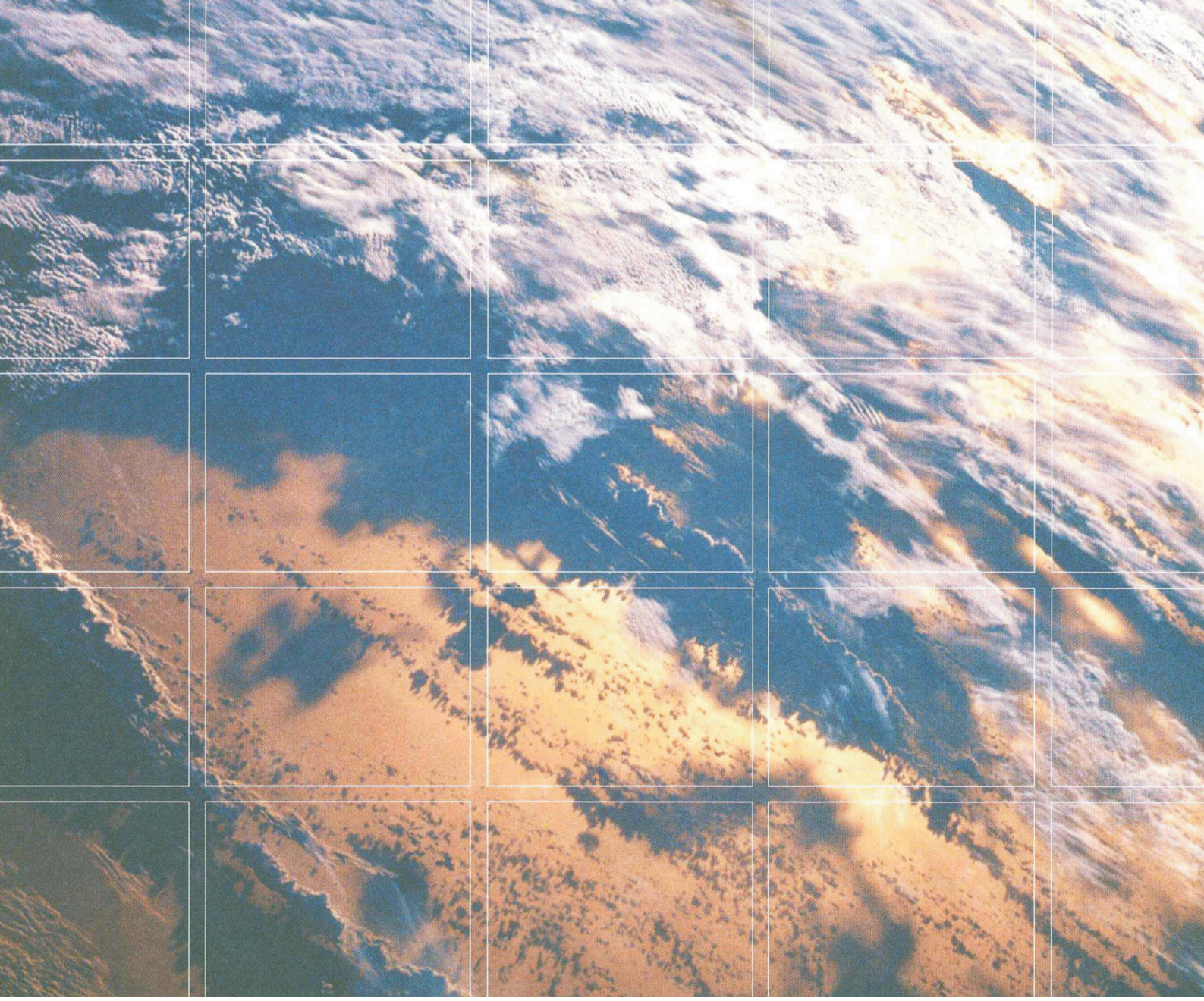

中華電力
CLP Power

ExxonMobil

Capco 青山發電有限公司 Castle Peak Power Co. Ltd.

Liquefied Natural Gas (LNG) Receiving Terminal and Associated Facilities

EIA Study (EIA Study Brief ESB-126/2005)

EM&A Manual
South Soko

22nd December 2006

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ERM

Liquefied Natural Gas (LNG) Receiving Terminal and Associated Facilities

22nd December 2006

For and on behalf of
ERM-Hong Kong, Limited

Approved by: 

Dr Robin Kennish

Position: Director

Date: 22nd December 2006

ERM

ENVIRONMENTAL IMPACT ASSESSMENT ORDINANCE (CAP. 499), SECTION 5(7)

PROJECT TITLE: LIQUEFIED NATURAL GAS (LNG) RECEIVING TERMINAL AND ASSOCIATED FACILITIES

NAME OF APPLICANT : CASTLE PEAK POWER COMPANY LIMITED

EM&A MANUAL – SOUTH SOKO

CONTENTS

ANNEXES

1 INTRODUCTION

1.1 PURPOSE OF THE MANUAL

This Environmental Monitoring and Audit (EM&A) Manual ("the Manual") has been prepared by ERM-Hong Kong, Limited (ERM) on behalf of The Castle Peak Power Company Limited (CAPCO), a joint venture between CLP Power Hong Kong Limited (CLP) and ExxonMobil Energy Limited (EMEL). The Manual is a supplementary document of the EIA Study of the Liquefied Natural Gas (LNG) Receiving Terminal and Associated Facilities at South Soko (hereafter referred to as the Project).

The Manual has been prepared in accordance with the *EIA Study Brief* (No. ESB-126/2005) and the *Technical Memorandum of the Environmental Impact Assessment Process* (*EIAO TM*). The purpose of the Manual is to provide information, guidance and instruction to personnel charged with environmental duties and those responsible for undertaking EM&A work during construction and operation. It provides systematic procedures for monitoring and auditing of potential environmental impacts that may arise from the works.

This Manual contains the following information:

- Responsibilities of the Contractor(s), Environmental Team (ET), and the Independent Environmental Checker (IEC) with respect to the environmental monitoring and audit requirements during the course of the project;
- The basis for, and description of, the broad approach underlying the EM&A programme;
- Requirements with respect to the construction and operational programme schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
- Details of the methodologies to be adopted including field, laboratory and analytical procedures, and details on quality assurance and quality control programme;
- The rationale by which the environmental monitoring data will be evaluated and interpreted;
- Preliminary definition of Action and Limit levels;
- Establishment of Event and Action plans;

- Requirements for reviewing pollution sources and working procedures required in the event of exceedances of applicable environmental criteria and/or receipt of complaints;

- Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures; and

- Requirements for review of EIA predictions and the effectiveness of the mitigation measures/environmental management systems and the EM&A programme.

For the purpose of this manual, the ET Leader (ETL), who will be responsible for and in charge of the ET, will refer to the person delegated the role of executing the EM&A requirements.

1.2 PROJECT DESCRIPTION

1.2.1 Background to the Study

CAPCO is proposing the development of a Liquefied Natural Gas (LNG) Receiving Terminal in the Hong Kong SAR for a sustainable supply of natural gas, primarily to fuel CAPCO's power plant at Black Point. CAPCO has conducted a series of studies examining the optimum approach to provide a long-term secure supply of natural gas to Hong Kong. They have also completed site search studies to examine the most suitable locations for the LNG terminal in Hong Kong. CAPCO commenced discussions with the members of the Environmental Study Management Group (ESMG) in September 2004 to explain the site selection process and outline a way forward. The ESMG was represented by a range of Government departments to advise CAPCO on environmental, conservation, gas and fire safety, planning, marine and land issues.

At the same time CAPCO commenced a dialogue with other key stakeholders including Non-governmental Organisations (NGOs) to seek feedback on their proposals and factor some of the issues raised into the design plans prior to commencing the formal *EIAO* process.

The outcome of the discussions with Government and other stakeholders was that South Soko and Black Point would be taken forward into the formal *EIAO* process and an EIA Study conducted on each.

1.2.2 The Proposed South Soko Island Project

The Project will involve the construction and operation of a LNG receiving terminal and its associated facilities at South Soko Island. The receiving terminal will provide a facility for LNG regasification and storage and pipeline inlet for transporting natural gas (regasified LNG) to the Black Point Power Station (BPPS). The natural gas will be sent via a submarine gas pipeline to a Gas Receiving Station (GRS) at BPPS. The principal natural gas user would be CAPCO. The terminal will require power supply during

construction and operation. In order to provide power supply to South Soko, it will necessitate the installation of a submarine electricity circuit or gas turbine generators. A submarine water main installation is proposed connecting Shek Pik Reservoir on Lantau Island and South Soko Island. However, the need for this water main connection will be confirmed during later design following a condition survey of the existing decommissioned watermain.

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

- Construction of a storage facility of liquefied natural gas with a storage capacity of more than 200 tonnes (item *L.2* of *Part I* of *Schedule 2* of *EIAO*);
- Dredging operation for the approach channel and turning circle that exceeds 500,000 m^3 (item *C.12* of *Part I* of *Schedule 2* of *EIAO*).
- Installation of a submarine gas pipeline connecting the proposed LNG terminal at the South Soko Island and the Black Point Power Station (item *H.2* of *Part I of Schedule 2* of *EIAO*);
- Dredging operation for the installation of a submarine power cable connecting Shek Pik with the proposed LNG terminal at South Soko which is less than 500m from the nearest boundary of an existing Site of Cultural Heritage (item *C.12(a)* of *Part I* of *Schedule 2* of *EIAO*); and,
- Potential dredging operation for the installation of a submarine water main connecting Shek Pik with the proposed LNG terminal at South Soko which is less than 500m from the nearest boundary of an existing Site of Cultural Heritage (item *C.12(a)* of *Part I* of *Schedule 2* of *EIAO*). This item is to be confirmed following a condition survey of the existing decommissioned watermain.

1.3 OBJECTIVE OF THE EM&A

The broad objective of this EM&A Manual is to define the procedures of the EM&A programme for monitoring the environmental performance of the LNG project during design, construction and operation. The construction and operational impacts arising from the implementation of the Project are specified in the EIA Report. The EIA Report also specifies mitigation measures and construction practices that may be needed to ensure compliance with the environmental criteria. These mitigation measures and their implementation requirements are presented in the Implementation Schedule of Mitigation Measures (*Annex A*).

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

- provide a database of environmental parameters against which to determine any short term or long term environmental impacts, such as through detailed baseline monitoring;
- provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- ensure the mitigation recommendations of the EIA are included in the design of the project;
- clarify and identify potential sources of pollution, impact and nuisance arising from the works for the responsible parties;
- confirm compliance with regulatory requirements, contract specifications and EIA study recommendations;
- confirm compliance of environmental designs during the design phase of the Project with the specifications stated in the EIA Report and the EP;
- monitor performance of the mitigation measures and to assess their effectiveness;
- take remedial action if unexpected issues or unacceptable impacts arise;
- verify the environmental impacts predicted in the EIA; and
- audit environmental performance.

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

Table 1.1 Summary of EM&A Requirements

Parameter	EM&A Phase			
	Design Phase (2)	Construction Phase	Post-Construction Phase	Operation Phase
Air Quality	-	Yes	-	-
Noise	-	Yes	-	-
Water Quality	-	Yes	Yes	-
Waste	-	Yes	-	-
Terrestrial Ecology	- (1)	-	-	-
Marine Ecology	- (1)	Yes	Yes	-
Fisheries	- (1)	-	Yes	-
Landscape and Visual	Yes	Yes	Yes	Yes
Cultural Heritage	Yes	Yes	-	-
Quantitative Risk	Yes	-	-	-
Land Contamination Prevention	Yes	-	-	-

Note:

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

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

1.4 THE SCOPE OF THE EM&A PROGRAMME

The scope of this EM&A programme is to:

- establish baseline water quality levels at specified locations;
- implement monitoring and inspection requirements for water quality monitoring programme;
- implement inspection and audit requirements for marine ecology (marine mammals, False Pillow Coral and Amphioxus) monitoring programme;
- liaise with, and provide environmental advice (as requested or when otherwise necessary) to construction site staff on the significance and implications of the environmental monitoring data;
- identify and resolve environmental issues and other functions as they may arise from the works;
- check and quantify the Contractor(s)'s overall environmental performance, implementation of Event and Action Plans (EAPs), and

remedial actions taken to mitigate adverse environmental effects as they may arise from the works;

- conduct monthly reviews of monitored impact data as the basis for assessing compliance with the defined criteria and to ensure that necessary mitigation measures are identified and implemented, and to undertake additional *ad hoc* monitoring and auditing as required by special circumstances;

- evaluate and interpret environmental monitoring data to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards, and to verify the environmental impacts predicted in the EIA;

- manage and liaise with other individuals or parties concerning other environmental issues deemed to be relevant to the construction process;

- conduct regular site inspections of a formal or informal nature to assess:

  - the level of the Contractor(s)'s general environmental awareness;

  - the Contractor(s)'s implementation of the recommendations in the EIA and their contractual obligations;

  - the Contractor(s)'s performance as a measured by the EM&A;

  - the need for specific mitigation measures to be implemented or the continued usage of those previously agreed;

  - to advise the site staff of any identified potential environmental issues;

  - submit monthly EM&A reports which summarise project monitoring and auditing data, with full interpretation illustrating the acceptability or otherwise of any environmental impacts and identification or assessment of the implementation status of agreed mitigation measures; and

- develop environmental contract clauses for contractor contract.

1.5 WORKS PROGRAMME AND WORKS LOCATIONS

The construction works are anticipated to commence in 2007. The preliminary construction programme is given in *Annex B*. The locations of works are shown in *Figure 1.1*. The Sensitive Receivers in the vicinity of the proposed LNG terminal at South Soko and along the proposed pipeline route are shown in *Figure 1.3*.

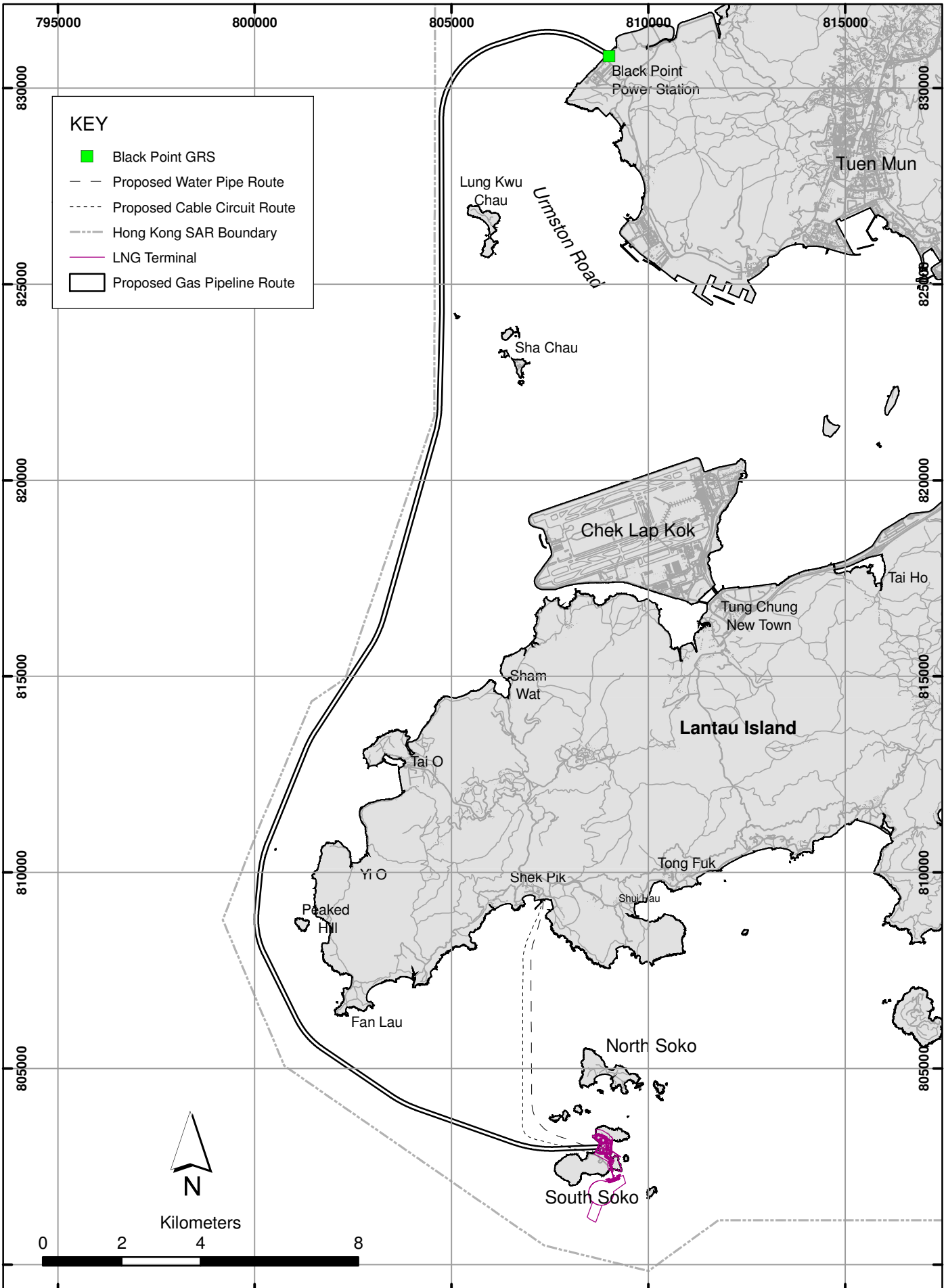

Figure 1.1

Locations of Works

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1.6 ORGANISATION AND STRUCTURE OF THE EM&A

1.6.1 General

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

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

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

1.6.2 Project Organisation

The roles and responsibilities of the various parties involved in the EM&A process are further expanded in the following sections and in *Figure 1.2*. The ET Leader will be responsible for, and in charge of, the Environmental Team; and will be the person responsible for executing the EM&A requirements, and to develop environmental Contract Clauses for Contractor Contract.

CAPCO

CAPCO will:

- retain an Environmental Team (ET) to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit data;
- retain an Independent Environmental Checker (IEC) to audit and verify the overall environmental performance of the works and to assess the effectiveness of the ET in their duties;
- supervise the Contractor(s)' activities and ensure that the requirements in the EM&A Manual and the Contract Document are fully complied with;
- develop appropriate contract clauses to ensure that the Contractor(s) will have qualified professionals to interface with the ETL/CAPCO/IEC to fulfil the EIA/EP requirements;

