref	EA Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
					D	S	D	
		colonies will be recorded. The ecological conditions of the transplantation sites will also be reported. No action and limit level for transplanted corals would be required.						
		mooring points/structures of the floating pier would be located on the shore and/or at least 40m seaward to avoid the coral colonies at Site B2 which are concentrated within the first 15m seaward from the coastline and none recorded over 35m seaward.	primary barging point/ during construction of the barging point	contractor		√		
		location of the floating pier would also be shifted from the original location for barging point at Zone 2 and Zone 3 of the mapping area in Site B2 (see Figure 2 in Appendix A9.2), to Zone 5 to further protect corals. Impacts to corals are not expected.	primary barging point/ during the entire construction phase	contractor		√		
		corals would be monitored as a precautionary measure. Prior to the commencement of all construction works, a baseline monitoring on natural corals would be conducted. At each of the Site C, B2, Site D2 (on the bedrock 80m south of the existing ferry pier) and a Control Site near the AFCD's Coral Buoy at Sharp Island, 20 undamaged natural coral colonies of significant size would be tagged by the marine ecologist(s) to be approved by AFCD. Each of the tagged coral colonies shall be identified to species level and photographed. Information on location, size and general condition of the surrounding environment will be recorded. Other information shall also be recorded such as the survey date, time, climate, sea and tidal conditions. Photos of the tagged corals would be used for AFCD approval on coral selection. No less than 15 colonies would be selected for monitoring. Priority shall be given to the largest colonies. Tags on the excluded coral colonies will be removed at the first impact monitoring.  Monitoring frequencies would be changed at different stages. For the natural colonies at Site D2 (on the bedrock) and the Control Site, monitoring will be	Site B2, the bedrock at Site D2 and the Control Site/ prior to construction and during the construction phase	contractor		√		

Ref	EA Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
					D	S	D	
		conducted weekly at the first two weeks of dredging works for the desalination plant pipelines. If no exceedance was recorded, the monitoring schedule would be changed to biweekly till the pipeline construction works are finished. The presence, survival, and health conditions of the coral colonies will be recorded. For the natural colonies at Site C, B2 and the Control Site, monitoring will be conducted monthly for the first three months of the construction phase. If no exceedance was recorded, the monitoring schedule would be changed to quarterly during the rest of the construction phase. For each monitored coral colony, the percent of sediment coverage, the colour and the thickness of the sediment, the bleaching effect and live/dead ratio (the health status of coral colony) shall be recorded.						
		es at Site D3, and at Site D2 (if seagrasses are found at Site D2 during the baseline survey), would be monitored in conjunction with the coral monitoring at Site D2 (natural corals on bedrock). The construction phase monitoring schedule would be the same as for coral monitoring at Site D2, weekly during the first two weeks of dredging works. After that, the monitoring schedule would be changed to biweekly till the pipeline construction works are finished. The extent of the seagrass beds, the coverage percentage and health conditions of seagrasses will be recorded.	and D2/during construction	tractor		√		
<b>Final Phase</b>								
		<u>al Ecology</u> al Ecology monitoring is not required. ronomically-friendly turfgrass management practices and the comprehensive monitoring programme currently applied in the existing golf course will be extended to the proposed third golf course as well. Based on this three-tier approach to environmental protection, water quality impacts are not anticipated.	urse/During the operation phase	urse Operator			√	

