

16. SUMMARY OF ENVIRONMENTAL OUTCOMES

16.1 Overview

- 16.1.1 This report presents a detailed assessment of the potential environmental impacts associated with a proposal to construct and operate a Permanent Aviation Fuel Facility at Tuen Mun Area 38. It represents the culmination of a comprehensive site selection and environmental assessment process dating back more than 10 years.
- 16.1.2 Construction of the proposed permanent facility will allow discontinuation of routine shipments of fuel oil to the existing AFRF near Sha Chau within the Lung Kwu Cha and Sha Chau Marine Park. Aviation fuel is currently transported to the AFRF reception jetty in 5000 dwt vessels. The annual demand for aviation fuel is currently 5.8 billion litres per annum which equates to an average shipment frequency of 3 vessels per day. These shipments and unloading operations within the Marine Park would cease on commissioning of the new permanent facility and the jetty would be maintained for strategic purposes as an emergency back up facility only. Thus, the project would result in a reduction to the disturbance currently experienced within the marine park.
- 16.1.3 The operation of the PAFF will also reduce the level of marine transport collision risk because ~1100 single hulled barges per year to the AFRF in 2009 will be replaced by 150-200 double hulled tankers per year travelling a shorter route to the PAFF and using marine pilots and tug boats.
- 16.1.4 The environmental assessment has clearly established the acceptability of the proposed project from an environmental perspective. It can be concluded from this work that there are no insurmountable unacceptable impacts associated with construction and operation of the fuel reception and storage facility. The environmental assessment process has enabled the identification of an environmental management regime and numerous specific mitigatory measures to ensure that any residual environmental impacts are kept to a practical minimum and well within acceptable bounds.

16.2 Summary of Principal Mitigatory Measures Identified

- 16.2.1 The EIA process has facilitated integration of environmental considerations into the fundamental design process for the project. The principal mitigation measures identified are those achieved through siting and plant design. In addition a number of specific construction and operational phase measures have been identified to minimise potential adverse environmental impacts. A complete listing of all recommendations and in-built mitigatory measures is detailed in the Environmental Mitigation Implementation Schedule provided in the Environmental Monitoring and Audit Manual, which accompanies this report. These measures will be implemented by the project proponent and enforced by EPD by means of the regulatory empowerment of the Environmental Impact Assessment Ordinance.
- 16.2.2 A summary of the most significant of these mitigatory measures is presented below:

Siting

- 16.2.3 The principal outcome of the environmental assessment process has been to identify the best available location for the reception facility and the preferred routing for the associated submarine supply pipeline from the tank farm to the airport.
- 16.2.4 A number of potential sites on both North and South Lantau, East of the Sokos, Tsing Yi and in the Tuen Mun area have been considered. The proposed location at Tuen Mun Area 38 is considered to be the environmentally most preferred of all these sites.
- 16.2.5 The site is in a heavy industrial setting in close proximity to the Castle Peak Power Station, a cement plant, a steel mill and the proposed EcoPark just being constructed adjacent to the site. This compares favourably with a number of other ecologically more sensitive sites under consideration which have included Sham Shui Kok, Sham Wat and Bluff Point on the North Lantau coast, Kau Yi Chau and, perhaps most significantly, a site East of the Sokos near the proposed future Marine Park. Siting the facility at the Tuen Mun Area 38 will mean that it can be constructed without the need for additional land reclamation. This confers very significant environmental advantages of the site at Tuen Mun Area 38 compared to many of the alternative sites. In addition, the site is also several kilometres away from sensitive residential development and the selection of the Tuen Mun Area 38 site has therefore protected residents in Tuen Mun and future residents in north Lantau associated with the Sham Shui Kok site.
- 16.2.6 A comparison of possible pipeline routes from the proposed site at Tuen Mun Area 38 to the airport has identified that the preferred routing is from the tank farm at Tuen Mun Area 38 to tie up with the existing pipeline from Sha Chau to HKIA. The marine stretch of pipeline is thus kept to about 4.8km compared to 11.2 km for an alternative routing running directly to the HKIA. The quantity of sediment requiring dredging and subsequent disposal is proportionally reduced to 340,000m³ compared to 563,000 m³ for the longer routing. This is significantly better in terms of potential impact on water quality and marine ecology as well as from a spoil disposal perspective. This routing will also minimise both the possible disturbance to the dolphin population in the construction phase and the need for periodic operational servicing visits to the existing temporary reception facility within the Marine Park by small tankers to flush out otherwise stagnant fuel from the retained strategic emergency backup pipeline.

