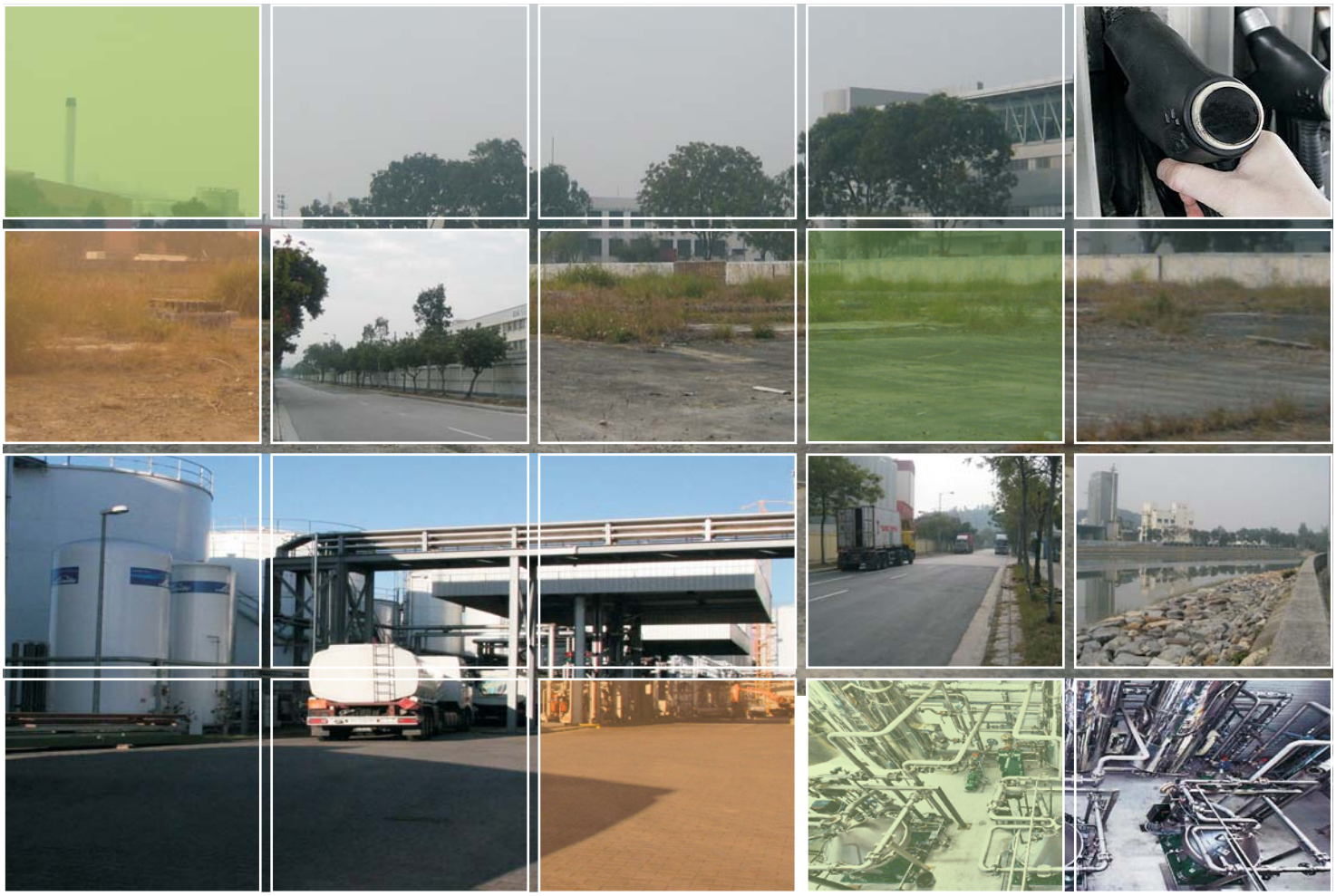
工程項目簡介
PROJECT PROFILE



Harvest Investment Holdings Limited
太豐實業有限公司

Harvest Fatty Acid Methyl Ester and Edible Oil Plant Development at Yuen Long Industrial Estate
太豐脂肪酸甲酯和食用油廠(元朗工業邨)發展項目

Project Profile
工程項目簡介

April 2011
二〇一一年 四月

Environmental Resources Management
香港環境資源管理顧問有限公司
21/F Lincoln House
Taikoo Place 979 King's Road
Island East Hong Kong
香港英皇道九七九號
太古坊林肯大廈二十一樓
Telephone 電話 2271 3000
Facsimile 傳真 2723 5660

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PROJECT PROFILE

Harvest Investment Holdings Limited

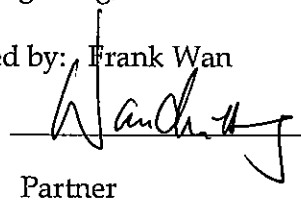
Harvest Fatty Acid Methyl Ester and Edible Oil Plant Development at Yuen Long Industrial Estate: *Project Profile*

April 2011

Reference 0109889

For and on behalf of
ERM-Hong Kong, Limited

Approved by: Frank Wan

Signed: 

Position: Partner

Date: 6 April 2011

CONTENTS

1 BASIC INFORMATION

1.1 PROJECT TITLE

Harvest Fatty Acid Methyl Ester and Edible Oil Plant Development at Yuen Long Industrial Estate (the Project)

1.2 NAME OF PROJECT PROPONENT

Harvest Investment Holdings Limited

1.3 NAME AND TELEPHONE NUMBERS OF CONTACT PERSON

Mr Yinsheng Mao, Chairman, Harvest Investment Holdings Limited

Tel: 2802 4288

1.4 PURPOSE AND NATURE OF THE PROJECT

The Project will involve the construction and operation of a 150,000 tonnes per annum (tpa) (or about 500 tonnes per day) (all production capacities indicated are maximum design production capacities to be reached progressively) Fatty Acid Methyl Ester (FAME) and Edible Oil plant. The facility will be designed as a multi-feedstock system capable of processing a mixture of waste cooking oil (WCO) and refined palm oil (RBD PO) or other vegetable oils to produce FAME and glycerine. The capacity of glycerine production is estimated to be up to 15,000 tpa (about 50 tonnes per day).

The Project will also include facilities for treating crude vegetable oils into edible oil, with by-products that can be used as feedstock for FAME production. The edible oil plant will have the capacity of producing edible oil up to 75,000 tpa (or about 250 tonnes per day).

With the capability of utilising WCO as feedstock for FAME production, the Project will offer an outlet for the disposal of WCO in Hong Kong and the conversion of waste to a green fuel.

As indicated in the consultation document recently published by the Environment Bureau of the HKSAR Government on *Hong Kong's Climate Change Strategy and Action Agenda*, the use of FAME is one of the measures in the Government's standing policy for reducing greenhouse gas (GHG) emissions. In line with this policy, the Project will produce FAME for sale in the local market, thereby making positive contributions to enhance the availability of FAME in Hong Kong and GHG emissions reduction.

1.5 LOCATION OF PROJECT AND HISTORY OF THE SITE

Subject to the land grant through a selection process to be conducted by the Hong Kong Science & Technology Parks Corporation (HKSTPC) in early 2011, the Project is intended to be located in a land lot within the Yuen Long Industrial Estate (YLIE) at 1 Wang Lee Street, YLIE, Yuen Long, New Territories with a total site area of around 2.4 ha (the Site). *Figure 1.1* shows the proposed location of the Site.

YLIE was developed in the early 1980s on land that has been reclaimed from fish ponds. It is currently managed by the HKSTPC. YLIE is currently designated as "Other Specified Uses (Industrial Estate)" in the Yuen Long Outline Zoning Plan (OZP) NO. S/YL/18.

The Site is currently vacant. Records of the HKSTPC indicate that Nippon Hume Concrete (HK) Ltd was the only previous occupant of the Site, which manufactured pre-cast concrete piles on the premises between October 1985 and July 2000. Subsequent to the closure of the concrete pile manufacturing facilities, all the aboveground structures were demolished and removed, except for the concrete hardstanding and the boundary wall.

1.6 DESIGNATED PROJECTS TO BE COVERED BY THE PROJECT PROFILE

The Project will qualify as a Designated Project (DP) under the *Environmental Impact Assessment Ordinance* (EIAO) with respect to the following items:

- Item K.6, Part I, Schedule 2 – a chemical or biochemical plant in which substances are processed and produced, with a storage capacity exceeding 500 tonnes;
- Item K.13, Part I, Schedule 2 – a dangerous goods godown with a storage capacity exceeding 500 tonnes; and
- Item L.4, Part I, Schedule 2 – a storage, transfer, and trans-shipment of oil facility with a storage capacity of not less than 1,000 tonnes.

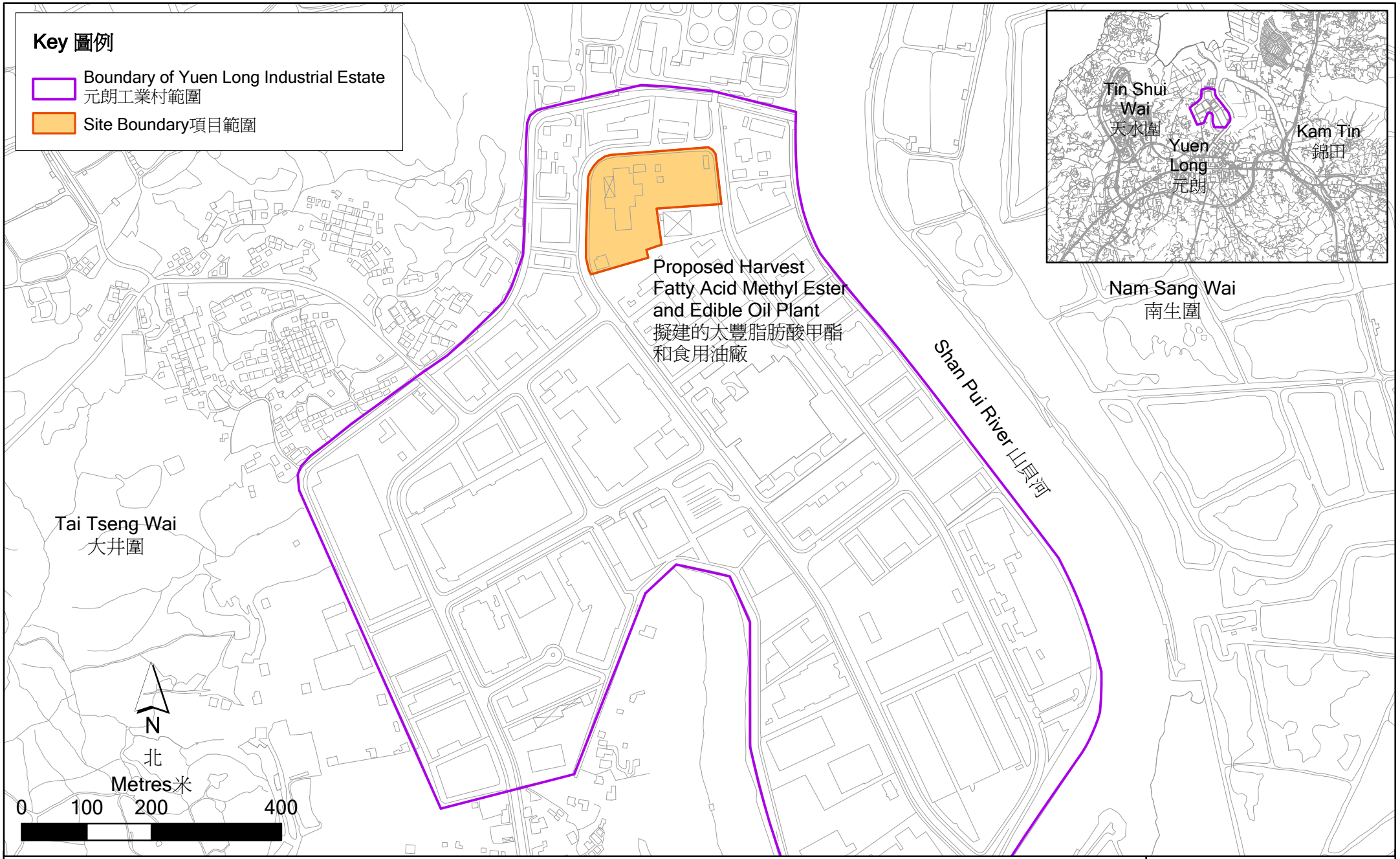


Figure 1.1
圖1.1

Proposed Site Location of Harvest Fatty Acid Methyl Ester and Edible Oil Plant Development
太豐脂肪酸甲酯和食用油廠擬建廠址示意圖

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Date: 18/01/2011

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2 PROJECT INFORMATION

2.1 OVERVIEW

FAME is a diesel fuel substitute produced from renewable sources such as vegetable oils and WCO. Animal fats and grease trap wastes may also be used as feedstock in some other FAME plants. This Project, however, will only utilise feedstock of vegetable origin. Chemically, FAME is defined as the mono alkyl esters of fatty acids and is typically produced through the transesterification of triglycerides in the feedstock, which are esters of fatty acids with glycerine, with methanol or ethanol in the presence of a base catalyst to produce glycerine and FAME.