Ref	EA Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
					D	S	D	
		<p><u>Ecology</u>                      Biological methods will also be applied at Holes 5 and 6. The proposed biological insecticide and fungicide products are all registered by AFCD. All are microbial or plant extracts, which are non-toxic to non-target organisms according to USEPA information (see Section 6 Water Quality Assessment). Chemical methods will only be used when necessary. This could significantly reduce the already low concentrations of chemicals in the runoff from Holes 5 and 6.</p>	<p>urse/During the operation phase</p>	<p>urse Operator</p>			<p>√</p>	
	2	<p>ing of the natural colonies at Site C, Site D2 (on the bedrock 80 m south of the existing pier) and the Control Site, would be conducted during the first two years of the operation phase. The monitoring schedule during the first three months would be monthly. If no exceedance was recorded, the monitoring schedule would be changed to semi-annually, i.e. once in dry season and once in wet season. The survival, and health conditions of the coral colonies will be recorded. For each monitored coral colony, the colour and the thickness of the sediment, the percent of sediment coverage, the bleaching effect and live/dead ratio (the health status of coral colony) shall be recorded. The need of any further monitoring will be reviewed according to the monitoring results after the second year monitoring. All tags on the monitored corals must be removed after the monitoring.</p>	<p>Site D2, the bedrock at Site D2 and the Control Site/ during the first two years of operation phase</p>	<p>Contractor</p>			<p>√</p>	
	2	<p>operation phase, the seagrass monitoring would be conducted in conjunction with the coral monitoring at Site D2 (natural corals on bedrock). Seagrasses at Site D3, and at Site D2 (if seagrasses are found at Site D2 during the baseline survey), would be monitored during the first two years of the operation phase. The monitoring schedule during the first three months would be monthly. After that, the monitoring</p>	<p>and D2/during the first two years of operation phase</p>	<p>Contractor</p>			<p>√</p>	

Ref	EA Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages			Relevant Legislation & Guidelines
					D	C	O	
		schedule would be changed to semi-annually, i.e. once in dry season and once in wet season. The extent of the seagrass beds, the coverage percentage and health conditions of seagrasses will be recorded. The need of any further monitoring will be reviewed according to the monitoring results after the second year monitoring.						

\* All recommendations and requirements resulted during the course of EIA Process, including ACE and/or accepted public comment to the proposed project.

\*\* D=Design, C=Construction, O=Operation

N/A Not applicable

**Table 15.5 Implementation Schedule of Fisheries Impact Measures**

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages**			Relevant Legislation & Guidelines
					D	C	O	
10.8.2		<u>Construction phase</u> In addition to the temporary drainage system which would collect site runoff for re-use for irrigation, site runoff would also be controlled by general site practices during the construction period.	Work site / During the construction period	All Contractor		√		
10.8.3		Silt curtains will be deployed during dredging for the desalination plant. With the deployment of silt curtains around the construction area, adverse water quality impacts associated with the dredging and back-filling would be controlled.	Work site / During the construction period	All Contractor		√		
10.7.12		The majority of the heavy construction works, in particular, the cut and fill earth works, would be conducted within the 2005-2006 dry season.	Work site / During the construction period	All Contractor		√		
10.10.1		Monitoring during construction is not required.						
		Operational Phase						
		Monitoring during operation is not required.						

\* All recommendations and requirements resulted during the course of EIA Process, including ACE and/or accepted public comment to the proposed project.  
 \*\* D=Design, C=Construction, O=Operation  
 N/A Not applicable

**Table 15.6 Implementation Schedule of Landscape and Visual Impact Measures**

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
<b>Landscape and Visual Impact - Construction Phase</b>								
Table 12.13		MC1 Site offices and construction yards: - Site offices and the construction yard shall be decommissioned after construction. Haul roads shall be decommissioned and restored with hydroseeding works after construction.	All site offices	All contractors		√		EIAO Guidance Note No. 8/2002
Table 12.13		MC2 Height of site offices: The height of site offices shall be controlled in order to avoid visual impacts.	All site offices	All contractors		√		EIAO Guidance Note No. 8/2002
Table 12.13		MC3 Hoarding and screening: Where practical the site offices areas, construction yards and storage areas shall be screened using olive green coated hoarding or vegetation around the peripheries of the works area until the completion of relevant construction phases.	All site office and construction yard areas.	All contractors		√		EIAO Guidance Note No. 8/2002
Table 12.13		MC4 Construction plant and building material: - Shall be orderly and carefully stored in order to appear neat and avoid visibility from outside where practical; - Excess materials shall be removed from site as soon as practical; All construction plant shall be removed from site upon completion of construction works.	In all construction yards.	All contractors		√		EIAO Guidance Note No. 8/2002
Table 12.13		MC5 Construction light: - To be oriented away from the viewing location of	All construction lights.	All contractors		√		EIAO Guidance Note No. 8/2002