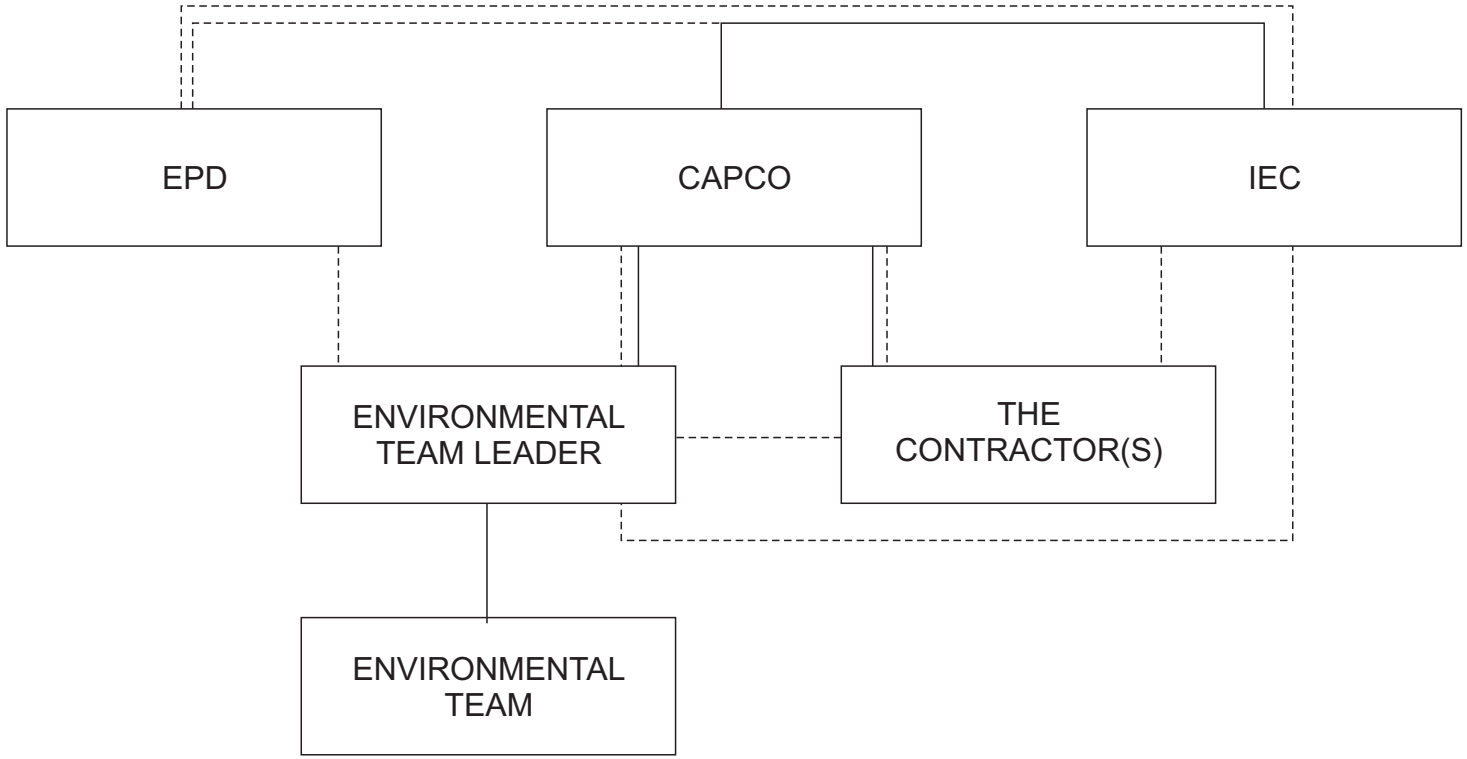

Figure 1.2

Indicative Project Organisation Chart

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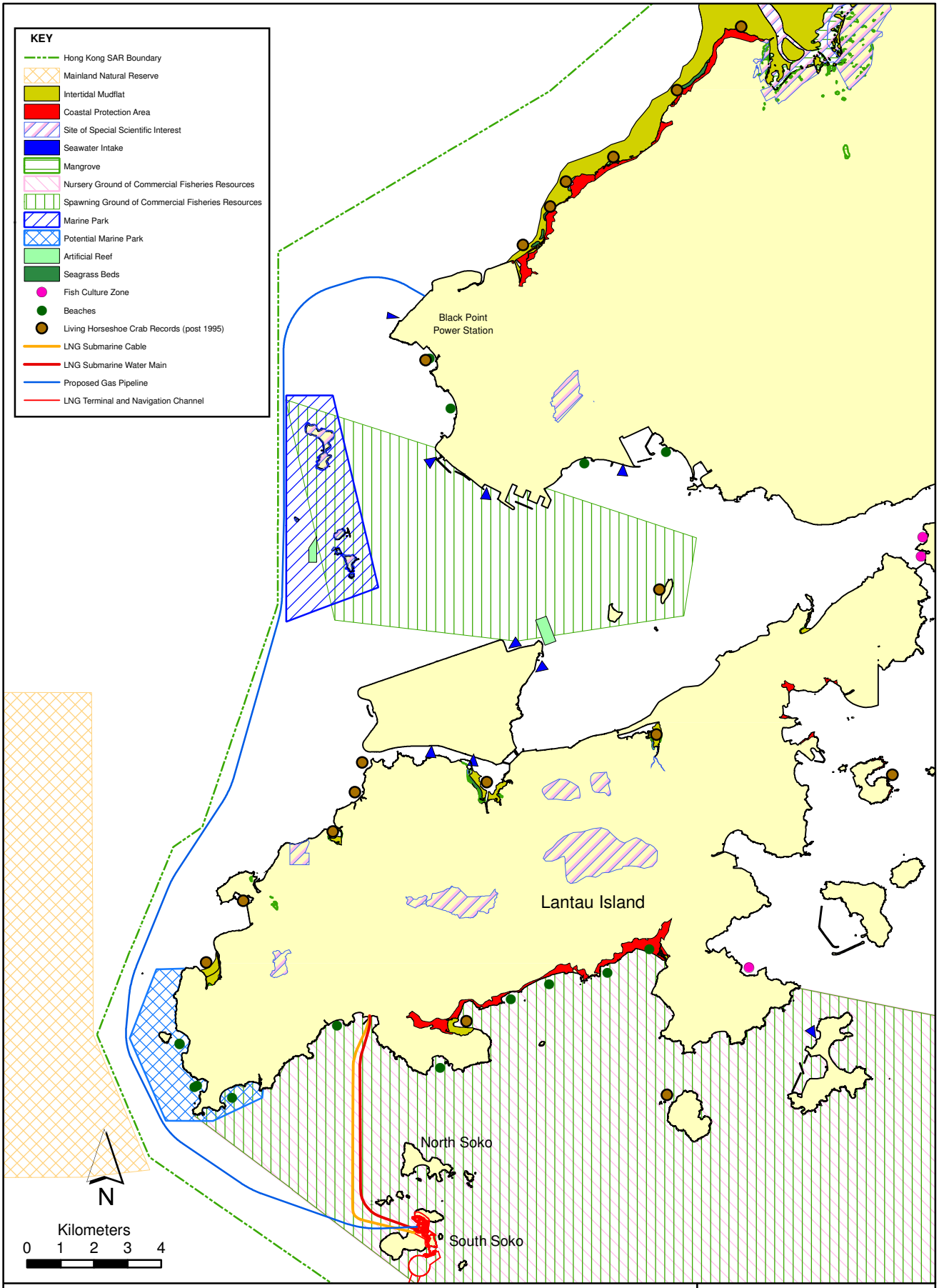

FIGURE 1.3

The Environmental Sensitive Receivers in the Vicinity of the Proposed LNG Terminal at South Soko and along the Proposed Pipeline Route

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- inform the Contractor(s) when action is required to reduce impacts in accordance with the Event and Action Plans;
- adhere to the procedures for carrying out complaint investigation; and
- participate in joint site inspections undertaken by the ET and IEC.

The Contractor(s)

The Contractor(s) will:

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

Environmental Team

The Environmental Team (ET) will:

- monitor various environmental parameters as required in this EM&A Manual;
- assess the EM&A data and review the success of the EM&A programme determining the adequacy of the mitigation measures implemented and the validity of the EIA predictions as well as identify any adverse environmental impacts before they arise;
- carry out regular site inspection to investigate and audit the Contractor(s)'s site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt issues;
- review the Contractor(s)'s working programme and methodology, and comment as necessary;
- provide advice (if required) to CAPCO for the development of environmental contract clauses for contractor contract;

- review and prepare reports on the environmental monitoring data, site environmental conditions and audits;
- report on the environmental monitoring and audit results and conditions to the IEC, Contractor(s), EPD and CAPCO;
- recommend suitable mitigation measures to the Contractor(s) in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans;
- adhere to the procedures for carrying out complaint investigation; and
- the ET Leader will keep a contemporaneous log-book and record each and every instance or circumstance or change of circumstances which may affect the environmental impact assessment and every non-conformance with the recommendations of the EIA Reports or the EPs.

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

Independent Environmental Checker

The IEC will:

- review and monitor the implementation of the EM&A programme and the overall level of environmental performance being achieved;
- arrange and conduct monthly independent site inspections/audits of the works;
- validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring stations, monitoring procedures and locations of sensitive receivers;
- carry out random sample check and audit on monitoring data and sampling procedures, etc;
- audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
- on needed basis, audit the Contractor(s)'s construction methodology and agree the appropriate, reduced impact alternative in consultation with CAPCO, the ET and the Contractor(s);
- provide specialist advice to CAPCO and the Contractor(s) on environmental matters;

- check complaint cases and the effectiveness of corrective measures;
- check that the necessary mitigation measures recommended in the EIA, EP and Contract documents, or as subsequently required, are effectively implemented;
- review EM&A report submitted by the ET leader and feedback audit results to ET by signing off relevant EM&A proformas;
- report the findings of site inspections/ audits and other environmental performance reviews to CAPCO, ET, EPD and the Contractor(s); and
- Sufficient and suitably qualified professional and technical staff will be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme for the duration of the Project.

1.6.3 Key Contact Information

Key contact information will be provided in a similar format as in *Table 1.2*.

Table 1.2 Contact Information - to be completed prior to commencement of construction

Name	Position	Telephone	Facsimile	E-mail
CAPCO – Environmental Permit Holder				
To be confirmed				
Contractor(s)				
To be confirmed				
Environmental Team				
To be confirmed				
Independent Environmental Checker				
To be confirmed				

1.7 STRUCTURE OF THE EM&A MANUAL

The remainder of the Manual is set out as follows:

- *Section 2* sets out the EM&A general requirements and EIAO Permit Conditions;
- *Section 3* sets out the EM&A requirement for air quality;
- *Section 4* sets out the EM&A requirement for noise;
- *Section 5* details the requirements for water quality baseline and impact monitoring, and lists relevant monitoring equipment, compliance and Event and Action Plans (EAPs);

- *Section 6* details the requirements for waste management;
- *Section 7* details the requirements for terrestrial ecology;
- *Section 8* details the requirements for marine ecology and fisheries;
- *Section 9* sets out the EM&A requirements for cultural heritage;
- *Section 10* sets out the EM&A requirements for landscape and visual;
- *Section 11* sets out the EM&A requirements for land contamination prevention and quantitative risk;
- *Section 12* describes the scope and frequency of site environmental auditing; and
- *Section 13* details the reporting requirements for the EM&A.

2 EM&A GENERAL REQUIREMENT

2.1 INTRODUCTION

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

2.2 CONSTRUCTION PHASE EM&A

2.2.1 General

The environmental issues, which were identified during the EIA process and are associated with the construction phase of the Project will be addressed through the monitoring and controls specified in this EM&A Manual and in the construction contracts.

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

2.2.2 Environmental Monitoring

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

2.2.3 Action and Limit Levels

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

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

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

2.2.4 *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(s)) does occur, the cause will be quickly identified and remediated, 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.

2.2.5 *Site Inspections*

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

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

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

Section 12 of this Manual presents details of the scope and frequency of on-site inspections and defines the range of issues that the audit protocols will be designed to address.

2.2.6 *Enquiries, Complaint and Requests for Information*

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

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

1) The ET Leader will notify CAPCO of the nature of the enquiry.

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

3) The Contractor(s) will undertake the following steps, as necessary:

- investigate and identify source of the issue;
- if considered necessary by CAPCO following consultation with the IEC, undertake additional monitoring to verify the existence and severity of the alleged complaint;
- liaise with EPD to identify remedial measures;
- liaise with the IEC to identify remedial measures;
- implement the agreed mitigation measures;
- repeat the monitoring to verify effectiveness of mitigation measures; and
- repeat review procedures to identify further practical areas of improvement if the repeat monitoring results continue to substantiate the complaint.

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

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

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

2.2.7 *Reporting*

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

2.2.8 *Cessation of EM&A*

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

2.3 *OPERATION PHASE EM&A*

As no unacceptable impacts were identified during the operation phase of the Project no operation phase EM&A is considered necessary. However, other operational licenses will require specific monitoring or audit conditions or practices, and a non EIA EM&A practice will need to be put in place.

3 AIR QUALITY

3.1 INTRODUCTION

The EIA study has concluded that no sensitive receivers will be affected by construction dust. Dust levels will be reduced through the implementation of mitigation measures. During the operational phase, emissions will be controlled by integrated measures, regular inspections, relevant emissions licenses and are not predicted to yield concentrations that would lead to significant air quality impacts. Therefore, no air quality monitoring will be required for either the construction or operational phase aside from that required by specific emissions licenses.

3.2 AIR QUALITY MITIGATION MEASURES

Regular site inspections should be carried out during the construction phase in order to ensure that the mitigation measures are implemented and are working effectively. The Contractor(s) will be responsible for the design and implementation of the mitigation measures which are presented in *Annex A*.

4 NOISE

4.1 INTRODUCTION

The EIA study of the Project has concluded that no sensitive receivers will be affected by construction noise. Based upon this, no noise monitoring is considered necessary during the construction phase. However, audit of the construction noise is recommended.

4.2 NOISE MITIGATION MEASURES

Regular site inspections should be carried out to audit the compliance of the Contractor(s) with regard to noise control, contract conditions and the relevant noise impact criteria, and to recommend further mitigation measures if found to be necessary.

No operational phase noise impacts were predicted at sensitive receiver locations and hence no operational phase monitoring is required.

5 WATER QUALITY

5.1 INTRODUCTION

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

5.2 SAMPLING METHODOLOGY

5.2.1 *Water Quality Parameters*

Measurements of Dissolved Oxygen (DO) concentration (mg L^{-1}), DO saturation (%), Salinity (mg L^{-1}), Temperature (^{o}C) and Turbidity (NTU) will be taken *in situ* by the ET at monitoring stations identified in *Sections 5.2.4, 5.2.5* and *5.3* below. Water samples for the measurements of SS (mg L^{-1}) will also be collected for laboratory analysis.

In addition to the water quality parameters, other relevant data will also be measured and recorded in Water Quality Monitoring Logs (*Annex D*), including the location of the sampling stations, water depth, time, weather conditions, sea conditions, tidal stage, current direction and speed, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results. Observations on any special phenomena and work underway at the construction site at the time of sampling will also be recorded.

5.2.2 *Sampling Procedures and Monitoring Equipment*

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

- ***Dissolved Oxygen and Temperature Measuring Equipment -*** The instrument will be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and will be operable from a DC power source. It will 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 will have a membrane electrode with automatic temperature compensation complete with a cable of not less than 35 m in length. Sufficient stocks of spare electrodes and cables will be available for replacement where necessary (e.g. YSI model 59 metre, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

- ***Turbidity Measurement Equipment*** - Turbidity within the water will be measured *in situ* by the nephelometric method. The instrument will be a portable, weatherproof turbidity-measuring unit complete with cable, sensor and comprehensive operation manuals. The equipment will be operated from a DC power source, it will have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU and will be complete with a cable with at least 35 m in length (for example Hach 2100P or an approved similar instrument).

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

- ***Suspended Solid Measurement Equipment*** - A water sampler (eg Kahlsico Water Sampler), which is a PVC cylinder (capacity not less than 2 litres), which can be effectively sealed with latex cups at both ends, will be used for sampling. The sampler will 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 suspended solids measurement will be collected in high-density polythene bottles, packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory in the same day as the samples were collected.

- ***Water Depth Gauge*** - A portable, battery-operated echo sounder (Seafarer 700 or a similar approved instrument) will be used for the determination of water depth at each designated monitoring station. This unit will preferably be affixed to the bottom of the work boat if the same vessel is to be used throughout the monitoring programme. The echo sounder should be suitably calibrated.

- ***pH Measuring Equipment*** - A portable pH meter capable of measuring a range between 0.0 and 14.0 will be provided to measure pH under the specified conditions (eg. Orion Model 250A or an approved similar instrument).

- ***Positioning Device*** - A hand-held or boat-fixed type differential Global Positioning System (DGPS) or other equivalent instrument of similar accuracy will be used during monitoring to ensure the accurate recording of the position of the monitoring vessel before taking measurements. The DGPS or equivalent instrument, should be suitably calibrated at appropriate checkpoint (e.g. Quarry Bay Survey Nail at Easting 840683.49, Northing 816709.55). For remote locations such as Sokos, suitable checkpoint should be identified by the ET/IEC to ensure the monitoring station is at the correct position before the water quality monitoring commence. Marine anchors will not be used when sampling the impact stations within or on the boundaries of the Lung Kwu Chau and Sha Chau Marine Park.

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

In-situ monitoring instruments will be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout the stages of the water quality monitoring. Responses of sensors and electrodes will be checked with certified standard solutions before each use. Wet bulb calibration for the DO meter will be carried out before measurement at each monitoring location. The turbidity meter will be calibrated to establish the relationship between turbidity readings (in NTU) and levels of SS (in mg L^{-1}) where possible.

For the on site calibration of field equipment, the *BS 1427:1993, "Guide to Field and on-site test methods for the analysis of waters"* will be observed.

Sufficient stocks of spare parts will be maintained for replacements when necessary. Back-up monitoring equipment will also be available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

5.2.3 Laboratory Measurement and Analysis

Analysis of suspended solids will be carried out in a HOKLAS or other international accredited laboratory. Water samples of about 500mL will be collected at the monitoring stations for carrying out the laboratory SS determination. The SS determination work will start within 24 hours after collection of the water samples. The analyses will follow the standard methods as described in APHA *Standard Methods for the Examination of Water and Wastewater*, *19th Edition*, unless otherwise specified (APHA 2540D for SS) with a detection limit of 1 mg L^{-1} or less.

The submitted information should include the chain of custody forms, pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch etc), detection limits and accuracy. The QA/QC details will be in accordance with requirements of HOKLAS or another internationally accredited scheme that HOKLAS has an agreement with. The limits of detection for the *in-situ* and laboratory measurements that will be obtained are shown in *Table 5.1*.

Table 5.1 Detection Limits and Precision for Water Quality Parameters

Parameter	Limit of Detection
Dissolved Oxygen	0.1 mg L^{-1}
Salinity	0.01 ppt
Temperature	0.1 °C
pH	0.01 units
Turbidity (NTU)	0.1 NTU
Suspended Solids	1 mg L^{-1}

5.2.4 Monitoring Locations, Frequency and Actions - Pilot Test

Introduction

In order to verify the modelling predictions in the EIA Report a pilot test will be established during the dredging works and jetting works for submarine cable/water main at a suitable location to be agreed with EPD and AFCD. The pilot test will consist of intensive water quality monitoring on the first three days of the dredging/jetting operation designed to verify the predictions from the modelling work. Pilot test will also include the testing on the effectiveness of silt curtains with reference to the reduction factors used in the water quality models.

The details below are indicative and will be agreed with AFCD and EPD in advance of conduct of the pilot test.

Stations

Three sets of monitoring stations will be arranged perpendicularly to the dredging/jetting path with respect to the three days monitoring. Monitoring locations will be fixed throughout the whole day of monitoring.

Frequency

Monitoring should be conducted hourly of turbidity and suspended solids (SS) for correlation (the methods for taking and analysing the samples should be as presented above).

Each station will be sampled and measurements will be taken at three depths, 1 m below the sea surface, mid depth and 1 m above the seabed. Where water depth is less than 6 m the mid-depth station may be omitted. If water depth is less than 3 m, only the mid-depth station will be monitored.

Duplicate water samples shall be taken and analyzed at all monitoring stations.

Reporting

The turbidity monitoring results should be submitted on a daily basis and the SS results should be submitted within 24 hours of collection by the ET Leader to EPD and AFCD for review.

Actions

The results of the pilot test will be utilised to indicate how the dredging/jetting works are performing in comparison to the modelling predictions presented in the EIA. The results will act essentially as an early warning tool to advise the Contractor how the dredging/jetting plant is performing. Should the results indicate that the modelling predictions are being exceeded then the Contractor will be able to take remedial action. In order to ensure that exceedances of the appropriate Action and Limit levels for the Impact Monitoring do not occur in the more environmentally sensitive areas of West and Northwest Lantau.

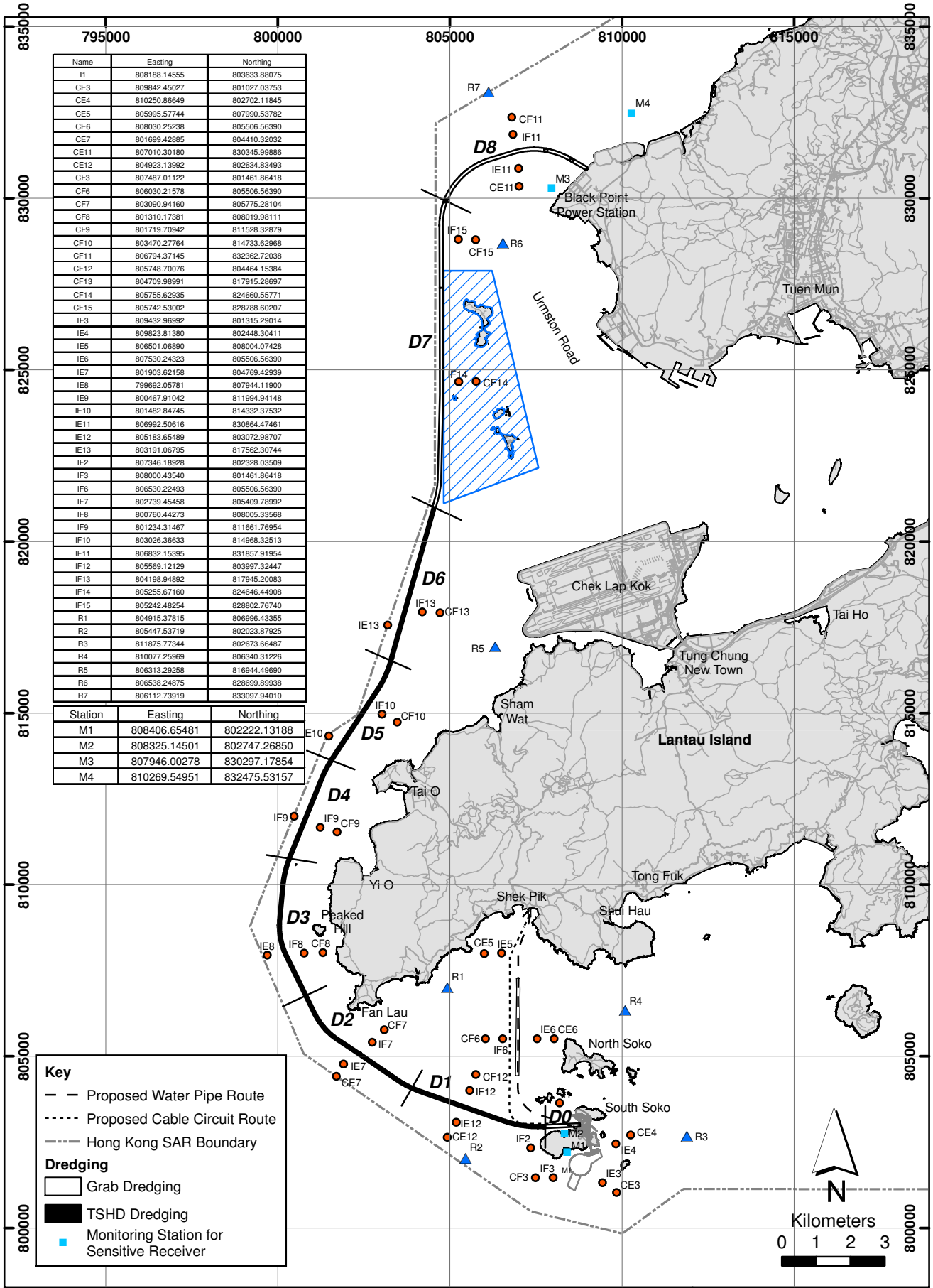
It should be noted that the Contractor is not obliged to reduce the dredging/jetting rates based on the results of the pilot test but is strongly advised to review their working methods and take remedial measures prior to any exceedances being triggered during actual construction work.

