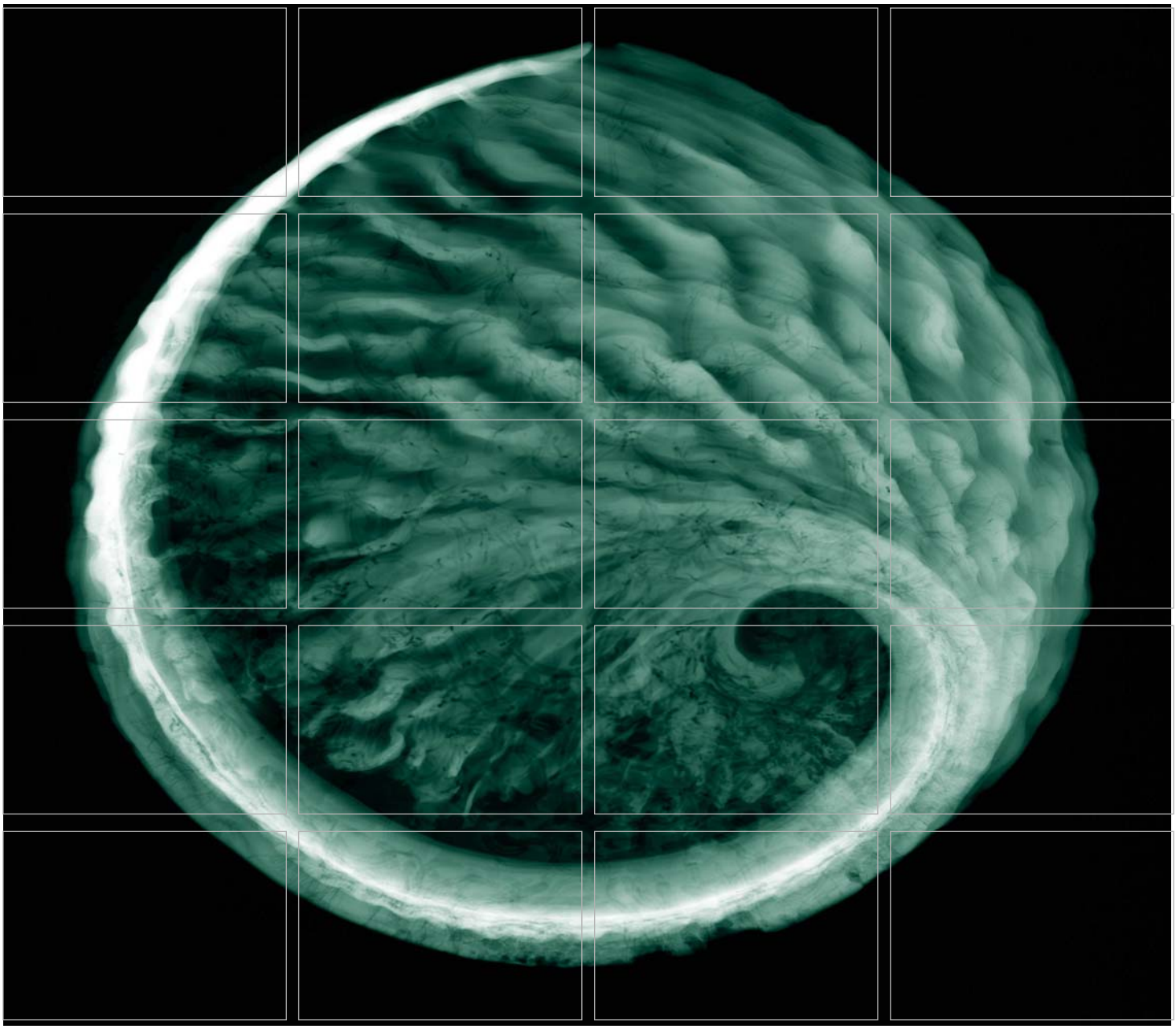

Permanent Aviation Fuel Facility (EP-262/2007/B)

Environmental Monitoring and Audit Manual

26th November 2008

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香港機場管理局 AIRPORT AUTHORITY HONG KONG

Permanent Aviation Fuel Facility for Hong Kong International Airport

Environmental Certification Sheet
EP-262/2007/B

Reference Document/Plan

Document~~/Plan~~ to be ~~Certified/~~ Verified:	Revised Environmental Monitoring and Audit (EM&A) Manual
Date of Report:	26th November 2008
Date received by ET:	26th November 2008
Date received by IEC:	26th November 2008

Reference EP Condition

Environmental Permit Condition: Condition No.: 2.5

Content: ***Updating of Environmental Monitoring and Audit (EM&A) Manual***

2.5 The Permit Holder shall, no later than one month before the commencement of construction of the sub-sea pipelines of the Project, submit to the Director for approval four hard copies and one electronic copy of an updated EM&A Manual for the Project. The updated EM&A Manual shall include the detailed arrangements of setting up a Community Liaison Group mentioned in Condition 2.4 of this Permit to monitor the proper design, construction and operation of the Project, the detailed arrangements of carrying out design audit of the arrangements and measures in the Project, the revised water quality monitoring programme by inclusion of monitoring of Persistent Organic Pollutants (POPs) during construction of the Project and the revised monitoring programme as recommended in the application document for variation of an environmental permit (Application No. VEP-243/2007). The updated EM&A Manual shall be certified by the ET Leader and verified by the IEC as conforming to the information and recommendations contained in the approved EIA Report (Register No. AEIAR-107/2007) and the application document for variation of an environmental permit (Application No. VEP-243/2007)

ET Certification

I hereby certify that the above referenced document/~~plan~~ complies with the above referenced condition of EP-262/2007/B

Craig A Reid
Environmental Team Leader:  Date: 26th November 2008

IEC Verification

I hereby verify that the above referenced document/~~plan~~ complies with the above referenced condition of EP-262/2007/B

Dr Guiyi Li, Independent
Environmental Checker:  Date: 28 Nov 2008

Notes:

Permanent Aviation Fuel Facility (EP-262/2007/B)
Environmental Monitoring and Audit Manual

26th November 2008

Document Code: C2475_Revised EM&A Manual_Nov08.doc

For and on behalf of Environmental Resources Management	
Approved by:	Craig A Reid
Signed:	
Position:	Environmental Team Leader
Date:	26th November 2008

CONTENTS

1 INTRODUCTION

1.1 BACKGROUND

A Permanent Aviation Fuel Facility (PAFF) is required to ensure a secure means to supply aviation fuel during the operational lifetime of the Hong Kong International Airport (HKIA). The PAFF will replace the existing temporary Aviation Fuel Receiving Facility (AFRF) adjacent to Sha Chau, as the existing facility does not have sufficient capacity. The PAFF must meet the capacity demand for the 2040 planning horizon of the airport and must be able to provide for strategic storage. The Airport Authority Hong Kong (AAHK) is committed to provide a replacement facility, after which the Sha Chau facility will be used for emergency backup purposes only. The proposed PAFF with its associated pipeline and jetty is shown in *Figure 1.1*.

The proposed project is designated under Sections H.2 and L.4 of Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) and as such the statutory procedures under the EIAO need to be followed and an environmental permit is required prior to the commencement of construction.

The AAHK first commissioned Meinhardt Infrastructure and Environmental Ltd (know as Mouchel Asia Limited at that time) in June 2001 to provide professional environmental services in respect of assessing Tuen Mun Area 38 as the location for a PAFF and to proceed with obtaining an Environmental Permit for the PAFF based on the EIA Study Brief No. ESB-072/2001 received from the Environmental Protection Department (EPD). An EIA of the PAFF facility (EIAO Register Number AEIAR-062-2002), based upon the layout detailed in *Figure 1.2a*, was prepared in accordance with EIA Study Brief issued by the EPD in May 2001 and submitted under the EIAO in May 2002 and subsequently Environmental Permit *EP-139/2002* was granted on the 28th August 2002.

However, the decision by EPD to grant the Environmental Permit was subject to a Judicial Review, with further details provided in Section 1.1.5 of the EIA Report. The Judicial Review sided in the favour of the DEP, as did the subsequent Judgement from the Court of Appeal from the High Court for Judicial Review in March 2005. However, the DEP's decision to grant the EP was quashed by the Judgement of the Court of Final Appeal of July 2006.

Leighton Contractors (Asia) Limited (LCAL) was awarded the Contract for the PAFF (the Project). Construction work for the Project had commenced as early as November 2005 under the Environmental Permit EP-139/2002 but works were stopped following the Judgement of the Court of Final Appeal of July 2006. As such, in order to continue with the construction of the project, the project needed to again go through the statutory procedures under the EIAO in order to obtain an environmental permit.

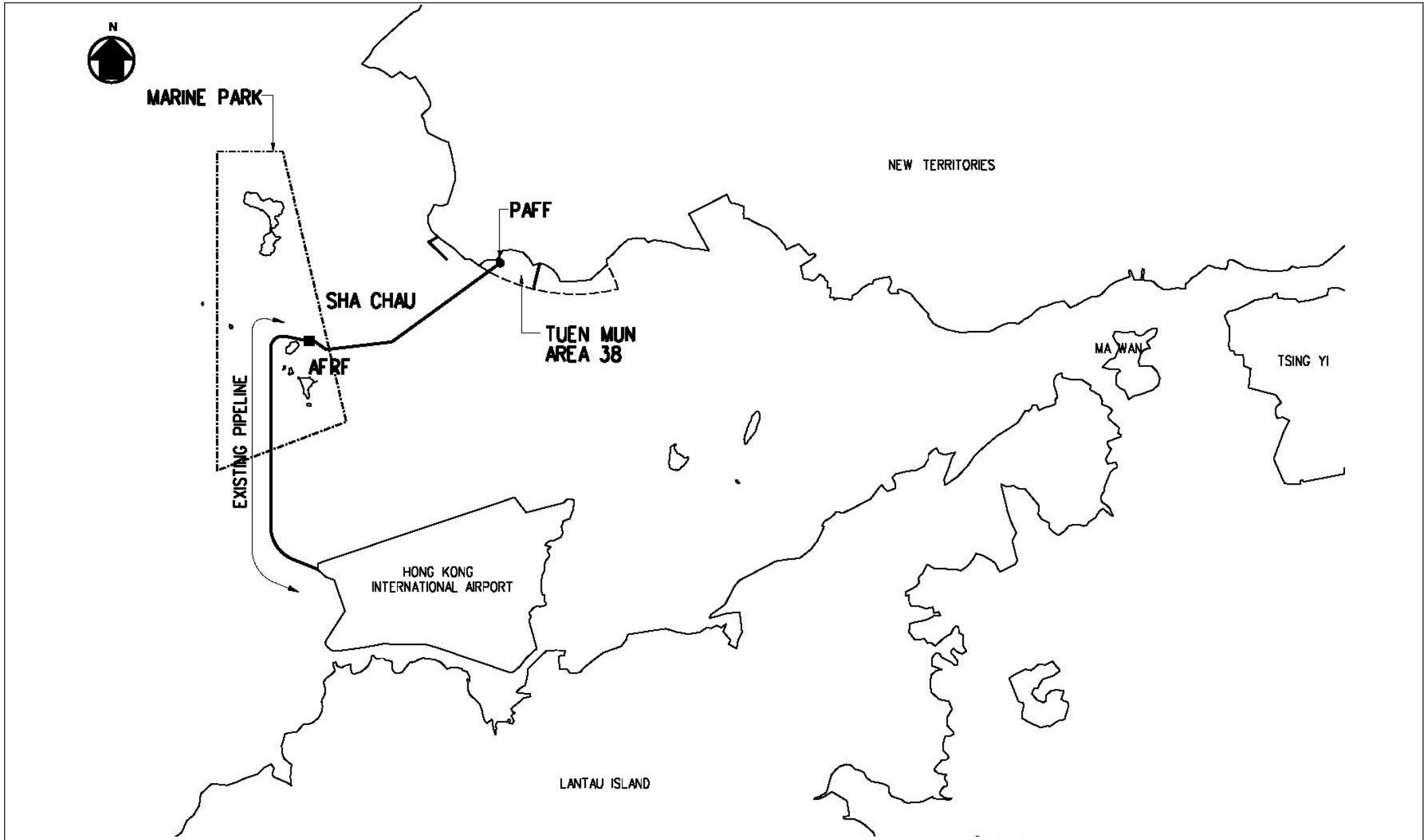

Figure 1.1

Location of PAFF

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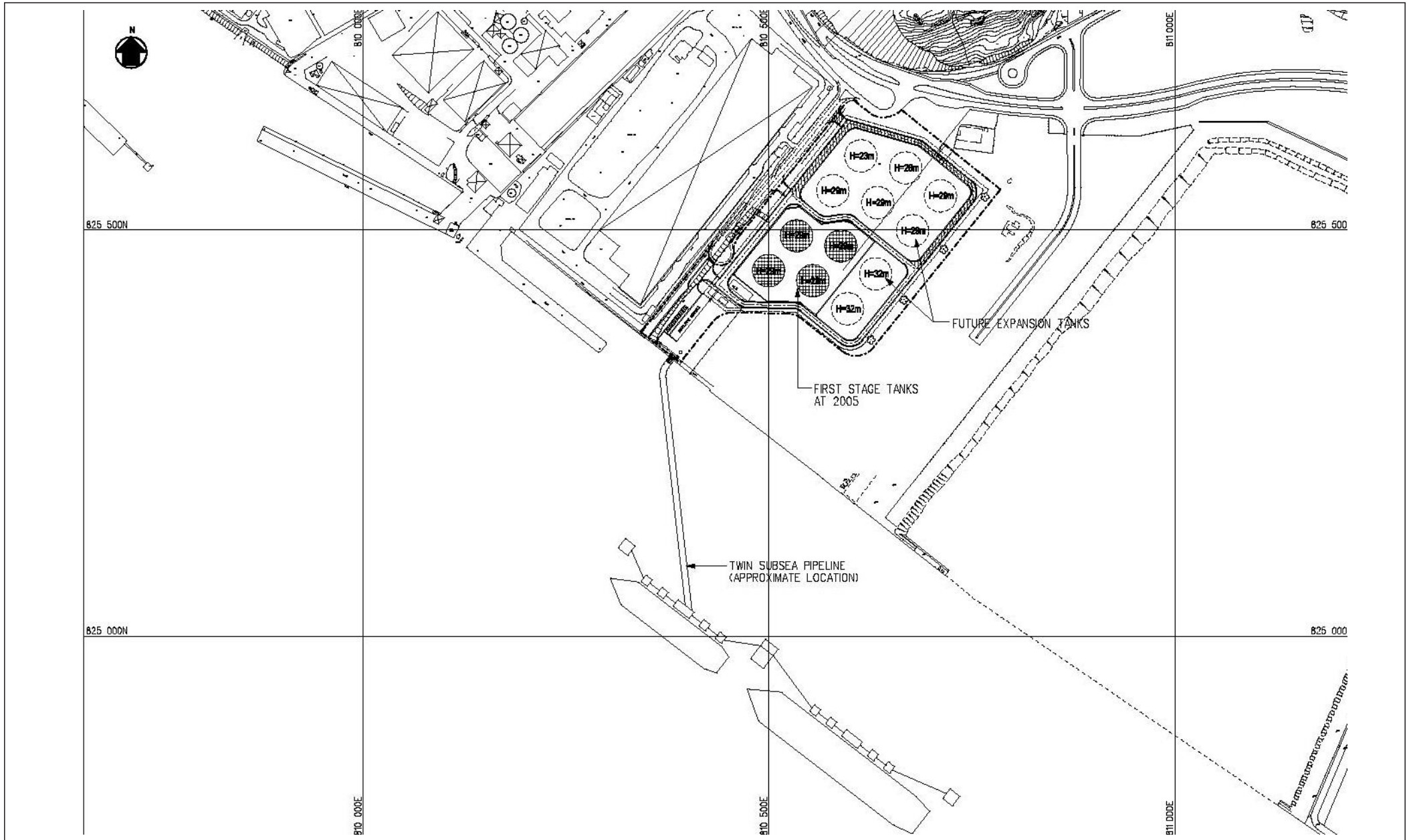

Figure 1.2a

Original Design of PAFF

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Environmental Resources Management

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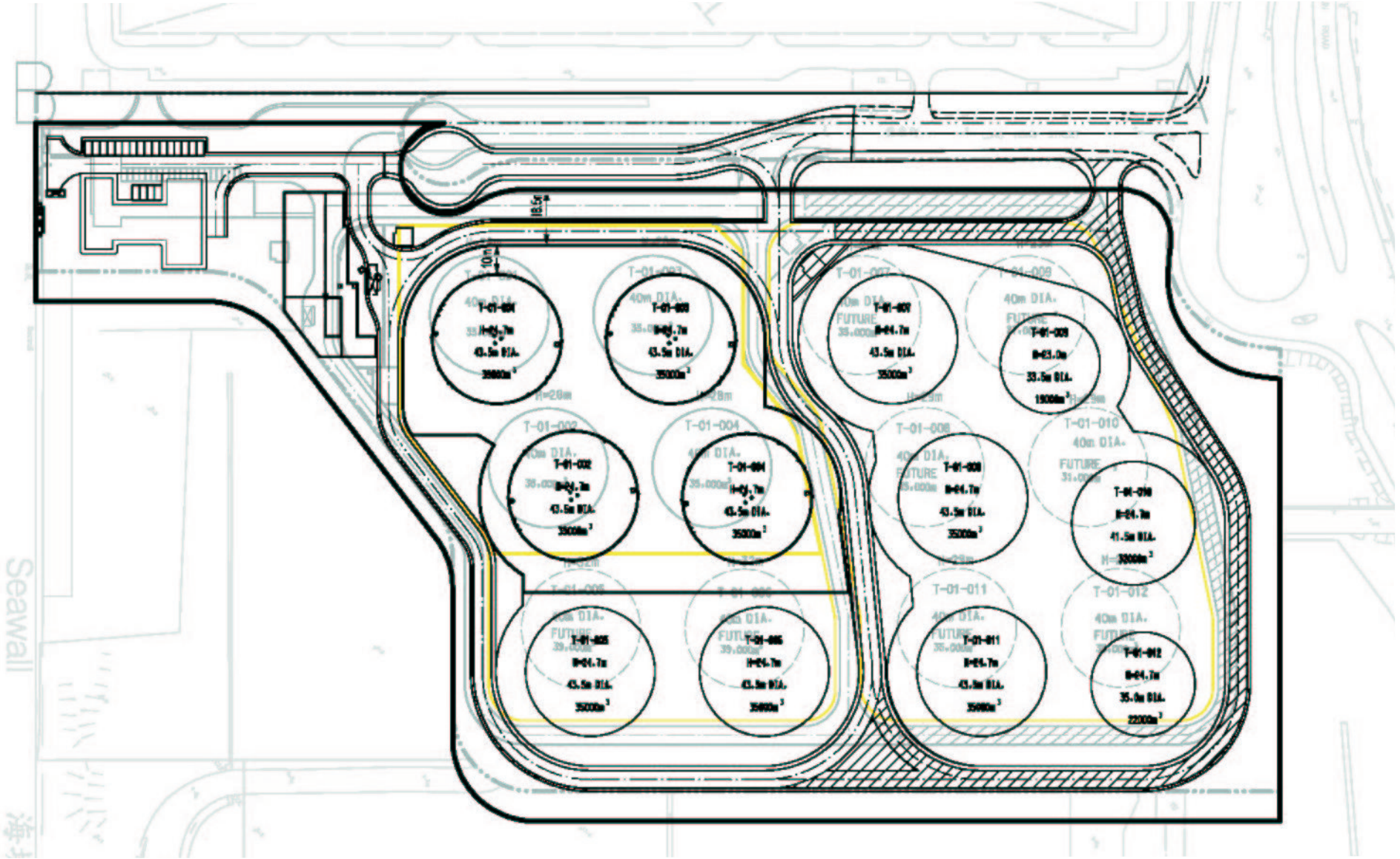

Figure 1.2b

Layout of Permanent Aviation Fuel Facility Tank Farm for Variation to Environmental Permit

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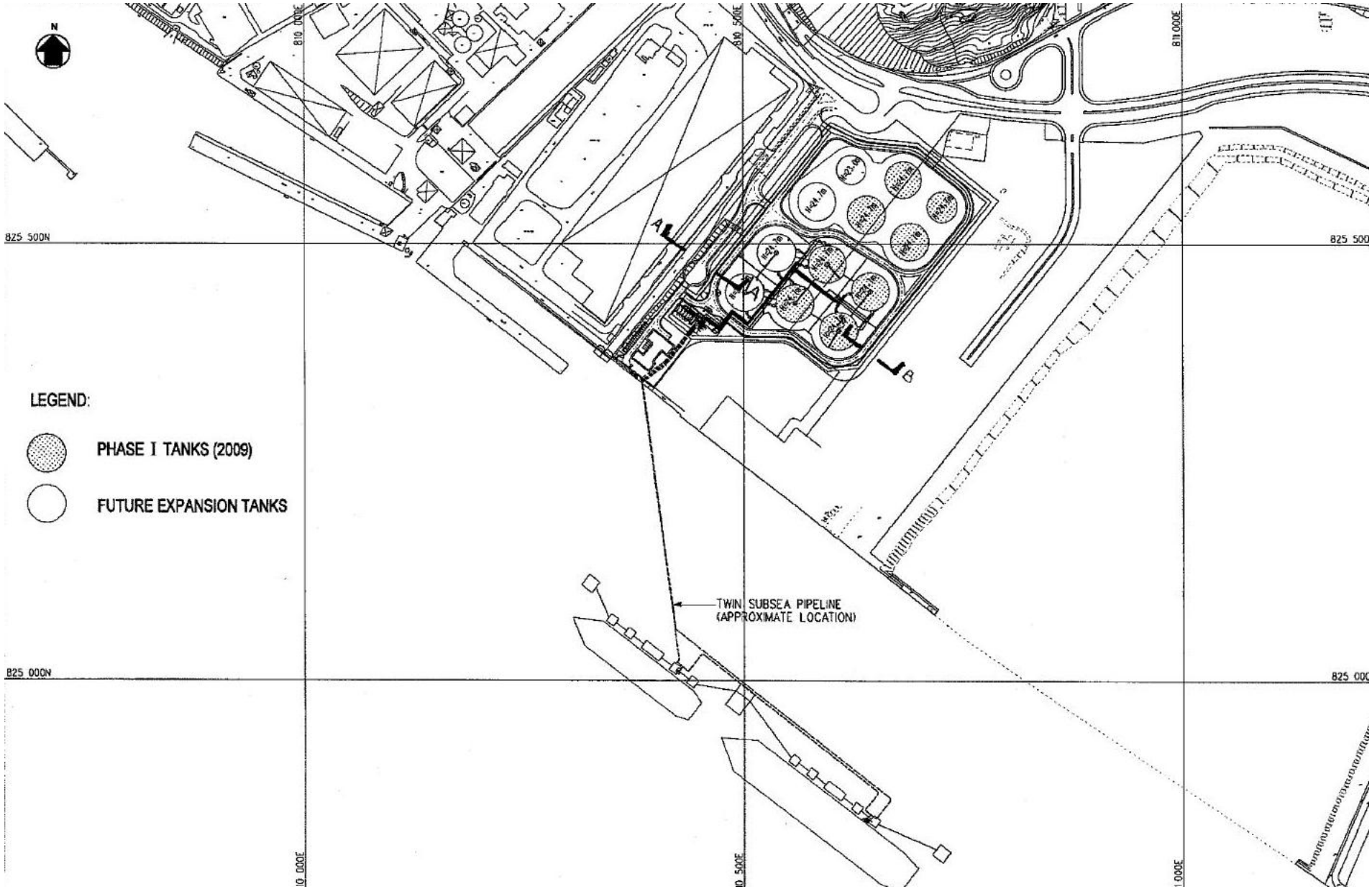

Figure 1.2c

Concept Layout of Permanent Aviation Fuel Facility Tank Farm and Jetty within Tuen Mun Area 38

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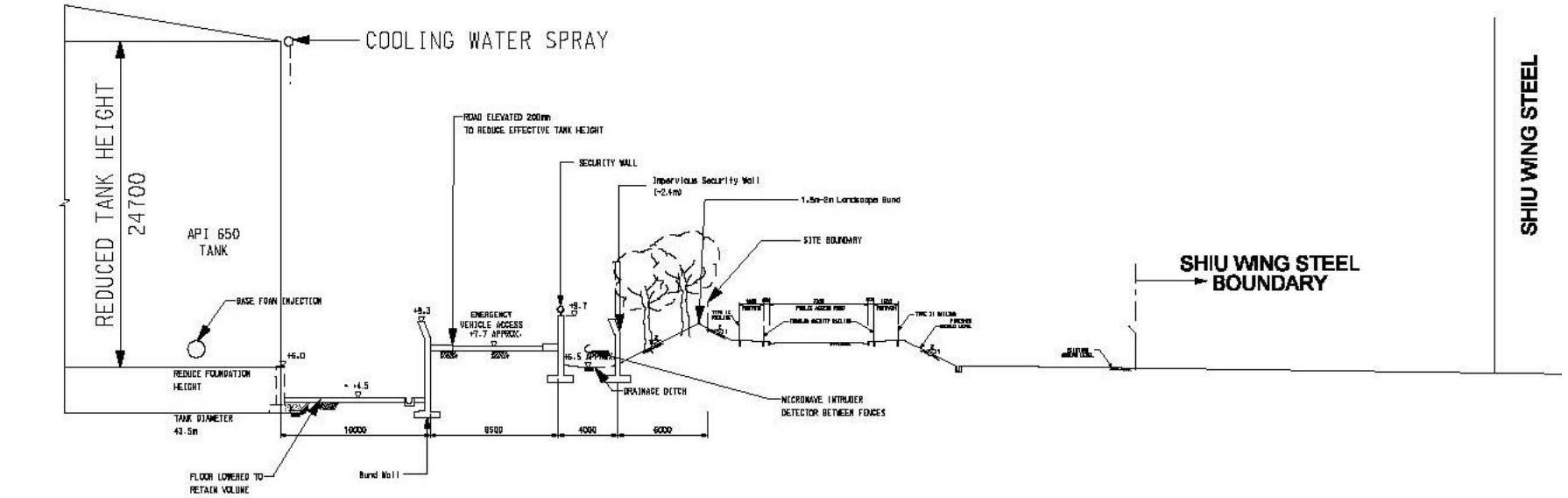