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
		VSRs; and - All lighting shall have frosted diffusers and reflective covers. While construction at night might be required from time to time, this should be controlled and minimised.						
Table 12.13		MC6 Vegetation: - Temporary construction sites shall be restored to standards as good as, or better than, the original condition. In this respect, areas that are not covered by golf course grassing works shall be hydro seeded; - The potential for soil erosion shall be reduced at the construction stage by minimizing the extent of vegetation disturbance on site and providing a protective cover over exposed ground; and No plant or building materials shall be stored under the dripline of retained trees and no vehicle movement or other construction activities like washing, concrete mixing etc shall be carried out under the dripline of trees.	All temporary construction sites.	All contractors		√		EIAO Guidance Note No. 8/2002
Table 12.13		MT1 Compensation for losses: - The tree compensation to tree loss ratio shall be between 1:2 and 1:3; At least 700 new trees shall have be of light standard or larger size.	As shown on mitigation measures plans.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		MT2 The majority of compensation species shall comprise species that already occurs within the LIA boundaries;	General.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		MT3 Where practical, trees that require removal shall be transplanted on Site;	General.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		MT4 New trees shall be planted in groups in order to screen visual impacts and to provide additional shade at the administration building, rain shelters and halfway houses.	As shown on mitigation measure plans.	All contractors	√	√		EIAO Guidance Note No. 8/2002

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
Table 12.13		MT5 Tree Planting on Slopes: <ul style="list-style-type: none"> <li>New slopes with a gradient larger than 30° shall have whip tree planting.</li> <li>Such whip trees shall comprise tree species with shrub-like characteristics, such as <i>Gordonia axillaries</i> (大頭茶) and <i>Raphiolepis indica</i> (車輪梅).</li> </ul>	General.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		MT6 Tree planting works at the hill where the desalination plant will be located shall be carefully positioned in order to represent its original profile.	At the desalination plant.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		MT7 Tree Preservation: <ul style="list-style-type: none"> <li>No tree shall be transplanted or felled without prior approval by relevant Government departments in accordance with WBTC 24/94, WBTC 14/2002 and ETWB 2/2004;</li> <li>All trees that are marked for retention shall be fenced off with a 1.2m high fence around the dripline of trees or larger area;</li> </ul> Transplant preparation works shall be carried as soon as possible after commencement of construction. Rootball and crown pruning shall be carried out over at least 1 month.	All areas with existing trees	All contractors	√	√		WBTC 24/94 WBTC 14/2002 ETWB 2/2004
Table 12.13		MT8 Buffer Areas <ul style="list-style-type: none"> <li>For streams the width of the buffer zones will be 20m from the stream bank. The only exception would be the buffer zone in the reach of upper tributary of stream B lying between the two parts of Hole 10, where the buffer will zone will be 5m, the dry tributary of stream B that will be converted to an underground culvert and the secondary tributary of stream A that will also be converted to an underground culvert.</li> </ul> No construction activities will be allowed in the buffer	At streams	All contractors	√	√		

