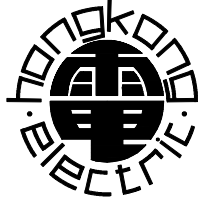


The Hongkong Electric Co. Ltd.
香港電燈有限公司



**LAMMA POWER STATION
NAVIGATION CHANNEL IMPROVEMENT
ENVIRONMENTAL IMPACT ASSESSMENT
(APPENDIX 6)**

**Environmental Monitoring & Audit Manual
(Construction Phase)**

January 2003

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1 INTRODUCTION

1.1 PURPOSE OF THE MANUAL

The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to provide information, guidance and instruction to personnel charged with environmental responsibilities and undertaking environmental monitoring and auditing work during the Lamma Power Station Navigation Channel Improvement (the Project). It provides systematic procedures for the monitoring and auditing of potential environmental impacts that may arise from the works.

1.2 BACKGROUND

1.2.1 Background to the Project

As the total dredging volume exceeds 500,000m³, the dredging operation of the Channel improvement is a designated project according to the Environmental Impact Assessment (EIA) Ordinance, Schedule 2, Part I, C.12. The EIA report for the Project was prepared in response to the Environmental Impact Assessment Study Brief No. ESB-078/2001 issued by EPD on 23 July 2001.

The EIA study concluded that no unacceptable or insurmountable impacts were expected from the proposed development, provided that the recommended mitigation measures in the EIA Report are adopted and implemented.

This EM&A Manual was prepared as per the mitigation measures and environmental monitoring requirements recommended in the EIA report.

1.2.2 Project Description

The Hongkong Electric Company Limited (HEC) is proposing to improve the existing navigation channel in order to provide a safe shipping access to and from the Lamma Power Station. The work involves re-deepening the existing channel by dredging to a water depth of -16 mPD approximately with an estimated total dredging volume of 2.98 million m³.

The Channel was first dredged to -15.9 mPD (approximately) in 1981. Maintenance of the Channel by means of dredging down to about -16.5 mPD level was carried out in 1989-1990. To cope with the updated vessel operation, the turning basin of the Channel was enlarged by extending 250m southward in early 2001.

The Project Area is illustrated in Figure 1.1. The grey area shows the limit of the Channel where dredging will be required under this Project. According to the latest bathymetric survey of the Channel, there is already sufficient water depth in the remaining section of the Channel in the south (beyond the grey area in Figure 1.1) and no dredging will be required.

The dredging options for the Project are continuous dredging using grab dredgers with cage-type silt curtains or intermittent dredging using one Trailer Suction Hopper Dredger (TSHD). Either one of two dredging options will be deployed. The dredging work is tentatively scheduled to take place from May to December 2003. Marine vessels will transport the dredged sediments to the mud disposal sites approved by the Marine Fill Committee for disposal.

1.3 OBJECTIVES OF THE ENVIRONMENTAL MONITORING AND AUDIT PROGRAMME

The environmental impacts resulting from the Lamma Power Station Navigation Channel Improvement are studied and presented in the EIA Report. The Report also specifies the mitigation measures that 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 contained in Annex B of this Manual. The EIA Report recommends that environmental monitoring should be carried out for water quality. In addition, environmental audits for water quality and waste management issues are also required.

This Manual provides specific details of the EM&A requirements that have been recommended to ensure compliance with the mitigation measures specified in the EIA Report.

The main objectives of this EM&A programme are to:

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

- provide data against which environmental audits may be undertaken.

1.4 THE SCOPE OF THE ENVIRONMENTAL MONITORING AND AUDIT PROGRAMME

The scope of this EM&A programme is to:

- establish baseline water quality levels at specified locations and review these baseline levels at specified period acceptable to the Authority;
- implement water quality impact monitoring programmes;
- implement audit requirements to address water quality and waste issues;
- liaise with and provide environmental advice (as requested or when otherwise necessary) to site staff on the comprehension and consequences of the EM&A programme;
- identify and resolve environmental issues and other functions as they may arise from the works;
- check and quantify the Contractor's overall environmental performance, implement Event and Action Plans (EAPs), and recommend and implement remedial actions to mitigate adverse environmental effects as they may arise from the works;
- conduct regular reviews of monitored impact data as the basis for assessing compliance with defined criteria and to ensure that necessary mitigation measures are identified, designed and implemented, and 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 any other environmental issues deemed to be relevant to the construction process;
- conduct regular site audits of a formal or informal nature to assess:
 - the level of the Contractors' general environmental awareness,
 - the Contractors' implementation of the recommendations in the EIA Report,
 - the Contractors' performance as measured by the EM&A programme,
 - the need for specific mitigation measures to be implemented or the continued usage of those previously agreed; and

- to advise the site staff of any identified potential environmental issues.
- submit regular 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.

1.5 STRUCTURE OF THE EM&A MANUAL

Following this introductory Section, the remainder of the Manual is set out as follows:

- *Section 2* presents the organisation and structure for the management of the EM&A programme, outlines the various parties involved in the EM&A process, the notes and responsibilities of key individuals;
- *Section 3* presents the EIA findings and sets out the EM&A general requirements;
- *Section 4* details the requirements for baseline and impact monitoring for water quality, and lists relevant monitoring equipment, locations, compliance and Event and Action Plans (EAPs);
- *Section 5* details the audit requirements with regard to waste management issues;
- *Section 6* describes the scope and frequency of site auditing; and
- *Section 7* details the EM&A reporting requirements.

In addition, *Annex A* provides samples for EM&A Reporting Documentation, and *Annex B* presents the summary of mitigation measures recommended in the EIA Report in the form of an Implementation Schedule.

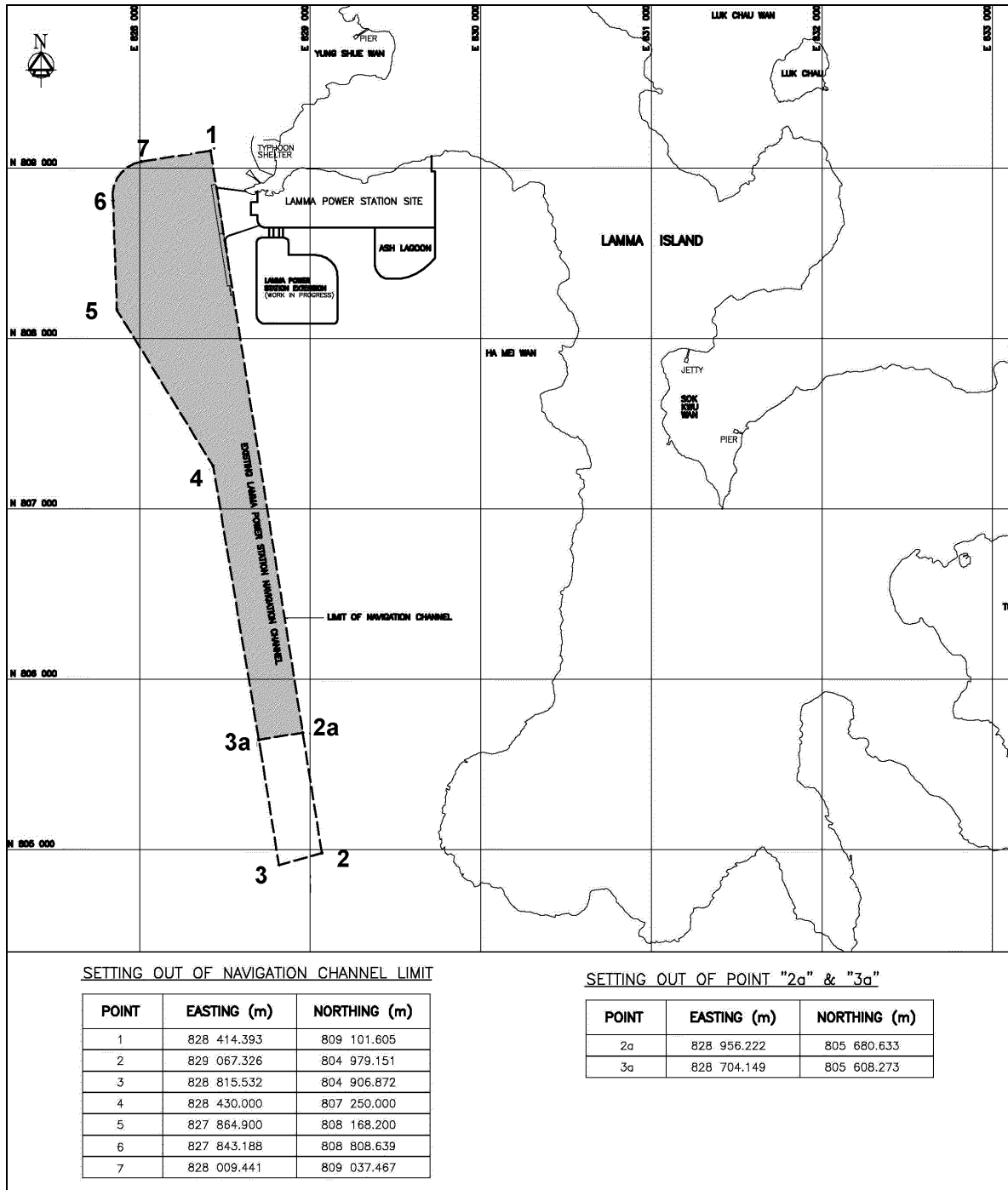


Figure 1.1. Layout of Work Site

2 ORGANISATION AND STRUCTURE OF THE EM&A PROGRAMME

2.1 GENERAL

The Project requires that the Engineer appoint an Environmental Team (ET) before the commencement of construction of the Project. The roles of the ET are to conduct the monitoring and auditing works and to provide specialist advice to the Engineer on the undertaking and implementation of his environmental responsibilities.

The ET shall have previous relevant experience with managing similarly sized EM&A programmes and the Environmental Team Leader (ET Leader) shall be a recognised environmental professional, who has at least seven years relevant experience in environmental monitoring and auditing or environmental management.

To maintain strict control of the EM&A process, an independent environmental consultant shall be appointed to act as an "Independent Environmental Checker" (IEC) before the commencement of construction of the project. The IEC is to verify and validate the environmental performance of the Contractor and the Environmental Team. The IEC shall have at least seven years' experience in EM&A or environmental management.

2.2 PROJECT ORGANISATION

The Chief Engineer (Projects) (thereafter called CE(P)) is the official contact person between EPD and HEC. CE(P) shall be authorized to sign all submissions to the EPD in accordance with the requirements of the EM&A Manual.

The Engineer of HEC shall appoint appropriate members of the Project and resident site staff to manage and supervise the work of the Contractor, the Environmental Team (ET) Leader and its various specialist teams and other professional delegates.

An Environmental Team will be established in-house to implement the environmental monitoring work as required by this EM&A Manual.

An Independent Environmental Checker (IEC) will be appointed by HEC to audit and verify the overall environmental performance of the construction site and assess the effectiveness of the ET.

The organisation and management structure for the EM&A programme is illustrated in *Figure 2.1*. The specific roles and responsibilities of the various parties involved in the EM&A process outlined above are further expanded upon in the following sections.

2.2.1 Contractor

Reporting to the Engineer, the Contractor shall:

- work within the scope of the contract and other tender conditions;
- provide assistance to the ET in conducting the required environmental monitoring;
- participate in the site inspections undertaken by the ET, as required, and undertake any corrective actions instructed by the Engineer;
- provide information/advice to the ET or IEC regarding works activities which may contribute, or be contributing to the generation of adverse environmental conditions;
- implement measures to reduce impact where 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.

2.2.2 Engineer or Engineer's Representative

The Engineer or Engineers Representative (ER) shall:

- monitor the Contractor's compliance with contract specifications, including the effective implementation and operation of environmental mitigation measures and other aspects of the EM&A programme;
- engage an ET to undertake the monitoring, laboratory analysis and reporting of the environmental monitoring and audit requirements outlined in this Manual;
- comply with the agreed Event and Action Plans in the event of any exceedance;
- employ an Independent Environmental Checker IEC to audit the results of the EM&A works carried out by the ET; and
- instruct the Contractor to follow the agreed protocols or those in the Contract Specifications in the event of exceedances or complaints.

