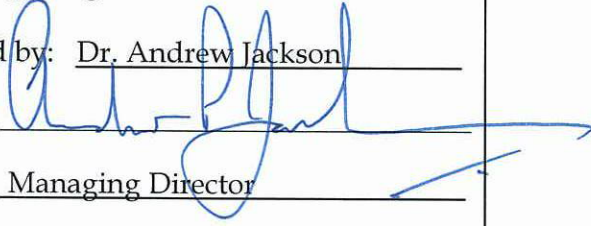


EXECUTIVE SUMMARY

ASB Biodiesel (Hong Kong) Limited

Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate: *Environmental Impact Assessment Report* - Executive Summary

October 2008

For and on behalf of ERM-Hong Kong, Limited
Approved by: <u>Dr. Andrew Jackson</u>
Signed: 
Position: <u>Managing Director</u>
Date: <u>6th October 2008</u>

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1 INTRODUCTION

1.1 BACKGROUND

ASB Biodiesel (Hong Kong) Ltd (the Project Proponent) proposes to construct and operate a 100,000 tonnes per annum (tpa) biodiesel plant (the Project) in Tseung Kwan O Industrial Estate (TKOIE). The plant will use a multi-feedstock which consists of waste cooking oil (WCO), oil and grease recovered from grease trap waste (GTW), Palm Fatty Acid Distillate (PFAD) ⁽¹⁾ and animal fats. The proposed biodiesel plant not only offers a convenient recycling outlet for GTW and WCO but also converts the oil and grease recovered from these wastes into useful products. The Project also offers a cleaner alternative to diesel fuel to the Hong Kong market.

1.2 OBJECTIVES

The Project is classified as a Designated Project under the *Schedule 2 Part I* of the *Environmental Impact Assessment Ordinance (EIAO)* and therefore the construction and operation of the Project will require an Environmental Permit.

An Environmental Impact Assessment (EIA) Study has been conducted to evaluate the potential environmental impacts due to the Project in accordance with the *EIA Study Brief (ESB-178/2007)* issued under the *EIAO* and the guideline on assessment methodology provided in the *Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)*. The overall objectives of the EIA Study are to provide information on the nature and extent of potential environmental impacts arising from the Project; to recommend appropriate mitigation measures to control the potential environmental impacts so that it complies with the requirements of the *EIAO-TM*, and to confirm the environmental acceptability of the Project. Key environmental issues identified in the *EIA Study Brief* include air quality, noise, water quality, marine ecology and hazard to life.

The general approach for the assessment includes a description of the baseline environmental conditions, identification and evaluation of potential impacts and recommendations for mitigation measures and an environmental monitoring programme. The assessments in this EIA Study are conducted using well-proven and internationally accepted methods based on reasonable worst-case conditions.

(1) PFAD is a fatty acid by-product of a palm oil refinery process. It is a liquid at about 60-80°C.

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2 PROJECT DESCRIPTION

2.1 PLANT LAYOUT AND PROCESSES

The proposed 100,000 tpa biodiesel plant will use multi-feedstock (primarily from WCO and trap grease, and supplemented with PFAD and animal fats) to produce biodiesel which complies with international standards. The biodiesel will be sold to local and international markets.

The proposed biodiesel plant will include a GTW pre-treatment facility (with a designed treatment capacity of 200,000 tpa or about 606 tpd) which will recover oil and grease from GTW and a wastewater treatment plant (with a designed treatment capacity of 170,000 m³ per annum) for the treatment of wastewaters generated from the GTW pre-treatment facility and the biodiesel production processes. The biodiesel plant will consist of a number of storage and process tanks. *Figure 2.1* shows the proposed layout of the biodiesel plant. The entire biodiesel production process is program-controlled to maintain a high level of safety and uniform quality of the final product.

2.2 TECHNOLOGY TO BE USED

The Project Proponent will adopt the BDI technology, a well-proven biodiesel production technology for the design of the biodiesel plant in order to achieve a high efficiency (which is able to utilise oil and grease with a high level of free fatty acids (over 20%) and completely transform them into biodiesel and three useable by-products, namely glycerine, fertilizer, and bioheating oil) and safety standard in the biodiesel production operation. No waste will be generated from the biodiesel production process. The biodiesel produced will meet the specification of the European standard CEN EN 14214.

2.3 CONSTRUCTION OF THE BIODIESEL PLANT

As the Project Site has been formed, no major earthworks will be required for site formation. The reinforced concrete buildings will be constructed on site using ready-mix concrete and conventional construction methods. The pre-fabricated structural steelworks and storage tanks will be assembled on site using hydraulic and tower cranes.