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
		zones, except for site formation works, which are required for the construction of bridge footings.						
Table 12.13		MS1 Bulk hydroseeding: Bulk site formation works shall be followed with bulk hydroseeding as soon as practical.	General.	All contractors		√		EIAO Guidance Note No. 8/2002
Table 12.13		MS2 Grassing: <ul style="list-style-type: none"> <li>In the case of golf course areas, grassing shall be carried out as soon as practical after sanding and shaping; and</li> <li>Sanding, shaping and grassing works shall be phased in sections.</li> </ul>	At proposed grassing areas.	All contractors		√		EIAO Guidance Note No. 8/2002
		MS3 Restoration: <ul style="list-style-type: none"> <li>In the case of residual areas that were disturbed during construction, which will not be part of the golf course areas, detailed site formation works and shaping shall be followed by hydroseeding and shrub planting as soon as practical; and</li> <li>The hydroseeding mix shall be composed of the following grass species: Eragrostis curvula Lolium Perenne Neyraudia reynaudiana Pennisetum purpureum; and the following shrub / small tree species: Gordonia axillaries, Rhamphiolepis indica and Rhodomyrtus tomentosa.</li> </ul>	At all residual areas.	All contractors		√		EIAO Guidance Note No. 8/2002
Table 12.13		ME1 Screening: <ul style="list-style-type: none"> <li>Bridges and pumping stations shall be screened by tree and shrub planting; and</li> </ul> Retaining wall shall be covered with climber plants.	All bridges and pumping stations.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		ME2 Abutments of bridges shall be surfaced with stone of volcanic origin with a colour and texture similar to that of rock in the surrounding landscape;	All bridges.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table		ME3	All pumping	All contractors	√	√		EIAO Guidance Note No. 8/2002



EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
12.13		Above-ground walls and foundations of pumping stations shall be surfaced with stone of volcanic origin with a colour and texture similar to that of rock in the surrounding landscape.	stations.					
Table 12.13		ME4 Above-ground covers of pumping stations shall have an olive green coating.	All pumping stations.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		ME5 The desalination plant shall be located within the hill behind the pier. Slope cutting of this hill shall have a natural appearance with hydroseeding cover.	As shown on the mitigation measure plans.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		ME6 Water tanks shall be located below surface level. Above-ground components shall be coated in olive green.	All water tanks.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		MB1 Extensions of the clubhouse shall have a surface cover that is in visual harmony with the clubhouse itself.	All new extensions of the clubhouse.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		MB2 Shrub planting shall be implemented in front of the new golf cart parking area in order to screen low-level views.	The new golf cart parking area.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		MB3 Tree and shrub planting shall be implemented on the peripheries of the maintenance building and its extensions.	At the maintenance building.	All contractors	√	√		EIAO Guidance Note No. 8/2002
Table 12.13		MB4 Halfway houses and rain shelters shall be surfaced with either stone or beige and olive green paint.	At all halfway houses and rain shelters.	All contractors		√		EIAO Guidance Note No. 8/2002
<b>Landscape and Visual Impact - Operational Phase</b>								
		N/A						

\* All recommendations and requirements resulted during the course of EIA Process, including ACE and/or accepted public comment to the proposed project.

\*\* D=Design, C=Construction, O=Operation

N/A Not applicable

**Table 15.7 Implementation Schedule of Cultural Heritage Mitigation Measures**

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
<b>Construction Phase</b>								
Table 13.4		Wan Chai Archaeological Site - Archaeological Watching Brief	Site formation and construction works	All Contractors		√		EIAO
Table 13.4		Grave #1 – Preservation in-situ - Fenced off three metre buffer zone around the grave	Site formation and construction works	All Contractors		√		EIAO
Table 13.4		Grave #5 - Preservation by record; and recovery of structural elements (if required by AMO)	Construction phase (prior to commencement of works)	All Contractors		√		EIAO
Table 13.4		Grave #20 - Preservation by record; and recovery of structural elements (if required by AMO)	Construction phase (prior to commencement of works)	All Contractors		√		EIAO
Table 13.4		Any, as of yet unidentified graves at Kap Lo Kok. If a grave is found works will stop in the immediate vicinity of the grave until it can be inspected by AMO staff.	Site formation and construction works	All Contractors		√		EIAO
<b>Operational Phase</b>								
		N/A						

\* All recommendations and requirements resulted during the course of EIA Process, including ACE and/or accepted public comment to the proposed project.