2.2.3 Environmental Team

The duties of the Environmental Team (ET) and Environmental Team Leader (ET Leader) are to:

- implement the EM&A programmes in accordance with the EM&A requirements as contained in this EM&A Manual;
- monitor the various environmental parameters as required by this or EM&A Manual;
- prepare Baseline Monitoring Report, Monthly EM&A reports and Final EM&A summary report for submission to the Authority;
- collect, analyse and statistically evaluate the EM&A monitoring data, with reference to the EIA Study recommendations, and to review the success of the EM&A programme by determining the adequacy of the mitigation measures implemented and the validity of the EIA predictions. Emphasis should be placed on identifying and resolving any adverse environmental impacts before they arise;
- conduct site inspections/investigate and inspect the Contractor's equipment and work methodologies with respect to pollution control and environmental mitigation, and to identify environmental issues that may require mitigation before the problem arises;
- audit the environmental monitoring data and report the status of the general site environmental conditions and the implementation of mitigation measures resulting from site inspections;
- certify the environmental acceptability of permanent and temporary works, relevant design, plans and submissions;
- monitor compliance with environmental protection clauses/specifications in the Contract;
- regularly review the project program and methodologies and comments as necessary;
- report on the environmental monitoring and audit results and the wider environmental issues (such as compliance with environmental and pollution prevention and control regulations) and conditions to the Engineer;
- adhere to the agreed protocols (contained in this EM&A Manual and/or those in the Contract Specifications) in the event of exceedances or complaints. For complaints, this will comprise the investigation of all complaints, and the evaluation and identification of suitable corrective measures;
- liaise with the IEC on all environmental issues performance matters, and the timely submission of relevant deliverables;

- advise the Contractor on environmental improvements, awareness, enhancement matters etc; and
- certify if necessary any additional mitigation measures or alternative measures that are required to be undertaken by the Contractor as the corrective actions to prevent adverse environmental impact arising from the Project.

2.2.4 Independent Environmental Checker

An Independent Environmental Checker (IEC) shall be appointed to independently audit and verify the overall environmental performance of the works and to assess the effectiveness of the ET in their duties. The IEC, who shall be independent from the management of the Project, shall advise the Engineer on the environmental issues related to the Project. The main objectives will be to:

- audit the overall EM&A programme including the implementation of all environmental mitigation measures, submissions relating to EM&A, and other submissions required under the Environmental Permit (EP);
- validate and confirm the accuracy of the monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
- conduct random site inspections;
- review the effectiveness of environmental mitigation measures and project environmental performance;
- review and verify the monthly EM&A Reports, Baseline Monitoring Report and Final EM&A Summary Report prepared by ET;
- verify the environmental acceptability of permanent and temporary works, relevant design plans and submissions, if any, under the EP;
- verify, if necessary, any additional mitigation measures or alternative measures to be undertaken by the Contractor as corrective actions to prevent adverse environmental impacts arising from the construction activities; and
- check complaint cases and the effectiveness of corrective measures implemented by the Contractor and the ET in case of Action/Limit level exceedance.

2.3 PROJECT PROGRAMME

The project programme would tentatively commence in May 2003. The duration of the project would be about eight months. The main activity for the project is dredging. Marine vessels will transport the dredged sediment to the mud disposal sites approved by the Marine Fill Committee of the Civil Engineering Department.

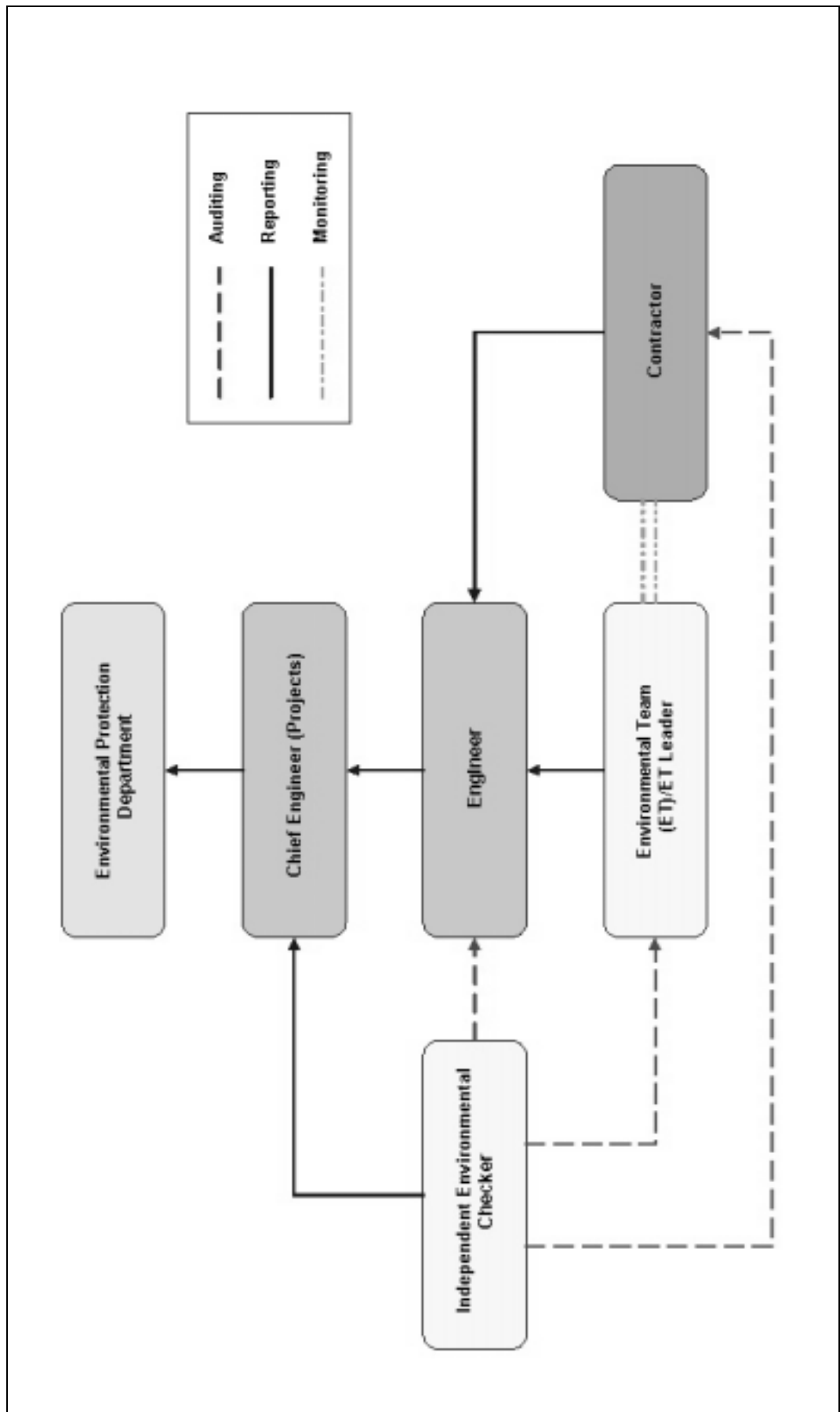


Figure 2.1. Organization of Environmental Monitoring and Audit Programme

3 EM&A GENERAL REQUIREMENTS

3.1 INTRODUCTION

In this section, the general requirements of the EM&A programme for the Lamma Power Station Navigation Channel Improvement Project are presented. The recommended mitigation measures and schedule for their implementation are detailed in *Annex B*.

The environmental issues associated with the Project which were identified during the EIA process will be addressed through the monitoring and controls specified in the EM&A Manual and contract.

3.2 EM&A REQUIREMENTS

The following sub-sections summarises the EM&A requirements recommended in the EIA Report:

3.2.1 Water Quality

Using the Lamma Channel Model constructed from the Lamma Power Station Extension EIA, the potential WQ impact of the proposed dredging works in terms of SS levels has been assessed. The elevation of the SS levels in the identified Sensitive Receivers is a deciding factor of the maximum dredging rates for the two dredging options.

The releasing potential of the contaminants in the seabed sediment has been ascertained from a purpose-designed Elutriation Test. The WQ parameters examined include nitrogen nutrients, sediment oxygen demand, heavy metals and micro-pollutants. For nitrogen nutrients and sediment oxygen demand, the resulting pollution elevation or oxygen depletion modelled was compared to the relevant WQOs.

Provided the dredging rates do not exceed the recommended maximum rates, the SS elevation and oxygen depletion will not lead to non-compliance with the local WQOs at all the WQSRs except in the very vicinity of the dredging locations. Currently there is no statutory WQ standard for Hong Kong's marine environment in terms of heavy metals or micro-pollutants. The predicted elevation of the heavy metals and micro-pollutants in the receiving waters has been compared to the standards in the EU, UK, USA and Japan. The increase in those pollution levels resulting from the proposed Channel Improvement at the recommended maximum dredging rates is well below the lowest values of the international standards reviewed, and is not considered to be of any concern.

At the recommended maximum dredging rates, the sediment deposition rates are predicted to be less than 0.01 kg/m²/day along the west coast of Lamma Island and less than 0.001 kg/m²/day in the proposed South Lamma water for both dredger options. These figures are well below the level of any ecological concern.

In view of the importance of the dredging rates in controlling WQ, the channel would be divided into four working zones for dredging. Each one has its own maximum dredging rate for wet and dry seasons respectively (*Annex B, Table B2 & Figure B2*). If dredging work is carried out in more than one zone in any day, the lowest rate in the affected zones will apply for that day. The dredging rates for each working zones will be reported in the Monthly EM&A Report on a daily basis to ensure that the maximum dredging rates will not be exceeded. The reporting of daily dredging rates should indicate the type of dredgers used, i.e. grab dredger or trailer suction hopper dredger, and the respective sizes of grab dredgers used.

No additional WQ mitigation measures are required as long as the maximum dredging rates for respective dredgers recommended in this EIA are not exceeded. Nevertheless, a comprehensive WQ monitoring (discussed in Section 4) will be carried out to verify the modelling predictions. Should the WQ monitoring during the construction work indicate that any exceedance of the WQOs is due to the dredging work, the maximum dredging rates would be reviewed.

3.2.2 Marine Ecology

Literatures and studies on the marine and coastal ecology of the Study Area has been reviewed in detail for this EIA and supplemented with additional field surveys conducted on 10 December 2001. Of greatest importance are the coastal stretches and waters off southern-south western Lamma. The Finless Porpoise was considered to be the key species potentially affected both directly and indirectly by works given that the southern extent of the Study Area is considered to be an important habitat, particularly in the period from February to April. Corals in this area are extremely sparse and patchy and already showing signs of stress. Furthermore they did not support significant reef communities and are of low ecological value when put into the Hong Kong context.

To protect the marine and coastal ecology, it is recommended that monitoring and audit focus on the source of the ecological impacts i.e. dredging works and their WQ impacts. By ensuring WQ does not exceed WQOs for the area then ecological impacts can be prevented. This can be accomplished through the water quality monitoring at the sensitive receivers around the study area. Details of the water quality monitoring will be discussed in Section 4.

Further, to avoid disruption to the finless porpoise population in the southeastern coastal waters of Lamma Island, some mitigation measures as shown in Annex B would be adopted.

An effective EM&A program through the on-site inspection will be formulated to ensure that the mitigation measures will be fully implemented. Hence, no ecological monitoring and audit is required.

3.2.3 Fisheries

The environmental assessment of the Project predicted that the recommended dredging rates at various working zones would prevent exceedance of the Water Quality Objectives (WQOs). As the dredging works are short term, small elevations in SS across the study area are not expected to affect fishing activities. The mitigation measures as recommended in the Marine Ecology would also help to minimise the impacts on fisheries activities as well. In addition, an intensive monitoring of water quality around the study area will be used to verify EIA predictions. Details of water quality monitoring are discussed in Section 4. As the EM&A requirements for fisheries impact will be similar to those recommended in Water Quality and Marine Ecology, no specific EM&A programmes is required for fisheries.

