

ASB Biodiesel (Hong Kong) Limited

Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate

Environmental Monitoring & Audit (EM&A) Manual

March 2009

Environmental Resources Management

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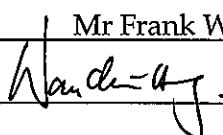
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ASB Biodiesel (Hong Kong) Limited

Development of a Biodiesel Plant
at Tseung Kwan O Industrial
Estate:
*Environmental Monitoring & Audit
(EM&A) Manual*

March 2009

For and on behalf of ERM-Hong Kong, Limited
Approved by: <u>Mr Frank Wan</u>
Signed: <u></u>
Position: <u>Partner</u>
Date: <u>19 March 2009</u>

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CONTENTS

1	INTRODUCTION	1
1.1	PURPOSE OF THE MANUAL	1
1.2	PROJECT DESCRIPTION	1
1.3	OBJECTIVES OF THE EM&A PROGRAMME	2
1.4	SCOPE OF THE EM&A PROGRAMME	3
1.5	STRUCTURE OF THE EM&A MANUAL	4
2	ORGANIZATION & STRUCTURE OF THE EM&A	7
2.1	INTRODUCTION	7
2.2	PROJECT PROPONENT	7
2.3	THE CONTRACTOR(S)	8
2.4	ENVIRONMENTAL TEAM	8
2.5	INDEPENDENT ENVIRONMENTAL CHECKER	9
3	GENERAL REQUIREMENTS OF EM&A PROGRAMME	11
3.1	INTRODUCTION	11
3.2	EM&A	11
3.3	METHODOLOGY AND CRITERIA	11
3.4	CONSTRUCTION PHASE EM&A	12
3.5	OPERATIONAL PHASE EM&A	12
3.6	ENQUIRIES, COMPLAINTS AND REQUESTS FOR INFORMATION	13
3.7	REPORTING	13
3.8	CHANGE OR CESSATION OF EM&A PROGRAMME	13
4	AIR QUALITY	15
4.1	INTRODUCTION	15
4.2	CONSTRUCTION PHASE	15
4.3	OPERATION PHASE	15
4.4	EVENT AND ACTION PLAN	24
5	NOISE	27
5.1	GENERAL	27
5.2	MITIGATION MEASURES	27
6	WATER QUALITY	29
6.1	INTRODUCTION	29
6.2	CONSTRUCTION PHASE	29
6.3	OPERATION PHASE	29
6.4	EVENT AND ACTION PLAN	34
7	MARINE ECOLOGY	37
7.1	INTRODUCTION	37
7.2	MITIGATION MEASURES	37

7.3	<i>DESIGN PHASE AUDIT</i>	38
8	<i>RISK MANAGEMENT</i>	41
8.1	<i>INTRODUCTION</i>	41
8.2	<i>EMERGENCY CONTINGENCY PLAN & EMERGENCY RESPONSE PLAN</i>	41
8.3	<i>DESIGN PHASE AUDIT</i>	42
8.4	<i>PRE-OPERATION AUDIT</i>	42
8.5	<i>EVENT AND ACTION PLAN</i>	42
9	<i>SITE INSPECTION AND AUDIT</i>	45
9.1	<i>SITE INSPECTION</i>	45
9.2	<i>COMPLIANCE WITH LEGAL REQUIREMENTS</i>	46
10	<i>ENVIRONMENTAL ENQUIRIES AND COMPLAINTS</i>	47
10.1	<i>INTRODUCTION</i>	47
10.2	<i>HANDLING PROTOCOLS</i>	47
10.3	<i>LOG-BOOK</i>	48
11	<i>REPORTING</i>	49
11.1	<i>GENERAL</i>	49
11.2	<i>MONTHLY EM&A REPORTS</i>	49
11.3	<i>QUARTERLY EM&A SUMMARY REPORTS</i>	53
11.4	<i>FINAL EM&A SUMMARY REPORT</i>	54
11.5	<i>DATA KEEPING</i>	56

LIST OF ANNEXES

<i>Annex A</i>	<i>Implementation Schedule</i>
<i>Annex B</i>	<i>Monitoring and Complaint Proforma</i>

1 INTRODUCTION

1.1 PURPOSE OF THE MANUAL

This Environmental Monitoring and Audit (EM&A) Manual (“the Manual”) has been prepared by ERM-Hong Kong, Limited (ERM) on behalf of ASB Biodiesel (Hong Kong) Ltd. (the Project Proponent). The Manual is a supplementary document of the Environmental Impact Assessment (EIA) Study of the project entitled “Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate” (hereafter referred to as the Project).

The Manual has been prepared with reference to the *EIA Study Brief* (No. ESB-178/2007) and the *Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM)*. The purpose of the Manual is to provide information, guidance and instruction to personnel charged with environmental duties and those responsible for undertaking EM&A works during construction and operation of the biodiesel plant. It provides systematic procedures for monitoring and auditing of potential environmental impacts that may arise from the Project.

1.2 PROJECT DESCRIPTION

1.2.1 Project Background

The Project Proponent proposes to construct and operate a 100,000 tonnes per annum (tpa) biodiesel plant in Tseung Kwan O Industrial Estate (TKOIE) (see *Figure 1.2a*). 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.

ERM was commissioned by the Project Proponent to undertake an EIA Study in accordance with the *EIA Study Brief* issued under the *EIAO* and the guideline on assessment methodology provided in the *EIAO-TM*. The EM&A requirements recommended in the *EIA Report* are presented in this Manual.

1.2.2 Project Location and Scope

The proposed biodiesel plant is located at the Chun Wang Street within the TKOIE which was developed on a reclaimed land and is currently managed by the Hong Kong Science and Technology Parks (HKSTP) Corporation. The Site has been vacated since it was formed. According to *Tseung Kwan O*

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

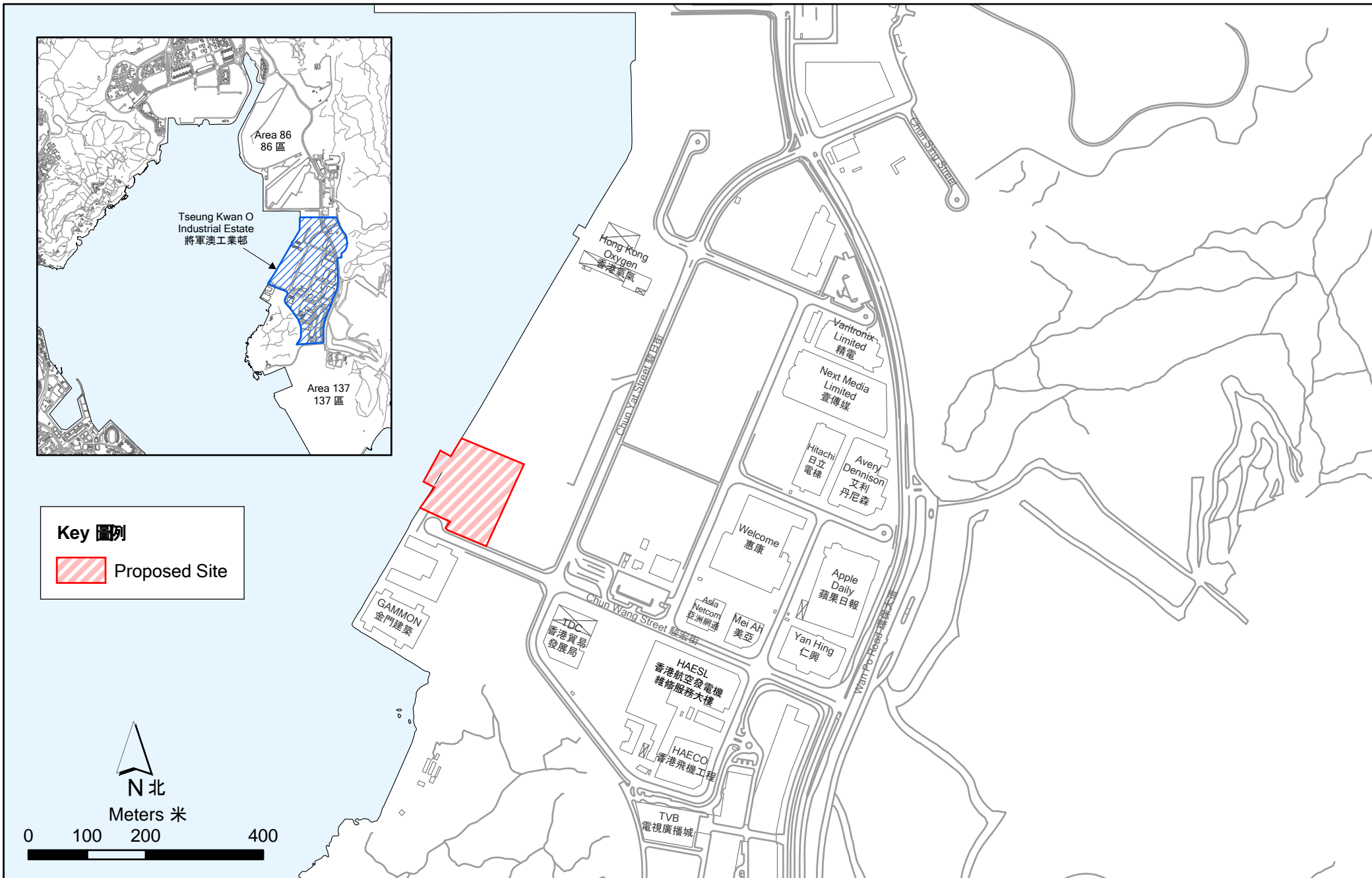


Figure 1.2a

Site Location Plan of the Biodiesel Plant

Outline Zoning Plan (OZP) S/TKO/15, the TKOIE is zoned as “Other Specified Use (Industrial Estate)” which aims to provide land for developing industries which cannot be accommodated in conventional industrial buildings.

The proposed 100,000 tpa biodiesel plant will make use of the 2nd generation of biodiesel production technology and make use multi-feedstock (primarily from WCO and trap grease, and supplemented with PFAD and animal fats) to produce biodiesel which complies with the 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 ⁽¹⁾), 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. *Figure 1.2b* shows the layout plan of the site.

1.2.3 Programme

The development programme of the biodiesel plant is outlined in *Table 1.2a*.

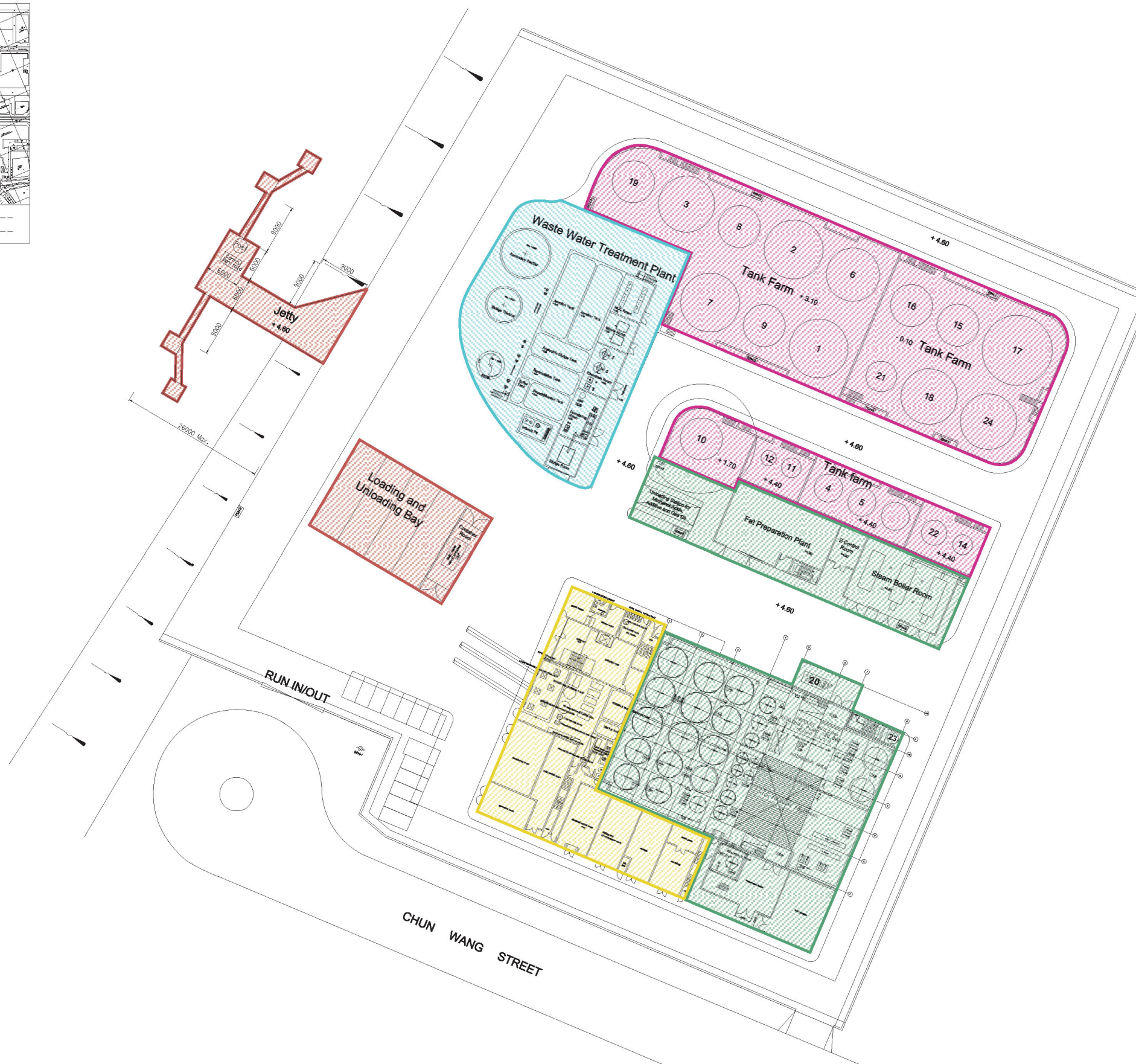
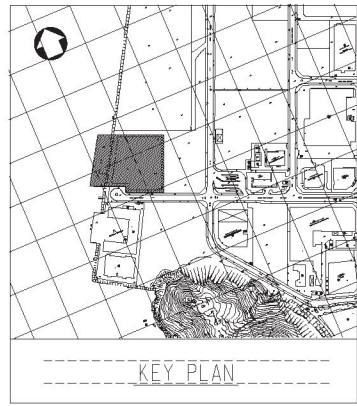
Table 1.2a *Tentative Project Development Programme*

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

1.3 OBJECTIVES OF THE EM&A PROGRAMME

The potential environmental impacts associated with the Project have been assessed and described in the *EIA Report*. It also specifies the mitigation measures required to comply with the environmental criteria. The *EIA Report* recommends that an EM&A programme be implemented to assess the effectiveness of measures and to confirm that there will be no adverse environmental impacts during the construction and operation of the biodiesel plant. It is also recommended that regular site audits be undertaken during construction phase to check whether good construction site practices are properly implemented to prevent adverse environmental impacts. Any activities that have a potential to cause adverse environmental impacts are identified before the adverse impacts occurred. Ad-hoc visits should also be undertaken in response to any complaints or reported non-compliance with environmental standards in order to enable prompt actions are taken to address the impacts.