\*\* D=Design, C=Construction, O=Operation

N/A Not applicable

**Table 15.8 Implementation Schedule of Land Contamination Mitigation Measures**

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
<b>Land Contamination - Construction Phase</b>								
11.9.2		<p>Since the exact cut areas on site during construction by the Contractor have not been determined at this stage, the Contractor should implement the suitable precautions and preventive measures for the discovery of buried or abandoned ordnance during the construction. Moreover, it is recommended that standard good practice should be implemented during the construction phase in order to minimize any potential exposure to contaminated soils or groundwater. These measures include:</p> <ul style="list-style-type: none"> <li>• The Contractor should sweep the area of intended excavation with a metal detector to check any ordnance underneath the ground prior to any excavation.</li> <li>• For any detection of metals under the ground, the Contractor should cease work immediately before confirming the identity of the cause. For any suspect of artillery ordnance, Hong Kong Police Force should be informed.</li> <li>• The use of bulk earth-moving excavator equipment would minimise construction workers' potential contact with the contaminated materials;</li> <li>• Exposure to any contaminated materials can be minimised by the wearing of appropriate clothing and personal protective equipment such as gloves (when interacting directly with suspected contaminated material), providing adequate hygiene and washing facilities and preventing smoking and eating during such activities;</li> <li>• Stockpiling of contaminated soil should be avoided. If this cannot be avoided, the stockpile of contaminated materials should be segregated from the uncontaminated ones. Moreover, the contaminated materials should be properly covered with waterproof material (e.g. tarpaulin sheet) to avoid leaching of contaminants, especially during rainy season.</li> <li>• Vehicles containing any excavated materials should be suitably covered to limit potential dust emissions or contaminated wastewater run-off, and truck bodies and tailgates should be sealed to prevent any leakage during transport or during wet conditions;</li> <li>• Only licensed waste haulers should be used to collect and transport any contaminated material to an appropriate disposal site and</li> </ul>	Work site / During the construction period	All Contractors		√		Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 35); Water Pollution Control Ordinance (Cap 358).

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
		procedures should be developed to ensure that illegal disposal of waste does not occur; <ul style="list-style-type: none"> <li>Necessary waste disposal permits should be obtained, as required, from the appropriate authorities, in accordance with the <i>Waste Disposal Ordinance (Cap 354)</i>, <i>Waste Disposal (Chemical Waste) (General) Regulation (Cap 35)</i>, as required;</li> <li>Records of the quantities of wastes generated and disposed of should be maintained;</li> <li>Adequate washing facilities should be provided on site; and</li> <li>In accordance with good construction practice, silt traps should be used to reduce the impact to drainage caused by suspended solids arising from disturbed ground, or any construction materials such as cement and gravel. Groundwater should be disposed of in accordance with the <i>Water Pollution Control Ordinance (Cap 358)</i>.</li> </ul>						
11.11.1		Based on preliminary site investigation, the site is considered as a potentially land contaminated site as hotspots of contamination of lead and sulphur were identified. Further investigation for land contamination at this site is therefore required and is detailed in the Contamination Assessment Plan (CAP) of this section to be undertaken prior to commencement of excavation works. A Contamination Assessment Report (CAR) should be prepared and if the results of the site investigation reveal contamination at the subject site, a Remediation Action Plan (RAP) should also be prepared and submitted together with the CAR to EPD for approval.	Work site / During the construction period	All Contractors		√		Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 35); Water Pollution Control Ordinance (Cap 358).