3.2.4 Noise

According to the EIA report, the noise impact of this Project on the NSRs is negligible and the cumulative noise levels are below the noise limits during normal working hours (07:00-19:00 on normal weekdays). The same conclusions apply to the restricted hours of 07:00-19:00 on holidays including Sundays and 19:00-23:00 on all days. The noise impact will also comply with the noise limit for the restricted hours of 23:00-07:00 on all days for the TSHD option and also for the grab dredgers option by scheduling the dredgers in working zones. As such, no noise monitoring for this project in particular is necessary. However, a daily logbook should be maintained to record the number and type of plants deployed for audit purpose.

In case justified noise complaints are filed, a near-field noise monitoring programme for the dredgers will be called into action. This is to check if the sound power levels (SWL) of the dredgers comply with that stipulated in the CNP. Should the SWL of dredger exceed that quoted in the CNP, appropriate action would be taken to remedy the situation.

3.2.5 Waste Management

The only source of waste generation is from the dredging works. It is estimated that a total of 2.98 million m³ of seabed sediment will be dredged from the Channel over a 8-month period from May to December 2003. The elutriation test results concluded in the EIA report have shown that the concentration of all heavy metals and organic micro-pollutants from the samples are below the level of concern. Therefore it is concluded that the impact from heavy metals and organic micro-pollutants leaking from dredging materials are of negligible quantities and will not be of any concern to the overall WQ. The dredged materials, classified as Category L suitable

for open sea disposal by EPD (cf letter ref (23)in EP 60/GI/12-293 dated 22/8/2001), will be disposed of at designated marine dumping sites approved by the Marine Fill Committee of the Civil Engineering Department. The contractor would obtain a valid dumping permit from the Authority prior to the commencement of dredging work. Detail EM&A requirements on waste management will be discussed in Section 5.

Based on the above summaries, the predominant environmental issues subject to EM&A are water quality and waste management. A broad description of the monitoring programme for these issues is provided in the following sections. The monitoring of the effectiveness of the mitigation measures will be achieved through this process as well as through site inspections. The inspections will include within their scope, mechanisms to review and assess the Contractor's environmental performance, ensuring that the recommended mitigation measures have been properly implemented, and that the timely resolution of received complaints are managed and controlled in a manner consistent with the recommendations of the EIA.

3.3 ENVIRONMENTAL MONITORING

The monitoring of environmental impacts shall be carried out by the Environmental Team; the monitoring work will comprise water quality impacts at representative sensitive receivers or strategic locations in the vicinity of the works. The monitoring programme for the Project is presented in *Sections 4*. Proper waste management is also required to ensure that the contractor will follow the mitigation measures recommended in the EIA report. The specific requirements are presented in *Section 5*.

3.4 ACTION AND LIMIT LEVELS

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

- *Action Levels*: beyond which there is a clear indication of a deteriorating ambient environment for which appropriate remedial actions are likely to be necessary to prevent environmental quality from falling outside the *Limit Levels*, which would be unacceptable; and
- *Limit Levels*: statutory and/or agreed contract limits stipulated in the relevant pollution control ordinances, the Hong Kong Planning Standards and Guidelines (HKPSG) or *Environmental Quality Objectives* established by the EPD. If these are exceeded, works should not proceed without appropriate remedial action, including a critical review of plant and working methods.

3.5 *EVENT AND ACTION PLANS*

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

3.6 *SITE INSPECTIONS*

In addition to monitoring water quality levels as a means of assessing the ongoing performance of the Contractor, the ET shall undertake regular site inspections and audits of on-site practices and procedures. The primary objective of the inspection and audit programme will be to assess the effectiveness of the environmental controls established by the Contractor and the implementation of the environmental mitigation measures recommended in the EIA.

Whilst the audit and inspection programme will undoubtedly complement the monitoring activity with regard to the effectiveness of water quality control, the criteria against which the audits shall be undertaken shall be derived from the clauses within the Contract Documents which seek to enforce the recommendations of the EIA and the established management systems.

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

Section 6 of this Manual presents details of the scope and frequency of on-site inspections and defines the range of issues that the audit protocols should be designed to address.

3.7 *ENQUIRIES, COMPLAINTS AND REQUESTS FOR INFORMATION*

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

All enquiries concerning the environmental effects of the works, irrespective of how they are received, shall be reported to the Engineer and directed to the Contractor where necessary. The detailed complaints handling procedure is presented in Section 6.3.

3.8 *REPORTING*

Monthly reports shall be prepared by the Environmental Team and verified by the Independent Environmental Checker. The monthly reports shall be prepared and submitted within 2 weeks of the end of each calendar month. Additional details on reporting protocols are presented in *Section 7*.

3.9 *REVIEW OF EM&A*

The EM&A work will be reviewed taking into account the experience gained and the actual environmental conditions as and when required.

3.10 *CESSATION OF EM&A*

The ET shall continue to carry out EM&A work until the completion of the navigation channel improvement works.

4 WATER QUALITY MONITORING

4.1 INTRODUCTION

In this section, the requirements, methodology, equipment, monitoring locations and mitigation measures for the monitoring and audit of water quality impacts from the Project are presented.

4.2 METHODOLOGY AND CRITERIA

Based on the recommendation in the EIA report, marine water quality monitoring shall be carried out to ensure that any deteriorating water quality is readily detected and that timely action is taken to rectify the situation. The appropriate water quality mitigation measures are outlined in the Implementation Schedule (in *Annex B* of this EM&A Manual).

4.3 WATER QUALITY MONITORING

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

- to determine the effectiveness of the operational controls and mitigation measures employed, and the need for supplementary mitigation measures; and
- to check compliance with relevant WQOs;

Parameters to be measured *in situ* are:

- Dissolved oxygen (DO) (% saturation);
- Dissolved oxygen (DO) (in mgL⁻¹);
- Temperature (°C);
- Turbidity (NTU);
- Salinity (ppt);
- pH; and
- Water depth (m).

Parameter to be measured in the laboratory is:

- suspended solids (mg L⁻¹);

In addition to the water quality parameters, other relevant data shall also be measured and recorded as follows:

- monitoring location/position;

- measurement depth;
- time;
- weather conditions,
- sea conditions;
- tidal stage;
- special phenomena and work activities at the site.

A sample monitoring record sheet is shown in *Annex A*.

4.4 MONITORING EQUIPMENT

For water quality monitoring, the following equipment shall be used to carry out the monitoring:

(a) Dissolved Oxygen and Temperature Measuring Equipment

The instrument shall be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and shall be operable from a DC power source. It shall be capable of measuring:

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

It shall have a membrane electrode with automatic temperature compensation complete with a cable of not less than 25 m in length. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary. (For example, YSI model 59 metre, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

(b) Turbidity Measurement Equipment

Turbidity within the water shall be measured in-situ by the nephelometric method. The instrument shall be a portable, weatherproof turbidity-measuring unit complete with cable, sensor and comprehensive operation manuals. The equipment shall be operated from a DC power source, it shall have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU and shall be complete with a cable with at least 25 m in length (Hach 2100P or an approved similar instrument).

(c) Water Depth Gauge

A portable, battery-operated echo sounder approved by the authority shall be used for the determination of water depth at each designated monitoring station. This unit shall 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.

(d) Salinity Measurement Instrument

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

(e) pH Measuring Instrument

A portable pH meter shall be provided for measuring pH of the water at each monitoring location.

(f) Water Sampling Equipment

A water sampler, consisting of a transparent PVC or glass cylinder of not less than two litres which can be effectively sealed with cups at both ends, shall be used (Kahlsico Water Sampler 13SWB203 or an approved similar instrument). The water 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.

Water samples for SS measurements shall be transferred directly to high density polythene sample bottles, packed in ice (cooled to 4 °C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.

Should changes to the sampling equipment be required, approval from EPD should be sought prior to their implementation.

(g) Positioning Device

A hand-held or boat-fixed type Global Positioning System (GPS) Receiver shall be used during monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

4.5 TESTING PROTOCOLS

- (a) All measuring equipment shall be checked, calibrated and maintained at intervals as recommended by the equipment manufacturers throughout all stages of the monitoring programme.
- (b) 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 equipment is under maintenance or calibration.

4.6 LABORATORY ANALYSIS

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 *Table 4.6a* and as described in APHA *Standard Methods for the Examination of Water and Wastewater, 17th Edition*, unless otherwise specified.

Table 4.6a Analytical Method to be Applied to Marine Water Quality Samples

Determinant	Standard Method
Suspended solids	APHA 2540D

4.6.1 Quality Assurance and Quality Control

Field Logs

Field logs are maintained for all survey works, noting the date of the survey, equipment used, survey date personnel and a record of all activities and observations. Field logs are retained for the duration of the Project and archived on completion.

In-situ measured data recorded from the instruments and will be transferred into Microsoft Excel format. Both soft-copy on disk and hardcopy are retained for records. Any deviation from the standard procedures shall be noted in the log and the reason for the deviation recorded. In addition, field logs shall contain notes of events or activities in the vicinity of the monitoring location which might give rise to anomalous values being measured.

Sampling

All samples will be assigned with a unique code which shall be attached to the sample container or written directly on the container.

Measurement Procedures

All in-situ monitoring equipment shall be checked and calibrated throughout all stages of the monitoring, or as required per the manufacturers specification. Certificate(s) of Calibration specifying the instrument being functional for the designed purpose will be attached to the monitoring reports. Response of sensors and electrodes will be checked with certified standard solutions before each use. Wet bulb calibration for a dissolved oxygen meter will be carried out before measurement at each monitoring location.

Transport of Samples

All samples transferred from one sub-contractor to another are accompanied by Chain of Custody (COC) sheets. Missing or damaged samples are notified to ET following logging of the samples into the laboratory QA system. Sample of the COC form can be found in *Annex C*.

Laboratory Testing

Quality assurance is provided during the processing of sampling and the subsequent analytical procedures. The laboratory operates its own in-house Quality Assurance and Quality Control Procedures in which all methods used are referenced or fully documented.

In addition to the laboratory's own Quality Assurance and Quality Control Procedures, "blind" duplicate samples of marine waters are submitted on a routine basis for analysis alongside the normal samples. The sample code for the "blind" duplicates should not be identifiable by the laboratory. Approximately one "blind" duplicate should be submitted for every ten standard samples. Samples to be duplicated on any one sampling occasion should be selected at random. As a means of identifying any systematic errors, the testing regime shall also include, as a minimum, the analyse of the followings:

- laboratory blanks;
- batch duplicates;
- matrix spikes;
- laboratory standards; and,
- certified reference materials.

All water testing parameters should be analyzed using method based on the "Standard Methods for the Examination of Water and Wastewater" APHA or other international methods accepted by EPD.

Table 4.6b ***Detection Limit of Suspended Solid***

Parameter	Detection Limit
Suspended Solid	1.0 mg/L

4.7 ***MARINE WATER QUALITY MONITORING LOCATIONS***

The water quality monitoring stations are shown in *Figure 4.1*. Seven Sensitive Receiver (SR) Stations as recommended in the EIA report have been chosen on the basis of their proximity to the dredging and filling operations and thus the greatest potential for water quality impacts, as detailed in *Table 4.7a*. The monitoring locations are:

- a) SR6 representing the sub-tidal assemblages at Pak Kok (north Lamma);
- b) SR7 representing the sub-tidal assemblages at Shek Kok Tsui (north west Lamma);
- c) SR10 representing the existing power station intakes (only for SS measurement);
- d) SR11 representing Hung Shing Ye beach;
- e) SR12 representing Lo So Shing beach; and
- f) SR14 and SR15 representing the south Lamma water.