(1) Based on 330 operating days per year.



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 1.2b

Proposed Layout Plan of the Biodiesel Plant

This Manual provides details of the EM&A requirements that have been recommended in the *EIA Report*. The objectives of undertaking EM&A for the Project are as follows:

- to provide a database against which the environmental impacts of the Project can be determined;
- to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- to monitor the performance of the Project and the effectiveness of mitigation measures;
- to verify the environmental impacts predicted in the *EIA Report*;
- to determine project compliance with regulatory requirements, standards and government policies;
- to take remedial action if unexpected problems or unacceptable impacts arise; and
- to provide data to enable an environmental audit.

1.4

SCOPE OF THE EM&A PROGRAMME

The scope of the EM&A programme is to:

- implement regular monitoring and site audit requirements (for air emissions, odour, noise, water quality, and marine ecology) and undertake additional or *ad hoc* monitoring if non compliance identified;
- implement design phase and pre-operation audit requirements to ensure that the recommended mitigation measures for risk management have been properly incorporated into the design of the biodiesel plant, and constructed or installed;
- implement inspection requirements for mitigation measures;
- liaise with, and provide environmental advice (as requested or when otherwise necessary) to construction and operational site staff on the comprehension and consequences of the environmental audit;
- identify and resolve environmental issues that may arise from the Project;
- check and evaluate the Contractor's and Project Proponent's overall environmental performance, and the effectiveness of the remedial actions;
- conduct monthly reviews of monitored impact data as the basis for assessing compliance with the defined criteria and to ensure that necessary mitigation measures are identified and implemented;

- 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 Report*;
- manage and liaise with other individuals or parties concerning other environmental issues deemed to be relevant to the construction or operational process;
- conduct regular site audits/inspections of a 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 Report*;
 - 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;
- to advise the site staff of any identified potential environmental issues; and
- prepare and 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.

1.5 *STRUCTURE OF THE EM&A MANUAL*

Following this introductory section, the remainder of the Manual is set out as follows:

- *Section 2* sets out the organisation and structure of the EM&A;
- *Section 3* sets out general requirements of EM&A programme;
- *Section 4* details monitoring and auditing requirements for air quality and odour;
- *Section 5* details the requirements for noise audit;
- *Section 6* details the requirements for water quality monitoring and audit;
- *Section 7* details the auditing requirements for marine ecology;
- *Section 8* details the auditing requirements for risk management;
- *Section 9* describes the scope and frequency of site inspection;

- *Section 10* details the protocols in handling environmental enquires and complaints; and
- *Section 11* details the EM&A reporting requirements.
- *Annex A* contains the implementation schedule summarising all mitigation measures recommended in the EIA Report;
- *Annex B* contains the monitoring and complaint log sheets.

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2.1 *INTRODUCTION*

The Project Proponent should appoint an Environmental Team (ET) to conduct environmental monitoring and auditing works and to provide specialist advice on undertaking and implementation of environmental responsibilities.

The ET should have previous relevant experience with managing similarly sized EM&A programmes, particularly concerning air quality (including odour), noise, water quality and ecological impacts, and risk management. The Environmental Team Leader (ET Leader) should be a recognised environmental professional, with a minimum of seven years relevant experience in environmental monitoring and auditing or environmental management.

An Independent Environmental Checker (IEC) should also be employed to audit and verify the overall environmental performance of this Project and to assess the effectiveness of the ET in their duties. The IEC should have at least seven years of experience in EM&A and environmental management and not be any way an associated body of the Contractor or the ET for the Project.

The roles and responsibilities of the various parties involved in the EM&A programme are outlined below.

2.2 *PROJECT PROPONENT*

The Project Proponent will:

- appoint an ET to undertake the monitoring and audit works and reporting of the findings of the EM&A programme outlined in this Manual;
- appoint an IEC to audit and verify the environmental performance of the this Project;
- provide assistance to the ET in conducting the required environmental monitoring;
- monitor the Contractor's compliance with Contract Specifications, including the effective implementation and operation of the environmental mitigation measures;
- participate in the site inspections undertaken by the ET, as required, and undertake any necessary corrective actions;

- provide information/advice to the ET regarding works activities which may contribute, or be contributing to the generation of adverse environmental conditions;
- implement measures to reduce impact where any applicable Action and Limit levels are exceeded;
- take responsibility and strictly adhere to the guidelines of the EM&A programme and complementary protocols developed by their Project staff.

2.3 *THE CONTRACTOR(S)*

The Contractor(s) will:

- work within the scope of the construction contract and other tender conditions;
- provide assistance to the ET in carrying out the environmental monitoring and audit activities;
- 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 Project Proponent and the ET;
- participate in the regular site inspections undertaken by the ET and undertake any corrective actions instructed by Project Proponent and the ET Leader; and
- adhere to the procedures for carrying out complaint investigation.

2.4 *ENVIRONMENTAL TEAM*

The ET will be led and managed by the ET Leader who should be an independent party from the Contractor. The ET Leader should possess at least 7 years experience of EM&A and has relevant professional qualifications, which should include being an Accredited Monitoring Professional of HKIEIA, subject to approval of the EPD. Suitable qualified staff will be included in the ET, and the ET should not be in any way an associated body of the Contractor(s).

The overall duties of the ET Leader and the team are as follows:

- monitor the various environmental parameters as required by this or subsequent revisions to the Manual;

- assess the EM&A data and review the success of the EM&A programme determining the adequacy of the mitigation measures implemented and the validity of the EIA predictions as well as identify any adverse environmental impacts before they arise;
- conduct regular site inspections to investigate and inspect the construction equipment and work methodologies with respect to pollution control and environmental mitigation, monitor compliance with environmental protection specifications, and to anticipate environmental issues that may require mitigation before the problem arises;
- audit the environmental monitoring data and report the status of the general site environmental conditions and the implementation of mitigation measures resulting from site inspections;
- review working programme and methodology, and comment as necessary;
- investigate and evaluate complaints, and identify corrective measures;
- advice to the on environmental improvement, awareness, enhancement matters, etc, on site;
- report on the environmental monitoring and audit results and the wider environmental issues and conditions to the Contractor(s), Project Proponent, IEC and the EPD;
- liaison with the IEC on all environmental performance matters;
- adhere to the agreed protocols in the event of exceedances or complaints; and
- the ET Leader will keep a contemporaneous log-book and record each and every instance or circumstance or change of circumstances which may affect the environmental impact assessment and every non-conformance with the recommendations of the *EIA Report* or the Environmental Permit(s) (EPs).

2.5

INDEPENDENT ENVIRONMENTAL CHECKER (IEC)

The IEC will be responsible for auditing and verifying the overall environmental performance of this Project and to assess the effectiveness of the ET in their duties. The ET Leader should possess at least 7 years experience of EM&A and has relevant professional qualifications, which should include being an Accredited Monitoring Professional of HKIEIA, subject to approval of the EPD. The IEC should not be any way an associated body of the Contractor or the ET for the Project.

The main duties of the IEC are:

- To review and audit in an independent, objective and professional manner in all aspects of the EM&A programme and requirements;
- To ensure that impact monitoring is conducted at the recommended requirement as stipulated in the EM&A Manual;
- To validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
- To carry out random site inspections, sample checks and audit on monitoring data and sampling procedures, etc;
- To conduct joint site inspection to the construction works areas with the Contractor, ET and the representative of the Project Proponent;
- To review the effectiveness of environmental mitigation measures and ensure satisfactory environmental performance;
- To audit the EM&A Manual recommendations and requirements against the status of implementation of environmental protection measures on site;
- To monitor the performance of the ET regularly to ensure that the EM&A programme strictly adheres to the requirements detailed in the EM&A Manual;
- To verify/check the investigation results of compliant cases and the effectiveness of the corrective measures;
- To review and verify EM&A reports that have been certified by the ET Leader;
- To feedback audit results to ET according to Event and Action Plan in the EM&A Manual; and
- To report the findings of site audits and other environmental performance reviews to the Project Proponent and the Director of Environmental Protection.

3 GENERAL REQUIREMENTS OF EM&A PROGRAMME

3.1 INTRODUCTION

The general requirements of the EM&A programme for the Project are described in this section. The scope of the programme is developed with reference to the findings and recommendations of the *EIA Report*.

3.2 EM&A

The potential environmental impacts and the implementation of the recommended mitigation measures for the construction and operation of the biodiesel plant should be monitored and audited through the EM&A programme specified in this Manual.

The EM&A programme will include regular and ad hoc site inspections/ audits and environmental monitoring. The programme also include the mechanisms to review and assess the Contractor's and Project Proponent's environmental performance, ensuring that the recommended mitigation measures have been properly implemented, and that timely resolution of received complaints are managed and controlled in a manner consistent with the recommendations of the *EIA Report*.

3.3 METHODOLOGY AND CRITERIA

The environmental issues associated with the construction and operational of the biodiesel plant will be controlled through the monitoring and mitigation measures specified in the *EIA Report* and this Manual.

During the construction phase, construction dust, noise and water quality and marine ecology will be subjected to EM&A. Air emissions, odour patrol, stormwater and treated effluent discharged from the Project Site will be monitored during the operation phase.

The monitoring of the effectiveness of the mitigation measures will be achieved through the environmental monitoring programme as well as through regular site inspections. The inspections will include within scope, mechanisms to review and assess the implementation of the recommended mitigation measures, and that the timely resolution of received complaints are managed and controlled in a manner consistent with the recommendations given in the *EIA Report* and this Manual.

Detailed monitoring / auditing methodology and criteria can be referred to *Sections 4 to 8*.

3.4 CONSTRUCTION PHASE EM&A

In addition to monitoring works as a means of assessing the ongoing environmental performance of the Project, the ET should undertake joint site inspections and audits of the on-site practices and procedures with Project Proponent, Contractor and IEC. The primary objectives of the site inspection and audit programme are to ensure that the good site practices and mitigation measures recommended in the EIA Report are properly implemented and to assess the effectiveness of these measures.

The findings of the site inspections and audits should be made known to the Contractor and Project Proponent at the time of the inspection to enable rapid resolution of identified non-compliances. Non-compliances, and the corrective actions undertaken, should be reported in the *Monthly EM&A Reports*.

Section 9 of this Manual presents details of the scope and frequency of on-site inspections and defines the range of issues that the audit protocols should be designed to address.

In particular, the site audit frequency should be increased to weekly intervals during the piling works for the jetty.

3.5 OPERATIONAL PHASE EM&A

3.5.1 Environmental Monitoring

Environmental monitoring will be carried out in accordance with this Manual and reported by the ET. Monitoring will be conducted at the chosen and agreed representative locations.

3.5.2 Action and Limit (A/L) Levels

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

- Action Level – 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 will be unacceptable.
- Limit Level – statutory limits stipulated in the relevant pollution control ordinances, Hong Kong Planning Standard Guidelines, or Environmental Quality Objectives established by the EPD. If these are exceeded, works should not proceed without appropriate remedial action, including a critical review of plant and working methods.

3.5.3 *Event and Action Plans*

The purpose of the Event Action Plan(s) (EAPs) is to provide, in association with the environmental monitoring activities, procedures for ensuring that if any significant environmental impacts occur in the form of exceedance of A/L Levels identified in the EM&A programme, cause(s) will be quickly identified and remediated.

3.6 *ENQUIRIES, COMPLAINTS AND REQUESTS FOR INFORMATION*

Enquiries, complaints and requests for information will be expected from a wide range of individuals and organisations including members of the public, government departments, nearby residents, press and community groups.

All enquiries concerning the environmental effects of the Project, irrespective of how they are received, should be reported to the Contractor and the Project Proponent and directed to the ET who should set up procedures for handling, investigation, and storage of such information (see *Section 10*).

In all cases, the complainant should be notified of the findings of the investigation.

3.7 *REPORTING*

The *Monthly EM&A Reports*, *Quarterly EM&A Summary Reports* and *Final EM&A Summary Report* will be prepared by the ET Leader and verified by the IEC prior to submission to the Contractor and the Project Proponent. In accordance with Annex 21 of the *EIAO-TM*, a copy of the monthly, quarterly summary and final summary EM&A reports will be made available to the Director of Environmental Protection. Details of reporting requirement and submission schedule will be in accordance with the guidelines set out in *Section 10*.

3.8 *CHANGE OR CESSATION OF EM&A PROGRAMME*

The ET will carry out the EM&A programme in accordance with this Manual throughout the construction and operation phases of the Project. Any change or cessation of the EM&A programme, or any part of it, should be justified by the ET Leader and verified by the IEC as conforming to the requirements set out in the Manual, and should be submitted to the EPD for approval.