FAME is a clear liquid at room temperature and its colour depends on the feedstock. FAME can be used alone or mixed in any ratio with diesel fuel of fossil origin for use in diesel engines. FAME has similar physical and chemical properties with respect to the operation of engines primarily designed for using diesel of fossil origin. With respect to the quality of FAME, the most commonly referenced standards include EN 14214 and ASTM D6751-08. The Project will produce FAME meeting these standards.

FAME is gaining recognition in many countries as an alternative fuel, which may be utilised without any modifications to the vehicle engine when it is used as a blend with diesel of fossil origin. In the European Union (EU), United States and many other countries (eg Brazil, Indonesia, Malaysia), there are mandatory requirements for the blending of FAME in diesel fuel for sale.

Contrary to fossil fuels such as diesel, FAME is a type of renewable energy source that potentially has no or very low net CO_2 emissions with its biological origin. FAME is now widely produced and used throughout EU, US and many other countries and it has gained worldwide popularity as an alternative energy source.

2.2 PROJECT DESCRIPTION

The Project will comprise three broad groups of facilities:

- the FAME and glycerine plant (FGP);
- the edible oil plant (EOP); and
- the auxiliary plant system and tank farm.

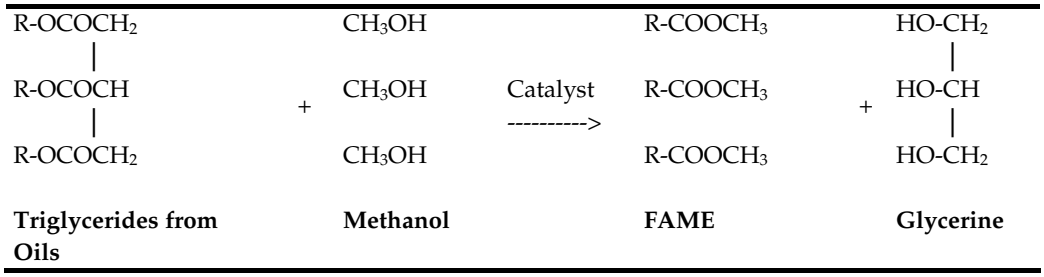
The manufacturing processes or operations within each of the above groups of facilities are described in more details in the following sections.

2.2.1 *FAME and Glycerine Plant*

The FGP will be designed as a multi-feedstock system capable of processing a mixture of WCO and RBD PO or other vegetable oils. FAME and glycerine are produced through a proprietary patented transesterification process, namely the "CD Process", which was originally developed by Oelmühle Leer Connemann GmbH. FAME plants with capacities ranging from 65,000 tpa to 200,000 tpa adopting the CD Process have been successfully completed and operated in a number of European countries. Proven technologies and experience with respect to the type and scale of production processes involved in the Project are therefore available.

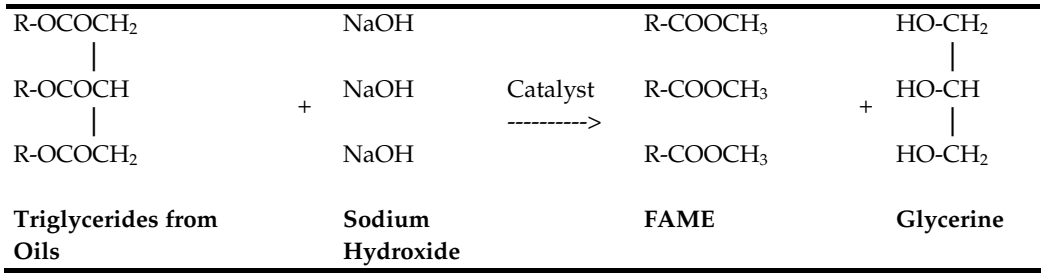
The main reaction in the CD Process involves the tranesterification of triglycerides in vegetable oils or WCO with methanol. Sodium methylate is used as the catalyst in the process. The reaction is presented in *Figure 2.1*.

Figure 2.1 Transesterification in CD Process



In addition to the transesterification process a side reaction also occurs, wherein triglycerides in vegetable oils or WCO react with sodium hydroxide to produce FAME and glycerine. *Figure 2.2* presents the side reaction.

Figure 2.2 Side Reaction



The production processes in the FGP can be broadly divided into the following stages:

- Pre-treatment;
- Transesterification;
- Methanol recovery and glycerine water pre-treatment;
- Glycerine water evaporation; and
- Glycerine distillation.

Figure 2.3 presents a schematic of the FGP. A brief description of each of the production stages is also provided below.

Pre-treatment

The first step in the production of FAME and glycerine involves the removal of undesirable substances such as phospholipids, lecithins, gums, sterol glycosides in the feedstock, which could influence the quality and free flow of the resulting FAME by degumming. Degumming of oil is achieved through hydration in the presence of phosphoric acid at an elevated temperature. Water, gums, and soap are then separated from the oil by a centrifugal separator. Water from the centrifugal separator is discharged to the spent water section and the gums and soap to the on-site wastewater treatment plant. The degummed oil is vacuum dried to remove remaining moisture.

Transesterification

Transesterification is the second step and involves alcoholysis of the degummed vegetable oil by methanol, using sodium methylate as a catalyst.

The output from transesterification column comprises two phases, namely a heavy phase and a light phase. The heavy phase is a mixture of water, glycerine, soaps, and traces of FAME, while the light phase is FAME.

The heavy phase is dried and washed to recover FAME, while the light phase is directed to the tank farm for storage. The residue from washing and drying of the heavy phase is passed through a series of separators to recover the glycerine water.

Methanol Recovery and Glycerine Water Pre-treatment

The methanol recovery and glycerine water pre-treatment is the first step in recovery and processing of glycerine. The washed and dried residue is dosed with acid (to maintain pH) and directed to the fatty acid separator for recovery of fatty acids. The remaining methanol and water are separated from fatty acids by steam stripping. The resultant fatty acids, free from methanol and water, are sold as an additive for pesticides and/or feedstock for crude ester.

The methanol/glycerine water from the fatty acid separator is recovered in the fractionating column. Pure methanol is recovered as the condensate and pumped into the methanol tanks for storage and reuse in the transesterification process, while glycerine water collected in the sump of the fractionating column is directed to the glycerine evaporation section.

Glycerine Water Evaporation

Crude glycerine is recovered as the condensate in the glycerine water evaporator and is further processed by distillation.

Glycerine Distillation

The crude glycerine from the glycerine water evaporator contains about 80% of glycerine and about 20% of impurities. Distillation allows removal of the impurities and the recovery of pharmaceutical grade glycerine. Activated carbon will be used in this process. The spent activated carbon will be collected by the supplier for regeneration. The glycerine collected at the end of the distillation process is directed to the tank farm for storage.

2.2.2 Edible Oil Plant

The EOP will also be designed as a multi-feedstock system and is capable of processing various crude vegetable oils such as soybean oil, rapeseed oil, palm oil, and sunflower seed oil. The refining of vegetable oil involves removal of gums, colour and odour, and non-cold resistant stearines.

The main production stages of the EOP are as follows:

- Pre-treatment by degumming, partial neutralisation or chemical neutralisation – removes gums in crude vegetable oil through hydration in the presence of a mineral acid (phosphoric acid) at an elevated temperature;
- Bleaching/filtration – removes colour by treatment with silica gel, activated carbon and bleaching earth, followed by filtration;
- Deacidification and deodorisation – removes free fatty acids, ketones, aldehydes etc from the oil by distillation (deacidification); and
- Winterisation – removes waxes from vegetable oil.

Figure 2.4 presents a schematic of the EOP. A brief description of each of its production stages is provided below.

Pre-treatment

Pre-treatment by degumming is the first step in refining of vegetable oil. The degumming of vegetable oil is similar to as that for the FGP and is achieved by hydration, ie addition of water, in the presence of phosphoric acid at an elevated temperature.

Bleaching / Filtration

Bleaching and filtration of oil are carried out to remove colour from naturally present lipochromes such as carotene, chlorophyll, and gossypol, natural colouring substance formed by the deterioration of oils during processing and storage, and metal derivatives. Oil is bleached with silica gel, activated carbon and bleaching earth in vacuum. After the bleaching step, the oil/silica gel/ activated carbon/ bleaching earth mixture is passed through a series of filters to separate the oil from impurities and to polish the oil. The residue from the filtration process is further treated with steam to extract any