Section A-A

Figure 1.2d

Cross Section Towards Shiu Wing Steel

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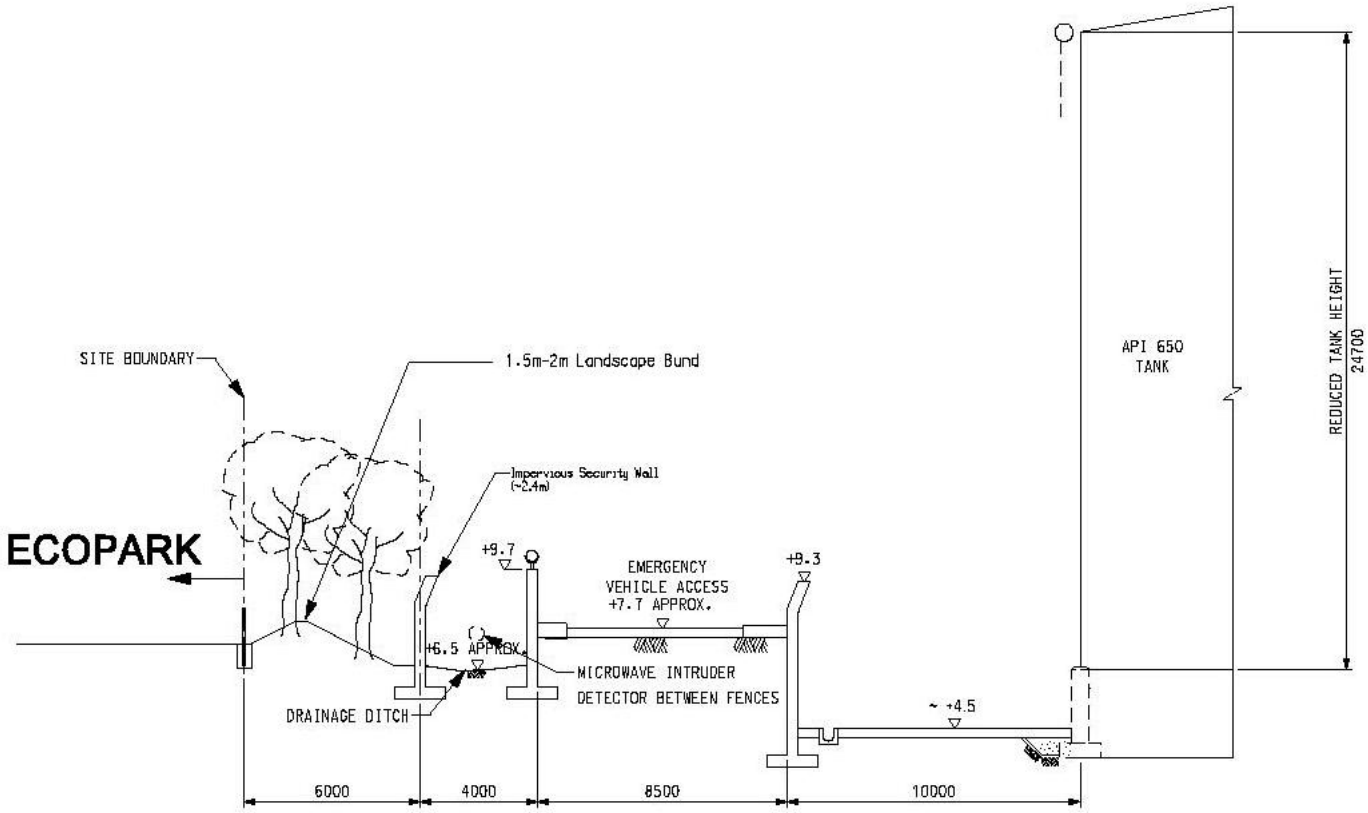

Section B-B

Figure 1.2e

Cross Section Towards EcoPark

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Environmental Resources Management

ERM

As noted above, while the previous EIA Study (April 2002) was undertaken based upon the project layout detailed in *Figure 1.2a*, the need for minor changes to the detailed layout of the site and the site boundary were identified and consequently an Application for Variation to the Environmental Permit (VEP) (*VEP-133/2004*) was submitted to the Director of Environmental Protection (DEP) for approval of the following changes:

- A change in the detailed layout of the site, in particular the designed height and dimension of the tanks. The height of the tanks has been reduced in compliance with FSD's specific requirements, where as the diameters of some tanks have been increased as a consequence of compliance with FSD's tanks height reduction requirements in order to maintain the designed fuel storage capacity of the tank farm.

- To shift the whole site by 10 metres to the southeast to accommodate Land's Department's commitment of land extension to Shiu Wing Steel.

The variation to the EP (*EP-139/2002/A*) was granted by EPD in February 2004. Details of the revised layout are provided in Section 2, Project Description and *Figure 1.2b*. In addition, the phasing of the tanks has changed with 8 (eight) to be constructed initially as shown in *Figure 1.2c*. Indicative cross sections between the tanks and the lot boundaries with Shiu Wing Steel and the EcoPark are provided in *Figures 1.2d* and *1.2e* respectively with the location of the cross-sections shown in *Figure 1.2c*.

The revised EIA (EIAO Register Number AEIAR-107/2007) for the project recommended comprehensive Environmental Monitoring and Audit requirements to be undertaken during the construction and operational stages of the project. This Report constitutes the Environmental Monitoring and Audit (EM&A) Manual for the proposed Permanent Aviation Fuel Facility, providing details of the EM&A recommendations and constitutes an update from the previous EM&A Manual (May 2006).

The revised EIA was submitted in 2007 and the environmental permit (EP-262/2007) was granted in May 2007. *EP-262/2007* has been amended to *EP-262/2007/A* and issued by the EPD on 30 November 2007. A further Variation to the Environmental Permit has been approved to allow dredging works to continue until March 2008. As such, *EP-262/2007/A* has been amended to *EP-262/2007/B* and issued by the EPD on 27 February 2008.

ERM-Hong Kong, Ltd (ERM) has been commissioned by LCAL to implement an environmental monitoring and auditing programme for the Project. In relation to the anticipated environmental impacts of the Project, respective mitigation measures and environmental monitoring and audit requirements have been recommended in the EIA reports. This Environmental Monitoring and Audit (EM&A) Manual has been prepared in supplement of the EIA reports to provide details of the EM&A requirements during the Project.

According *to Condition 2.5* of the EP (EP-262/2007), an updated EM&A Manual shall been prepared and submit to the Director of Environmental Protection (DEP) no later than one month before the commencement of construction of the sub-sea pipelines of the Project. This EM&A Manual has been prepared based on the EM&A Manual (February 2007) submitted with the Revised EIA Report (2007) and the EM&A Manual (May 2006) in operation prior to suspension of construction works and has been reviewed and updated in regard to the latest available information (as detailed above). A summary of the changes made is presented in *Table 1.1* below.

Table 1.1 Summary of Changes made in EM&A Manual

Section	**Summary of Changes from Revised EM&A Manual Submitted in February 2007**
Section 2 – Organisation and Structure of the EM&A	Arrangements added to account for setting up a Community Liaison Group to monitor the proper design, construction and operation of the Project,
Section 3 – EM&A General Requirement	No significant changes made.
Section 4 – Air Quality	No significant changes made.
Section 5 – Noise	No significant changes made.
Section 6 – Water Quality	Revision to water quality monitoring programme by inclusion of monitoring of Persistent Organic Pollutants (POPs) during construction of the Project and the revised monitoring programme as recommended in the application document for variation of an environmental permit (Application No. VEP-243/2007)
Section 7 – Waste Management	No significant changes made.
Section 8 – Ecology	No significant changes made.
Section 9 – Cultural Heritage	No significant changes made.
Section 10 – Landscape and Visual	No significant changes made.
Section 11 – Land Contamination, Hazard to Life and Fuel Risk Spill	Arrangements added to account for carrying out design audit of the arrangements and measures in the Project,
Section 12 – Site Environmental Audit	No significant changes made.
Section 13 – Reporting	No significant changes made.

The Hong Kong SAR Government's applicable environmental regulations for noise, air quality, ecology, water quality, landscape and visual resources, waste management and heritage protection, the Hong Kong Planning Standards and Guidelines and recommendations in the Permanent Aviation Fuel Facility EIA Report have served as guidance documents in the preparation of this Manual. This EM&A Manual fulfills the requirements of the EIA Study Brief, Clause 3.3.15, and follows the approach recommended in EPD's Generic EM&A Manual, Annex 21 of the Technical Memorandum on the EIA Process and EM&A Guidelines for Development Projects in Hong Kong.

1.2 DESCRIPTION OF PROJECT AND ASSUMPTIONS

1.2.1 Background

It is proposed that the PAFF will be located at an undeveloped reclaimed shoreline site at Tuen Mun Area 38. It will consist of the following major elements:

- a jetty with two berths, which together will accommodate a full range of vessels from 10,000 to 80,000 dwt vessels;
- a tank farm with gross aviation fuel tankage capacity of 264,000m^3 on commissioning and an ultimate tankage of about 388,000m^3 as well as pumps and associated facilities;
- on site operational facilities including offices; and,
- 500mm diameter twin subsea pipelines to transfer the fuel to the aviation fuel system at the airport.

The planning, design and construction of the project is programmed to take in the region of 3-4 years, with the commissioning date estimated to be in 2009.

The overall study area showing the location of the proposed site and the proposed pipeline alignment is provided in *Figure 1.1*.

1.3 WORKS PROGRAMME AND WORKS LOCATIONS

While some construction works for the PAFF have been undertaken from November 2005, they were suspended following the Judgement of the Court of Final Appeal of July 2006. A summary of the works that have been undertaken prior to the suspension of works is provided in *Table 1.2* below.

Table 1.2 Summary of Construction Undertaken Before Suspension of Works

Section	Description of Works	Status
Land	Operation Building – Fire Inlet Chamber	- Steel cofferdam installed in position and blinding laid - Rebar about 90% complete and some formwork fixed in position.
Land	Bund wall footing and lower portion of wall of CH 555-000 & CH 000-075	The bund wall bases cast
Land	Landscaping	- 209 nos. of tree transplanted - 492 metres of 1.5m high hoarding erected
Jetty	Marine piling	100 piles (100 out of 100) driven to final set and 2 fender piles installed
Tankfarm	Erection of storage tank nos. 1, 2, 3, 4, 5 and 6	- Laying of floor plates completed - Welding of joints between floor plates started but suspended - Construction of concrete ringbeams

The construction works have recommenced since July 2007. *Table 1.3* summaries the outstanding construction works to be completed.

Table 1.3 Summary of Construction Works to be Undertaken

Section	Description of Works
Land	Construction of Operation Building – Fire Inlet Chamber
Land	Erection of bund wall
Jetty	Construction of jetty
Dredging	Dredging and laying of pipelines
Tankfarm	Erection of 8 storage tanks (nos. 2, 4, 5, 6, 8, 10, 11 and 12)

1.4 OBJECTIVES OF THE ENVIRONMENTAL MONITORING AND AUDIT

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 Permanent Aviation Fuel Facility project during design, construction and implementation.

The manual provides details of the environmental monitoring and audit requirements arising from the EIA for water quality, noise, air, water quality, ecology, landscape and visual, waste, land contamination, hazard to life and fuel spill risks and cultural heritage. The purposes of the defined EM&A programme are as follows:

- to ensure the specified mitigation recommendations of the EIA are included in the design of the project;
- to clarify and identify sources of pollution, impact and nuisance arising from the works;
- to confirm compliance with legal, contract specifications and EIA study recommendations;
- to provide an early warning system for impact prevention; to provide a database of environmental parameters against which to determine any short term or long term environmental impacts;
- to propose timely, cost-effective and viable solutions to actual or potential environmental issues;
- to monitor performance of the mitigation measures and to assess their effectiveness and, whenever necessary, identify any further need for additional measures; to verify the EIA predicted impacts;
- to collate information and evidence for use in public, District Council and Government consultation; and

- to audit environmental performance.

EM&A procedures are required during the design, construction and operational phases of the project implementation and a summary of the requirements for each of the environmental parameters is detailed in *Table 1.4* below.

Table 1.4 Summary of EM&A Requirements

Parameter	EM&A Phase		
	Design Phase(1)	**Construction Phase**	**Post-Construction Phase**
Air Quality	-	Y	-
Noise	-	Y	-
Water Quality	-	Y	-
Ecology	-	Y	Y
Landscape and Visual	Y	Y	Y
Cultural Heritage	-	Y	-
Hazard to Life (2)	Y	-	-
Fuel Spillage Risk	Y	-	Y
Fisheries (2)	-	-	-
Land Contamination (2)	Y	-	-
Waste	-	Y	-

Note: (1) Detailed design of the facility will extend into the construction period and as such EM&A for the Design Phase refers to audit of the design as and when it is completed and not necessary pre-construction.

(2) As per the findings of the EIA, Construction and Post-Construction Phase Monitoring was not considered necessary for these parameters.

1.5 SCOPE OF THE EM&A PROGRAMME

The scope of the EM&A programme is to undertake the followings:

(i) Implement monitoring and audit activities for each environmental parameter as follows:

Dust:

- Implement construction phase audit requirements for dust aspects.

Noise:

- Implement construction phase audit requirements for noise aspects.

Ecology:

- Implement dolphin monitoring during dredging; and,

- Implement post-construction phase dolphin abundance monitoring prior to the operation of the PAFF.

Water Quality:

- Establish baseline water quality levels at specified locations and review these levels on a regular basis; and

- Implement construction water quality impact monitoring programme.

Landscape and Visual:

- Design detailed landscape specifications;

- Implement baseline survey to establish/confirm existing landscape and visual conditions;

- Implement construction phase audit requirements for landscape and visual resources; and,

- Implement operational phase audit requirements for landscape and visual resources.

Waste:

- Implement construction phase audit requirements for waste aspects.

Heritage:

- Implement construction phase audit requirements for marine archaeological resources in accordance with MAI requirements and recommendations.

Hazard to Life, Fuel Spill Risk and Land Contamination:

- Prepare an Environmental Management Plan within 3 months of the commencement of the operation of the PAFF to ensure the on-going adequacy of the fuel spill contingency plan and that it is being implemented as required and that the above mitigation measures have been incorporated and are effective. Undertake regular audits at least every 12 months as part of the implementation of the EMP;

- The Franchisee to undertake regular inspections and audits two inspections every year of the tank farm, jetty and pipelines including one undertaken pursuant to the Joint Inspection Group (JIG) explained above; inspection of the whole sub sea pipelines every 5 to 10 years; Health, Safety and Environmental audit of the facility once every 3 years; and inspection of the structural integrity of the tanks once per year.

- During the operational phase, undertake a review of the EIA report at the time of the planning for the Phase II expansion of the tank farm (around

2025 as required) to ensure that the required measures in terms of latest technology, standards and statutory requirements are taken account in the planning and design of the future tanks.

- The Franchisee to undertake some routine monitoring of water quality in the vicinity of the PAFF site to check the effectiveness of the proposed precautionary measures implemented for on-site spill control. Details will be agreed with the relevant authorities within 3 months of the commencement of operation of the PAFF.

(ii) Liaison and provision of advice to construction site staff on the purposes and implementation of the EM&A programme.

(iii) Identify and resolve environmental issues that may arise from the project.

(iv) Check and quantify the Contractor's overall performance, implement Event/Action Plans and recommend and implement remedial actions to mitigate adverse environmental effects as identified by the EM&A programme and EIA.

(v) Conduct monthly reviews of monitored impact data during the construction phase and bi-monthly reviews during the operational phase as the basis for assessing compliance with defined criteria and ensuring that necessary mitigation measures are identified, designed and implemented and to undertake additional ad hoc monitoring and audit as required by particular circumstances.

(vi) Evaluate and interpret all environmental monitoring data to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards and to verify the environmental impacts predicted in the EIA.

(vii) Manage and liaise with other individuals or parties concerning any relevant environmental issues.

(viii) Audit the effectiveness of the Environmental Management System (EMS) practices and procedures and implement any changes as appropriate.

(ix) Conduct regular site audits of formal or informal nature to assess:

- the level of the Contractor's general environmental awareness;
- the Contractor's implementation of the recommendations in the EIA;
- the Contractor's performance as measured by the EM&A;
- the need for specific mitigation measures to be implemented or the continued usage of those previously agreed; and,

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

(x) Submit 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.

This EM&A Manual provides the following information:

- Description of the project;
- Identification and recommendations for monitoring requirements for all phases of development, including:
  - ◊ Identification of sensitive receivers;
  - ◊ Monitoring locations;
  - ◊ Monitoring parameters and frequencies;
  - ◊ Monitoring equipment to be used;
  - ◊ Programmes for baseline monitoring and impact monitoring; and,
  - ◊ Data management of monitoring results.
- The organisation management structure, and procedures for auditing of the Project and implementation of mitigation measures that are recommended for the Project;
- The environmental quality performance limits for compliance auditing for each of the recommended monitoring parameters to ensure compliance with relevant environmental quality objectives, statutory or planning standards;
- Organisation and management structure, and procedures for reviewing the design submissions, monitoring results and auditing the compliance of the monitoring data with the environmental quality performance limits, contractual and regulatory requirements, and environmental policies and standards;
- Event and Action plans for impact and compliance procedures;
- Complaints handling, liaison and consultation procedures;
- Interim notification of exceedances, reporting procedures, report formats and reporting frequency including periodical quarterly summary reports and annual reviews to cover all construction, post-Project and operational phases of the development;

- Implementation schedules, summarising all recommended mitigation measures.

This Manual is considered to be a working document and should be reviewed periodically and revised once substantial changes have been made.

2 ORGANISATION AND STRUCTURE OF THE EM&A

2.1 INTRODUCTION

In this Section, the various parties involved in the EM&A process are outlined. The structure of the organisations responsible for implementing the EM&A programme and their key responsibilities are presented. *Figure 2.1* shows the organisation structure for the Project.

The roles and responsibilities of the various parties involved in the construction phase EM&A process are outlined in the following sections. The duties and responsibilities of respective parties are as described below.

2.2 PROJECT ORGANISATION

For the purpose of this EM&A Manual, the Airport Authority Hong Kong appointed Franchisee is referred to as the "Employer" and the Project "Engineer" defined as the Franchisee's Site Representative (FSR), who will be responsible for the supervision of the construction of the Project.

The specifications for certain risk and spill control mitigation measures will be required to be designed during the detailed design phase of the project. These items will include:

- land and marine spill response plan; pipeline leak detection and automatic shut-off system; pipeline rock armour protection;
- tank high level shut-off;
- tank bunding; tank leak drainage isolation and containment system;
- on-site fire fighting equipment;
- jetty protection; and,
- emergency shut down valves for fuel delivery.

In addition, the landscape design drawings and dolphin exclusion zone during dredging will require specifications during the detailed design and could require the input of specialists such as landscape architect and trained biologist.

In respect of the design phase EM&A, the Engineer commissioned to undertake the Design and Construction Assignment will be required to designate an auditor(s) to undertake an environmental audit of the design of these measures in order to ensure that the recommendations of the EIA have been fully and properly specified. Detailed design of the facility will extend into the construction period and as such EM&A for the Design Phase refers to audit of the design as and when it is completed and not necessary pre-

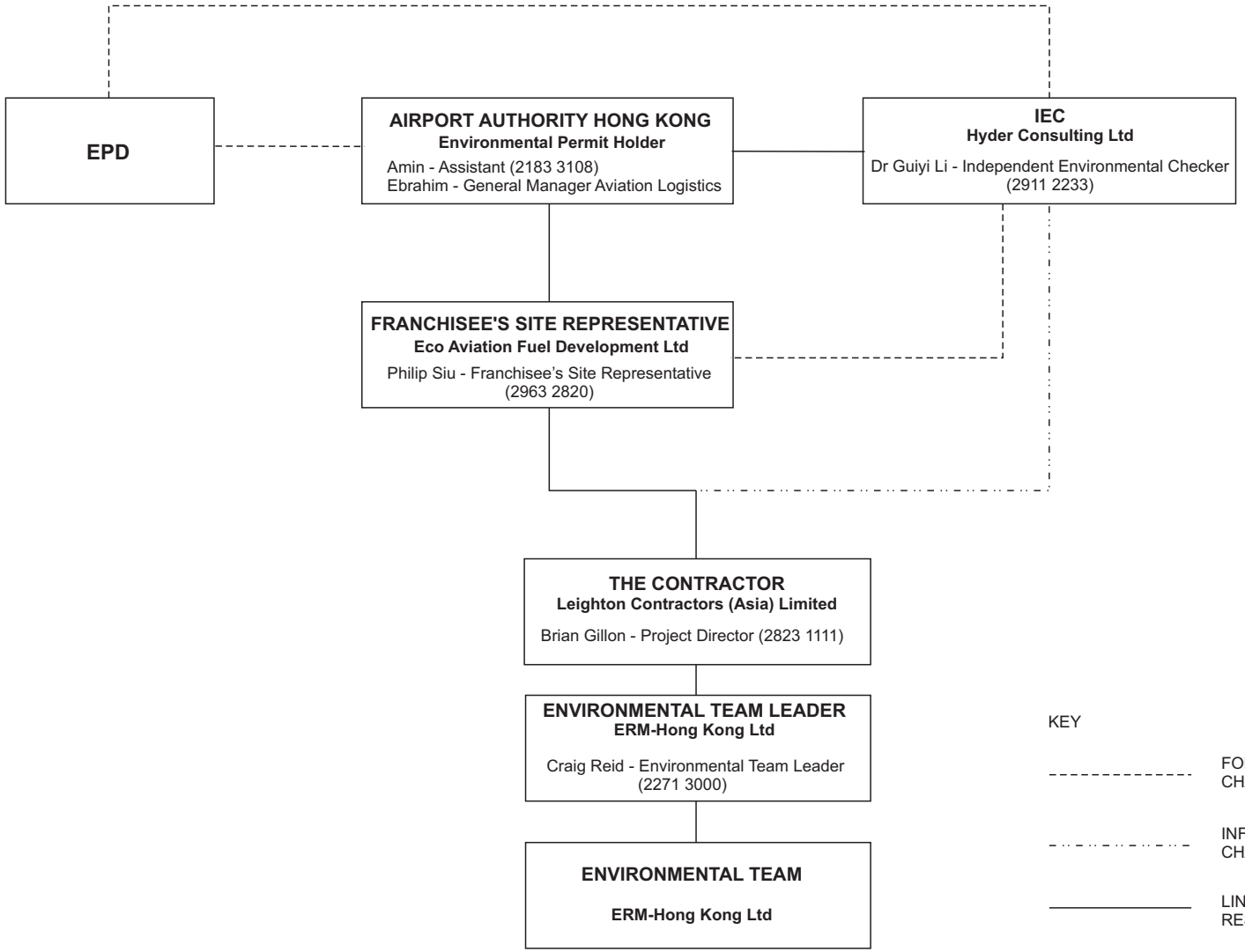

Figure 2.1

ORGANISATION CHART

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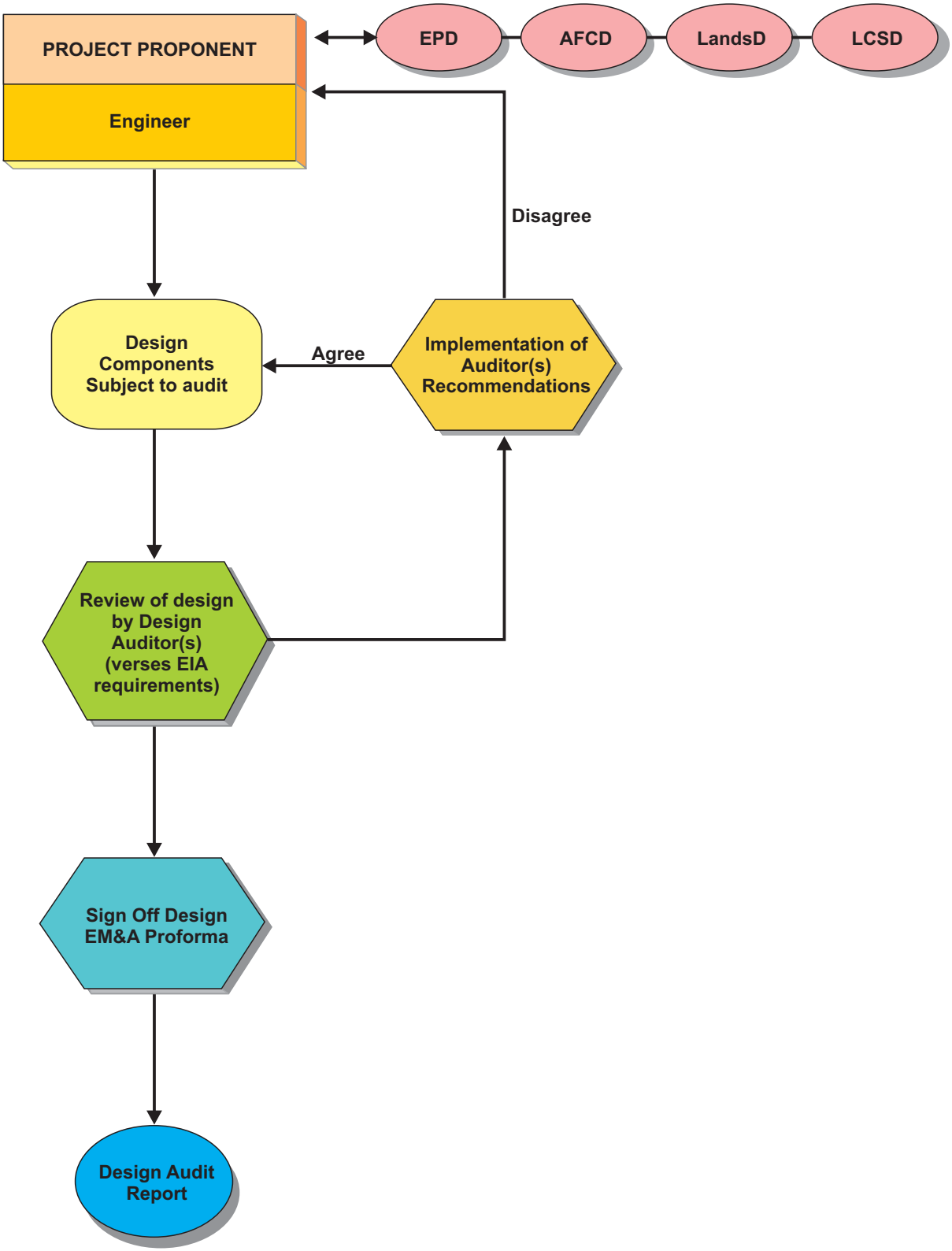

Figure 2.2

EM&A Procedures

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Environmental Resources Management

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construction. As such, the design audit shall be undertaken as and when the relevant design aspects are produced and the Engineer will be required to prepare a Design Audit Report at the end of the detailed design which will confirm that the requirements of the EIA have been fully taken into account in the project design. The Engineer shall use suitably qualified staff to undertake the audit requirements. A flow chart of the design phase EM&A procedures is shown in *Figure 2.2*.