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4 AIR QUALITY

4.1 INTRODUCTION

No adverse air quality impact is anticipated during the construction phase with the implementation of good site practices and appropriate mitigation measures. The *EIA Report* has identified that construction dust is the only concern during construction phase, and as the construction scale is relatively small, dust emission from the site could be audited during the monthly site inspections.

The general requirements, methodology and equipment for the monitoring of the emissions of the stacks of the boiler, biogas flare (if in operation) and process building, and odour concentrations at the final air scrubber as well as the odour patrols are described in this Section. The mitigation measures recommended to control air quality and odour impacts are summarised in the *Implementation Schedule* (see *Annex A*).

4.2 CONSTRUCTION PHASE

In order to ensure no adverse air quality impact will arise from the construction of the Project, it is necessary to undertake monthly site inspections to ensure that mitigation measures recommended in the *EIA Report* are properly implemented. The requirements of the site inspection are set out in *Section 8* of the Manual.

The site inspection will verify the implementation status and evaluate the effectiveness of the mitigation measures.

4.3 OPERATION PHASE

Monitoring of the emissions of the boiler stack, biogas flare (if in operation) and process building, and odour concentrations at the final air scrubber should be carried out. Odour patrols along the Project Site boundary should also be conducted.

4.3.1 *Emissions of Boiler and Biogas Flare (if in operation)*

The performance of the boiler and biogas flare should be monitored when they are in operation. The purpose of the monitoring is to ensure that the boiler and biogas flare are operated under its design conditions and emission limits.

Monitoring Parameter, Location and Frequency

Gas samples should be collected from the stack of the boiler and biogas flare (if in operation) for laboratory analysis of the parameters at a frequency as

described in *Table 4.3a*. In addition, the exhaust gas temperature and velocity should also be monitored during the air sampling.

Table 4.3a *Monitoring Parameters, Locations and Frequency of the Stacks of Boiler and Biogas Flare ^(a)*

Stacks	Monitoring Frequency	Parameters
Boiler	<ul style="list-style-type: none"> Monthly 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. 	Laboratory analysis for: <ul style="list-style-type: none"> NO_x CO Non-methane Organic Compounds (NMOC) SO₂ During measurement: <ul style="list-style-type: none"> Exhaust gas temperature Exhaust gas velocity (m s⁻¹)
Biogas Flare (if in operation)	<ul style="list-style-type: none"> Monthly 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. 	Laboratory analysis for: <ul style="list-style-type: none"> NO_x CO NMOC SO₂ During measurement: <ul style="list-style-type: none"> Exhaust gas temperature Exhaust gas velocity (m s⁻¹)

Note:
(a) Monitoring will not be carried out during raining days.

Monitoring Equipment

The ET should be responsible for providing and maintaining a sufficient number of the following monitoring equipment.

Air Sampling Equipment: The sampling equipment should be able to capture emission from the stack into inert sample containers for direct analysis on a gas chromatography in the laboratory.

Exhaust Gas Temperature and Velocity: A built-in monitoring system should be installed in the stack of the process building, or suitable hand-held thermometer and anemometer should be used for monitoring exhaust gas temperature and velocity during air sampling.

Monitoring Methodology

The monitoring methodologies for NO_x, CO, NMOCs, SO₂, exhaust gas temperature and velocity are summarised in *Table 4.3b*. Monitoring should be carried out according to the requirements set out in the relevant USEPA methods or equivalent methods approved by the EPD.

Table 4.3b *Monitoring Methodology for Stacks of Boiler and Biogas Flare*

Stacks	Parameter	Recommended Method ^(a)
Boiler	• NO _x	• USEPA Method 7
	• CO	• USEPA Method 10B
	• SO ₂	• USEPA Method 3
	• NMOCs	• USEPA Method TO-14
	• Exhaust gas temperature	• USEPA 40 CFR Part 60
	• Exhaust gas velocity / flow rate	• USEPA Method 2D
Biogas Flare (if in operation)	• NO _x	• USEPA Method 7
	• CO	• USEPA Method 10B
	• SO ₂	• USEPA Method 3
	• NMOCs	• USEPA Method TO-14
	• Exhaust gas temperature	• USEPA 40 CFR Part 60
	• Exhaust gas velocity / flow rate	• USEPA Method 2D
Note:		
(a) Reference to http://www.epa.gov/ttn/emc/promgate.html		

Laboratory Analysis

Gas sample should be transferred to the analytical laboratory within 24 hours and analysed within 48 hours after collection.

Bulk gas samples should be analysed by gas chromatography for the parameters listed in *Table 4.3b* to detection limit of 0.0025% or lower unless other specified. The carrier gas to be used for the analysis should be helium, hydrogen or nitrogen with a minimum purity of 99.995%.

Performance Compliance

The limit levels for different parameters from the boiler stack and biogas flare are presented in *Table 4.3c*. In case of non-compliance with the limit levels, more frequent monitoring and actions in accordance with the Event Action Plan (EAP) (see *Table 4.4a*) should be carried out.

Table 4.3c *Limit Levels for Various Parameters of the Stacks of Boiler and Biogas Flare*

Stacks	Parameters	Limit Level
Boiler	NO _x	0.66 g s ⁻¹ (based on volume of oil consumed)
	CO	0.17 g s ⁻¹ (based on volume of oil consumed)
	SO ₂	0.24 g s ⁻¹ (based on volume of oil consumed)
	NMOC	1.13 x 10 ⁻² g s ⁻¹ (if biogas is burnt) at 0°C, 1 atm
	Exhaust gas pressure	1 atm
	Exhaust gas temperature	100°C (minimum)
	Exhaust gas velocity	7 m s ⁻¹ (minimum)
Biogas Flare (if in operation)	NO _x	0.015 g s ⁻¹
	CO	0.005 g s ⁻¹
	SO ₂	1.07 x 10 ⁻³ g s ⁻¹
	NMOC	4.9 x 10 ⁻⁴ g s ⁻¹
	Exhaust gas pressure	1 atm
	Exhaust gas temperature	815°C (minimum)
	Exhaust gas velocity	0.54 m s ⁻¹ (minimum)

4.3.2 *Emissions of Process Building*

The performance of the stack emission from the process building should be monitored when the process building is in operation. The purpose of the monitoring is to ensure that the emissions from the process building comply with the limits specified in the *EIA Report*.

Monitoring Parameter, Location and Frequency

Gas sample should be collected from the stack of the process building for laboratory analysis of acetyldehyde and methanol. In addition, the exhaust gas temperature and velocity should also be monitored during the sampling (see *Table 4.3d*).

Table 4.3d *Monitoring Parameters, Locations and Frequency of the Stack of Process Building ^(a)*

Stack	Monitoring Frequency	Parameters
Process Building	Monthly 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.	Laboratory analysis for: <ul style="list-style-type: none"> • Acetyldehyde • Methanol During measurement: <ul style="list-style-type: none"> • Exhaust gas temperature • Exhaust gas velocity (m s⁻¹)
Note:		
(a) Monitoring will not be carried out during raining days.		

Monitoring Equipment

The ET should be responsible for providing and maintaining a sufficient number of the following monitoring equipment.

Air Sampling Equipment: The sampling equipment should be able to capture emission from the stack into inert sample containers for direct analysis on a gas chromatography in the laboratory.

Exhaust Gas Temperature and Velocity: A built-in monitoring system should be installed in the stack of the process building, or suitable hand-held thermometer and anemometer should be used for monitoring exhaust gas temperature and velocity during air sampling.

Monitoring Methodology

Table 4.3e summarises the monitoring methodologies for acetyldehyde and methanol, exhaust gas temperature and velocity. Monitoring will be carried out according to the requirements set out in the relevant USEPA methods or equivalent methods approved by the EPD.

Table 4.3e *Monitoring Methodology for Stack at Process Building*

Stack	Parameter	Recommended Method ^(a)
Process Building	• Acetyldehyde	• USEPA Method TO-14
	• Methanol	• USEPA Method TO-14
	• Exhaust gas temperature	• USEPA 40 CFR Part 60
	• Exhaust gas velocity / flow rate	• USEPA Method 2D
Note:		
(a) Reference to http://www.epa.gov/ttn/emc/promgate.html		

Laboratory Analysis

Gas sample should be transferred to the analytical laboratory within 24 hours and analysed within 48 hours after collection.

Bulk gas samples should be analysed by gas chromatography for acetyldehyde and methanol to detection limits of 0.0025% or lower unless other specified. The carrier gas to be used for the analysis should be helium, hydrogen or nitrogen with a minimum purity of 99.995%.

Performance Compliance

The limit levels for different parameters from the stack of the process building are presented in Table 4.3f. In case of non-compliance with the limit levels, more frequent monitoring and actions in accordance with the EAP (see Table 4.4a) should be carried out.

Table 4.3f *Limit Levels for Various Parameters of the Stack of the Process Building*

Stack	Parameter	Limit Level
Process Building	Acetyldehyde	0.028 g s ⁻¹
	Methanol	0.028 g s ⁻¹
	Exhaust gas temperature	35°C (minimum)
	Exhaust gas velocity	0.79 m s ⁻¹ (minimum)

4.3.3 *Odour Emission of Final Air Scrubber*

The performance of the odour emission from the final air scrubber should be monitored. The purpose of the monitoring is to ensure that the exhaust emitted from the final air scrubber will meet the required odour emission limit.

Monitoring Parameter, Location and Frequency

Odour sample should be collected from the stack of the final air scrubber for laboratory analysis of the odour concentration. In addition, the exhaust gas temperature and velocity of the final air scrubber should be monitored during sampling (see *Table 4.3g*).

Table 4.3g *Monitoring Parameters, Locations and Frequency of the stack of Final Scrubber* ^(a)

Stack	Monitoring Frequency	Parameters
Final Air Scrubber	Monthly for the first 2 years of operation	Laboratory analysis for: <ul style="list-style-type: none"> • Odour concentration (OU s⁻¹) During measurement: <ul style="list-style-type: none"> • Exhaust gas temperature • Exhaust gas velocity (m s⁻¹)
Note:		
(a) Monitoring will not be carried out during raining days.		

Monitoring Equipment

The ET should be responsible for providing and maintaining a sufficient number of the following monitoring equipment.

Air Sampling Equipment: Teflon bag should be used to collect the exhaust air from the stack of final air scrubber for analysis by the odour panelists in the laboratory.

Exhaust Gas Temperature and Velocity: A built-in monitoring system should be installed in the stack of the final air scrubber, or suitable hand-held thermometer and anemometer should be used for monitoring exhaust gas temperature and velocity during odour sampling.

Monitoring Methodology

The monitoring methodology for odour, exhaust gas temperature and velocity are summarised in *Table 4.3h*. Monitoring will be carried out according to the requirements set out in the European Standard Method EU13725 or equivalent methods approved by the EPD.

Table 4.3h *Monitoring Methodology*

Stack	Parameter	Recommended Method ^(a)
Final Air Scrubber	• Odour concentration	Air sampling
		• Grab sampling by using Teflon bag
	• Exhaust gas temperature	Laboratory analysis
		• Forced-choice Dynamic Olfactometer according to European Standard Method (EN13725)
• Exhaust gas velocity / flow rate	• USEPA 40 CFR Part 60	
		• USEPA Method 2D

Note:
(a) Reference to <http://www.epa.gov/ttn/emc/promgate.html>

Laboratory Analysis

The odour samples should be transferred to the analytical laboratory within 8 hours of collection and analysed within 24 hours after collection.

The odour concentration should be analysed using the dynamic olfactometer according to the European Standard Method (EN13725).

Performance Compliance

The limit levels for different parameters from the final air scrubber are presented in *Table 4.3i*. In case of non-compliance with the limit levels, the actions in accordance with the EAP (see *Table 4.4a*) should be carried out.

Table 4.3i *Limit Levels for Various Parameters of the Emission from the Final Scrubber*

Stack	Parameters	Limit Level
Final Air Scrubber	Odour	200.3 OU s ⁻¹
	Exhaust gas temperature	Ambient
	Exhaust gas velocity	0.7 m s ⁻¹ (minimum)

4.3.4 *Odour Patrol*

Monitoring Parameter, Location and Frequency

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. If there is no exceedance of action limit or there is no substantiated odour compliant 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 intervals thereafter. If the action level is not triggered for four consecutive quarterly monitoring, the monitoring can be terminated.

The patrol should be conducted a trained personnel/competent person who should have a specific sensitivity to a reference odour (i.e. on reference materials n-butanol with the concentration of 50ppm in nitrogen (v/v)).

The parameter, location and frequency of odour patrol are summarised in *Table 4.3j*.

Table 4.3j *Parameter, Location and Frequency for Odour Patrol*

Patrol Location	Patrol Frequency	Parameters
Patrol along Biodiesel Plant Site Boundary	Two times a day, one in the morning and one in the afternoon <ul style="list-style-type: none"> • Monthly for the first 12 months of operation. If the monitoring results of the first year monitoring meet the limit level, the monitoring frequency will be reduced to quarterly intervals in the second year; • If the action level is triggered during the second year of operation, the frequency will be resumed to monthly intervals until compliance with the action level for three consecutive months is obtained; • If the action level is not triggered for four consecutive quarterly monitoring, the monitoring can be terminated. 	Odour Intensity (see <i>Table 3.3k</i>)

The odour intensity detected during the patrol should be categorised as in *Table 3.3k*.

Table 3.3k *Odour Intensity Level*

Class	Odour Intensity	Description
0	Not Detected	No odour perceived or an odour so weak that it cannot be easily characterised or described
1	Slight	Identified odour, slight
2	Moderate	Identified odour, moderate
3	Strong	Identified odour, strong
4	Extreme	Severe odour

Monitoring Methodology

Odour patrol will be conducted by a trained personnel/competent person patrolling and sniffing along the Project Site boundary to detect any odour. The trained personnel/competent person, who is employed by the ET, shall:

- Have their individual odour threshold of n-butanol in nitrogen gas in the range of 20 to 80 ppb/v required by the European Standard Method (EN 13725);
- Be free from any respiratory diseases;

- Not be allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30 minutes before and during the odour patrol; and
- Take great care not to cause any interference with their own perception or that of others by lack of personal hygiene or the use of perfumes, deodorants, body lotions or cosmetics.