Table 4.7a *Locations of Marine Water Quality Monitoring Stations*

Station	Easting	Northing
SR6	830 150	811 500
SR7	829 004	810 903
SR10	829 194	808 600
SR11	830 119	808 650
SR12	830 386	807 189
SR14	829 977	805 758
SR15	829 566	804 545

As detailed in *Table 4.7b*, three Control Stations as recommended in the EIA report have been selected, namely CS1, CS2 and CS3, to facilitate comparison of the water quality of the SR stations with ambient water quality conditions. Details of the control stations are as follows:

- a) CS1 representing the ambient WQ conditions during the ebb tide;
- b) CS2 representing the ambient WQ in West Lamma Channel, outside the main tidal stream passing through the Project Area; and
- c) CS3 representing the ambient WQ conditions during the flood tide.

Monitoring data from these Control Stations can be used as upstream and downstream controls for the SR stations. Locations of control stations shall be subject to change depending on the location and timing of dredging and other marine works projects in the Study Area. Any proposal for changes to the locations of control/impact stations shall be subject to EPD approval.

Table 4.7b *Locations of Marine Water Quality Control Stations*

Station	Easting	Northing
CS1	828 000	813 492
CS2	825 000	808 000
CS3	829 000	802 000

The locations of water quality monitoring are depicted in *Figure 4.1*.

Water quality monitoring results from SR stations should be compared to baseline monitoring results, control stations' results and EPD's Water Quality Objectives (WQO) for the Southern Water Control Zone (SWCZ). The standards stated in the WQOs are as follows:

- *Suspended Solids (SS)*: SS should not be raised above ambient levels by an excess of 30% nor cause the accumulation of SS which may adversely affect aquatic communities.
- *Dissolved Oxygen (DO)*: DO within 2m of the bottom should not be less than 2 mg/L for 90% of the samples; depth averaged DO should not be less than 4 mg/L for 90% of the samples during the whole year.

4.8 BASELINE CONDITIONS

Baseline conditions of various water quality parameters such as DO, SS and Turbidity will be established prior to the commencement of the works. Baseline monitoring will be performed at all designated Control and SR stations, 3-days per week, at mid-flood and mid-ebb tides, for 4 weeks before the initiation of marine works. There should not be any marine construction activities in the vicinity of the stations during the baseline monitoring.

In order to take into account the seasonal variations of the baseline DO level, separate baseline DO levels for the dry and the wet seasons will be derived both from the baseline data obtained prior to the commencement of works and EPD's routine monitoring data in the study area over the last 5 years.

EPD monitoring data measured at the same water control zone in which the sensitive receivers are located would be applied to the impact stations. For SR6, the Action and Limit levels would be calculated from MWQ results at WM1 while that for SR7-SR15, data at SM5-7 would be used.

Based on the above approach, the Action Levels of SR6 and SR7-15 would be calculated from the 5th percentile of MWQ results at WM1 and SM5-7 respectively. Similarly, the Limit Levels of SR6 and SR7-15 would be calculated from the 1st percentile of MWQ results at WM1 and SM5-7 respectively or the WQO for DO in non-FCZ.

Details of the monitoring parameters for the project are stated in *Section 4.3*. The monitoring should be carried out following the requirements presented in *Section 4.11*.

4.9 IMPACT MONITORING

Impact monitoring for seawater quality at SRs and Control Stations should be performed on three days per week, at mid-flood and mid-ebb tides. In case of exceedances of Action and or Limit Levels, monitoring frequency may need to be increased. The locations for impact monitoring should be the same as those for baseline monitoring. Details of the monitoring parameters are stated in *Section 4.3*. The monitoring should be carried out following the requirements presented in *Section 4.11*.

To verify the assumed bulking factors stipulated in EIA report, a sounding survey will be carried out two months after the commencement of dredging work. Additional sounding surveys should be carried out for every three months after the initial sounding survey. The measured bulking factor obtained from the sounding surveys will be adopted for the dredging work. The actual dredging rate will then be determined accordingly.

4.10 POST-PROJECT MONITORING

Upon completion of all dredging activities, a post-project WQ monitoring shall be carried out for 4 weeks. Post-project monitoring for seawater quality at SRs and Control Stations should be performed on three days per week, at mid-flood and mid-ebb tides. The locations for impact monitoring, impact parameters and requirements should be the same as those for impact monitoring.

4.11 MONITORING REQUIREMENTS

The following requirement should be followed for the baseline, impact and post-dredging monitoring.

- a) Sampling should take place under non-exceptional conditions with respect to the tides, weather and season. No dredging work will be carried out when typhoon signal no.3 or above is hoisted. No sampling should be carried out when typhoon signal No.3 or above or black rainstorm signal is hoisted. The make-up sampling work would immediately be scheduled to ensure the water quality.
- b) At least one duplicate in-situ measurement and water sample for laboratory analyses are required for all sampling locations.
- c) The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit levels, in which case the monitoring frequency will be increased.
- d) All measurements shall be carried out at three water depths, namely, 1 m below water surface, mid-water depth, and 1 m above seabed as appropriate to the derivation of Action and Limit levels. If the water depth is less than 6 m, the mid-depth measurement may be omitted. If

the depth is less than 3 m, only the mid-depth measurement needs to be taken. All parameters should be measured on each monitoring day.

- e) At each measurement depth, two consecutive measurements would be taken. The probes would be retrieved out of the water after the first measurement and then redeployed for the second measurement. When the difference in value between the first and second measurement of on-site parameters is more than 25% of the value of the first reading, the reading shall be discarded and further readings shall be taken.
- f) Monitoring schedule should reach EPD at least one week prior to the commencement of monitoring.

4.12 COMPLIANCE ASSESSMENT

Water quality monitoring results will be evaluated against Action and Limit levels as shown in *Table 4.12a*. Exceedances of the Action and Limit Levels may, as necessary, result in changes to the monitoring and dredging operations, potentially involving increased monitoring and implementation of appropriate mitigation measures.

Table 4.12a Action and Limit levels for Water Quality

Parameters	Action	Limit
DO in mg/ L (Surface, Middle and Bottom).	<p><u>Surface and Middle</u></p> <p>5%-ile of baseline and last 5 years' MWQ in Hong Kong for surface and middle layers.</p> <p><u>Bottom</u></p> <p>5%-ile of baseline and last 5 years' MWQ in Hong Kong for bottom layer.</p>	<p><u>Surface and Middle</u></p> <p>4 mg/L or 1%-ile of baseline and last 5 years' MWQ in Hong Kong for surface and middle layers.</p> <p><u>Bottom</u></p> <p>2 mg/L or 1%-ile of baseline and last 5 years' MWQ in Hong Kong for bottom layer.</p>
SS in mg/L (depth-averaged)	95%-ile of baseline data or 120% upstream control station's SS at the same tide of the same day	99%-ile of baseline, or 130% of upstream control station's SS at the same tide of the same day. For SR10, the SS limit is 100 mg/L
Turbidity (Tby) in NTU (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's Tby at the same tide on the same day	99%-ile of baseline data or 130% of upstream control station's Turbidity at the same tide on the same day
Notes:		
<ul style="list-style-type: none"> • "Depth-averaged" is calculated by taking the arithmetic mean of the reading of all three depths; • In order to take into account the seasonal variations of the baseline DO level, separate baseline DO levels for the dry and the wet seasons would be derived both from the baseline data obtained prior to the commencement of works and EPD's routine monitoring data in the study area over the last 5 years. 		

-
- For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
 - For SS and Turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
 - All the figures given in the table subject to revision pending results of the baseline monitoring and subsequent approval by EPD.
 - Whichever of the two criteria is greater, except DO which will take the lower of the two criteria, shall be used as the Action and Limit levels. Subject to approval from EPD.
-

4.13 EVENT AND ACTION PLANS

Should the monitoring results of the water quality parameters at any designated monitoring stations indicate that the water quality criteria have been exceeded, the actions in accordance with the Event and Action Plans in *Table 4.13a* shall be carried out.

Sources of impact will be identified by comparing the data from the Control and Impact Stations as well as site observations on special activities and abnormalities. If both the Control and Impact Stations show exceedences of the Action and Limit Levels then the recorded exceedences would not be attributed to the works and mitigation measures would not need to be implemented. In this case it may still be recommended that the monitoring frequency be increased at both Control and Impact Stations to provide additional confirmation on the finding that the exceedences are not attributable to the works. If, however, exceedences are found at the Impact Stations and not at the Control Stations then suitable mitigation measures should be devised, as the impacts would be attributed to the works.

4.14 MITIGATION MEASURES

Details of all the recommended mitigation measures are included within the Implementation Schedule (in *Annex B* of this EM&A Manual).

4.15 AUDITING REQUIREMENTS

In order to ensure that water resources are adequately protected it will be necessary to undertake audits to ensure the effective implementation of the recommended mitigation measures and to ensure compliance with the EIA report's assumptions and recommendations.

Table 4.13a Event and Action Plans for Water Quality

Exceedance	ET Leader	IEC	Engineer	Contractor
Action level exceeded on one sampling day	Verbally inform the Contractor, and IEC. Repeat in-situ measurement to confirm findings; Identify source(s) of impact; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IEC, Engineer and Contractor; Repeat measurement on next day of exceedance.	Provide feedback to the Engineer on the remedial actions proposed by the ET / Contractor Advise Engineer on the effectiveness of the proposed remedial measures Verify the implementation of the remedial measures	Discuss with Contractor the proposed mitigation measures; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures.	Inform the Engineer and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Propose and discuss mitigation measures with Engineer; Implement the agreed mitigation measures.
Action level exceeded on more than one consecutive sampling day	Repeat in-situ measurements to confirm findings; Identify source(s) of impact; Inform Contractor and IEC; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measure with IEC, Engineer and Contractor; Ensure mitigation measures are implemented; Prepare to increase the monitoring frequency to daily; Repeat measurement on next day of exceedance.	Provide feedback to the Engineer on the remedial actions proposed by the ET / Contractor Advise Engineer on the effectiveness of the proposed remedial measures Verify the implementation of the remedial measures	Discuss with ET and Contractor on the proposed mitigation measures; Make agreement on the mitigation measures to be implemented; Assess the effectiveness of the implemented mitigation measures.	Inform the Engineer and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment; Consider changes of working methods; Propose mitigation measures to Engineer within 3 working days and discuss with ET and Engineer; Implement the agreed mitigation measures.