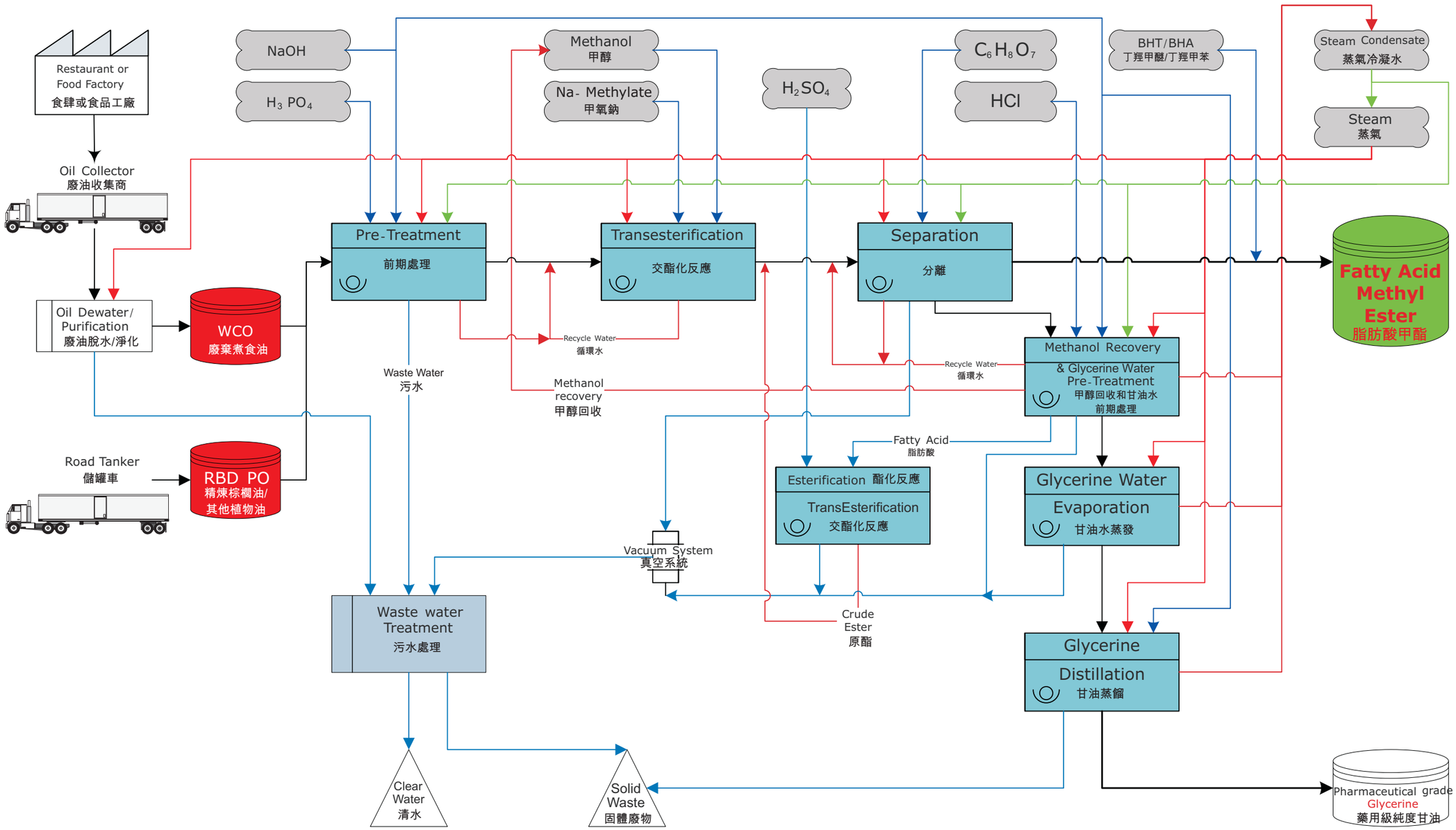


Figure 2.3
圖 2.3

Indicative Schematics of Fatty Acid Methyl Ester Production Process
脂肪酸甲酯生產工序示意圖

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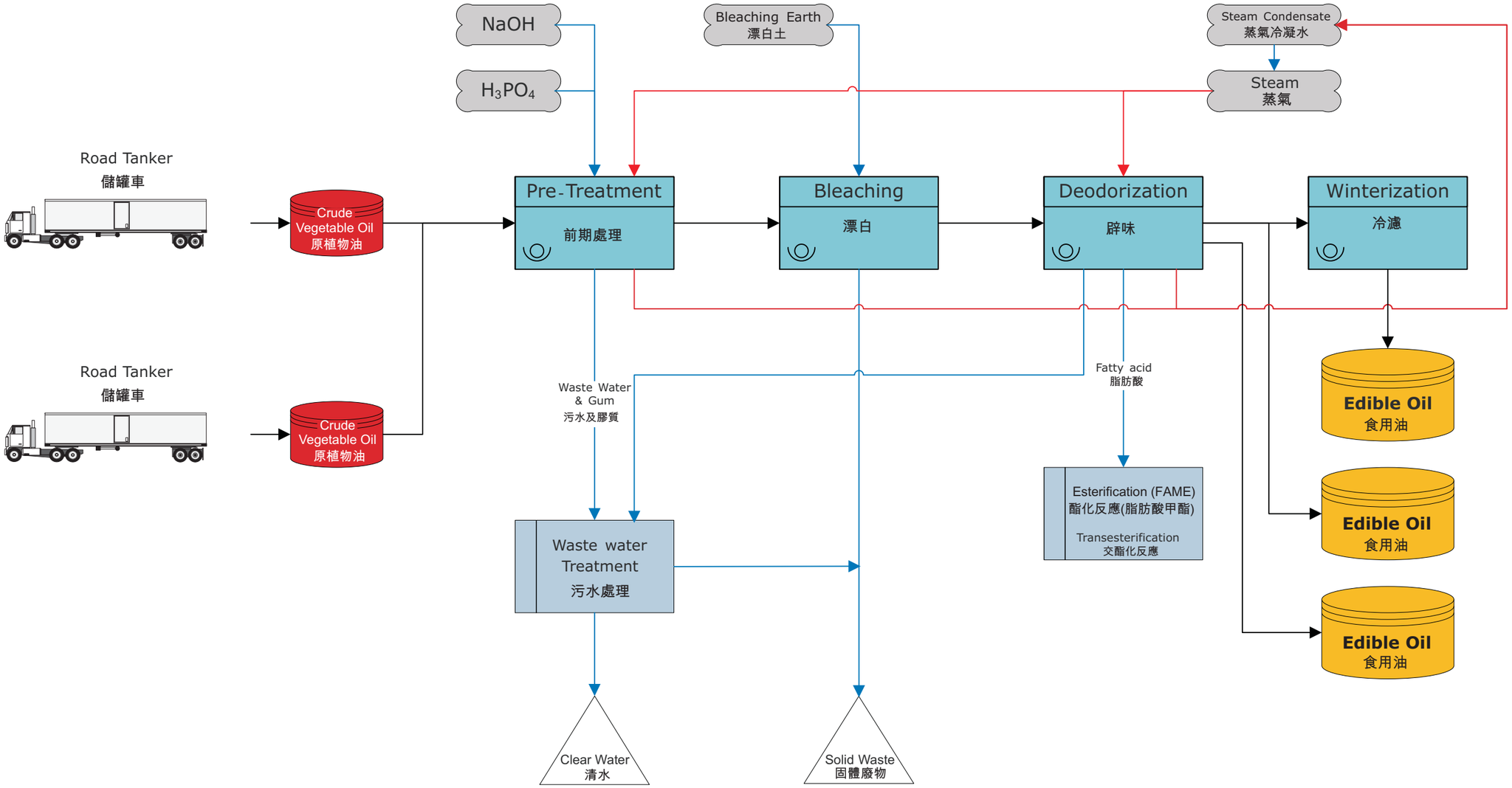

Figure 2.4
圖 2.4

Indicative Schematics of Vegetable Oil Refining
植物油精煉工序示意圖

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DATE: 30\03\2011

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remaining oil. The spent silica gel/activated carbon/bleaching earth will be collected by the supplier for regeneration.

Winterisation

Winterisation is the removal of waxes from vegetable oil. The presence of these waxes with higher melting points results in turbidity of the oil at temperatures below 10˚C. The winterisation process involves cooling the oil to allow solidification of waxes with higher melting points and filtration to separate the waxes from the oil. The oil after winterisation is directed to the tank farm for storage. The waxes will be transported offsite and utilised as feedstock in other industrial processes.

2.2.3 Auxiliary Plant System and Tank Farm

Auxiliary Plant System

Auxiliary plant systems include a nitrogen blanketing system, exhaust gas treatment system, gas detection and warning system, wastewater treatment plant, diesel blending plant, heat recovery system, uninterruptible power supply, steam generator, compressed air generation system and cooling water system.

The nitrogen blanket system allows creation of a nitrogen blanket around all plant units, tanks, and other equipment that are located in a methanol atmosphere. The nitrogen displaces air, hence oxygen, inside such equipment, thereby preventing formation of an explosive atmosphere. In addition, special gas detectors are installed in the vicinity of equipment that is located in a methanol atmosphere. These detectors are placed at a height of about 20 cm above floor level to measure the methanol concentration in air. If the methanol concentration exceeds a pre-determined threshold value, the alarm will be triggered.

The exhaust gas treatment system consists of a wash column filled with a structured packing. This system restricts the quantity of methanol emitted to the atmosphere.

The wastewater treatment plant will treat process effluents by dissolved air flotation (DAF) and anaerobic digestion to remove pollutants such as fatty acids prior to discharge to foul sewer. The biogas generated from the anaerobic digestion will be flared and the sludge generated (about 400 kg per day) will be dewatered and disposed of to landfill or other facilities designated by the EPD.

As the FAME produced is intended mainly for local consumption without blending or as blends with diesel of fossil origin, blending will be undertaken on site.

All plant process units are equipped with integrated heat recovery systems with efficiencies over 80%.

The uninterruptible power supply supports the functioning of the plant computer system (ie operating system server, operating system clients, and plant bus) and plant safety equipment (such as gas monitoring system and emergency stops) for a period of approximately 10 to 15 minutes to enable safe shutdown of plant and equipment in the event of mains power outage.

The process steam generator provides process steam for the facilities in the Project. The boilers will be FAME/diesel-fired. The compressed air generating system produces compressed air to produce clean and dry instrument air for the measuring and control system. Cooling required for the manufacturing processes is achieved through a closed-loop cooling water system.

Tank Farm

The tank farm of the Project will be divided into the following sections for the storage of materials required or produced at different stages of the production process:

- tanks used for the storage of feedstock;
- tanks for storing intermediate products (such as pre-treated oils, crude glycerine water, refined sunflower seed oil), by-products (such as gums, fatty acid distillates, and yellow glycerine), and special materials (such as sodium methylate); and
- tanks for storing the final products (such as FAME, distilled pharmaceutical grade glycerine, and edible oil).

The tank farm will be bunded to contain spillage, if any. The bunds will have the capacity to contain the contents of the largest tank in the bund.

2.2.4 Site Personnel

It is currently envisaged that a total operational staff of about 80 will be employed for the operation of the Project. The operational staff will work in shifts and there will be up to 60 staff on site at any one time.

2.2.5 Transportation of Feedstock, Reagents and Products

It is currently envisaged that the feedstock and reagents for the production process will be delivered to the Site by road in 20'or 40' containers; 10 to 25 tonnes road tankers; 5 to 15 tonnes trucks; and 2.5 tonnes vans. Based on the current estimates, the delivery traffic will comprise up to about 100 truck trips per day.

The products and wastes generated from the Project will also be transported off-site using vehicles. It is currently estimated that up to about 55 truck trips per day will be generated for the transportation of products and wastes off-site.

2.2.6 *Construction of the Project*

Metal hoardings will be erected to fence off the Site prior to the commencement of foundation construction. The plant will most likely be supported on pile caps founded on piles socketted into bedrock. Piled foundation will also be used for the buildings. The exact detailed design of the foundation will be further investigated as the design of the Project progresses. Piling works will only be carried out during the daytime.

The reinforced concrete buildings will be constructed with ready-mix concrete by commonly adopted construction methods. In addition, the perimeter bund walls for the process and tank farm areas will be constructed of reinforced concrete.

The pipes and gantries will be supported by structural steelworks, which will be pre-fabricated and assembled on site. The prefabricated structural steel works and storage tanks will be assembled and erected on site by hydraulic and tower cranes.

The installation of equipment will commence upon the completion of civil works. Subject to approvals from relevant authorities, installation works may be carried out on a 24 hours per day and seven days per week basis.

Considerations on green and sustainable buildings will also be incorporated as appropriate in the Project.

2.2.7 *Outline Project Planning and Implementation Programme*

The Project Proponent will appoint specialist process designers for the design of the production process and the procurement of associated equipment. The contractors for the construction of the Project are yet to be determined through the subsequent procurement process.

The development programme currently envisaged for the Project is outlined in *Table 2.1*:

Table 2.1 Tentative Project Development Programme

Activity	**Indicative Date**
Conceptual design	April 2011 to August 2011
Engineering design and contract procurement	May 2011 to April 2012
Commencement of the construction of the Project (Subject to issuance of EP)	Early 2012
Commencement of operation of the Project	September 2013 or later

3 POTENTIAL ENVIRONMENTAL IMPACTS

3.1 OVERVIEW

Table 3.1 identifies the potential environmental impacts that may arise from the construction and operation of the Project. The potential impacts that are expected to arise from the construction and operation of the Project are air quality, noise, waste management, water quality, and hazard to life associated with the FAME production process.

Table 3.1 Potential Environmental Impacts

Potential Impact	Construction	Operation
• Gaseous Emissions	×	✓
• Dust	✓	×
• Odour	×	✓
• Noise	✓	✓
• Night-time Operations	×	✓
• Traffic	✓	✓
• Liquid Effluents, Discharges or Contaminated Runoff	✓	✓
• Generation of Waste or By-products	✓	✓
• Manufacturing, Storage, Use, Handling, Transport, or Disposal of Dangerous Goods, Hazardous Materials or Wastes	×	✓
• Hazard to Life	×	✓
• Landfill Gas Hazard	×	×
• Disposal of Spoil Material, including potentially Contaminated Materials	×	×
• Disruption of Water Movement or Bottom Sediment	×	×
• Unsightly Visual Appearance	×	×
• Cultural & Heritage	×	×
• Terrestrial Ecology	×	×
• Marine Ecology	×	×
• Cumulative Impacts	×	✓

Note:
✓ = Possible × = Not Expected

3.2 EXISTING ENVIRONMENTAL CONDITIONS

3.2.1 General

The Project is located in the northern part of YLIE, bounded by Wang Lee Street in the north and west, and Wang Lok Street in the east. Two industrial establishments, Fung Shing Steel Co. Ltd. (Fung Shing) and Hong Kong Petrochemical Co. Ltd. (HK Petrochem) are located immediately south of the Site. Fung Shing processes steel sheets into products for construction and manufacturing purposes, including steel tubes, steel pipes, and corrugated

steel sheets. HK Petrochem is a facility for the production of polystyrene resin.

The Site does not have any direct frontage to existing or planned sensitive uses. The nearest identified air and noise sensitive receivers are three-storey village-type residential premises including Green Garden and Leon Court located approximately 200m to the southeast of the Site (*Figure 3.1*) but these are mostly screened by other industrial premises along the western boundary of YLIE. The industrial premises between the Site and the environmental sensitive receivers are listed in *Table 3.2* and shown in *Figure 3.1*.

Table 3.2 Industrial Premises between the Site and Identified Sensitive Receivers

Name of Industrial Premises	Nature of Business [(a)]
XYG (HK) Ltd.	Production of safety glass
Eu Yan Sang (HK) Ltd	Research and development of Chinese medicine
Dunwell Industrial (Holdings) Ltd	Used oil recycling

Note:

(a) Information on the nature of business of industrial establishments in the vicinity of the Site is extracted from the tenants directory published on the HKSTPC website and the websites of the respective companies.

The Site was formed by reclamation of fishponds and developed in the early 1980s. The Site is on generally levelled ground and basic infrastructure such as roads, public drainage and sewerage networks, utilities, have been established.

3.2.2 Air

The local air quality is mainly influenced by industrial emissions from industrial premises within the YLIE, and vehicular traffic on nearby roads. Air sensitive receivers (ASRs) have been identified in accordance with the criteria in *Annex 12* of the *Technical Memorandum on Environmental Impact Assessment Process* (EIAO–TM). The locations of representative ASRs are shown in *Figure 3.1* and listed in *Table 3.3*.

Table 3.3 Representative Air Sensitive Receivers

ASR	Location	Approximate Distance from nearest Site Boundary (m)
A1	Ng Uk Tsuen	290
A2	Green Garden	190
A3	Leon Court	240
A4	Tai Tseng Wai	390
A5	Jade Court	435
A6	Vienna Villa	455
A7	Pavilion west of YLIE	130
A8	Scattered houses at Nam Sang Wai	295

3.2.3 Noise

The nearest residential noise sensitive receiver (NSR) to the Site is the Green Garden (190m to the west) and a house at Nam Sang Wai (295m to the east).

3.2.4 Water Quality

The water body nearest to the Site is the Shan Pui River, located immediately east of YLIE, which is located within the Deep Bay Water Control Zone (WCZ).