The trained personnel/competent person should use their nose (olfactory sensors) to sniff odours along the patrol route. The main odour emission sources and the areas to be affected by the odour nuisance should be identified. Meteorological conditions including temperature, wind speed, wind direction, relative humidity obtained from the Tseung Kwan O Weather Station of the Hong Kong Observatory at the time of the odour patrol should be reported.

Performance Compliance

Odour Complaint: When a complaint is received regarding odour nuisance, a complaint log (see *Annex B*) should be completed within 24 hours and kept with the Project Proponent. The form should include but not be limited to the following:

- Date and time of the complaint;
- Name and contact information of the complainant;
- Location of where the odour nuisance occurred;
- Characteristics of the odour;
- Odour strength;
- Meteorological conditions including temperature, wind speed, wind direction, relative humidity obtained from the Tseung Kwan O Weather Station of the Hong Kong Observatory at the time of the complaint; and
- Operation activities carried out at the biodiesel plant at the time the nuisance occurred.

Action and Limit Levels for Odour Patrol: *Table 4.3l* shows the action and limit levels to be used for odour patrol. When the action and limit levels are triggered, investigation will be carried out to identify the cause of exceedance and actions in accordance with the *Event and Action Plan* (see *Table 4.4a*) will be taken.

Table 4.31 *Action and Limit Levels for Odour Patrol*

Parameter	Action Level	Limit Level
Perceived odour intensity	<ul style="list-style-type: none"> • Odour intensity \geq Class 2 recorded; or • One documented complaint received 	<ul style="list-style-type: none"> • Odour intensity \geq Class 3 recorded on 2 consecutive patrols ^(a) ^(b)
Notes:		
(a) Either Class 3-strong or Class 4-extreme odour intensity.		
(b) The exceedances of the odour intensity do not need to be recorded at the same location.		

4.4 *EVENT AND ACTION PLAN*

The ET Leader should take the following actions during operation phase of the Project when action/ limit levels are exceeded:

- Inform Project Proponent and IEC and investigate and record the cause of exceedance within 24 hours;
- Repeat measurement to confirm findings; and
- Implement the EAP as shown in *Table 4.4a*.

Table 4.4a Event / Action Plan for Air Quality Monitoring during Operation Phase

Event	Actions		
	ET Leader	IEC	Project Proponent
Exceedance of Limit Level for stack emission from boiler, biogas flare, process building and final air scrubber	<ul style="list-style-type: none"> Repeat measurement to confirm finding Identify source(s) and investigate the cause(s) of exceedance Inform Project Proponent whether the cause of exceedance is due to the Project Prepare the Notification of Exceedance within 24 hours Discuss remedial actions with the Project Proponent Assess the effectiveness of Project Proponent's remedial actions For the monitoring of emissions from the stacks of the boiler, biogas flare and process building, increase the monitoring frequency from half-yearly (for the second year onward) to monthly intervals. If results of three consecutive monthly monitoring show no exceedance of the limit level, the monitoring frequency will be reverted back to half-yearly intervals. 	<ul style="list-style-type: none"> Verify the Notification of Exceedance submitted by the ET Leader Check with the Project Proponent on the operating activities and implementation of control measures Discuss with ET Leader and Project Proponent on the possible remedial actions Advise the Project Proponent on the effectiveness of the proposed remedial measures Supervise implementation of remedial measures 	<ul style="list-style-type: none"> Rectify any unacceptable practice; Amend working methods as required Implement amended working methods, if necessary

Actions			
Exceedance of Action Level for odour	<ul style="list-style-type: none"> • Identify source(s) / reason of exceedance or complain • Prepare the odour complain form or the Notification of Exceedance within 24 hours • Inform Project Proponent whether the cause of exceedance is due to the Project • Discuss remedial actions with the Project Proponent • 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 intervals thereafter. 	<ul style="list-style-type: none"> • Verify the Notification of Exceedance submitted by the ET Leader 	<ul style="list-style-type: none"> • Rectify any unacceptable practice; • Amend working methods as required • Implement amended working methods, if necessary
Exceedance of Limit Level for odour	<ul style="list-style-type: none"> • Identify source(s) / reason of exceedance or complain • Prepare the odour complain form or the Notification of Exceedance within 24 hours • Inform Project Proponent whether the cause of exceedance is due to the Project • Assess the effectiveness of Project Proponent's remedial actions or amended design 	<ul style="list-style-type: none"> • Verify the Notification of Exceedance submitted by the ET Leader • Check with the Project Proponent on the operating activities and implementation of control measures • Discuss with ET Leader and Project Proponent on the possible remedial actions • Advise the Project Proponent on the effectiveness of the proposed remedial measures • Supervise implementation of remedial measures 	<ul style="list-style-type: none"> • Rectify any unacceptable practice; • Propose and implement remedial measures or amend design as required within 3 working days of notification • Resubmit proposals if problem still not under control

5.1 GENERAL

The EIA study predicted that the noise levels at the identified representative Noise Sensitive Receivers (NSRs) due to the construction activities of the Project were well below the respective noise criteria and no NSRs would be adversely affected by the construction noise. Noise monitoring during construction phase is considered not necessary. However, monthly site inspections will be carried out during construction to audit the compliance of the Contractor with regard to noise control and to recommend further mitigation measures if found to be necessary.

No adverse noise impacts were predicted at the identified representative NSRs during the operational phase and hence no operational phase monitoring is required.

The following mitigation measures are recommended in the *EIA Report* to minimise potential noise impact of the Project.

5.2 MITIGATION MEASURES

5.2.1 Construction Phase

While adverse noise impact is not expected during the construction phase of the Project, good site practices will be implemented by the Contractor to minimise potential construction noise impact. The site practices listed below will be adopted during the construction phase:

- Only well-maintained plant will be operated on-site and plant will be serviced regularly during the construction program;
- Silencers or mufflers on construction equipment will be utilized and will be properly maintained during the construction phase;
- Mobile plant, if any, will be sited as far from NSRs as possible;
- Machines and plant (such as trucks) that may be in intermittent use will be shut down between work periods or will be throttled down to a minimum;
- Plant known to emit noise strongly in one direction will, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and
- Material stockpiles and other structures will be effectively utilised, wherever practicable, in screening noise from on-site construction activities.

5.2.2 *Operational Phase*

Although no adverse noise impact is expected during the operational phase of the Project, the following measures will be implemented as far as practicable:

- Choose quieter equipment;
- Include noise levels specification when ordering new plant items;
- Locate fixed plant items or noise emission points away from the NSRs as far as practicable;
- Provide complete noise enclosures for all outdoor pumps with no opening facing the LOHAS Park;
- Locate noisy machines in enclosed plant rooms or buildings; and
- Develop and implement a regularly scheduled plant maintenance programme so that plant items are properly operated and serviced. The programme will be implemented by properly trained personnel.

6 WATER QUALITY

6.1 INTRODUCTION

No adverse water quality impact is anticipated during the construction phase with the implementation of good site practices and appropriate mitigation measures. These are summarised in the *Annex A*.

The *EIA Report* indicates that adverse water quality impacts on the water sensitive receivers within the Study Area are not expected from the operational activities. However, to ensure that the stormwater and effluent discharged from the Project Site will comply with the discharge standards, the quality of stormwater/ effluent discharged from the site will be monitored.

6.2 CONSTRUCTION PHASE

In order to ensure that no adverse water quality impact will arise from the construction of the Project, it is necessary to undertake regular site inspections to ensure that the mitigation measures recommended in the *EIA Report* are properly implemented. The audit programme will also verify the implementation status and evaluate the effectiveness of the mitigation measures.

The site audit frequency will be increased to weekly intervals during the piling works for the jetty.

The water quality mitigation measures recommended in the *EIA Report* are outlined in the *Implementation Schedule* (see *Annex A*).

6.3 OPERATION PHASE

6.3.1 Stormwater Discharge

The quality of stormwater discharged from the Project Site should be monitored when the biodiesel plant is in operation. The purpose of the monitoring is to ensure that the stormwater discharge complies with the standards stipulated in Table 10b (Standards for effluents discharged into the marine waters of Southern, Mirs Bay, Junk Bay, North Western, Eastern Buffer and Western Buffer Water Control Zones) of the *Technical Memorandum - Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM - Effluent)*.

Monitoring Parameter, Location and Frequency

Water sample should be collected from the terminal manholes of the stormwater drainage system of the Project Site (see *Figure 6.3a*) for laboratory analysis of oil and grease and suspended solids. *Table 6.3a* shows the monitoring parameters, location and frequency of the stormwater discharge

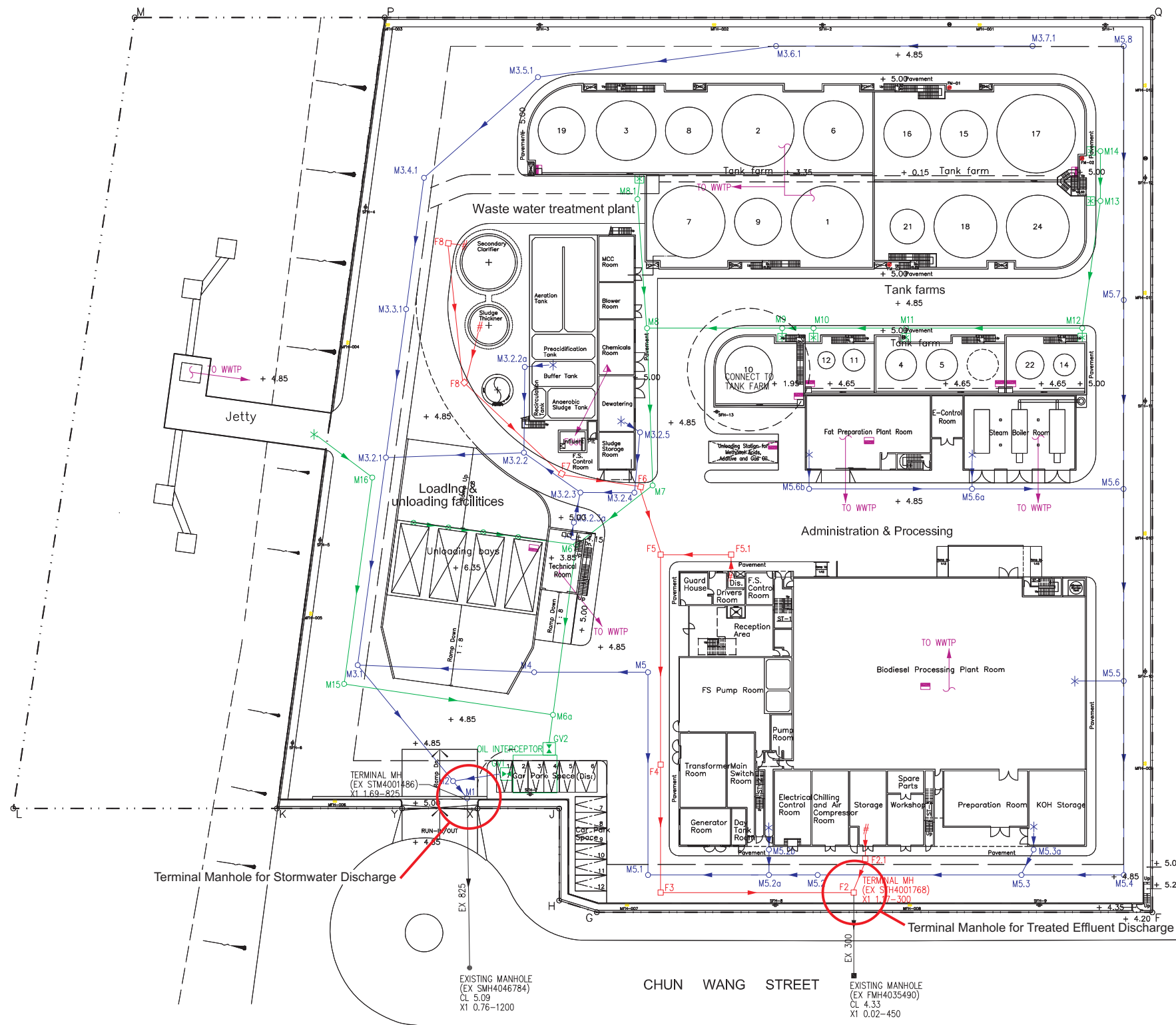


Figure 6.3a

Monitoring Locations for Stormwater and Treated Effluent Discharged from the Project Site

recommended in the *EIA Report*. However, a valid discharge licence shall be obtained from the EPD prior to the discharge of stormwater from the Project Site. The monitoring frequency, locations and parameters specified in the discharge licence shall be fully considered during the monitoring.

Table 6.3a *Monitoring Parameters, Locations and Frequency of the Stormwater Discharge*

Location	Monitoring Frequency	Parameters
Stormwater terminal manhole	<ul style="list-style-type: none"> • Monthly 	Laboratory analysis for: <ul style="list-style-type: none"> • Oil and grease • Suspended Solids

Monitoring Equipment

Water Sampling Equipment: Water sample should be collected from the manhole using an open mouthed vessel with a lip (for pouring into sampling containers). A glass or polyethylene vessels should be used.

Sample Containers: 500 ml glass or polyethylene vessels should be used for storage of the water sample for laboratory analysis. All sampling equipment and containers should be properly cleaned prior to use. All bottles should be fitted with a screw cap with inert plastic liner.

Laboratory Measurement / Analysis

Analysis of the stormwater sample should be carried out by a laboratory accredited under the Hong Kong Laboratory Accreditation Scheme (HOKLAS). The monitoring methodologies for oil and grease and suspended solids are summarised in *Table 6.3b*. The analysis will be carried out according to the requirements set out in the relevant USEPA or American Public Health Association (APHA) methods or equivalent methods approved by the EPD.