Exceedance	ET Leader	IEC	Engineer	Contractor
Limit level exceeded on one sampling day	<p>Verbally inform the Contractor, IEC and the EPD of the exceedance;</p> <p>Repeat in-situ measurement to confirm findings;</p> <p>Identify source(s) of impact;</p> <p>Check monitoring data, all plant, equipment and Contractor's working methods;</p> <p>Discuss mitigation measure with IEC, Engineer and Contractor;</p> <p>Ensure mitigation measures are implemented;</p> <p>Increase the monitoring frequency to daily until no exceedance of Limit level.</p>	<p>Provide feedback to the Engineer on the remedial actions proposed by the ET / Contractor</p> <p>Advise Engineer on the effectiveness of the proposed remedial measures</p> <p>Verify the implementation of the remedial measures</p>	<p>Discuss with Contractor on the proposed mitigation measures;</p> <p>Request Contractor to critically review the working methods;</p> <p>Make agreement on the mitigation measures to be implemented;</p> <p>Assess the effectiveness of the implemented mitigation measures.</p>	<p>Inform the Engineer and confirm notification of the non-compliance in writing;</p> <p>Rectify unacceptable practice;</p> <p>Check all plant and equipment; Consider changes of working methods;</p> <p>Propose mitigation measures to Engineer within 3 working days and discuss with Engineer;</p> <p>Implement the agreed mitigation measures.</p>
Limit level exceeded by more than one consecutive sampling day	<p>Repeat in-situ measurement to confirm findings;</p> <p>Identify source(s) of impact;</p> <p>Inform Contractor, IEC and EPD;</p> <p>Check monitoring data, all plant, equipment and Contractor's working methods;</p> <p>Discuss mitigation measure with IEC, Engineer and Contractor;</p> <p>Ensure mitigation measures are implemented;</p> <p>Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.</p>	<p>Provide feedback to the Engineer on the remedial actions proposed by the ET / Contractor</p> <p>Advise Engineer on the effectiveness of the proposed remedial measures</p> <p>Verify the implementation of the remedial measures</p>	<p>Discuss with Contractor on the proposed mitigation measures;</p> <p>Request Contractor to critically review the working methods;</p> <p>Make agreement on the mitigation measures to be implemented;</p> <p>Assess the effectiveness of the implemented mitigation measures;</p> <p>Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the marine works until no exceedance of the Limit Level.</p>	<p>Inform the Engineer and confirm notification of the non-compliance in writing;</p> <p>Rectify unacceptable practice;</p> <p>Check all plant and equipment; Consider changes of working methods;</p> <p>Propose mitigation measures to Engineer within 3 working days and discuss with Engineer;</p> <p>Implement the agreed mitigation measures..</p> <p>As directed by the Engineer, to slow down or to stop all or part of the marine work</p>

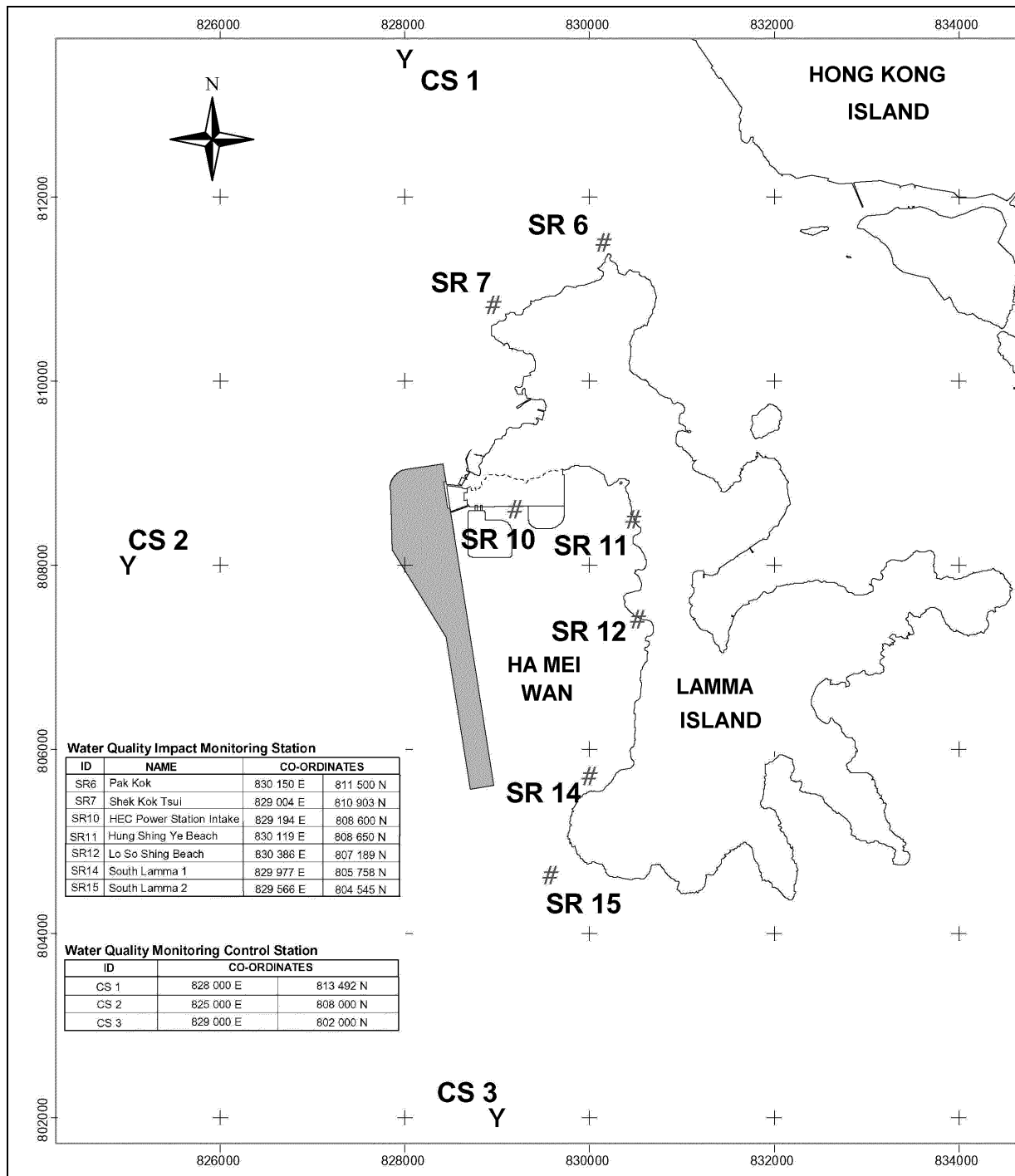


Figure 4.1. Location of Water Quality Monitoring Stations

5 WASTE MANAGEMENT

5.1 INTRODUCTION

In this section, EM&A recommendations, methodology, audit of waste management and reporting are presented.

5.2 EM&A RECOMMENDATIONS

In order to ensure that the Contractor has implemented the recommendations of the EIA, the ET shall conduct site audits of the waste generated from the Project (viz. dredged mud), to determine if the waste is being managed in accordance with the approved procedures. The scope of the waste management audits is presented below.

5.3 OBJECTIVES OF THE WASTE AUDIT

The aims of the waste management audit will include, but are not limited to, the following:

- ensuring that the wastes arising from works are handled, stored, collected, transferred and disposed of in an environmentally acceptable manner and comply with the relevant requirements under the *Waste Disposal Ordinance (WDO)* and its regulations, and the *Dumping at Sea Ordinance (DASO)*;
- ensuring that the Contractor properly implements the appropriate environmental protection and the Implementation Schedule (*Annex B*) to minimise and control the potential for waste impacts.

5.4 METHODOLOGY AND CRITERIA

The Contractor is responsible for waste control within the working site, removal of waste material produced by the working site and the implementation of any mitigation measures to avoid or minimise potential adverse impacts associated with waste arising from the Project.

The Contractor should also ensure that the necessary waste disposal permits or licences are obtained from appropriate authorities in accordance with the various Ordinances. The Contractor should follow the procedures in the approved method statements, recommendations in the EIA report and the EM&A Manual. One set of relevant documents including the Environmental Permit for the Project and dumping permit will be kept at site for reference at any time.

The ET should also regularly inspect and audit the waste management practices on site with reference to the recommendations given in the Implementation Schedule in *Annex B*. The ET inspection results and their associated recommendations on improvements to the waste management shall be submitted to the Engineer for follow up action. The inspection results with the remedial actions taken by the Contractor, if any, will be represented in the Monthly EM&A reports.

Disposal of uncontaminated dredged mud has provisionally been assigned to East Tung Lung Chau, East of Ninepins and East Sha Chau Pit CMP IVb. According to the letter from the Marine Fill Committee of the Civil Engineering Department (CED) dated 9th May 2002 regarding allocation of Disposal Capacity for Cateogroy L Sediment, in the dry season from beginning October to mid-March, the dredged material should be disposed of at the East Tung Lung Chau disposal site for up to 50,000 m³/day (in hopper) and the remaining volume should be disposed of at the East Sha Chau Pit CMP IVb. East Ninepin site should be used for the disposal of the dredged material in the wet season from mid-March to the end of September only.

If the dredged muds are disposed of at East Tung Lung Chau disposal areas, HEC is required to carry out environmental monitoring in accordance with the EM&A Manual for Backfilling of Marine Borrow Areas at East Tung Lung Chau. The monitoring shall include bathymetric surveys, water quality monitoring and ecological monitoring. As the monitoring work is carried out under the separate EM&A Manual already endorsed by the Authority, the monitoring results will not be reported under this EM&A Manual. Instead, the monitoring reports shall be submitted to EPD separately and copied to the Fill Management Division of the CED at agreed intervals.

Barges should be fitted with tight fitting seals to their bottom openings to prevent leakage of materials during the transport process.

Barges should not be filled to a level which will cause overflow of materials during loading and transportation.

5.5 REPORTING

The monthly EM&A reports shall contain the results of the waste management practices being implemented on site. These include the site inspection results and records of daily dredged materials.

6 ENVIRONMENTAL AUDITING

6.1 SITE INSPECTIONS

Site inspections provide a direct means to track and ensure the enforcement of specified environmental protection and pollution control measures. The inspections should be undertaken routinely by the ET to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Additionally, the ET shall be responsible for defining the scope of the inspections, detailing any deficiencies that are identified, and reporting any necessary action or mitigation measures that were implemented as a result of the inspection.

Site inspections shall be carried out once per week. The areas of inspection should include the general environmental conditions in the vicinity of the site and pollution control and mitigation measures within the site; it should also review the environmental conditions outside the site area which are likely to be affected, directly or indirectly, by site activities. The ET shall make reference to the following information in conducting the inspections:

- the environmental protection and pollution control mitigation measures included in this EM&A Manual;
- ongoing results of the EM&A programme;
- works progress and programme;
- individual works method statements which shall include proposals on associated pollution control measures;
- the relevant environmental protection and pollution control laws; and
- previous site inspection results.

The ET inspection results and their associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to the Engineer within 24 hours, for reference and for taking immediate action. They shall also be presented, along with the remedial actions taken, in the monthly EM&A report. The Contractor shall follow the procedures and time frames stipulated in the environmental site inspection for the implementation of mitigation proposals and the resolution of deficiencies in the Contractor's EMS. An action reporting system shall be formulated and implemented to report on any remedial measures implemented subsequent to the site inspections.

Ad hoc site inspections shall also be carried out by the ET Leader if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the associated investigation work.

In addition to the ET's inspection, the IEC shall also conduct random site inspections in order to verify the Contractor's environmental performance and appropriate implementation of the required practices and mitigation measures. These inspections will also be an important source of data collection to allow the IEC to undertake an up-to-date and informed review of the information and data contained within the monthly EM&A reports.

6.2 COMPLIANCE WITH LEGAL AND CONTRACTUAL REQUIREMENTS

The Contractor shall comply with environmental protection and pollution control requirements stipulated in this EM&A Manuals well as Hong Kong environmental protection and pollution control laws.

The ET Leader shall review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented.

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

After reviewing the documentation, the ET Leader shall advise the Engineer and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works is incompatible with the works programme or may result in potential violation of environmental protection and pollution control requirements by the works in due course, he shall also advise the Contractor and the Engineer accordingly.

Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The Engineer shall follow up to ensure that appropriate action has been taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

6.3 ENVIRONMENTAL COMPLAINTS

HEC has already established a formal procedure for handling complaints on environmental matters against Lamma Power Station to ensure that appropriate actions will be taken to handle the complaints properly. Similar to other existing specific EM&A programs for the Power Station, handling of complaints will generally follow the established procedure and only those identified to be related to the Navigation Channel Improvement work will be reported in this EM&A report. A flow chart outlining the complaints

handling procedure is shown in *Figure 6.1* and briefly described below.

Complaints can be received via various channels and can generally be classified into verbal and written complaints. Details of complaints shall be logged into a complaints register by the ET. Information to be recorded shall include the name, address & contact number of the complainant and also the date, time & nature of the complaint.

When a verbal complaint is received which obviously does not concern HEC, the party receiving the complaint shall directly reply to the complainant accordingly or via Public Affairs Department (PA) unless it is lodged via EPD in which case it shall be referred to CE(P) or his representative for a formal reply.

Any verbal complaint which may concern HEC or written complaint shall be referred to the ET who shall then coordinate a detailed investigation. Where appropriate, the party receiving the complaint shall also take immediate temporary remedial action to alleviate the problem or prevent it from deteriorating. After the investigation is completed, the party receiving the complaint shall reply to the complainant accordingly or via PA unless it is lodged via EPD for which the reply shall be made by CE(P).

Replies to written complaints shall be formal in writing signed by the nominated responsible officer. In all replies, whether verbal or written, the complainant shall be informed of the investigation results and the subsequent remedial actions taken. When the investigation reveals that the complaint is not justified, the complainant shall also be informed, together with the reasons for arriving at such a conclusion. The details of the replies shall be referred to the ET for logging into the complaints register.

When a complaint is referred to the ET for a detailed investigation, the ET shall:-

- a) Where necessary arrange a verbal or written acknowledgement to the complainant advising that an investigation is underway.
- b) Coordinate an investigation to determine the validity of the complaint and to identify the source of the problem.
- c) Arrange monitoring to verify the existence and severity of the complaint if necessary.
- d) Propose mitigation measures if necessary.
- e) Arrange additional monitoring, audit and inspections as necessary to verify the status and effectiveness of the mitigation measures.
- f) Arrange interim replies to the complainant if necessary.

- g) Record the relevant information in the complaints register.
- h) Log the details of the complaint and report the actions taken to investigate, resolve and respond to the complaint in the monthly EM&A Report.

During the complaint investigation work, the relevant Department(s) shall cooperate with the ET in providing all necessary information and assistance. If mitigation measures are necessary, the relevant Department(s) shall ensure that the measures are promptly carried out.

A pending-complaint review system (such as regular evaluation in routine Working Committee Meetings) shall be operated to ensure timely follow-up of outstanding complaints.

The normal contact telephone and fax numbers at HEC for complaints are:-

Party	Attention	Telephone	Fax
Generation Division	Central Control Room No.1	2982 6410	2982 6504
System Control Department	Customer Emergency Services Centre (24 hours)	2555 4999	2555 6637

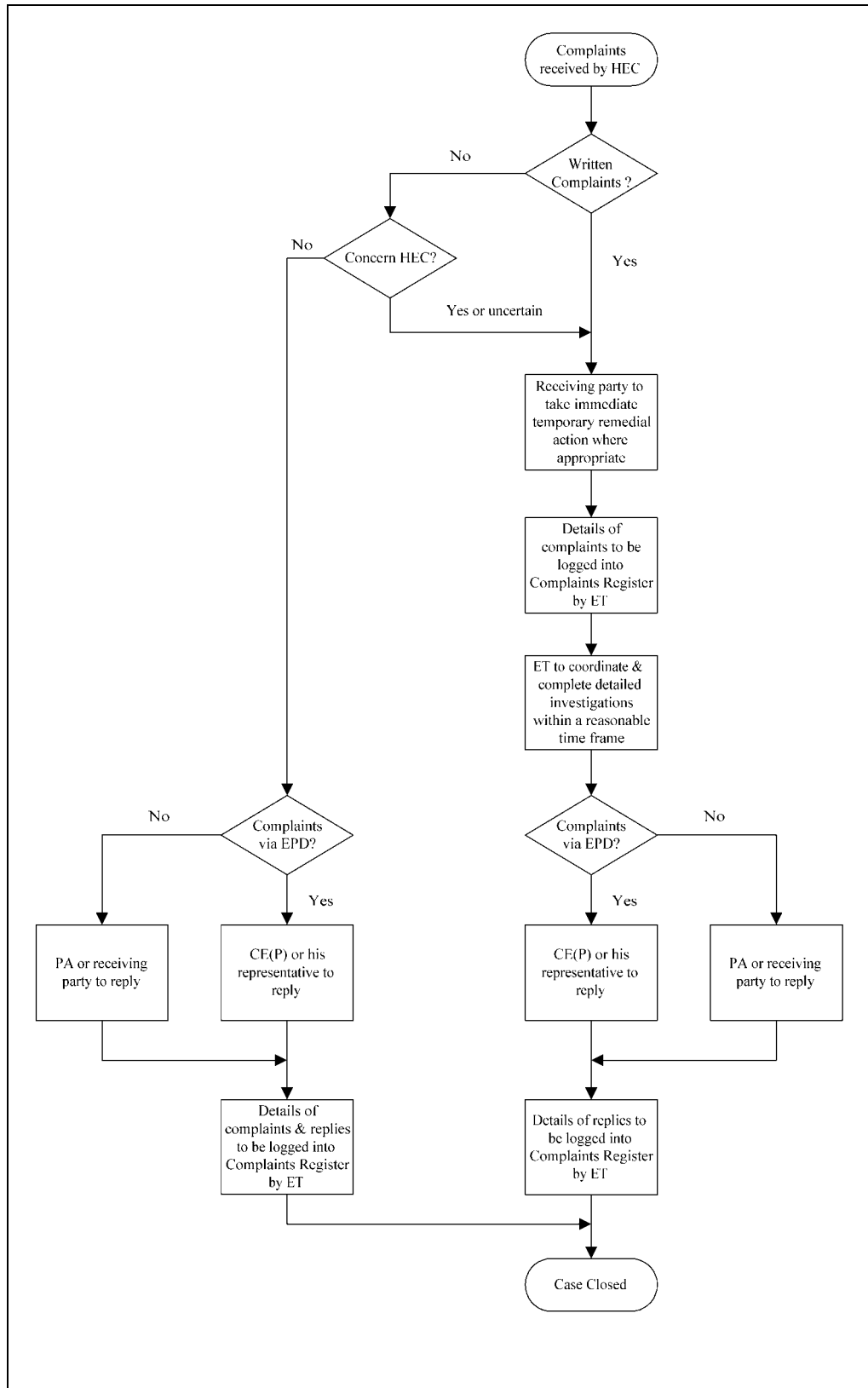


Figure 6.1. Complaints Handling Procedure

7 REPORTING

7.1 INTRODUCTION

The primary reporting function, undertaken within the EM&A programme, will be the issuance of formal exceedance notifications, corrective actions and ongoing feedback between the ET Leader, the Contractor and the Engineer. Reporting will be driven by the results of the monitoring and audit programme and will be recorded through written correspondence, site inspections and minutes and notes of meetings.

In addition, periodic reviews of the EM&A process and subsequent revisions to the EM&A Manual, as appropriate, will be prepared and circulated to relevant personnel within the Contractor's Project Team as a means of gauging site staff and contractor performance. The periodic reviews will comprise the Monthly EM&A Reports. These reports will be copied to the EPD for comment. The exact details of the frequency, distribution and time frame for submission shall be agreed with the EPD prior to the commencement of the works.

7.2 BASELINE MONITORING REPORT

The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report at least 2 weeks before the commencement of the works that would affect the monitoring results. Copies of the Baseline Report shall be submitted to all parties for agreement; including the Engineer, IEC and the EPD. Two hard copies and one soft copy of the Baseline Monitoring Report shall be submitted to EPD. The submissions shall be certified by the ET leader and verified by the IEC. The report shall include the following elements:

- i) drawings showing locations of the baseline monitoring stations;
- ii) monitoring results (in both hard and soft copies) together with the following information:
 - monitoring methodology;
 - equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency and durations;
- iii) details on influencing factors, including:
 - major activities, if any, being carried out on the site during the period;
 - weather conditions during the period;
 - other factors which might affect the results;

- iv) determination of action and limit levels for each monitoring parameter and statistical analysis of the baseline data;
- v) revisions for inclusion in the EM&A Manual

7.3 MONTHLY EM&A REPORTS

Monthly EM&A Reports shall be prepared and certified by the ET Leader. The reports shall be verified by the IEC and submitted to the EPD with one hard copy and one soft copy within 2 weeks of the end of each month after works commence. The ET Leader shall liaise with the relevant parties to confirm the format of monthly reports in both hard copy and electronic format. The report shall include the following elements:

- i) 1-2 pages executive summary;
- ii) basic project information including a synopsis of the project organisation, programme and management structure, and the work undertaken during the month;
- iii) a brief summary of EM&A requirement including:
 - all monitoring parameters;
 - environmental quality performance limits;
 - Event-Action Plan;
 - environmental mitigation measure, as recommended in the EIA report;
 - Environmental requirements in contract documents;
- iv) advice on the implementation status of the environmental protection, mitigation and pollution control measures, as recommended in the EIA report, summarised in the updated implementation schedule;
- v) drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- vi) monitoring results (in both hard and softcopies) together with the following information:
 - monitoring methodology;
 - equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency and durations;
- vii) graphical plots of trends of monitored parameters over the past reporting periods for representative monitoring stations annotated against the following:
 - major activities being carried out on the site during the period;
 - weather conditions during the period; and
 - any other factors which might affect the monitoring results;
- viii) a summary of non-compliance (exceedances) of the environmental quality performance limits;
- ix) a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;

- x) a description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedure taken and summary of complaints;
- xi) a summary record of all complaints received (written or verbal) for each media, including location and nature of complaints liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints;
- xii) a summary record of notification of summons, successful prosecutions for breaches of environmental protection/pollution control legislation, and actions taken to rectify such breaches;
- xiii) a forecast of the work programme, impact predications and monitoring schedule for the next three months; and
- xiv) comments, recommendations and conclusions for the monitoring period.

7.4 FINAL EM&A SUMMARY REPORT

The EM&A programme shall be terminated upon completion of dredging and post-dredging monitoring. Copies of the final EM&A Summary Report shall be submitted to all parties for agreement; including the Engineer, IEC and the EPD. Two hard copies and one soft copy of the final EM&A Summary Report shall be submitted to EPD. The submissions shall be certified by the ET leader and verified by the IEC. The final EM&A summary report shall include the following:

- a) an executive summary;
- b) basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the entire construction period;
- c) a brief summary of EM&A requirement including:
 - monitoring parameters;
 - environmental quality performance limits (Action and Limit levels); and
 - environmental mitigation measures, as recommended in the project EIA study final report;
- d) advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation status proformas;
- e) drawings showing the projects area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- f) graphical plots of the trends of monitored parameters over the construction period for representative monitoring stations annotated against:
 - the major activities being carried out on Site during the period;
 - weather conditions during the period;
 - any other factors which might affect the monitoring results; and
 - the return of ambient environmental conditions in comparison with baseline data;

- g) compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies;
- h) provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;
- i) advice on the solid and liquid waste management status;
- j) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- k) a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
- l) a summary description of the actions taken in the event of non-compliance and follow-up procedures related to earlier non-compliance;
- m) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- n) review the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);
- o) a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up action taken and results;
- p) review the practicality and effectiveness of the EIA process and EM&A programme (e.g. effectiveness and efficiency of the mitigation measures), recommend any improvement in the EM&A programme; and
- q) a conclusion to state the return of ambient and/or the predicted scenario as per EIA findings.

7.5 RECORD OF SOUNDING SURVEYS

Record of sounding surveys on the navigation channel shall be submitted to EPD for reference upon completion of the dredging works.

7.6 ELECTRONIC REPORTING OF EM&A INFORMATION

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

All environmental monitoring data in the Baseline Monitoring and the monthly EM&A shall be made available to the public via internet access in the form of a website, in the shortest possible time and in no event later than two weeks after the relevant environmental monitoring data are collected or become available, unless otherwise agreed with EPD. HEC shall notify EPD in writing the internet address where the environmental monitoring data are to be placed. The internet address and the relevant environmental monitoring data shall be made available to the public via the EIAO Internet Website and the EIAO Register Office.

The internet website shall enable user friendly public access to the monitoring data and with features capable of:

- i) providing access to environmental monitoring data collected since the commencement of works;
- ii) searching by date;
- iii) searching by types of monitoring data; and
- iv) hyperlinks to relevant monitoring data after searching.

7.7 DATA KEEPING

All documents and records, in both paper and electronic format, pertaining to this EM&A programme will be retained by the ET Leader as part of the Project files and will be subject to appropriate data handling procedures. All documents and data shall be kept up to 1 year after the completion of the Project.

7.8 INTERIM NOTIFICATION OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCES

Interim notifications of exceedances of Limit levels will be reported both verbally and in writing to the EPD as soon as practicable. The Monthly Reports will contain all available details concerning exceedances and complaints, their causes and those steps taken to control impacts and prevent their recurrence.

Annex A

Seawater Quality Monitoring On-site Results

Project Code: _____ Our Ref: _____ Sampling Site: _____ Page No.: _____

Sampling Date: _____ Tide: _____ Time for Mid-flood/mid-ebb: _____

Equipment: _____

Monitoring Location	Sample Code	Measurement		Water Depth (m)	Measuring Depth (m)	DO (mg/L)		DO (%)		pH		Temp (°C)		Salinity (ppt)		Turbidity (NTU)		Weather Condition	Other Observation	
		Date	Time			1 st Trial	2 nd Trial	1 st Trial	2 nd Trial	1 st Trial	2 nd Trial	1 st Trial	2 nd Trial	1 st Trial	2 nd Trial	1 st Trial	2 nd Trial			
SR6				Top																
				Middle																
				Bottom																
SR7				Top																
				Middle																
				Bottom																
SR10				Top																
				Middle																
				Bottom																
SR11				Top																
				Middle																
				Bottom																
SR13				Top																
				Middle																
				Bottom																
SR14				Top																
				Middle																
				Bottom																
SR15				Top																
				Middle																
				Bottom																

Prepared by: _____

Checked by: _____

Annex A

Seawater Quality Monitoring On-site Results

Project Code: _____ Our Ref: _____ Sampling Site: _____ Page No.: _____

Sampling Date: _____ Tide: _____ Time for Mid-flood/mid-ebb: _____

Equipment: _____

Monitoring Location	Sample Code	Measurement		Water Depth (m)	Measuring Depth (m)	DO (mg/L)		DO (%)		pH		Temp (°C)		Salinity (ppt)		Turbidity (NTU)		Weather Condition	Other Observation
		Date	Time			1 st Trial	2 nd Trial	1 st Trial	2 nd Trial	1 st Trial	2 nd Trial	1 st Trial	2 nd Trial	1 st Trial	2 nd Trial	1 st Trial	2 nd Trial		
CS1				Top															
				Middle															
				Bottom															
CS2				Top															
				Middle															
				Bottom															
CS3				Top															
				Middle															
				Bottom															

Prepared by: _____

Checked by: _____

Seawater Quality Monitoring Laboratory Results

Project Code: _____

Sampling Site: _____

Sampling Date: _____

Page: _____

Monitoring Location	Sampling Code	Measuring Depth	SS
SR6		Top	
		Middle	
		Bottom	
SR7		Top	
		Middle	
		Bottom	
SR10		Top	
		Middle	
		Bottom	
SR11		Top	
		Middle	
		Bottom	
SR12		Top	
		Middle	
		Bottom	
SR14		Top	
		Middle	
		Bottom	
SR15		Top	
		Middle	
		Bottom	
CS1		Top	
		Middle	
		Bottom	
CS2		Top	
		Middle	
		Bottom	
CS3		Top	
		Middle	
		Bottom	

Prepared by: _____

Checked by: _____

TABLE B1 IMPLEMENTATION SCHEDULE

EIA Ref.	EM&A Log Ref	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
					Des	C	O	Dec	
Mitigation Measures for both Grab Dredger and TSHD Options									
3.11	A1	No dredging should be carried out at Working Zone BCs from February to April.	Location: Working Zone BCs Timing/Duration: February to April	HEC & Dredging Contractor		✓			Wild Animals Protection Ordinance, Marine Parks Ordinance and Marine Parks Regulations, Animals and Plants Ordinance
3.11	A2	Vessel route between the dredging site and the disposal sites should avoid the Finless Porpoise habitat area and be subject to a maximum speed limit of 10 knots in southern Lamma waters as indicated in Figure B3.	Location: South Lamma Timing/Duration: During the Project period	HEC & Dredging Contractor		✓			Wild Animals Protection Ordinance, Marine Parks Ordinance and Marine Parks Regulations, Animals and Plants Ordinance
5.2	A3	The number of dredgers and operation conditions specified in the applicable CNPs should be strictly followed. In applying for the CNPs, it should be ensured that the number of dredgers and operation conditions are compatible with the recommendations of this EIA.	Location: The Project Area Timing/Duration: During restricted hours of the Project period	HEC & Dredging Contractor		✓			Noise Control Ordinance
2.11.2	A4	The grab dredger option and TSHD option should not be operated concurrently.	Location: The Project Area Timing/Duration: During the Project period	HEC & Dredging Contractor		✓			WQOs for Southern and Western Buffer WCZs, WPCO, Noise Control Ordinance

EIA Ref.	EM&A Log Ref	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
					Des	C	O	Dec	
Mitigation Measures for TSHD Option Only									
2.11.4	B1	Dredging works should be carried out in phases in accordance with the programme, number of dredgers and maximum dredging rates specified in Table B4.	Location: The Project Area Timing/Duration: During dredging	HEC & Dredging Contractor		✓			WQOs for Southern and Western Buffer WCZs, WPCO
2.11	B2	There should not be more than one TSHD operating concurrently at any time.	Location: The Project Area Timing/Duration: During dredging	HEC & Dredging Contractor		✓			WQOs for Southern and Western Buffer WCZs, WPCO
Mitigation Measures for Grab Dredger Option Only									
2.11.4	C1	Dredging works should be carried out in phases in accordance with the programme, number of dredgers and maximum dredging rates specified in Table B3.	Location: The Project Area Timing/Duration: During dredging	HEC & Dredging Contractor		✓			WQOs for Southern and Western Buffer WCZs, WPCO, Noise Control Ordinance
2.8.12	C2	Each grab dredger to be deployed should have a grab capacity of no less than 8 m ³ .	Location: The Project Area Timing/Duration: During dredging	HEC & Dredging Contractor		✓			WQOs for Southern and Western Buffer WCZs, WPCO
2.12	C3	Cage-type silt curtains as illustrated in Figure B1 should be deployed for grab dredgers. The silt curtains should be properly maintained during the dredging period.	Location: The Project Area Timing/Duration: During dredging	HEC & Dredging Contractor		✓			WQOs for Southern and Western Buffer WCZs, WPCO
2.11	C4	There should be no more than 5 grab dredgers operating concurrently at any time.	Location: The Project Area Timing/Duration: During dredging	HEC & Dredging Contractor		✓			WQOs for Southern and Western Buffer WCZs, WPCO, Noise Control Ordinance

EIA Ref.	EM&A Log Ref	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
					Des	C	O	Dec	
Good Site Practice									
2.12	D1	<p>Daily dredging volume should be spread as evenly as possible over the 24 hour period whenever practical.</p> <p>Special care should be taken during lowering and lifting grabs to minimize unnecessary disturbance to the seabed.</p> <p>Vessels used should have adequate clearance of the seabed.</p> <p>Barges should be fitted with tight fitting seals to their bottom openings to prevent leakage of material.</p> <p>Grabs should be tightly closed and hoist speed is suitably low.</p> <p>Barges should not be filled to a level which will cause overflow of materials during loading and transportation.</p> <p>Appropriate monitoring of WQ in accordance with EM&A Manual during dredging works should be undertaken to allow the implementation of appropriate Action Plans to prevent any unacceptable WQ impacts.</p> <p>Large objects should be removed from the grab to avoid losses from partially closed grabs.</p>	<p>Location: The Project Area, the disposal areas and on route between the dredging site and the disposal areas</p> <p>Timing/Duration: During dredging and disposal</p>	HEC & Dredging Contractor		✓			WQOs for Southern and Western Buffer WCZs, WPCO

EIA Ref.	EM&A Log Ref	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
					Des	C	O	Dec	
3.11	D2	<p>The vessel operators should be fully briefed on the following:</p> <ul style="list-style-type: none"> • Possible presence of dolphins and porpoises in the vicinity of the Study Area and along routes to the Project Area; • Rules for safe vessel operation around cetaceans; • Slowing to 10 knots in the presence of cetaceans within the area marked on Figure B3; and • The dumping of chemicals, rubbish, oils etc into the waters is strictly prohibited and enforced. 	Timing: In the event of spotting porpoises or dolphins	Dredging Contractor		✓			Wild Animals Protection Ordinance, Marine Parks Ordinance and Marine Parks Regulations, Animals and Plants Ordinance, Dumping at Sea Ordinance, Waste Disposal Ordinance

Table B2 Recommended Maximum Daily/Hourly/Cycle Dredging Volume (in-situ Volume) for Working Zones

Season		Wet Season (April to September)				Dry Season (October to March)			
Working Zone		AB _n	AB _s	BC _n	BC _s	AB _n	AB _s	BC _n	BC _s
Grab Dredger with Silt Curtains (Grab Capacity ≥ 8 m ³)	m ³ /day	33,800	31,400	26,300	21,200	43,800	33,200	33,200	34,200
	m ³ /hr	1,549	1,439	1,205	972	2,008	1,522	1,522	1,568
TSHD	m ³ /day	12,500	11,300	8,300	5,300	39,500	34,300	27,000	19,700
	m ³ /cycle	1,432	1,295	951	607	4,526	3,930	3,094	2,257

Note:

- The recommended maximum dredging rate refers to the maximum dredging rates when all dredging activities taking place at one particular working zone. For the grab dredger option, dredging may be carried out concurrently at more than one working zones during some time periods. In this case, the combined dredging rates during those time periods should not exceed the lowest of the maximum rates recommended for the concerned working zones.
- The above maximum daily dredging rates are based on 24-hour operations. If the daily working hours are restricted, the maximum daily dredging rates should be reduced proportionally.
- The division of working zones are illustrated in Figure B2.
- For the grab dredger option, recommended maximum hourly dredging rate = 1.1 * recommended maximum daily dredging rate/24.
- For the TSHD option, recommended maximum cycle dredging rate = 1.1 * recommended maximum daily dredging rate/9.6 (where 9.6 is the number of dredging cycle in a day assumed in water quality modelling).

Table B3 Proposed Working Schedule - Grab Dredger Option

Working Zone	Construction Programme							
	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03
ABn	GD1	GD1	GD1	GD1	GD1	GD1		
	GD2	GD2	GD2	GD2	GD2	GD2	GD2	GD2
ABs	GD3	GD3	GD3	GD3	GD3	GD3	GD3	GD3
	GD4	GD4	GD4	GD4	GD4			
BCn	GD5	GD5	GD5	GD5	GD5	GD5		
BCs						GD4	GD4 GD5 GD1	GD4 GD5 GD1
Maximum dredging rate (m ³ /day)	26,300					33,200		
Maximum dredging rate (m ³ /hr)	1,205					1,522		

Note:

1. GD1 denotes Grab Dredger No. 1.
2. The above maximum daily dredging rates are based on 24-hour operations. If the daily working hours are restricted, the maximum daily dredging rates should be reduced proportionally.

Table B4 Proposed Working Schedule - TSHD Option

Working Zone	Construction Programme							
	May-03	Jun-03	Jul-03	Aug-03	Sep-03	Oct-03	Nov-03	Dec-03
ABn	TSHD							
ABs							TSHD	
BCn								TSHD
BCs						TSHD		
Maximum dredging rate (m ³ /day)	12,500					19,700	34,300	27,000
Maximum dredging rate (m ³ /cycle)	1,432					2,257	3,930	3,094

Note:

1. TSHD denotes Trailer Suction Hopper Dredger
2. The above maximum daily dredging rates are based on 24-hour operations. If the daily working hours are restricted, the maximum daily dredging rates should be reduced proportionally.

FIGURE B1 ILLUSTRATION OF CAGE-TYPE SILT CURTAIN

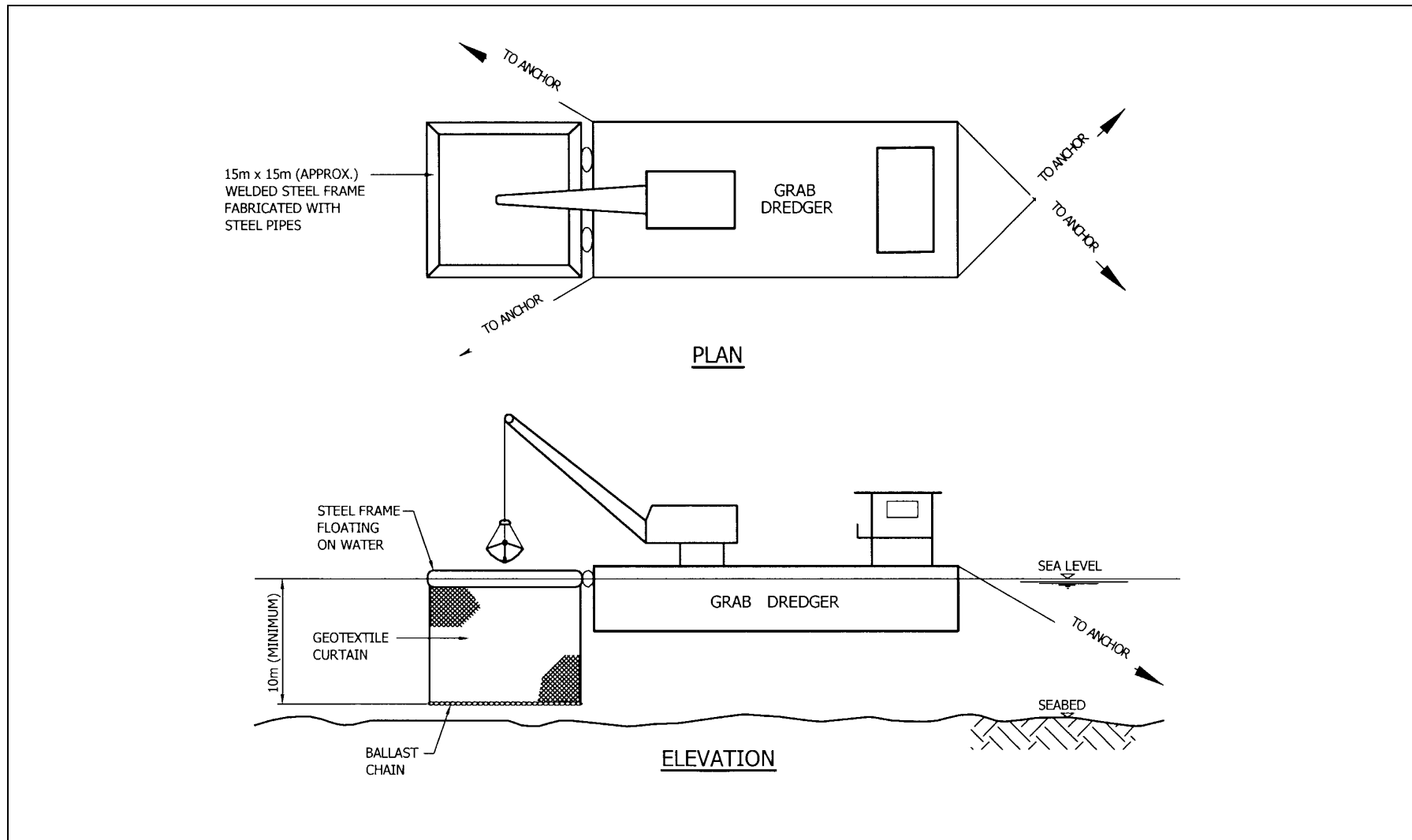


FIGURE B2 WORKING ZONES FOR LAMMA CHANNEL IMPROVEMENT

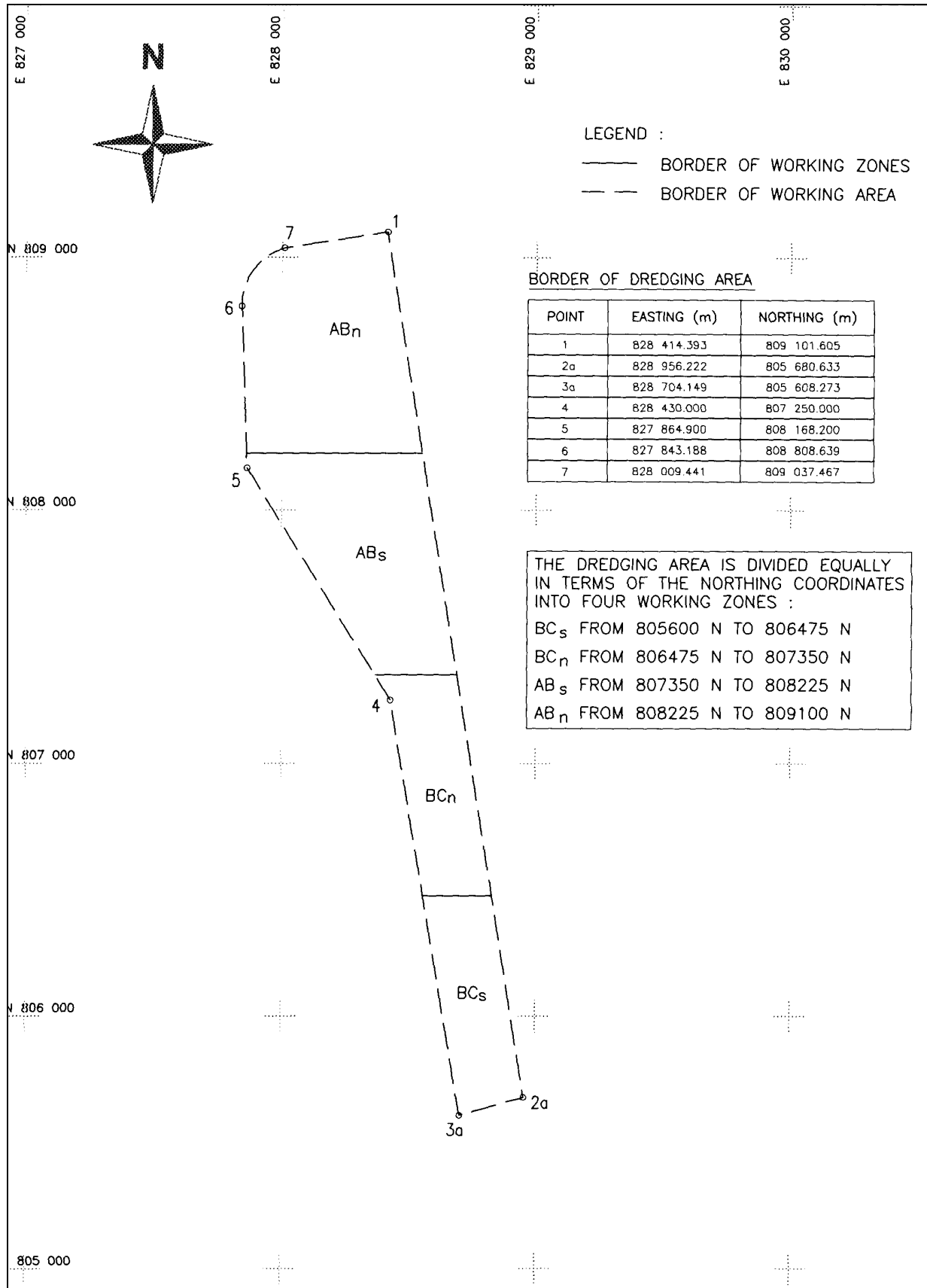
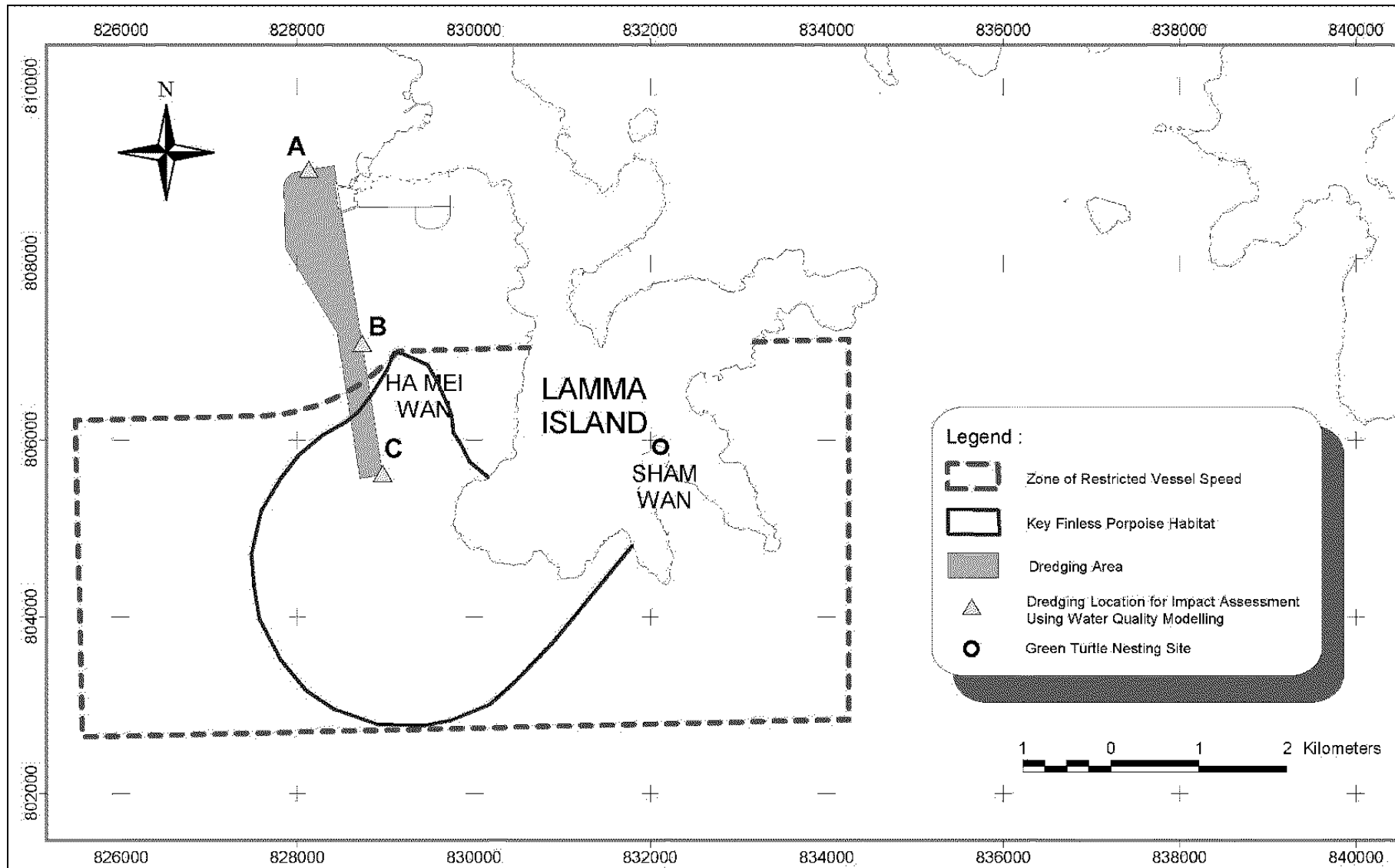


FIGURE B3 LOCATION OF KEY PORPOISE HABITAT AROUND THE PROJECT AREA



Sample Chain-of-Custody (Sample Delivery)

Sampling Code: _____

Record No.: _____

Project: _____

Sampling Date: _____

Type of Sample: _____

Total No. of Sample: _____

Sample Storage Condition: _____

Sample Transported from: _____ to _____ by: _____

Sample Code	Sample Vol. (L)	Container Material	Sample Container Condition	Remarks	Checked by

Delivery Date: _____

Receiving Date: _____

Delivery Time: _____

Receiving Time: _____

From: _____

To: _____

Relinquished By: _____

Receiving By: _____