5.2.5 *Monitoring Locations for Dredging and Backfilling Activities*

Water quality monitoring will be conducted within Hong Kong Waters during dredging and backfilling activities. The monitoring stations for dredging and backfilling activities are shown in *Figure 5.1* and detailed in *Table 5.2.*

The monitoring locations were determined based upon the areas required for the dredging and backfilling activities for the submarine utilities as well as for the approach channel and reclamation areas (backfilling only). As seen in *Figure 5.1,* Impact Stations are defined as at a distance of approximately 500 m away from the construction works area. Depending on the works this typically represents the maximum extent of the zone of influence predicted by the modelling exercises resulting from the dredging activities. At the Impact locations, impact from the dredging activities should be at minimum.

In addition, Reference Stations have been chosen to facilitate comparison of the water quality of the Impact Stations with ambient water quality conditions, Reference Stations are located in areas not expected to be affected by other projects and which lie within the path of water body movements affecting the Impact Stations but are well outside the predicted influence of the construction works. Monitoring data from these Reference Stations could be used as upstream and downstream controls for the Impact Stations.



Name	Easting	Northing
I1	808188.14555	803633.88075
CE3	809842.45027	801027.03753
CE4	810250.86649	802702.11845
CE5	805995.57744	807990.53782
CE6	808030.25238	805506.56390
CE7	801699.42885	804410.32032
CE11	807010.30180	830345.99886
CE12	804923.13992	802634.83493
CF3	807487.01122	801461.86418
CF6	806030.21578	805506.56390
CF7	803090.94160	805775.28104
CF8	801310.17381	808019.98111
CF9	801719.70942	811528.32879
CF10	803470.27764	814733.62968
CF11	806794.37145	832362.72038
CF12	805748.70076	804464.15384
CF13	804709.98991	817915.28697
CF14	805755.62935	824660.55771
CF15	805742.53002	828788.60207
IE3	809432.96992	801315.29014
IE4	809823.81380	802448.30411
IE5	806501.06890	808004.07428
IE6	807530.24323	805506.56390
IE7	801903.62158	804769.42939
IE8	799692.05781	807944.11900
IE9	800467.91042	811994.94148
IE10	801482.84745	814332.37532
IE11	806992.50616	830864.47461
IE12	805183.65489	803072.98707
IE13	803191.06795	817562.30744
IF2	807346.18928	802328.03509
IF3	808000.43540	801461.86418
IF6	806530.22493	805506.56390
IF7	802739.45458	805409.78992
IF8	800760.44273	808005.33568
IF9	801234.31467	811661.76954
IF10	803026.36633	814968.32513
IF11	806832.15395	831857.91954
IF12	805569.12129	803997.32447
IF13	804198.94892	817945.20083
IF14	805255.67160	824646.44908
IF15	805242.48254	828802.76740
R1	804915.37815	806996.43355
R2	805447.53719	802023.87925
R3	811875.77344	802673.66487
R4	810077.25969	806340.31226
R5	806313.29258	816944.49690
R6	806538.24875	828699.89938
R7	806112.73919	833097.94010

Station	Easting	Northing
M1	808406.65481	802222.13188
M2	808325.14501	802747.26850
M3	807946.00278	830297.17854
M4	810269.54951	832475.53157

FIGURE 5.1

Water Quality Monitoring Stations During Dredging and Jetting Activities

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Date: 28/11/2006

Environmental Resources Management

ERM

Locations of Reference Stations would be subject to change depending on the location and timing of dredging and other marine works projects in the Study Area. Any proposal to change the locations of Control / Impact Stations would be subject to the EPD's approval.

Apart from the Impact and Reference Stations, Control Stations have been proposed to assist in the identification of the source of any impact. They are approximately 1000 m away from the construction works area and 500 m away from the Impact Stations. Control Stations are particularly useful for the identification of the pollution source and pathway if exceedances are found at Impact Stations but not at the Reference Stations.

In addition, subject to the locations of dredging works, water quality monitoring will also be conducted at the Sensitive Receiver Stations including Fish Fry habitat at Pak Tso Wan (M2), Seawater intake at Black Point Power Station (M3) and Intertidal mudflat/horseshoe crab nursery ground at Pak Nai (M4) when dredging works are located close to these locations.

In order to monitor the water quality in the area where *Pseudosiderastea tayami* is located (*Figure A1.1*), water quality monitoring at Station M1 (both inside and outside the silt curtain) is required during the dredging activities at the Approaching Channel at South Soko.

Table 5.2 ***Location of Marine Water Quality Monitoring Stations for Dredging Activities***

Monitoring Station Identification	Type	Location	Coordinates
I1 (ebb & flood)	Impact	North of South Soko (D0)	Please refer to *Figure 5.1*
IF2	Impact	West of South Soko	Please refer to *Figure 5.1*
IF3 (flood)	Impact	Southwest of South Soko	Please refer to *Figure 5.1*
CF3 (flood)	Control	Southwest of South Soko	Please refer to *Figure 5.1*
IE3 (ebb)	Impact	Southeast of South Soko	Please refer to *Figure 5.1*
CE3 (ebb)	Control	Southeast of South Soko	Please refer to *Figure 5.1*
IE4 (ebb)	Impact	East of South Soko	Please refer to *Figure 5.1*
CE4 (ebb)	Control	East of South Soko	Please refer to *Figure 5.1*
IE5 (ebb)	Impact	Shek Pik	Please refer to *Figure 5.1*
CE5 (ebb)	Control	Shek Pik	Please refer to *Figure 5.1*
IE6 (ebb)	Impact	West of North Soko	Please refer to *Figure 5.1*
CE6 (ebb)	Control	West of North Soko	Please refer to *Figure 5.1*

Monitoring Station Identification	Type	Location	Coordinates
IF6 (flood)	Impact	West of North Soko	Please refer to *Figure 5.1*
CF6 (flood)	Control	West of North Soko	Please refer to *Figure 5.1*
IE7 (ebb)	Impact	South of Fan Lau (D2)	Please refer to *Figure 5.1*
CE7 (ebb)	Control	South of Fan Lau (D2)	Please refer to *Figure 5.1*
IF7 (flood)	Impact	South of Fan Lau (D2)	Please refer to *Figure 5.1*
CF7 (flood)	Control	South of Fan Lau (D2)	Please refer to *Figure 5.1*
IE8 (ebb)	Impact	West of Peaked Hill (D3)	Please refer to *Figure 5.1*
IF8 (flood)	Impact	West of Peaked Hill (D3)	Please refer to *Figure 5.1*
CF8 (flood)	Control	West of Peaked Hill (D3)	Please refer to *Figure 5.1*
IE9 (ebb)	Impact	West of Tai O (D4)	Please refer to *Figure 5.1*
IF9 (flood)	Impact	West of Tai O (D4)	Please refer to *Figure 5.1*
CF9 (flood)	Control	West of Tai O (D4)	Please refer to *Figure 5.1*
IE10 (ebb)	Impact	Northwest of Tai O (D5)	Please refer to *Figure 5.1*
IF10 (flood)	Impact	Northwest of Tai O (D5)	Please refer to *Figure 5.1*
CF10 (flood)	Control	Northwest of Tai O (D5)	Please refer to *Figure 5.1*
IE11 (ebb)	Impact	West of Black Point (D8)	Please refer to *Figure 5.1*
CE11 (ebb)	Control	West of Black Point (D8)	Please refer to *Figure 5.1*
IF11 (flood)	Impact	West of Black Point (D8)	Please refer to *Figure 5.1*
CF11 (flood)	Control	West of Black Point (D8)	Please refer to *Figure 5.1*
IE12 (ebb)	Impact	West of South Soko (D1)	Please refer to *Figure 5.1*
CE12 (Ebb)	Control	West of South Soko (D1)	Please refer to *Figure 5.1*
IF12 (flood)	Impact	Northwest of South Soko (D1)	Please refer to *Figure 5.1*
CF12 (flood)	Control	Northwest of South Soko (D1)	Please refer to *Figure 5.1*
IE13 (ebb)	Impact	West of Chek Lak Kok (D6)	Please refer to *Figure 5.1*
IF13 (flood)	Impact	West of Chek Lap Kok (D6)	Please refer to *Figure 5.1*
CF13 (flood)	Control	West of Chek Lap Kok (D6)	Please refer to *Figure 5.1*

Monitoring Station Identification	Type	Location	Coordinates
IF14 (flood)	Impact	Lung Kwu Chau/Sha Chau Marine Park (D7)	Please refer to *Figure 5.1*
CF14 (flood)	Control	Lung Kwu Chau/Sha Chau Marine Park (D7)	Please refer to *Figure 5.1*
IF15 (flood)	Impact	North of LKC/SC Marine Park (D7)	Please refer to *Figure 5.1*
CF15 (flood)	Control	North of LKC/SC Marine Park (D7)	Please refer to *Figure 5.1*
R1	Reference	East of Fan Lau	Please refer to *Figure 5.1*
R2	Reference	West of South Soko	Please refer to *Figure 5.1*
R3	Reference	East of South Soko	Please refer to *Figure 5.1*
R4	Reference	North of North Soko	Please refer to *Figure 5.1*
R6	Reference	Northeast of Marine Park	Please refer to *Figure 5.1*
R7	Reference	Northwest of Black Point	Please refer to *Figure 5.1*
M1	Monitoring for *Pseudosiderastea tayami*	South of South Soko	Please refer to *Figure 5.1*
M2	Monitoring for Fish Fry Habitat at Pak Tso Wan (inside silt curtain)	South Soko	Please refer to *Figure 5.1*
M3	Monitoring for Seawater Intake at Black Point Power Station	West of Black Point	Please refer to *Figure 5.1*
M4	Monitoring for Intertidal Habitat at Pak Nai	Pak Nai, Northeast of Black Point	Please refer to *Figure 5.1*

Due to the separation of the project works areas, monitoring at specified stations will be required only for the corresponding construction activities. *Table 5.3* shows the monitoring requirements for different areas of work for the Project.

For the gas pipeline, water monitoring for each specified Area (i.e. Areas D1 and D2) is only required when dredging is conducted within the area. For example, if dredging takes place in Area D2, only the water monitoring stations in Area D2 plus specified Reference stations and Sensitive Receiver stations (if appropriate) will be sampled. Flood tide stations will be monitored during flood tide and ebb tide stations will be monitored during ebb tide.

Table 5.3 Water Monitoring Stations for Dredging Works in Different Areas

Dredging Area (tidal status)	Impact Stations	Control Stations	Reference Stations	Sensitive Receiver Stations
Gas/Water Pipeline/Submarine Cable / Western Berth Seawall - South Soko (D0) (Flood)	I1, IF2	-	R3	M2
Gas/Water Pipeline/Submarine Cable / Western Berth Seawall - South Soko (D0) (Ebb)	I1	-	R2	M2
Approaching Channel/ Eastern Berth Seawall - South Soko (Flood)	IF3	CF3	R3	M1
Approaching Channel/ Eastern Berth Seawall - South Soko (Ebb)	IE3, IE4	CE3, CE4	R2	M1
Water Pipeline/Submarine Cable – Shek Pik (Ebb)	IE5	CE5	R1	-
Water Pipeline – Mid Section (Flood)	IF6	CF6	R4	-
Water Pipeline – Mid Section (Ebb)	IE6	CE6	R1	-
Gas Pipeline – Area D1 (Flood)	IF12	CF12	R2	M2
Gas Pipeline – Area D1 (ebb)	IE12	CE12	R1	M2
Gas Pipeline – Area D2 (Flood)	IF7	CF7	R2	-
Gas Pipeline – Area D2 (Ebb)	IE7	CE7	R5	-
Gas Pipeline – Area D3 (Flood)	IF8	CF8	R2	-
Gas Pipeline – Area D3 (Ebb)	IE8	-	R5	-
Gas Pipeline – Area D4 (Flood)	IF9	CF9	R2	-
Gas Pipeline – Area D4 (Ebb)	IE9	-	R5	-
Gas Pipeline – Area D5 (Flood)	IF10	CF10	R2	-
Gas Pipeline – Area D5 (Ebb)	IE10	-	R5	-
Gas Pipeline – Area D6 (Flood)	IF13	CF13	R2	-
Gas Pipeline – Area D6 (Ebb)	IE13	-	R5	-
Gas Pipeline – Area D7 (Flood)	IF14, IF15	CF14, CF15	R5	-
Gas Pipeline – Area D8 (Flood)	IF11	CF11	R6	M3, M4

Dredging Area (tidal status)	Impact Stations	Control Stations	Reference Stations	Sensitive Receiver Stations
Gas Pipeline – Area D8 (Ebb)	IE11	CE11	R7	M3, M4

Water quality monitoring would be undertaken by suitably qualified members of the ET. Water quality monitoring results from the Reference, Control and Impact stations would be compared to EPD's Water Quality Objectives (WQOs), for the Southern (SWCZ), North West (NWWCZ), and Deep Bay Water Control Zones (DBWCZ), 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 2 m of the bottom should not be less than 2 mg L^{-1} for 90% of the samples; depth averaged DO should not be less than 4 mg L^{-1} for 90% of the samples during the whole year.

Prior to the commencement of the EM&A programme, the ET would seek approval of the proposed changes to the water monitoring stations from the IEC, EPD and AFCD.

5.2.6 *Monitoring Locations for Jetting Activities*

The Impact Stations for jetting activities will be determined by the location of the jetting barge.

For the jetting works along the water pipe and submarine cable, water monitoring will be conducted at the distances of 500 m and 1000 m to the east of the barge (i.e. approximately 90°) during ebb tide and at the same distances to the west of the barge (i.e. approximately 270°) during flood tide.

Table 5.4 summarises the reference monitoring stations for jetting activities at different areas.

Sediment laden plumes observed from the works area or elsewhere in the vicinity of the control stations during sampling will be recorded and brought to the immediate attention of the ET.

Water quality monitoring should be undertaken by suitably qualified members of the ET. Water quality monitoring results from the Reference, Control and Impact stations would be compared to EPD's Water Quality Objectives (WQOs) for the Southern (SWCZ), 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 2 m of the bottom should not be less than 2 mg L^{-1} for 90% of the samples; depth averaged DO should not be less than 4 mg L^{-1} for 90% of the samples during the whole year.

Prior to the commencement of the EM&A programme, the ET would seek approval of any proposed changes to the water monitoring stations from the IEC, EPD and AFCD.

Table 5.4 Water Monitoring Reference Stations for Jetting Works in Different Areas

Jetting Area (tidal status)	Reference Station
Power Cable/Water Pipeline - South Soko (Flood)	R4
Power Cable/Water Pipeline - South Soko (Ebb)	R2

5.3 BASELINE MONITORING

Baseline monitoring will be conducted to collect representative water quality data from the key areas where marine works will be undertaken. This baseline monitoring will provide data for comparison with water quality data collected during impact monitoring works.

Baseline monitoring will be conducted at Impact (I1, IF2 to IF15, IE3 to IE13,), Control stations (CE3/CF3 to CE7/CF15, CE11), Reference stations (R1 to R7) as well as at Sensitive Receiver stations (M1 to M4) specified in *Table 5.2* three times a week at mid-flood and mid-ebb tides for four consecutive weeks prior to the commencement of any marine works for the Project. The tidal range selected for the baseline monitoring should be at least 0.5m for both flood and ebb tides. There shall not be any marine construction activities in the vicinity of the stations during the baseline monitoring. The interval between 2 sets of consecutive monitoring shall not be less than 36 hours. Baseline monitoring will commence no earlier than two months before construction works are due to commence. Baseline monitoring programme should be passed to EPD at least two weeks prior to commencement of baseline monitoring.

During baseline monitoring, measurements will be taken at each station at three depths, 1 m below the sea surface, mid depth and 1 m above the seabed. Where water depth is less than 6 m the mid-depth station may be omitted. If water depth is less than 3 m, only the mid-depth station will be monitored, to avoid natural resuspension of sediments from confounding the results.

The ET will be responsible for undertaking the baseline monitoring and submitting the results within 10 working days from the completion of the baseline monitoring work to the IEC for certification prior to onward transmission to EPD and AFCD.

5.4 IMPACT MONITORING

During the course of the marine works, impact monitoring would be undertaken at the relevant Reference, Control, Impact and Sensitive Receiver Stations three times a week. Monitoring locations would be based upon the locations of the dredging, backfilling and jetting activities detailed in *Sections 5.2.5* and *5.2.6*. Monitoring at each station would be undertaken at both mid-ebb and mid-flood tides on the same day. The tidal range selected for the baseline monitoring should be at least 0.5m for both flood and ebb tides. The interval between two sets of monitoring would not be less than 36 hours. The monitoring frequency would be increased in the case of exceedances of Action/Limit Levels if considered necessary by ET and IEC. Monitoring frequency would be maintained as far as practicable. Impact monitoring schedules should be passed to EPD at least two weeks prior to commencement of impact monitoring.

Two consecutive measurements of DO concentration (mgL^{-1}), DO saturation (%) and turbidity (NTU) would be taken *in-situ* according the stated sampling method. The monitoring probes would be retrieved out of water after the first measurement and then redeployed for the second measurement.

Where the difference in value between the first and second measurement of DO or turbidity parameters is more than 25% of the value of the first reading, the reading would be discarded and further readings would be taken. Water samples for SS (mgL^{-1}) measurements would be collected at the same depths and as for the *in-situ* measurements, duplicates would be taken at Control, Reference, Impact and Sensitive Receiver Stations.

In addition to the above *in-situ* measurements temperature and salinity would be determined at Control, Reference, Impact and Sensitive Receiver Stations at the same depths, as specified above.

The monitoring location/position, time, water depth, water temperature, salinity, weather conditions, sea conditions, tidal stage, special phenomena and work underway at the marine works site will be recorded.

Upon completion of all marine construction activities, a post-project water quality monitoring exercise would be carried out for four weeks, in the same manner as the baseline monitoring.

5.5 WATER QUALITY COMPLIANCE

Water quality monitoring will be evaluated against Action and Limit Levels. The key assessment parameters are dissolved oxygen and suspended sediment and thus Action and Limit Levels based on the assessment criteria are identified for these. However turbidity can also provide valuable instantaneous information on water quality and thus an Action Limit is also recommended for this parameter to facilitate quick responsive action in the event of any apparent unacceptable deterioration attributable to the works. The proposed Action and Limit Levels are shown in *Table 5.5*.

Action and Limit levels are used to determine whether operational modifications are necessary to mitigate impacts to water quality. In the event that the levels are exceeded, appropriate actions in Event and Action Plan (*Table 5.6)* should be undertaken and a review of works should be carried out by the Contractor(s).

Any noticeable change to water quality will be recorded in the survey reports and will be investigated and remedial actions will be undertaken to reduce impacts. Particular attention will be paid to the Contractor(s)'s implementation of the recommended mitigation measures.

Table 5.5 Action and Limit Levels for Water Quality

Parameters	Action (mg L^{-1})	Limit (mg L^{-1})
For all marine construction works		
DO in mgL^{-1} (surface, middle, bottom)	Data from impact stations show a depletion of 30% compared with corresponding data from control stations	DO levels are < 5 mgL^{-1} at the surface and middle depths or are < 2 mg L^{-1} for the bottom depth.
Turbidity in NTU in mg L^{-1} (depth averaged)	120% of reference station's mean Turbidity (at the same tide of the same day)	130% of reference station's mean SS (at the same tide of the same day)
For all marine construction works		
Suspended Solids in mg L^{-1} (depth averaged),	120% of reference station's mean SS (at the same tide of the same day).	130% of reference station's mean SS (at the same tide of the same day)

Parameters	Action (mg L^{-1})	Limit (mg L^{-1})

Notes:

- For DO, exceedance of the water quality limits occurs when monitoring result is lower than the limits.
- For SS, exceedance of the water quality limits occurs when monitoring result is higher than the limits.
- All the figures given in the table are for reference only and these may be amended with the agreement of EPD.
- "Depth Averaged" is calculated by taking the arithmetic mean of the *in-situ* parameters readings at all three depths. For suspended solids "depth averaged" is calculated by combining all three samples into one mixed sample which is analysed to produce a physical arithmetic mean.

It should be noted that all Action Limit levels presented in *Table 5.5* may be revised based on the baseline data to be collected in advance of construction works. If deemed necessary, the ET in consultation with the Contractor(s) will propose revised Action Limit levels and seek approval from CAPCO, the IEC and EPD.

The IEC will be empowered to audit the environmental performance of construction, aspects of the EM&A programme, validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations and procedures. If any exceedance occurs, the ET, IEC and the Contractor(s) will follow the actions stated in the Event and Action Plan (*Table 5.6).*

Table 5.6 Event and Action Plan for Water Quality Monitoring during Construction Phase

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

EVENT	ACTION			
	ET[1]	IEC[1]	Contractor(s)	CAPCO
Limit Level being exceeded by one consecutive sampling day	1. Repeat *in-situ* measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform the IEC, the Contractor(s) and EPD; 4. Check monitoring data, plant, equipment and the Contractor(s)'s working methods; 5. Discuss mitigation measures with the IEC, CAPCO and the Contractor(s); 6. Ensure mitigation measures are implemented.	1. Discuss with the ET / Contractor(s) on the mitigation measures; 2. Review proposals on mitigation measures submitted by the Contractor(s) and advise CAPCO accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Immediate stoppage of works; 2. Inform CAPCO and confirm notification of the exceedance in writing; 3. Rectify unacceptable practice; 4. Check plant and equipment; 5. Consider changes of working methods; 6. Discuss with the ET, the IEC and CAPCO and propose mitigation measures to the IEC and CAPCO within 3 working days; 7. Implement the agreed mitigation measures.	1. Discuss with the IEC, the ET and the Contractor(s) on the proposed mitigation measures; 2. Request the Contractor(s) to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures.
Limit Level being exceeded by more than one consecutive sampling days	1. Repeat *in-situ* measurement to confirm findings; 2. Identify source(s) of impact; 3. Inform the IEC, the Contractor(s) and DEP; 4. Check monitoring data, plant, equipment and Contractor(s)'s working methods; 5. Discuss mitigation measures with the IEC, CAPCO and the Contractor(s); 6. Ensure mitigation measures are implemented;	1. Discuss with ET and Contractor(s) on the mitigation measures; 2. Review proposals on mitigation measures submitted by the Contractor(s) and advise CAPCO accordingly; 3. Assess the effectiveness of the implemented mitigation measures.	1. Immediate stoppage of works; 2. Inform CAPCO and confirm notification of the exceedance in writing; 3. Rectify unacceptable practice; 4. Check plant and equipment; 5. Consider changes of working methods; 6. Discuss with the ET, the IEC and CAPCO and propose mitigation measures to the IEC and CAPCO within 3 working days; 7. Implement the agreed mitigation measures; 8. As directed by CAPCO, slow down or stop all or part of the construction activities.	1. Discuss with the IEC, the ET and the Contractor(s) on the proposed mitigation measures; 2. Request Contractor(s) to critically review working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess effectiveness of the implemented mitigation measures; 5. Consider and instruct, if necessary, the Contractor(s) to slow down or to stop all or part of the marine work until no exceedance of Limit Level.