If a site laboratory is set up for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control should be approved by the EPD.

The detection limits for oil and grease and suspended solids are shown in *Table 6.3b*. The analysis works should be undertaken within 24 hours after collection of the water sample.

Table 6.3b *Laboratory Analysis Method and Analytical Detection Limits for Stormwater Discharge from the Project Site*

Sample	Parameter	Recommended Measurement / Analysis Method	Analytical Detection Limit (mg L ⁻¹)
Stormwater Discharge	• Oil and grease	• USEPA 1664 A, APHA 5520 B or equivalent method subject to approval of the EPD	• 5
	• Suspended Solids	• APHA 2540D or equivalent method subject to approval of the EPD	• 0.1

Performance Compliance

The limit levels for stormwater discharge should follow Table 10b of the *TM - Effluent*. In case of non-compliance with the limit levels, the actions in accordance with the EAP (see *Table 6.4a*) should be carried out.

6.3.2 *Treated Effluent Discharged from Project Site*

The quality of treated effluent discharged from the Project Site should be monitored when the on-site wastewater treatment plant (WWTP) is in operation. The purpose of the monitoring is to ensure that the quality of effluent discharged from the Project Site complies with the Table 1 (Standards for effluents discharged into foul sewers leading into Government sewage treatment plants) of the *TM - Effluent* or those specified in Project’s discharge licence issued under the *Water Pollution Control Ordinance*.

Monitoring Parameter, Location and Frequency

Table 6.3c shows the monitoring parameters, location (see *Figure 6.3a*) and frequency of the treated effluent discharged from the Project Site recommended in the *EIA Report*. However, a valid discharge licence shall be obtained from EPD prior to the discharge of effluent from the Project. The monitoring frequency, location and parameters specified in the discharge licence shall be fully considered during the monitoring.

Effluent sample should be taken from the terminal manhole of the foul water drainage system of the Project Site. The samples should be taken below the surface to ensure that the surface scum is not included in the sample.

Table 6.3c *Monitoring Parameters, Location and Frequency of the Treated Effluent Discharged from the Project Site*

Location	Monitoring Frequency	Parameters
Terminal manhole of the foul water drainage system of the Project Site	<ul style="list-style-type: none"> • Monthly 	On-site Measurements <ul style="list-style-type: none"> • Volume • pH • Temperature Laboratory analysis: <ul style="list-style-type: none"> • Parameters listed in Table 1 of the <i>TM - Effluent</i> or those specified in Project's discharge licence issued under the <i>Water Pollution Control Ordinance</i>.

Monitoring Equipment

The measurements of flow volume, pH and temperature should be undertaken *in situ*. The following equipment should be used.

Discharge Volume: A built-in flow meter should be installed in the foul water discharge sewer, or suitable hand-held electromagnetic flow meter should be used for monitoring effluent discharge volume into the public sewers of the TKOIE.

pH: A portable pH meter capable of measuring a range between 0.0 and 14.0 (eg Orion Model 250A or an approved similar instrument) should be used to measure pH on site.

Temperature: The instrument should be a portable equipment which should be capable of measuring temperature of 0 to 45 degree Celsius.

Sampling Equipments: Effluent samples should be obtained from the terminal manhole of the foul water drainage system using an open mouthed vessel with a lip (for pouring into sampling containers). A glass or polyethylene vessel is used according to the container type.

Sample Containers: The types and size of containers to be used for storage of effluent samples for laboratory analysis will depend upon the analytical parameter and should be in accordance with the specific requirements of the analytical laboratory. Separate samples should be collected for the analysis of heavy metal (250 mL minimum), sulphides (100 mL minimum) and other determinants (1 litre minimum). All bottles should be fitted with inert plastic inserts and have a screw cap. For samples taken for sulphide analysis, 2 ml of 0.5 molar zinc acetate and 2 mL of 0.75 molar sodium carbonate should be added per 100 mL of sample as a preservative.

Laboratory Measurement / Analysis

Analysis of the treated effluent sample should be carried out by a HOKLAS accredited laboratory. The analyses should follow the standard methods as described in the APHA "Standard Methods for the Examination of Water and

Wastewater, 19th Edition', relevant USEPA methods or equivalent method as approved by EPD.

If a site laboratory is set up for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control should be approved by the EPD.

The detection limits for parameters listed in the Table 1 of the TM-Effluent are shown in *Table 6.3d*. The analysis works should be undertaken within 24 hours after collection of the water samples.

Table 6.3d *Laboratory Analysis Methodology and Analytical Detection Limit for Treated Effluent from On-site WWTP*

Sample	Parameter	Recommended Measurement / Analysis Method	Analytical Detection Limit (mg L ⁻¹)
Treated Effluent discharged from the terminal manhole of the foul sewer of the Project Site	• Suspended solids	• USEPA 1664 A or APHA 2540 D	• 0.1
	• Settleable solids	• USEPA 160.5	• 1
	• BOD	• APHA 5210 B	• 3
	• COD	• APHA 5220 D	• 10
	• Oil & Grease	• APHA 5520 B or USEPA 1664 A	• 5
	• Iron	• USEPA Method 6020A	• 0.04
	• Boron	• USEPA Method 6020A	• 0.1
	• Mercury	• USEPA Method 6020A	• 0.001
	• Cadmium	• USEPA Method 6020A	• 0.001
	• Copper	• USEPA Method 6020A	• 0.01
	• Nickel	• USEPA Method 6020A	• 0.001
	• Chromium	• USEPA Method 6020A	• 0.01
	• Zinc	• USEPA Method 6020A	• 0.01
	• Silver	• USEPA Method 6020A	• 0.001
	• Other toxic metals individually	• USEPA Method 6020A	• 1
	• Total toxic metals	• USEPA Method 6020A	• 1
	• Cyanide	• APHA 4500 CN- C& E	• 0.001
	• Phenols	• APHA 5530 C	• 0.1
	• Sulphide	• APHA 4500	• 1
	• Sulphate	• APHA 4100	• 5
• Total nitrogen	• APHA 4500 N C	• 0.4	
• Total phosphorus	• APHA 4500 P B & E	• 0.01	
• Surfactants (total)	• APHA 5540 C & D	• 0.1	

Performance Compliance

The limit levels for treated effluent discharged from the Project Site should follow those specified in Project's discharge licence issued or Table 1 of the *TM-Effluent* or the discharge license issued under the *WPCO*. In case of non-compliance with the limit levels, the actions in accordance with the EAP (see *Table 6.4a*) should be carried out.

The ET Leader should take the following actions during the operation phase of the Project when action/ limit levels are exceeded:

- Inform Project Proponent, and investigate and record the cause of exceedance within 24 hours;
- Repeat measurement to confirm findings; and
- Implement the EAP as shown in *Table 6.4a*.

Table 6.4a *Event and Action Plan for Water Quality Monitoring during Operation Phase*

Event	Action		
	ET Leader	IEC	Project Proponent
Exceedance of Limit Level for Stormwater Discharged from the Project Site	<ul style="list-style-type: none"> Identify source(s) and investigate the cause(s) of exceedance Repeat measurement to confirm finding Prepare the Notification of Exceedance within 24 hours Discuss remedial actions with the Project Proponent Assess the effectiveness of Project Proponent's remedial actions 	<ul style="list-style-type: none"> Verify the Notification of Exceedance submitted by the ET Leader Check with Project Proponent on the operating activities Discuss with ET Leader and Project Proponent on the possible remedial actions Advise the Project Proponent on the effectiveness of the proposed remedial measures Supervise implementation of remedial measures 	<ul style="list-style-type: none"> Propose and implement remedial measures or amend design as required; Rectify any unacceptable practice; Amend working methods as required; Implement amended working methods, if necessary
Exceedance of Limit Level for Treated Effluent Discharged from Project Site	<ul style="list-style-type: none"> Identify source(s) and investigate the cause(s) of exceedance Repeat measurement to confirm finding Prepare the Notification of Exceedance within 24 hours Discuss remedial actions with the Project Proponent Assess the effectiveness of Project Proponent's remedial actions 	<ul style="list-style-type: none"> Verify the Notification of Exceedance submitted by the ET Leader Check with Contractor on the operating activities and implementation of landfill gas control measures Discuss with ET Leader and Contractor on the possible remedial actions Advise the IC on the effectiveness of the proposed remedial measures Supervise implementation of remedial measures 	<ul style="list-style-type: none"> Check the performance of the on-site WWTP; Rectify any unacceptable performance; Carry out remedial measures or amend design as required; Implement amended design, if necessary.

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7 MARINE ECOLOGY

7.1 INTRODUCTION

Potential ecological impacts associated with the construction and operation of the biodiesel plant has been identified and assessed in the *EIA Report*. To ensure that the design of the jetty and the construction of marine piles will not cause adverse ecological impacts particularly to the hard coral colony, a design phase audit should be carried out. Site inspections during construction should be conducted to ensure that the recommended mitigation measures on water quality are properly implemented such that secondary impacts on marine ecological resources can be avoided and minimised.

As no adverse water quality and hydrodynamic impacts are expected due to the operation of the biodiesel plant, no monitoring and audit will be required during operation phase.

7.2 MITIGATION MEASURES

In accordance with the guidelines on marine ecology impact assessment stipulated in the *EIAO-TM*, the general policy for mitigating impacts to marine ecological resources, in order of priority, are:

- *Avoidance:* Potential impacts should be avoided to the maximum extent practicable by adopting suitable alternatives;
- *Minimisation:* Unavoidable impacts should be minimised by taking appropriate and practicable measures such as constraints on the intensity of works operations or timing of works operations; and
- *Compensation:* The loss of important species and habitats may be provided for elsewhere as compensation. Enhancement and other conservation measures should always be considered whenever possible.

The mitigation measures recommended to minimise the potential impacts to marine ecological resources are listed in *Annex A* and summarised below.

7.2.1 Direct Loss of Hard Coral Colony

Once the detailed layout plan of the marine piles is available, the location of the piles will be reviewed to determine the possibility of preventing direct loss of hard coral colony and other marine organisms caused by the piling works (see *Section 7.3*). Hence, it further reduces the marine ecological impact due to the construction of the jetty.

7.2.2 *Changes in Water Quality*

Mitigation measures for minimising water quality impacts are presented in the *Implementation Schedule* (see *Annex A*). These measures should be properly implemented and good construction site practices should be adopted to minimise potential impacts to marine ecological resources.

7.2.3 *Spillage Control and Clean Up*

Control measures has been incorporated into the design of the materials handling, storage and processing systems of the biodiesel plant which will avoid or minimise potential spillage of materials on-site. Spillage of raw materials (GTW, WCO, etc) and products of the biodiesel plant (eg biodiesel, glycerine) will be contained and collected for reuse, or diverted to the on-site WWTP for treatment. The contaminated area will be properly cleaned. A detailed Emergency Response Plan will be developed and properly implemented to minimise potential impacts on the marine environment.

7.3 *DESIGN PHASE AUDIT*

7.3.1 *Audit Requirements*

The *EIA Report* recommended that the location of the marine piles should be carefully designed to avoid direct loss of hard coral colony and other marine organisms due to construction of the jetty. The detailed design of the jetty and marine piles should be checked by a marine ecologist of the ET prior to construction of the jetty to ensure that the footprint of marine piles are in suitable locations to minimise ecological impacts.

The design phase EM&A requirements for marine ecology comprise the audit of the detailed jetty design to ensure that ecological resources are retained as far as practicable.

7.3.2 *Non-Conformity in the Design Phase*

The ET should review the detailed design of the jetty and closely liaise with the Design Engineer to minimise marine ecological impacts, particularly on the hard coral colony, due to the construction of the jetty. In the event of a non-conformity, the EAP as detailed in *Table 7.3a* should be followed.

Table 7.3a *Event / Action Plan for Design Phase*

Action Level	ET	IEC	Design Engineer	Project Proponent
Non-conformity (direct impacts on hard coral colony or other marine organisms are identified in the Design Phase Audit)	<ul style="list-style-type: none"> • Inform Project Proponent, IEC and Design Engineer • Discuss remedial actions with IEC, Project Proponent and Design Engineer • inform IEC when remedial action taken is completed 	<ul style="list-style-type: none"> • Verify the non-conformity identified by the ET Leader • Discuss with ET Leader, Design Engineer and Project Proponent on the possible remedial actions • Verify remedial actions when completed 	<ul style="list-style-type: none"> • Amend designs, if possible • Discuss remedial actions with Project Proponent and the ET 	<ul style="list-style-type: none"> • Discuss remedial actions with Design Engineer and the ET

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8.1 INTRODUCTION

A quantitative risk assessment has been conducted in the *EIA Report* for the operation phase of the Project. The risk assessment has taken account of a list of mitigation measures to be implemented during the design and operation of the biodiesel plant (see *Annex A*). These mitigation measures should be audited during the detailed design stage and before the operation of the plant. The aims of design phase/ pre-operation audits are to ensure that:

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

In addition to the mitigation measures described in *Section 8.9* of the *EIA Report* and *Annex A* of this Manual, further voluntary risk reduction measures (for example, consider to minimise the spill vapourisation from a liquid pool, by a spill containment system which may be designed such that spills can be diverted and collected outside of the process building) may be considered during the detailed design.

8.2 EMERGENCY CONTINGENCY PLAN & EMERGENCY RESPONSE PLAN

A detailed Emergency Contingency Plan (ECP) and Emergency Response Plan (ERP) should be submitted to the Director of Environmental Protection at least 3 months before commencement of operation of the Project. The ECP should detail the actions to be taken in case of accidental spills occurred and set out preventive actions to avoid any spillages from discharge into the sea. Whilst, the ERP should detail procedures to handle any risk on-site and off-site due to any incident at the facility during loading/unloading operations, transfer operations, storage tank farm operations and processing operations.