3.2.5 Ecology

Nam Sang Wai, an area with ecological importance, is located at about 230m to the east of the Project Site across the Shan Pui River.

3.2.6 Cultural Heritage

No cultural heritage resources are identified within the Site as it is located on land formed from reclamation.

3.2.7 Landscape & Visual Impact Assessment

The Project will be located within the YLIE amidst facilities of similar nature established for industrial purposes. The building height limit specified by the YLIE will be observed.

3.2.8 Landfill Gas Hazard

There is no landfill located in the vicinity of the Site. No landfill gas hazard is anticipated.

3.3 POTENTIAL ENVIRONMENTAL IMPACTS

3.3.1 General

This section highlights potential environmental impacts that are expected to arise from the construction and operation of the Project, which include air quality, noise, night-time operation, traffic, water quality, ecology, cultural heritage, landscape and visual, waste, land contamination, hazard to life, and cumulative impacts.

3.3.2 Air Quality

Construction Phase

The Site is formed and levelled, and is currently vacant. No major earthworks are therefore required for the construction of the Project. Minor excavation works will be required for the construction of the foundation works and utilities with the Site. Dust generated from the concreting works for the construction of buildings will be minimal. With the implementation of dust suppression measures stipulated under the *Air Pollution Control*

(Construction Dust) Regulation and good site practices, no adverse construction dust impact is anticipated.

Operational Phase

Air emissions from the Project include direct emissions from the FAME/ diesel boilers and biogas flare for the wastewater treatment plant, fugitive emissions from the storage tanks, distillation columns, process tanks etc, and odours from wastewater treatment plant and WCO storage. The Project will comply with all Hong Kong environmental requirements and will adopt good engineering practices to minimise the potential impacts on air quality from its operation.

3.3.3 Noise

Construction Phase

The construction of the Project will involve the use of Powered Mechanical Equipment (PME) such as generators, excavators, piling machine, concrete breakers, concrete lorry mixers, and mobile/tower cranes, etc. The separation distance between the nearest NSRs and the Site is approximately 200m, but screened by other YLIE industrial premises in between. Therefore, adverse construction noise impacts are not envisaged.

Operational Phase

Noise from fixed sources during the operational phase will be generated from pumps, blowers, and reactors. Most of these noise sources will be enclosed. The designed total sound pressure level of the noise generated from all plant and equipment will be limited to 85 dB(A) at the Site boundary. Fixed noise sources will be carefully designed such that they would comply with the acceptable noise level (ANL) of the area stipulated in the Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites. Therefore, adverse noise impacts from the operation of the Project are not expected.

With respect to the small traffic generation due to the operation of the Project, the incremental traffic noise will be negligible when compared to the background traffic noise in the Study Area. Noise generated by traffic is not expected to cause any adverse impact on the identified NSRs.

3.3.4 Night Time Operations

Construction Phase

Piling works will not be undertaken during restricted hours (ie between 19:00 hrs and 07:00 hrs of the next day, and the entire day on general holidays and Sundays). As equipment installation works are not considered significant noise or dust generating activities, equipment installation may be undertaken 24 hours a day seven days a week. It is anticipated that the installation works will not cause adverse air and noise impacts on indentified sensitive

Key 圖例

- Air/Noise Sensitive Receiver 空氣/噪音敏感受體
- 300m from Site Boundary 項目300米研究範圍
- 500m from Site Boundary 項目500米研究範圍
- Boundary of Yuen Long Industrial Estate 元朗工業村範圍
- Site Boundary 項目範圍

A/NSR 空氣/噪音敏感受體	Name 名稱
A/NSR1	Ng Uk Tsuen 吳屋村
A/NSR2	Green Garden 趣怡花園
A/NSR3	Leon Court 麗安花園
A/NSR4	Tai Tseng Wai 大井圍
A/NSR5	Jade Court 翠安閣
A/NSR6	Vienna Villa 維園山莊
A/NSR7	Pavilion at the west of YLIE 元朗工業村西邊的涼亭
A/NSR8	Scattered houses at Nam Sang Wai 南生圍的疏落村屋

Proposed Harvest Fatty Acid Methyl Ester and Edible Oil Plant 擬建的太豐脂肪酸甲酯和食用油廠

A/NSR1 A/NSR2 A/NSR3 A/NSR4 A/NSR5 A/NSR6 A/NSR7 A/NSR8

SHAN PUI RIVER 山貝河 Kam Tin River 錦田河

N 北

0 100 200 400 Metres米

Figure 3.1
圖3.1

Locations of Air / Noise Sensitive Receivers
空氣及噪音敏感受體位置圖

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receivers. Construction works undertaken within restricted hours will comply with the provisions of the *Noise Control Ordinance*.

Night installation works are anticipated to involve a few vehicles per hour. As the night-time traffic in the Study Area is low, adverse traffic impact to the local road system is not envisaged.

Operational Phase

The Project will operate 24 hours a day. One of the more significant concerns regarding night-time operation is noise generated by plant and equipment. Potential impact from facility operation is expected to be insignificant as the facility is located within an industrial area, the sound pressure level of all plant and equipment will be limited to 85dB(A), and potential impact on the nearest NSR is expected to be negligible. As the night-time traffic generated by the Project is expected to be low, it is anticipated that the potential impact from the night-time traffic will be insignificant.

3.3.5 Traffic

Transportation of feedstock, reagents and products / by-products to and from the Project will generate additional traffic on Wang Lee Street and Wang Lok Street. The anticipated daily traffic flow associated with the operation of the Project will only be up to about 100 truck trips. This is negligible when compared to the background traffic along Wang Lee Street and Wang Lok Street. The operation of the Project is not expected to cause adverse traffic impacts to the local road networks and the noise associated with it.

3.3.6 Water Quality Impact

Construction Phase

No marine works or dredging of marine sediment will be required. Construction site runoff will be the major source of water quality impacts associated with the land-based construction activities. As discussed in *Section 3.3.2*, the construction of the Project will only involve minor earthwork. The construction of the superstructures has low risk of generating silty runoff. Portable toilets will be used and the sewage will be collected regularly by specialised contractor for off-site disposal. With the implementation of general good site practice in accordance with the *Practice Note for Professional Persons on Construction Site Drainage (ProPECC PN1/94),* the land-based construction activities will not cause adverse water quality impacts.

Operational Phase

The operation of the Project has a potential to cause adverse water quality impacts if the site runoff, wastewater and material storage are not properly managed. The first flush of the stormwater runoff from the Site will be intercepted and passed through a silt trap and an oil interceptor prior to discharge to existing stormwater drainage system of the YLIE.

All process wastewater effluents generated from the Project will be collected and treated at the on-site wastewater treatment plant for reuse on-site or discharge to public foul sewer. The effluent quality will comply with the discharge standards stipulated in Table 1 of the *Technical Memorandum on Standards for Effluents Discharged to Drainage and Sewerage Systems, Inland and Coastal Water* published by the EPD. Domestic sewage generated from site personnel will be discharged to public foul sewer via appropriate connections. No adverse water quality impact due to operation of the Project is anticipated.

An emergency response plan will be developed during the detailed design stage to stipulate the actions to be taken in case spillage occurred and prevent any spillages from discharge into the sea.

3.3.7 Ecology

The Project will be located on reclaimed land with no ecological sensitivity, no potential terrestrial ecological impacts are foreseen. Nam Sang Wai is located over 200m to the east from the Project Site, and over 100m from YLIE. There will be no discharge to nearby water bodies, and no other physical interference between the Project and Nam Sang Wai. Ecological impact is therefore not envisaged.

3.3.8 Cultural Heritage

The Project will be located within a well-developed industrial estate, YLIE, where existing industrial operations are taking place. Cultural heritage impact is not envisaged.

3.3.9 Landscape & Visual

Landscape Impact

The Project will be located within YLIE, where vegetation is limited. The development of the Project within YLIE will therefore have negligible impact on existing landscape resources.

Visual Impact

Construction Phase

As the Project will be located at YLIE and the scale of the construction activities is relatively small, no significant visual impacts in the overall industrial setting of the area.

Operational Phase

The heights of the buildings and tanks of the Project are expected to be comparable to the adjacent buildings within the YLIE, and therefore the Project is not anticipated to be visually intrusive in the overall setting of the YLIE.

3.3.10 Waste

Construction Phase

Construction and Demolition Materials (C&DM): The quantity of vegetation waste to be generated from site preparation will be minimal and it will be disposed of at one of the landfills. C&DM will be generated from site preparation works and construction of the Project. As the Site has been formed and levelled, no major earthworks will be required for site formation. All excavated materials generated from the foundation works will be reused on site as far as practicable.

With respect to the small scale of the new building construction works, it is anticipated that a small amount of C&DM will be generated. The C&DM will be segregated on site into public fill and construction waste (including paper, metals, plastics and wood waste from packaging materials and wooden formworks) and stored in separate skips for disposal at public fill reception facilities and landfills, respectively. Recyclables, such as paper, metal and wood will be stored in different skips for recycling as far as practicable. It is expected that the amount of construction waste requiring disposal at landfills will be small. No adverse waste management impact is anticipated.

Chemical Waste: The chemical waste likely to be generated from the construction activities will, for the most part, arise from the maintenance of construction plant and equipment. The quantity of chemical waste to be generated will be small (expected to be less than 100 Litres per month). These chemical wastes will be readily accepted for treatment and disposal at the Chemical Waste Treatment Centre (CWTC) at Tsing Yi.

Storage, handling, transport and disposal of chemical waste will be arranged in accordance with the *Code of Practice on the Packaging, Labelling and Storage of Chemical Waste* published by the EPD. Provided that this occurs, the potential environmental impacts arising from the handling, storage and disposal of a small amount of chemical waste generated from the construction activities will be negligible.

Sewage and General Refuse: Sewage and general refuse will be generated by the construction workforces. An adequate number of portable toilets will be provided on site to ensure that sewage from site staff is properly collected, for treatment and disposal. The portable toilets will be desludged and maintained regularly by a specialised contractor. Recyclable materials (ie paper, plastic bottles and aluminium cans) will be separated for recycling, in order to reduce the amount of general refuse to be disposed of at landfills. Adequate number of enclosed waste containers will be provided on site to avoid spillage of waste. No adverse environmental impacts from sewage and general refuse are envisaged.

Operational Phase

Table 3.4 summarises the types and quantity of solid wastes that will generated from the operation of the Project.

Table 3.4 Solid Wastes from the Operation of the Project

Waste	Quantity/Frequency	Reuse / Disposal
Sludge from wastewater treatment	About 0.4 tpd of dewatered sludge (> 30% dry solid content)	Disposal at landfill by trucks or the future Sludge Treatment Facilities
Spent activated carbon/silica gel/ bleaching earth from bleaching process	About 1.25 to 5 tpd	Collection by supplier for regeneration
Chemical waste (used lubricating oil, solvents, wastes from laboratory)	About a few litres a month	Disposal at CWTC or other licensed facility
General refuse from site personnel	Less than 50kg per day	Disposal at landfill by trucks.

The disposal of these operational wastes at landfills and CWTC is not expected to have an adverse environmental impact on landfills and CWTC. Further, good management practices (such as use of appropriate containers for storage and employment of reputable and/or licensed contractors) would minimise the potential impact from the storage and handling of these wastes.

3.3.11 Land Contamination

Construction Phase

The Site is on reclaimed land and the previous use of the land was manufacturing of pre-cast concrete piles. Land contamination issue associated with the construction of the Project is not anticipated.

Operational Phase

During the operation of the Project, spillages, if not properly managed, could cause land contamination. The materials to be stored on-site include reagents (such as phosphoric acid, methanol, sodium hydroxide) and products (such as FAME, glycerine and edible oils). FAME is biodegradable and the potential environmental impact due to accidental spillage of FAME or leakage from the FAME storage tanks will be much lower than that for diesel of fossil origin.

WCO is not a chemical / hazardous waste, and therefore any spillage within the Site is not expected to cause land contamination as defined by the EPD.

All materials storage tanks will be designed to comply with the relevant statutory requirements (including structural integrity of the tank; construction of a containment bund and concrete floor; and the type of storage tank will be compatible with the materials) minimising the potential of land contamination.

To allow quick reaction to spill incidents an adequate number of spill kits will be provided in accessible locations. In addition, an emergency response plan

will be developed during the detailed design stage to ensure that any spillage of reagents or products, and leakage from the storage tanks will be responded to immediately and the spills or leaks are mitigated. With the implementation of the precautionary design measures and emergency response plans, potential for land contamination from the operation of the Project is considered to be minimal.

3.3.12 Hazard to Life

A risk assessment of the Project will be conducted to assess the potential hazard to life associated with its operations. The key hazards are anticipated to be associated with the FAME production process in which high pressure, elevated temperature and flammable chemical reagents are involved.

Based on an examination of hazards associated with the Project, a checklist of release cases will be developed and assessed in the EIA Study.