**Land Contamination - Operational Phase**

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
11.10.3		<p><i>Prevention of Contamination Impact</i></p> <p>In order to prevent the chemicals from contaminating the land, a Turfgrass Management Plan (TMP). The latest version of the HKJC Kau Sai Chau Golf Course “Turfgrass Management Guidelines” is appended to the EIA report.</p>	Golf course/During the operation phase	Golf Course Operator			√	Waste Disposal Ordinance (Cap 354), Waste Disposal (Chemical Waste) (General) Regulation (Cap 35); Water Pollution Control Ordinance (Cap 358).
11.10.4		<p>As present in the water quality assessment section, four main chemicals are used for existing golf courses, they are nitrogenous fertilizers, herbicides, fungicides and insecticides. The approach should be to minimize application of fertilizers and this is also driven by economic requirements to minimize recurrent costs. Healthy growth rates are achieved when the grass is not over fertilized or over watered. A balanced programme allows the grass to stand up to wear and develop disease resistance. In line with existing practice, the following mitigation measures will be implemented:</p> <ul style="list-style-type: none"> <li>• Nutrient status will be monitored every 6 months of the year through the aid of soil and leaf tissue tests. Tests help determine the optimum nutrient provisions for turf grass.</li> <li>• A slow release fertilizer will be used to help minimize the amount of nitrate leached from the soil.</li> <li>• Applying low quantity of fertilizer is recommended to minimize the leaching due to the active uptake.</li> <li>• Applications will not be made if heavy rain is forecast to minimize the significant nitrogen runoff.</li> </ul>						
11.10.8		Routine soil testing for nutrients as described in the TMP will be conducted to ensure that nutrient applications to the golf course are having the desired effect. Adjustments are made to the applications program to amend any soil imbalances or deficiencies in nutrients. To monitor whether there is any land contamination during the operation stage, regular soil sampling and testing (e.g. say for every 6 month or a period agreed by EPD) will be taken according to the two publications issued by EPD (see section 11.2.1) and the certified test results reports should be submitted to EPD for information.	Golf course/During the operation phase	Golf Course Operator			√	
11.10.9		All fertilizers and pesticides will be well-documented including following details:						

EIA Ref	EM&A Ref	Environmental Protection Measures*	Location / Timing	Implementation Agent	Implementation Stages **			Relevant Legislation & Guidelines
					D	C	O	
		<ul style="list-style-type: none"> <li>Location of applications;</li> <li>Type of fertilizer applied;</li> <li>Amount applied in kg per hectare;</li> <li>Date of applications; and</li> <li>Product applied.</li> </ul>						
11.10.10		<p><u>Spillages</u></p> <p>In the event that any spillages occur on the golf courses, the following actions would be taken:</p> <ul style="list-style-type: none"> <li>Make every effort to contain the spillage responsibly and safely;</li> <li>Block drainage downstream flows and divert upstream flows where practicable;</li> <li>Notify Environmental Protection Department;</li> <li>Collect samples of downstream water for analysis;</li> <li>Continue sampling until the impact of the spillage can no longer be detected.</li> </ul>	Golf course/During the operation phase	Golf Course Operator			√	
11.10.12		The extent of the contamination (e.g. volume of the contaminated soil) should be identified and confirmed by taken samples of contaminated soil for testing. Remediation action should also be carried out and completed within 3 to 6 months.	<u>Golf course/During the operation phase</u>	<u>Golf Course Operator</u>			√	

\* All recommendations and requirements resulted during the course of EIA Process, including ACE and/or accepted public comment to the proposed project.

\*\* D=Design, C=Construction, O=Operation

N/A Not applicable

# **Appendix B**

## **Sample Data Sheet, Complaint Log and Interim Notification Exceedances**

**Appendix B  
 Data Sheet for TSP Monitoring**

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

	<u>Name &amp; Designation</u>	<u>Signature</u>	<u>Date (dd/mm/yy)</u>
Field Operator	_____	_____	_____
Laboratory Staff	_____	_____	_____
Checked by	_____	_____	_____



**Appendix B  
 Water Quality Monitoring Data Record Sheet**

Monitoring Location				
Date ( dd/mm/yy)				
Start Time (hh:mm)				
Weather				
Sea Conditions				
Tidal Mode				
Water Depth (m)				
Monitoring Depth		Surface	Middle	<b>Bottom</b>
Salinity				
Temperature (°C)				
DO Saturation (%)				
DO (mg/l)				
Turbidity (NTU)				
Suspended Solids (SS)				
Sample Identification				
SS Laboratory Results* (mg/l)				
Observed Construction Activities	<100m from location			
	>100m from location			
Other Observations				

\* The SS results are to be filled up once they are available from the laboratory.

	<u>Name &amp; Designation</u>	<u>Signature</u>	<u>Date (dd/mm/yy)</u>
Recorded By	_____	_____	_____
Checked By	_____	_____	_____



Appendix B

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 (dd/mm/yy) \_\_\_\_\_