The ECP and ERP should be prepared by ET and certified by the IEC before submitting to the Director of the Environmental Protection in accordance with the requirement set out in the EP.

8.3 *DESIGN PHASE AUDIT*

8.3.1 *Audit Requirements*

The risk reduction mitigation measures proposed in the *EIA Report* should be incorporated into the detailed process design, engineering design and contract documents. Designs should be checked by the ET and verified by the IEC to ensure that the measures are fully incorporated and that potential conflicts with other design criteria and operational requirements are resolved prior to construction of the biodiesel plant.

The design phase EM&A requirements for risk management comprise the audit of the detailed design of the plant. Check should be made once the draft detailed design and the specification of the biodiesel plant are available.

8.3.2 *Non-Conformity in the Design Phase*

The ET should review the detailed design and specification and closely liaise with the Design Engineer to ensure all risk management measures have been incorporated. The detailed design should then be verified by the IEC. In the event of a non-conformity, the EAP as detailed in *Table 8.4a* should be followed.

8.4 *PRE-OPERATION AUDIT*

8.4.1 *Audit Requirements*

Before the operation of the biodiesel plant, a site audit should be conducted by ET and verified by the IEC to ensure that the recommended mitigation measures are properly installed and implemented in accordance with the recommendations of the *EIA Report*.

8.4.2 *Non-Conformity in the Design Phase*

The ET should check the plant setup, operation procedure, installation and implementation of the mitigation measures and confirm that they are developed in accordance with the recommendations of the *EIA Report*. The IEC should be verified by the findings of the audits undertaken by the ET. In the event of a non-conformity, the EAP as detailed in *Table 8.4a* should be followed.

8.5 *EVENT AND ACTION PLAN*

In the vent of a non-conformity, the EAP as detailed in *Table 8.5a* should be followed.

Table 8.5a *Event / Action Plan*

Action Level	ET	IEC	Design Engineer	Project Proponent	Contractor
<i>Design Phase Audit</i>					
Non-conformity of the recommendation s of the <i>EIA Report</i>)	<ul style="list-style-type: none"> • Inform IEC, Project Proponent and Design Engineer • Discuss remedial actions with IEC, Project Proponent and Design Engineer • Verify remedial actions when completed 	<ul style="list-style-type: none"> • Discuss remedial actions with ET, Project Proponent and Design Engineer • Verify remedial actions when completed 	<ul style="list-style-type: none"> • Amend designs • Discuss remedial actions with Project Proponent and the ET 	<ul style="list-style-type: none"> • Discuss remedial actions with Design Engineer and the ET 	<ul style="list-style-type: none"> • Discuss remedial actions with Project Proponent , Design Engineer, and the ET • Carry out the remedial action
<i>Pre-operation Audit</i>					
Non-conformity of the recommendation s of the <i>EIA Report</i>)	<ul style="list-style-type: none"> • Inform IEC, Project Proponent and Design Engineer • Discuss remedial actions with IEC, Project Proponent and Design Engineer • Verify remedial actions when completed 	<ul style="list-style-type: none"> • Discuss remedial actions with ET, Project Proponent and Design Engineer • Verify remedial actions when completed 	<ul style="list-style-type: none"> • Amend designs and operational setting • Discuss remedial actions with Project Proponent and the ET 	<ul style="list-style-type: none"> • Discuss remedial actions with Design Engineer and the ET 	<ul style="list-style-type: none"> • Incorporate remedial action

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9.1 SITE INSPECTION

Site inspections provide a direct means to track and ensure the enforcement of specified environmental protection and pollution control measures. The inspections should be undertaken by the ET, IEC and the Contractor to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Additionally, the ET should be responsible for defining the scope of the inspections, detailing any deficiencies that are identified, and reporting any necessary actions or mitigation measures that are implemented as a result of the inspection.

Joint site inspections with ET, IEC and Contractor should be carried out at least once per month. In particular during the piling works being carried out, the frequency of site inspection should be increased to once per week. The areas of inspection should not be limited to the general environmental conditions in the vicinity of the site and the pollution control and mitigation measures within the site; the environmental conditions outside the site area which are likely to be affected, directly or indirectly, by site activities. The ET should make reference to the following information in conducting the inspections:

- the EIA Study and EM&A recommendations on environmental protection and pollution control mitigation measures;
- ongoing results of the EM&A programme;
- works progress and programme;
- individual works method statements which should include proposals on associated pollution control measures;
- contract specifications on environmental protection;
- relevant environmental legislation and guidelines; and
- previous site inspection results undertaken.

The inspection results and their associated recommendations on improvements to the environmental protection and pollution control works should be submitted to the IEC, Contractor and Project Proponent, as appropriate, within one working day, for verification, comment and for taking immediate actions. They should also be presented, along with the remedial actions taken, in the monthly EM&A report. The Contractor should follow the procedures and time-frames stipulated in the environmental site inspection for the implementation of mitigation proposal. An action

reporting system should be formulated and implemented to report on any remedial measures implemented subsequent to the site inspections.

The ET should also carry out *ad hoc* site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the associated investigation work.

9.2

COMPLIANCE WITH LEGAL REQUIREMENTS

There are a number of environmental protection and pollution control laws which the Contractor and Project Proponent should comply with. In order that the works are in compliance with the relevant environmental law and regulations, all works method statements submitted by the Contractor should be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.

The ET Leader should review all 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 and Project Proponent should also make available for inspection relevant documents to the ET and IEC so that the checking, verification and auditing process can be carried out. The relevant documents are expected to include the updated work progress reports, the updated works programme, the application letters for different licences/permits under the environmental protection laws, all valid licences/permits and environmental related records. The site diary should also be available, upon request, to the ET during his site inspection.

After reviewing the documentation, the ET Leader should advise the IEC, Contractor and Project Proponent of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works is incompatible with the works programme or may result in a potential violation of environmental protection and pollution control requirements by the works in due course, he/she should also advise the Contractor and Project Proponent accordingly.

Upon receipt of the advice, the IEC, Contractor and Project Proponent should undertake immediate actions to remedy the situation. The ET should follow up to ensure that appropriate action has been taken by the Contractor and Project Proponent in order to satisfy the legal requirements.

10.1 *INTRODUCTION*

This section sets out the handling protocol in dealing with environmental related complaints and enquiries. The handling protocols aimed at:

- Ensuring that environmental complaints and enquiries are received, recorded and communicated to the Contractor and Project Proponent.
- Ensuring that the Contractor and Project Proponent are kept fully informed of actions taken to address the calls received.
- Enabling mobilisation of resources quickly to mitigate the potential impacts.

10.2 *HANDLING PROTOCOLS*

The Contractor and Project Proponent should establish guidance in handling enquiry or complaints via phone calls, correspondence, classification of complaint and enquiry, assignment of responsible staff, investigation procedures, follow-up actions to be taken and compilation of complaint record for inspection. In general, complaints made via phone calls should be responded immediately by the designated holder or relevant staff.

All environmental related complaints via phone call or correspondence should be forwarded to the ET Leader to carry out an independent complaint investigation with the following procedures:

- log complaint and date of receipt onto the complaint database and inform the Contractor, IC, IEC and Project Proponent immediately;
- investigate the complaint jointly with the Contractor and the IEC and discuss with the Contractor and IEC to determine its validity, and assess whether the source of the problem is due to works activities;
- identify mitigation measures in consultation with the Contractor /Project Proponent if a complaint is valid and due to works;
- submit interim report to the EPD on status of the complaint investigation and follow-up actions;
- upon the identification of follow-up actions, the Contractor and/or Project Proponent should implement them as soon as possible;
- review the implementation status and its effectiveness, and when necessary, undertake additional monitoring and audit to verify the

situation, and review that circumstances leading to the complaint do not recur;

- record the complaint, investigation, the subsequent actions and results into the monthly EM&A reports.

During the complaint investigation stage, the ET Leader and Contractor should cooperate with the IEC and Project Proponent in providing all necessary information and assistance for completion of the investigation. If mitigation measures are required following the investigation, the Contractor and Project Proponent should promptly carry out the measures. The ET should ensure that the measures have been carried out properly and IEC should verify that the measures have been carried out by the Contractor.

10.3 LOG-BOOK

The ET Leader should keep a contemporaneous log-book of each and every instance or circumstance or change of circumstances which may affect the findings of the EIA and non-compliance with the Environmental Permit (EP). The ET Leader should notify the IEC within one working day of the occurrence of any such instance or circumstance or change of circumstance and the IEC should notify the Director of Environmental Protection by fax within one working day of receipt of notification from the ET Leader of each and every occurrence, change of circumstances or non-compliance with the EIA Report and the EP.

The ET Leader's log-book should be kept readily available for inspection by persons (such as IEC, Project Proponent and Contractor) assisting in supervision of the implementation of the recommendations of the *EIA Report* and the conditions set out in the EP, or by EPD or his authorised officers.

11 REPORTING

11.1 GENERAL

Reports can be provided in an electronic medium upon agreeing the format with the Project Proponent and the EPD. This will enable a transition from a paper / historic and reactive approach to an electronic/real time proactive approach.

Types of reports that the ET Leader should prepare and submit include *Monthly EM&A Reports*, *Quarterly EM&A Summary Reports* and *Final EM&A Summary Report*. In accordance with Annex 21 of the *EIAO-TM*, a copy of the monthly, quarterly summary and final EM&A reports should be made available to the Director of Environmental Protection.

11.2 MONTHLY EM&A REPORTS

The results and findings of all EM&A works required in the Manual should be recorded in the *Monthly EM&A Reports* prepared by the ET Leader. The *Monthly EM&A Reports* should be submitted within 10 working days after the end of each reporting month, with the first report due in the month after construction commences. The *Monthly EM&A Reports* should be submitted to the IEC, Contractor, Project Proponent and EPD. The ET Leader should liaise with each party on the required number of copies of the *Monthly EM&A Reports* in both hard copy and electronic medium requirement.

The ET Leader should review the number and location of monitoring stations and parameters every six months or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress. The report should include, but not limited to, the following elements.

11.2.1 First Monthly EM&A Report

The first monthly EM&A report should include at least the following:

- (a) Executive Summary (1 to 2 pages):
 - breaches of Action and Limit levels;
 - complaint log;
 - notifications of any summons and successful prosecutions;
 - reporting changes; and
 - future key issues.

- (b) Basic Project Information:
- project organisation including key personnel contact names and telephone numbers;
 - construction programme; and
 - management structure.
- (c) Environmental Status:
- works undertaken during the month with illustrations (such as location of works etc); and
 - drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring stations.
- (d) A brief summary of EM&A requirements including:
- all monitoring parameters;
 - environmental quality performance limits (Action/Limit levels); and
 - Event and Action Plans.
- (e) Implementation Status:
- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the *EIA Report*, summarised in the updated *Implementation Schedule* (see *Annex A*);
- (f) Monitoring results (in tabulated form 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;
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period;
 - graphical plots of the monitored parameters in the month annotated against:

- the major activities being carried out on site during the period;
 - any other factors which might affect the monitoring results; and
 - quality assurance (QA) / quality control (QC) results and detection limits.
- (g) Report on non-compliance, complaints, notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- (h) Others
- an account of the future key issues as reviewed from the works programme and work method statements; and
 - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

11.2.2 *Subsequent Monthly EM&A Reports*

The subsequent *Monthly EM&A Reports* should include at least the following:

- (a) Executive Summary (1 to 2 pages):
- breaches of Action /Limit Levels;
 - complaints log;
 - notifications of any summons and successful prosecutions;

- reporting changes; and
 - future key issues.
- (b) Environmental Status:
- construction programme;
 - works undertaken during the month with illustrations including key personnel contact names and telephone numbers; and
 - drawing showing the Project area, any environmental sensitive receivers.
- (c) Implementation Status:
- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the *EIA Report*, summarised in the updated *Implementation Schedule*.
- (d) Monitoring results (in tabulated form 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;
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period that may affect the results;
 - graphical plots of the monitored parameters in the month annotated against:
 - the major activities being carried out on site during the period;
 - any other factors which might affect the monitoring results; and
 - quality assurance (QA) / quality control (QC) results and detection limits.
- (e) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (Action /Limit levels);

- record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- (f) Others
- an account of the future key issues as reviewed from the works programme and work method statements;
 - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.
- (g) Appendix
- Action and Limit levels;
 - monitoring schedule for the present and next reporting period;
 - cumulative statistics on complaints, notifications of summons and successful prosecutions; and
 - outstanding issues and deficiencies.

11.3 *QUARTERLY EM&A SUMMARY REPORTS*

The *Quarterly EM&A Summary Reports* should contain the following information:

- up to half page executive summary;
- basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of works undertaken during the quarter;
- a brief summary of EM&A requirements including:

- monitoring parameters;
- environmental quality performance limits (Action / Limit levels); and
- environmental mitigation measures, as recommended in the *EIA Report*;
- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the *EIA Report*, summarised in the updated implementation schedule;
- drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring stations;
- graphical plots of any trends in 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;
- a summary of non-compliance (exceedances) of the environmental quality performance limits (Action / Limit levels);
- a brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures;
- a summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance;
- a summarised record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- comments (for examples, a review of the effectiveness and efficiency of the mitigation measures) recommendations (for example, any improvement in the EM&A programme) and conclusions for the quarter; and
- Project Proponents' contacts and any hotline telephone number for the public to make enquiries.

11.4 FINAL EM&A SUMMARY REPORT

The *Final EM&A Summary Report* should include at least the following:

- an executive summary;

- drawings showing the Project area, any environmental sensitive receivers;
- basic Project information including a synopsis of the Project organisation, contacts of key management, and a synopsis of work undertaken during the entire construction and operation periods;
- brief summary of EM&A requirements including:
 - monitoring parameters;
 - environmental quality performance limits (Action /Limit levels); and
 - environmental mitigation measures, as recommended in the *EIA Report*; and
 - Event and Action Plans.
- advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the *EIA Report*, summarised in the updated implementation schedule;
- graphical plots of the trends of monitored parameters over the construction and operation periods;
- a summary of non-compliance (exceedances) of the environmental quality performance limits (Action /Limit levels);
- a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
- a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of breaches, investigation, follow-up actions taken and results;
- a review of the validity of EIA predictions and identification of shortcomings in the EIA recommendations;
- advice on the environmental acceptability of the Project with reference to the specific impact hypothesis;
- review monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);

- review the practicality and effectiveness of the EM&A programme (for examples, a review of the effectiveness and efficiency of the mitigation measures), recommend any improvement in the EM&A programme; and
- A conclusion to state the return of ambient and/or predicted scenario as per EIA findings.