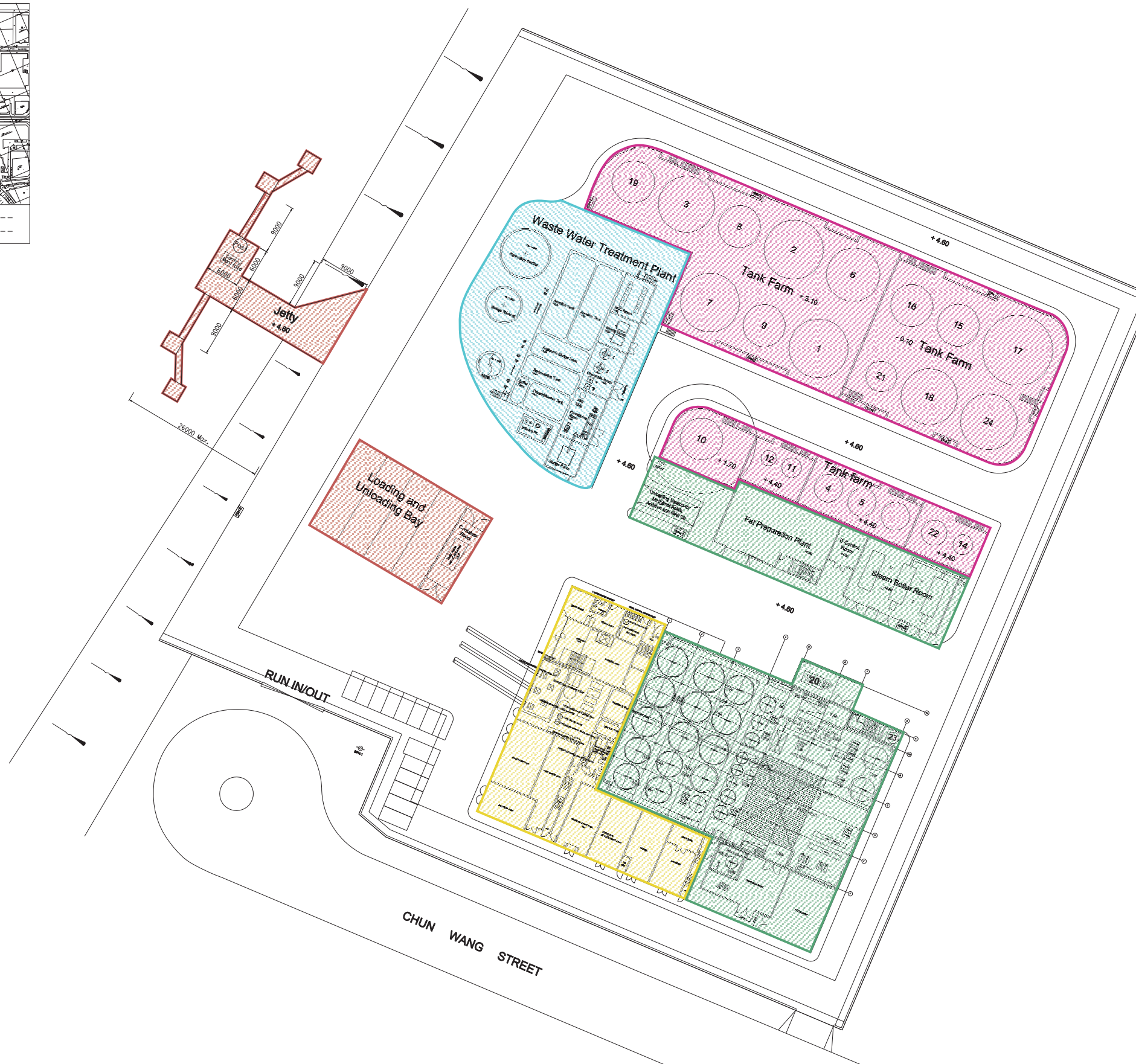
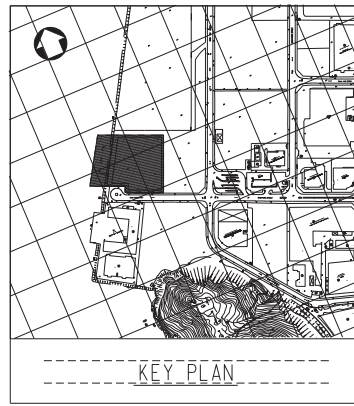
No dredging of marine sediments or reclamation works will be required for the construction of the jetty. The jetty will be constructed in the form of a piled deck. Marine bored piles will be driven through the existing rubble mound seawall to competent bearing strata by a piling rig mounted barge. Concrete infill of the piles will be undertaken prior to the placement of the trellis beam and pre-cast concrete panels.