During the construction phase of the project, an Environmental Team Leader (ETL) shall ensure the Contractor's compliance with the project's environmental performance requirements during construction and undertake the post construction EM&A works and his responsibilities will include field measurements, sampling, analysis of monitoring results, reporting and auditing. The ETL shall be approved by the ER and shall be competent and shall have at least 7 years relevant environmental monitoring and audit experience on projects of a similar scale and nature.

The ETL will require suitably qualified support staff (the Environmental Team, (ET)) to carrying out the EM&A programme. Both the ETL and members of the ET shall be independent and shall not be in any way connected to the Contractor's company. Due to the specialist nature of some of the EM&A works required for this project, the ET should comprise professionals proficient to undertake the tasks involved. Thus, the ET should include personnel experienced in noise, dust and water quality monitoring and supervision of waste management.

The qualified specialists in dolphin survey monitoring, with a minimum of 2 years post qualification experience and two years practical experience in this field, will be required as part of the ET to undertake the post construction abundance monitoring of the dolphins prior to the operation of the facility. In addition, a Registered Landscape Architect, as defined by the Landscape Architect's Registration Board, will be required on the ET to monitor and audit the landscaping installation works.

A qualified marine archaeologist to the satisfaction of the AMO will be required to undertake the audit of the potential marine archaeological resources as defined by the Marine Archaeological Investigation. The qualified archaeologist should possess professional qualifications such as an academic degree in archaeology, relevant experience in marine archaeology at a supervision level and be familiar with the archaeology of Hong Kong and/or South China.

In addition to the ETL and ET, an Independent Environmental Checker (IEC) shall be employed to advise the ER on environmental issues related to the project. The role of the IEC shall be independent from the management of construction works, but the IEC shall be empowered to audit the environmental performance of the construction activities and operational mitigation. The IEC shall have project management experience in addition to

the requirements of the ETL specified in *Section 2.4* and the appointment of the ICE will be subject to the approval of the FSR.

A Community Liaison Group will also be set up as required by the Environmental Permit.

The operational EM&A works will be the responsibility of the Contractor and will be undertaken in parallel to the maintenance period after the completion of construction. The future, operational stage, EIA review at the planning stage for the future tanks should be undertaken by an environmental specialist appointed by the Franchisee at that time.

2.3 THE CONTRACTOR

The Contractor will:

- employ an Environmental Team (ET) to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit data;
- 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 the Engineer;
- accompany joint site inspection undertaken by the ET; and
- adhere to the procedures for carrying out complaint investigation.

2.4 ENVIRONMENTAL TEAM

The overall duties of ETL and the team are as follows:

- sampling, analysis and statistical evaluation of monitoring parameters with reference to the EIA study recommendations and requirements in respect of water quality;
- environmental site surveillance;
- audit of compliance with environmental protection and pollution prevention and control regulations;
- monitor the implementation of environmental mitigation measures;

- monitor compliance with the environmental protection clauses/specifications in the Contract;
- review construction programme and comment as necessary;
- review construction methodology and comment as necessary;
- complaint investigation, evaluation and identification of corrective measures;
- audit of the EMS and recommend and implement any changes as appropriate;
- liaison with the IEC on all environmental performance matters;
- advice to the Contractor on environmental improvement, awareness, enhancement matter, etc., on site; and,
- timely submission of the designated EM&A reports to the FSR, the IEC, the DEP, the AFCD, the AMO and PlanD/LPU as appropriate.

2.5 ENGINEER OR FRANCHISEE'S SITE REPRESENTATIVE

The Engineer of Franchisee's Site Representative (FSR) will:

- supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- participate joint site inspection undertaken by the ET; and
- adhere to the procedures for carrying out complaint investigation.

2.6 INDEPENDENT ENVIRONMENTAL CHECKER

The IEC may require specialist support staff in order to properly carry out his duties which shall include the following:

- review and audit all aspects of the EM&A programme;
- validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
- carry out random sample check and audit on monitoring data and sampling procedures, etc;

- conduct random site inspection;
- audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
- review the effectiveness of environmental mitigation measures and project environmental performance;
- audit the Contractor's construction methodology and agree the least impact alternative in consultation with the ETL and the Contractor;
- check complaint cases and the effectiveness of corrective measures;
- review EM&A report submitted by the ETL;
- feedback audit results to ETL by signing off relevant EM&A proformas.

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.

2.7 *SETTING UP OF COMMUNITY LIAISON GROUP*

As required by the Environmental Permit, in order to enhance communication with the local community, a Community Liaison Group (CLG) comprising relevant stakeholders to advise on and monitor the proper design, construction and operation of the Project, will be set up within three months after commencement of construction of the Project.

The duties of the CLG will include the following:

- To advise on and monitor the proper design, construction and operation of the Project.
- To liaise with, and take into account the views of, the Advisory Council on the Environment (the "ACE").
- To maintain and promote communication with all relevant community stakeholders.

The Advisory Council on Environment (ACE) and DEP shall be informed in writing regarding the membership and terms of reference of the CLG, and shall take into account ACE's views.

The Composition of the CLG will be as follows:

- The Airport Authority Airport Management Director or a representative appointed by the CEO of the Airport Authority shall act as Chairman of the Group.

- The Secretary to the Group shall be a staff member of the Airport Authority appointed by the Chairman of the Group.

- Oher members of the Group shall comprise of members of the Tuen Mun community (and/or other relevant persons) appointed on an individual basis by the CEO of the Airport Authority from time to time.

- Members of the Group shall be aged 18 or above.

- The Group shall inform the ACE and Director of Environmental Protection (the "Director") in writing the membership and composition of the Group from time to time.

The following arrangements will be adhered to with regard to meetings of the CLG:

- Meetings of the Group are expected to be held four times a year or as and when requested by the Chairman as necessary.

- The agenda of each meeting shall be determined by the Chairman. Members of the Group may and are encouraged to propose issues for discussion in writing.

- Full meeting minutes and any follow-up action taken by the Group pursuant to such meeting shall be recorded and kept by the Secretary.

- All meeting minutes, records of any follow-up action taken by the Group pursuant to such meeting, all other relevant documents and associated papers shall be uploaded onto a dedicated internet Website for the Project (the "Website") within one month of the date of the relevant meeting.

- The Chairman may invite any number of guests to attend meetings of the Group as and when he/she regards necessary and appropriate.

- No remuneration of any form shall be made to members of the Group for their service, attendance at meetings, site visits and/or participation in activities of the Group.

The following terms of service shall apply to the CLG:

- Each member will be appointed to serve the Group for a period of two years, commencing on a date to be designated by the CEO of the Airport Authority.

- If any member resigns from the Group before expiration of his/her term of service, the CEO of the Airport Authority may appoint an individual to replace such member for the remainder of his/her term of service.

- All members of the Group are eligible for re-appointment after expiration of his/her term of service.

- The Group members' terms of service shall be reviewed after the first anniversary of the establishment of the Group.

2.8 KEY CONTACT INFORMATION

Key contact information is presented below in *Table 2.1*.

Table 2.1 Contact Information

Name	Position	Telephone	Facsimile	E-mail
Airport Authority Hong Kong – Environmental Permit Holder				
Mr Amin Ebrahim	Assistant General Manager Aviation Logistics	2183 3108	2824 2786	ebraa@hkairport.com
Contractor – Leighton (Asia) Construction Limited				
Brian Gillon	Project Director	2823 1111	2529 8784	brian.gillon@leightonasia.com
Franchisee's Site Representative – ECO Aviation Fuel Development Limited				
Philip Siu	Franchisee's Site Representative	2963 2820	2563 6311	philip.siu@towngas.com
Environmental Team – ERM-Hong Kong Limited				
Craig Reid	Environmental Team Leader	2271 3000	2723 5660	craig.reid@erm.com
Independent Environmental Checker – Hyder Consulting Limited				
Dr Guiyi Li	Independent Environmental Checker	2911 2233	2805 5028	guiyi.li@hyderconsulting.com

2.9 TERMINOLOGY

To clarify the terminology for impact monitoring and audit, key definitions are specified below and are used throughout this Manual.

Monitoring refers to the systematic collection of data through a series of repetitive measurements. The stages of monitoring are defined in this document as follows:

- Baseline Monitoring refers to the measurement of parameters, such as noise and air quality impact parameters, during a representative pre-project period for the purpose of determining the nature and ranges of natural variation and to establish, where appropriate, the nature of change; and,

- Impact Monitoring involves the measurement of environmental impact parameters, such as noise and air quality, during Project construction and implementation so as to detect changes in these parameters which can be attributed to the Project.

Audit is a term that infers the verification of a practice and certification of data. The types of audit are defined below:

(i) Compliance audit is defined as follows:

- the process of verification that all or selected parameters measured by a noise or air quality impact monitoring programme or levels of an operation are in compliance with regulatory requirements and internal policies and standards; and,

- the determination of the degree and scope of any necessary remediation in the event of exceedance of compliance

(ii) Post Project Audit is carried out after the implementation and commissioning of a Project

For the purpose of noise, air and water quality impact monitoring and audit, the Action and Limit Levels are defined as follows:

- The Action Level is the level defined in which there is an indication of a deteriorating ambient level for which a typical response could be an increase in the monitoring frequency; and,

- The Limit Level is the level beyond the appropriate remedial pollution control ordinances, noise and air quality impact objectives or Hong Kong Planning Standards and Guidelines established by the EPD for a particular project, such that the works should not proceed without appropriate remedial action, including a critical review of plant and work methods.

3 EM&A GENERAL REQUIREMENT

3.1 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.

3.2 CONSTRUCTION PHASE EM&A

3.2.1 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 and marine ecology as determined in the EIA.

The 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 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.

3.2.2 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.

3.2.3 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 Limits:* 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.

3.2.4 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) 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.

3.2.5 Site Inspections

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

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 at the time of the inspection to enable the rapid resolution of identified non-compliances. Non-compliances, and the corrective actions undertaken, will also be reported in the monthly EM&A Reports.

Section 11 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.

3.2.6 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.

All enquiries concerning the environmental effects of the construction works, irrespective of how they are received, will be reported to the Engineer and via the Contractor directed to the ET which will set up procedures for the handling, investigation and storage of such information.

In all cases the complainant will be notified of the findings, and audit procedures will be put in place to minimise the change of reoccurrence of the problem, should there be one.

3.2.7 Reporting and Submissions

The following submissions will required to be certified by the ET Leader and verified by the IEC:

- Baseline monitoring report
- EM&A report (monthly, quarterly and final)
- Waste management plan
- Landscape plan
- Design plan to prevent risk to life, fuel spillage, land contamination and water quality impact during operation

The monthly reports will be prepared and submitted within two weeks of the end of each calendar month.

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.

4 AIR QUALITY

4.1 INTRODUCTION

The potential for SO2, NO2 and smoke emitted from the diesel-powered equipment during the construction phase is expected to be minimal as the number of such plant required on-site will be limited and under normal operation, equipment with proper maintenance is unlikely to cause significant dark smoke emissions. Notwithstanding, plant should be regularly maintained to minimise emissions.

The principal source of air pollution during the construction phase will be dust from exposed site areas, stockpiling, movement of vehicles along unpaved roads, excavation and handling of construction materials, all of which will be particularly relevant during the dry seasons.

However, the closest residential sensitive receivers to the proposed PAFF are low rise residential properties at Lung Kwu Tan and high rise residential blocks at Melody Gardens in Tuen Mun, both some 2 and 3km away respectively. In addition, the sensitive receivers are shielded from the PAFF site by topography. There is also a planned Holiday Camp to the east along Lung Man Road but this is about 550m away and as such not within the study area. However, the Shiu Wing Steel facility, cement plant and proposed Eco Park at Tuen Mun Area 38 adjacent to the site are considered to be sensitive to construction dust and as such dust predictions have been undertaken for these.

4.2 RELEVANT LEGISLATION

Air quality is regulated through Annex 4 of the Technical Memorandum on EIA Process (TMEIA) which specifies compliance with the Air Quality Objectives (AQO) and other standards established under the Air Pollution Control Ordinance (APCO). The APCO and all regulations specified by this Ordinance, for example the Air Pollution Control (Construction Dust) Regulation, should be complied with. The 24 hour Total Suspended Particulates (TSP) AQO is 260 $\mu g/m^3$.

In addition to the Air Quality Objectives, the TMEIA stipulates a criteria to meet the hourly TSP concentration of 500 $\mu g/m^3$ measured at 298°K (25°C) and 101.325 kPa (1 atmosphere) for construction dust impact assessment.

The Air Pollution Control (Construction Dust) Regulation defines notifiable and regulatory works for achieving the purpose of dust control for a number of activities. The Regulation requires any notifiable work shall require advance notice to EPD. It also requires the contractor to ensure that the notifiable work and regulatory work will be carried out in accordance to the Schedule of the Regulation. Dust control and suppression measures are provided in the Schedule. Notifiable works are site formation; reclamation;

demolition, foundation and superstructure construction for buildings; and road construction. Regulatory works are building renovation, road opening and resurfacing, slope stabilisation, and other activities including stockpiling, dusty material handling, excavation, concrete production, etc. This project is expected to include both notifiable and regulatory works.

The proposed PAFF is classed as a specified process under Part IV of the APCO and falls within the category "Organic Chemical Works" described in Schedule 1 of the Ordinance. The following relevant clause relates to the tank farm of the proposed PAFF:

"Works, not being a chemical process described in any other process of the following kinds in which:

(b) any organic liquids, including liquid fuel are stored in tanks having an installed capacity exceeding 100m^3."

4.3 AIR QUALITY MITIGATION MEASURES

4.3.1 Mitigation Measures during Construction Phase

Dust predictions are adjacent sensitive receivers show that some exceedances of both the 1-hour (500 $\mu g/m^3$) and 24-hour (260 $\mu g/m^3$) criteria could arise at Shiu Wing Steel and the EcoPark. As such twice daily watering of the site and watering of the construction area every 1.5 hours in the vicinity of SR3c during the works of site formation, stock piling, dusty material handling and excavation has been recommended. Also, in accordance with the Air Pollution Control (Construction Dust) Regulation, the Contractor will be required to ensure that dust control measures stipulated in the Regulation should be implemented to control dust emissions. Based upon this, the following dust control measures are recommended. These measures are also summarised in the Environmental Mitigation Implementation Schedules in *Annex B*.

- watering of the construction area every 1.5 hours in the vicinity of SR1, SR3a, SR3c and SR3d during site formation, stock piling, dusty material handling and excavation works;
- the Contractor shall, to the satisfaction of EPD, install effective dust suppression measures and take such other measures as may be necessary to ensure that at the site boundary, dust levels are kept to acceptable levels;
- the Contractor shall not burn debris or other materials on the works areas;
- provide site hoarding not less than 2.4m at site boundary;
- in hot, dry or windy weather, a watering programme shall maintain all exposed road surfaces and dust sources wet;

- dust creating activities shall be reprogrammed to avoid periods of high winds;

- where breaking of oversize rock/concrete is required, watering shall be implemented to control dust. Water spray shall be used in dry conditions during the handling of fill material at the site and at active cuts, excavation and fill sites where dust is likely to be created;

- open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading;

- during transportation by truck, materials shall not be loaded to a level higher than the side and tail boards, and shall be dampened or covered before transport. Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards;

- no earth, mud, debris, dust and the like shall be deposited on public roads. Wheel washing facility shall be usable prior to any earthworks excavation activity on the site;

- areas of exposed soil shall be minimised to areas in which works have been completed shall be restored as soon as is practicable;

- all stockpiles of aggregate or spoil shall be enclosed or covered and water applied in dry or windy conditions; and,

- provide awareness training in the need to minimise dust.

If the above measures are not sufficient to manage dust generation, upon the advice of the ETL, the Contractor shall liaise with the ET regarding other mitigation measures and consult the IEC for their effectiveness, and then propose these measures to the FSR for approval prior to the implementation of the measures

4.3.2 EM&A Requirements

EM&A is recommended during the construction phase only and the effective management of dust arisings during the construction phase will be monitored through the site audit programme.

The aims of the dust audit are:

- to ensure that appropriate measures, including but not limited to those measures stipulated above, as being implemented with the aim to minimise and control dust arisings from the site; and,

- to encourage good site practices.

The Contractor shall be required to pay attention to the environmental standard and guidelines detailed in *Section 4* and carry out appropriate dust management measures.

During the site inspections and the document review procedures as mentioned in Chapter 11 of this Manual, the ET shall pay special attention to the issues relating to dust management and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong.

The Contractor's dust management practices should be audited with reference to the checklist detailed in *Table 4.1* below:

Table 4.1 Dust Management Checklist

Activities	Timing	Monitoring Frequency	If non-compliance, Action Required
Twice daily water programme of exposed areas	Throughout the works	Twice daily	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to initiate watering more frequently. Corrective action shall be undertaken within 48 hours. The ETL shall ensure that corrective action has been taken.
No burning of material on-site	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to cease burning material. The Contractor shall immediately suspend burning on site.
Watering programme of exposed areas in hot, dry or windy weather	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to initiate watering not less than once daily. Corrective action shall be undertaken within 48 hours. The ETL shall ensure that corrective action has been taken.
Dusty activities shall not be programme in periods of high winds	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to reschedule the works accordingly.
Water spraying during rock or concrete breaking	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to implement spraying. Corrective action shall be undertaken within 48 hours. The ETL shall ensure that corrective action has been taken.

Activities	Timing	Monitoring Frequency	If non-compliance, Action Required
Dropping heights shall be minimised to 2m	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to reduce dropping height. The ETL shall ensure that corrective action has been taken.
Demolition material/waste in dump trucks are properly covered before leaving the site	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to comply. The Contractor shall prevent trucks shall leaving the site until the waste are properly covered. The ETL shall ensure that corrective action has been taken.
Stockpiles contained so as not to cause a dust nuisance	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to cover the spoil or implement watering. The ETL shall ensure that corrective action has been taken.
Wheel washing facilities are used and effective	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to use wheel washing facilities. The ETL shall ensure that corrective action has been taken.

Note: ETL – Environmental Team Leader, IEC – Independent Environmental Checker, FSR – Franchisee Site Representative

Should any ad hoc spot check monitoring be required of the Total Suspended Particulates (TSP) levels, this shall comprise monitoring of 1-hour TSP levels measured by direct reading methods. Any ad hoc monitoring shall be carried out by the Environmental Team Leader (ETL) (see Section 1) to ensure that construction works are not generating dust which exceeds the acceptable level.

Other relevant data including weather conditions and any other special phenomena and work progress of the concerned site shall be recorded in detail by the ETL. A sample data sheet is shown in *Annex C*.

The Contractor is responsible for provision of the monitoring equipment if required and shall ensure that direct reading samplers with an appropriate calibration kit are available for carrying out ad hoc measurements if required. Calibration of dust monitoring equipment shall be conducted by the ETL in accordance with the manufacturer's recommendations. The calibration data shall be properly documented for future reference by concerned parties, such as the IEC.

Wind data monitoring equipment shall also be provided for logging wind speed and wind direction near to the dust monitoring locations if monitoring is required. The equipment installation location shall be proposed by the Contractor in consultation with the ETL and agreed with the FSR, in consultation with the IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed.

- the wind sensors should be installed on masts at an elevated level 10 m above ground so that they are clear of obstructions or turbulence caused by the buildings;
- the wind data should be captured by a data logger to be down-loaded for processing at least once a month;
- the wind data monitoring equipment should be re-calibrated at least once every six months; and,
- wind direction should be divided into 16 sectors of 22.5 degrees each.

In exceptional situations, the ETL may propose alternative methods to obtain representative wind data upon approval from the FSR and agreement from the IEC.

When selecting sites for ad hoc monitoring, the following preferred locations and factors shall be considered:

- the site boundary or locations close to the major dust emission source; and,
- the prevailing meteorological conditions.

The ETL shall agree with the FSR, in consultation with the IEC, the position of the ad hoc monitoring.

5 NOISE

5.1 INTRODUCTION

Powered mechanical equipment will be used to form the tank farm, jetty and lay the pipeline for the PAFF. However, the Tuen Mun Area 38 site is located on newly formed reclaimed land in an area zoned for industrial use. The existing land adjacent to the site is occupied by the cement plant and Shui Wing Steel Mill, with Castle Peak Power Station further to the west. To the east, a further lot of reclaimed land is proposed for use as an EcoPark, and this is bordered by a sea area earmarked for formation in the near future. The River Trade Terminal is located further down the coast. The alignment of the pipeline passes through open sea away from the land. None of these are classed as noise sensitive receivers.

The closest noise sensitive receivers to the proposed PAFF are low rise residential properties at Lung Kwu Tan and high rise residential blocks at Butterfly Beach in Tuen Mun, both about 2km and 3km away respectively. In addition, these sensitive receivers are shielded from the PAFF site by topography and there will be no line of sight to the facility. There is also a planned Holiday Camp to the east along Lung Man Road but this is about 550m away and as such not within the study area.

5.2 RELEVANT LEGISLATION

Non restricted hours include the daytime hours on working days which are not a Sunday or a public holiday between 07:00-19:00. The noise generated by the construction of the Project during the non-restricted daytime hours will be assessed with reference to Table 1B of Annex 5 of the TMEIA. 4

If construction works during restricted hours are specified in the construction programme or percussive piling is to be undertaken, a Construction Noise Permit (CNP) will be required for the works and the noise impacts will be assessed to ensure compliance with the relevant Noise Control Ordinance (NCO) noise limits as specified in Annex 5 of the TMEIA. Once applied for, the CNP will be assessed by the Noise Control Authority based upon the contemporary situation at the time of the application.

An application for a CNP for percussive piling is assessed in accordance with the Technical Memorandum on Noise from Percussive Piling under the NCO.

The CNP may contain permitted hours of operation as a condition with reference to the predicted noise levels at noise sensitive receivers. However, it is not anticipated that percussive piling works will be required during the construction of this project.

The NCO construction noise limits during restricted hours are determined with reference to the type of area within which a Noise Sensitive Receiver

(NSR) is located. For village and low-density residential areas not affected by noise, an Area Sensitivity Rating (ASR) of 'A' is applied, while a low-density residential areas in which traffic noise is noticeable but not dominant, an ASR of 'B' is employed. For a similar area in which noise from a major road is readily noticeable and dominates the noise environment, an ASR of 'C' is applied. The definition of a major road is provided in the Technical Memorandum on Noise from Construction Work Other than Percussive Piling. The construction noise criteria for each NSR are applied to the noise arising from operation of construction equipment.

5.3 MITIGATION DURING CONSTRUCTION PHASE

There are no sensitive receivers within designated 300m of the proposed site and works, with the closest being the proposed Holiday Camp some 550m away and other sensitive receivers are about 2km away. As such significant noise impacts during the construction phase are not predicted. Notwithstanding, measures to minimise noise levels as far as possible are recommended as follows. As no sensitive receivers will be affected by the project, the mitigation measures are advisory in nature only.

- use quiet equipment with suitable noise levels and labels;
- regular maintenance of equipment;
- ensure noise attenuation devices are fitted to plant and equipment such as:
    - fitting more efficient exhaust sound reduction equipment and ensuring the Manufacturers' enclosure panels are kept closed on dump trucks, lorries, excavators and cranes;
    - fitting suitably designed muffler or sound reduction equipment and using dampened bit to eliminate ringing on breakers; and,
    - ensure all leaks in air lines are sealed on all pneumatic equipment.
- use temporary noise barriers where applicable;
- restrict or modify working hours to minimise high noise activities;
- provide awareness training in the need to minimise noise; and,
- proper planning of work area; and good site practice to limit noise emissions at source.

If additional measures are deemed necessary by the ETL, the Contractor shall liaise with the ETL regarding other mitigation measures and consult the IEC for their effectiveness, and then propose these measures to the ER for approval prior to the implementation of the measures.

5.4 EM&A REQUIREMENTS

Management of noise during the construction phase will be monitored through the site audit programme.

The aims of the noise audit are:

- to ensure that appropriate measures, including but not limited to those measures stipulated above, as being implemented with the aim to minimise and control noise from the site; and,
- to encourage good site practices.

The Contractor shall be required to pay attention to the environmental standard and guidelines detailed in *Section 5.2* and carry out appropriate noise mitigation measures.

During the site inspections and the document review procedures as mentioned in Chapter 11 of this Manual, the ETL shall pay special attention to the issues relating to noise mitigation and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong (see above *Section 5.2*).

The action level for construction noise is defined in *Table 5.1*. Should non-compliance of the criteria occur, the ETL, the IEC, the ER and the Contractor shall undertake their specified actions in accordance with the Action Plan shown in *Table 5.2*.

Table 5.1 Action Levels for Construction Noise

Time Period	Action
0700 – 1900 hrs on normal weekdays	When one documented complaint is received

Should any ad hoc noise monitoring be required in the even of a complaint, the construction noise level shall be monitored by the ET and shall be measured in terms of the A-weighted equivalent continuous sound pressure level (Leq). Leq (30 min) shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. In respect of all other time periods, Leq(5 min) shall be employed for comparison with the Noise Control Ordinance criteria. A sample data record sheet is shown in *Annex C* for reference.

As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out any noise monitoring.

Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agree to within 1.0dB.

Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding 10m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s. The Contractor shall ensure that noise measuring equipment and associated instrumentation are available for carrying out any ad hoc monitoring if required.

The locations for noise monitoring, if required shall be proposed by the Contractor in consultation with the ETL and verified with the Franchisee's Site Representative (FSR), the IEC and Environmental Protection Department (DEP).

The monitoring station shall normally be at a point 1m from the exterior of a building facade or in the case the measurement is not being carried out at a building, be at a position 1.2m above the ground.

For reference, a correction of +3dB(A) shall be made to the free field measurements. Noise levels shall be corrected in accordance with Section 2.10, 2.11 and 2.13 of the "Technical Memorandum on Noise From Construction Works Other Than Percussive Piling". The ETL shall agree with the IEC on the monitoring position and the corrections adopted prior to the commencement of the works.

Table 5.2 ***Event/Action Plan for Construction Noise***

Event	Action			
	ETL	**IEC**	**FSR**	**Contractor**
Action Level	1. Notify the IEC and Contractor 2. Carry out investigation 3. Report the results of investigation to the IEC and the Contractor 4. Discuss with the Contractor and formulate remedial measures 5. Consider undertaking ad hoc monitoring to check mitigation effectiveness	1. Review the analysed results submitted by the ET 2. Review the proposed remedial measures by the Contractor and advise the FSR accordingly 3. Supervise the implementation of remedial measures	1. Confirm the receipt of notification of failure in writing 2. Notify the Contractor 3. Require the Contractor to propose remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented	1. Submit noise mitigation proposals to IEC 2. Implement noise mitigation proposals

Note: ETL – Environmental Team Leader, IEC – Independent Environmental Checker, FSR – Franchisee's Site Representative

6 WATER QUALITY

6.1 INTRODUCTION

In accordance with the recommendations of the EIA and conditions of approval from Country and Marine Parks Authority (CMPA), water quality EM&A is required when construction works are being undertaken within 1000m of the Lung Kwu Chau and Sha Chau Marine Park and for dredging along the entire pipeline. In addition, baseline water quality monitoring will be required prior to the commencement of the above said construction activities. Also, *Condition 2.5* of the *EP* requires the inclusion of monitoring of Persistent Organic Pollutants (POPs) during construction of the Project. The following sections provide details of the water quality monitoring, including POPs 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.

6.2 SAMPLING METHODOLOGY FOR WATER QUALITY MONITORING

Sampling for water quality will be conducted for both standard water quality parameters as well as Persistant Organic Pollutants (POPs). Due to the different schedules associated with each monitoring programme, monitoring for water quality parameters are discussed in *Section 6.2.1* with monitoring of POPs in *Section 6.2.2.*

6.2.1 *Water Quality Parameters*

In accordance with the recommendations of the EIA, construction phase water quality EM&A is required when marine construction works are being undertaken within 1000m of the Lung Kwu Chau and Sha Chau Marine Park and for dredging along the length of the pipeline. Measurements of suspended solids (SS), turbidity in Nephelometric Turbidity Units (NTU) and dissolved oxygen (DO) in mg/L shall be undertaken by the ET at a number of Control and Impact Stations stated in *Section 6.2.4*, below. Measurements shall be taken on a daily basis on both flood and ebb tides to ensure that any deteriorating water quality could be readily detected and timely action will be taken to rectify the situation. SS shall be determined in the laboratory whilst turbidity and DO shall be measured *in-situ*.

Baseline measurements shall be undertaken for a period of one week prior to construction on both flood and ebb tides. The baseline data shall be reviewed to identify any pre-project variability in the dataset and to confirm the suitability of the control stations to represent conditions at the impact stations in the absence of any construction activity associated with the project.

Concurrently with the water quality parameter measurements, associated data shall also be recorded, including the monitoring location, time, water depth, water temperature, salinity, pH, DO saturation, weather conditions, sea conditions and tidal stage. Observations on any special phenomena and work underway at the construction site at the time of sampling shall also be recorded. Water temperature, salinity, pH and DO saturation shall be measured *in-situ* using direct reading instrumentation. A sample monitoring record sheet is shown in *Annex C*.

In addition, the Franchisee shall undertake some routine monitoring of water quality in the vicinity of the PAFF site during the operation phase to check the effectiveness of the proposed precautionary measures implemented for on-site spill control. The details of the monitoring to be undertaken, including the parameters, frequency and monitoring locations, shall be prepared by the Franchisee as part of the PAFF Operations Manual and the details will be agreed with the relevant authorities within 3 months of the commencement of operation of the PAFF. However, the monitoring should include but not be limited to the parameters of TPH and PAH and reference should be made to the existing monitoring programme undertaken for the fuel tank farm on the HKIA platform. As such, the details of this monitoring are not specified in this Manual.

Monitoring Equipment

For water quality monitoring, the following equipment will be supplied and used by the Contractor:

- ***Dissolved Oxygen and Temperature Measuring Equipment***

The instrument shall be a portable, weatherproof dissolved oxygen measuring instrument connected with cable and use a DC power source. It shall be capable of measuring:-

- a dissolved oxygen level in the range of 0-20 mg/l and 0-200% saturation; and,

- a temperature of 0-45 degree Celsius

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

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

- ***Turbidity Measurement Equipment***

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

- ***Salinity Measurement Instrument***

A portable salinometer capable of measuring salinity in the range of 0-40 ppt shall be provided for measuring salinity and, if necessary, setting salinity compensation on the Dissolved Oxygen Meter.

- ***Suspended Solid Measurement Equipment***

The equipment for measuring suspended solids shall be provided as follows:

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

- Water samples for suspended solids measurement shall be collected in high density polythene bottles, packed in ice (cooled to 4^0C without being frozen) and delivered to the laboratory as soon as possible after collection.

- ***Water Depth Gauge***

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

- ***pH Measuring Equipment***

A portable pH meter capable of measuring a range between 0.0 and 14.0 shall 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 shall be provided and used during monitoring to ensure the monitoring vessel is at the correct location before taking measurements. Marine anchors shall not be used when sampling the impact stations within or on the boundaries of the marine park.

- ***Calibration of Equipment***

All *in-situ* monitoring instrument shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes shall be checked with certified standard solutions before each use. Wet bulb calibration for the DO meter shall be carried out before measurement at each monitoring location.

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*" shall be followed.

- ***Backup Equipment***

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

Laboratory Measurement and Analysis

Analysis of suspended solids shall be carried out in a HOKLAS or other international accredited laboratory. Water samples of about 500ml shall be collected at the monitoring stations for carrying out the laboratory SS determination. The SS determination work shall start within 24 hours after collection of the water samples. The SS determination shall follow TSS-SM25400 or equivalent methods subject to approval of the DEP.

The limits of detection for the *in-situ* and laboratory measurements that shall be obtained are shown in *Table 6.1*.

Table 6.1 Detection Limits and Precision of Water Quality Determinands

Determinand	Limit of Detection	Precision
Dissolved Oxygen	0.1 mg/L	1%
Salinity	0.01 ppt	1%
Temperature	0.1 degree Celsius	1%
pH	0.01 units	1%
Turbidity (NTU)	0.1 NTU	1%
Suspended Solids	1 mg/L	2%

If a site laboratory is set up or a non-HOKLAS and non-international accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures and quality control shall be approved by the DEP. All the analytical procedures shall be witnessed by the Franchisee's Site Representative (FSR). The ET shall provide the ER with one copy of the relevant chapters of the "Standard Methods for the Examination of

Water and Wastewater" updated edition and any other relevant document for his reference.

Monitoring Locations

Water quality monitoring will be conducted place within 1 km of the Lung Kwu Chau and Sha Chau Marine Park and for dredging along the entire pipeline. The water quality monitoring locations are shown in *Figure 6.1* and detailed in *Table 6.2*. A schedule for water quality monitoring shall be prepared by the Environmental Team Leader (ETL) and approved by the Franchisee's Site Representative (FSR), the IEC and the Environmental Protection Department (EPD) prior to the commencement of the monitoring.

Table 6.2 Location of Marine Water Quality Monitoring Stations

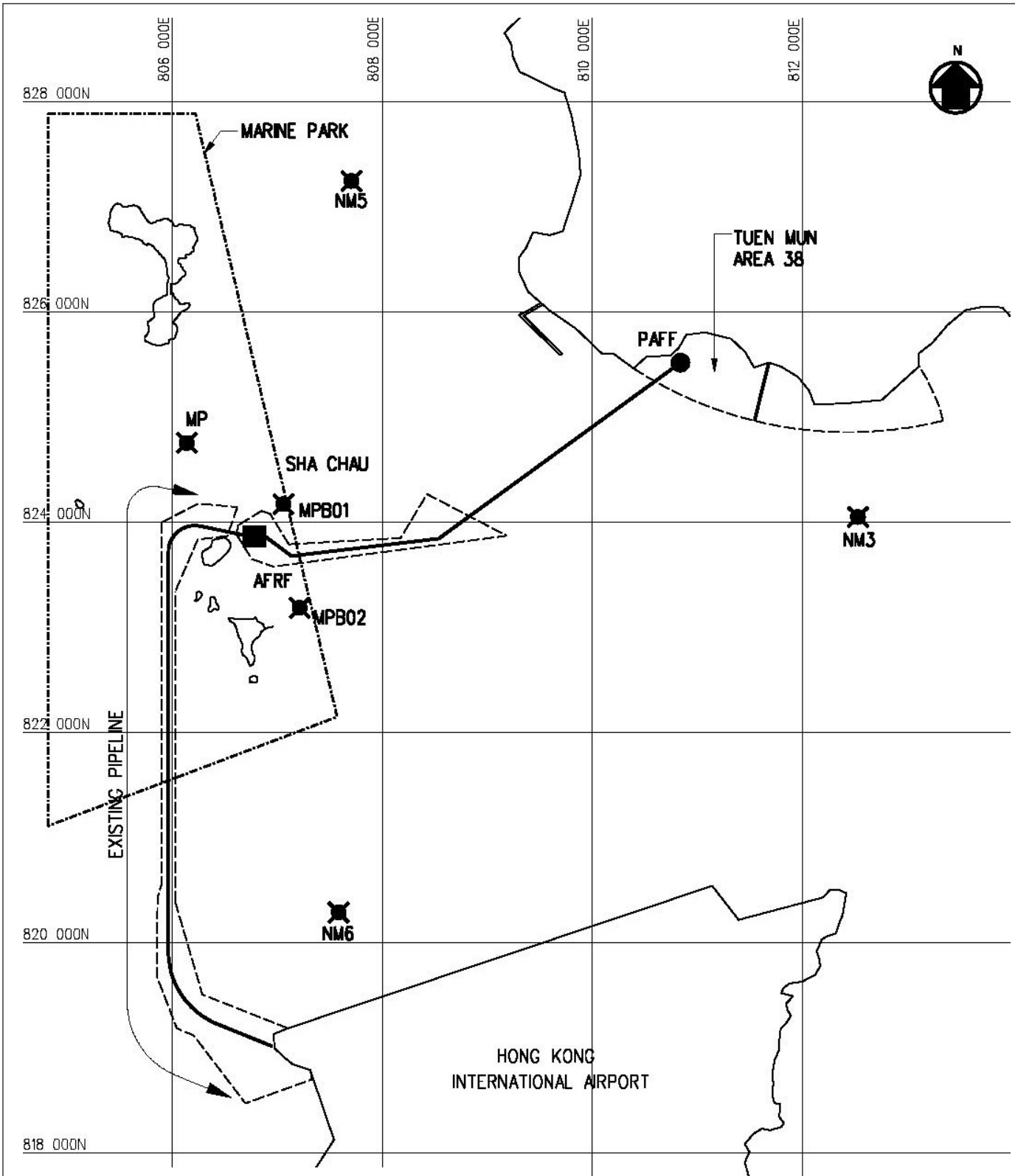
Monitoring Station Identification	Type	Location	Northing	Easting
MPB1	Impact	Northeast Sha Chau	824172	807060
MPB2	Impact	East Sha Chau	823184	807212
MP	Impact	North Sha Chau	824753	806140
C1 (NM3)	Control	South Tuen Mun	824049	812527
C2 (NM5)	Control	East Lung Kwu Chau	827245	807707
C3 (NM6)	Control	North Airport	820288	807584

The status and locations of water quality sensitive receivers and the marine activities sites may change after issuing this Manual. If required, the ETL in consultation with the Contractor shall propose updated monitoring locations and seek approval from the FSR, the IEC and the DEP.

Control stations are necessary to compare the water quality from potentially impacted sites with the ambient water quality. The control stations have been selected to be within the same body of water as the impact monitoring stations but shall be outside the area of influence of the works and, as far as practicable, not affected by any other works. It should be noted that the control stations are located at the exact same co-ordinates as EPD's routine monitoring stations NM3, NM5 and NM6. This will facilitate reference with a substantial volume of baseline data should this later be found necessary.

Impact stations MPB1 and MPB2 have been selected at positions on the Marine Park boundary 500m from the nearest dredging point to assess any potential impacts that may be caused by the works. An additional impact station, MP is located within the main body of the Marine Park at a point approximately equidistant between the East Sha Chau Island cluster and Lung Kwu Chau.

For monitoring during dredging activities, water quality impact monitoring stations shall be positioned 500m to the north/northwest and south/southeast of all dredgers operating at a distance greater than 1 km from the boundary of



Location of Marine Water Quality Monitoring Stations

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C3 (NM6)	Control	North Airport	820288	807584

Figure 6.1

Water Quality Monitoring Locations

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Environmental Resources Management

ERM

the Lung Kwu Chau and Sha Chau Marine Park. These stations will provide data on water quality when dredging is in progress outside the Marine Park. These stations shall be located upstream (IMO1) and downstream (IMO2) of the dredger and shall move on a daily basis so that they are in current streams that could be affected by the dredging. If more than one dredger is in operation, additional upstream and downstream monitoring stations will be monitored accordingly. Station names will follow a similar format as that for a single dredger, ie IMO3 and IMO4 and so on.

All measurements shall be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above sea bed. Duplicate *in-situ* measurements and samples collected from each independent sampling event are required for all parameters to ensure a robust statistically interpretable data set.

Baseline Monitoring

Baseline conditions for water quality shall be established and agreed with the IEC prior to the commencement of works. The purpose of the baseline monitoring is to demonstrate the suitability of the proposed impact and control stations. The baseline conditions shall be established by measuring the water quality parameters specified above.

Measurements and samples shall be taken in duplicate at all designated monitoring stations (impact (MPB1, MPB2 and MP) and control stations (C1, C2 and C3)) on a daily basis on both flood and ebb tides for a period of 1 week prior to the commencement of marine works. Baseline monitoring will commence no earlier than two months before dredging works are due to commence.

Duplicate measurements and samples shall be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above sea bed. *In-situ* measurements shall be made during both the descent and ascent of the sensor. If the difference between the measured values at any one depth is greater than 25%, the measurements shall be repeated until an acceptable match is made. If no match is achieved then the equipment shall be checked for accurate calibration or malfunction.

No marine construction activities shall be on-going in the vicinity of the stations during the baseline monitoring. The ETL shall be responsible for undertaking the baseline monitoring and submitting the results within 20 working days from the completion of the baseline monitoring work.

Pursuant to *Condition 5.2* of the *EP*, a Baseline Monitoring Report shall be submitted to the Director at least 2 weeks before commencement of construction of the sub-sea pipelines of the Project. The submission shall be certified by the ET Leader and verified by the IEC before submission to the Director.

Impact Monitoring

In-situ measurements shall be taken when marine construction works are being undertaken within 1000m of the Lung Kwu Chau and Sha Chau Marine Park and for dredging along the entire pipeline.

Measurements shall be taken at 3 depths, namely 1m below the surface, mid-depth and 1m above sea bed. *In-situ* measurements shall be made during the descent and ascent of the sensor. If the difference between the measured values at any one depth is greater than 25%, the measurements shall be repeated until an acceptable match is made. If no match is achieved then the equipment shall be checked for accurate calibration or malfunction

In addition, duplicate water samples for suspended solid analysis shall be collected at all the above stations and promptly forwarded to the laboratory for analysis. Results for suspended solids shall be received back from the laboratory within 3 days of receipt of the samples.

All three impact stations, MPB1, MPB2 and MP shall be sampled on every sampling event on both flood and ebb tides. The Control stations to the south and east of the works area, C1 and C3, shall be sampled on the flood tide only. The Control stations to the north-west of the works area, C2, shall be sampled on the ebb tide only. If sediment laden plumes from the works area or elsewhere are observed in the vicinity of the control stations during sampling, this shall be recorded and brought to the immediate attention of the ETL.

Water Quality Compliance

The water quality criteria, namely Action and Limit levels, are shown in *Table 6.3* below. Should the monitoring results of the water quality parameters at any designated monitoring stations indicate that the water quality criteria are exceeded, the actions in accordance with the Action Plan in *Table 6.6* shall be carried out.

Any noticeable change to water quality shall be recorded in the survey reports and shall be investigated and remedial actions shall be undertaken to reduce impacts. Particular attention shall be paid to the Contractor's implementation of the recommended mitigation measures, as presented in Section 6.4.

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 6.3*.

Table 6.3 Action and Limit Levels for Water Quality

Parameters	Action (mg/L)	Limit (mg/L)
DO in mg/L (Depth Average & Bottom)	Depth Average 4.2 mg/l and upstream control stations' mean DO (at the same tide of the same day)	Depth Average 4.0 mg/l and upstream control stations' mean DO (at the same tide of the same day)
DO in mg/L (Depth Average & Bottom)	Bottom 3.3 mg/l and upstream control stations' mean DO (at the same tide of the same day)	Bottom 2.5 mg/l and upstream control stations' mean DO (at the same tide of the same day)
Suspended Solids (Depth averaged)	24 mg/l and 130% of upstream control stations' mean SS (at the same tide of the same day)	37 mg/l and 130% of upstream control stations' mean SS (at the same tide of the same day)
Turbidity in NTU (Depth averaged)	29 NTU and 130% of upstream control stations' mean Turbidity (at the same tide of the same day)	49 NTU and 130% of upstream control stations' mean Turbidity (at the same tide of the same day)

Notes:

- For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- For SS, non-compliance 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 DEP.
- "Depth Averaged" is calculated by taking the arithmetic mean of the *in-situ* parameters readings at all three depths.

The IEC shall be empowered to audit the environmental performance of construction, all 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 IEC shall follow the actions stated in the Event and Action Plan in *Table 6.6*.

6.2.2 Sampling Methodology for POPs

Water Quality Parameters for POPs

Condition 2.5 of the *EP* requires the inclusion of monitoring of Persistent Organic Pollutants (POPs) during construction of the Project. Measurements of three types of POPs namely Polychlorinated aromatic hydrocarbons (PAHs), Polyholorinated biphenyls (PCBs) and Dichloro-Diphenyl-Trichloroethane (DDT) in ug/L shall be undertaken by the ET at Control and Impact Stations identified in listed in *Table 6.2*. All collected samples for POPs will be determined in a laboratory.

Laboratory Measurement and Analysis for POPs

The sampling equipment for POPs is the same as the measurement for Suspended Solids as described in *Section 6.2.3*. Analysis of POPs shall be carried out in a HOKLAS or other international accredited laboratory. Water samples of about 2,000ml shall be collected at the monitoring stations for carrying out the laboratory POPs determination. The POPs determination work shall start within 24 hours after collection of the water samples. The POPs determination shall follow USEPA 8270/GCMS or equivalent methods subject to approval of the DEP.

The limits of detection for the *in-situ* and laboratory measurements that shall be obtained are shown in *Table 6.4*.

Table 6.4 Detection Limits of POPs Determinands

Determinand	Limit of Detection
PAHs	0.10 ug/L (individual)
PCBs	0.01 ug/L (individual)
Total DDTs	0.01 ug/L

Baseline Monitoring for POPs

The purpose of the baseline monitoring for POPs is to demonstrate the suitability of the proposed impact and control stations. The baseline conditions shall be established by measuring the water quality parameters of PAHs, PCBs and DDTs.

Measurements and samples shall be taken at all designated monitoring stations (impact (MPB1, MPB2 and MP) and control stations (C1, C2 and C3)) on both flood and ebb tides for a period of 1 week prior to the commencement of marine works. The interval between 2 sets of monitoring should not be less than 36 hours. A maximum of four sets of monitoring data will be taken. Baseline monitoring will commence no earlier than two months before dredging works are due to commence.

Duplicate samples shall be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above sea bed. Monitoring results for each parameter shall be produced by combining all three samples of three depths into one mixed sample.

No marine construction activities shall be on-going in the vicinity of the stations during the baseline monitoring. The ETL shall be responsible for undertaking the baseline monitoring and submitting the results within 2 weeks from the completion of the baseline monitoring work.

Pursuant to *Condition 5.2* of the *EP*, a Baseline Monitoring Report shall be submitted to the Director at least 2 weeks before commencement of construction of the submarine pipelines of the Project. The submission shall be certified by the ETL and verified by the IEC before submission to the Director.

Impact Monitoring for POPs

Samples shall be taken at designated monitoring stations on a bi-weekly basis when marine construction works are being undertaken within 1000m of the Lung Kwu Chau and Sha Chau Marine Park and for dredging along the entire of the pipeline.

Duplicate samples for PAHs, PCBs and DDTs shall be taken at 3 depths, namely 1m below the surface, mid-depth and 1m above sea bed at the stations listed in *Table 6.2* and promptly forwarded to the laboratory for analysis. Monitoring results for each parameter shall be produced by combining all three samples of three depths into one mixed sample. Results shall be received back from the laboratory within 2 weeks of receipt of the samples.

All three impact stations, MPB1, MPB2 and MP shall be sampled on every sampling event on both flood and ebb tides. The Control stations to the south and east of the works area, C1 and C3, shall be sampled on the flood tide only. The Control stations to the north-west of the works area, C2, shall be sampled on the ebb tide only.

Water Quality Compliance for POPs

The water quality criteria, namely Action and Limit levels, are shown in *Table 6.5*. Should the monitoring results of the water quality parameters at any designated monitoring stations indicate that the water quality criteria are exceeded, the actions in accordance with the Action Plan in *Table 6.7* shall be carried out.

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

Table 6.5 Acton and Limit Levels for POPs Monitorin

Parameters	Action	Limit
PAHs in ug/L (Depth averaged)	95 percentile of baseline data	99 percentile of baseline data
PCBs in ug/L (Depth averaged)	95 percentile of baseline data	99 percentile of baseline data
DDTs in ug/L (Depth averaged)	95 percentile of baseline data	99 percentile of baseline data

Notes:

- "Depth averaged" is calculated by combining all three samples into one mixed sample which is analysed to produce a physical arithmetic mean.

The IEC shall be empowered to audit the environmental performance of construction, all 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 IEC shall follow the actions stated in the Event and Action Plan in *Table 6.7*.

6.2.3 Summary of Water Quality Monitoring

A summary of monitoring of water quality to be undertaken is presented in *Table 6.6*.

Table 6.6 Summary of Monitoring for Water Quality and POPs

Period	Duration	Frequency		Tidal States	Stations
		Water Quality[a]	POPs[b]		
Pre-Construction (Baseline)	One week	Daily	Four Days Only	Flood and Ebb	MPB1, MPB2, MP, C1, C2, C3
Construction (Impact)	Entire Dredging Period	Daily	Bi-Weekly	Ebb	MPB1, MPB2, MP, C2
				Flood	MPB1, MPB2, MP, C1, C3,

Notes: [a] Parameters include: Dissolved Oxygen; Salinity; Temperature; pH; Turbidity (NTU); and Suspended Solids.

[b] Parameters include: PAHs; PCBs and DDT

6.3 WATER QUALITY MITIGATION MEASURES

The EIA report has numerous recommended water quality mitigation measures. These are summarised in the Water Quality Environmental Mitigation Implementation Schedule provided in the *Annex B*. Specifically the Contractor shall be responsible for the design and implementation of the following measures:

Works within Marine Park

- no working from shore;
- no deployment of anchors; and,
- no deployment of trailer suction dredger.

Dredging

- use of Lean Material Overboard (LMOB) systems shall be prohibited;
- mechanical grabs shall be designed and maintained to avoid spillage and should seal tightly while being lifted;
- barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material;
- any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes;
- loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation; excess material shall be cleaned from the decks and exposed fitting of barges and hopper dredges before the vessel is moved;
- adequate freeboard shall be maintained on barges to ensure that decks are not washed by wave action; all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash; and,
- the works shall not cause foam, oil, grease or litter or other objectionable matter to be present in the water within and adjacent to the works site.

Works on Land

- wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;
- sewage effluent and discharges from on-site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided;
- storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on

site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks;

- silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm;

- temporary access roads should be protected by crushed stone or gravel;

- rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities;

- measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system;

- open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms;

- manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers;

- discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system; all vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit; wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain;

- the section of construction road between the wheel washing bay and the public road should be protected with crushed stone or coarse gravel;

- wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects; vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO or collected for off site disposal;

- the contractors shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately;

- waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance; all fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas.

The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank; and,

- surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.

Table 6.7 Acton and Limit Levels for POPs Monitoring

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

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

7 WASTE MANAGEMENT

7.1 INTRODUCTION

The Contractor is responsible for waste control within the construction site, removal of waste material produced from the site and to implement any mitigation measures to minimise waste or redress problems arising from the waste from the site. Activities during the construction phase will result in the generation of a variety of wastes which can broadly be classified into distinct categories based on their nature and the options for their disposal. These include:

- dredged marine mud;
- excavated materials suitable for reclamation and public fill;
- construction and demolition waste, including cleared vegetation, some of which may be suitable for reclamation and fill; chemical waste; and,
- sewage.

In respect of the dredged marine mud, the marine pipelines connecting the on-shore PAFF facility with the receiving jetty with and the airport would require the excavation and disposal of an estimated 340,000m^3 of marine sediment. Based upon the review of historical data, it has been concluded that there is already a clear weight of evidence to indicate that the sediments to be dredged for this project are generally not contaminated to an extent that they would pose a threat to marine life if disturbed during dredging and put into suspension in the water column assuming the WQO for suspended sediments is satisfied and this has been assumed for the purposes of the EIA. However, in terms of applying for a license under the statutory controls required by the Dumping at Sea Ordinance (DASO) and following the process prescribed by *ETWB 34/2002*, it is noted that the results of the sediment testing along the pipeline alignment (*Section 6.2.5.14* of the *EIA*) indicated that about 70% of the sediment was Category L material and will be disposed of at a the South Cheung Chau spoil disposal area. However, 30% of the sediment samples is classified as Category M material based on *ETWB 34/2002* and will be disposed of at the East Sha Chau contaminated mud disposal site.