3.3.13 Cumulative Impacts

Construction Phase

The Project will be located in an industrial area, with the closest residential development approximately 200m away. The potential impact to local air quality, water quality, noise levels, traffic, ecology, landscape, waste management, land contamination, and hazard to life, from its construction are considered minimal with proper mitigation measures and good site practice in place. With the general industrial setting in the immediate vicinity of the Project, cumulative impacts from the construction of the Project are not envisaged.

Operational Phase

As the Project will be located in an industrial area, with the closest residential development approximately 200m away, the potential environmental impact from its operation is considered minimal with adequate mitigation measures implemented. As a result, cumulative impacts from the operation of the Project are not envisaged.

3.4 ENVIRONMENTAL PROTECTION MEASURES

The following general good site management practices and environmental protection measures will be implemented for the Project.

Construction Phase

- All debris and materials will be covered or stored in a sheltered debris collection area. 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 in accordance with *Air Pollution Control Ordinance*.

- Idling PME will be switched off. Low noise PME will be used as far as practicable. Work will be planned to avoid sequential uses of noisy PME.

- Public fill and general refuse will be segregated and stored separately for disposal. Waste will be properly stored at site and windblown litter and dust will be minimised during transportation by either covering trucks or transporting wastes in enclosed containers. Waste will be disposed of at licensed sites. A trip-ticket system will be established in accordance with *ETWBTC No. 31/2004* to monitor the disposal of construction waste and to control fly-tipping.

- The contractor will register as a chemical waste producer with EPD. Chemical waste will be handled in accordance with the *Code of Practice on the Packaging, Handling and Storage of Chemical Waste*.

- Effluent discharge from construction activities shall conform to relevant *ProPECC Note 1/94 Construction Site Drainage* requirements and comply with the *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* under the *WPCO*.

Operational Phase

Proven technologies and environmental protection measures (for example, limit the total sound pressure level at the site boundary to 85 dB(A), waste air cleaning system etc) have been adopted for the design and operation of the proposed facility.

3.5 REFERENCE TO PREVIOUSLY APPROVED EIA REPORTS

For the preparation of this Project Profile, reference has been made to the *EIA for Development of a Biodiesel Plant at Tseung Kwan O Industrial Estate* approved on 26 February 2009 (AEIAR-131/2009). The Project being proposed and the FAME plant at Tseung Kwan O Industrial Estate (TKOIE) will involve different proprietary industrial processes and different feedstock but they are both essentially based on the production of FAME through a tranesterification process. The findings of AEIAR-131/2009 with regard to operational air quality and risk impacts are therefore considered relevant to the Project being proposed. Notwithstanding the similarities indicated above, the exact relevance of the mitigation measures presented in AEIAR-131/2009 will be determined in the EIA Study to be undertaken with reference to the detailed design and operations of the Project.

太豐實業有限公司

太豐脂肪酸甲酯和食用油廠於元朗工業村的發展項目：*工程項目簡介*

2011年4月

檔案編號 0109889

香港環境資源管理有限公司	
批核:	溫志雄 代行
簽署:	
職位:	合夥人
日期:	2011年4月6日

目錄

1 基本資料

1.1 工程項目名稱

太豐脂肪酸甲酯和食用油廠(元朗工業邨)發展項目（以下簡稱「本項目」）

1.2 工程項目倡議人名稱

太豐實業有限公司

1.3 聯絡人姓名及電話號碼

太豐實業有限公司主席 毛銀生先生

電話：2802 4288

1.4 工程項目的目的和性質

本項目會建造並經營一個年產 150,000 公噸（或日產約 500 公噸）（本文所示所有生產量均爲設計的最高生產量，將在本項目中逐步達到）的脂肪酸甲酯和食用油廠。這項設施是一個可以使用多種原材料的系統，能夠混合使用廢棄煮食油和精煉棕櫚油或其他植物油作原材料，生成脂肪酸甲酯和甘油。本設施可年產甘油達 15,000 公噸（約日產 50 公噸）。

本項目將有設施把原植物油加工爲食用油，加工過程產生的副產品亦可用作脂肪酸甲酯生產工序的原材料。食用油廠可年產食用油達 75,000 公噸（或日產約 250 公噸）。

由於本項目可以使用廢棄煮食油爲生產脂肪酸甲酯的原材料，故此可爲本地廢棄煮食油的處置及廢物轉成環保燃料提供出路。

正如香港特別行政區政府環境局最近發出的《香港應對氣候變化策略及行動綱領》公眾諮詢文件所言，使用脂肪酸甲酯爲港府其中一項減少溫室氣體排放的常設政策。本項目會對應上述政策，生產脂肪酸甲酯供本地銷售，有助脂肪酸甲酯在本港普及和溫室氣體減排。

1.5 工程項目地點及廠址簡史

本項目擬建於元朗工業邨宏利街一號，總面積約 2.4 公頃的土地（以下簡稱「廠址」），但該地段的租約仍有待 2011 年初由香港科技園公司（以下簡稱爲「科技園」）以招標方式出售。圖 1.1 顯示本項目擬建的位置。

元朗工業邨是於八十年代初期建於回填魚塘所得的土地上，現時由科技園負責管理。此工業邨於元朗分區計劃大綱圖第 S/YL/18 號中被列爲「其他用途（工業邨）」。

工程地點現時空置。科技園的記錄顯示該地點過去只曾租予日本謙混凝土（香港）有限公司，於 1985 年 10 月至 2000 年 7 月之間在該處生產混凝土樁。該混凝土樁生產設施關閉後，除了混凝土地台和廠界圍牆以外，其他地面建築結構均已拆除。

1.6 本工程項目簡介所涵蓋的指定工程項目

根據下列摘錄自《環境影響評估條例》的描述，本項目將會界定爲指定工程項目：

- 附件 2 第 I 部，第 K.6 項－貯存量超過 500 公噸並將物質加工或生產的化工廠或生化工廠；
- 附件 2 第 I 部，第 K.13 項－貯存量超過 500 公噸的危險品倉庫；及
- 附件 2 第 I 部，第 L.4 項－貯存量不少於 1,000 公噸的油類貯存、輸送和轉運設施。

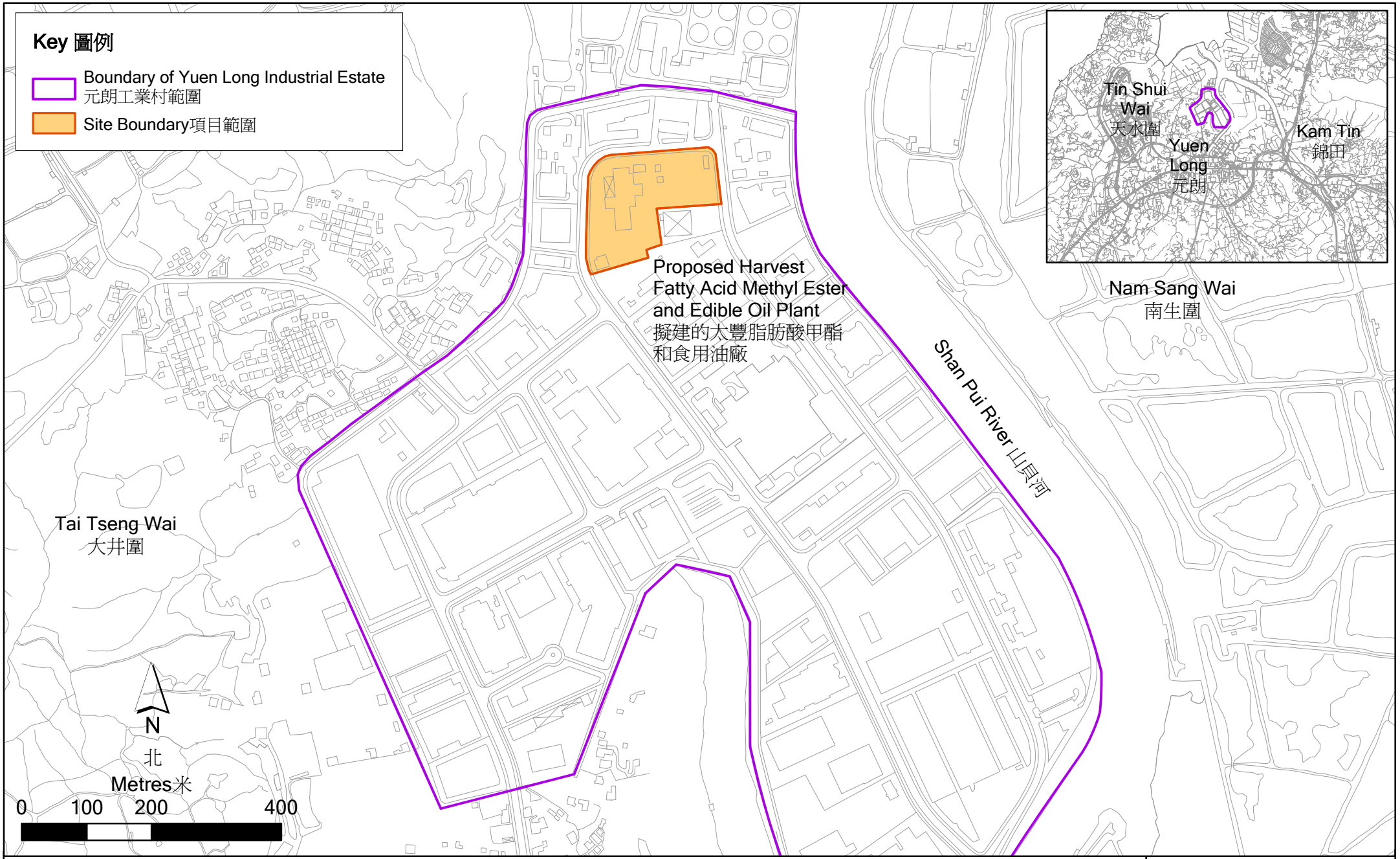

Figure 1.1
圖1.1

Proposed Site Location of Harvest Fatty Acid Methyl Ester and Edible Oil Plant Development
太豐脂肪酸甲酯和食用油廠擬建廠址示意圖

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Date: 18/01/2011

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2 工程項目資料

2.1 概論

脂肪酸甲酯是一種柴油替代品，用可再生原料製成，例如植物油和廢棄煮食油。部份脂肪酸甲酯廠可以使用動物脂肪和隔油池廢物作爲原材料，但本項目只會採用源自植物的原料。脂肪酸甲酯在化學上屬於脂肪酸中的單烷酯通常是由原材料中的三酸甘油酯（亦即脂肪酸和甘油的酯化物）與甲醇或乙醇在鹼性催化劑協助下發生「交酯化」的化學反應，形成甘油和脂肪酸甲酯（或脂肪酸甲酯）。

脂肪酸甲酯在室溫下是一種透明液體，顏色則視乎原料而定。它可以單獨或以任何比例與石油提煉的柴油燃料混合，供柴油引擎使用。就運作柴油引擎而言，脂肪酸甲酯的物理和化學性質都與石化柴油相若。就脂肪酸甲酯的品質而言，最常參考的標準爲 EN 14214 和 ASTM D6751-08。本項目將會生產符合上述標準的脂肪酸甲酯。

脂肪酸甲酯逐漸在多國獲得認受。汽車引擎不必改裝就可使用混入脂肪酸甲酯的石化柴油作燃料。歐盟、美國和許多其他國家（如巴西、印尼、馬來西亞等）已規定柴油燃料需混入脂肪酸甲酯方可出售。

與化石燃料如石化柴油不同，脂肪酸甲酯是一種源自生物的可再生能源，只有極低或全無二氧化碳淨排放。脂肪酸甲酯現時在歐美及多個其他國家都有生產和使用，是世界各地漸受歡迎的另類能源。

2.2 工程項目說明

本項目包括三大類設施：

- 脂肪酸甲酯和甘油廠；
- 食用油廠；及
- 輔助系統和儲存罐區。

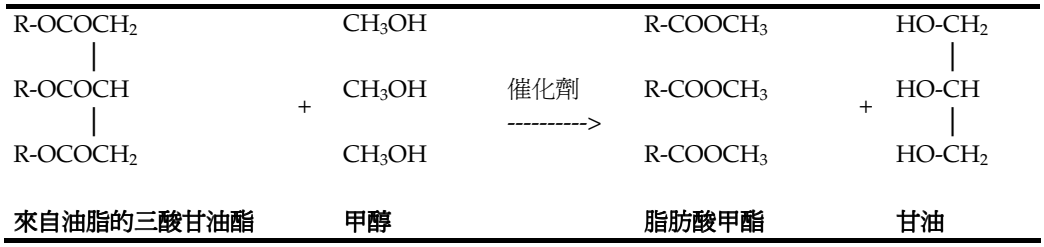
上述各類設施的生產工序或運作情況於下文細述。

2.2.1 脂肪酸甲酯和甘油廠

脂肪酸甲酯和甘油廠將設計成一個可以使用多種原材料的系統，能夠混合加工廢棄煮食油和精煉棕櫚油或其他植物油。這項設施會採用由 Oelmühle Leer Connemann GmbH 研發的交酯化工序，該工序稱爲「CD 或持續去醣基工序」。歐洲數國已有成功採用「CD 工序」的脂肪酸甲酯廠，其年產量介乎 65,000 公噸至 200,000 公噸不等。就本項目生產工序的類型和規模而言，已有確實可行的技術和經驗供借鏡。