2.4 PROJECT PLANNING AND IMPLEMENTATION

The development programme for the biodiesel plant is outlined in *Table 2.4a*.

Table 2.4a *Tentative Project Development Programme*

Activities	Timeline
Engineering design and equipment procurement	April 2008 to March 2009
Commencement of the construction of the Biodiesel plant and installation of equipments	March 2009 to February 2010
Statutory Inspection	February 2010 to April 2010
Commencement of testing and checkout	April to June 2010
Commencement of the Biodiesel plant	June 2010



TANK LIST		VOLUME [m ³]
1	TRAP GREASE, CRUDE STORAGE TANK	1500
2	TRAP GREASE, CRUDE STORAGE TANK	1500
3	TRAP GREASE, CLEANED STORAGE TANK	1000
4	DEWATERED GREASE TRAPPED WASTE (LIPOFIT)	150
5	DEWATERED GREASE TRAPPED WASTE (LIPOFIT)	150
6	WASTE COOKING OIL, CLEANED STORAGE TANK	1000
7	PFAD STORAGE TANK	1500
8	ANIMAL FAT, CRUDE STORAGE TANK	500
9	ANIMAL FAT, CLEANED STORAGE TANK	500
10	METHANOL STORAGE TANK	500
11	SULFURIC ACID STORAGE TANK	50
12	PHOSPHORIC ACID STORAGE TANK	25
14	ADDITIVE STORAGE TANK	50
15	BIODIESEL QUALITY TANK	500
16	BIODIESEL QUALITY TANK	500
17	BIODIESEL-EUROPE STORAGE TANK	2500
18	BIODIESEL HONGKONG STORAGE TANK	1200
19	GLYCERINE 80% STORAGE TANK	500
20	FERTILIZER CONTAINER	20
21	BIOHEATING OIL STORAGE TANK	200
22	GAS OIL STORAGE TANK	100
23	NITROGEN STORAGE TANK	25
24	WASTE COOKING OIL, CRUDE STORAGE TANK	1200

Legend

- Zone 1 - Processing Building
- 1A - Administration Building
- 1B - Process Building
- Zone 2 - Tank Farms
- Zone 3 - Waste Water Treatment Plant
- Zone 4 - Loading & Unloading Facilities



Figure 2.1

Proposed Layout Plan of the Biodiesel Plant

3 ENVIRONMENTAL IMPACTS

3.1 INTRODUCTION

The environmental outcomes associated with the construction and operation of the proposed biodiesel plant have been assessed in the EIA Study. The key findings and recommendations are summarized below.

3.2 AIR QUALITY

3.2.1 Construction Phase

The Project Site has been formed and is currently vacant. No major earthworks will be required for the site formation works and only minor excavation works will be required for the construction of the foundation works and site utilities. The storage tanks and process equipment will be pre-fabricated off-site and assembled on site using hydraulic and tower cranes and hence minimal dust will be generated from this activity. Dust generated from the minor excavation works and concreting works for the construction of site buildings will be minimal. The dust and air emissions generated from the marine works will be minimal.

With the implementation of dust suppression measures stipulated under the *Air Pollution Control (Construction Dust) Regulation* and the adoption of good site practices, no adverse construction dust impact is anticipated. Dust monitoring during the construction phase is therefore considered not necessary.

3.2.2 Operation Phase

The boiler and biogas stacks (if in operation) and the exhaust of the Process Building are the major emission sources associated with the operation of the biodiesel plant. Nitrogen dioxide (NO₂), carbon monoxide (CO), sulphur dioxide (SO₂), Non-Methane Organic Compounds (NMOC), methanol and acetyldehyde (as one of the impurities of methanol) are the principal emissions of concerns. The assessment indicates that the operation of the proposed biodiesel plant together with the existing major air emission sources in the TKOIE, will not cause adverse air quality impacts at the identified Air Sensitive Receivers (ASRs). The predicted concentrations of pollutants are well below the respective criteria.

The potential odour impact due to the discharge of exhaust air from the final air scrubber of the on-site wastewater treatment plant has been evaluated. After scrubbing, the odour concentration will be significantly reduced and will not cause adverse odour impacts to the identified ASRs.

It is concluded that the construction and operation of the biodiesel plant will not cause adverse air quality impacts and will comply with the *EIAO-TM* requirements.

3.3 NOISE

3.3.1 *Construction Phase*

Powered Mechanical Equipment (PME), such as air compressors, hydraulic hammers, excavators etc, will be used for the construction of the biodiesel plant and the associated jetty. The predicted construction noise levels at the identified representative Noise Sensitive Receivers (NSRs) range from 48 dB(A) to 64 dB(A) and 48 to 55dB(A) for residential premises and an educational institution, respectively. These levels are well below the noise criteria for domestic premises and educational institutions. Therefore, the NSRs will not be adversely affected by the construction of the Project. Good construction site practices will be implemented by the Contractor to further minimise the noise impact.

3.3.2 *Operation Phase*

The operation of fixed plant (such as pumps, water cooling tower, air-cooled chiller, blowers, and reactors) will generate noise. The noise levels at the identified NSRs due to operation of the fixed plant have been predicted based on a set of conservative assumptions. Due to the large separation distances between the NSRs and the noise sources, the predicted operational noise levels range from 40 to 49 dB(A) and 38 to 47 dB(A) during the corresponding day-time and night-time periods. These noise levels comply with the day-time and night-time noise criteria of 60 and 50 dB(A), respectively. As no adverse noise impact during the operational phase is anticipated according to *EIAO-TM*, noise monitoring is considered not necessary.

3.4 WATER QUALITY

3.4.1 *Construction Phase*

The construction works for the Project will mainly be land-based. With respect to the nature and relatively small scale of the land based construction activities, the potential water quality impacts are considered minimal with the implementation of the good site practices outlined in *ProPECC PN 1/94 "Construction Site Drainage"*.

A jetty (50 m long and 26 m wide) in a form of a reinforced concrete deck supported by bored piles will be constructed. A total of about 60 piles (approximate diameter of 1 m each) will be constructed and will be driven through the existing rubble mound seawall. No dredging or reclamation works will be required. The water quality impacts due to the piling activities will be minimal and no adverse water quality impact is anticipated.

As no adverse water quality impact is anticipated, no water quality monitoring is considered necessary during the construction phase.

3.4.2

Operation Phase

The cross-sectional area of each pile underwater has been estimated to be 0.8m². It is estimated that the volume of each pile underwater will range from 8m³ to 9.6 m³. Although there may be localised effects due to the physical resistance of the piles, the water flow through the piled structure will generally be maintained. It is not expected that the piles will cause adverse impacts to water flow regime at the jetty during the operational phase.

A surface water drainage system will be provided to collect stormwater runoff from the Project Site. Oil interceptor will be installed at strategic location of the Site to prevent any oily water discharges into the stormwater drain.

Wastewater from the biodiesel production process will be collected and treated prior to discharge to the foul sewer leading to the Tseung Kwan O Sewage Treatment Works.

The tank farm area will be bunded to contain any spillage or leakage of materials from the storage tanks. Contaminated water collected from the bunded area will be diverted to the on-site wastewater treatment plant for treatment.

All materials to be used and stored on site (except for the gas oil) are biodegradable and hence the potential for of land contamination or environmental pollution due to the spillage of materials during handling and transfer, and leakage of tanks will be less severe. Nevertheless, the plant / equipment and tank farm are designed to comply with relevant local regulations and international standards. Measures have been put in place to prevent spillage of materials during handling and transfer. For example, dry coupling will be used to connect two loading/unloading pipes or a flexible hose to a transfer pipe in order to avoid any leakage of the materials at the joint. The loading/unloading area will be bunded to contain any potential spillage of materials. In addition, the operations will be undertaken at the paved loading/unloading station and will be manned by trained staff and closely monitored with flow control equipment.

Any spillages will be contained and the spill be absorbed by appropriate absorbents. The area will be properly washed and the wastewater will be conveyed to the on-site wastewater treatment plant for treatment. For accidental spills during the transportation of biodiesel off the site, retainer booms will be deployed around the barge and the contaminated areas to prevent the spillage spreading. A detailed emergency response plan will be developed to define the detailed actions to be taken in the event of a spill during the detailed design stage.

Based on the above and with the provision of appropriate mitigation measures, no adverse water quality impacts are anticipated. Stormwater and treated effluent discharged from the site will be monitored on monthly intervals during the operational phase.

3.5 *ECOLOGY*

3.5.1 *Construction Phase*

No dredging and reclamation works will be required. Permanent loss of a small stretch ⁽¹⁾ of low ecological value marine habitats at the artificial seawall is expected due to the marine works for jetty construction. Pile surfaces can, however, serve as artificial habitat for the settlement and re-colonisation of marine assemblages. Residual impacts are expected to be low.

As no adverse water quality impact is expected due to construction activities, there will be no secondary impacts to ecology. It is considered that environmental monitoring is not required. Nevertheless, a monthly site inspection is recommended to ensure that the recommended mitigation measures on water quality are properly implemented such that secondary adverse impacts on marine ecological resources can be avoided and minimised.

3.5.2 *Operation Phase*

As no adverse water quality and hydrodynamic impacts are expected due to operation of the biodiesel plant, the potential impacts to marine ecological resources are expected to be minimal. No adverse impacts to marine ecology are expected.

No monitoring and audit will be required during the operational phase.

3.6 *RISK ASSESSMENT*

A Quantitative Risk Assessment (QRA) has been conducted for the Operational Phase of the Project. The potential risks to the off-site population have been estimated based on the population levels (including the planned population at the vacant land adjacent to the biodiesel plant). The assessment shows that principal hazards arise from handling of methanol, which is highly flammable, in the process area, storage of methanol and other combustible fluids like biodiesel and the unloading operations for the barges and road tankers.

The overall risk levels estimated for the operational phase of the Project are within the “acceptable” region of Hong Kong Risk Guidelines. Therefore the Hazard to Life criteria stipulated in Annex 4 of *EIAO-TM* are met.

(1) A total of approximately 48 m², which is about 3% of the total area of the jetty.

3.7 ENVIRONMENTAL MONITORING AND AUDIT

3.7.1 Construction Phase

With respect to the findings and recommendations of the EIA Study, no noise, water quality and marine ecological monitoring during the construction phase will be necessary. However, monthly site inspections will be carried out to audit the compliance of the Contractor with regard to noise control and water quality.

3.7.2 Operation Phase

With respect to the findings and recommendations of the EIA Study, no noise and marine ecological monitoring during the operation phase will be necessary.

Air Quality

Monitoring of key pollutants (NO_x, CO, SO₂ and NMOC) in the flue gases of the boilers and biogas flare (if in operation), and methanol and acetyldehyde in the exhaust gas of the Process Building will be carried out at monthly intervals for the first 12 months of operation. If the monitoring results of the first year monitoring meet the limit level, the monitoring will be reduced to half-yearly intervals for the whole operational stage. Exhaust gas temperature and exhaust gas velocity will also be monitored at the same frequency.

The odour emission of the final air scrubber will be monitored at monthly intervals for the first two operational years of the biodiesel plant.

Odour patrol will be carried out along the Project Site boundary on monthly basis during the first year of the operation of the biodiesel plant to confirm that the operation of the biodiesel plant will not cause odour nuisance. If there is no exceedance of action limit or there is no substantiated odour complaint during the first year of operation, the monitoring frequency will be reduced to quarterly intervals in the second year of the operation. During the second year of operation, if the action level is triggered, the frequency will be resumed to monthly until compliance with the action level for three consecutive months is obtained and the frequency will be reduced to quarterly interval thereafter. If the action level is not triggered for four consecutive quarterly monitoring, the monitoring can be terminated.

Water Quality

To ensure that the stormwater or effluent discharged from the Project Site will comply with the discharge standards, the quality of the stormwater/effluent will be monitored at the terminal manholes of the stormwater and foul water drainage systems on a monthly basis.

Risk Management

It is recommended that the mitigation measures recommended in *Section 8.9* should be audited during the detailed design stage and before the operation of the plant to ensure that:

- they have been properly incorporated into the design of the plant;
- control and management measures are clearly described in the detailed Emergency Response Plan; and
- be properly installed and implemented.

An *Implementation Schedule*, containing the recommended mitigation measures, monitoring and audit requirements, and the implementation agent are presented in *Annex D* of the *EIA Report*.

OVERALL CONCLUSION

In accordance with the *EIA Study Brief* and the guidance in the *EIAO-TM*, the EIA Study has identified and assessed potential environmental impacts associated with the construction and operation of the Project.

The study concludes that with the implementation of the recommended environmental control measures during the construction and operational phases, no unacceptable environmental impacts are envisaged.

EM&A activities are recommended to ensure the effectiveness of the recommended mitigation measures.