Note: (1) ET – Environmental Team, IEC – Independent Environmental Checker

5.6 WATER QUALITY MITIGATION MEASURES

The EIA report has outlined a variety of recommended water quality mitigation measures. These are summarised in the Implementation Schedule of Mitigation Measures (*Annex A)*.

6 WASTE MANAGEMENT

6.1 INTRODUCTION

During the construction phase, waste management will be the Contractor(s)'s responsibility to ensure that wastes produced during the construction phase are managed in accordance with appropriate waste management practices and `EPD's regulations and requirements. The construction Contractor(s) will also follow the Waste Management Plan when managing the different types of wastes on site.

The Project is expected to generate the following during the construction phase:

- Dredged marine sediment;
- C & D Materials;
- Chemical waste;
- Sewage; and
- General refuse.

Auditing of waste management practices weekly during site inspections will ensure that these solid and liquid wastes generated during construction are not disposed of into the surrounding storm drains. The construction Contractor(s) will be responsible for the implementation of any mitigation measures to reduce waste or redress issues arising from the waste materials.

6.2 WASTE MANAGEMENT PRACTICES

The construction Contractor(s) will submit a Waste Management Plan (WMP) for the construction works to EPD for approval. The WMP will describe arrangements for avoidance, re-use, recover and recycling, storage, collection, treatment and disposal of different categories of waste to be generated from construction activities and will include the recommended mitigation measures on waste management detailed in *Annex A* of this EM&A Manual. The WMP will indicate the disposal location(s) of all surplus excavated spoil and other waste.

Prior to the commencement of dredging activities, the disposal strategy for the dredged sediment will be determined in accordance with the *ETWBTC No. 34/2002: Management of Dredged/Excavated Sediment*.

A Trip Ticket system will be included in the WMP. Surplus excavated spoil and other wastes will not be disposed at any other designated disposal locations unless otherwise approved in writing by EPD, Secretary of Public Fill Committee and/or other authorities as appropriate.

The Implementation Schedule (*Annex A)* provides details on the appropriate mitigation measures for avoiding and preventing adverse environmental impacts associated with dredged marine mud, construction and demolition (C&D) materials, chemical wastes, general refuse and sewage from the workforce. The WMP should be refined and updated as more detailed information is generated on the volume of dredged marine mud. Similarly, it should be regularly reviewed, and updated as appropriate, throughout the course of the construction works to ensure that it remains current with the latest detailed information and works practices.

The WMP should also outline the requirements for a waste audit program to ensure the measures outlined in the plan are effectively implemented and adhered too.

6.3 EM&A REQUIREMENTS

In order to ensure that the construction Contractor(s) has implemented the recommendations of the EIA Report, the ET will conduct regular site audits of the waste streams, to determine if wastes are being managed in accordance with the procedures in the approved WMP. The audits should look at the aspects of waste management including waste generation, storage, recycling, transport and disposal. An appropriate audit programme should be undertaken with the first audit conducted at the commencement of the construction works. Routine weekly site inspections should also include waste management. The scope of the waste management audits is presented below.

6.3.1 *Objectives of Waste Audit*

The waste management audit programme will include, but is not limited to, the following:

- ensuring that the wastes arising from works are handled, stored, collected, transferred and disposed of an environmentally acceptable manner and comply with the relevant requirements under the *Waste Disposal Ordinance (WDO)* and its regulations;
- ensuring that the construction Contractor(s) properly implements the appropriate environmental protection and waste pollution control mitigation measures, as outlined in the Implementation Schedule and presented in *Annex A,* to reduce and control the potential for waste impacts.
- ensuring the effective implementation of the Contractor(s)'s WMP; and
- to encourage the reuse and recycling of materials.

6.3.2 *Methodology and Criteria*

The construction Contractor(s) must ensure that the necessary disposal permits or licences are obtained from appropriate authorities in accordance with the various Ordinances. In addition to the ET audits, each construction Contractor(s) will designate a member of staff as being responsible for inspecting and auditing the on-site waste management practices on a monthly basis, with reference to the relevant legislation and guidelines as well as the recommendations given in the Implementation Schedule contained in *Annex A* of this EM&A Manual, and defined below:

General Legislation

- *Waste Disposal Ordinance* (Cap 354);
- *Waste Disposal (Chemical Waste) (General) Regulation* (Cap 354);
- *Waste Disposal (Charges for Disposal of Construction Waste) Regulation*;
- *Land (Miscellaneous Provisions) Ordinance* (Cap 28);
- *Public Health and Municipal Services Ordinance* (Cap 132) – Public Cleansing and Prevention of Nuisances (Urban Council) and (Regional Council) By-laws;
- *Dumping at Sea Ordinance* (1995); and,
- The storage, handling and disposal of chemical waste should be audited with reference to the requirements of the *Code of Practice on the Package, Labelling and Storage of Chemical Wastes* published by the EPD.

Other Relevant Guidelines

- *Waste Disposal Plan for Hong Kong* (December 1989), Planning, Environment and Lands Branch Government Secretariat, Hong Kong Government;
- *Environmental Guidelines for Planning In Hong Kong* (1990), Hong Kong Planning and Standards Guidelines, Hong Kong Government;
- *New Disposal Arrangements for Construction Waste* (1992), Environmental Protection Department & Civil Engineering Department, Hong Kong Government;
- *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes* (1992), Environmental Protection Department, Hong Kong Government;
- *Works Branch Technical Circular, 32/92, The Use of Tropical Hard Wood on Construction Site;* Works Branch, Hong Kong Government;
- *Works Branch Technical Circular No. 2/93 and 2/93B, Public Dumps*, Works Branch, Hong Kong Government;

- *Works Branch Technical Circular No. 16/96, Wet Soil in Public Dumps*; Works Branch, Hong Kong Government;
- *Works Bureau Technical Circular No. 4/98 and 4/98A, Use of Public Fill in Reclamation and Earth Filling Projects*; Works Bureau, Hong Kong SAR Government;
- *Waste Reduction Framework Plan*, 1998 to 2007, Planning, Environment and Lands Bureau, Government Secretariat, 5 November 1998;
- *Works Bureau Technical Circular No. 12/2000, Fill Management*; Works Bureau, Hong Kong Government;
- *Environmental Transport and Works Bureau Technical Circular No 31/2004, Trip-ticket System for Disposal of Construction and Demolition Material*; *Environmental Transport and Works Bureau*, Hong Kong SAR Government;
- *Works Bureau Technical Circular No. 25/99A and 25/99C, Incorporation of Information on Construction and Demolition Material Management in Public Works Sub-committee Papers*; Works Bureau, Hong Kong SAR Government.
- *Works Bureau Technical Circular No. 19/2001, Metallic Site Hoardings and Signboards*, Works Bureau, Hong Kong SAR Government.
- *Environment, Transport and Works Bureau Technical Circular (Works) No.34/2002, Management of Dredged/Excavated Material*, Environment, Transport and Works Bureau, Hong Kong SAR Government.
- *Environment, Transport and Works Bureau Technical Circular (Works) No.19 /2005, Environmental Management on Construction Sites*, Environment, Transport and Works Bureau, Hong Kong SAR Government.
- *Environment, Transport and Works Bureau Technical Circular (Works) No.33 /2002, Management of Construction and Demolition Material including Rock*, Environment, Transport and Works Bureau, Hong Kong SAR Government.
- *Environment, Transport and Works Bureau Technical Circular (Works) No 19/2005, Environmental Management on Construction Sites*, Environment, Transport and Works Bureau.
- *Environment, Transport and Works Bureau Technical Circular (Works) No 31/2004, Trip Ticket System for Disposal of Construction & Demolition Materials*, Environment, Transport and Works Bureau.

The Contractor(s)'s waste management practices will be audited with reference to the checklist detailed in *Table 6.2* below:

Table 6.2 Waste Management Checklist

Activities	Timing	Checking Frequency	If non-compliance noted, Action Required
Necessary waste disposal permits or licences have been obtained	Before the commencement of works	Once	The ET will inform the Contractor(s), CAPCO and IEC. The Contractor(s) should apply for the necessary permits/ licences prior to disposal of the waste. The ET will ensure that corrective action has been taken.
Dredged sediments are managed and disposed in accordance with the *ETWBTC No. 34/2002: Management of Dredged/Excavated Sediment*.	Throughout the dredging works. Sediment assessment to be completed prior to dredging	Twice a Month	The ET will inform the Contractor(s), CAPCO and IEC. CAPCO will instruct the Contractor(s) to manage and dispose the dredged materials properly. The Contractor(s) will immediately suspend dredging until the dredging materials are properly managed and disposed.
Only licensed waste haulier are used for waste collection.	Throughout the works	Twice a Month	The ET will inform the Contractor(s), CAPCO and IEC. CAPCO will instruct the Contractor(s) to use a licensed waste haulier. The Contractor(s) will temporarily suspend waste collection of that particular waste until a licensed waste haulier is used. Corrective action will be undertaken within 48 hours.
Records of quantities of wastes generated, recycled and disposed are properly kept. For demolition material/waste, the number of loads for each day will be recorded (quantity of waste can then be estimated based on average truck load. For landfill charges, the receipts of the charge could be used for estimating the quantity).	Throughout the works	Twice a Month	The ET will inform the Contractor(s), CAPCO and IEC. The Contractor(s) will estimate the missing data based on previous records and the activities carried out. The ET will audit the results and forward to CAPCO and IEC for approval.
Wastes are removed from site in a timely manner. General refuse is collected on a daily basis.	Throughout the works	Twice a Month	The ET will inform the Contractor(s), CAPCO and IEC. CAPCO will instruct the Contractor(s) to remove waste accordingly.
Waste storage areas are properly cleaned and do not cause windblown litter and dust nuisance.	Throughout the works	Twice a Month	The ET will inform the Contractor(s), CAPCO and IEC. CAPCO will instruct the Contractor(s) to clean the storage area and/or cover the waste.

Activities	Timing	Checking Frequency	If non-compliance noted, Action Required
Different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste.	Throughout the works	Twice a Month	The ET will inform the Contractor(s), CAPCO and IEC. CAPCO will instruct the Contractor(s) to provide separate skips/ containers. The Contractor(s) will ensure the workers place the waste in the appropriate containers.
Chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes, published by the EPD.	Throughout the works	Twice a Month	The ET will inform the Contractor(s), CAPCO and IEC. CAPCO will instruct the Contractor(s) to rectify the issues immediately. Warning will be given to the Contractor(s) if corrective actions are not taken within 24 hrs.
Demolition materials are properly covered before leaving the site.	Throughout the works	Twice a Month	The ET will inform the Contractor(s), CAPCO and IEC. CAPCO will instruct the Contractor(s) to comply. The Contractor(s) will ensure the demolition materials are properly covered when transport out of the site.
Wastes are disposed at licensed sites.	Throughout the works	Twice a Month	The ET will inform the Contractor(s), CAPCO and IEC. CAPCO will warn the Contractor(s) and instruct the Contractor(s) to ensure the wastes are disposed of at the licensed sites. Should it involve chemical waste, the Waste Control Group of EPD will be notified.

Note: ET – Environmental Team, IEC – Independent Environmental Checker

6.4 MITIGATION MEASURES

Details of the required mitigation measures are included within the Implementation Schedule of *Annex A* of this EM&A Manual.

7 TERRESTRIAL ECOLOGY

7.1 INTRODUCTION

The EIA study has concluded that the impact on the natural habitats is considered to be low and no adverse residual impact is expected after the implementation of the mitigation measures. During the operational phase, adverse impacts are not expected to occur. Therefore, no terrestrial ecology monitoring will be required for either the construction or operational phase.

Before the works commence, a detailed vegetation survey on the Golden Eulophia would be conducted within the impacted shrubland and Project Area by a suitably qualified botanist / ecologist to identify and record the affected individuals prior to the commencement of site clearance works. Feasibility and suitability of transplanting the affected plant species would be carefully studied and suitable receptor sites would be identified. A detailed transplantation proposal providing information on transplantation methodology, recipient site, implementation programme, water requirement, post-transplanting monitoring and personnel involved shall be submitted to and approved by EPD and AFCD. Transplantation would be undertaken and supervised by a suitably qualified botanist / horticulturist. After transplantation, monitoring will be undertaken to check the performance and health conditions of the transplanted individuals on weekly basis in the first month after transplantation and monthly basis for additional eleven months. Remedial actions will be discussed with AFCD in the event of unsuccessful transplantation.

7.2 TERRESTRIAL ECOLOGY MITIGATION MEASURES

Regular site inspections should be carried out in order to ensure that the mitigation measures are implemented and are working effectively. The Contractor(s) will be responsible for the design and implementation of the mitigation measures which are presented in *Annex A*.

Compensatory tree and shrub planting will be provided at the locations detailed in the EIA report, for the loss of secondary woodland (approximately 0.2 ha), shrubland (1.9 ha), grassland (1.3 ha) and revegetate the temporary lost habitat including the areas of the temporary construction stores and spoil storage area. The selection of planting species shall be made with reference to the species identified in *Annex 8* and be native to Hong Kong or the South China region, and will include food plants of the butterfly species of conservation interest, to provide additional measures for the butterflies.

8 MARINE ECOLOGY AND FISHERIES

8.1 INTRODUCTION

The constraints on construction works defined within the EIA will act as appropriate mitigation measures to control the environmental impacts to marine ecological resources to within acceptable levels. In addition to the Indo-Pacific Humpback Dolphin (*Sousa chinensis*) and Finless Porpoise (*Neophocaena phocaenoides*) exclusion zone monitoring and monitoring of the condition of colonies of False Pillow Coral (*Pseudosiderastrea tayami*), impacts of construction activities will be monitored through impacts to water quality (see *Section 5* of this EM&A Manual).

In accordance with the recommendations of the EIA for the South Soko option, specific additional measures will be instituted for marine mammals during the construction works. The monitoring will be instituted for the dredging for the submarine gas pipeline as well as during marine percussive piling for the LNG jetty at South Soko Island.

Although adverse impacts to colonies of the coral species, *Pseudosiderastrea tayami* located on the south coast of South Soko are not predicted to occur with mitigation, coral monitoring will be undertaken. The monitoring will be focussed on the dredging works of the approach channel and turning circle, and will verify that these works will have no adverse ecological impact on these corals.

In accordance with the recommendation of the EIA for South Soko option regarding fisheries impact assessment, geophysical survey will be conducted in the post-construction phase of the pipeline works to confirm that the seabed profile would be restored to its original configurations after the completion of pipeline works.

The following sections provide details of the measures to be undertaken by the ET to ensure that the additional measures recommended in the EIA are carried out.

8.2 MARINE MAMMAL EXCLUSION ZONE: AROUND THE PILING AND SUBMARINE PIPELINE DREDGING VESSEL

8.2.1 *Visual Monitoring*

Marine mammal exclusion zones for various construction activities are listed in *Table 8.1*. The marine mammal exclusion zone should be monitored by the

qualified person(s) (1) with an unobstructed, elevated view of the area. The view may be undertaken from the piling barge, dredging vessel and/or from the hillside on the south of South Soko Island. The viewpoint(s) will be proposed by the ET to the IEC for approval. Activities should not begin until the qualified person certifies that the exclusion zone is continuously clear of marine mammals for a period of 30 minutes. Should marine mammals move into the exclusion zone during the activities, cessation of the activities will be commenced as described in *Table 8.1*.

Table 8.1 Exclusion Zone Requirement for Various Activities

Activity	Exclusion Zone	Requirement
Marine Percussive Piling Works for Jetty	500m from piling barge	30 minutes clear of marine mammals before percussive piling activities begin. If cetaceans are observed in the exclusion zone, percussive piling will be delayed until they have left the area. When dolphins/ porpoises are spotted within the exclusion zone, percussive piling works will cease and will not resume until the observer confirms that the zone has been continuously clear of dolphins/ porpoises for a period of 30 minutes. Piling works will be restricted to a daily maximum of 12 hours with daylight operations. No piling works will be conducted during the finless porpoises calving period between October and January.

(1) The qualified person(s) should hold a post-graduate degree in a relevant environmental or biological discipline and the CVs should be approved by the IEC prior to commencement of works.

Activity	Exclusion Zone	Requirement
Dredging Works for Gas Pipeline Installation and Approaching Channel/Turning Basin	250m from dredger	30 minutes clear of marine mammals before dredging activities begin. If cetaceans are observed in the exclusion zone, dredging will be delayed until they have left the area. As per previous practice in Hong Kong, should cetaceans move into the dredging area during dredging, it is considered that cetaceans will have acclimatised themselves to the works therefore cessation of dredging is not required. Dredging work in the Approaching Channel /Turning Basin will not be conducted during the finless porpoises calving period between October and January. Dredging work along the west Lantau pipeline route as well as the pipeline route along the border of the Sha Chau Lung Kwu Chau Marine Park will not be conducted during the peak calving season of the Indo-Pacific Humpback Dolphin, ie March through August. Except the pipeline section along Urmston Road (waters of busy marine traffic), dredging works will be restricted to a daily maximum of 12 hours with daylight operations.

The qualified person for the above visual monitoring must be suitably trained to conduct the visual monitoring works and may be part of the ET. The IEC will be required to verify the qualification and experience of the qualified person.

8.2.2 *Additional Marine Mammal Monitoring*

CAPCO, as part of their Enhancement Plan proposal (refer to *Part 4* of this EIA Report) will conduct long-term monitoring of the distribution and abundance of dolphins and porpoises during the construction and post-construction phase of the project.

8.3 *TAGGED FALSE PILLOW CORAL MONITORING: ADJACENT TO THE DREDGING WORKS FOR TURNING CIRCLE AND APPROACH CHANNEL*

8.3.1 *Objective*

The objective of the coral monitoring will be to detect if any adverse impacts occur to *Pseudosiderastrea tayami* colonies in the vicinity of the turning circle and approach channel during dredging and, where such impacts are identified and are found to be associated with the dredging works, to ensure appropriate action is undertaken to effectively reduce such impacts.

The coral monitoring will be reviewed in conjunction with the water quality monitoring results, which will detect concentrations of suspended solids generated during dredging.

8.3.2 *Monitoring Locations*

The monitoring programme will involve undertaking dive surveys at the impact station both before and during the construction phase. Since there are no *P. tayami* assemblages suitable as a control site, the impacts to coral colonies during works will be inferred through a comparison between these two sets of baseline and impact monitoring data and using the water quality monitoring results.

The location of the monitoring will correspond to the area corresponding to Transects J surveyed during the EIA Study, as illustrated in *Figure A1.1*. *P. tayami* was recorded as common at this site with numerous small colonies surrounded by thick layers on silt. Colonies ranged from 2-3 cm to >20 cm in diameter indicating active recruitment at this site.

The number and location of the corals to be monitored at the impact station (the corals to be tagged) shall be identified in the field in the shallow depth zone (<6m depth). Ideally 20 colonies will be tagged though this will depend on how many individuals are present during the baseline survey.

8.3.3 *Monitoring Techniques*

The coral monitoring work shall be undertaken by observers hired by the ET that are experienced in the field identification of sessile benthic taxa using SCUBA gear. The observers shall be qualified marine biologists with a postgraduate degree in marine biology and specialist knowledge of corals. As the amount of monitoring work is quite high the ET should retain the services of a minimum of two coral specialists for the survey works. The same coral specialists shall be used for each dive survey to maintain consistency in the documentation of the tagged coral condition and shall be approved by AFCD in advance of undertaking the monitoring work.

The survey programme will be divided into Baseline Monitoring Surveys and Impact Monitoring Surveys:

- Baseline monitoring surveys will be conducted prior to the commencement of dredging works. Four surveys will be required at weekly intervals for baseline monitoring, the first of which will include coral tagging. The baseline surveys will gauge ambient variations in sedimentation conditions at the site; and,

- Impact monitoring surveys will be scheduled to be conducted at regular intervals once each week following commencement of the dredging works. It is expected that dredging works for the turning circle and approach channel will occur for a period of about 3 months.

The approach to undertaking this work is described as follows.

8.3.4 *Baseline Monitoring / False Pillow Coral Tagging*

The first Baseline Monitoring Survey will be undertaken at the impact station at least 4 weeks prior to commencement of the dredging works for the turning circle and approach channel. The first survey will include a general reconnaissance swim to identify and gain information on the distribution and characteristics of the *P. tayami* colonies. The corals will then be tagged. Priority will be given to tagging the largest, undamaged corals as these colonies are likely to be the most prone to sediment damage and the recording of the condition of the corals will be more clearly identified in colonies not damaged in prior incidents. The approach for tagging will be discussed with the ET Leader and AFCD.