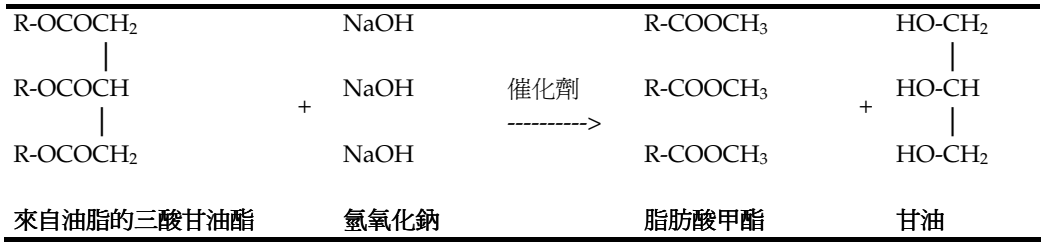
「CD 工序」的主要化學反應是植物油或廢棄煮食油中的三酸甘油酯與甲醇所產生的交酯化反應。這項工序會使用甲醇鈉作爲催化劑。圖 2.1 顯示這項工序的化學反應。

圖2.1　　CD 工序中的交酯化反應



除了交酯化反應外，尚有一個副反應在此工序中發生，亦即植物油或廢棄煮食油中的三酸甘油酯與氫氧化鈉的化學反應，從而產生脂肪酸甲酯和甘油。圖 2.2 顯示該副反應。

圖2.2　　副反應



脂肪酸甲酯和甘油廠的生產工序可以大致分爲下列各階段：

- 前期處理；
- 交酯化反應；
- 甲醇回收和甘油水前期處理；
- 甘油水蒸發；及
- 甘油蒸餾。

圖 2.3 爲脂肪酸甲酯和甘油廠的生產工序示意圖。後文則爲各階段工序的簡介。

<u>前期處理</u>

生產脂肪酸甲酯和甘油的第一步是進行前期處理或脫膠。脫膠程序是要清除例如磷脂、卵磷脂、膠質物、糖基類黃酮等會影響脂肪酸甲酯品質和流動性的雜質。整個程序是在高溫和加入磷酸的情況下進行油脂水合作用。水、膠質和皂質會以離心機和油脂分離。經離心機分離出的水會排進廢水設施，而膠質物料和皂質則會被送至廠內的污水處理設施。脫膠後的油脂則會以真空抽吸法移除剩餘水份。

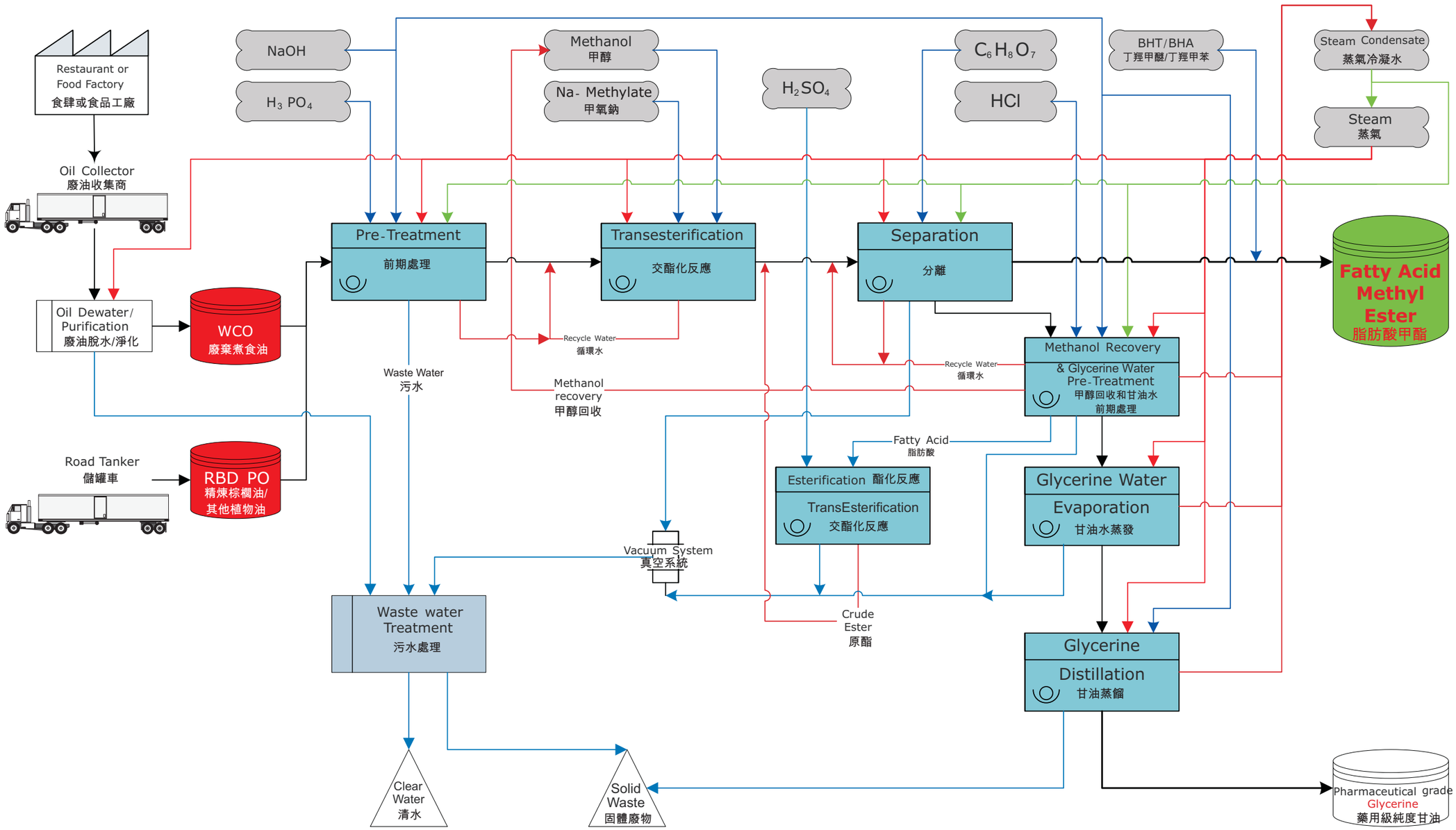


Figure 2.3
圖 2.3

Indicative Schematics of Fatty Acid Methyl Ester Production Process
脂肪酸甲酯生產工序示意圖

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交酯化反應

交酯化反應是生產過程的第二步。它是以甲氧鈉爲催化劑，使甲醇與脫膠後的植物油發生反應而令植物油醇化。

從交酯化反應柱出來的物質有兩個部份，即較重部份和較輕部份。較重的部份是水、甘油、皂質和少量脂肪酸甲酯的混合物，而較輕的部份則爲脂肪酸甲酯。

較重的部份會加以乾燥和清洗，以回收當中的脂肪酸甲酯；而較輕部份會輸送至儲存罐區儲存。較重的部份清洗和乾燥後的渣滓，會通過一系列的分離器，回收當中的甘油水。

甲醇回收和甘油水前期處理

甲醇回收和甘油水前期處理，是甘油回收及處理程序中的第一步。經過清洗和乾燥的渣滓會加酸（以維持酸鹼度），並送至脂肪酸分離器回收其中的脂肪酸。然後會以蒸汽把剩餘的甲醇和水從脂肪酸中分離。這些不含任何甲醇和水份的脂肪酸會出售作殺蟲劑及／或生產酯的材料。

脂肪酸分離器中的甲醇／甘油水則會用分餾柱回收。冷凝後的純甲醇會被抽至甲醇罐儲存，並再用於交酯化反應工序，而分餾柱底槽的甘油水則輸送至甘油蒸發設施。

甘油水蒸發程序

冷凝後的的原甘油會從甘油蒸發器中回收，再以蒸餾法加以處理。

甘油蒸餾程序

未經處理的甘油濃度約達 80%，其餘的 20%是各類雜質。這些雜質可以透過蒸餾清除，從而取得藥用級純度的甘油。本工序會使用活性碳。已使用的活性碳會由供應商回收再生。蒸餾所得的甘油會輸送至儲存罐區儲存。

2.2.2 食用油廠

食用油廠的設計，可以使用多種原材料，而且能夠處理多種植物油，例如大豆油、菜籽油、天然棕櫚油和葵花籽油。植物油的精煉過程包括脫膠、除色、辟味和清除不耐冷的硬脂。

食用油廠的主要生產工序可分爲下列階段：

- 脫膠／部份中和或化學中和等前期處理－在原植物油加入無機酸（磷酸），在高溫下透過水合作用移除其中的膠質；
- 漂白／過濾－以硅藻土、活性碳和漂白土清除色素，再進行過濾；
- 除酸及辟味－以蒸餾法（除酸法）清除油脂中的游離脂肪酸、酮、醛等；及
- 冷濾－從植物油中清除臘質。

圖 2.4 爲食用油廠的生產工序示意圖。後文則爲各個階段工序的簡介。

前期處理

植物油精煉的第一步是脫膠。植物油的脫膠工序與脂肪酸甲酯和甘油廠的脫膠工序相若，也是透過水合作用進行，即在高溫下加水和磷酸。

漂白／過濾

對油脂進行漂白和過濾的目的，是要清除油脂中天然存在的脂色素如胡蘿蔔素、葉綠素和棉子酚、油脂在處理和儲存過程中因變質而產生的天然有色物質，以及油脂中的金屬衍生物。油脂會以硅藻土、活性碳和漂白土於真空環境下進行漂白。完成漂白階段後，由油脂、硅藻土、活性碳和漂白土組成的混合物會經過一系列的過濾設施，去除油脂中的雜質，並提高油脂純度。過濾工序所產生的渣滓會以蒸汽再作處理，以提取所有殘餘油脂。已使用的硅藻土、活性碳和漂白土會由供應商回收再生。

冷濾

冷濾程序是要從植物油中清除臘質。這類高熔點的臘質會令油脂在溫度低於 10°C 時變得混濁。冷濾程序是把油脂冷凍，讓當中的高熔點的臘質凝固，然後將臘質從油脂中過濾分離。完成冷濾程序的油脂會被輸送至儲存罐區儲存。分離出的臘質會運走作其他工業生產程序的原材料。

2.2.3 輔助系統和儲存罐區

輔助系統

本項目的輔助系統包括一個充氮系統、廢氣處理系統、氣體偵測及預警系統、污水處理系統、柴油調配設施、熱力回收系統、無間斷供電系統、蒸汽產生器、壓縮空氣系統和冷卻水系統。

充氮系統可以爲有甲醇地區內的機器、儲存罐和其他設備提供氮氣保護層。氮氣會取代設備內的空氣和當中的氧，以防止設備內形成可觸發爆炸的氣體環境。此外，甲醇氣體環境內的設備附近都會裝設特別的氣體偵測器。氣體偵測器設於離地 20 厘米的高度，以測量空氣中的甲醇濃度。若甲醇濃度超過一個預定數值，警號便會啓動。

廢氣處理系統包括一條裝有規整填料的清洗柱。這個系統會限制排入大氣中的甲醇量。

污水處理系統會以溶氣浮除法及厭氧消化法，將生產工序污水中的污染物如脂肪酸等先行清除方作排放於污水渠。污水厭氧消化產生的生物氣體會以燃燒器耗用；而污泥（每日約 400 公斤）經脫水後會送往堆填區或其他環保署指定的設施棄置。

