EMERGENCY CONTINGENCY PLAN

For

Chemical and Material Spillage

EP-319/2009/C

Development of a Biodiesel Plant at

Tseung Kwan O Industrial Estate

Version 1: 30 December 2013

22 Chun Wang Street, Tseung Kwan O Industrial Estate, New Territories, Hong Kong

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SECTION 1 INTRODUCTION

This plan stipulates the actions to be taken in case of accidental spills occurred and prevent any spillages from discharge into the sea in order to minimise effects to health and safety from exposure to chemical and material spills and reduce the impact on the environment. The plan applies to all the staff in the biodiesel plant at the Tseung Kwan O Industrial Estate (TKOIE) where chemical and materials are transported, purchased, stored, handled, or used, including vehicles of visitors or suppliers who bring the chemicals and raw materials into the biodiesel plant that are potentially hazardous.

The biodiesel plant is built with concrete cement with enclosed seawall to prevent the land contamination when the spillage is occurred inside the plant. The foul drainage covers all the process buildings and wastewater treatment units and the potential contaminated wastewater will be diverted to the wastewater treatment plant for onsite treatment so as to fulfill the discharge requirement prior to discharging the treated effluent to the foul drain connecting to the sewerage system of the Tseung Kwan O Industrial Estate (TKOIE). Also, the foul drainage is designed and built separately from the storm water drainage system to avoid cross contamination. The storm water drainage system is built with 2 oil interceptors to contain potentially contaminated surface water and to prevent from seawater contamination. The cleaning of the oil interceptors will be arranged in the regular schedule by the contracted GTW collector and the wastewater will be unloaded via the GTWSR for reuse.

SECTION 2 PROCESS DESCRIPTIONS

The biodiesel plant consists of 2 parts of the operation: 1) biodiesel production & 2) grease trap waste and wastewater treatment.

2.1 BIODIESEL PRODUCTION

The process can be divided in two main parts:
1. Esterification and transesterification of the raw material to biodiesel
2. By-product preparation

The following sections describe the process steps of the biodiesel production. (See Appendix A)

Detail description

The feedstock for biodiesel production will be used cooking oil (UCO) , grease trap oil (GTO), palm oil fatty acid distillate (PFAD) and tallow.

Raw materials with high content of free fatty acids (palm oil fatty acids, grease trap oil) can be directly transferred into methyl ester by esterification using high-pressure, high-temperature reaction conditions without catalyst. The so-formed methyl ester has a certain content of free fatty acids, which can be processed in the following esterification step.

The raw materials with a certain content of free fatty acids as well as fatty acids recycled from the by-product acidification and the oil phase from the high pressure esterification are transferred to the esterification stage. Fatty acids are esterified with methanol under acidic conditions and ambient pressure in a batch process. The oil phase is transferred to the transesterification discontinuously. This step requires a catalyst which makes the transesterification reaction possible under moderate temperatures and normal pressure. The catalyst – a mixture of potassium hydroxide (KOH) and methanol – is prepared in a separate mixing station (solid potassium hydroxide is dissolved in methanol with a certain ratio).

The transesterification process is a two-step process. After dosing methanol and the catalyst the triglycerides are transformed to biodiesel and glycerine. Due to the density difference the glycerine together with the catalyst and the excessive methanol separates from the biodiesel phase and can be discharged to the by-product preparation line. The biodiesel phase of the first reaction step remains in the transesterification vessel and again methanol and the catalyst are dosed to the vessel. With this technology a sufficiently high degree of transesterification is achieved. The glycerine phase is again discharged to the by-product preparation line.

The methyl ester phase contains certain amounts of methanol, catalyst (mainly in form of soaps) and water. The catalyst is removed from the methyl ester phase by several washing steps (the aqueous phase is discharged to the by-product preparation line). The methyl ester phase after the last washing step contains low volatile high boiling contaminants as well as volatile substances such as water and methanol. The volatile substances are removed in the flash column (degasser), the low volatile high boiling substances are removed in the distillation unit. The distillate represents the high quality methyl ester and is transferred to the biodiesel quality tank, and later, to the biodiesel storage tanks.

The volatile substances from the degasser are transferred to the by-product preparation line. The low volatile high boiling substances, namely bioheating oil (BHO), are discharged to a storage tank. They can be further used as heating oil for an oil burner (e.g. thermal oil boiler) and will be used to provide process heat in the plant.

The glycerine phase from the transesterification and the aqueous phases of the methyl ester purification are processed together with the aqueous phase of the esterification in the acidification vessel. In this process step the potassium hydroxide and the potassium soaps are transformed with sulfuric acid to potassium sulfate, glycerine phase and fatty acid phase. The potassium sulfate is a solid phase, the methyl ester forms together with the fatty acids the fatty acid phase, which has a low solubility in the glycerine phase at acidic conditions. This three phase mixture can be separated by the means of a tricanter (continuous operation as well as the acidification). As mentioned above, the fatty acid phase is reused in the esterification unit (increasing the biodiesel output of the process). The generated potassium sulfate is discharged via a screw conveyor to a container as pasty fertilizer. The acidic glycerine phase from the tricanter is neutralized with the basic catalyst in the neutralization tank. The thereby generated potassium sulfate is filtrated off and discharged back to acidification tank. The filtered neutralized glycerine phase is distilled. In the column methanol and water are separated from the glycerine. A second column separates water and methanol.