As *P. tayami* has an encrusting massive growth form, there is no feasible way of using a ring tag, as is used for table corals. The corals shall, therefore, be tagged using small stones, which shall be painted a bright orange or green colour and marked with mahjong tags. At each tagged colony a numbered stone shall be placed next to the coral head and a matching numbered tag nailed into an adjacent piece of hard substrate (boulder or bedrock). A fine rope trail may also be laid down linking all tagged colonies to aid future re-locations – the feasibility of this will be determined during the baseline survey.

Following the tagging exercise, Baseline Monitoring will then be collected, as outlined below. In total, Baseline Monitoring Survey data will be collected from 4 surveys conducted at weekly intervals prior to the commencement of the dredging works. The aim of these surveys will be to determine whether there is any natural variation in sedimentation on the corals in the absence of dredging works. This baseline will then be compared to the data gathered during the impact monitoring.

Monitoring Parameters

Information on the coral colonies shall be recorded, including their specific location, size and general condition of their environment. Other information shall also be recorded such as the survey date, time, atmospheric, sea and tidal conditions.

The sediment cover of each tagged coral colony shall be recorded including the percent of coverage, colour and texture of the sediment and the approximate thickness of the sediment layer both on the colony and on adjacent bedrock or boulder substrate. Any contiguous patches of sediment cover >10% shall be counted. The health status of each tagged coral colony, including bleaching effect and live/dead ratio, shall also be recorded. Three parameters are to be recorded for each tagged coral and these are:

- Percentage sediment cover;
- Percentage bleached tissue; and,

- Percentage dead - total or partial mortality.

Each parameter will be assessed as a percentage of the total colony area. To aid percentage cover estimates a 50 x 50 cm quadrat (with a ten cm^2 lined grid) will be used.

Sediment cover - it will be important to note the colouration and texture of the sediment and the approximate thickness of the sediment layer both on the colony and on adjacent bedrock or boulder substrate. All sediment areas must be documented. Contiguous patches of sediment cover >10 % must be counted and accumulated patches documented with time.

Bleaching - two bleaching categories will be recorded:

- Blanched or pale - a loss of zooxanthellae or photosynthetic pigments; and,

- Bleached - a total loss of zooxanthellae and coral tissue still present. White colouration as skeleton is visible through transparent coral tissue. It is possible that lower portions of the coral remain unbleached and therefore help to differentiate bleaching as opposed to partial mortality where tissue is absent.

All bleached tissue must be noted and percentage cover estimated for both blanched and bleached areas. Contiguous patches of bleached tissue >10 % cover must be counted and accumulated patches documented with time.

Total or partial mortality - coral tissue death may be through sediment deposition, bleaching, bacterial infection etc and this may lead to rapid algal overgrowth and colonisation of exposed skeleton by fouling organisms. Dead skeletal areas will appear white if recently dead and within a few days sediment settlement and algal overgrowth will change the appearance of such areas to a duller colouration. Partial mortality must be recorded and contiguous patches of dead tissue >10 % must be counted and accumulated patches documented with time.

Upon relocation of the tagged colony the condition of the coral will be assessed by noting areas of settled sediment, bleaching or partial/total mortality on a pre-printed sheet of underwater paper. The extent and location of such measurable parameters will be sketch by chinagraft pencil (or equivalent) on laminated photographs of the tagged colony. These sketch outlines will be redrawn over the scanned images to verify field notes when compiling the data. Other observations will also be noted.

Physical damage to colonies, tissue distension, mucous production and any other factors considered relevant will be noted in the field and included in the survey report.

8.3.5 *Impact Monitoring*

The focus of the impact monitoring will be to determine whether impacts are occurring to *P. tayami* colonies during dredging works for the approach channel and turning circle from sedimentation or elevated SS levels. The results of the coral monitoring will be reviewed in association with the water quality monitoring results. The water quality data reviewed should be from the stations corresponding to the relevant coral station, M1 (refer to *Table 5.2*). Impact monitoring will be undertaken on a twice per week basis during the dredging works, and the Proforma report together with evidentiary photographs would be submitted to EPD, AFCD and other concerned parties within 2 days for scrutiny.

The information to be obtained will be as for the Baseline Monitoring, including information on: the health status of the corals, condition of their environment, survey date, time, atmospheric, sea and tidal conditions during the survey and sediment cover in terms of percentage of coverage and approximate thickness. Each tagged coral colony shall also be photographed.

It should be noted all tags must be removed after the study.

8.4 *ADDITIONAL AMPHIOXUS MONITORING*

As an additional marine ecology measure CAPCO will conduct a pre-construction survey of Tung Wan at South Soko to gather further information on the distribution and abundance of the amphioxus, *Branchiostoma belcheri*. It is envisaged that the survey will be conducted at similar locations to those surveyed during the EIA and will follow the same sampling technique.

CAPCO will also undertake a post-construction survey within Tung Wan one year following completion of all marine construction works for the Project. This survey will follow the same protocols as the pre-construction survey.

The results of the two rounds of surveys will be provided to EPD and AFCD for information purpose.

8.5 *MARINE ECOLOGY COMPLIANCE – ACTION EVENT PLAN*

The main focus of the ecological monitoring will be to determine whether impacts are occurring to the *P. tayami* colonies on the south coast of South Soko during the dredging works for the turning circle and approach channel. The detection of ecological impacts will be considered as significant and lead to a comprehensive review of the installation operations and mitigation measures. The ecological monitoring is focussed on the responses of tagged corals to the dredging works. The monitoring has focussed on tagged corals because changes in percentage cover or abundance of corals would not be apparent over the short timeframe within which the works occur.

The action plan for the introduction of mitigation measures has been prepared based on the assessment of changes from the baseline in the following parameters:

- Sediment Cover (% of coral surface);
- Bleaching (% of surface bleached white); and,
- Partial Mortality (% of surface exhibiting mortality).

Decision points for the Action Limit Levels have been based on protocols adapted from monitoring on the Great Barrier Reef in Australia, Sai Kung, West Po Toi and Tolo Channel in Hong Kong (1) (2) (3) (4). EM&A results from the studies in Hong Kong have demonstrated that these protocols have successfully prevented impacts to corals. The stepwise approach to the application of the Action Event Plan is detailed in *Table 8.2*.

Table 8.2 Step-wise 'False Pillow Coral' Monitoring Action Event Plan

Step	
Step 1	Commence tagged coral monitoring at the impact site following methodology described in Section 8.3.4. If no increase in sedimentation cover/ bleaching/partial mortality is observed on the *P. tayami* colonies no action is required. The coral survey specialist should present this information to the ET Leader at the end of each survey day for verification. Monitoring should continue according to the normal schedule. If an increase in sedimentation cover/ bleaching/ partial mortality is observed on the *P. tayami* colonies, Step 3 should be enacted, if not, Step 2.
Step 2	If no actions are triggered a formal report should be issued to the Contractor, CAPCO, EPD and AFCD and the IEC along with evidentiary photographs the day following completion of the survey. Meanwhile monitoring work and dredging works should continue uninterrupted. If no actions are triggered for the reminder of the dredging works the ET Leader should issue a formal report every week to all parties detailing the findings of the monitoring.
Step 3	If during the Impact Monitoring a 15% increase in the percentage of sedimentation on the hard corals occurs at more than 20% of the tagged coral colonies at the Impact Monitoring Station, then the Action Level is exceeded (Step 4). If during the Impact Monitoring a 15% increase in the percentage of bleaching of hard corals occurs at more than 20% of the tagged coral colonies at the Impact Monitoring Stations, then the Action Level is exceeded. (Step 4). If during the Impact Monitoring a 15% increase in the percentage of partial mortality of corals occurs at more than 20% of the tagged coral colonies at the Impact Monitoring Station, then the Action Level is exceeded (Step 4). If the Action Level is not exceeded, Step 2 is enacted.

(1) Benson L J, Holdworthy PM, Buttler IR, and Oliver J (1994) Townsville Port. Authority Capital Dredging Works 1993; Environmental Monitoring Programme. ISBN O 646 2155 965

(2) ERM - Hong Kong, Limited (2001) Water Quality and Control Monitoring Plan for the Proposed 132 kV Cable Circuits From A Kung Wan to Sai Kung Pier, Final Report for CLP Power.

(3) ERM - Hong Kong, Limited (2001) Focussed Cumulative Water Quality Impact Assessment of Sand Dredging at the West Po Toi Marine Borrow Area. Environmental Monitoring and Audit Manual. Updated Manual 9 July 2001 for HAM Dredging and Marine Contractors.

(4) ERM - Hong Kong, Limited (2003) The Proposed Submarine Gas Pipelines from Cheng Tou Jiao Liquefied Natural Gas Receiving Terminal, Shenzhen to Tai Po Gas Production Plant, Hong Kong. Environmental Monitoring and Audit Manual for the Hong Kong and China gas Company Ltd.

Step	
Step 4	If the Action Level is exceeded the ET Leader should inform all parties (Contractor, CAPCO, EPD, AFCD and IEC). The data from the water quality monitoring should also be reviewed. If the water quality monitoring shows no attributable effects of the installation works, then the Action Level is not triggered. If the water quality data indicate exceedances (for SS and/or turbidity) the ET Leader should discuss with the Contractor the most appropriate method of reducing suspended solids during dredging (eg reduce dredging rates). The water quality data reviewed should be from the stations corresponding to the coral station, M1 (refer to *Table 5.2*). This mitigated method should then be enacted on the next working day (Step 5).
Step 5	Monitoring should proceed the following day as per Step 1. If during the Impact Monitoring a 25% increase in the percentage of sedimentation on the hard corals occurs at more than 20% of the tagged coral colonies at the Impact Monitoring Station, then the Limit Level is exceeded (Step 6). If during the Impact Monitoring a 25% increase in the percentage of bleaching of hard corals occurs at more than 20% of the tagged coral colonies at the Impact Monitoring Stations then the Limit Level is exceeded (Step 6). If during the Impact Monitoring a 25% increase in the percentage of partial mortality of corals occurs at more than 20% of the tagged coral colonies at one or more Impact Monitoring Stations then the Limit Level is exceeded (Step 6). If the Limit Level is not exceeded Step 2 is enacted and work continues according to the mitigated method.
Step 6	If the Limit Level is exceeded the ET Leader should inform all parties (Contractor, CAPCO, EPD, AFCD and IEC) immediately. The ET Leader should inform the Contractor to suspend dredging operations until an effective solution is identified. Once the solution has been identified and agreed with all parties dredging works may recommence.

It should be noted, that for the success of the monitoring programme there should be an element of review and revision throughout the ecological monitoring aspects of the programme as more data are gathered. This will ensure that the programme takes account of the data as they are collected and allow for full utilisation of the available information. If no actions have been triggered during the initial impact monitoring events then the ET Leader may propose to reduce the scale of the monitoring works for agreement by CAPCO, EPD, AFCD and the IEC.

8.6 MITIGATION MEASURES

The EIA has highlighted that as part of the construction procedure for the marine percussive piling works a bubble jacket will be installed to aid in reducing the levels of underwater sounds generated by the percussive piling activities. A silt curtain will be provided along the southern coast of South Soko where *P. tayami* is located, to aid in reducing the levels of suspended solids generated by the dredging works. Mitigation measures for marine mammals and False Pillow Coral are presented in *Annex A*.

8.7 BUBBLE JACKET PILOT TEST

A pilot test will be conducted to verify the effectiveness of the design of bubble jacket proposed by the Contractor at reducing underwater sound

levels generated from marine percussive pile driving. The methodology for the test will be developed once the detailed design and methodology for marine percussive piling has been developed. It is envisioned that the pilot test methodology will reference previous similar tests that have been conducted in Hong Kong at the Temporary Aviation Fuel receiving facility at Sha Chau and the Permanent Aviation Fuel Facility at Area 38.

The methodology and protocol for the test will be agreed with EPD and AFCD in advance and will take place on the first pile to be percussively piled into the seabed on site at South Soko.

9 CULTURAL HERITAGE

9.1 INTRODUCTION

This section will provide details of the cultural heritage monitoring to be undertaken during the Project period.

9.2 STANDING HERITAGE

Relocation of impacted standing heritage had been recommended in the EIA Study (comprising the Tai A Chau Tin Hau Temple, seven earth shrines (S001 to S005 and S007 to S008) and 21 graves (G001 to G014, G016 to G022) and a tables (TA001)). The Study Team in consultation with the local seafarers and village representatives have identified a location to the west of Pak Tso Wan for relocation of the Tai A Chau Tin Hau Temple. Continuous consultation activities with the local seafarers worshipping at the seven shrines and grave descendants are being undertaken. Prior to removal relocation of these sites, a photographic and cartographic record will be prepared, in accordance with the AMO's requirements.

In addition, an archaeological survey will be undertaken to confirm if there is any archaeological impact to the suitable relocation site for the Tai A Chau Tin Hau Temple. If archaeological deposits are identified, appropriate measures will be implemented prior to relocation work commence.

9.3 MARINE ARCHAEOLOGY

As the EIA concluded that no antiquity or relic of the marine archaeological interests were found, no marine archaeology EM&A is required.

9.4 ARCHAEOLOGY AT SOUTH SOKO ISLAND

9.4.1 *Rescue Excavation*

Archaeological interests were identified at South Soko in the EIA Study and recommendations have been put forward for the rescue of the archaeological deposits (i.e. impacted area of Site A and Sites B to E) in specified locations prior to commencement of construction works.

Table 9.1 listed out the impacted sites required rescue excavation. Their location is presented in *Figure 9.1.*

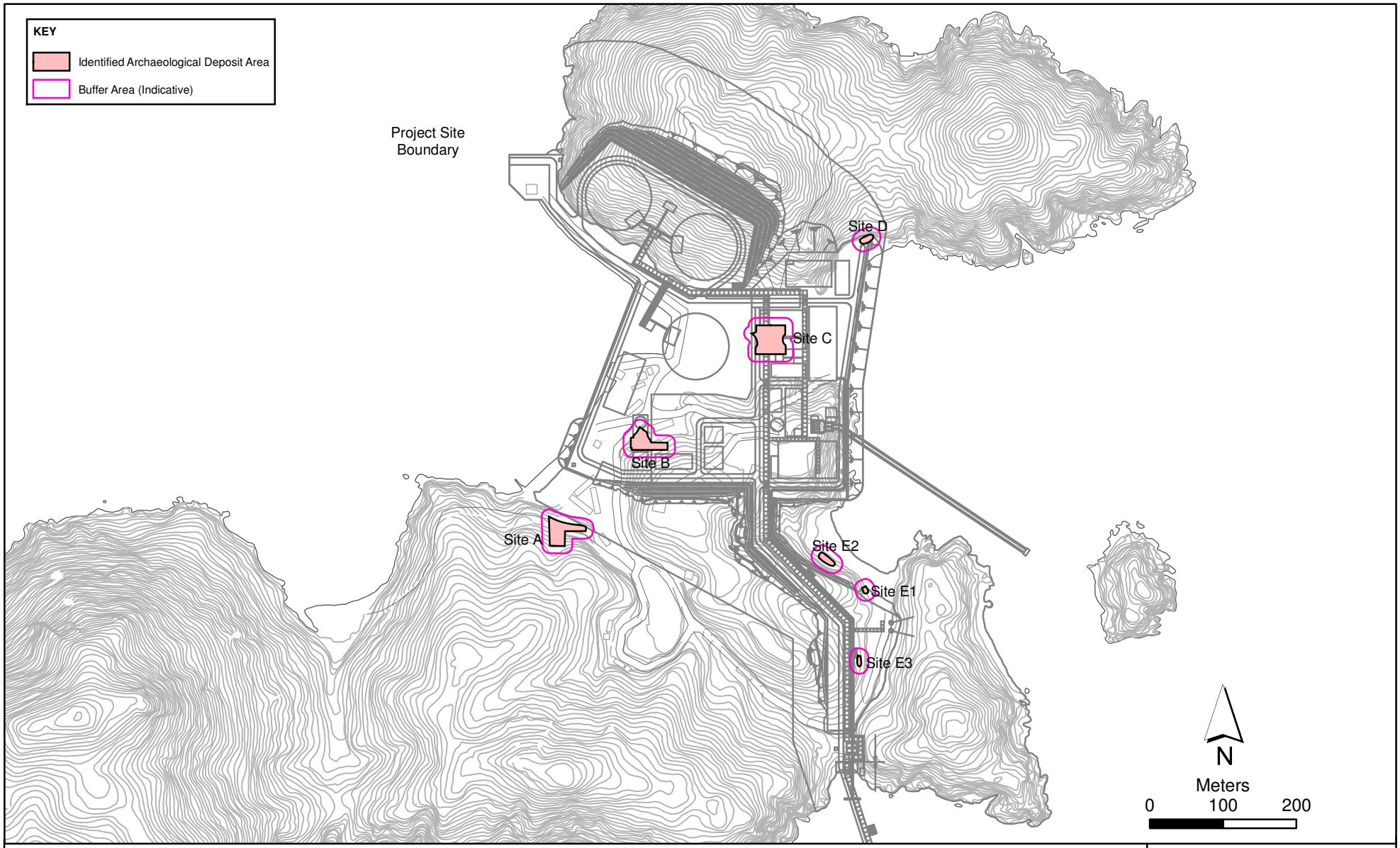


Figure 9.1

Impacted Archaeological Deposit Areas and Their Buffer Zones

File: EIA_Docuset2/0018180_Archae_deposit+buffer_b.mxd
Date: 22/11/2006

Environmental Resources Management

ERM

Table 9.1 Summary Findings of Archaeological Deposit Areas within Tai A Chau Survey Area

Site	Impacted Area Coverage (m^2)	Chronology
Site A	Maximum of 900 m^2 subject to detailed design review on the soil nailing works area required.	Late Phase of Middle Neolithic Age (3,600B.C.-2,900B.C.)
Site B	800 m^2	Late Neolithic Age (2,400B.C.-1,500B.C.) & Late Ming to Middle Qing Dynasties (the 17th to 18th century)
Site C	1,600 m^2	Late Neolithic and Bronze Ages (2,400B.C.-800B.C.)
Site D	100 m^2	Late Neolithic Age, Tang to Song Dynasties (A.D.618-1279)
Site E1	80 m^2	Late Neolithic to Bronze Age (4,000B.C.-800B.C.)
Site E2	250 m^2	Song and late Qing Dynasties (A.D.960-1279, the late 19th to the early 20th centuries)
Site E3	120 m^2	Late Neolithic Age

A separate *Archaeological Action Plan* will be prepared detailing the rescue excavation plan as described in *Section 9.4.3*.

No mitigation is considered necessary for Site G as the EIA has indicated that it will not be impacted by the project works.

9.4.2 Archaeological Watching Brief

Archaeological watching brief (archaeological monitoring) will be undertaken at the buffer zones (within 10 m from the sites) for Sites B to E and impacted buffer zone for Site A during construction phase of the project. The buffer zones are shown in *Figure 9.1* which are subject to amendment if significant archaeological findings are unearthed in the course of rescue excavation.

Personnel

The qualified archaeologist must apply for the *Licence to Excavate and Search for Antiquities* under the *Antiquities and Monument Ordinance* (Cap.53, section 13) from the Antiquity Authority before the monitoring works commence.

Overall Procedure

1. The monitoring process will involve a qualified archaeologist observing the construction works to determine whether any archaeological deposits are present in areas being excavated.

2. Upon identification of deposits, the archaeologist will be given access to record the deposits. The archaeological finds will be collected, treated, packaged and recorded in accordance with requirement of either common archaeological practice or AMO guidelines.

3. Upon the completion of monitoring, the archaeological finds, field records and the monitoring report will be submitted to AMO.

Recording for Monitoring

The full set of recording sheets, drawings and photography for the recording of any archaeological deposits identified and any archaeological finds found during the monitoring process must be submitted to AMO upon completion of monitoring.

Monitoring Report

The results of the monitoring will be presented in report form, following standards set by either common archaeological practice or AMO relevant guidelines. This includes a non-technical summary, project background, geological, topographical, archaeological and historic background, field methodology, implementation, finds assessment and conclusion.

9.4.3 Archaeological Action Plan

A separate *Archaeological Action Plan* (AAP) following the *Criteria for Cultural Heritage Impact Assessment* as stated in the *Study Brief No. ESB-126/2006* will be prepared detailing the archaeological actions required to mitigate impacted archaeological deposits as described in *Sections 9.4.1* and *9.4.2* above. The plan will include the following:

a) a detailed plan for rescue excavation for Sites B to E and impacted area of Site A;

b) a detailed plan for archaeological watching brief (watching brief) at the buffer areas for Sites A to E; and

c) a contingency plan to address possible arrangement when significant archaeological findings are unearthed for items (a) and (b).

Sufficient funding, time and personnel will be allowed to implement the plan prior to construction work commencement. The AAP will be submitted and agreed with AMO by the project proponent prior to licence application by a qualified archaeologist. The qualified archaeologist and any personnel of the project should inform AMO of the discovery of any antiquities or supposed antiquities in the course of excavation. The relevant provision of *AM Ordinance* should also be observed and complied.

10 LANDSCAPE AND VISUAL

10.1 INTRODUCTION

This Section defines the EM&A requirements that have been recommended to ensure that the proposed landscape and visual mitigation measures are effectively implemented.

10.2 GENERAL

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

Landscape Plans for the Project should be prepared before the commencement of landscape works of the Project. The Landscape Plan will include the locations, design details, implementation schedules, and drawings in the scale of 1:1000 or other appropriate scale showing the landscape and visual mitigation measures. The Landscape Plan will be certified by the ET Leader and verified by the IEC as conforming to the requirements set out in *Section 11.11* of the EIA Report before deposit to EPD.

10.3 CONSTRUCTION AND POST-CONSTRUCTION PHASE AUDIT

A specialist Landscape Sub-Contractor should be employed for the implementation of landscape construction works and subsequent maintenance operations during a 24 month establishment period.