廠內生產的脂肪酸甲酯擬主要供本港使用，可以未混和調配的脂肪酸甲酯或脂肪酸甲酯混和石化柴油的形式銷售。調配工序會於廠內進行。

廠內所有工序的設施，都會備有超過 80%回收效率的熱力回收系統。

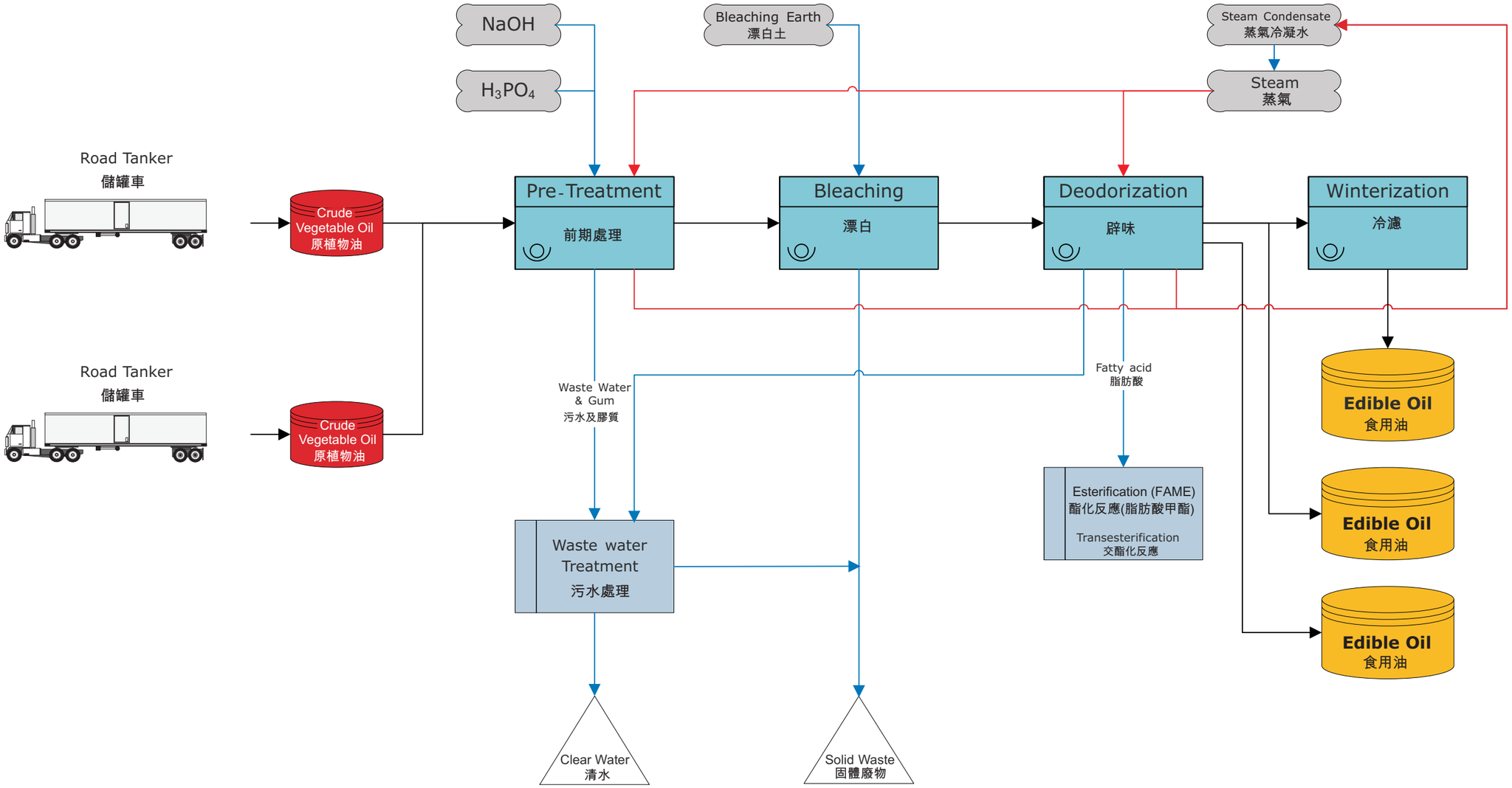

Figure 2.4
圖 2.4

Indicative Schematics of Vegetable Oil Refining
植物油精煉工序示意圖

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無間斷供電系統是在主電源中斷時繼續供電，讓廠內的電腦系統（即操作系統伺服器、用戶機和系統總線）和安全設備（例如氣體監察系統和緊急停機裝置）仍可以保持操作約 10 至 15 分鐘，以便各項機器和設備都可以安全地關上。

蒸汽產生器會爲本項目的相關設施提供生產用蒸汽。蒸汽渦爐會以脂肪酸甲酯或柴油爲能源。壓縮空氣供應系統爲測量和控制系統提供清潔和乾燥的儀錶氣源。生產工序所需要的冷卻功能，則會由一個閉合循環式的冷卻水系統提供。

儲存罐區

本項目的儲存罐區會分成以下各區，存放不同生產階段所需物料或成品：

- 原材料的儲存罐；
- 存放中途產品（例如已作前期處理的油脂、未處理的甘油水、已精煉的葵花籽油）、副產品（例如膠質、脂肪酸蒸餾液和黃色甘油）和特別物料（例如甲氧鈉）的儲存罐；及
- 存放最終成品的儲存罐（例如脂肪酸甲酯、已蒸餾的藥用級甘油和食用油）。

所有儲存罐都會以堅牆圍繞，以阻擋任何溢漏物料外洩。堅牆所圍範圍的容量將足以容納該範圍內最大儲存罐所存放的全部物品。

2.2.4 駐廠人員

本項目預計會聘用約 80 名運作人員，以輪班方式工作，在廠內同時會有最多 60 人。

2.2.5 原材料、化學反應劑及成品的運輸

現時預計生產工序所需的原材料及化學反應劑會以 20 英尺及 40 英尺貨櫃、10 至 25 公噸儲罐車、5 至 15 公噸貨車、及 2.5 公噸客貨車運抵廠址。按現時的估計，運送物料產生的交通約爲每天 100 架次。

本項目的成品和廢物會以車運出，現時預計成品和廢物運輸會產生的交通約爲每天 55 架次。

2.2.6 本項目的建造工程

在進行地基工程前，工地四周會豎立金屬圍板。生產設施最可能會設於由預鑽孔嵌岩式樁柱支撐的樁帽上。廠房建築物亦會建於樁柱式地基上。有關地基的詳細設計會於本項目的工程設計逐步開展後再作研究。樁柱工程只會在日間進行。

鋼筋混凝土建築物會在現場用預先混合的混凝土，以慣常的施工方法建造。此外，生產區及儲存罐區的堅牆亦將以鋼筋混凝土建造。

喉管和托台都會以預製但在現場組裝的鋼架承托。預製的鋼結構和儲存罐，會在現場以液壓起重機和塔式起重機組裝。

在完成土木工程後便會開始安裝設備。若本項目獲有關當局批准，安裝工作會每星期七天，每天廿四小時進行。

本項目會融入適當的環保及可持續建築的元素。

2.2.7 工程項目規劃和實施大綱

工程項目倡議者將委託專門的工序設計顧問及供應商，設計生產工序及供應相關設備。至於本項目建造工程的承建商，仍有待稍後的採購程序決定。

表 2.1 簡述了本項目現時預計的發展計劃：

表 2.1 暫定項目發展計劃

活動	大概日期
概念設計	2011 年 4 月至 2011 年 8 月
工程設計和合約採購	2011 年 5 月至 2012 年 4 月
項目建造工程動工 (根據環境許可證的發出日期而定)	2012 年初
項目投產	2013 年 9 月或以後

3 潛在環境影響

3.1 概論

表 3.1 羅列了本項目在施工和運作期間可能造成的潛在環境影響。主要的潛在影響有：空氣質素、噪音、廢物管理、水質，以及脂肪酸甲酯生產工序所涉及的對生命的危害。

表3.1 潛在環境影響

潛在影響	施工階段	運作階段
• 氣體排放物	×	✓
• 塵埃	✓	×
• 氣味	×	✓
• 噪音	✓	✓
• 晚間操作	×	✓
• 交通	✓	✓
• 液體排放物、一般排放物或已受污染徑流	✓	✓
• 產生廢物或副產品	✓	✓
• 危險品、有害物料或廢物的製造、儲存、使用、處理、運送或處置	×	✓
• 對生命的危害	×	✓
• 生物氣危險	×	×
• 廢棄物料的處置，包括可能受污染的物料	×	×
• 對水流或海底沉積物的干擾	×	×
• 不悅目的外觀	×	×
• 文化遺產	×	×
• 陸地生態	×	×
• 海洋生態	×	×
• 累積影響	×	✓

註：
✓= 可能會有　　× = 預計沒有

3.2 現有環境情況

3.2.1 一般情況

本項目位於元朗工業邨北部，西面及北面爲宏利街而東面爲宏樂街。該地點的南面毗鄰豐盛鋼鐵有限公司和香港石油化學有限公司。豐盛鋼鐵有限公司的業務爲加工鋼材成爲供建築工程及其他工業生產使用的鋼鐵製品，例如鋼通、鋼管和鋼坑板。香港石油化學有限公司則主要生產聚苯乙烯產品。

工程地點並無直接面向任何現有和規劃中的敏感受體。最接近的空氣和噪音敏感受體是一些三層高的邨屋，包括趣怡花園和麗安花園。這些建築物

和工地距離約 200 米而兩者之間有工業邨西部的其他建築物阻隔。*表 3.2 及圖 3.1* 列出於工地和環境敏感受體之間的工業處所。

表3.2 工程地點和環境敏感受體之間的工業處所

工業處所的名稱	業務性質 (1)
信義玻璃（香港）有限公司	生產安全玻璃
余仁生（香港）有限公司	中藥研究及發展
正昌石油化工有限公司	廢潤滑油回收再煉

註:

(1) 以上有關業務性質的資料取自香港科技園公司網站上之「入駐企業名錄」及有關企業的網站。

元朗工業邨是於八十年代初期建於回填魚塘所得的土地上。該處大致上是平坦的土地，而且已有各項基本的基礎設施，例如道路、公共雨水和污水收集網絡、公用設施等。

3.2.2 空氣

當地的空氣質素主要受毗鄰元朗工業邨的工業設施、及附近道路上的車輛運作時所排放的廢氣影響。是次研究按照《環境影響評估程序技術備忘錄》附件 12 所闡述的準則，找出了多個空氣敏感受體。各個具代表性的空氣質素敏感受體見圖 3.1，並羅列於表 3.3。

表3.3 具代表性的空氣質素敏感受體

空氣敏感受體	位置	與本項目最接近的工地邊界大約距離（米）
A1	吳屋村	290
A2	趣怡花園	190
A3	麗安花園	240
A4	大井圍	390
A5	翠安閣	435
A6	維園山莊	455
A7	元朗工業村西邊的涼亭	130
A8	南生圍的疏落村屋	295

3.2.3 噪音

最接近本項目的噪音敏感受體是趣怡花園（位於西面約 190 米）和於南生圍的一間村屋（位於東面約 295 米）。

3.2.4 水質

最接近本項目的水體是山貝河，位於元朗工業邨以東，屬於后海灣水質管制區範圍。

3.2.5 生態環境

具生態重要性的南生圍位於廠址以東約 230 米處，山貝河對岸。

Key 圖例

- Air/Noise Sensitive Receiver 空氣/噪音敏感受體
- 300m from Site Boundary 項目300米研究範圍
- 500m from Site Boundary 項目500米研究範圍
- Boundary of Yuen Long Industrial Estate 元朗工業村範圍
- Site Boundary 項目範圍

A/NSR 空氣/噪音敏感受體	Name 名稱
A/NSR1	Ng Uk Tsuen 吳屋村
A/NSR2	Green Garden 趣怡花園
A/NSR3	Leon Court 麗安花園
A/NSR4	Tai Tseng Wai 大井圍
A/NSR5	Jade Court 翠安閣
A/NSR6	Vienna Villa 維園山莊
A/NSR7	Pavilion at the west of YLIE 元朗工業村西邊的涼亭
A/NSR8	Scattered houses at Nam Sang Wai 南生圍的疏落村屋

Proposed Harvest Fatty Acid Methyl Ester and Edible Oil Plant 擬建的太豐脂肪酸甲酯和食用油廠

A/NSR1 A/NSR2 A/NSR3 A/NSR4 A/NSR5 A/NSR6 A/NSR7 A/NSR8

SHAN PUI RIVER 山貝河 Kam Tin River 錦田河

N 北

0 100 200 400 Metres米

Figure 3.1
圖3.1

Locations of Air / Noise Sensitive Receivers
空氣及噪音敏感受體位置圖

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3.2.6 文化遺產

由於本項目位於填塘所得的土地上，因此沒有發現任何文化遺產資源。

3.2.7 景觀及視覺影響評估

本項目將位於元朗工業邨內，比鄰其他工業大廈。本項目將會遵守元朗工業邨的建築物高度限制。

3.2.8 堆填區沼氣風險

廠址附近並無堆填區。因此，本項目將不會受到堆填區沼氣風險影響。

3.3 潛在環境影響

3.3.1 一般情況

本節旨在闡述本項目在施工和運作期間可能造成的環境影響，其中包括空氣質素、噪音、晚間操作、交通、水質、生態環境、文化遺產、景觀及視覺、廢物、土地污染、對生命的危和害累積影響。

3.3.2 空氣質素

施工階段

本工程項目的工地已經平整，現時空置。因此，無需進行大型土方工程。然而，地基工程和廠內的地下設施都需要進行小量挖掘工程。建造廠房所需進行的混凝土工程只會產生小量塵埃。預計在實施《空氣污染管制（建造工程塵埃）規例》所規定的減少塵埃措施，並採用良好施工方法後，本項目在施工期間將不會產生不良的塵埃影響。

運作階段

本項目的氣體排放物包括：脂肪酸甲酯或柴油蒸汽渦爐及污水處理設施生物氣體燃燒器直接排放的廢氣；從儲存罐、蒸餾柱和生產釜逸出的氣體，以及從廢水處理設施和廢棄煮食油儲存罐散發出的氣味。本項目將會符合香港所有環保要求，並會在運作時採用良好工程手法來減少對空氣質素的潛在影響。