The tank farm and associated offices and workshops will be constructed on existing undeveloped reclaimed land. The site formation works will not be particularly extensive and as such large quantities of this type of waste material are not predicted. The total quantity of excavated material is estimated to be about 95,000m^3. It is recommended that some of this material could be reused on site for purposes such as landscaping or to form bund walls. However, about 80,000m^3 will be surplus and require disposal off-site. Notwithstanding, this excavated material will be suitable for subsequent use

as public fill in another reclamation and the closest facility for receiving public fill material is Tuen Mun Area 38 C&D stockpile on an adjacent site.

Because the site is already clear and not previously developed, quantities of demolition waste will be minor and limited to the removal of temporary structures and slabs employed during construction. Similarly the vegetative covering to be cleared will not be very substantial. The volume of other more general C&D material generated by the project will depend on the specific operating procedures and site practices. It cannot be quantified at present. However it is very important to recognise that, with careful management, waste arisings can be greatly reduced.

The site area, including the temporary haul roads, will have to be cleared at the start of construction of the vegetation. This process will include trees, in accordance with the tree survey report, and the mixture of topsoil and vegetative matter will form C&D waste, not being suitable for public fill, which will require disposal to landfill. However, by stripping/uprooting the vegetation first, before removing the top soil, it would be possible separate the earth into material for reuse on site, material suitable for public fill and the fraction that would require disposal to landfill. In this way, the amount of waste can be minimised.

It is unlikely that any large quantities of chemical wastes will be generated during the construction of this project but any materials should be handled, stored, transported and disposed of in an appropriate manner. Other wastes including sewage and general refuse will be generated and these will also need to be collected and disposed offsite appropriately.

7.2 *APPLICABLE ENVIRONMENTAL STANDARDS AND GUIDELINES*

The Contractor shall comply with all relevant requirements of the Waste Disposal Ordinance. The Waste Disposal Ordinance prohibits the unauthorised disposal of wastes, with waste defined as any substance or article which is abandoned. Construction waste is not directly defined in the Ordinance but is considered to fall within the category of "trade waste". Wastes can only be disposed of at licensed sites under this Ordinance. Compliance with the Public Health and Municipal Services Ordinances (Cap 132) and the Public Cleansing and Prevention of Nuisances (Regional Council) By-laws will be required to control any nuisance from the collections and disposal of waste.

The Contractor will be required to reuse materials on site as far as practicable and minimise waste arisings. In this regard, reference should be made all relevant technical circulars including the *Works Branch Technical Circular (WBTC) No. 5/99* for the *Trip-ticket System for Disposal of Construction and Demolition Material* and *WBTC No. 32/92* on the *Use of Tropical Hardwood on Construction Sites*.

In addition, construction wastes which are wholly inert may be taken to public dumps. The *Land (Miscellaneous Provisions) Ordinance (Cap 28)* requires that dumping licences are obtained by individuals or companies who deliver suitable construction wastes to public fills, public filling barging points or public fill stockpiled areas. Under the licence conditions public dumps will accept only inert building debris, soil, rock and broken concrete.

Under the *Waste Disposal (Chemical Waste) (General) Regulation* under the *Waste Disposal Ordinance (Cap 354)*, 'chemical waste' includes any scrap material and unwanted substances specified under Schedule 1 of the Waste Disposal Regulations. These are noted as posing serious environmental, health, and safety hazards if not stored and disposed of appropriately. Chemical wastes are often produced primarily as a result of construction equipment maintenance activities, and include liquids such as waste oils and cleaning solvents. The Contractor must register as a chemical waste generator with the Environmental Protection Department (DEP) and arrange for a licensed collector to collect and dispose of the waste. Chemical wastes shall be handled, stored, transported and disposed with reference to the *Code of Practice on the Package, Labelling and Storage of Chemical Wastes* and *A Guide to the Chemical Waste Control Scheme* published by the DEP.

Also, reference should be made to the Water Pollution Control Ordinance for the control of sewage and any waste water from the site.

7.3 MITIGATION MEASURES

Based on the mitigation measures recommended in the EIA Report, the following measures, as summarized in the Environmental Mitigation Implementation Schedule in *Annex B*, shall be undertaken when handling waste material during construction phase:

- excavated material shall be re-used on site for purposes such as landscaping or formation of bund walls. If absolutely necessary any surplus should be conveyed to the nearest available public fill site after obtaining a suitable licence;
- the site and surroundings shall be kept tidy and litter free;
- no waste shall be burnt on site;
- waste oils, chemicals or solvents shall not be disposed of to drain;
- the Contractor shall identify a co-ordinator for the management of waste. The co-ordinator shall prepare and implement a Waste Management Plan (WMP) which specifies procedures such as a ticketing system to facilitate tracking of loads and ensure that illegal disposal of waste does not occur, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. The WMP shall be prepared with

reference to Works Branch Technical Circular (WBTC) No. 29/2000 "Waste Management Plan" and WBTC 5/99 for the Trip-ticket System for Disposal of Construction and Demolition Material and issued to Engineer for approval and CED. CED should be contacted to confirm the availability for C&D and public fill waste;

- all material shall be reused on site as far as practicable, including formwork, plywood, topsoil and excavated material;
- good site practice shall be implemented to avoid waste generation and promote waste minimisation;
- waste materials such as paper, metal, timber and waste oil shall be recycled as far as practicable;
- falsework shall be constructed using proprietary steel systems rather than wood;
- temporary structures used during construction shall be provided in the form of proprietary Portakabin type units sited on areas of permanent hard paving units as far as practicable;
- re-use and recycle of waste must always be considered first. Waste disposal shall only be undertaken in the last resort. Any surplus material generated shall be sorted on site into C&D waste and the public fill fraction. The C&D waste shall be disposed of at a licensed landfill or deposited at an authorised waste transfer facility. Material suitable for public fill shall be re-used on site for uses such as landscaping or construction of bundwalls. If absolutely necessary, any surplus shall be delivered to the nearest public filling area, public filling barging point or public fill stockpile area after obtaining an appropriate licence. Suitable provisions shall be included in the construction contract to ensure that the Contractor sorts and recycles waste;
- vegetation shall be stripped prior to site clearance and chopped and compacted to reduce its volume;
- stockpiled material shall be covered by tarpaulin and /or watered as appropriate to prevent windblown dust and surface run off;
- excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage and dust generation;
- wheel washing facilities shall be used by all trucks leaving the site to prevent transfer of mud onto public roads;
- dredged marine mud shall be disposed of in a gazetted marine disposal ground under the requirements of the *Dumping at Seas Ordinance*;

- temporary storage areas for general refuse shall be enclosed. Sufficient dustbins shall be provided for storage of waste as required under the *Public Cleansing and Prevention of Nuisances By-laws*. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station.

- all waste containers shall be in good condition and fitted with lids or covers to prevent waste from escaping or the ingress of water;

- all waste containers shall be in a secure area on hardstanding;

- the Contractor shall register with EPD as a chemical waste producer under the *Waste Disposal (Chemical Waste) (General) Regulation*. A licensed contractor shall be employed to collect chemical waste for delivery to a licensed treatment facility. Suitable chemical waste storage areas shall be formed on site for temporary storage pending collection. All chemical wastes shall be handled, stored, transported and disposed of in accordance with the Code of Practice on the Package, Labelling and Storage of Chemical Wastes and A guide to the Chemical Waste Control Scheme published by the EPD;

- emergency equipment to deal with any spillage or fire shall be kept on site;

- a register of chemical products shall be kept on site together and include information on methods for safe handling, storage and disposal;

- all containers used for storage of chemical waste shall be maintained in good condition and clearly labelled in both English and Chinese;

- all storage areas for chemical waste shall be:

    - clearly labelled; enclosed on at least 3 sides;

    - have impermeable floor and bunding sufficient to fully retain any spillage or leakages;

    - ventilated; and,

    - covered to prevent rainfall from entering.

- all types of asbestos including sources (such as clutch linings) shall be treated as chemical waste. Asbestos containing wastes shall be kept separate from other wastes;

- all leaking containers shall be contained and removed from site as soon as practically possible;

- empty oil drums an chemical containers shall be removed from site as soon as is reasonably practicable;

- nightsoil arising from chemical toilets shall be transported by a licensed contractor to a Government Sewage Treatment Works for disposal in accordance with the Sanitation and Conservancy (Regional Council) By-laws; and,

- training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.

7.4 WASTE DISPOSAL RECOMMENDATIONS

The recommended disposal sites for the different types of waste are detailed in *Table 7.1* below:

Table 7.1 Recommended Waste Disposal Sites

Type of Waste	Disposal Site
Inert material (dirt/soil, concrete, bricks, masonry, ceramics, tiles, etc.) which comply with the requirements of the Public Dumping License	Re-use on site.
C&D waste (plastics, glass, wood, including cleared vegetation etc.)	WENT Landfill; or NWNT Transfer Station
Chemical waste (as defined under Schedule 1 of the Waste Disposal (Chemical Waste) Regulation)	Chemical waste treatment facility at Tsing Yi; or other approved facility.
General refuse	WENT Landfill; or NWNT Transfer Station
Marine dredged mud*	South of Cheung Chau and East of Sha Chau

* subject to quality

7.5 EM&A REQUIREMENTS

EM&A is recommended during the construction phase only and the effective management of waste arisings during the construction phase will be monitored through the site audit programme.

The aims of the waste audit are:

- to ensure the waste arising from the works are handled, stored, collected, transferred and disposed of in an environmentally acceptable manner; and,

- to encourage the reuse and recycling of material.

The Contractor shall be required to pay attention to the environmental standard and guidelines detailed in *Section 7.2* and carry out appropriate waste management and obtain the relevant licence/permits for waste

disposal. The Environmental Team Leader (ETL) shall ensure that the Contractor has obtained from the appropriate authorities the necessary waste disposal permits or licences including:

- Chemical Waste Permits/licenses under the *Waste Disposal Ordinance (Cap 354)*;
- Public Dumping Licence under the *Land (Miscellaneous Provisions) Ordinance (Cap 28)*;
- Marine Dumping Permit under the *Dumping at Sea Ordinance (Cap 466)*; and,
- Effluent Discharge Licence under the *Water Pollution Control Ordinance (Cap 358)*.

The Contractor shall refer to the relevant booklets issued by the DEP when applying for the licence/permit and the ETL shall refer to these booklets for auditing purposes.

During the site inspections and the document review procedures as mentioned in *Section 11* of this Manual, the ETL shall pay special attention to the issues relating to waste management and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws of Hong Kong (see above *Section 7.2*). In addition to the site inspections, the ETL shall review the documentation procedures prepared by the Waste Coordinator once a week to ensure proper records are being maintained and procedures undertaken in accordance with the WMP. Pursuant to *Condition 3.3* of the *EP*, the WMP shall be certified by the ET Leader and verified by the IEC.

The Contractor's waste management practices should be audited with reference to the checklist detailed in *Table 7.2* below:

Table 7.2 Waste Management Checklist

Activities	Timing	Monitoring Frequency	If non-compliance, Action Required
All necessary waste disposal permits or licences have been obtained	Before the commencement of demolition works	Once	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. Apply for the necessary permits/ licences prior to disposal of the waste. The ET shall ensure that corrective action has been taken.
Only licensed waste hauliers are used for waste collection.	Throughout the works	Weekly	The ET shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to use a licensed waste haulier. The Contractor shall temporarily suspend waste collection of that particular waste until a licensed waste haulier is used. Corrective action shall 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 shall be recorded (quantity of waste can then be estimated based on average truck load. Should landfill charging be implemented, the receipts of the charge could be used for estimating the quantity).	Throughout the works	Weekly	The ET shall inform the Contractor, FSR and IEC of the non-compliance. The Contractor shall estimate the missing data based on previous records and the activities carried out. The ETL shall audit the results and forward to the FSR and IEC for approval.
Wastes are removed from site in a timely manner. General refuse is collected on a daily basis.	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to remove waste accordingly.
Waste storage areas are properly cleaned and do not cause windblown litter and dust nuisance.	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to clean the storage area and/or cover the waste.
Different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste.	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to provide separate skips/ containers. The Contractor shall ensure the workers place the waste in the appropriate containers.

Activities	Timing	Monitoring Frequency	If non-compliance, Action Required
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	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to rectify the problems immediately. Warning shall be given to the Contractor if corrective actions are not taken within 24 hrs and of the EPD shall be identified.
Demolition material/waste in dump trucks are properly covered before leaving the site.	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall instruct the Contractor to comply. The Contractor shall prevent trucks shall leaving the site until the waste are properly covered.
Wastes are disposal of at licensed sites.	Throughout the works	Weekly	The ETL shall inform the Contractor, FSR and IEC of the non-compliance. The FSR shall warn the Contractor and instruct the Contractor to ensure the wastes are disposed of at the licensed sites. Should it involve chemical waste, the Waste Control Group of EPD shall be notified.

Note: ETL – Environmental Team Leader, IEC – Independent Environmental Checker, FSR – Franchisee's Site Representative

8 ECOLOGY

8.1 INTRODUCTION

The previous EIA (April 2002) recommended various EM&A measures for ecology to be undertaken in both the design phase and during construction during piling activities for the PAFF jetty. The objectives of the design audit were to ensure that the design process clearly implements the design ecology mitigation specified in the EIA and to ensure that such designs are ecologically feasible and effective. The construction EM&A objectives were to ensure that the ecological contract works and construction mitigation procedures recommended in the EIA for the protection of the Chinese White Dolphins were carried out as specified and were effective.

However, some construction works have been undertaken in accordance with Environmental Permit EP-139/2002/A and before works were suspended following the Judgement of the Court of Final Appeal of July 2006. For example, the percussive piling for the jetty was one of the activities that has been completed. As such, the following measures were undertaken in accordance with the EP during the piling works:

- dolphin acoustic monitoring;
- dolphin exclusion zone;
- pre-construction abundance monitoring;
- underwater noise monitoring;
- piling acoustic decoupling methods; and,
- bubble jacket trial, design and use.

Therefore, the remaining ecological EM&A required comprises post construction abundance monitoring in order to ensure that any shifts in dolphin distribution due to piling are detected and to determine the efficacy of the recommended mitigation measures, together with and an exclusion zone around the dredging operation within the Marine Park and along the pipeline. The overall procedures for the ecological EM&A during construction are shown in *Figure 8.1*.

8.2 CONSTRUCTION PHASE EM&A

The Environmental Team Leader (ETL) shall be responsible for conducting the EM&A programme and ensuring the Contractor's compliance with the project's environmental performance requirements during construction. The ETL will be required to establish the dolphin exclusion zone during dredging in the marine park and along pipeline and undertake the post construction

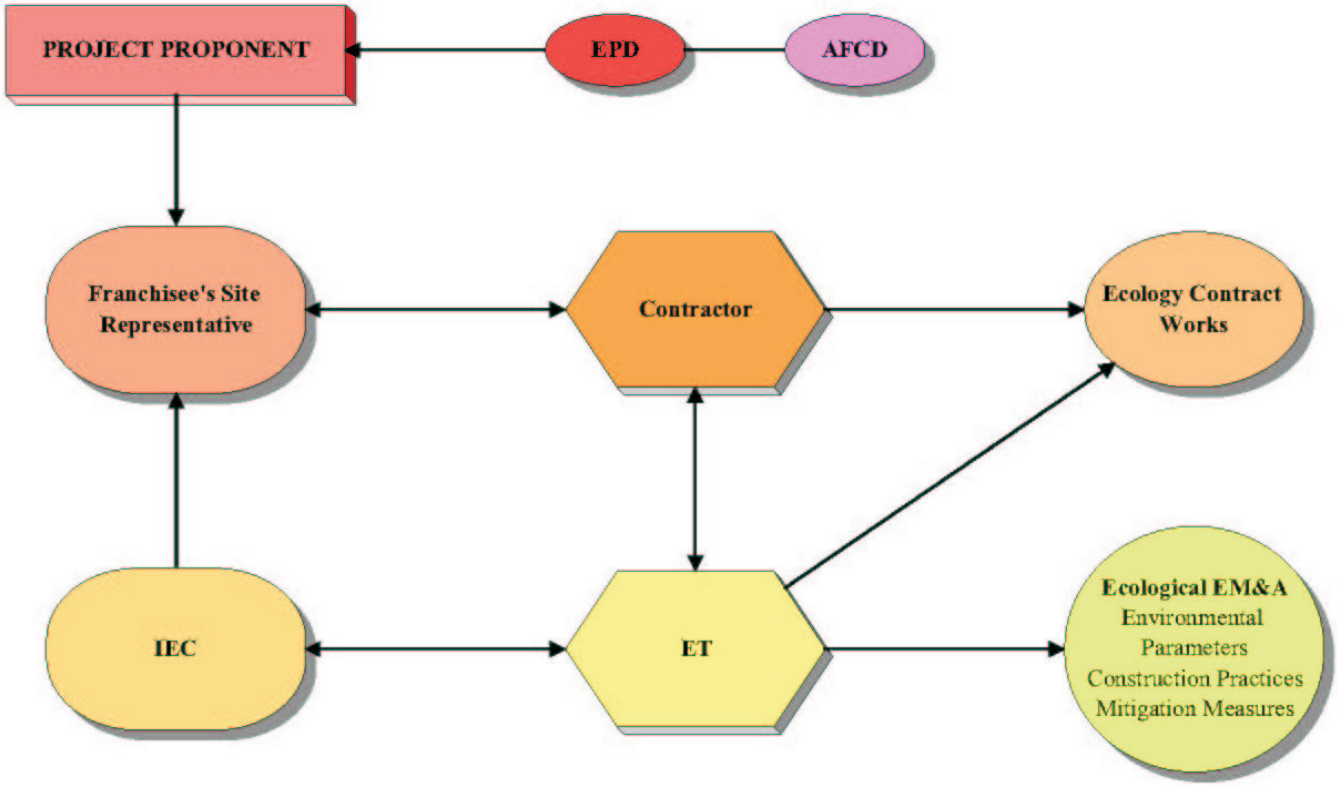

Figure 8.1

Ecology Procedures

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abundance monitoring, as detailed in *Section 1*. Further details of the EM&A requirements are detailed below.

8.2.1 Dolphin Exclusion Zone: Around all Dredging Operations

There does not appear to be any evidence to suggest that dredging activity has any deleterious impact to dolphins. No impacts are predicted to dolphin populations as a consequence of pipeline construction and as such no mitigation is required. Nevertheless, an exclusion zone around all dredging operations within the Marine Park and along the entire length of the pipeline should be implemented and dredging should not commence until the area is clear of dolphins. A dolphin exclusion zone within a radius of 250m around all dredgers should be implemented and the area visually inspected for dolphins prior to commencement of dredging. Although this exclusion zone is smaller than required for piling, as dredging is a considerably less intrusive activity, 250m is considered appropriate (Jefferson pers. comm.). In addition, as indicated in *Section 6*, the dredging plume is not expected to extend more than 100-200m from the dredger and as such a 250m exclusion zone is considered to be sufficient. The dolphin exclusion zone should be monitored by independent dolphin observer [(1)] with an unobstructed, elevated view of the area. Dredging should not begin until the observer certifies that the area is continuously clear of dolphins for a period of 30 minutes (thereby taking into account the approximate maximum dive time of the dolphins of 4 minutes). Following the 30 minute scan and when the area is found to be clear of dolphins, dredging may commence. Should dolphins move into the area during dredging, cessation of dredging is not required.

In addition, in accordance with the requirement from the Environmental Permit, no dredging works shall be carried out in the night time (i.e. from 1900 hours to 0700 hours of the following day) except for the section crossing the Urmston Road Channel as shown in *Figure 8.2*.

It should be noted that, according to the revised requirement of Environmental Permit *EP-262/2007/B* issued on February 2008, the radius of the dolphin exclusion zone has been revised to 500m.

8.2.2 Avoidance of Calving Season

According to recent dolphin data (AFCD, 2005) the dolphin calving season is from March to August and about 76% of calves are born in this period.

In accordance with the requirement from the Environmental Permit, no dredging works shall be carried out from March to August in order to avoid the peak calving season of Chinese White Dolphin.

[1] A qualified person with a degree in biology shall be employed to carry out monitoring and visual inspection of Chinese White Dolphin. The qualification and experience of qualified person shall be certified by ET Leader and verified by IEC. The qualified person shall form part of ET.

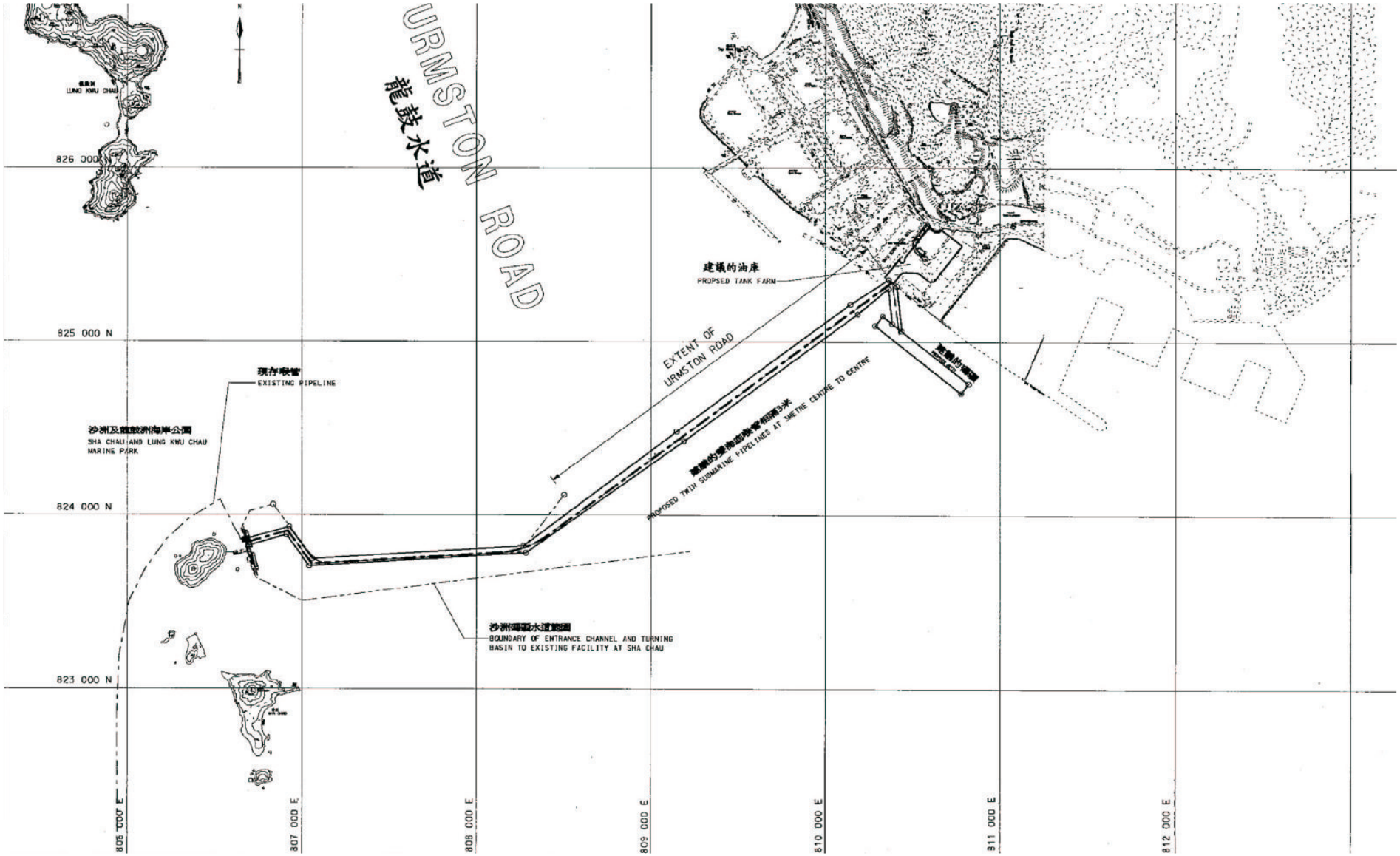

Figure 8.2
圖 8.2

Extent of Urmston Road Channel (Reproduces based no Figure 7.5 in EIA Report)
龍鼓水道的範圍

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8.2.3 Dolphin Monitoring

It should be noted that as some construction activities commenced in November 2005, before the Judgement of the Court of Final Appeal of July 2006, the pre-construction abundance monitoring was undertaken in late 2005 and the results are provided in *Appendix F3* of the *EIA report*. As such, the post-construction dolphin abundance monitoring will be required to be undertaken for during a period of 28 days prior to the operation of the PAFF.

In order to ensure that any shifts in dolphin distribution due to piling are detected and to determine the efficacy of the recommended mitigation measures, post construction monitoring of dolphin abundance is required. Should dolphin sighting numbers be significantly different (taking into account naturally occurring alterations to distribution patterns such as due to seasonal change) to the pre-construction activity (following the post-construction monitoring) recommendations for a further post-construction monitoring survey will be made. Data should be then be re-assessed and the need for any further monitoring established. Significance levels will be quantitatively determined following the post-construction monitoring which will review up-to-date publicly available information on dolphin distribution to allow for typical variance levels.

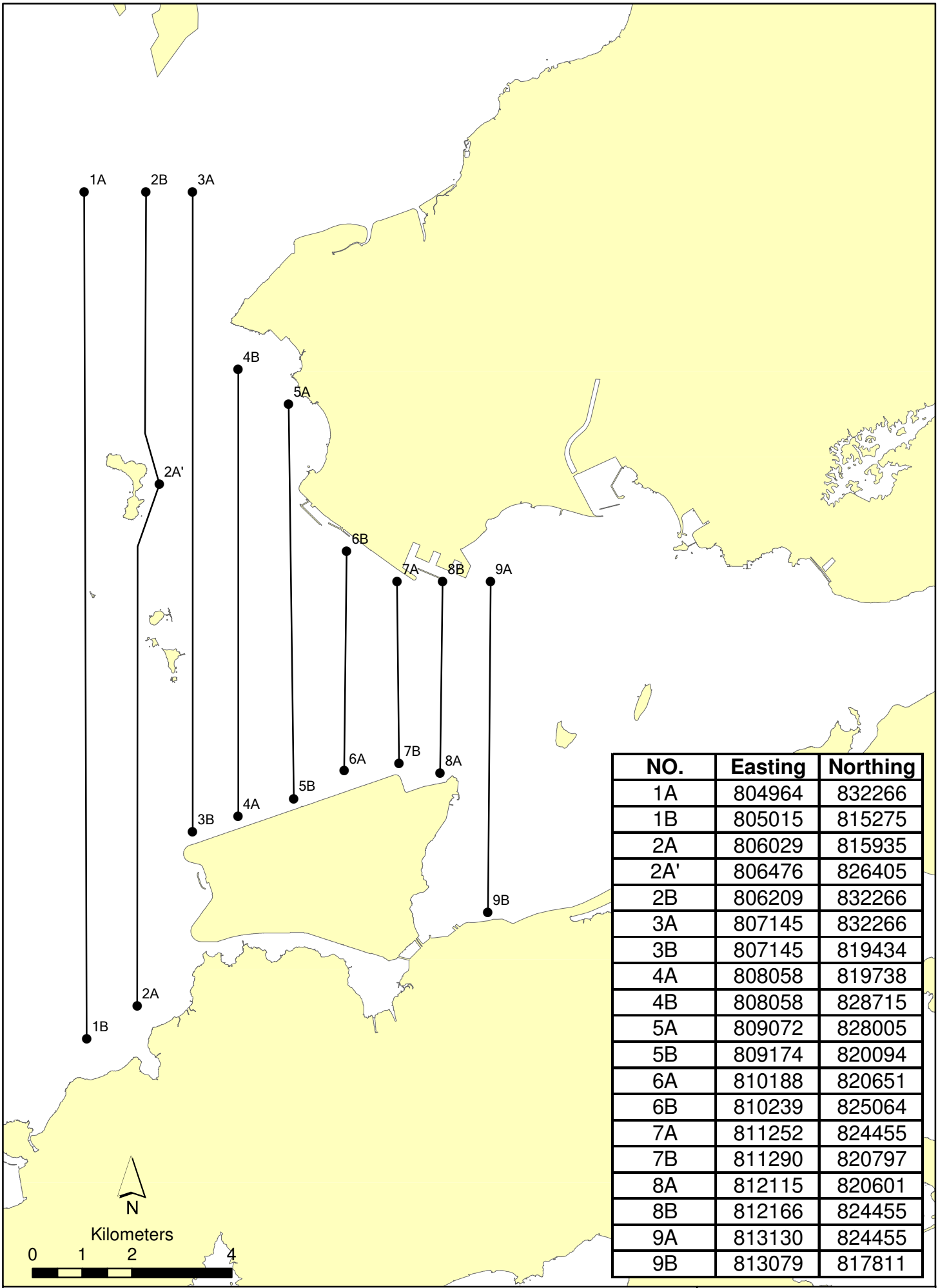
A monitoring programme is required for during a period of 28 days prior to the operation of the PAFF. The period required for the post-construction monitoring is based on the monitoring conducted for the AFRF and is considered to be adequate to derive a reasonably large amount of data thereby allowing any significant trends in dolphin distribution to be detected (Jefferson pers. comm.). Six, one-day survey events will be undertaken within the 28 consecutive day period for the post-construction monitoring events.

The monitoring should also be undertaken by a suitably qualified person (in biology) and should be independent of the construction contractor and should form part of the independent Environmental Team (ET). The IEC may audit the work of the ET if deemed necessary. Monitoring will be conducted following the methodology detailed below.

8.2.4 Vessel-based Observations

Line transect surveying techniques have now been standardised in Hong Kong Special Administrative Region Waters so that data from all surveys are directly comparable. The study area with line transects is presented in *Figure 8.3*. In order to provide a suitable long-term dataset for comparison, pre-and post construction phase dolphin monitoring will employ an identical methodology and follow the same line transects as those presented in *Figure 8.3*.

On each survey day, the survey vessel departed from Tung Chung New Pier. Observation for incidental sighting began immediately on departure from the assigned pier and continued until the vessel reached the survey area.



NO.	Easting	Northing
1A	804964	832266
1B	805015	815275
2A	806029	815935
2A'	806476	826405
2B	806209	832266
3A	807145	832266
3B	807145	819434
4A	808058	819738
4B	808058	828715
5A	809072	828005
5B	809174	820094
6A	810188	820651
6B	810239	825064
7A	811252	824455
7B	811290	820797
8A	812115	820601
8B	812166	824455
9A	813130	824455
9B	813079	817811

FIGURE 8.3

LINE TRANSECTS FOR DOLPHIN MONITORING

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The survey vessel had an open upper deck, allowing for observer eye heights of 4 to 5m above water level and relatively unobstructed forward visibility between 270° and 90°. When on-effort, the vessel travelled along the survey lines at a speed of approximately 7 to 8 knots (13 to 15 km/hr). The direction of the survey was alternated on different days to avoid possible biases related to the timing of the survey coverage.

Vessel-based transect observations by a three-person team were conducted by searching the 180° swath in front of the survey vessel (270° to 90°). The area behind the vessel was not searched, although dolphins observed here were recorded as off-effort sightings. A primary observer scanned the entire search path (270° to 90°) continuously with Fujinon 7X50 marine binoculars or equivalent as the second member of the team, designated the data "recorder", scanned the same area with the naked eye and occasional binocular check. The third observer on the boat rotated into the observation team after half an hour, thus relieving one of the initial team. Observers rotated every half an hour. While on-effort, observers were instructed to ignore potential sighting cues that could bias the sighting distance calibration (eg pair-trawl fishing vessels).

A critical consideration in the survey was to ensure a strict timed quantification of "sighting effort" in order to maximise the comparative value of the field survey results. The time and position for the start and end of a period of intensive, uninterrupted effort, and the sighting conditions such as visibility range and Beaufort scale associated with it were recorded. The collection of effort data allowed comparisons within a single study as well as between studies. Strict recording of time and speed travelling along the assigned transect ("on-effort") was always therefore recorded. Time spent during any deviation from the transect was recorded as "off-effort".

During periods of poor weather, when visibility is hindered (eg below 1km) or when Beaufort force 5 is reached, the survey would normally be postponed. Such conditions did not occur during the survey. During data analysis, however, only data collected in conditions of Beaufort force 3 or less will be used.

Sightings distant to 500m perpendicular distance and sightings of single dolphins that were hard to track were not pursued (although those distant to 500m ahead of the vessel were pursued). The initial sighting distance between the dolphin and the survey vessel and sighting angle was recorded in order to calculate the perpendicular sighting distance (PSD). These and other details of the sighting, include the exact location of the sighting, number of individuals were on every occasion discussed among the observation team and recorded immediately. Distances and angles were made as accurately as possible.

A global positioning system was available on board and used during every field survey. A sighting record was filled out at the initial sighting with time, position, distance and angle data filled in immediately and verified between

primary observer and recorder. All other information on sea state, weather conditions (Beaufort Scale), as well as notes on dolphin appearance, behaviour, and any other information were completed at the end of the sighting.

An action plan has also been defined (*Table 8.2*) to indicate that should dolphin numbers be significantly different (taking into account naturally occurring alterations to distribution patterns such as due to seasonal change) to the pre-construction activity following the 6 days post-construction monitoring, recommendations for a further 6 days monitoring with a 28 day period will be required. The action plan should be undertaken within a period of 1 month after a significant difference has been determined. For the purpose of the EM&A works, the "significance" level which will trigger the action plan shall be proposed by the ET as part of the post-construction monitoring programme design to be agreed with AFCD prior to the monitoring being undertaken.

A summary of equipment requirement is summarized in *Table 8.1.*

Table 8.1 Summary of Equipment Requirement

Equipment	Type
Vessel for Monitoring	A monitoring boat which should have a flying bridge or upper deck with a relatively unobstructed forward visibility (270^{o} – 90^{o}) allowing for observer eye height of 4-5m above water
Observation	Fujinon 7X50 marine binoculars (or similar) with compass/reticule
Calibration	Leica Geovid laser range finder binnacles or equivalent
Records	Clipboard
Navigation and Positioning	Global Positioning System Device (Magellen NAV 5000D or similar approved) (+ spare batteries)

8.3 MITIGATION MEASURES

As the piling of the jetty has been completed and this has the highest potential to result in impacts to the Chinese White Dolphin, mitigation measures to minimise impacts from the remaining construction activities on the Chinese White dolphin have been recommended by the EIA. No other significant ecological impacts are predicted as a result of the project, however, measures recommended to minimise impacts on water quality will also reduce impacts on ecological resources. The ecological mitigation measures to be implemented during the construction phase are as follows:

- implementation of a 250m dolphin exclusion zone during dredging in the Marine Park and along the length of the pipeline (as indicated in *EIA report*,

the dredging plume is not expected to extend more than 100-200m from the dredger and as such a 250m exclusion zone is considered to be sufficient); restricted dredging to a daily maximum of 12 hours within daylight hours except for the section crossing Urmston Road Channel. The Urmston Road section of the pipeline is indicated in *Figure 8.2*;

- no hydraulic dredging shall be carried out within the Sha Chau and Lung Kwu Chau Marine Park;

- pipeline trench dredging within Sha Chau and Kung Kwu Chau Marine Park shall be scheduled to coincide with maintenance dredging for marine access channel for Sha Chau Aviation Fuel Receiving Facility;

- no construction work shall be carried out from shore or land within the Sha Chau and Lung Kwu Marine Park;

- avoid dredging during the calving season between March and August; and,

- undertake 6 days post construction dolphin abundance monitoring within a 28 day period. Comparison of the post construction dolphin monitoring with that of over the pre-construction dolphin monitoring will allow the assessment of the overall efficacy of the project-specific mitigation measures through the implementation of an Action Plan detailed in the *Table 8.2* below. Statistical procedures shall be used for data comparison. A range of applicable statistical procedures exist (e.g., t-test, ANOVA and ANCOVA, etc.) and the ET shall propose the procedure to be applied as part of the post-construction phase dolphin monitoring programme design to be agreed with AFCD prior to the monitoring being undertaken.

Table 8.2 Action Plan for Dolphin Monitoring

EVENT	ACTION			
	ETL	**IEC**	**FSR**	**Contractor**
Dolphin numbers recorded in the post-construction monitoring are significantly lower than those recorded in the pre-construction monitoring	1. Repeat statistical data analysis to confirm findings; 2. Review historical data to ensure differences are as a result of natural variation or previously observed seasonal differences; 3. Identify source(s) of impact; 4. Inform the IEC, FSR and Contractor; 5. Check monitoring data, all plant, equipment and Contractor's working methods; 6. Discuss mitigation measures, such as additional dolphin monitoring, with the IEC and Contractor.	1. Discuss monitoring with the ETL and the Contractor; 2. Review proposals for repeat monitoring and any other measures submitted by the Contractor and advise the FSR accordingly;	1. Discuss the repeat monitoring and any other measures proposed by the ETL with the IEC; 2. Make agreement on the measures to be implemented.	1. Inform the FSR and confirm notification of the non-compliance in writing; 2. Discuss with the ETL and the IEC and propose measures to the IEC and the FSR; 3. Implement the agreed measures.

Note: ETL – Environmental Team Leader, IEC – Independent Environment Checker, FSR – Franchisee's Site Representative

9 CULTURAL HERITAGE

9.1 RELEVANT LEGISLATION

The Environmental Impact Assessment Ordinance (EIAO) stipulates that consideration must be given to issues associated with cultural heritage and archaeology as part of the EIA process. Respectively Annexes 10 and 19 of the Technical Memorandum on EIA Process (TM) outline the following:

- the criteria for evaluating the impacts on sites of cultural heritage; and,
- guidelines for impact assessment.

The TM identifies a general presumption in favour of the protection and conservation of all sites of cultural heritage and requires impacts upon sites of cultural heritage to be 'kept to a minimum'. There is no quantitative standard for determining the relative importance of sites of cultural heritage, but in general sites of unique, archaeological, historical or architectural value should be considered as highly significant.

In addition, since the introduction of the EIAO, the Antiquities and Monuments Office (AMO) have the power to request a Marine Archaeological Investigation (MAI) for developments affecting the seabed.

Chapter 10 of the *HKPSG* provides guidelines relating to the conservation of historic buildings, archaeological sites and other antiquities. The guidelines detail the methods for the conservation and preservation of protected monuments, the method of identifying and recording antiquities, particularly buildings which should be conserved and the recording and grading of the such buildings and archaeological sites. The process of monuments and development control through the planning process is also highlighted.

Legislation relating to antiquities is set out in the Antiquities and Monuments Ordinance (*Chapter 53* of the *Laws of Hong Kong*), which came into force on January 1st 1976. The legislation applies equally to sites on land and underwater. The purpose of the Ordinance is to prescribe controls for the discovery and protection of antiquities in Hong Kong. A summary of the key aspects of the legislation relevant to the current study is presented below:

- Human artefacts, relics and built structures may be gazetted and protected as monuments. The Antiquities Authority may, after consultation with the Antiquities Advisory Board (AAB) and with Government approval, declare any place, building, site or structure which the Antiquities Authority considers to be of public interest by reason of its historical, archaeological or palaentological significance, to be a monument, historical building, archaeological or palaentological site or structure;

- Once declared a site of public interest, no person may undertake acts, which are prohibited under the Ordinance, such as to demolish or carry on building or other works, unless a permit is obtained from the Antiquities Authority;

- For archaeological sites, all relics dated prior to 1800 AD belong to the Hong Kong Government. Archaeological sites are classified into three categories, as follows:

    - Designated – those that have been declared as monuments and are to be protected and conserved at all costs;

    - Administrative Protection – those which are considered to be of significant value but which are not declared as monuments and should be either protected, or if found not possible to protect these sites then salvaged; and,

    - Monitored – those which are of lesser significance or whose potential is not fully assessed which should not be disturbed with the exception of minor works if they are permitted and monitored by AMO

- The Legislation sets out the procedures for the issuing of Licences to Excavate and Search for Antiquities, the effect of which is to forbid all such activities being undertaken without such a licence. It also provides for the penalties exacted for infringement of the Ordinance, including fines and imprisonment.

The Antiquities and Monuments Office (AMO) of the Leisure and Cultural Services Department is part of the Government Secretariat and comprises the executive arm of the Antiquities Authority. The Antiquities and Monuments Office services the Antiquities Advisory Board who are responsible for advising the Government on sites which merit protection. The office further has responsibility for the protection of buildings and items of historical interest and areas of archaeological significance.

The Home Affairs Bureau provide guidelines and Criteria for Cultural Heritage Impact Assessment (CCHIA) which stress that preservation in totality must be taken as the first priority. Projects undertaken are not to cause excessive impact on archaeologically and historically important sites unless there are adequate protection or mitigation measures or a satisfactory rescue plan is proposed.

The AMO considers all buildings and structures in the following categories to be historical and deserving of consideration for preservation:

- all pre-1950 buildings and structures; and,

- selected post-1950 buildings and structures of high architectural and historical significance and interest.

Once identified as having the potential for conservation, buildings are entered into the record. They are then graded by AMO to show their relative value. Evaluation is based on the following criteria:

- outstanding architectural merits - especially features emphasising certain period, technological and artistic merits;

- special historical interest - accommodating important civic or social function, for example, ancestral halls, religious buildings, post offices, city halls, courts of law, railways station, etc;

- associations - with important events or well-known persons; and,

- group value - especially in historic villages.

Archaeological sites are identified and recorded by the AMO as they are revealed through systematic survey, casual finding and/or the EIA process. All such archaeological sites are considered to be of cultural heritage value and their preservation in totality is taken as the primary aim of the EIA process. The CHIA stipulate that if this is not possible, amelioration must be achieved by reduction of potential impacts and preservation achieved by means of detailed cartographic and photographic survey or preservation of an archaeological site "by record", i.e. through excavation to extract the maximum data as the very last resort. The search for and excavation of all archaeological material requires a license from the Antiquities Authority.

The AMO issue Guidelines for Marine Archaeological Investigation (MAI) which details the standard practice, procedures and methodology which must be undertaken in determining the marine archaeological potential, presence of archaeological artefacts and defining suitable mitigation measures.

9.2 MITIGATION MEASURES

The diver survey did not reveal any material of cultural significance after investigation of the exposed, above surface anomalies and as such no mitigation measures are required. However, the sub-surface anomalies identified by the geophysical survey could not be examined by the diver survey and as such as a watching brief is recommended. This would comprise:

- Dredge operators to be made aware of the potential presence of cultural heritage material. The operators would be required to report to the AMO any unusual resistance and/or recovery of timbers, anchors or other wreck related material. Any obstacles encountered during the dredging that are

of timber should be reported to the maritime archaeologist. The obstacle should be avoided and not removed until it has been assessed by the marine archaeologist as to whether the obstacle is of cultural heritage importance;

- A qualified marine archaeologist as a member of the ET shall be on board the dredging barge during dredging within 25m either side SS1 and SS2 (Figure 5a and 5b, MIA Task 4.1, Appendix G of EIA report) in the event of any unusual resistance occurring or blockages which requires the dredge head to be bought on deck for cleaning and examination; and,

- Dredging to cease in the nominated area SS1 after 3 metres of sediment removal and after 1 metre for SS2. A dive survey will then be undertaken to examine the trench for possible cultural remains.

During the course of the watching brief, if the targets are identified as being potentially archaeologically important, then an immediate marine archaeological impact assessment in accordance with EIAO TM Annex 19 will be required to be undertaken by a qualified marine archaeologist.

The details of SS1 and SS2 are detailed in *Table 9.1* below.

Table 9.1 Sub-surface Targets

Target	Approximate Depth	Depth below sea bed (m)	Length (m)	Height (m)	Latitude	Longitude
SS1	19	2.5	30	4	22°21.9263'N	113°55.3930'E
SS2	21	Exposed(1)	18	2.5	22°21.8318'N	113°55.2557'E

(1) MAI Report does not specify the depth.

In addition, it is recommended that any changes, additions or alterations to the dredging method and alignment should be further assessed by a marine archaeologist to determine if any further assessment is required. These recommendations are included in the Environmental Mitigation Implementation Schedules in *Annex B*.

9.3 CONSTRUCTION PHASE AUDIT

All mitigation measures which are recommended by the MAI shall be undertaken and supervised by a qualified marine archaeologist engaged by the Contractor. In the event of non compliance, the responsibilities of the relevant parties are detailed in the Event / Action plan provided on *Table 9.2*. The Event/Action plan shall be reviewed once the findings of the MAI are known.

Table 9.2 Event / Action Plan for Construction Phase

Action Level	ETL[1]	IEC[1]	FSR[1]	Contractor[1]
Non-conformity on one occasion	1. Identify Source 2. Inform the IEC and the FSR 3. Discuss remedial actions with the IEC, the FSR and the Contractor 4. Monitor remedial actions until rectification has been completed	1. Check report 2. Check the Contractor's working method 3. Discuss with the ETL and the Contractor on possible remedial measures 4. Advise the FSR on effectiveness of proposed remedial measures. 5. Check implementation of remedial measures.	1. Notify Contractor 2. Ensure remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify Source 2. Inform the IEC and the FSR 3. Increase monitoring frequency 4. Discuss remedial actions with the IEC, the FSR and the Contractor 5. Monitor remedial actions until rectification has been completed 6. If exceedance stops, cease additional monitoring	1. Check monitoring report 2. Check the Contractor's working method 3. Discuss with the ET and the Contractor on possible remedial measures 4. Advise the FSR on effectiveness of proposed remedial measures 5. Supervise implementation of remedial measures.	1. Notify the Contractor 2. Ensure remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake any necessary replacement

Note: (1) ETL – Environmental Team Leader, IEC – Independent Environmental Checker, FSR – Franchisee's Site Representative

10 LANDSCAPE AND VISUAL

10.1 INTRODUCTION

The EIA has recommended the EM&A for landscape and visual resources is undertaken during both the design, construction and operational phases of the project. The design, implementation and maintenance of landscape mitigation measures is a key aspect of this and 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 possible date and without compromise to the intention of the mitigation measures. In addition, implementation of the mitigation measures recommended by the EIA will be monitored through the site audit programme.

10.2 MITIGATION MEASURES

The Landscape and Visual Assessment of the EIA recommended a series of mitigation measures for the construction phase to ameliorate the landscape and visual impacts of the project. These measures include the following, which are also summarised in the environmental mitigation implementation schedules provided in *Annex B*:

- the construction programme for the PAFF should be reduced to the shortest possible period and should be executed in phases;
- the extent and periphery of the works areas should be managed so that they are as small as possible and do not appear cluttered, untidy and unattractive, particularly to road traffic along Lung Mun Road;
- temporary hoarding barriers should be of a recessive visual appearance in both colour and form;
- materials should be stored in areas with the least obstruction to residents, pedestrians and traffic;
- all material stockpiles should be covered with an impermeable material and sandbagging diversions should be placed around exposed soil;
- a raised bund/earth mound comprising containment bund-wall, access road and planting buffer shall be built around the tank farm;
- transplantation of existing road side whips affected by the proposed works and new compensatory planting works should be carried within the first year of construction;
- the design of all the buildings and structures of the PAFF should incorporate materials, details and textures which are visually recessive;

- non-reflective neutral grey colours with low chromatic intensity for the tanks and jetty to reduce the potential contrast between the tanks and their background;

- building roofs should have a thin edge and walls of office building should be set back and be dark either in colour or by being in shadow;

- light colours and tones of grey, green and blue shall be used for all buildings;

- building roof shall be durable insulated, self cleansing, rigid curved metal cladding system (either steel or aluminium) with a non-reflecting matt and/or textured) finish;

- building external walls shall be finished in an aluminium panel and general walls to be finished in ceramic tile (self cleaning/dust-proof) and/or durable textured external spray paint;

- security fencing should be used around the perimeter; minimum amount of lighting for the tanks, only applied for safety at the key access points and staircases;

- limited lighting intensity on the site; and directional down lighting is suggested to minimise light spill to the surrounding.

10.3 DESIGN PHASE AUDIT

The landscape measures proposed within the EIA to mitigate the landscape and visual impacts of the scheme should be embodied into the detailed landscape design drawings and contract documents including the protection of existing trees where possible, the transplanting of existing trees and the planting of new trees and shrubs. Designs should be checked to ensure that the measures are fully incorporated and that potential conflicts with civil engineering, geo-technical, structural, lighting, signage, drainage, underground utility and operational requirements are resolved prior to construction.

The design phase EM&A requirements for landscape and visual resources comprise the audit of the detailed landscaping and visual specifications to be prepared during the detailed design together with ensuring that the design is sensitive to landscape and visual impacts and that landscape resources are retained as far as practicable. Monitoring of design works against the recommendations of the landscape and visual impact assessments within the EIA should be undertaken as and when the designs are produced to ensure that they fulfil the intentions of the mitigation measures.

The landscape and visual auditor shall review the designs as and when they are prepared and liaise with the landscape architect and design engineer to

ensure all measures have been incorporated in the design in a format that can be specified to the Contractor for implementation. In the event of a non conformity, the Event/Action plan as detailed in *Table 10.1* below should be followed.

Table 10.1 Event / Action Plan for Design Phase

Action Level	Landscape and Visual Auditor	Project Engineer (PE)	Project Landscape Architect (PLA)
Non Conformity (with Design Standards and Specification)	• Identify Source • Inform PE and PLA • Discuss remedial actions with PE, PLA • Verify remedial actions when complete	• Notify PLA • Discuss remedial actions with PLA • Ensure remedial designs are fully incorporated	• Amend designs • Discuss remedial actions with PE

10.4 BASELINE MONITORING

Baseline monitoring for the landscape will comprise a vegetation survey of the vegetation and trees on the site. Representative vegetation types will be identified along with typical species composition.

The landscape and visual baseline will be determined with reference to the landscape and visual impact assessments included in the EIA Report.

10.5 CONSTRUCTION AND POST-CONSTRUCTION PHASE AUDIT

A specialist Landscape Sub-Contractor should be employed by the Contractor for the implementation of landscape construction works and subsequent maintenance operations during the 24 month establishment period. It is proposed that as the majority of the planting works in the area not to be development initially, the planting should be conducted within the first half of the construction contract. Thus, the establishment works will be undertaken through the latter half of the construction contract. The intention is to provide at least 24 months establishment period for the majority of the planting works.

All measures undertaken by both the Contractor and the specialist Landscape Sub-Contractor during the construction phase and first year of the operational phase shall be audited by a Registered Landscape Architect, as a member of the ET, on a regular basis to ensure compliance with the intended aims of the measures. Site inspections should be undertaken at least once every two weeks throughout the construction period and once every two months during the operational phase. The broad scope of the audit is detailed below but should also be undertaken with reference to the more specific checklist

provided in *Table 10.2*. Operational phase auditing will be restricted to the last 12 months of the establishment works of the landscaping proposals and thus only the items below concerning this period are relevant to the operational phase.

- the extent of the agreed works areas should be regularly checked during the construction phase. Any trespass by the Contractor outside the limit of the works, including any damage to existing trees shall be noted;
- the progress of the engineering works should be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken;
- all existing trees and vegetation within the study area which are not directly affected by the works are retained and protected;
- the methods of protecting existing vegetation proposed by the Contractor are acceptable and enforced;
- preparation, lifting transport and re-planting operations for any transplanted trees;
- all landscaping works are carried out in accordance with the specifications;
- the planting of new trees, shrubs, groundcover, climbers, ferns, grasses and other plans, together with the replanting of any transplanted trees are carried out properly and within the right season; and,
- all necessary horticultural operations and replacement planting are undertaken throughout the Establishment Period to ensure the healthy establishment and growth of both transplanted trees and all newly established plants.