Design

- 16.2.7 One of the most important mitigation measures is the placement of a rock armour protective layer positioned to cover the pipeline but not protrude above the seabed. This will prevent possible mechanical damage, for example from trailing anchors or trawling nets. To provide additional security it is proposed that the pipeline shall be fitted with a leak detection system. This system shall be monitored on a 24-hour basis by the control centre at the Tuen Mun Area 38 site. In the unlikely event of any failure this warning system would trigger emergency shutdown.
- 16.2.8 All elements of the fuel handling, storage and transportation system will be designed to minimise the risk of failure, and the resultant leaks/spills, to the lowest practicable extent. Fuel storage tanks will be constructed in a bunded area which will have collection capacity greater than the maximum content of the largest tank, to contain any

fuel leaks or spills. There shall be no direct outlet from the bund to ensure retention of any spilled material. A collection sump shall be included in the base. Protection against leaks or spills from the bottom of the tanks will be achieved by the installation of an impermeable membrane in the tank foundation beneath the tank bottom. A spill detection system will be fitted underneath this membrane to provide additional security. Removal of accumulated rainwater shall be activated manually and discharged to storm drain via an oil / water separator. Emergency shut down valves shall be installed within the wider site storm drainage system to provide for further emergency retention of spillages.

- 16.2.9 The risk of losses and spills from the jetty will be minimised through design to international standards. Vessels coupling points will be protected with slop collection utilities. Auxiliary tanks will be installed at the tank farm for recovered fuel and slops. Oily drainage systems and slop collection systems will connect to an oil/water separator before water is discharged.
- 16.2.10 The design of the tank farm has also incorporated a perimeter landscaped bund which will be implemented early in the construction process in order to provide screening for Phase 1 tanks. The perimeter bund will also screen future tanks.

Mitigation through Operational Controls

- 16.2.11 The facility will be carefully managed in the operational phase to keep the risk of accidental fuel spillages or leaks to the minimum that can be practically achieved. Operational procedures will be drawn up by the facility operator and be based on the principles of prevention and detection in the first instance and then containment and safe disposal in the event that an unforeseen loss does occur.
- 16.2.12 All plant and equipment will be subject to thorough inspection and maintenance programmes (once per month) to prevent spills or losses of fuel as a result of failure. This will be reinforced by the installation of automatic leak detection systems as outlined above. These systems will be continuously monitored by trained staff to enable immediate detection and response in the unlikely event that a fuel loss does occur.
- 16.2.13 The facility operator will draw up detailed Emergency Response Plans to minimise, contain and remediate any fuel losses that may occur from the offloading jetty and its marine approaches, the tank farm and the supply pipelines.

Mitigation of Impacts During Construction

- 16.2.14 Construction activities will be carefully monitored for compliance by means of a comprehensive environmental monitoring and audit programme as outlined in Section 15 and described in more detail in the Environmental Monitoring and Audit Manual which accompanies this report. This will check compliance with all identified mitigation measures and against the results of ambient environmental monitoring programme to detect and arrest quickly any environmental deterioration and prevent reoccurrence.
- 16.2.15 Construction phase mitigation will generally take the form of adherence to relevant Hong Kong guidelines e.g. EPD PROPECC notes as well as internationally recognised

good construction site practice. In addition, a number of special measures specific to this project have been identified through the EIA process to minimise disruption within the Marine Park and to the dolphin population including:

- ◆ dolphin exclusion zone during dredging in the Marine Park, as well as along the length of the pipeline;
- ◆ restriction of dredging works 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 shown in Figure 7.5;
- ◆ dredging along the entire length of the pipeline will avoid this main calving season of March to August;
- ◆ no access to the shore or working from land within the Marine Park;
- ◆ no hydraulic trailer dredging within Marine Park;

16.2.16 Measures were also identified by the previous EIA (April 2002) to suppress exposure of dolphins to piling noise as far as practicable. The piling for the jetty has already been completed and as such the following measures are a summary of those was applied during these works:

- ◆ dolphin acoustic monitoring;
- ◆ dolphin exclusion zone;
- ◆ underwater noise monitoring to supplement visual dolphin surveillance;
- ◆ pre-construction abundance monitoring;
- ◆ no percussive piling during peak dolphin calving season;
- ◆ piling acoustic decoupling methods; and
- ◆ bubble jacket trial, design and use.

16.2.17 Post construction dolphin abundance monitoring will also be required to be undertaken for 6 days within a period of 28 days prior to operation of the PAFF to ensure the effectiveness of the mitigation measures which were undertaken during the piling for the jetty.

16.3 Summary of Key Findings and Recommendations

16.3.1 The proposed Permanent Aviation Fuel Facility site at Tuen Mun Area 38 with connecting pipeline to tie in with the existing pipeline from Sha Chau to HKIA, represents the best available environmental option.

16.3.2 Implementation of a comprehensive list of mitigation measures, as specified in the implementation schedule, is recommended along with the environmental management regime detailed in the Environmental Monitoring and Audit Manual.

16.3.3 With the adoption of these mitigation measures, the project will not result in any adverse residual environmental impacts. The project would fully comply with all environmental regulations and standards prevailing in Hong Kong.