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

Post-construction phase auditing will be restricted to the last 12 months of the establishment works of the landscaping proposals and thus only the items in the list below related to this period are relevant to the post-construction audit; the remainder are for the construction phase site inspections. The broad scope of the audit/inspections is detailed below but should also be

undertaken with reference to the more specific checklist provided in *Table 10.1.*

- the extent of the agreed works areas should be regularly checked during the construction phase. Any trespass by the Contractor(s) outside the limit of the works, including any damage to existing trees will be noted;

- the progress of the engineering works should be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken;

- existing trees and vegetation within the study area which are not directly affected by the works are retained and protected to the extent safely practical;

- the methods of protecting existing vegetation proposed by the Contractor(s) are acceptable and enforced;

- preparation, lifting transport and re-planting operations for any transplanted trees;

- landscaping works are carried out in accordance with the specifications;

- the planting of new trees, shrubs, groundcover, climbers, ferns, grasses and other plants, together with the replanting of any transplanted trees are carried out properly and within the right season; and

- necessary horticultural operations and replacement planting are undertaken throughout the Establishment Period to ensure the healthy establishment and growth of both transplanted trees and newly established plants.

Table 10.1 Construction/Post-Construction Phase Audit Checklist

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

In the event of non-compliance from the Environmental Permit, EIA Study, EM&A Manual and Landscape Plan, the responsibilities of the relevant parties is detailed in the Event / Action plan provided on *Table 10.2*.

Table 10.2 Event and Action Plan for Landscape and Visual Monitoring during Construction Phase

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

Note: (1) ET – Environmental Team, IEC – Independent Environmental Checker

10.4 MITIGATION MEASURES

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

10.5 AUDITING REQUIREMENTS

Implementation of the mitigation measures for landscape and visual resources recommended by the EIA will be monitored through the site audit programme. *Section 12* of this EM&A Manual sets out the requirements of the auditing programme.

11 LAND CONTAMINATION PREVENTION AND QUANTITATIVE RISK

11.1 INTRODUCTION

This Section defines the EM&A requirements that have been recommended to ensure that appropriate measures to reduce land contamination and quantitative risk be undertaken during the design phase of the project. A design phase audit is recommended to ensure that the design of the Project, including the spill response plan, comprise the necessary elements to control, detect, contain, clean up, handle and dispose any material that could lead to contaminated land or pose a risk to life or the environment.

11.2 MITIGATION MEASURES

A series of mitigation measures were recommended to be integrated into the design, concerning considerations of land contamination and quantitative risk. These mitigation measures were developed to reduce the likelihood of the loss of fuels from the system, hence reduce the associated contamination and risk. These measures are based on the need to specify procedures for detecting a leak and containing a leak if it occurs, and to define methods for clean up and disposal of the leak.

These measures are summarised in the Implementation Programme of Mitigation Measures (*Annex A*).

11.3 DESIGN PHASE AUDIT

The measures proposed within the EIA to prevent land contamination and risk to life and the environment should be embodied into the detailed design drawings and contract documents. Designs should be checked to ensure that the measures are incorporated and that potential conflicts with civil engineering, geo-technical, structural, lighting, signage, drainage, underground utility and operational requirements are resolved prior to construction.

The EM&A requirements for land contamination and quantitative risk to the environment comprise the audit during design phase. The audit will focus on the integration of fuel spill control, leakage detection and leakage/spill containment into detailed engineering design.

The design items for audit will include:

- pipeline leak detection and automatic shut-off system;
- pipeline rock armour protection;
- bunding of fuel/oil/grease storage areas;
- tank leak detection, drainage isolation and containment system;

- on-site fire service installations and equipment;
- jetty fire protection; and
- fuel delivery shut off valves.

CAPCO will carry out the audit to ensure appropriate measures have been incorporated in the design and have been specified to the Contractor(s) for implementation.

12 SITE ENVIRONMENTAL AUDIT

12.1 SITE INSPECTIONS

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

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

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

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

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

mitigation proposal and the resolution of deficiencies in the Contractor(s)' EMS. An action reporting system will be formulated and implemented to report on any remedial measures implemented subsequent to the site inspections.

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

12.2 COMPLIANCE WITH LEGAL AND CONTRACTUAL REQUIREMENTS

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

In order that the works are in compliance with the contractual requirements, the works method statements submitted by the Contractor(s) to CAPCO for approval will be sent to the ET for review.

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

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

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

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

12.3 ENVIRONMENTAL COMPLAINTS

The complaints handling procedure will be as follows:

The ET will undertake the following procedures upon receipt of a complaint:

(i) log complaint and date of receipt into the complaint database and inform the IEC immediately;

(ii) investigate the complaint and discuss with the Contractor(s) and CAPCO to determine its validity and to assess whether the source of the issue is due to works activities;

(iii) if a complaint is considered valid due to the works , the ET will identify mitigation measures in consultation with the Contractor(s), CAPCO and IEC;

(iv) if mitigation measures are required, the ET will advise the Contractor(s) accordingly;

(v) review the Contractor(s)'s response on the identified mitigation measures and the updated situation;

(vi) if the complaint is transferred from EPD, an interim report will be submitted to EPD on the status of the complaint investigation and follow-up action within the time frame assigned by EPD;

(vii) undertake additional monitoring and audit to verify the situation if necessary and ensure that any valid reason for complaint does not recur;

(viii) report the investigation results and the subsequent actions on the source of the complaint for responding to complainant. If the source of complaint is EPD, the results should be reported within the time frame assigned by EPD; and

(ix) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

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

12.4 LOG-BOOK

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

13 REPORTING

13.1 GENERAL

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

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

13.2 DESIGN PHASE AUDIT REPORT

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

13.3 BASELINE MONITORING REPORT

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

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

(i) up to half a page executive summary.

(ii) brief project background information.

(iii) drawings showing locations of the baseline monitoring stations.

(iv) monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency and duration; and
- quality assurance (QA)/quality control (QC) results and detection limits.

(v) details on influencing factors, including:

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

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

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

(viii) comments, recommendations and conclusions.

13.4 MONTHLY EM&A REPORTS

Construction Phase

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

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

Post-Construction Phase

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

13.4.2 Contents of First Monthly EM&A Report

(i) 1-2 pages executive summary, comprising:

- breaches of AL levels;
- complaint Log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- forecast of impact predictions.

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

(iii) Environmental Status, comprising:

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

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

- monitoring parameters;
- environmental quality performance limits (Action and Limit levels);
- Event-Action Plans;
- environmental mitigation measures, as recommended in the Project EIA study final report; and
- environmental requirements in contract documents.

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

(vi) monitoring results (in both hard and diskette copies) together with the following information:

- monitoring methodology;
- name of laboratory and equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency, and duration; and

(vii) graphical plots of trends of monitored parameters over the past four reporting periods for representative monitoring stations annotated against the following:

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

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

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

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

(xi) a description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

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

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

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

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

13.4.3 Contents of the Subsequent Monthly EM&A Reports

(i) Title page.

(ii) Executive summary (1-2 pages), including:

- breaches of Action and Limit levels;
- complaint log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- forecast of impact predictions.

(iii) Contents page.

(iv) Environmental status, comprising:

- drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- summary of non-compliance with the environmental quality performance limits; and
- summary of complaints.

(v) Environmental issues and actions, comprising:

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

(vii) Appendices, including:

- action and limit levels;
- graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following: major activities being

carried out on site during the period; weather conditions during the period; and any other factors which might affect the monitoring results;

- monitoring schedule for the present and next reporting period;
- cumulative complaints statistics; and
- details of complaints, outstanding issues and deficiencies.

13.4.4 Quarterly EM&A Summary Report

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

(i) Up to half a page executive summary.

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

(iii) a brief summary of EM&A requirements including:

- monitoring parameters;
- environmental quality performance limits (Action and Limit levels); and
- environmental mitigation measures, as recommended in the Project EIA study final report.

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

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

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

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

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

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

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

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

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

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

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

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

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

13.5 ANNUAL/FINAL EM&A REVIEW REPORTS

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

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

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

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

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

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

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

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

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

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

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

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

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

(xi) a summary record of notifications of summonses and successful prosecutions for breaches of the current environmental

protection/pollution control legislations, locations and nature of the breaches investigation, follow-up actions taken and results.

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

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

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

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

13.6 DATA KEEPING

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

13.7 ELECTRONIC REPORTING OF EM&A INFORMATION

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

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

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

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

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

13.8 INTERIM NOTIFICATIONS OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCES

With reference to Event/Action Plans, when the environmental quality limits are exceeded, the ET will notify the Contractor(s), CAPCO, EPD and the AFCD as appropriate within 24 hours of the identification of the exceedance. The notification will be followed up with each party on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notifications is shown in *Annex C.*

Annex A

Implementation Schedule of Mitigation & Precautionary Measures

Annex A Implementation Schedule for South Soko

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Des	C	O	Dec	
1. Air Quality Measures								
Construction Phase								
S 4.7.1	EM&A in the form of site audit of dust generating activities.	Land Site / During Construction	ET		✓			Environmental Impact Assessment Ordinance
S.4.7.1	Dust control measures stipulated in the *Air Pollution Control (Construction Dust) Regulation* will be implemented during the construction of the LNG terminal to control the potential fugitive dust emissions.	Land Site / During Construction	Contractor(s)		✓			Air Pollution Control (Construction Dust) Regulation
S.4.7.1	Good site practices such as regular maintenance and checking of the diesel powered mechanical equipment will be adopted to avoid any black smoke emissions and to minimize gaseous emissions.	Land Site / During Construction	Contractor(s)		✓			-
S 4.7.1	For dust control measures for the operation of a concrete batching plant, mitigation measures specified in the *Guidance Note of Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2* shall be implemented.	Land Site / During Construction	Contractor(s)		✓			Guidance Note of Best Practicable Means for Cement Works (Concrete Batching Plant) BPM 3/2
S 4.7.1	The dust control measures for the operation of the rock crushing plant recommended in the *Guidance Note of Best Practicable Means for Mineral Works (Rock Crushing Plant) BPM 11/1* will be implemented during the operation of the mobile rock crusher.	Land Site/During Construction	Contractor(s)		✓			Guidance Note of Best Practicable Means for Mineral Works (Rock Crushing Plant) BPM 11/1
Operational Phase								

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Des	C	O	Dec	
S.4.7.2	The air control measures for the operation of the gas turbine generator recommended in the *Guidance Note of Best Practicable Means for Electricity Works (Coal-fired Plant, Gas-fired Gas Turbine and Oil-fired Gas Turbine (Peak Lopping Plant)) (BPM 7/1)* will be implemented.	During operation of the gas turbine generators	CAPCO	✓		✓		Guidance Note of Best Practicable Means for Electricity Works (Coal-fired Plant, Gas-fired Gas Turbine and Oil-fired Gas Turbine (Peak Lopping Plant)) (BPM 7/1)
2. Noise No mitigation measures were specified in the EIA report as no noise sensitive receivers are located in the Project Area.								
3. Water Quality								
S.6.7.6	No ballast water from the LNG carrier will be discharged in Hong Kong waters.	Hong Kong Waters / During Operation	Contractor(s)			✓		-
S 6.8.1 and Annex 6A EM&A Manual	Dredging/Jetting plants will be required to comply with the rates modelled in the EIA report (*S6 Annex 6A*) for the various activities assessed and a pilot test will be conducted to verify their performance as well as the effectiveness of silt curtains prior to commencement of marine construction works. The details of the test will be agreed with EPD and AFCD prior to start of the test.	Dredged/Jetting areas / During Construction	Contractor(s) and ET		✓			-
S 6.8.1	No overflow is permitted from the trailing suction hopper dredger but the Lean Mixture Overboard (LMOB) system will be in operation at the beginning and end of the dredging cycle when the drag head is being lowered and raised.	Dredged areas/ During Construction	Contractor(s)		✓			-
S 6.8.1	Dredged marine mud will be disposed of in a gazetted marine disposal area in accordance with the *Dumping at Sea Ordinance (DASO)* permit conditions.	Dredged areas/ During Construction	Contractor(s)		✓			Dumping at Sea Ordinance
S 6.8.1	Disposal vessels will be fitted with tight bottom seals in order to prevent leakage of material during transport.	Dredged areas/ During Construction	Contractor(s)		✓			Dumping at Sea Ordinance

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Des	C	O	Dec	
S 6.8.1	Barges will be filled to a level, which ensures that material does not spill over during transport to the disposal site and that adequate freeboard is maintained to ensure that the decks are not washed by wave action.	Dredged areas/ During Construction	Contractor(s)		✓			-
S 6.8.1	After dredging, any excess materials will be cleaned from decks and exposed fittings before the vessel is moved from the dredging area.	Dredged areas/ During Construction	Contractor(s)		✓			Dumping at Sea Ordinance
S 6.8.1	The contractor(s) will ensure that the works cause no visible foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the dredging site.	Dredged areas/ During Construction	Contractor(s)		✓			-
S 6.8.1	If installed, degassing systems will be used to avoid irregular cavitations within the pump.	Dredged areas/ During Construction	Contractor(s)		✓			-
S 6.8.1	Monitoring and automation systems will be used to improve the crew's information regarding the various dredging parameters to improve dredging accuracy and efficiency.	Dredged areas/ During Construction	Contractor(s)		✓			-
S 6.8.1	Control and monitoring systems will be used to alert the crew to leaks or any other potential risks such as chemicals and oils.	Dredged areas/ During Construction	Contractor(s)		✓			-
S 6.8.1	When the dredged material has been unloaded at the disposal areas, any material that has accumulated on the deck or other exposed parts of the vessel will be removed and placed in the hold or a hopper. Under no circumstances will decks be washed clean in a way that permits material to be released overboard.	Dredged areas/ During Construction	Contractor(s)		✓			Dumping at Sea Ordinance
S 6.8.1	Dredgers will maintain adequate clearance between vessels and the seabed at all states of the tide and reduce operations speed to ensure that excessive turbidity is not generated by turbulence from vessel movement or propeller wash.	Dredged areas/ During Construction	Contractor(s)		✓			-
S 6.8.1	Deployment of silt curtains (stand type or cage type) at various locations during the dredging/jetting works for the project. Please refer to Annex A1 for details.	Dredging/Jetting at Various Locations	Contractor(s)		✓			-

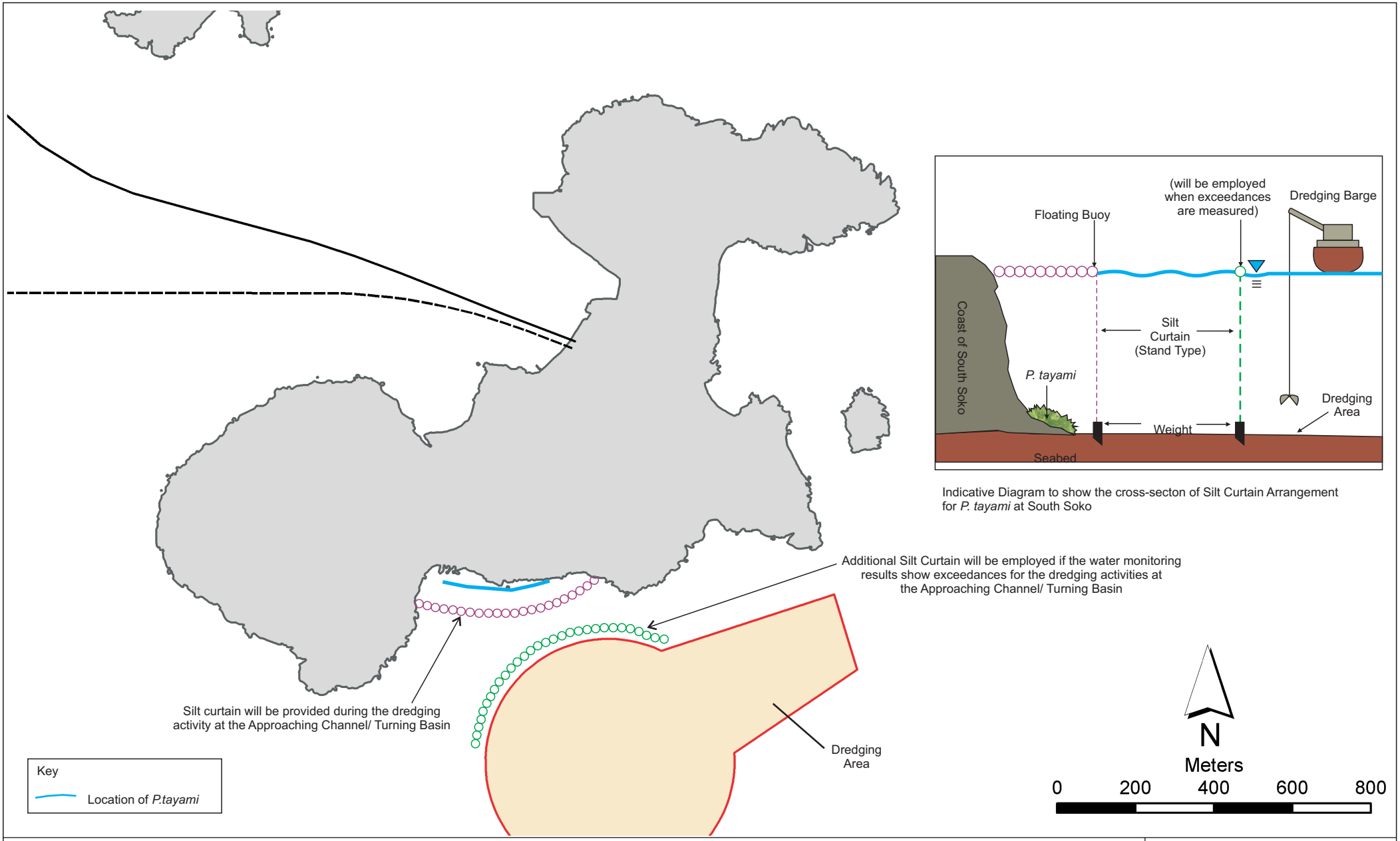
EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Des	C	O	Dec	
S 6.8.1 S 6.8.2	Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes. The forward speed of the jetting machine should be limited to a maximum of 21 m/hr along the zones at West of South Soko, the Urmston Road crossing near to the Lung Kwu Chau and Sha Chau Marine Park and West of Black Point.	Dredged areas/ During Construction Jetting/ During Construction	Contractor(s)		✓			-
S 6.8.3	Prior to the commencement of the site formation earthworks, surface water flowing into the site from uphill will be intercepted through perimeter channels at site boundaries and safely discharged from the site via adequately designed sand/silt removal facilities such as sand traps.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Channels, earth bunds or sand bag barriers will be provided on site to direct stormwater to silt removal facilities. The design of silt removal facilities will make reference to the guidelines in *Appendix A1* of *ProPECC PN 1/94*.	Land Site / During Construction	Contractor(s)		✓			ProPECC PN 1/94
S 6.8.3	The surface runoff or extracted ground water contaminated by silt and suspended solids will be collected by the on-site drainage system and discharged into storm drains after the removal of silt in silt removal facilities.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Unprotected partially formed soil slopes will be temporarily protected by plastic sheeting, suitably secured against the wind, at the end of each working day.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.2	Earthworks to form the final surfaces will be followed up with surface protection and drainage works to prevent erosion caused by rainstorms.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Appropriate surface drainage will be designed and provided where necessary. All slope drainage will be designed to the Geotechnical Manual for Slopes published by the Geotechnical Engineering Office of The Civil Engineering and Development Department.	Land Site / During Construction	Contractor(s)		✓			-

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Des	C	O	Dec	
S 6.8.3	Temporary trafficked areas and access roads formed during construction will be protected by coarse stone ballast or equivalent. These measures shall prevent soil erosion caused by rainstorms.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Drainage systems, erosion control and silt removal facilities will be regularly inspected and maintained to ensure proper and efficient operation particularly following rainstorms. Deposited silt and grit will be removed regularly.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Measures will be taken to reduce the ingress of site drainage into excavations. If trenches have to be excavated during the wet season, they will be excavated and backfilled in short sections wherever practicable. Water pumped out from trenches or foundation excavations will be discharged into storm drains via silt removal facilities.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Open stockpiles of construction materials (for example, aggregates, sand and fill material) of more than 50 m^3 will have measures in place to prevent the washing away of construction materials, soil, silt or debris into any drainage system.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Manholes (including newly constructed ones) will be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris being washed into the drainage system.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	The precautions to be taken at any time of year when rainstorms are likely together with the actions to be taken when a rainstorm is imminent or forecasted and actions to be taken during or after rainstorms are summarised in *Appendix A2* of *ProPECC PN 1/94*.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Oil interceptors will be provided in the drainage system where necessary and regularly emptied to prevent the release of oil and grease into the storm water drainage system after accidental spillages.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Temporary and permanent drainage pipes and culverts provided to facilitate runoff discharge will be adequately designed for the controlled release of storm flows.	Land Site / During Construction	Contractor(s)		✓			-

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Des	C	O	Dec	
S 6.8.3	The temporary diverted drainage will be reinstated to the original condition when the construction work has finished or when the temporary diversion is no longer required.	Land Site / During Construction	Contractor(s)		✓			-
S 6.8.3	Water used in ground boring and drilling for preparation of blasting or rock / soil slope stabilization works will be re-circulated as far as practicable after sedimentation. When there is a need for final disposal, the wastewater will be discharged into storm drains via silt removal facilities.	Boring & Drilling/ During Construction	Contractor(s)		✓			-
S 6.8.3	Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, will undergo large object removal by installing bar traps at the drain inlets. It is not considered necessary to carry out silt removal due to the small quantities of water involved. Similarly, pH adjustment of such water is not considered necessary due to the small quantities and the fact that the water is only likely to be mildly alkaline.	Building / During Construction	Contractor(s)		✓			-
S 6.8.3	During the early stages of work, portable chemical toilets will be used and the effluent will be shipped offsite until the temporary sewage treatment work (STW) plant is operational.	All facilities / During Construction	Contractor(s)		✓			-