Table 10.2 Construction/Post-Construction Phase Audit Checklist

Area of Works	Items to be Monitored
Advance planting	monitoring of implementation and maintenance of planting, and against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Protection of all trees to be retained	identification and demarcation of trees / vegetation to be retained, erection of physical protection (e.g. fencing), monitoring against possible 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 minimise damage, monitoring of adjacent areas against possible 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 minimise damage, timing of operations, implementation of all 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 possible incursion, physical damage, fire, pollution, surface erosion, etc.
Decorative treatment of site hoarding	implementation and maintenance, to ensure compliance with agreed designs.
Architectural design and treatment including visually recessive designs, materials, textures and colours for office buildings, oil tanks, jetty and other associated buildings, structures and engineerins works.	implementation and maintenance of mitigation measures, to ensure compliance with agreed designs.
Establishment Works	monitoring of implementation of maintenance operations during Establishment Period

In the event of non-compliance the responsibilities of the relevant parties is detailed in the Event / Action plan provided on *Table 10.3*.

Table 10.3 Event / Action Plan for Construction Phase

Action Level	ETL[1]	IEC[1]	FSR[1]	Contractor[1]
Non-conformity on one occasion	1. Identify Source 2. Inform the Contractor, IEC and the FSR 3. Discuss remedial actions with the IEC, the FSR and the Contractor 4. Monitor remedial actions until rectification has been completed	1. Check report 2. Check the Contractor's working method 3. Discuss with the ETL and the Contractor on possible remedial measures 4. Advise the FSR on effectiveness of proposed remedial measures. 5. Check implementation of remedial measures.	1. Notify Contractor 2. Ensure remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify Source 2. Inform the Contractor, IEC and the FSR 3. Increase monitoring frequency 4. Discuss remedial actions with the IEC, the FSR and the Contractor 5. Monitor remedial actions until rectification has been completed 6. If exceedance stops, cease additional monitoring	1. Check monitoring report 2. Check the Contractor's working method 3. Discuss with the ETL and the Contractor on possible remedial measures 4. Advise the FSR on effectiveness of proposed remedial measures 5. Supervise implementation of remedial measures.	1. Notify the Contractor 2. Ensure remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake any necessary replacement

Note: (1) ETL – Environmental Team Leader, IEC – Independent Environmental Checker, FSR – Franchisee's Site Representative

11 LAND CONTAMINATION, HAZARD TO LIFE AND FUEL SPILL RISK

11.1 INTRODUCTION

The EIA has recommended that EM&A for land contamination, hazard to life and environmental risk be undertaken during the design phase of the project. A design phase audit is recommended to ensure that the design of the PAFF, including the spill response plan, includes 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

The Land Contamination, Hazard to Life and Fuel Spill Risk sections of the EIA have recommended a series of mitigation measures for integration into the design. All mitigation measures for these three parameters are based upon the need to minimise the likelihood of the loss of fuel from the system occurring, specify procedures to detect and contain a leak if it did occur and define methods for clean up and disposal. These measures include the following, which are also summarised in the environmental mitigation implementation schedules provided in *Annex B*:

- ultimate bunding of all fuel storage areas to a level of up to 150% of largest individual tank in each compound;
- adherence to relevant design standards for storage tanks, pipework, containment and drainage;
- regular monthly plant inspections and maintenance; impermeable lining of tank pits; leak detection systems;
- controlled surface drainage and the provision of emergency shut off valves;
- emergency spill response plans;
- provision of spill control materials and equipment on site;
- run off from the roofs of site buildings and landscaped areas shall be conveyed in closed drains to the nearest storm water drain to prevent the generation of excessive quantities of surface water which may be polluted;
- suitable absorbent materials (e.g. sand or earth) shall be kept on site to deal with spills. Chemical dispersants shall not be employed;
- the facility shall be designed, constructed, operated and maintained in full accordance with the Code of Practice for Oil Installations, 1992;

- tank pressure testing shall be carried out routinely to check for possible tank leaks. Product inventory monitoring shall be integrated into site management procedures to check for any abnormal or unexpected product loss;

- tank overfill monitoring systems shall be installed and regularly tested. Inlet valves should automatically shutdown on exceedance of "high-high level" to prevent over-filling; pipe leakages shall be routinely checked for by means of a pressure sensitive leak detection system and routine inventory control; pipeline to be protected by armour layer;

- drainage from areas of hardstanding shall be treated by means of oil / water separators prior to discharge to storm drain. All surface drainage shall be fitted with closure valves to provided additional containment and facilitate clean up of any leaks; and,

- the delivery pipeline from the jetty and the supply line to the airport shall be fitted with pressure sensitive leak detectors.

The results of the spill modelling have shown that some key sensitive marine ecological receivers could be affected in the short term by a spill associated with the PAFF. As such it will be necessary to include contingencies to protect these resources in the spill response plan. The locations which should be protected by the rapid use of booms are as follows:

- Ma Wan fish culture zone;

- Lung Kwu Tan beach and horseshoe crab nursery area;

- Tai Ho Wan mangroves and seagrass stands and horseshoe crab nursery area; Tai O mangrove stand;

- gazetted beaches in Castle Peak Bay and along the coast to Sham Tseng;

- coastline of Lung Kwu Tan, Sha Chau and Tree Island;

- Sha Chau and Lung Kwu Chau Marine Park; and,

- Tung Chung Bay/San Tau mangrove and seagrass stands and horseshoe crab nursery area.

The PAFF operator will maintain a readiness to react to any fuel spills in the Spill Response Plan procedure which will set out all necessary actions for preparedness, prevention and responses. The rationale for the spill response plan should be based around prevention and early detection and will be continuously developed before and after the commissioning of the PAFF. In particular, the spill response plan will define procedures to contain and clean up spills of various categories in order to reduce hazards to life and impacts to the environment. A Jetty Operation Manual will be prepared to specify the

requirements for vessels to berth at the jetty including the compulsory use of pilots and tug boats. In addition, spill control equipment will be stored at the PAFF tank farm and the jetty and will include at least the following:

- sand bags;
- oil water separator;
- containment booms;
- oil skimmers with recovery containers;
- absorbent booms; and,
- absorbent pads.

On the prevention side, the whole PAFF facility will be protected by impressed current cathodic protection system and monitoring by a leak detection system to prevent and manage the risk of fuel leakage. Routine inspections will be undertaken on a regularly basis (such as daily, weekly, monthly or quarterly basis) to ensure the proper functioning of the whole facility.

The key features which should be included in the spill response procedures are summarised below and an outline Fuel Spill Contingency Plan is provided in Appendix J3 of the EIA Report:

- organization of the spill response team and the responsibilities of each member;
- response procedures to be adopted in the case of a spill, including:
    - identification of the source of spill;
    - reporting to relevant Authorities;
    - containment of leaking fuel;
    - recovery and processing of free fuel;
    - clean up methodology;
    - handling and disposal protocols; and,
    - at sea surveys and beach surveys for dolphins to look for stranded animals and include the need to liaise with Ocean Park specialists to get their assistance in rehabilitation of any dolphins that might be affected by the spill.
- establishment of an emergency control centre on the PAFF site;

- establishment of effective communication emergency mechanisms and a 24-hour emergency contact list;
- training and competence level requirement of PAFF staff;
- suitable and regular spill response training to be provided to the operating personnel and regular spill response drills to be conducted to test and exercise the responses;
- provision and maintenance of spill equipment at the PAFF land site, on the PAFF jetty at the Sha Chau reception point and at the HKIA site;
- drills and exercise requirements; and,
- follow-up procedures and post spill recordings

11.3 DESIGN PHASE AUDIT

The measures proposed within the EIA to mitigate for 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 fully 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 design phase EM&A requirements for land contamination and risk to life and the environment comprise the audit of the integrated fuel spill control, detection and containment detailed design specifications to be prepared during the detailed design. Monitoring of design works against the recommendations within the EIA should be undertaken as and when the designs are produced to ensure that they fulfil the intentions of the mitigation measures. The design items for audit will include:

- land and marine spill response plan; pipeline leak detection and automatic shut-off system;
- pipeline rock armour protection;
- tank high level shut-off; tank bunding;
- tank leak drainage isolation and containment system;
- on-site fire fighting equipment;
- jetty protection; and,
- emergency shut down valves for fuel delivery.

Detailed design of the facility will extend into the construction period. EM&A for the Design Phase refers to audit of the design as and when it is completed and is thus not necessary pre-construction. The design audit shall be undertaken by the ETL when the relevant design aspects are produced and liaise with the design engineer to ensure all measures have been incorporated in the design in a format that can be specified to the Contractor for implementation.

The audit shall cover specific environmental protection measures earmarked for implementation during the Design Phase, as indicated in the *Implementation Schedule* in *Annex B* of this manual. As part of the procedures of the audit, relevant design information and documentation, such as engineering design drawings, design memoranda and procurement specification, shall be reviewed from an environmental perspective to determine whether the required environmental protection measures have been provided in accordance with the recommendations of the EIA Report or the relevant EP Conditions.

In the event of a non conformity, the Event/Action plan as detailed in *Table 11.1* below should be followed. The outcome of all the design audits undertaken will be reported in the Design Audit Report to be deposited with EPD before the operation of the Project in accordance with EP Condition 4.1.

Table 11.1 Event / Action Plan for Design Phase

Action Level	Auditor	Franchisee's Site Respresentative (FSR)	Design Engineer (DE)
Non Conformity (with Design Standards and Specification)	• Identify Source • Inform FSR and DE • Discuss remedial actions with FSR and DE • Verify remedial actions when complete	• Discuss remedial actions with DE • Ensure remedial designs are fully incorporated	• Amend designs • Discuss remedial actions with FSR

Prior to the operation of the facility, the Franchisee will submit a Design Audit Manual, as detailed in *Section 13.3.*

11.4 OPERATIONAL IMPACT MONITORING

Much of the prevention for the risks to human life, leakages and spillages, on land and in the sea, are based upon the design and construction of PAFF following the latest technology, standards and guidelines. In order to ensure that the required design measures are taken into account during the planning and design for the future tank development, a review of the EIA report will be

undertaken at the planning stage for the future expansion (around 2025 as required). The review should be undertaken by an environmental specialist appointed by the Franchisee at that time.

In addition, the following regular inspections and audits will be undertaken by the Franchisee during the operational phase of the facility:

- two inspections every year of the tank farm, jetty and pipelines including one undertaken pursuant to the Joint Inspection Group (JIG) explained above;
- inspection of the whole sub sea pipelines every 5 to 10 years;
- Health, Safety and Environmental audit of the facility once every 3 years; and,
- inspection of the structural integrity of the tanks once per year.

Also, in order to ensure the on-going adequacy of the fuel spill contingency plan and that it is being implemented as required, it is proposed that an Environmental Management System be set up for the operational phase of the project to allow regular audits of the systems/mitigation measures incorporated in the project and the fuel spill contingency plan. The Environmental Management System shall be developed and implemented prior to the commencement of the operation of the PAFF and it is recommended that audits are undertaken at least every 12 months and the audits should be undertaken by an environmental specialist appointed by the Franchisee. An audit report which shall include, amongst others, an operation manual providing operating and monitoring procedures for the PAFF operation shall be deposited at least 6 months before operation of the project.

In addition, it is recommended that the Franchisee undertake some routine monitoring of water quality in the vicinity of the PAFF site to check the effectiveness of the proposed precautionary measures implemented for on-site spill control. The details of the monitoring to be undertaken, including the parameters, frequency and monitoring locations, will be prepared by the Franchisee as part of the PAFF Operations Manual and the details will be agreed with the relevant authorities prior to the commencement of operation of the PAFF. However, the monitoring should include but not be limited to the parameters of TPH and PAH and reference should be made to the existing monitoring programme undertaken for the fuel tank farm on the HKIA platform. As such, the details of this monitoring are not specified in this Manual.

12 SITE ENVIRONMENTAL AUDIT

12.1 SITE INSPECTIONS

Site inspections provide a direct means to assess and ensure the Contractor's environmental protection and pollution control measures are in compliance with the contract specifications. Site inspections shall be undertaken routinely by the Environmental Team Leader (ETL) to inspect the construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented in accordance with the EIA.

The ETL is responsible for the formulation of an environmental site inspection, deficiency and remedial action reporting system and for carrying out the site inspection works. In consultation with the IEC, the ETL shall prepare a procedure for the site inspection, deficiency and remedial action reporting requirements and submit this to the Contractor for agreement and to the Franchisee's Site Representative (FSR) for approval within 21 days of commencement to the construction contract.

Regular site inspections shall be carried out at least once per week. The areas of inspection shall 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 ETL shall make reference to the following information while conducting the inspections:

- the EIA recommendations on environmental protection and pollution control mitigation measures as stated in the EIA report;
- work progress and programme;
- individual works methodology proposals;
- the contract specifications on environmental protection;
- the relevant environmental protection and pollution control laws;
- previous site inspection results; and,
- environmental monitoring data.

The Contractor shall update the ETL with all relevant information on the construction works prior to carrying out the site inspections. The site inspection results and associated recommendations on improvements to the environmental protection and pollution control works shall be submitted, in a site inspection proforma (*Annex D*), by the ETL to the IEC, the FSR and the Contractor within 24 hours for reference and for taking immediate action. T he

Contractor shall follow the procedures and time-frame, as stipulated in the environmental site inspection, deficiency and remedial action reporting system to report on any remedial measures subsequent to site inspections.

Ad hoc site inspections shall also be carried out by the ETL and IEC if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint (an example of the complaint log is provided in *Annex D*) 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 shall comply.

In order that the works are in compliance with the contractual requirements, all the works method statements submitted by the Contractor to the FSR for approval shall be sent to the ETL for vetting to see whether sufficient environmental protection and pollution control measures have been included.

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

The Contractor shall regularly copy relevant documents to the ETL so that the checking work can be carried out. The documents shall include at 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 licence/permit. The site diaries shall also be available for the ETL's inspection upon request.

After reviewing the document, the ETL shall advise the IEC, the FSR and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. The ETL shall also advise the IEC, the Contractor and the FSR 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 violation of environmental protection and pollution control requirements.

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

12.3 ENVIRONMENTAL COMPLAINTS

Complaints shall be referred to the ETL for carrying out complaint investigation procedures. The ETL shall prepare a flow chart of the complaint response procedures that addresses, complaint receiving channels, responsible parties/contacts for information, the investigation process, procedures for the implementation of mitigation/remedial action, guidelines for communication and public relation with the complainant etc. The flow chart should be agreed by all parties and issued to the Contractor, FSR and IEC for reference.

The ETL shall 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 to determine its validity and to assess whether the source of the problem is due to works activities;

(iii) if a complaint is considered valid by the FSR or EPD and due to the works, the ET will identify mitigation measures in consultation with the IEC;

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

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

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

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

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

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

During the complaint investigation work, the Contractor and FSR shall cooperate with the ETL in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation by the ES, in consultation with the IEC, the Contractor shall promptly carry out the mitigation measures. The ETL and

FSR shall approve the proposed mitigation measures and check that the measures have been carried out by the Contractor.

12.4 CHOICE OF CONSTRUCTION METHOD

At times during the construction phase the Contractor may submit method statements for various aspects of construction. This state of affairs would only apply to those construction methods that the EIA has not imposed conditions while for construction methods that have been assessed in the EIA, the Contractor is bound to follow the requirements and recommendations in the EIA study. The Contractor's options for alternative construction methods may introduce adverse environmental impacts into the project. It is the responsibility of the ETL, in accordance with established standards, guidelines and EIA study recommendations and requirements, to review and determine the adequacy of the environmental protection and pollution control measures in the Contractor's proposal in order to ensure no unacceptable impacts would result. To achieve this end, the ETL shall provide a copy of the Proactive Environmental Protection Proforma as shown in Annex D to the IEC for approval. The IEC should audit the review of the construction method and endorse the proposal on the basis of no adverse environmental impacts.

13 REPORTING

13.1 GENERAL

The following reporting requirements are based upon a paper documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the Franchisee's Site Representative (FSR). The reports are required to be prepared by the Environmental Specialist (ETL).

13.2 DOCUMENTATION

All documentation is required to be filed in a traceable and systematical manner. Site documentation, including monitoring field records, laboratory analysis records, meeting minutes, correspondences etc. shall be cross-referenced by the ETL and be ready for inspection upon request. All EM&A results and findings shall be documented in the respective construction and operational phase EM&A reports prepared by the ETL and endorsed by the IEC prior to dissemination to the Contractor, the FSR and EPD. All reports including details of water quality monitoring, ecology, landscape and visual and archaeological EM&A shall also be issued to the AFCD, the AMO and the PlanD/LPU as appropriate.

All documentation shall be in paper form and/or electronic (in an agreed format) upon request. All documents and data shall be kept for at least one year after the completion of the operational phase EM&A works. All submissions (reports, data and correspondences etc.) shall be liable to free use for the purposes of communicating environmental data and the owner of information shall claim no copyright. Any request to treat all or part of a submission in confidence will be respected, but if no such request is made it will be assumed that the submission is not intended to be confidential.

Real time reporting of the monitoring data shall also be provided for the project through the dedicated internet website.

13.3 DESIGN AUDIT MANUAL AND REPORT

Prior to the operation of the project, the Franchisee will submit a Design Audit Manual detailing the procedures proposed to be followed to carry out the design audit, such as necessary qualification/experience of auditor(s), standards/guidelines/practices to be referred to/complied with, inspections/testing to be carried out, and systematic checklist, if considered appropriate for carrying out of the audit.

The Design Audit Report shall provide the means for the Franchisee undertaking the detailed design of the project to certify that the completed environmental design elements have been completed in accordance with the

EIA requirements. The ETL shall include in the report a signed off proforma to confirm that there are no outstanding environmental measures, identified as requiring design phase audit, that require further action. The Design Audit Report shall be prepared by the ETL and issued to EPD, the AFCD and the PlanD/LPU, as appropriate, prior to the commencement of the construction period.

13.4 BASELINE MONITORING REPORT

In respect of the construction phase EM&A works, the ETL shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of baseline monitoring for water quality. Copies of the Baseline Environmental Monitoring Report shall be submitted to the following: the Contractor, the IEC, the FSR, EPD, the AFCD, the AMO and the PlanD/LPU, as appropriate. The ETL shall 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 background information.

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

(iv) an updated construction programme with milestones of environmental protection/mitigation activities annotated

(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.

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

(viii) comments and conclusions.

13.5 EM&A REPORTS

The results and findings of all construction phase EM&A work required in this Manual shall be recorded in the EM&A Reports prepared by the ETL on a monthly basis and endorsed by the IEC. The EM&A Reports shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due one month and 10 days after construction commences.

A maximum of 4 copies of each EM&A Report shall be submitted to each of the following parties: the Contractor, the IEC, the FSR, EPD, the AFCD, the AMO and the PlanD/LPU, as appropriate. Before submission of the first EM&A Report, the ETL shall liaise with the parties on the exact number of copies and format of the reports in both hard copy and electronic medium.

The post-construction EM&A works will be undertaken on a two monthly basis for a period of one year after the commission of the project. The ETL shall prepare post-construction phase EM&A Reports on a bi-monthly basis to be submitted within 10 working days of the end of the reporting period. The reports shall be submitted to the Contractor, the IEC, the FSR, EPD and PlanD/LPU, as appropriate.

13.5.1 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
- future key issues.

(ii) Basic Project information including a synopsis of the Project organisation (including key personnel, contact names and telephone numbers), 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:

– all monitoring parameters;

– environmental quality performance limits (Action and Limit levels);

– Event-Action Plans;

– environmental mitigation measures, as recommended in the Project EIA study final report; and

– environmental requirements in contract documents.

(v) Advice on 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) Summary/findings on the site environmental audits conducted in the reporting period.

(vii) 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

– QA/QC results and detection limits.

(viii) 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;
- any other factors which might affect the monitoring results; and,
- QA/QC results and detection limits.

(ix) Advice on the solid and liquid waste management status.

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

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

(xii) 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.

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

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

(xv) An account of the future key issues as assessed from the works programme and work method statements.

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

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

13.5.2 Contents of the Subsequent Monthly EM&A Reports

(i) Title page.

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

- breaches of all Action and Limit levels;
- complaint log;

- notifications of any summons and successful prosecutions;
- reporting changes; and
- future key issues.

(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

(vi) Future key issues.

(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.

13.5.3 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 be around 5 pages and will 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.

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

(vii) 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.

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

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

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

(xii) 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 shall be made if the quarterly assessment analytical results demonstrate that the quarterly mean is significantly higher then the 1.3 ambient mean value (p <0.05).

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

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

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

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

13.6 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 post-construction 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:

(iv) environmental mitigation measures as recommended in the project EIA study final report;

(v) environmental impact hypotheses tested;

(vi) environmental quality performance limits (Action and Limit Levels);

(vii) all monitoring parameters; and

(viii) 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 all 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
- the return of ambient environmental conditions in comparison with baseline data

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

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

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

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

(xi) A summary record of notifications of 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.

13.7 DATA KEEPING

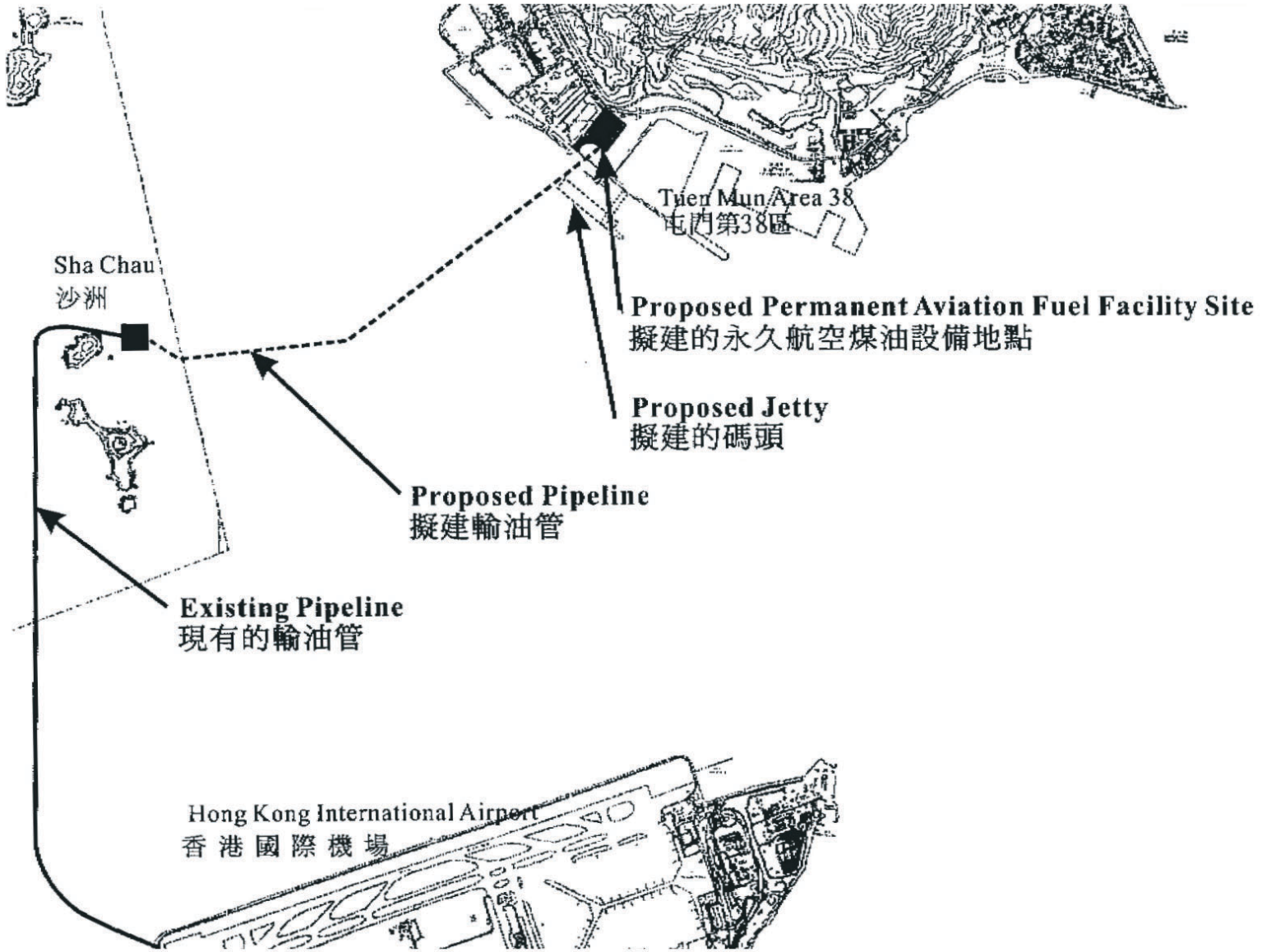
The site documents such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the EM&A Reports for submission. However, the documents shall be kept by the ET and be ready for inspection upon request. All relevant information shall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

13.8 INTERIM NOTIFICATIONS OF ENVIRONMENTAL QUALITY LIMIT EXCEEDANCES

With reference to Event/Action Plans, when the environmental quality limits are exceeded, the ETL shall immediately notify the Contractor, the FSR, EPD and the AFCD as appropriate. The notification shall be followed up with advice to 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 D*.

Annex A

Project Location



NOT TO SCALE

Annex B

PROJECT LOCATION

Environmental Resources Management

ERM

FILE: 0018105aa1
DATE:12/12/2005

Annex B

Implementation Programme

ANNEX B IMPLEMENTATION SCHEDULE

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
Water Quality										
6.7	6.8.1	There should be no access to the shore or working from land within the Marine Park. No marine anchors shall be used within the Marine Park.	Marine Park / Pipeline Dredging	Contractor	TMEIA		Y		N/A	On going
6.7	6.8.1	No hydraulic dredging within Marine Park.	Marine Park / Pipeline Dredging	Contractor	TMEIA		Y		N/A	Completed
6.7	6.8.1	Dredging for pipeline trench should be timed to coincide with maintenance dredging for Sha Chau AFRF marine access channel if relevant.	Sha Chau ARFR Marine access channel	Airport Authority	TMEIA		Y		N/A	On going
6.4		The work rate for dredging should not exceed 4,000 m^3/hr for the TSHD and 7,000 m^3/day for the grab dredger.	Marine Park / Pipeline Dredging	Contractor	TMEIA		Y		N/A	On going
6.7	6.8.1	Standard good dredging practice measures shall be written in the dredging contract.	Marine Park / Pipeline Dredging	Franchisee	TMEIA		Y		N/A	On going
6.7	6.8.1	Use of Lean Material Overboard (LMOB) systems shall be prohibited. No mud overflow is to be permitted for dredging using TSHD.	Dredged areas/ Pipeline Dredging	Contractor	TMEIA Marine Fill Committee Guidelines. DASO permit conditions		Y		N/A	Not applicable
6.7	6.8.1	Mechanical grabs shall be designed and maintained to avoid spillage and should seal tightly while being lifted.	Dredged areas/ Pipeline Dredging	Contractor	TMEIA Marine Fill Committee Guidelines. DASO permit conditions		Y		N/A	On going
6.7	6.8.1	Barges and hopper dredgers shall have tight fittings seals to their bottom openings to prevent leakage of material.	Dredged areas/ Pipeline Dredging	Contractor	TMEIA Marine Fill Committee Guidelines. DASO permit conditions		Y		N/A	On going

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
6.7	6.8.1	Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes	Dredged areas/ Pipeline Dredging	Contractor	TMEIA Marine Fill Committee Guidelines. DASO permit conditions		Y		N/A	Not applicable
6.7	6.8.1	Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation.	Dredged areas/ Pipeline Dredging	Contractor	TMEIA Marine Fill Committee Guidelines. DASO permit conditions		Y		N/A	On going
6.7	6.8.1	Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved.	Dredged areas/ Pipeline Dredging	Contractor	TMEIA Marine Fill Committee Guidelines. DASO permit conditions		Y		N/A	On going
6.7	6.8.1	Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action.	Dredged areas/ Pipeline Dredging	Contractor	TMEIA Marine Fill Committee Guidelines. DASO permit conditions		Y		N/A	On going
6.7	6.8.1	All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash.	Dredged areas/ Pipeline Dredging	Contractor	TMEIA Marine Fill Committee Guidelines. DASO permit conditions		Y		N/A	On going
6.7	6.8.1	The works shall not cause foam, oil, grease, letter or other objectionable matter to be present in the water within and adjacent to the works site.	Dredged areas/ Pipeline Dredging	Contractor	TMEIA Marine Fill Committee Guidelines. DASO permit conditions		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
6.7	6.8.1	Placement of pipeline trench backfill should be undertaken in a controlled manner to minimise impacts. Backfilling with rock should be undertaken either down pipe or by a reverse grab operation or other controlled technique to ensure that this material does not mound on the seabed	Pipeline trench/ Pipeline Dredging	Contractor	TMEIA Minimise disturbance		Y		N/A	Pending
6.7	6.8.1	Wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Sewage effluent and discharges from on-site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Storm drainage should be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sandbag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
6.7	6.8.1	Temporary access roads should be surfaced with crushed stone or gravel.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Open stockpiles of construction materials (e.g. aggregates and sand) o nsite should be covered with tarpaulin or similar fabric during rainstorms.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
6.7	6.8.1	All vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	The section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO or collected for off site disposal.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	The contractors shall prepare oil/chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
6.7	6.8.1	Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	All fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.	Land site/ Throughout construction period	Contractor	TMEIA ProPECC Note 1/94. WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	6.8.1	Wastewater from pipe commissioning dewatering exercises shall be stored on site and for chemical analysis and safe disposal in accordance with the WPCO.	Tank Farm/Tank farm commissioning	Franchisee	TMEIA WPCO TM on Effluent Standards		Y		N/A	Ongoing
6.7	Section 6	All construction works shall be subject to routine audit to ensure implementation of all EIA recommendations and good working practice.	Land site/ Throughout construction period	Contractor	EM&A Manual		Y		N/A	Ongoing
6.7	Section 6	Submarine section of aviation fuel pipeline shall be covered with rock armour protection which shall not protrude above the level of the adjacent natural seabed.	Submarine pipeline	Franchisee	TMEIA Rock armour to minimum thickness of 1m	Y	Y		Franchisee	On going
6.7	Section 6	Detailed emergency response procedures shall be drawn up. These will include requirements to maintain floating oil booms, absorbent materials and skimmers on site at all times.	All facilities	Franchisee	TMEIA Industry Standards e.g. Oil Companies International Marine Forum			Y	Franchisee	Pending

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
6.7	Section 6	Coupling points on the jetty will be protected with slop collection utilities.	Jetty	Franchisee	TMEIA Rock armour to minimum thickness of 1m		Y		Franchisee	On going
6.7	Section 6	Auxiliary tanks shall be permanently maintained at the tank farm for recovered fuel and slops.	Tank farm	Franchisee	TMEIA			Y	Franchisee	Pending
6.7	Section 6	Oily drainage systems and slop collection systems will connect to an oil/water separator.	Tank farm	Franchisee	TMEIA Industry Standards e.g. Oil Companies International Marine Forum		Y		Franchisee	On going
6.7	Section 6	All tanks shall be bunded to a capacity of at least 150% of the largest individual tank in each compound by 2040. Tank pits shall be protected by an impermeable bed (e.g. geotextile sheeting) to prevent seepage of aviation fuel to ground. A leak detection system shall be installed beneath the containment membrane.	Tank farm	Franchisee	TMEIA Hong Kong Code of Practice for Oil Installations, 1992		Y		Franchisee	On going
6.7	Section 6	There shall be no direct outlet from the bund. A collection pump shall be included in the base. Removal of accumulated rainwater shall be activated manually and discharged to storm drain via an oil/water separator.	Tank farm	Franchisee	TMEIA		Y		Franchisee	On going
6.7	Section 6	Contingency procedures shall be drawn up to ensure containment and safe disposal of any fuel lost from tanks or pipework. Suitable absorbent materials (e.g. sand or earth) shall be kept on site to deal with spillages.	Tank farm	Franchisee	TMEIA Hong Kong Code of Practice for Oil Installations, 1992			Y	Franchisee	Pending
6.7	Section 6	Valves shall be installed within the storm drainage system to facilitate the retention of spillages.	Tank farm	Franchisee	TMEIA		Y		Franchisee	On going

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
6.10	Section 6	Water quality monitoring shall be undertaken for suspended solids, turbidity, and dissolved oxygen.	Design monitoring stations as defined in EM&A Manual, section 6. Construction period when dredging takes place within 1000m of Marine Park and along entire length of the pipeline	Contractor	EM&A Manual		Y		N/A	Ongoing
6.10	Section 6	Routine water quality monitoring in the vicinity of the PAFF site to check the effectiveness of the proposed precautionary measures implemented for on-site spill control. The details of the monitoring to be undertaken will be prepared by the Franchisee as part of the PAFF Operations Manual and the details will be agreed with the relevant authorities within 3 months of the commencement of operation of the PAFF. Monitoring should include but not be limited to the parameters of TPH and PAH and reference should be made to the existing monitoring programme undertaken for the fuel tank farm on the HKIA platform.	Operational phase. Location and frequency to be determined and agreed with relevant authorities	Franchisee	EM&A Manual			Y	N/A	Pending
Ecology										
7.8	5.3	Undertake post construction dolphin abundance monitoring.	Construction	Contractor	TMEIA		Y		N/A	Pending

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule			Maintenance Agency	Implementation Status
						D	C	O		
7.8	5.3	A 250m dolphin exclusion zone shall be implemented and dredging shall not begin until the observer has confirmed that the area has been clear for 30 minutes.	250m around dredger/throughout dredging in Marine Park and along the length of pipeline	Contractor	TMEIA		Y		N/A	Ongoing
7.8	5.3	Avoidance of dolphin main calving season between March and August.	Throughout dredging in Marine Park and along the length of the pipeline	Contractor	TMEIA		Y		N/A	Ongoing
Landscape & Visual										
8.10	7.2.1	The construction programme for the PAFF should be reduced to the shortest possible period.	PAFF site / throughout construction period	Contractor	TMEIA	Y	Y		N/A	Ongoing
8.10	7.2.1	The extent and periphery of the works areas should be managed so that they are as small as possible and do not appear cluttered, untidy and unattractive, particularly to road traffic along Lung Mun Road.	PAFF site / throughout construction period	Contractor	TMEIA		Y	Y	N/A	Ongoing
8.10	7.2.1	Temporary hoarding barriers should be of a recessive visual appearance in both colour and form.	PAFF site / throughout construction period	Contractor	TMEIA	Y	Y		N/A	Ongoing
8.10	7.2.1	Materials should be stored in areas with the least obstruction to residents, pedestrians and traffic.	PAFF site / throughout construction period	Contractor	TMEIA		Y	Y	N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule			Maintenance Agency	Implementation Status
						D	C	O		
8.10	7.2.1	All material stockpiles should be covered with an impermeable material and sandbagging diversions should be placed around exposed soil.	PAFF site / throughout construction period	Contractor	TMEIA		Y	Y	N/A	Ongoing
8.10	7.2.1	Conservation of existing and imported soil resources.	PAFF site / throughout construction period of fuel tank expansion	Contractor	TMEIA			Y	N/A	Ongoing
8.10	7.2.1	A landscape perimeter bund comprising containment bund-wall, access road and planting buffer shall be built and maintained around the tank farm.	PAFF site / throughout construction period	Project Proponent	TMEIA	Y	Y	Y	Franchisee	Ongoing
8.10	7.2.1	The design of the PAFF should incorporate materials, details and textures which are visually recessive.	PAFF site / design	Project Proponent	TMEIA	Y	Y		N/A	Ongoing
8.10	7.2.1	Colours should be of low chromatic intensity to reduce the potential contrast between the structure and their background.	PAFF site tanks / design	Project Proponent	TMEIA	Y	Y		N/A	Ongoing
8.10	7.2.1	Visually permeable security fencing should be used around the perimeter.	Site perimeter	Project Proponent	TMEIA	Y	Y	Y	N/A	Ongoing
8.10	7.2.1	Minimum amount of lighting for the tanks shall be used, only applied for safety at the key access points and staircases.	Tanks / Operational phase	Project Proponent	TMEIA	Y	Y	Y	N/A	Ongoing
8.10	7.2.1	Limited lighting intensity on the site.	PAFF site / Operational phase	Project Proponent	TMEIA	Y	Y	Y	N/A	Ongoing
8.10	7.2.1	Directional down lighting is suggested to minimise light spill to the surrounding area.	PAFF site / Operational phase	Project Proponent	TMEIA	Y	Y	Y	N/A	Ongoing

Cultural Heritage

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
9.8.1	9.2.1	Undertake a watching brief during dredging of the pipeline within 25m either side of anomalies SS1 and SS2. This should comprise: • Dredge operators to be made aware of the potential presence of cultural heritage material. The operators would be required to report to the AMO any unusual resistance and/or recovery of timbers, anchors or other wreck related material. Any obstacles encountered during the dredging that are of timber should be reported to the marine archaeologist. The obstacle should be avoided and not removed until it has been assessed by the marine archaeologist as to whether the obstacle is of cultural heritage importance; • A marine archaeologist shall be on board the dredging barge during dredging within 25m either side of SS1 and SS2 in the event of any unusual resistance occurring or blockages which requires the dredge head to be bought on deck for cleaning and examination; and,	Within vicinity of SS1 and SS2	Franchisee	TMEIA		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
		• Dredging to cease in the nominated area SS1 after 3 meters of sediment removal and after 1 metre for SS2. A dive survey will then be undertaken to examine the trench for possible cultural remains.								
9.8.2	9.2.1	During the course of the watching brief, if the targets are identified as being potentially archaeologically important, then an immediate marine archaeological impact assessment in accordance with EIAO TM Annex 19 will be required to be undertaken by a qualified marine archaeologist.	With vicinity of SS1 and SS2	Franchisee	TMEIA		Y		N/A	Ongoing
9.8.4	9.2.1	Any changes, additions or alterations to the dredging method and alignment should be further assessed by marine archaeologist to determine if any further assessment is required.	Pipeline alignment	Franchisee	TMEIA		Y		N/A	Ongoing
Fuel Spill Risk										
11.4.1	10.2	Tank farms will be constructed in a bunded area surrounding the tanks which will have collection capacity of 150% of the maximum content of the largest tank.	Tank farm / Design Phase	Franchisee	TMEIA	Y			N/A	On going
11.4.1	10.2	Emergency shut down valves shall be installed within the wider site storm drainage system.	Tank farm / Design Phase	Franchisee	TMEIA	Y			N/A	On going
11.4.1	10.2	An impermeable membrane shall be installed in the tank foundation beneath the tank bottom.	Tank farm / Design Phase	Franchisee	TMEIA	Y			N/A	On going
11.4.1	10.2	Pipeline to be covered with a protective rock armour layer.	Pipelines/ Design Phase	Franchisee	TMEIA	Y			Franchisee	On going
11.4.1	10.2	An integrated leak detection system shall be installed to all pipelines to provide early detection of any leak.	Pipelines/ Design Phase	Franchisee	TMEIA	Y			N/A	On going

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule			Maintenance Agency	Implementation Status
						D	C	O		
11.4.1	10.2	An automatic shut-off system shall be implemented for pipelines.	Pipelines/ Design Phase	Franchisee	TMEIA	Y			N/A	On going
11.4.1	10.2	A workboat shall be on standby at the jetty during tanker berthing.	Jetty/ During Tanker Berth	Franchisee	TMEIA	Y		Y	N/A	Pending
11.4.1	10.2	Skimmers shall be available for quick deployment in case of a spill.	Jetty/ During Tanker Berth	Franchisee	TMEIA	Y		Y	N/A	Pending
11.4.1	10.2	An emergency response plan shall be prepared prior to the operation of the PAFF.	Jetty/ During Tanker Berth	Franchisee	TMEIA	Y		Y	N/A	Pending
11.4.1	10.2	Operator-training programme shall be implemented.	Jetty/ During Tanker Berth	Franchisee	TMEIA	Y		Y	N/A	Pending
11.6	10.4	During the planning of the later phase of the tank farm development, in order to ensure that the required mitigation measures are undertaken at that time, review the EIA report only if the latest technology, industrial standards and statutory requirements have changed by that time.	During planning stage for future tank construction	Franchisee	TMEIA			Y	N/A	Pending

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
11.6	10.4	Regular inspections and audits will be undertaken by the Franchisee during the operational phase of the facility: • Two inspections every year of the tank farm, jetty and pipelines including one undertaken pursuant to the Joint Inspection Group (JIG) explained above; • Inspection of the whole sub sea pipelines every 5 to 10 years; • Health, Safety and Environmental audit of the facility once every 3 years; and, • Inspection of the structural integrity of the tanks once per year.	Operation	Franchisee	TMEIA			Y	N/A	Pending
11.6	10.4	Prepare an Environmental Management Plan to ensure the on-going adequacy of the fuel spill contingency plan and that it is being implemented as required and that the above mitigation measures have been incorporated and are effective.	Within 3 months of start of operation of the PAFF with audits every 24 months	Franchisee	TMEIA			Y	N/A	Pending
Land Contamination										
13.5.1	10.2	Bunding shall be provided by all fuel storage areas to at least 150% of largest individual tank in each compound.	Tank farm / Design	Franchisee	TMEIA	Y			N/A	On going
13.5.1	10.2	Relevant design standards for storage tanks, pipework, containment and drainage shall be adhered to.	Tank farm / Design	Franchisee	TMEIA	Y			N/A	On going
13.5.1	10.2	Plant inspections and maintenance shall be undertaken once per month.	Tank farm / Design	Franchisee	TMEIA	Y	Y	Y	N/A	On going
13.5.1	10.2	Impermeable lining shall be provided for all tank pits.	Tank farm / Design	Franchisee	TMEIA	Y			N/A	On going

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule			Maintenance Agency	Implementation Status
						D	C	O		
13.5.1	10.2	Leak detection systems shall be provided to all valves.	Tank farm / Design	Franchisee	TMEIA	Y			N/A	On going
13.5.1	10.2	Surface drainage shall be contained and treated prior to discharge.	Tank farm / Design	Franchisee	TMEIA	Y	Y	Y	N/A	On going
13.5.1	10.2	Emergency spill response plans shall be prepared.	Tank farm / Design	Franchisee	TMEIA	Y		Y	N/A	Pending
13.5.1	10.2	Spill control materials and equipment shall be provided on site.	Tank farm / Design	Franchisee	TMEIA	Y		Y	N/A	Pending
13.5.1	10.2	Runoff from the rood of site buildings and landscaped areas shall be conveyed in closed drains to the nearest storm water drain to prevent the generation of excessive quantities of surface water which may be polluted.	Tank farm / Design	Franchisee	TMEIA	Y		Y	N/A	On going
13.5.5	10.2	Suitable absorbent materials (e.g. sand or earth) shall be kept on site to deal with spills. Chemical dispersants shall not be employed.	Tank farm / Design	Franchisee	TMEIA	Y			N/A	Pending
13.5.5	10.2	The facility shall be designed, constructed, operated and maintained in full accordance with the Code of Practice for Oil Installations, 1992.	Tank farm / Design	Franchisee	TMEIA	Y	Y	Y	N/A	On going
13.5.5	10.2	Tank pressure testing shall be carried out routinely to check for possible tank leaks. Product inventory monitoring shall be integrated into site management procedures to check for any abnormal or unexpected product loss.	Tank farm / Design	Franchisee	TMEIA	Y	Y	Y	N/A	On going
13.5.5	10.2	Tank overfill monitoring systems shall be installed and regularly tested. Inlet valves shall be designed to automatically shutdown on exceedance of "high-high level" to prevent over-filling.	Tank farm / Design	Franchisee	TMEIA	Y	Y	Y	N/A	On going
13.5.5	10.2	Pipe leakages shall be routinely checked for by means of a pressure sensitive leak detection system and routine inventory control.	Tank farm / Design	Franchisee	TMEIA	Y	Y	Y	N/A	On going

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule			Maintenance Agency	Implementation Status
						D	C	O		
13.5.5	10.2	Drainage from areas of hardstanding shall be treated by means of oil/water separators prior to discharge to storm drain. All surface drainage shall be fitted with closure valves to provided additional containment and facilitate clean up of any leaks.	Tank farm / Design	Franchisee	TMEIA	Y	Y	Y	N/A	On going
13.5.5	10.2	The delivery pipeline from the jetty and the supply line to the airport shall be fitted with pressure sensitive leak detectors.	Tank farm / Design	Franchisee	TMEIA	Y	Y		N/A	On going
Waste Management										
14.7.2	8.3.1	The Contractor shall identify a coordinator for the management of waste.	Contract mobilisation	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	The waste coordinator shall prepare and implement a Waste Management Plan which specifies procedures such as ticketing system, to facilitate tracking of loads and to ensure that illegal disposal of waste does not occur, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposal.	Contract mobilisation	Contractor	TMEIA, Works Branch Technical Circular No. 5/99 for the Trip-ticket System for Disposal of Construction and Demolition Material		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
14.7.2	8.3.1	The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges.	Contract mobilisation	Contractor	TMEIA, Land (Miscellaneous Provisions) Ordinance (Cap 28); Waste Disposal Ordinance (Cap 354); Dumping at Sea Ordinance (Cap 466); Water Pollution Control Ordinance.		Y		N/A	Ongoing
14.7.2	8.3.1	No waste shall be burnt on site.	PAFF Site throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	Excavated material shall be used on site for purposes of landscaping or formation of bund walls as far as possible.	All site / throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	All material shall be reused on site as far as practicable, including formwork plywood, topsoil and excavated material.	All site / throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	Suitable provisions shall be included in the construction contract to ensure that the Contractor sorts and recycles waste.	Contract preparation stage	HyD	TMEIA	Y			N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
14.7.2	8.3.1	Re-use and recycling of waste must always be considered first. Waste disposal shall only be undertaken in the last resort. Any 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.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	The site and surroundings shall be kept tidy and litter free.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	The C&D waste shall be disposed of at a licensed landfill or deposited at an authorised waste transfer facility and the material suitable for public fill delivered to a public filling area, public filling barging point or public fill stockpile area after obtaining the appropriate licence.	CEDD pubic fill stockpile in Mui Wo, North Lantau or Mui Wo refuse transfer stations / Throughout construction	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	Stockpile material shall avoid vegetated areas.	All areas / throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	Stockpiles shall be covered by tarpaulin and/or watered as required.	All areas / throughout construction period, particularly during dry season	Contractor	TMEIA, Public Health and Municipal Services Ordinance (Cap 132) and the Public Cleansing and Prevention of Nuisances (Regional Council) By-laws		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
14.7.2	8.3.1	Storage of material on site should be kept to a minimum.	All areas / throughout construction period	Contractor	TMEIA, Public Cleansing and Prevention of Nuisances (Regional Council) By-laws		Y		N/A	Ongoing
14.7.2	8.3.1	Excavated material in trucks shall be covered by tarpaulins.	All areas, particularly at site exits / throughout construction period	Contractor	TMEIA, Reduce the potential for spillage and dust. Public Health and Municipal Services Ordinance (Cap 132) and the Public Cleansing and Prevention of Nuisances (Regional Council) By-laws		Y		N/A	Ongoing
14.7.2	8.3.1	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/ throughout construction period	Contractor	TMEIA, Public Cleansing and Prevention of Nuisances (Regional Council) By-laws		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
14.7.2	8.3.1	Suitable chemical waste storage areas should be formed at the works site for temporary storage pending collection.	Works site/ throughout construction period	Contractor	TMEIA, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. A Guide to the Chemical Waste Control Scheme		Y		N/A	Ongoing
14.7.2	8.3.1	A licensed contractor shall be employed to collect chemical waste for delivery to a licensed treatment facility.	Chemical waste treatment facility at Tsing Yi / throughout construction period	Contractor	TMEIA, Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. A Guide to the Chemical Waste Control Scheme		Y		N/A	Ongoing
14.7.2	8.3.1	Temporary storage areas for general refuse should be enclosed to avoid environmental impacts.	All areas/ throughout construction period	Contractor	TMEIA, Public Health and Municipal Services Ordinance		Y		N/A	Ongoing
14.7.2	8.3.1	Sufficient dustbins should be provided for storage of waste.	All areas/ throughout construction period	Contractor	TMEIA, Public Cleansing and Prevention of Nuisances Ordinance (Regional Council) By-laws, Public Health and Municipal Services Ordinance		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
14.7.2	8.3.1	General refuse should be cleared daily and should be disposed of to the nearest licensed facility.	All areas, WENT landfill or NWNT refuse transfer stations/ throughout construction period	Contractor	TMEIA, Sanitation and Conservancy (Regional Council) By-laws		Y		N/A	Ongoing
14.7.2	8.3.1	Waste oils, chemicals or solvents shall not be disposed of to drain.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	Good site practice shall be implemented to avoid waste generation and promote waste minimisation.	PAFF site/ throughout construction period	Contractor	TMEIA		Y			Ongoing
14.7.2	8.3.1	Waste materials such as paper, metal, timber and waste oil shall be recycled as far as practicable.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	Temporary structures used during construction shall be provided in the form of proprietary Protakabin type units sited on areas of permanent hard paving units as far as practicable.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	Dredged marine mud shall be disposed of in a gazetted marine disposal ground under the requirements of the Dumping at Sea Ordinance.	PAFF site/ throughout construction period				Y		N/A	Ongoing
14.7.2	8.3.1	All waste containers shall be in good condition and fitted with lids or covers to prevent waste from escaping or the ingress of water.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	All waste containers shall be in a secure area on hardstanding.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule D	C	O	Maintenance Agency	Implementation Status
14.7.2	8.3.1	Emergency equipment to deal with any spillage or fire shall be kept on site.	PAFF site/ throughout construction period		TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	All containers used for storage of chemical waste shall be maintained in good condition and clearly labelled in both English and Chinese.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	All storage areas for chemical waste shall be: • Clearly labelled; • Enclosed on at least 3 sides; • Have impermeable floor and bunding sufficient to fully retain any spillage or leakages; • Ventilated; and, • Covered to prevent rainfall from entering.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	All types of asbestos including sources (such as clutch linings) shall be treated as chemical waste. Asbestos containing wastes shall be kept separate from other wastes.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	All leaking containers shall be contained and removed from site an soon as is reasonably practicable.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing
14.7.2	8.3.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycling.	PAFF site/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location / Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Schedule			Maintenance Agency	Implementation Status
						D	C	O		
14.7.2 Section 5	8.3.1	EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site audit programme shall be undertaken.	All areas/ throughout construction period	Contractor	TMEIA		Y		N/A	Ongoing

* Note: "D" denotes "Design Phase", "C" denotes "Contruction Phase" and "O" denotes "Operational Phase"

Annex C

Samples of Data Record Sheets

Noise Monitoring Field Record Sheet

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

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

Data Sheet for TSP Monitoring

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

		Name & Designation	Signature	Date
Field Operator	:	_____	_____	_____
Laboratory Staff	:	_____	_____	_____
Checked by	:	_____	_____	_____

Water Quality Monitoring Data Record Sheet

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.

Annex D

Proforma for EM&A Programme

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: _____

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 Checker (Environment): _____ 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 Checker (Environment): _____ Date: _____

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: _____

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 Checker (Environment): _____ Date: _____

DATA RECOVERY SCHEDULE

Ref: _____

Date	Air Quality Monitoring									Noise Monitoring						
	Monitoring Station*									Monitoring Station*						
	A02	A06	A07	A21	A24	A34	A36	A40	A42	R2	R5	R7	R14	R16	R21	R24
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
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19																
20																
21																
22																
23																
24																
25																
26																
27																
28																
29																
30																
31																
% of R																

* *Research type of parameters*

% of R *The percentage of Data Recovery is the natural monitoring over the scheduled monitoring*

Signed by Environmental Team Leader: _____ Date: _____

Copy to Independent Checker (Environment)

SITE INSPECTION PROFORMA

Ref: _____

Date	Location	Req't 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: _____ on _____

Signed by Environmental Team Leader: _____ Date: _____

Copy to Independent Checker (Environment)

PROACTIVE ENVIRONMENTAL PROTECTION PROFORMA

Ref: _____

Ref*	Proposed Construction Method*	Location/ Working Period	Anticipated Impacts	Recommended Mitigation Measures

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

** *Details of equipment, vehicles, plants, processes, technologies for the option of construction method*

Reviewed by Environmental Team Leader: _____ Date: _____

Approved by Independent Checker (Environment): _____ 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 Checker (Environment): _____ 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: _____

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:

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