11.5

DATA KEEPING

Documentation such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the *Monthly EM&A Reports*. However, such documents should be well kept by the Project Proponent and ET Leader, as appropriate, and should be available for inspection of the IEC and EPD upon request. All relevant information should be clearly and systematically recorded in the documents. The monitoring data should also be recorded in electronic format, and the soft copy should be available to the EPD upon request. All documents and data should be kept for at least one year following decommissioning of the biodiesel plant.

Annex A

Implementation Schedule

A1 IMPLEMENTATION SCHEDULE

A1.1 INTRODUCTION

This *Annex* summarises all the mitigation measures recommended in the EIA study and presents them in the form of an Implementation Schedule in accordance with the requirements of Section 3.4.7.3 of the *EIA Study Brief No. ESB-178/2007*.

The Implementation Schedule has the following column headings:

EIA Ref

This denotes the section number or reference from the main text of the *EIA Report*.

EM&A Ref

This denotes the sequential number of each of the recommended mitigation measures specified in the Implementation Schedule.

Recommended Mitigation Measures

This denotes the recommended mitigation measures, courses of action or subsequent deliverables that are to be adopted, undertaken or delivered to avoid, reduce or ameliorate predicted environmental impacts.

Objectives of the Recommended Measures and Main Concerns to be Addressed

This denotes the objectives of the recommended mitigation measures and main concerns to be addressed in the EIA study.

Location

This indicates the spatial area in which the recommended mitigation measures are to be implemented together with details of the programming or timing of their implementation.

Who to Implement the Measure

This denotes where the responsibility lies for the implementation of the recommended mitigation measures.

When to Implement the Measures

This denotes the stage at which the recommended mitigation measures are to be implemented either during the Design, Construction or Operation phases.

What Requirements or Standards for the Measures to Achieve

This defines the controlling legislation that is required to be complied with.

Table A1.1a Implementation Schedule

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
<i>Air Quality – Construction Phase</i>									
4.7.1	AQ1	<ul style="list-style-type: none"> Dust control measures such as water spaying on roads and dusty areas, covering of lorries by impervious sheets and controlling of the falling height of fill materials will be implemented; 	To minimise potential dust nuisance	Main haul road	Contractor		✓		<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>
4.7.1	AQ2	<ul style="list-style-type: none"> Effective dust screens, sheeting or netting will be provided to enclose the scaffolding from the ground level of the facility during the building construction; 	To minimise potential dust nuisance	All construction works area	Contractor		✓		<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>
4.7.1	AQ3	<ul style="list-style-type: none"> All debris and materials will be covered or stored in a sheltered debris collection area; 	To minimise potential dust nuisance	All construction works area	Contractor		✓		<i>Air Pollution Control (Construction Dust) Regulations</i> <i>HKAQO and EIAO-TM Annex 4</i>
4.7.1	AQ4	<ul style="list-style-type: none"> Hoarding from ground level will be provided along the entire length of the site boundary except for a site entrance or exit; 	To minimise potential dust nuisance	Site boundary and entrance	Contractor		✓		<i>Air Pollution Control (Construction Dust) Regulations</i>

(1) D=Design; C=Construction; O=Operation

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
									<i>HKAQO and EIAO-TM Annex 4</i>
4.7.1	AQ5	<ul style="list-style-type: none"> Every stockpile of dusty materials will be covered entirely by impermeable sheeting or placed in an area sheltered on the top and the 3 sides; 	To minimise potential dust nuisance	All construction works area	Contractor		✓		<i>Air Pollution Control (Construction Dust) Regulations</i>
									<i>HKAQO and EIAO-TM Annex 4</i>
4.7.1	AQ6	<ul style="list-style-type: none"> Regular maintenance and checking of the diesel powered mechanical equipment will be adopted to avoid any black smoke emissions and to minimize gaseous emissions. 	To minimise potential black smoke emission	All construction works area	Contractor		✓		<i>Good Site Practice</i>
4.7.1	AQ6	<ul style="list-style-type: none"> Monthly site audits will be conducted to ensure the implementation of suitable dust control measures and good site practices 	To minimise potential dust nuisance and black smoke emission	All construction works area	Contractor		✓		-
<i>Air Quality – Operational Phase</i>									
4.4.2	AQ7	<ul style="list-style-type: none"> During berthing of the marine vessel at the jetty, the main engine of the vessel will be switched off to minimise emissions. The power supply to the marine vessels will be provided by an on-site power supply. 	To minimise air quality impact	At the jetty	Operator		✓		-
4.9.2	AQ8	<ul style="list-style-type: none"> NO_x, CO, SO₂ and NMOC concentrations in the flue gas of the stacks of the boilers and biogas flare (if in operation), methanol and acetyldehyde concentrations in the vent gas of process building, and odour concentration at the stack of the final air scrubber will be monitored on monthly basis for the first year of the operation. If the results of the first year monitoring meet the limit levels, the monitoring will be reduced to half-year intervals for the operational stage. 	To minimise air quality impact	Emission monitoring : boiler stack, biogas flare (if in operation), vent pipe of process building and final air scrubber stack Odour patrol : along	Operator		✓		-

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
		Exhaust gas temperature and exhaust gas velocity will also be monitored at the same frequency.		the Project Site boundary					
4.9.2	AQ9	<ul style="list-style-type: none"> Odour concentration at the stack of the final air scrubber will be monitored on monthly basis for the first two years of the operation. Exhaust gas temperature and exhaust gas velocity of the final scrubber will also be monitored at the same frequency. 	To minimise odour nuisance	Emission monitoring : final air scrubber stack	Operator		✓	-	
4.9.2	AQ10	<ul style="list-style-type: none"> 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. If there is no exceedance of action limit or there is no substantiated odour compliant 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. 	To minimise odour nuisance	Along Project Site boundary	Operator		✓	-	

Noise – Construction Phase

5.7.1	N1	<p>Adopt good site practice listed below:</p> <ul style="list-style-type: none"> Only well-maintained plant will be operated on-site and plant will be serviced regularly during the construction program; Silencers or mufflers on construction equipment will be 	To further minimise potential construction noise nuisance.	All construction works area	Contractor		✓		Noise Control Ordinance (NCO) and Annex 5 of EIAO-TM
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EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
		<p>utilized and will be properly maintained during the construction program;</p> <ul style="list-style-type: none"> • Mobile plant, if any, will be sited as far from NSRs as possible; • Machines and plant (such as trucks) that may be in intermittent use will be shut down between work periods or will be throttled down to a minimum; • Plant known to emit noise strongly in one direction will, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures will be effectively utilised, wherever practicable, in screening noise from on-site construction activities. 							
Noise – Operational Phase									
5.7.2	N2	<p>Adopt good site practice listed below:</p> <ul style="list-style-type: none"> • Choose quieter equipment; • Include noise levels specification when ordering new plant items; • Locate fixed plant items or noise emission points away from the NSRs as far as practicable; • Provide complete noise enclosures for all outdoor pumps with no opening facing the LOHAS parks; • Locate noisy machines in enclosed plant rooms or buildings; and • Develop and implement a regularly scheduled plant 	To further minimise potential operational noise nuisance.	Within the Project Site	Contractor/ Operator	✓	✓		<i>Noise Control Ordinance (NCO) and Annex 5 of EIAO-TM</i>

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	

maintenance programme so that plant items are properly operated and serviced. The programme will be implemented by properly trained personnel.

Water Quality – Construction Phase

6.7.1 WQ1 Piling Activities

- Silt curtain will be installed around the marine piling area to contain any suspended mud and sediments generated during the piling works. Silt removal facilities such as silt traps or sedimentation facilities will be provided to remove silt particles from groundwater (if pumping is required) to meet the requirements of the *TM* standard under the *WPCO*. The design of silt removal facilities will be based on the guidelines provided in *ProPECC PN 1/94*. All drainage facilities and erosion and sediment control structures will be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms.

To minimise potential water quality impacts arising from the land based piling works

The piling area and the construction works area

Contractor

✓

ProPECC PN 1/94
WPCO Cap 358AK– Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal

6.7.1 WQ2 Construction Site Run-off and Drainage

- Silt removal facilities such as silt traps or sedimentation facilities will be provided to remove silt particles from runoff to meet the requirements of the *TM* standard under the *WPCO*. The design of silt removal facilities will be based on the guidelines provided in *ProPECC PN 1/94*. All drainage facilities and erosion and sediment control structures will be inspected monthly and maintained to ensure proper and efficient operation at all times and particularly during rainstorms.

To minimise potential water quality impacts arising from the construction works

All construction works area

Contractor

✓

ProPECC PN 1/94
WPCO Cap 358AK– Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
6.7.1	WQ3	<ul style="list-style-type: none"> Careful programming of the works to minimise surface excavations for the construction works during the wet season. If excavation of soil cannot be avoided during the wet season, exposed slope surfaces will be covered by a tarpaulin or other means. Other measures that need to be implemented before, during, and after rainstorms are summarised in <i>ProPECC PN 1/94</i>. 	To minimise potential water quality impacts arising from the construction works	All construction works area	Contractor	✓			<i>ProPECC PN 1/94</i>
6.7.1	WQ4	<ul style="list-style-type: none"> Exposed soil surfaces will be protected by paving or fill material as soon as possible to reduce the potential of soil erosion. 	To minimise potential water quality impacts arising from the construction works	All construction works area	Contractor	✓			<i>ProPECC PN 1/94</i>
6.7.1	WQ5	<ul style="list-style-type: none"> Open stockpiles of construction materials or construction wastes on-site of more than 50m³ will be covered with tarpaulin or similar fabric during rainstorms. These materials will not be placed near the seawall area. 	To minimise potential water quality impacts arising from the construction works	All construction works area	Contractor	✓			<i>ProPECC PN 1/94</i>
6.7.1	WQ6	<p><u>General Construction Activities</u></p> <ul style="list-style-type: none"> Debris and refuse generated on-site will be collected, handled and disposed of properly to avoid entering the nearby water sensitive receivers (WSRs). Stockpiles of cement and other construction materials will be kept covered when not being used. 	To minimise potential water quality impacts arising from the construction works	All construction works area	Contractor	✓			<i>ProPECC PN 1/94</i>
6.7.1	WQ7	<ul style="list-style-type: none"> Oils and fuels will only be used and stored in designated areas which have pollution prevention facilities. All fuel tanks and storage areas will be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. The bund will be drained of rainwater after a rain event. 	To minimise potential water quality impacts arising from the construction works	All construction works area	Contractor	✓			<i>ProPECC PN 1/94</i>
6.7.1	WQ8	<p><u>Sewage generated from On-site Workforce</u></p>	To minimise potential water quality impacts	All construction works area	Contractor	✓			WPCO

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
		<ul style="list-style-type: none"> Temporary sanitary facilities, such as portable chemical toilets, will be provided on-site. A specialised contractor will be responsible for regular collection and appropriate disposal of the sewage and maintenance of these facilities. 	arising from on-site sewage generation						<i>Waste Disposal Ordinance (WDO)</i>
6.10	WQ9	<ul style="list-style-type: none"> Monthly site inspections will be carried out during construction to ensure that the mitigation measures listed above are properly implemented. The site audit frequency will be increased to weekly intervals during the piling works. 	To prevent water quality impact	All construction works area	Contractor			✓	
Water Quality – Operational Phase									
6.7.2	WQ10	<u>Spillage of Raw Materials and Biodiesel Products</u>							
		<ul style="list-style-type: none"> Should a spill arise, the following actions will be taken: <ul style="list-style-type: none"> Within the loading/unloading area: The bunded loading and unloading area will be paved with an impermeable surface and spills will be intercepted and collected by the collection drains. The contaminated wastewater will be transferred to the on-site wastewater treatment plant for treatment. Spillage on site: The spill will be contained and removed by using appropriate absorbent or dispersant. The spillage area will be cleaned up immediately. The wastewater will be collected and treated at the on-site wastewater treatment plant. During transportation: Retainer booms will be used to create a wrap around the barge and the 	To minimise potential water quality impacts on surface water arising from accidental spillage of raw materials and biodiesel products	Biodiesel Plant	Operator			✓	WPCO <i>Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Inshore Waters (Water-TM)</i>

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
		contaminated areas to prevent the spillage spreading. Absorbents will be used to absorb the waste in the confined area.							
6.7.2	WQ11	<ul style="list-style-type: none"> A detailed emergency response plan will be developed prior to the commencement of the operation of the biodiesel plant to stipulate the actions to be taken in case accidental spills occurred and prevent any spillages from discharge into the sea. 	To minimise potential water quality impacts on surface water arising from accidental spillage of raw materials and biodiesel products	Biodiesel Plant	Operator			✓	
6.7.2	WQ12	<ul style="list-style-type: none"> Implementation of the control and actions described in the emergency response plan. 	To minimise potential water quality impacts on surface water arising from accidental spillage of raw materials and biodiesel products	Biodiesel Plant	Operator			✓	
6.7.2	WQ13	<ul style="list-style-type: none"> The training for the staff for awareness of the potential environmental risk association with spillage of materials and proper implementation of the control measures and emergency responses described in the emergency response plan. The training will include all possible risks, which can be occurred when handling different materials (eg methanol, acids and bases, biodiesel, etc) and the necessary clean up procedures. Training will make reference to the MSDS (Material safety data sheets) so that the staff will be fully conversant with the potential risks and environmental implications associated with spillage of materials. 	To minimise potential water quality impacts on surface water arising from accidental spillage of raw materials and biodiesel products	Biodiesel Plant	Operator			✓	