3.3.3 噪音

施工階段

本項目的建造工程需要使用機動設備，例如發電機、挖掘機、打樁機、混凝土破碎機、混凝土攪拌車和流動／塔式起重機。由於最接近的噪音敏感受體離工地約 200 米，而且兩者之間有其他工業設施阻隔，預計施工期間產生的噪音不會對環境造成不良影響。

運作階段

在本項目的運作階段，泵機、送風機和反應釜都會產生固定音源噪音。這些噪音來源大都會裝設在建築物內。本項目的設計會將所有機器和設備在廠址邊界

的總聲壓級限於不超過 85 分貝(A)。固定音源均會經仔細設計而使其符合《管制非住用處所、非公眾地方或非建築地盤噪音技術備忘錄》內訂明的可接受的噪音聲級。因此，預計本項目的運作不會對噪音敏感受體造成不良噪音影響。

由於本項目的運作只會產生小量交通，新增的交通噪音若與研究區的背景交通噪音比較，只屬微不足道。預計本項目的交通噪音不會對已知的噪音敏感受體造成不良影響。

3.3.4 晚間操作

施工階段

本工程項目不會在受管制的時段（即晚上七時至上午七時，及公眾假期和星期日整天）進行樁柱工程。由於設備安裝工程不會產生顯著的噪音或塵埃，因此，可能會以每星期七天、每天廿四小時進行。預計這些安裝工程不會對已知的敏感受體造成不良的空氣質素和噪音影響。在受管制時段內進行的建造工程將會遵照《噪音管制條例》的要求進行。

在晚間進行安裝工程時，每小時會有數部車輛進出。由於研究區的晚間交通較少，預計安裝工程所產生的晚間交通不會對當地道路網絡造成不良交通噪音影響。

運作階段

本項目將會每天 24 小時運作。在晚間運作中，較值得關注的環保事宜之一，是機器和設備所產生的噪音。由於有關設施都位於工業區內，預計與它們的運作有關的潛在影響並不顯著。而且，所有機器和設備的總聲壓級不會超過 85 分貝(A)，因此，對最接近的噪音敏感受體可能造成的噪音影響只屬微不足道。由於本項目產生的晚間交通流量低，因此預計本項目對晚間交通的影響並不顯著。

3.3.5 交通

運送原料、化學反應劑和產品／副產品進出本項目，均會增加宏利街和宏樂街的交通量。預計本項目在運作時所產生的每日交通流量只會最多約 100 架次。若與宏利街和宏樂街的背景交通流量相比，新增交通流量實屬微不足道。因此，預計本項目在運作時，不會對當地道路網絡造成不良交通影響。

3.3.6 水質影響

施工階段

本項目無需進行海事工程或海上挖泥工程。在陸上建造工程方面，主要的水質影響將會來自建造工地的徑流。正如第 3.3.2 節所述，本項目的建造工程只需進行小量土方工程。在建造上蓋建築時，產生含泥徑流的風險較低。工地上會使用流動廁所，有關的污水會由專門的承辦商定期收集，並運離工地處置。在實施《專業人士環保事務諮詢委員會專業守則 PN1/94—建築工地排水渠》所闡述的一般良好施工方法後，陸上建造工程將不會對水質造成不良影響。

運作階段

本項目在運作期間，若不妥善管理廠區內的徑流、廢水和物料儲存，便可能對水質造成不良影響。廠區的雨季初次徑流會通過隔泥和隔油設施，然後才排放至元朗工業邨的現有雨水收集系統。

本項目產生的所有生產工序廢水會輸往廠內的污水處理設施處理供廠內再用或排放至公共污水渠。排放的水質會符合環保署出版的《技術備忘錄 - 排放入排水及排污系統、內陸及海岸水域的流出物的標準》表一所規定的排放標準。廠內人員所產生的生活污水則會排放至公共污水渠。預計本項目的運作不會對水質造成不良影響。

在詳細設計階段將會制訂溢漏應變計劃，規定在發生溢漏時所需採取的行動，並防止任何溢漏物料被排入海中。

3.3.7 生態環境

由於本項目將會位於沒有生態價值的填塘土地上，因此預計不會有任何潛在陸地生態影響。南生圍位於廠址以東約 200 米，元朗工業邨約 100 米。本項目將不會於附近水體排水，亦不會與南生圍有任何物理上的干擾。因此，預計本項目的發展計劃不會對生態環境作出不良影響。

3.3.8 文化遺產

由於本項目將會位於發展成熟的元朗工業邨內，現時亦有大量工廠運作中。因此，預計本項目的發展計劃不會對文化遺產作出不良影響。

3.3.9 景觀及視覺

<u>景觀影響</u>

本項目將會位於元朗工業邨內，該處植被有限。因此，本項目的發展計劃只會對現有景觀資源造成微不足道的影響。

<u>視覺影響</u>

施工階段

由於本項目位於元朗工業邨，而且建造工程的規模亦相對細小，因此，預計不會對該區的整體工業環境造成任何顯著視覺影響。

運作階段

預計本項目的建築物和儲存罐高度，均會與元朗工業邨內的毗鄰建築物相若，因此不會對元朗工業邨的整體格局造成不協調的視覺效果。

3.3.10 廢物

<u>施工階段</u>

建造及拆卸物料（拆建物料）：在清理工地時所產生的植被廢物會極少，並會被棄置於堆填區。本項目的工地準備和建造工程都會產生拆建物料。由於工地

已經平整，因此在平整工地時無需進行大型土方工程。在地基工程掘出的物料會盡量在現場再次使用。

由於新建築物的建造工程規模細小，預計只會產生小量拆建物料。這些物料會在現場分類成爲公眾填土和建造廢物（包括紙張、金屬、來自包裝物料和木方工程的塑膠和木），並會分開存放於不同的收集斗內，然後分別運往公眾填土接收設施和堆填區處置。可循環再造的物料，例如紙、金屬和木等，都會盡可能存放於不同的收集斗，以供循環再造。預計需要運往堆填區處置的建造廢物量會很少。因此，預計本項目不會在廢物管理方面造成任何不良影響。

化學廢物：建造工程所產生的化學廢物，大部份都會來自建造機器和設備的維修工作。這些化學廢物量會比較少（預計每個月少於一百公升）。青衣的化學廢物處理中心將會接收這些化學廢物。

有關這些廢物的存放、處理、運輸和處置，都會按照環保署出版的《包裝、標識及存放化學廢物的工作守則》作出適當安排。若能依照有關守則處理、存放和處置由建造工程產生的少量化學廢物，對環境的潛在影響只是微不足道。

污水和一般垃圾：建築工人將會產生污水和一般垃圾。工地內會設置足夠的流動廁所，確保能夠妥善收集工地工作人員所產生的污水，並作適當處理和處置。流動廁所會由專門的承辦商負責定期清理渣滓和保養維修。可循環再造物料（即紙張、塑膠瓶和鋁罐）都會分類收集供循環再造，藉以減少需要棄置於堆填區的一般垃圾。工地現場會放置足夠數量的有蓋廢物容器，以免廢物溢出。預計本項目所產生的污水和一般垃圾都不會造成不良環境影響。

運作階段

表 3.4 羅列了在本項目運作期間將會產生的固體廢物種類和數量。

表 3.4　　本項目運作產生的固體

處理程序	數量／頻率	再用／棄置
污水處理系統產生的污泥	每天約 0.4 公噸脫水污泥（乾燥固體含量超過 30%）	由貨車運往堆填區棄置或將來的污泥處理設施
漂白工序使用過的活性碳/硅藻土/漂白土	每天約 1.25 至 5 公噸	由供應商回收再生
化學廢物（廢舊潤滑油、溶劑、實驗室廢物）	每月約數公升	運往化學廢物處理中心或其他持牌設施處置
廠內人員所產生的一般垃圾	每日少於 50 公斤	由貨車運往堆填區棄置

預計把這些廢物運往堆填區和化學廢物處理中心處置，將不會對該等設施造成不良的環境影響。此外，在存放和處理這些廢物時，若能採用良好的管理方法（例如把廢物儲存於適當的容器內，以及僱用信譽良好及／或持牌的承辦商等），將可令有關的潛在影響減至最低。

3.3.11　　土地污染

施工階段

工程地點是一片填塘土地，而之前則用作混凝土樁生產設施用途。因此，本項目在施工階段不預期有土地污染問題。

運作階段

本項目在運作階段若出現任何物料溢漏，而又不作妥善管理，便可能造成土地污染。在現場存放的物料包括：化學反應劑（如磷酸、甲醇、氫氧化鈉）和成品（如脂肪酸甲酯、甘油和食用油）。由於脂肪酸甲酯可以經生物降解，因此由脂肪酸甲酯意外溢出，或脂肪酸甲酯儲存罐洩漏而造成的潛在環境影響，會比石化柴油低。

廢棄煮食油並非化學品／有害廢物，因此，縱使在項目範圍內發生溢漏，也不會造成環保署所界定的土地污染。

所有物料儲存罐的設計，都會符合相關法定要求（包括儲存罐結構完整；建造一幅圍繞四周的堡牆和混凝土鋪築地面；採用與所盛載化學品相容的儲存罐），以冀把發生土地污染的機會減至最低。

本項目亦會在易於觸及之處放置充足的溢漏處理器材，使溢漏事故得以迅速處理。此外，本項目將會在詳細設計階段制訂緊急應變計劃，確保若有任何化學反應劑或產品溢出，或儲存罐洩漏時，會立即作出應變行動，緩解溢漏影響。在實施審慎的設計措施和緊急應變計劃後，本項目在運作期間造成土地污染的可能性極低。

3.3.12 對生命的危害

本項目會就其運作對生命的潛在危害程度進行風險評估。預料主要的風險在於涉及高壓、高溫和易燃化學反應劑的脂肪酸甲酯生產工序。

環境影響評估研究在仔細審視本項目的各種危險情況後，會根據結果擬訂一份洩漏情況清單並作評估。

3.3.13 累積影響

施工階段

本項目將位於一個工業區內，距離最近的住宅約 200 米。因此，只要項目在施工時採用合適的緩解措施及實施良好的施工方法，相信對當地空氣質素、水質、噪音、交通、生態環境、景觀、廢物管理、土地污染和對生命的危害等，預計本項目在施工時不會造成累積影響。

運作階段

本項目將會位於一個工業區內，距離最近的住宅約 200 米，因此預計只要於運作期間採取合適的緩解措施，所造成的潛在環境影響會極輕微。正因上述緣故，估計本項目在運作期間不會造成累積影響。

3.4 環境保護措施

本項目會實施下列各項良好管理方法和環境保護措施。

施工階段

- 所有瓦礫和建築物料都會加以覆蓋，或存放於有上蓋的瓦礫物料收集區。本項目將會按照《空氣污染管制條例》的規定，實施塵埃控制措施，例如在路面和多塵地區洒水、以不透氣的物料覆蓋卡車，以及控制傾卸填土的高度。

- 施工期間會將閒置的機動設備關上，並盡量使用低噪音機動設備。妥善計劃工序，避免連續地使用高噪音機動設備。

- 公眾填土及一般垃圾會作分類，然後分別存放和處置。現場的廢物會妥當存放，並會在運送廢物時，把卡車覆蓋，或用封閉的容器盛載廢物，以減少被風吹起的垃圾和塵埃。廢物會運往持牌的地點處置。此外，亦會按照《環境運輸及工務局技術通告編號 31/2004》，訂立一套運載記錄制度，用作監察建造廢物的處置情況，並控制隨地非法傾倒泥頭。

- 承建商會於環保署登記爲化學廢物生產者。在處理化學廢物時，會按照《包裝、處理及存放化學廢物的工作守則》的規定。

- 施工時所排放的廢水，必須符合《專業人士環保事務諮詢委員會專業守則 PN1/94—建築工地排水渠》中的有關規定，並符合《水污染管制條例》中的《技術備忘錄 - 排放入排水及排污系統、內陸及海岸水域的流出物的標準》。

<u>運作階段</u>

擬建設施的設計和運作，採用了得到認可的技術和環境保護措施（例如：把廠址邊界的總聲壓級限制在 85 分貝(A)以下，並設置廢氣處理系統等）。

3.5 對先前已獲准的環評報告的引用

本工程項目簡介參考了在 2009 年 2 月 26 日獲得批准的《將軍澳工業邨生物柴油廠發展計劃環境影響評估》（環評條例登記冊編號：AEIAR-131/2009）。本項目使用的工序和原材料，都有別於這個位於將軍澳工業邨的生物柴油廠，但都是基本上透過交酯化反應工序來生產脂肪酸甲酯。因此，該環評報告（環評條例登記冊編號：AEIAR-131/2009）就該項目在運作時可能產生的空氣質素和風險影響的研究結果與本項目相關。然而，兩個項目雖有類同之處，但該份環評報告所提出的緩解措施與本項目的確實相關程度，仍需稍後就著本項目的詳細設計和運作細節進行的環評研究確定。