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Des	C	O	Dec	
S 6.8.3	The storage areas of oil, fuel and chemicals will be surrounded by bunds or other containment device to prevent spilled oil, fuel and chemicals from reaching the receiving waters.	All facilities / During Construction	Contractor(s)		✓			-
S 6.8.3	The Contractors will prepare guidelines and procedures for immediate clean-up actions following any spillages of oil, fuel or chemicals.	All facilities / During Construction	Contractor(s)		✓			-
S 6.8.3	Surface run-off from bunded areas will pass through oil/water separators prior to discharge to the stormwater system.	All facilities / During Construction	Contractor(s)		✓			-
S 6.8.3	Wastewater generated from the washing down of mixer trucks and drum mixers and similar equipment should be recycled wherever practicable. To prevent pollution from wastewater overflow, the pump sump of any wastewater recycling system will be provided with a standby pump of adequate capacity.	Concrete Batching Plant/ During Construction	Contractor(s)		✓			-
S 6.8.3	Under normal circumstances, surplus wastewater from the concrete batching will be treated in silt removal and pH adjustment facilities before it is discharged into foul sewers. Discharge of this wastewater into storm drains will require more elaborate treatment and regular testing checks. Surface run-off will be separated from the concrete batching plant as to the extent practical and diverted to the stormwater drainage system. Surface run-off contaminated by materials in the concrete batching plant will be adequately treated before disposal into stormwater drains.	Concrete Batching Plant/ During Construction	Contractor(s)		✓			-
S 6.9.3	Fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas.	Chemicals Storage and Handling/ During Operation	Contractor(s)			✓		-
S 6.9.4	Sewage from toilets, kitchens and similar facilities should be discharged into a foul sewer. Wastewater collected from canteen kitchens, including that from basins, sinks and floor drains, should be discharged into foul sewers via grease traps. The foul sewer will then lead to the sewage treatment plant prior to discharge to the ocean.	Wastewater / During Operation	Contractor(s)			✓		-

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Des	C	O	Dec	
S 6.9.4	Vehicle and plant servicing areas, vehicle wash bays and lubrication bays should, as far as possible, be located within roofed areas. The drainage in these covered areas should be connected to foul sewers via a oil / water separator.	Wastewater / During Operation	Contractor(s)			✓		-
S 6.9.4	Oil leakage or spillage should be contained and cleaned up immediately. Waste oil should be collected and stored for recycling or disposal, in accordance with the *Waste Disposal Ordinance.*	Wastewater / During Operation	Contractor(s)			✓		Waste Disposal Ordinance
S 6.10.1	Water quality monitoring shall be undertaken for suspended solids, salinity, turbidity, and dissolved oxygen. If exceedances occur due to dredging and jetting activities, event and action plan should be adopted.	Designated monitoring stations as defined in EM&A Manual *Section 6* Construction period for dredging/jetting works	ET		✓			Environmental Impact Assessment Ordinance
4. Ecology								
Marine Ecology								
S 15.7	Removal of the breakwater in Tung Wan and associated reclamation.	Design	CAPCO	✓				-
S 9.9.2	Vessel operators working on the Project construction or operation will be given a briefing, alerting them to the possible presence of dolphins and porpoises in the area, and guidelines for safe vessel operations in the presence of cetaceans. If high speed vessels are used, they will be required to slow to 10 knots when passing through a high density dolphin area (west Lantau, Sha Chau and Lung Kwu Chau, north of South Soko).	During Construction / Marine works	Contractor(s) and ET		✓			-
S 9.9.2	The vessel operators will be required to use predefined and regular routes, as these will become known to dolphins and porpoises using these waters.	During Construction / Marine works	Contractor(s)		✓			-
S 9.9.1	The vessel operators will be required to control and manage all effluent from vessels.	During Construction / Marine works	Contractor(s)		✓			-



Indicative Diagram to show the cross-secton of Silt Curtain Arrangement for *P. tayami* at South Soko

Figure A1.1

Indicative Arrangement of Silt Curtain (Stand Type) for *P. tayami*

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0018180_SK_jpg.mxd
DATE: 26/09/2006

Environmental Resources Management

ERM

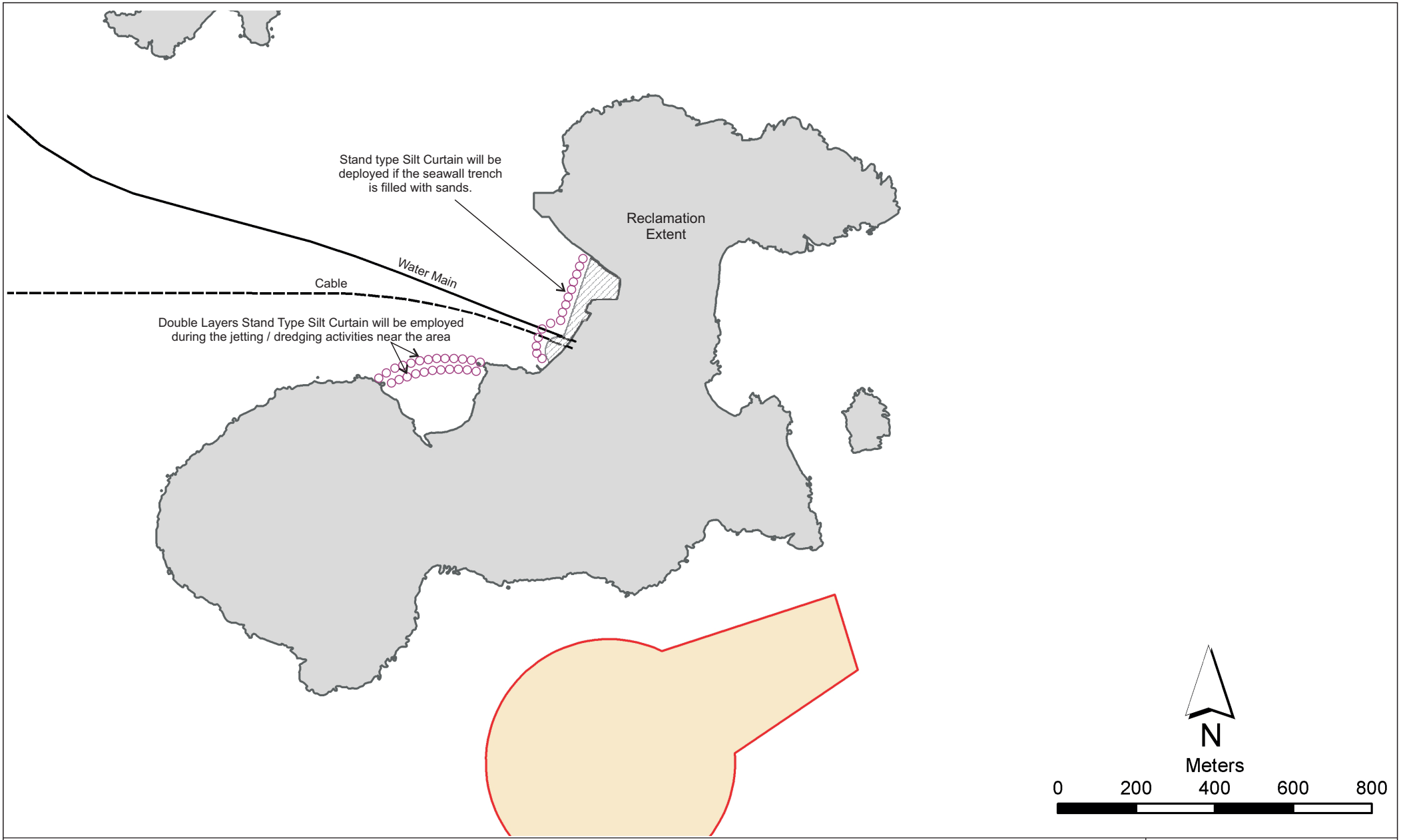

Figure A1.2

Indicative Arrangement of Silt Curtain (Stand Type) for Jetting / Dredging and Sanfilling Activities near South Soko

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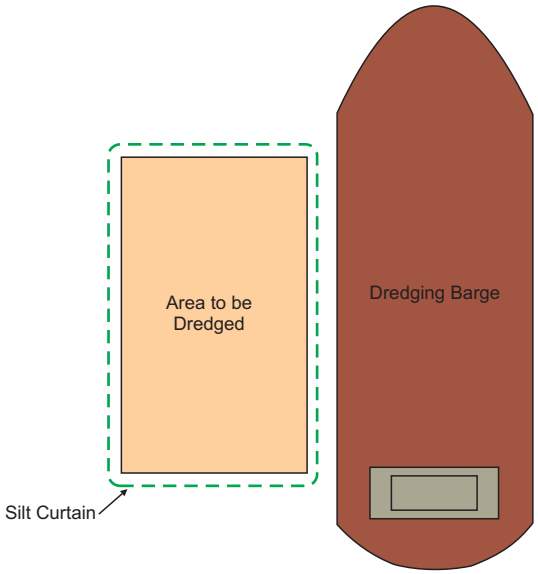
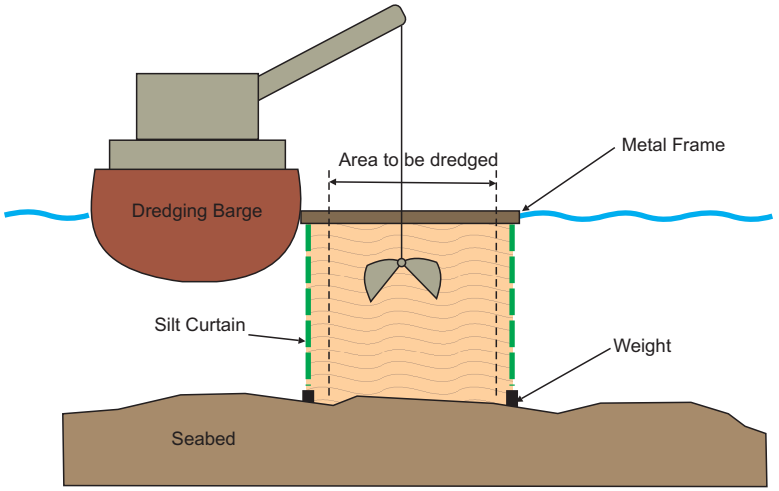
0018180_SK_jpg.mxd
DATE: 28/11/2006

Environmental Resources Management

ERM



(a) Cage Type Silt Curtain Arrangement for Grab Dredging



(b) Cross-secton of Cage Type Silt Curtain Arrangment

Figure A1.4

Indicative Arrangement of Cage Type / Metal Frame Type Silt Curtain

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DATE: 04/09/2006

Environmental Resources Management

ERM

EIA Ref.	Environmental Protection Measures	Location/Duration of Measures/Timing of Completion of Measures	Implementation Agent	Implementation Stage				Relevant Legislation & Guidelines
				Des	C	O	Dec	
S 9.9.2	A policy of no dumping of rubbish, food, oil, or chemicals will be strictly enforced. This will also be covered in the contractor briefings.	During Construction / Marine works	Contractor(s)		✓			-
S 9.10	No dredging works will be conducted during the finless porpoises calving period between October and January.	During dredging of the Approach Channel and Turning Circle	Contractor(s)		✓			-
S 9.10	No piling works will be conducted during the finless porpoises calving period between October and January.	During piling of the Jetty	Contractor(s)		✓			-
S 3.3.3	Standard practice in Hong Kong also includes using a bubble curtain/jacket to aid in attenuating underwater sound propagation. Such practice uses air bubbles to reduce noise by reflecting, scattering and absorbing the sound (in the form of underwater pressure pulses) produced by the piling works. Details will be agreed in advance of construction works with EPD.	During Percussive Piling works for Jetty	Contractor(s) and ET		✓			-
S 9.10	To reduce underwater sound levels associated with percussive piling, the following steps will be taken: - Quieter hydraulic hammers should be used instead of the noisier diesel hammers; - Instigate 'ramping-up' of the piling hammer to provide an advance warning system to marine mammals in the vicinity - Acoustic decoupling of noisy equipment on work barges should be undertaken.	During Percussive Piling works for Jetty	Contractor(s)		✓			-

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S 9.10	An exclusion zone of 500 m radius will be scanned around the work area for at least 30 minutes prior to the start of percussive piling. If dolphins or porpoises are observed in the exclusion zone, piling will be delayed until they have left the area. No marine percussive piling works will be conducted during the finless porpoises peak calving period between October and January. Marine percussive piling works to be restricted to a daily maximum of 12 hours within daylight operations	During Percussive Piling works for Jetty	ET & Contractor(s)		✓			-
EM&A Manual	A pilot test of the bubble jacket will be conducted during percussive piling of the 1st marine pile. Details of the test will be agreed with EPD and AFCD prior to commencement of the test.	During Percussive Piling works for Jetty	ET & Contractor(s)		✓			-
S 9.10	No dredging works for the submarine gas pipeline installation works along the west Lantau pipeline route as well as the pipeline route along the border of the Sha Chau Lung Kwu Chau Marine Park will take place during the peak calving season of the Indo-Pacific Humpback Dolphin, ie March through August.	During Dredging for the Gas Pipeline Installation at West and Northwest Lantau Waters, along the Sha Chau/Lung Kwu Chau Marine Park Boundary	ET & Contractor(s)		✓			-

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S 9.10	A marine mammal exclusion zone within a radius of 250 m from the pipeline dredging vessel will be implemented during the construction phase. An exclusion zone of 250 m radius will be scanned around the dredger for at least 30 minutes prior to the start of dredging. If cetaceans are observed in the exclusion zone for a continuous period of 30 minutes, dredging will be delayed until they have left the area. As per previous practice in Hong Kong, should cetaceans move into the dredging area during dredging, it is considered that cetaceans will have acclimatised themselves to the works therefore cessation of dredging is not required. Except the pipeline section along Urmston Road (waters of busy marine traffic), dredging works will be restricted to a daily maximum of 12 hours with daylight operations. Because of marine traffic constraints, grab dredgers may need to operate 24 hours on the pipeline section which crosses the Urmston Road channel off Black Point enabling completion in the shortest possible time.	During Dredging for the Gas Pipeline Installation / Approaching Channel/Turning Basin	ET		✓			-

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S 9.13.3, Part 4 of EIA	Long-term monitoring will be conducted for the distribution and abundance of dolphins and porpoises during the construction and post-construction phase of the project. A suitable pre-construction period of dolphin monitoring will also be conducted. The protocols for this will be agreed with AFCD in advance and conducted as part of the Enhancement Plan	During marine construction activities / Post-construction and Pre-construction	CAPCO		✓			-
EM&A Manual	Dive monitoring will be conducted in accordance with the details specified in the EM&A Manual	*Dive Monitoring for False Pillow Coral / During Dredging*	ET		✓	✓		-
EM&A Manual	Pre-and Post-construction surveys of Amphioxus will be conducted within Tung Wan to confirm the presence/absence of this species in the benthic sediments.	*Pre and Post construction surveys of Amphioxus*	ET	✓				-
S 10.8	Geophysical survey will be conducted during the post-construction of pipeline works to confirm the seabed would be reinstated to its original	Post-construction after pipeline works	ET		✓	✓		-

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Terrestrial Ecology								
S 8.7.2	A detailed vegetation survey on the Golden Eulophia would be conducted within the impacted shrubland and Project Area by a suitably qualified botanist/ ecologist to identify and record the affected individuals prior to the commencement of site clearance works. Feasibility and suitability of transplanting the affected plant species would be carefully studied and suitable receptor sites would be identified. Detailed transplantation proposal providing information of transplantation methodology, recipient site, implementation programme, water requirement, post-transplanting monitoring and personal involved shall be submitted to and approved by EPD and AFCD. Transplantation would be undertaken and supervised by a suitably qualified botanist/ horticulturist. After transplantation, monitoring will be undertaken to check the performance and health conditions of the transplanted individuals on weekly basis in the first month after transplantation and monthly basis for additional eleven months. Remedial actions will be discussed with AFCD in the event of unsuccessful transplantation.	Land site / Pre-Construction	ET Contractor(s) Contractor(s)	✓				- - -
S 8.7.2	Where possible, structures will utilise appropriate design to complement the surrounding landscape. Materials and finishes will be considered during detailed design. The major lighting sources will be pointed inward and downwards where practicable to reduce light spill	Land site / Pre-Construction	Contractor(s)	✓				-
S 8.7.2	Erect fences along the boundary of the works area before the commencement of works to prevent vehicle movements, and encroachment of personnel, onto adjacent areas.	Land site / Pre-Construction	Contractor(s)	✓				-
S 8.7.2	Regularly check the work site boundaries to ensure that they are not breached and that damage does not occur to surrounding areas.	Land site / During Construction	Contractor(s)		✓			-

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S 8.7.2	Reclaim temporarily affected areas, particularly the secondary woodland and shrubland habitats at South Soko, and shrubland at Shek Pik, after completion of construction works, through on-site tree/shrub planting. The tree shrub species will be chosen with reference to those in the surrounding area and the food plant of butterfly species of conservation interest.	Land site / Post-Construction	Contractor(s)			✓		-
S 8.7.3	Compensatory tree and shrub planting will be provided at the locations detailed in the EIA report, for the loss of secondary woodland (approximately 0.2 ha), shrubland (1.9 ha), grassland (1.3 ha) and revegetate the temporary lost habitat including the areas of the temporary construction stores and spoil storage area. The selection of planting species shall be made with reference to the species identified in *Annex 8* and be native to Hong Kong or the South China region, and will include food plants of the butterfly species of conservation interest, to provide additional measures for the butterflies.	Land site / Post-Construction	Contractor(s)			✓		-
5. Landscape and Visual								
S 11.11	Areas compacted during the construction phase that are not required during the operation phase, are to be cultivated to a depth of up to 300mm in accordance with the future Landscape Specification.	Land site / During Construction	Contractor(s)		✓			-
S 11.11	During the design phase, a soil stabilisation and embankment planting strategy will be developed to ensure that land affected by slope excavation can be replanted. Soil preparation and the selection and provision of suitable growing medium is to be completed in accordance with the relevant best practice guidelines.	Land site / Pre-Construction (Detail Design)	Contractor(s)	✓				-

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S 11.11	Planting of trees and shrubs is to be carried out in accordance with the Landscape Details and the relevant best practice guidelines. Plant species and densities are to be provided in future detailed design documents and are to be selected so as to achieve a finished landscape that matches the surrounding equivalent landscape	Land site / Post-Construction	Contractor(s)			✓		-
EM&A Manual	Post-construction phase audit shall be conducted at the last 12 months of the landscaping proposal during establishment work	Land site / Post-Construction	ET			✓		-
S 11.11	Areas of cut to be stabilised for operational requirements. Materials and finishes of stabilisation to be selected to complement the surrounding landscape where this is technically feasible. This includes the addition of pigments and aggregates in the finished slope that complement the existing geology of the area.	Land site / During Construction	Contractor(s)		✓			-
S 11.11	It is anticipated that sand will naturally form at the base of the new sea walls creating a beach area similar to the existing beach. This process is dependent on natural forces, but is likely to occur within ten years.	Land site / During Construction	Contractor(s)		✓			-
S 11.11	Where technically feasible and practicable, new plantings are to be installed as early as possible during the construction works	Land site / During Construction	Contractor(s)		✓			-
S 11.11	Where possible site hoardings to be erected and coloured to complement the surrounding areas. Colours such as green and light brown are recommended.	Land site / During Construction	Contractor(s)		✓			-
S 11.11	The reclamation areas shall utilise natural rocks for the engineered sea-walls.	Land site / During Construction	Contractor(s)		✓			-

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S 11.17	Where possible, built structures should utilise appropriate designs to complement the surrounding landscape. Materials and finishes will also be considered during detailed design.	Land site (VMM1) / Pre-Construction (Detail Design)	Contractor(s)	✓				-
S 11.17	Colours for the terminal can be used to complement the surrounding area. Lighter colours such as shades of light grey and light brown may be utilised where technically feasible to reduce the visibility of the terminal.	Land site (VMM2) / Pre-Construction (Detail Design)	Contractor(s)	✓				-
S 11.17	In addition to the landscape mitigation plantings proposed in the EIA report, appropriate new plantings will be installed where possible, to help integrate the new structures into the surrounding landscape.	Land site (Vmm3) / Pre-Construction (Detail Design)	Contractor(s)	✓				-
S 11.18	Security lighting of the site boundary - These will generally be spot lights mounted on the external fencing and will have the beams directed towards the ground.	Land site / During & Post-Construction	Contractor(s)		✓	✓		-
S 11.18	General access lighting - This will provide safe access and operational lighting conditions around the site. Baffles will be fitted where possible to reducing upward light spill	Land site / Post-Construction	Contractor(s)			✓		-
6. Cultural Heritage								
S 12.7	A photographic and cartographic record will be prepared for impacted standing heritage sites, in accordance with the AMO's requirements.	Tai A Chau Tin Hau Temple, 21 graves and an associated tablet and 7 earthshrines/Prior to relocation of impacted standing heritage sites at South Soko	Contracted Cultural Heritage Specialist	✓				Antiquities and Monuments Ordinance
S 12.7	An archaeological survey will be undertaken to confirm if there is any archaeological impact to the suitable relocation site for the Tai A Chau Tin Hau Temple. If archaeological deposits are identified, appropriate measures will be implemented prior to relocation work commence.	Tai A Chau Tin Hau Temple relocation site/Prior to relocation work	Contracted and Licenced Archaeologist	✓				Antiquities and Monuments Ordinance

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S 12.7	Rescue excavations at the impacted archaeological deposits (i.e., Sites A,B, C, D and E) to preserve the archaeological deposits by record, following the Archaeological Action Plan (a separate document detailing the rescue excavation plan, archaeological watching brief plan and contingency plan to be submitted and agreed with AMO by the project proponent prior to licence application by a qualified archaeologist.	Sites B to E with area coverage of 800 m^2, 1,600 m^2, 100 m^2 and 450 m^2 respectively and impacted area of Site A (maximum area of 900m^2)/Prior to construction commencement at South Soko	Contracted Archaeological Rescue Excavation Team led by a Licenced Archaeologist.	✓				Antiquities and Monuments Ordinance
S 12.7	An archaeological watching brief (archaeological monitoring) will be undertaken following the separate *Archaeological Action Plan* to be agreed with AMO by the project proponent as mentioned above.	Buffer areas of Sites B to E and impacted buffer area of Site A/ During Construction at South Soko	Contracted and Licenced Archaeologist		✓			Antiquities and Monuments Ordinance
7. Waste Management								
S 7.6	The Contractor shall identify a coordinator for the management of waste.	Contract mobilisation / During Construction (C)	Contractor(s)		✓			-
S 7.6	The waste coordinator shall prepare and implement a Waste Management Plan which specifies procedures such as a ticketing system, to facilitate tracking of loads and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed.	Contract mobilisation / During Construction (C)	Contractor(s)		✓			-

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S 7.6	The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges.	Contract mobilisation / During Construction (C)	Contractor(s)		✓			Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes WBTC No 5/99, Trip-ticket System for Disposal of Construction and Demolition Material Water Pollution Control Ordinance
S 7.6	No waste shall be burnt on site. Wastes shall be collected by licensed waste haulier and be disposed of at licence sites.	During Construction	Contractor(s)		✓			Air Pollution Control Ordinance
S 7.5 & 7.6	Excavated material shall be used on site to the extent practical. It is intended that the excavated rock be taken to a quarry in China for processing. It is intended that the processed rock will be subsequently reused within the project for the submarine gas pipeline bedding works or within the reclamation. Otherwise, excavated rocks shall be reused in other concurrent projects in Hong Kong to the extent practical. Excavated rocks shall be delivered to the Public Fill in Tuen Mun Area 38 at the last resort.	Land Site / During Construction (C)	Contractor(s)		✓			WBTC No. 2/93, Public Dumps ETWBTC No. 34/2002, Management of Dredged/Excavated Sediment; Environment, Transport and Works Bureau, Hong Kong SAR Government
S 7.6	Material shall be reused on site as far as practicable, including formwork plywood, topsoil and excavated material.	Land Site / During Construction (C)	Contractor(s)		✓			WBTC 32/92, The Use of Tropical Hard Wood on Construction Site

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S 7.6	Surplus material generated shall be sorted on site into construction and demolition (C&D) waste and the public fill fraction. A sorting facility shall be set up on the site.	Land Site / During Construction (C)	Contractor(s)		✓			-
S 7.6	The site and surroundings shall be kept tidy and litter free. Waste storage area shall be properly cleaned and shall not cause windblown litter and dust nuisance.	All areas / During Construction (C)	Contractor(s)		✓			WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness. Works Bureau, Hong Kong SAR Government
S 7.6	Stockpiled material shall avoid vegetated areas.	Land Site / During Construction (C)	Contractor(s)		✓			
S 7.6	Stockpiles shall be covered by tarpaulins and/or watered as needed.	Land Site / During Construction, particularly dry season (C)	Contractor(s)		✓			Air Pollution Control (Construction Dust) Regulation
S 7.6	Storage of material on site should be kept to a minimum. Construction materials shall be planed and stocked carefully to reduce amount of waste generated and avoid unnecessary generation of waste.	All areas / During Construction (C)	Contractor(s)		✓			-
S 7.6	Use of reusable non-timber formwork to reduce the amount of C&D materials	All areas / During Construction (C)	Contractor(s)		✓			Works Branch Technical Circular (WBTC) No. 32/92, The Use of Tropical Hard Wood on Construction Site
S 7.6	Wheel washing facilities shall be used by all trucks leaving the site to prevent the transfer of mud onto public roads.	Site entrances and exits / During Construction (C)	Contractor(s)		✓			Air Pollution Control (Construction Dust) Regulation

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S 7.6	Suitable chemical waste storage areas should be formed at the works site for temporary storage pending collection. Chemical wastes shall be separated for special handling and shall be disposed at appropriate treatment at the Chemical Waste Treatment Centre.	Land Site / During Construction (C)	Contractor(s)		✓			Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
S 7.6	Any unused chemicals and those with remaining functional capacity shall be recycled to the extent practical.	Land Site / During Construction (C)	Contractor(s)		✓			-
S 7.6	A licensed contractor shall be employed to collect chemical waste for delivery to a licensed treatment facility.	Chemical waste treatment facility at Tsing Yi/ During Construction (C)	Contractor(s)		✓			Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
S 7.6	Temporary storage areas for general refuse should be enclosed or contained to avoid environmental impacts.	All areas / During Construction (C)	Contractor(s)		✓			WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness.
S 7.6	Sufficient dustbins should be provided for storage of waste.	All areas / During Construction (C)	Contractor(s)		✓			WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness. Works Bureau, Hong Kong SAR Government

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S 7.6	General refuse should be timely cleared and should be disposed of to the nearest licensed facility.	All areas / During Construction (C)	Contractor(s)		✓			WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness.
S 7.5 & 7.6	Nightsoil arising from chemical toilets and chemical treatment facilities should be transported by a licensed contractor to government Sewage Treatment Works for disposal. The dewatered sludge from the toilets shall be stored in enclosed containers and transported by barge to the WENT landfill for disposal.	Land Site / During Construction (C)	Contractor(s)		✓			-
S 7.6	Waste oils, chemicals or solvents shall not be disposed of to drain. Drainage systems, sumps and oil interceptors shall be cleaned and maintained regularly.	All facilities / During Construction (C)	Contractor(s)		✓			-
S 7.6	Good site practice shall be implemented to avoid waste generation and promote waste minimisation.	All facilities / During Construction (C)	Contractor(s)		✓			-
S 7.6	Waste materials such as paper, metal, timber and waste oil shall be recycled as far as practicable. Different types of waste shall be segregated and stored of in different containers, skips or stockpiles to enhance reuse or recycling of material and their proper disposal. Recycling bins will be provided at strategic locations to facilitate recovery of aluminium can and waste paper from the site.	Land Site / During Construction (C)	Contractor(s)		✓			ETWBTC No. 33/2002, Management of Construction and Demolition Material Including Rock
S 7.6	Dredged marine mud shall be disposed of in a gazetted marine disposal ground under the requirements of the Dumping at Seas Ordinance. Marine mud shall be assessed in accordance with the ETWBTC No. 34/2002 prior to the dredging to identify the suitable disposal ground.	Dredging / During Construction (C)	Contractor(s)		✓			Dumping at Sea Ordinance
S 7.6	Waste containers shall be in good condition and fitted with lids or covers to prevent waste from escaping or the ingress of water.	All facilities / During Construction (C)	Contractor(s)		✓			WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness.

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S 7.6	Waste containers shall be in a secure area on hardstanding.	All facilities / During Construction (C)	Contractor(s)		✓			WBTC Nos. 6/2002 and 6/2002A, Enhanced Specification for Site Cleanliness and Tidiness.
S 7.6	Proper storage and site practices shall be adopted to reduce the potential for damage or contamination of construction materials.	All facilities / During Construction (C)	Contractor(s)		✓			-
S 7.6	Emergency equipment to deal with any spillage or fire shall be kept on site.	All facilities / During Construction (C)	Contractor(s)		✓			Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
S 7.6	Containers used for storage of chemical waste shall be: - maintained in good condition and clearly labelled in both English and Chinese; - suitable for the substance they are holding, resistant to corrosion, and securely closed; and - capacity of less than 450 L unless the specifications have been approved by the EPD.	All facilities / During Construction (C)	Contractor(s)		✓			Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes

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S 7.6	Storage areas for chemical waste shall be: - clearly labelled and used solely for the storage of chemical waste; - enclosed on at least 3 sides; - have adequate ventilation; - arranged so that incompatible materials are appropriately separated; - have impermeable floor and bunding sufficient to fully retain any spillage or - leakages; ventilated; and - covered to prevent rainfall from entering.	All facilities / During Construction (C)	Contractor(s)		✓			Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
S 7.6	Leaking containers shall be contained and removed from site as soon as is reasonably practicable.	All facilities / During Construction (C)	Contractor(s)		✓			Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
S 7.6	Training shall be provided to site personnel in proper waste management and chemical handling procedures, the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling.	All facilities / During Construction (C)	Contractor(s)		✓			-

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S 7.6	EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site audit programme shall be undertaken.	All facilities / During Construction (C)	ET		✓			-
S 7.6	Nomination of approved personnel to be responsible for good site practices, arrangements for collection and effective disposal to an appropriate facility of the wastes generated at the site.	All facilities / During Construction (C)	Contractor(s)		✓			-
S 7.6	Appropriate measures to reduce windblown litter and dust transportation of waste by either covering trucks or by transporting wastes in enclosed containers.	All facilities / During Construction (C)	Contractor(s)		✓			-
S 7.6	Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors. A recording system for the amount of wastes generated/recycled and disposal sites.	All facilities / During Construction (C)	Contractor(s)		✓			-
8. Land Contamination								
S 14.4	Fuel, lubricating oil, chemical and chemical waste storage areas present on the site shall be provided with secondary containment.	Land Site / During Operation (O)	CAPCO			✓		Waste Disposal (Chemical Waste) (General) Regulation Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes
S 14.4	Individual drainage from lines, pumps, compressors, vessels, heat exchangers and instruments shall be connected to an on-site Coalescing Plate Interceptor (CPI) type oil water separator.	Land Site / During Operation (O)	CAPCO			✓		-
S 14.4	Stationary equipment that could release hydrocarbons and that are not located in containment areas will be installed on skids containing drain pans. An open drain system will collect spillage/leakage/contaminated storm water from these areas and will connect to the oil water separator.	Land Site / During Operation (O)	CAPCO			✓		-

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S 14.4	Spill containment and clean up equipment shall be provided in areas where oils, chemicals and chemical wastes are handled and stored.	Land Site / During Operation (O)	CAPCO			✓		-
S 14.4	Training shall be provided to relevant personnel on hazardous materials handling and spill control and clean up.	Land Site / During Operation (O)	CAPCO			✓		-
S 14.4	Contaminated materials and dispensed spill control and clean-up equipment shall be collected and disposed of in accordance with the WDO.	Land Site / During Operation (O)	CAPCO			✓		Waste Disposal Ordinance

Annex A1 Summary of Mitigation Measures during the Dredging and Jetting Activities for LNG Project

Marine Work Location (Zone)	Marine Work and Plant Type	No. of Plants	Proposed Mitigation Measures
Western Berth, South Soko	Dredging by Closed Grab Dredger	1	Double-Layer silt curtain will be provided at Pak Tso Wan (see *Figure A.1.2*) during the dredging activities at western berth. Cage type silt curtain will be installed next to the grab dredger.
Sai Wan Western Berth, South Soko	Sandfilling by Pelican Barge	1	Seawall (completely constructed) in place prior to the reclamation works. In case the seawall trench is filled with sand instead of rock, a silt curtain (stand type) enclosing the sandfilling area, see *Figure A1.2* will be installed.
Tung Wan Eastern Berth, South	Dredging by Closed Grab Dredger	1	Although no predicted WQO exceedances, cage type silt curtain will be installed next to the grab dredger to minimise the sediment dispersion.
Approach Channel and Turning Basin	Dredging by Closed Grab Dredger or TSHD	3 grabs or 2 grabs + 1 TSHD (please refer to EIA S6 for further details)	Silt curtain (cage type, see *Figure A.1.4*) will be used during grab dredging activities at AC/TB. Silt curtain (stand type) will be provided at South of South Soko to protect the False Pillow Coral (see *Figure A1.1*). Should exceedance occur during water quality monitoring, additional silt curtain (stand type) (see *Figure A1.1*) will be installed at the edge of the channel dredging area.
Submarine Water Main (at South Soko shore approach)	Dredging by Closed Grab Dredger	1	Double-layer silt curtain will be provided at Pak Tso Wan (see *Figure A.1.2*) during the dredging activities at western berth. Cage type silt curtain will be installed next to the grab dredger.
Submarine Water Main (at Shek Pik shore approach)	Dredging by Closed Grab Dredger	1	Not required due to no predicted WQO exceedances.
Submarine Water Main (waterway crossing sand borrow area and marine navigation channel)	Dredging by Closed Grab Grab Dredger	1	Not required due to no predicted WQO exceedances.
Submarine Water Main (near South Soko)	Jetting by Jetting machine	1	Double-layer silt curtain (*Figure A1.2*) will be provided at Pak Tso Wan during the jetting activities near Pak Tso Wan, South Soko
Submarine Water Main (near Shek Pik)	Jetting by Jetting machine	1	Not required due to no predicted WQO exceedances.

Marine Work Location (Zone)	Marine Work and Plant Type	No. of Plants	Proposed Mitigation Measures
Submarine Cable Circuit	Jetting by Jetting machine	1	Double-Layer silt curtain (*Figure A1.2*) will be provided at Pak Tso Wan during the jetting activities near Pak Tso Wan, South Soko
Submarine Intake	Dredging by Closed Grab Dredger	1	Not required due to no predicted WQO exceedances.
Cooled Water Outfall	Dredging by Closed Grab Dredger	1	Not required due to no predicted WQO exceedances.
Gas Receiving Station at Black Point	Dredging by Closed Grab Dredger	2	Not required due to no predicted WQO exceedances.
Gas Receiving Station at Black Point	Sandfilling by Pelican Barge	1	Not required due to no predicted WQO exceedances.
Gas Pipeline (KP 0 – 1)	Dredging by Closed Grab Grab Dredger	1	Double-Layer silt curtain (see *Figure A1.2*) will be provided at Pak Tso Wan during the dredging activities near the west of South Soko. Cage type silt curtain will be installed next to the grab dredger.
Gas Pipeline (KP 1 – 24.5)	Dredging by TSHD	1	The TSHD will be operated 12 hours a day and the dredging works will avoid the Chinese While Dolphin calving season from March to August.
Gas Pipeline (KP 24.5 – 31)	Dredging by Closed Grab Dredger	3	Cage type silt curtain will be used during grab dredging activities along Lung Kwu Chau/Sha Chau Marine Park Boundary.
Gas Pipeline (KP 31 – 33.5)	Dredging by Closed Grab Dredger	1	Not required due to no predicted WQO exceedances. Should exceedance occur during water quality monitoring, silt curtain (cage type) (see *Figure A1.4*) will be used during the dredging activity.
Gas Pipeline (KP 33.5 – 33.976)	Dredging by Closed Grab Dredger	1	Not required due to no predicted WQO exceedances. Should exceedance occur during water quality monitoring, silt curtain (cage type) (see *Figure A1.4*) will be used during the dredging activity.
Gas Pipeline (KP 33.976 – 35.39)	Dredging by Closed Grab Dredger	1	Not required due to no predicted WQO exceedances. Should exceedance occur during water quality monitoring, silt curtain (cage type) (see *Figure A1.4*) will be used during the dredging activity.
Gas Pipeline (KP 35.39 – 37)	Dredging by Closed Grab Dredger	1	Not required due to no predicted WQO exceedances. Should exceedance occur during water quality monitoring, silt curtain (cage type) (see *Figure A1.4*) will be used during the dredging activity.

Marine Work Location (Zone)	Marine Work and Plant Type	No. of Plants	Proposed Mitigation Measures
Gas Pipeline (KP 37 – 37.803)	Dredging by Closed Grab Dredger	1	Not required due to no predicted WQO exceedances. Should exceedance occur during water quality monitoring, silt curtain (cage type) (see *Figure A1.4*) will be used during the dredging activity.
Gas Pipeline (KP 37.803 – 38.303)	Dredging by Closed Grab Dredger	1	Not required due to no predicted WQO exceedances. Should exceedance occur during water quality monitoring, silt curtain (cage type) (see *Figure A1.4*) will be used during the dredging activity.

Annex B

Preliminary Construction Programme

Annex B - Preliminary Construction Programme

SOUTH SOKO OPTION

Construction Item	Yr 1												Yr 2												Yr 3												Yr 4											
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34	M35	M36	M37	M38	M39	M40	M41	M42	M43	M44	M45	M46	M47	M48
Land Based Works																																																
Site Preparation Work																																																
Site Clearance				Y	Y	Y																																									
Soil Compaction				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																																	
Blasting and Excavation							Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																															
Slope Stabilization and Drainage Works								Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																								
Reclamation																																																
Dredging				Y	Y																																										
Seawall Construction																																															
Placing Seawall Core						Y	Y	Y	Y	Y																																					
Placing Seawall Rock Armour						Y	Y	Y			Y	Y	Y																																			
Placing Fill								Y	Y	Y																																					
Drainage Works																																															
Install of Temporary Work								Y	Y																																					
Laying of Drainage Pipes								Y	Y																																					
Backfilling								Y	Y																																					
Main Jetty																																															
Ground Investigation					Y	Y	Y																																							
Jetties and Access Bridge																																															
Steel Piles Construction					Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																														
Concrete Caps, Slabs and Foundations															Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																	
Dredging of Approach Channel and Turning Basin								Y	Y	Y							Y	Y																													
Intake and Outfall Construction										Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																												
LNG Terminal, Civil, M&E Work																																															
Terminal Civil, M&E Work															Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Installation of Water Main & Cable																																															
Dredging										Y	Y	Y																																			
Water Pipeline Installation													Y	Y	Y																																
Post Trenching Jetting															Y	Y																														
Backfilling														Y	Y	Y	Y	Y	Y																												
Submarine Cable Installation by Direct Burying (Jetting)																								Y	Y	Y	Y																				
Installation of Submarine Gas Pipeline																																															
Pipeline Installation by Dredging													Y	Y	Y	Y	Y	Y	Y	Y	Y																									
Installation of Gas Receiving Station																																															
Dredging									Y	Y																																				
Seawall Construction																																															
Placing Seawall Core										Y	Y	Y																																		
Placing Seawall Rock Armour												Y	Y	Y	Y																																
Placing Fill												Y	Y	Y	Y																																

Annex C

Proforma for EM&A Programme

Proforma for Construction Phase EM&A Programme

IMPLEMENTATION SCHEDULE

Ref: _____

EIA Ref*	EM&A Log Ref	Environmental Protection Measures*	Location/ Timing	Implementation Agent	Implementation Stages**			
					Des	C	O	Dec

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

** *Des- Design, C-Construction,O-Operation, Dec- Decommissioning*

Signed by Project Proponent: Date: _____

IMPLEMENTATION STATUS PROFORMA

Ref**	Environmental Protection Measures*	Implementation Status

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

** *EIA Ref / EM&A Log Ref / Design Document Ref*

Signed by Environmental Team Leader: Date: _____

Audited by Independent Environmental Checker: Date: _____

SITE INSPECTION PROFORMA **Ref:** _____

Date	Location	Req. Ref.*	Observation / Deficiency	Mitigation Action** (Responsible Agency)	Date*** of Confirmation

* *EIA Ref / EM&A Log Ref / Design Document Ref / Environmental Protection Contract Clause*
** *Specific Environmental Mitigation Measures should be stated, such as, equipment, processes, systems, practices or technologies*
*** *The required completion date to confirm the specified Environmental Protection Action*

This Proforma is an Environmental Protection Instruction for:

Signed by Environmental Team Leader: Date: _____

Copy to Independent Environmental Checker Date: _____

REGULATORY COMPLIANCE PROFORMA

Ref: _____

Ref*	Environmental License / Permit*	Control Area / Facility / Location	Effective Date

* *Name of Applicant, Business Corporation, relevant regulation and remark of license / permit conditions*

** *File reference of the licensee / permittee*

Recorded by Environmental Team Leader: Date: _____

Signed by Independent Environmental Checker : Date: _____

COMPLAINT LOG **Ref:** _____

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

Filed by Environmental Team Leader: Date: _____

Proforma for Operational Phase EM&A Programme

IMPLEMENTATION STATUS PROFORMA

EIA Ref*	EM&A Log Ref	Environmental Protection Measures*	Location/ Timing	Implementation Agent	Implementation Stages**			
					Des	C	O	Dec

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

** *Des- Design, C-Construction,O-Operation, Dec- Decommissioning*

Signed by Project Proponent: Date: _____

IMPLEMENTATION STATUS PROFORMA **Ref:** _____

Ref**	Environmental Protection Measures*	Implementation Status

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

** *EIA Ref / EM&A Log Ref / Design Document Ref*

Signed by Environmental Team Leader: Date: _____

Audited by Independent Environmental Checker : Date: _____

REGULATORY COMPLIANCE PROFORMA

Ref*	Environmental License / Permit*	Control Area / Facility / Location	Effective Date

* *Name of Applicant, Business Corporation, relevant regulation and remark of license / permit conditions*

** *File reference of the licensee / permittee*

Recorded by Environmental Team Leader: Date: _____

Signed by Independent Environmental Checker: Date: _____

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

Incident Report on Action Level or Limit Level Non-compliance

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

Prepared by : _____

Designation : _____

Signature : _____

Date: _____

Annex D

Water Quality Monitoring Log

Water Quality Monitoring Log

Location				
Date				
Start Time	(hh:mm)			
Weather				
Sea Conditions				
Tidal Mode				
Water Depth	(m)			
Monitoring Depth		Surface	Middle	Bottom
Salinity				
Temperature	(^{0}C)			
DO Saturation	(%)			
DO	(mg/l)			
Turbidity	(NTU)			
SS Sample Identification				
SS	(mg/l)			
Observed Construction Activities	<100m from location			
	>100m from location			
Other Observations				

	Name & Designation	Signature	Date
Recorded by:	_____	_____	_____
Checked by:	_____	_____	_____

Note: The SS results are to be filled in once they are available from the laboratory.