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
6.10	WQ14	<ul style="list-style-type: none"> During the operation phase, 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. Parameters to be monitored will include: <ul style="list-style-type: none"> Stormwater discharge from the site: oil and grease and suspended solids; and Treated effluent from the wastewater treatment plant: Parameters listed in Table 1 of the Technical Memorandum on Standards for Effluents Discharged to Drainage and Sewerage Systems, Inland and Coastal Water or those specified in the WPCO licence. 	To prevent water quality impact	Biodiesel Plant	Operator			✓	WPCO

Ecology – Construction Phase

7.11	EC1	<ul style="list-style-type: none"> Mitigation measures for minimising water quality impacts are presented in detail above (EM&A Ref WQ1 to WQ8). These measures will be properly implemented and good construction practices will be adopted to minimise potential adverse impacts to marine ecological resources. 	To minimise potential water quality impacts arising from the construction works	All construction works area	Contractor			✓	ProPECC PN 1/94
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Ecology – Operational Phases

7.11	EC2	<ul style="list-style-type: none"> Mitigation measures for minimising water quality impacts are presented in detail above (EM&A Ref WQ9 and WQ10). These measures will be properly implemented and good operational practices will be adopted to minimise potential adverse impacts to marine ecological resources. 	To minimise potential water quality and ecological impacts on arising from accidental spillage of raw materials and biodiesel products	Biodiesel Plant	Operator			✓	WPCO <i>Technical Memorandum Standards for Effluents Discharged into Drainage and Sewerage</i>
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EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
									<i>Systems, Inland and Inshore Waters (Water-TM)</i>
7.11	EC3	<ul style="list-style-type: none"> Once available, the location of the piles will be reviewed to determine the possibility of preventing direct loss of hard coral colony and other marine organisms caused by the piling footprint. 	To prevent direct impact on the identified coral along the seawall	Jetty area	Contractor		✓		
Risk									
8.9	R1	<ul style="list-style-type: none"> The process plant building will be provided with adequate number of gas detectors distributed over the various areas of potential leak sources to provide adequate coverage. A coverage factor of 90% for 1 out of N detectors for alarm to be ensured (i.e. the system will be designed so that at least one detector (out of the N detectors provided) triggers in 90% of occasions when a high concentration of flammables is present). 	To prevent build up of flammable vapours within the process building	Process building	Design Engineer and Operator		✓	✓	✓
8.9	R2	<ul style="list-style-type: none"> Additional leak detection systems based on process parameters will be considered such as low pressure or others as applicable. 	To prevent and control leakage of materials from process tanks	Process building	Design Engineer and Operator		✓	✓	✓
8.9	R3	<ul style="list-style-type: none"> Upon gas detection, the process system will be isolated. All pumps, motors will be stopped. Emergency shutdown valves will also be provided at the liquid outlet connections of major equipments holding significant inventory of methanol (>5m³). Emergency shutdown system will be designed to meet a performance target of 90% for the reliability of the overall shutdown system. 	To prevent build up of flammable vapours within the process building	Process building	Design Engineer and Operator		✓	✓	✓
8.9	R4	<ul style="list-style-type: none"> Emergency ventilation system will be provided in accordance with relevant design codes for adequate ventilation of process areas inside buildings, to ensure that 	To prevent build up of flammable vapours within the process	Process building	Design Engineer and Operator		✓	✓	✓

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
		the ventilation rate is sufficient to bring down the concentration to 50% of lower explosive limit (LEL). The ventilation system will be designed to avoid any stagnant pockets in accordance with relevant codes (e.g. IP 15 : Area Classification Code for Installations Handling Flammable Liquids, IEC 60079, Part 10 :2002 Electrical Apparatus for Explosive Gas Atmospheres and NFPA 30 : The Flammable and Combustible Liquids Code). A performance target of 90% for the reliability of the ventilation system is to be achieved.	building						
8.9	R5	<ul style="list-style-type: none"> All electrical equipment inside the building will be classified in accordance with the electrical area classification requirements. No unclassified electrical equipment will be used during operations or maintenance. 	To avoid ignition sources	Process building	Design Engineer and Operator	✓	✓	✓	
8.9	R6	<ul style="list-style-type: none"> Reference will also be made to codes of practice and guidance issued in Europe that apply to places where explosive atmospheres may occur (called 'ATEX' requirements). These are covered as part of the European Directive: the Explosive Atmospheres Directive (99/92/EC) and the UK regulations, Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR). Where potentially explosive atmospheres may occur in the workplace, the requirements include, identifying and classifying (zoning) areas where potentially explosive atmospheres may occur; avoiding ignition sources in zoned areas, in particular those from electrical and mechanical equipment; where necessary, identifying the entrances to zoned areas; providing appropriate anti-static clothing for employees; and before they come into operation, verifying the overall explosion protection safety of areas where explosive atmospheres may occur. The code of practice 	To avoid ignition sources	Process building	Design Engineer and Operator	✓	✓	✓	

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
		and guidance cover among others control and mitigation measures, safe maintenance, repair and cleaning procedures.							
8.9	R7	<ul style="list-style-type: none"> If there are any openings from the building, the near vicinity outside of such openings should also be met with the area classification requirements as per the relevant code example IP 15. 	To avoid ignition sources	Process building	Design Engineer and Operator	✓	✓	✓	
8.9	R8	<ul style="list-style-type: none"> Gas detection will be provided in methanol storage area and emergency shutdown system on liquid inlet and outlet piping of methanol storage tank including automatic shutdown on high level will be provided. 	To prevent build up of flammable vapours within the process building and to minimise leakage of materials from process tanks	Process building	Design Engineer and Operator	✓	✓	✓	
8.9	R9	<ul style="list-style-type: none"> Online oxygen analysers will be provided in the closed vent system of process equipment located inside the process building to detect any air ingress into equipment due to a maintenance activity or during normal operation, for example due to nitrogen blanketing failure. Appropriate control and shutdown actions on high oxygen alarms will be designed as required. Also, portable gas analyzers will be used to test the internal atmosphere of process equipment after completion of maintenance 	To prevent risk of explosion in the processing equipment	Process building	Design Engineer and Operator	✓	✓	✓	
8.9	R10	<ul style="list-style-type: none"> A preliminary process hazard analysis has been carried out as part of the basic design. Also, as part of this QRA study, a detailed hazard identification has been carried out. Further review of design safety measures will be performed as the design process continues, using a structured hazard identification process such as Hazard and Operability Study. 	To further minimise risks associated with the operation of the plant	-	Design Engineer and Operator	✓			

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾			What requirements or standards for the measure to achieve?
						D	C	O	
8.9	R11	<ul style="list-style-type: none"> The reliability requirements for process safety interlock systems will be determined following a structured process such as Safety Integrity Level determination and verification studies as per IEC 60508 and 60511. 	To prevent and control leakage of materials from process tanks	Process building	Design Engineer and Operator	✓	✓	✓	
8.9	R12	<ul style="list-style-type: none"> Safety Management Systems and Procedures will be developed to cover all aspects of operations and maintenance including safe handling of chemicals, safe operating and maintenance practices, operator training, employment of suitably qualified personnel with relevant process industry experience, period audit and review of the safety management systems and procedures etc. The systems and procedures will be in line with the best practices in the process industry and also reflect the high standards adopted in Hong Kong by companies operating in the LPG, flammable liquid and gas industry. 	To prevent and minimise risk to on-site staff and off-site population	Whole Site	Operator		✓	✓	
8.9	R13	<ul style="list-style-type: none"> In the event of any maintenance activity inside a building, procedures will be developed to ensure that flammable concentration build-up does not occur due to draining, opening of vessel or piping etc. The start-up and maintenance operations will be supervised and checked independently of the person undertaking such tasks, to provide a greater oversight. Also, the reliability of the nitrogen in the blanketing system will be ensured to minimise failure of blanketing leading to potential vapour releases from enclosed equipment inside the building. All vents from the process equipments inside the building will be routed to a safe location outside the building. 	To prevent release and accumulation of flammable vapours within the process building	Process building	Operator		✓	✓	
8.9	R14	<ul style="list-style-type: none"> Detailed emergency response plans will be developed to handle any impacts on-site and off-site due to any incident 	To avoid fire or explosion due to	Whole Site	Operator		✓	✓	

EIA Ref.	EM&A Ref	Environmental Protection Measures	Objectives of the Recommended Measure & Main Concerns to address	Location of the Measures	Who to implement the measure?	When to implement the measure? ⁽¹⁾ D C O	What requirements or standards for the measure to achieve?
		at the facility during loading/ unloading operations, transfer operations, storage tank farm operations and processing operations.		operation of the plant			

Annex B

Monitoring and Complaint Proforma

Data Sheet for Stack Monitoring (Boiler & Biogas Flare)

Monitoring Location	
Details of Location	
Sampler Identification	
Date & Time of Sampling	
Exhaust gas pressure	
Exhaust gas temperature	
Exhaust gas velocity	

Parameter	Value
NO _x	
CO	
SO ₂	
NMOC	

Name & Designation

Signature

Date

Field Operator:

Laboratory Staff:

Checked by:

Data Sheet for Stack Monitoring (Process Building)

Monitoring Location	
Details of Location	
Sampler Identification	
Date & Time of Sampling	
Exhaust gas pressure	
Exhaust gas temperature	
Exhaust gas velocity	

Parameter	Value
Acetyldehyde	
Methanol	

Name & Designation

Signature

Date

Field Operator:

Laboratory Staff:

Checked by:

Data Sheet for Stack Monitoring (Final Air Scrubber)

Monitoring Location	
Details of Location	
Sampler Identification	
Date & Time of Sampling	
Exhaust gas temperature	
Exhaust gas velocity	

Parameter	Value
Odour Concentration	

Name & Designation

Signature

Date

Field Operator:

Laboratory Staff:

Checked by:

Data Sheet for Odour Patrol

Date	
Time	
Monitoring Location	
Description of Location	
Site Conditions	

Weather	Sunny / Fine / Overcast / Shower / Rain
Ambient Temperature	°C
Wind Speed	
Wind Direction	
Wind from the Project Area	Yes / No

Odour Level (0-4) *	0 / 1 / 2 / 3 / 4
Major Odour Sources	
Remarks	

Note: *

0	Not Detected	No odour perceived or an odour so weak that it cannot be easily characterized or described
1	Slight	Identifiable odour, slight
2	Moderate	Identifiable odour, moderate
3	Strong	Identifiable, strong
4	Extreme	Severe odour

Name & Designation

Signature

Date

Recorded by:

Checked by:

Stormwater Discharge Monitoring Data Sheet – Laboratory Testing

Location	
Monitoring Location	
Date	
Time	
Weather	

Parameters	Value
Oil and grease	
Suspended Solids	

Name & Designation

Signature

Date

Field Operator:

Laboratory Staff:

Checked by:

Treated Effluent discharge from the Terminal Manhole of the Foul Sewer Drainage System of the Project Site

Monitoring Data Sheet – Laboratory Testing

Location	
Monitoring Location	
Date	
Time	
Weather	

Parameters	Value	Parameters	Value
Suspended Solids		Settleable solids	
BOD		COD	
Oil & Grease		Iron	
Boron		Mercury	
Cadmium		Copper	
Nickel		Sulphide	
Chromium		Sulphate	
Zinc		Total Nitrogen	
Siler		Total Phosphorus	
Other toxic metals individually		Surfactants (Total)	
Total toxic metals		Phenols	
Cyanide			

Name & Designation

Signature

Date

Field Operator:

Laboratory Staff:

Checked by:

**Treated Effluent discharge from the Terminal Manhole of the Foul Sewer Drainage
System of the Project Site**

Monitoring Data Sheet – In-situ Monitoring

Location	
Monitoring Location	
Date	
Time	
Weather	
pH	
Temperature	

Name & Designation

Signature

Date

Recorded by:

Checked by:

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

Incidental 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	

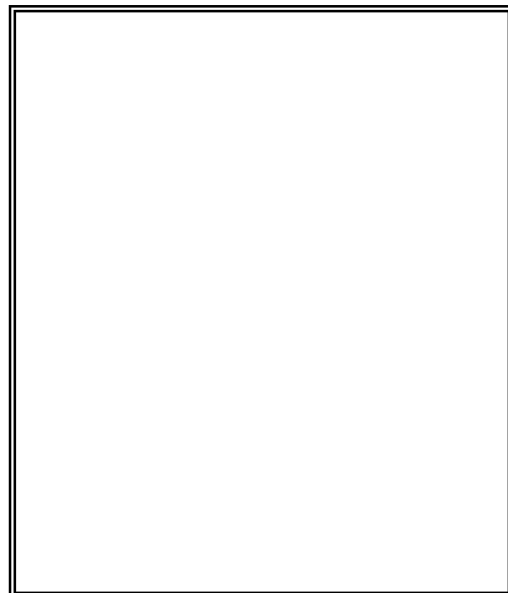
Location Plan

Prepared by: _____

Designation: _____

Signature: _____

Date: _____



Complaint Log

Ref:

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

Filed by Environmental Team Leader:

Date:

Implementation Status Proforma

Ref:

Ref**	Environmental Protection Measures*	Implementation Status

* All recommendations and requirements resulted during the Course of EIA Process, including ACE and/or accepted public comment to the proposed projects.
** EIA Ref/ EM&A Log Ref/ Design Document Ref

Signed by Environmental Team Leader:

Date:

Regulatory Compliance Proforma

Ref:

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

* Name of Applicant, Business Corporation, relevant regulation and remark of license/permit conditions
 ** File reference of the license/permittee

Recorded by Environmental Team Leader:

Date:

Site Inspection Proforma

Ref:

Date	Location	Requirement 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, process, system, practices or technologies
 *** The required completed date to confirm the specified Environmental Protection Action

Recorded by Environmental Team Leader:

Date:

