

1 INTRODUCTION

1.1 Background Information

- 1.1.1 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 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.
- 1.1.2 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.
- 1.1.3 The AAHK first commissioned Meinhardt Infrastructure and Environment Ltd (known 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 2.1a, 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.
- 1.1.4 However, the decision by EPD to grant the Environmental Permit was subject to a Judicial Review, with further details provided on 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.
- 1.1.5 Construction work for the PAFF had commenced as early as November 2005 under 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 needs to again go through the statutory procedures under the EIAO in order to obtain an environmental permit.
- 1.1.6 As noted above, while the previous EIA study (April 2002) was undertaken based upon the project layout detailed in Figure 2.1a, 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.
- ◆ A shift of the whole site by 10 metres to the southeast to accommodate Land's Department's commitment of land extension to Shiu Wing Steel Ltd.

1.2.1 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 2.1b. In addition, the phasing of the tanks has changed with 8 (eight) to be constructed initially as shown in Figure 2.1c. The key objectives of this Assignment is, therefore, to update the previous EIA study (April 2002) taking into account changes in the site layout as necessary. Also, given the time lapse between the previous and this EIA study, relevant changes to the surrounding area including additional sensitive receivers have also been taken into account. The details and recommendations of the Judgement of the Court of Final Appeal of July 2006 must also be followed in updating the previous EIA Report.

1.1.7 The current EIA for the project has 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 and update from the previous EM&A (April 2002), including the following additional details:

- ◆ Section 5: Ecology - details on dolphin monitoring requirements specified;
- ◆ Section 6: Water Quality - additional water quality monitoring stations added to the EM&A programme and details on water quality monitoring requirements specified.
- ◆ Section 9: Cultural Heritage - new section detailing marine archaeology requirements.

1.1.8 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 Policy

1.2.1 The Franchisee's Site Representative (FSR) and the Contractor shall adopt Environmental Policy Statements in accordance with the requirements of this Manual in

order to foster a sound EM&A programme to protect the environment. The following policy statements shall be adopted:

- ◆ establish a commitment to environmental excellence in all activities arising from the development project;
- ◆ encourage the adoption of environmental management principles to prevent potential impacts and minimise adverse impacts; and
- ◆ commit to the recommendations in the EIA study report and related EIA process requirements.

1.3 EM&A Programme Objectives

1.3.1 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.

1.3.2 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.

1.3.2 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 1.1 below.

Table 1.1 Summary of EM&A Requirements

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

1.4 Scope of the EM&A Programme

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

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

Dust: a) Implement construction phase audit requirements for dust aspects.

Noise: a) Implement construction phase audit requirements for noise aspects.

Ecology: a) Implement post-construction phase dolphin abundance monitoring prior to the operation of the PAFF.

Water Quality: a) Establish baseline water quality levels at specified locations and review these levels on a regular basis.
 b) Implement construction water quality impact monitoring programme.

Landscape and Visual: a) Design detailed landscape specifications.
 b) Implement baseline survey to establish/confirm existing landscape and visual conditions.
 b) Implement construction phase audit requirements for landscape and visual resources.

- c) Implement operational phase audit requirements for landscape and visual resources.
- Waste
- a) Implement construction phase audit requirements for waste aspects.
- Heritage
- a) Implement construction phase audit requirements for marine archaeological resources in accordance with MAI requirements and recommendations.
- Hazard to Life
Fuel Spill Risk
Land Contam.
- a) 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 24 months as part of the implementation of the EMP.
 - b) 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.
 - c) 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. This is only required if the latest technology, standards and statutory requirements are deemed to have changed at that time.
 - d) 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.

1.4.2 Thus, this EM&A Manual provides the following information:

- (i) Description of the project.
- (ii) 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.
 - (iii) The organisation management structure, and procedures for auditing of the Project and implementation of mitigation measures that are recommended for the Project.
 - (iv) 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.
 - (v) 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.
 - (vi) Event and Action plans for impact and compliance procedures.
 - (vii) Complaints handling, liaison and consultation procedures.
 - (viii) 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.
 - (ix) Implementation schedules, summarising all recommended mitigation measures.
- 1.4.3 This Manual is considered to be a working document and should be reviewed periodically and revised once substantial changes have been made.

1.5 Project Organisation

- 1.5.1 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.
- 1.5.2 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.

- 1.5.3 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.
- 1.5.4 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-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 1.2.
- 1.5.5 During the construction phase of the project, an Environmental Team Leader (ETL) is to be employed by the Contractor. He 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.
- 1.5.6 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.
- 1.5.7 Accordingly, 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.
- 1.5.8 In addition, 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.

1.5.9 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.

1.5.10 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 Independent Checker (Environment) (IEC) on all environmental performance matters.
- ◆ Advice to the Contractor on environmental improvement, awareness, enhancement matter, etc., on site.
- ◆ Timely submission of the designated EM&A reports to the FSR, the IEC, the DEP, the AFCD, the AMO and PlanD/LPU as appropriate.

1.5.11 In addition to the ETL and ET, an Independent Checker (Environment) (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 1.5.5 and the appointment of the ICE will be subject to the approval of the FSR. 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.
- 1.5.12 An organisation chart showing the lines of communication between the key parties with respect to the EM&A works is provided on Figure 1.3. Both the ETL and IEC shall be retained for the duration of the EM&A works which will span the construction phase. 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.
- 1.6 Terminology**
- 1.6.1 To clarify the terminology for impact monitoring and audit, key definitions are specified below and are used throughout this Manual.
- 1.6.2 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:
- (i) 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.
 - (ii) 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.
- 1.6.3 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.

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

- (i) 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.
- (ii) 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.