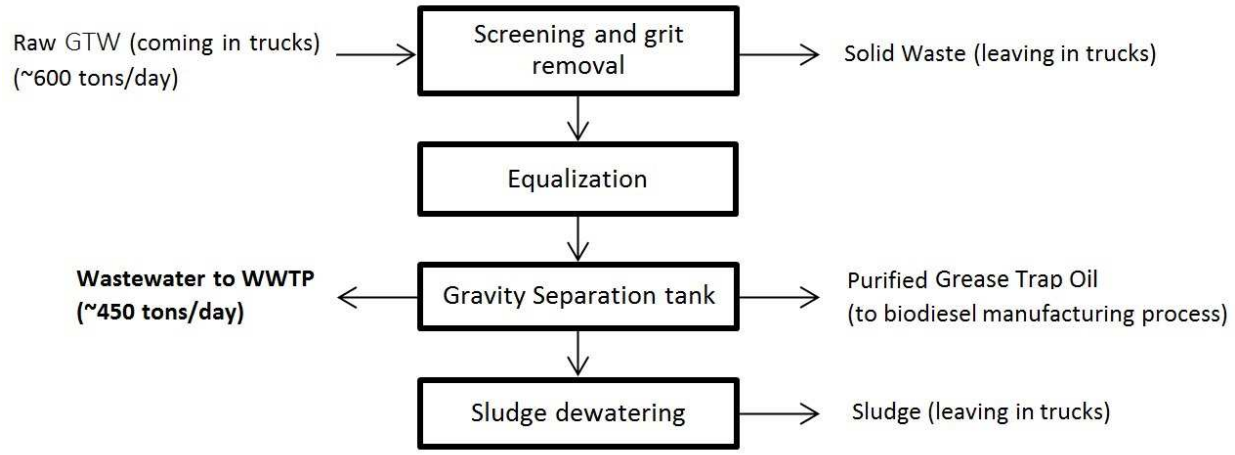
The recovered methanol and water are recycled and reused in the process. The crude glycerine (80% glycerine) is discharged to the storage tank.

2.2 Grease Trap Waste and Wastewater Treatment

Grease Trap Waste Treatment

Grease trap waste (GTW) treatment process is designed to separate oil, wastewater and sludge mixture in the raw GTW. The following figure shows the block flow diagram of the process:

Figure 1 Block flow diagram of Grease Trap Waste (GTW) Pre-treatment Process



The external GTW collectors will deliver and unload the GTW at the Grease Trap Waste Screening Room (GTWSR) where the GTW is screened and removed of grit. In order to reduce the potential problems of clogging of oil at the pipelines, heating coils are equipped.

In the second process, the GTW goes through a process called equalization to provide a buffering volume for overcoming the operational problems caused by variations of flow and characteristics of wastewater. The preliminary treated GTW from the first process is led into and retained in buffer tanks for a period of time where the process of equalization occurs.

Gravity Separation is the most important step in the treatment process, which aims for oil-water separation and solids settling. The tank is designed to separate the three layers in the raw GTW: (i) oil layer at the top, (ii) wastewater at the middle and (iii) sludge at the bottom. Firstly, the GTW from the buffer tank is pumped into the separation tank. Inside the tank, a skimmer is installed to remove the treated GTW at the top layer. The wastewater layer at the middle of the separation tank will be pumped to the wastewater treatment plant. It is estimated that the wastewater capacity is around 450 tons/day. The sludge, which is at the bottom layer, with be collected using a sludge scraper and is pumped out from the bottom of the tank for sludge treatment.

In the final process of sludge dewatering, centrifuges are installed to dewater the sludge collected at the bottom of separation tank. The dewatered sludge will then be delivered to landfill by trucks.

WASTEWATER TREATMENT

Wastewater treatment process comprises I) Pre-treatment, II) Anaerobic Treatment III) Aerobic Treatment IV) Biogas Treatment V) Off Gas Treatment and VI) Sludge Treatment. The process flow diagram is presented in Appendix B

I) Pre-treatment

Wastewater from the production site will be flowing to an influent pit by gravity for collection to remove big solid particles and then will be pumped to an oil-water separator. The oil-water separator is used for free oil removal and the wastewater will flow into the buffer tank by gravity after wastewater undergoes oil removal. The buffer tank is to equalize water quality and flow fluctuation. After the wastewater is equalized in the buffer tank, it will be pumped to the Dissolved Air Floatation Unit (DAF) from buffer tank for further removing total suspended solids (TSS) and oil in wastewater.

II) Anaerobic Treatment

The wastewater will be treated anaerobically in a two stage anaerobic process. In the first stage (Pre Acidification Tank) the wastewater is partly pre-acidified. In the second stage (IC reactor) the organic pollutants of the wastewater are converted into the biogas.

III) Aerobic Treatment

After anaerobic treatment, the wastewater will flow to an activated sludge system for further removal of remained biodegradable chemical oxygen demand (COD). Activated sludge system consists of an aeration tank and a secondary clarifier.

IV) Biogas Treatment

In the IC reactor the by-product, namely the biogas, is produced. The amount of the biogas produced depends on the COD-load applied to the IC reactors. The higher the COD-load is, the higher the biogas production will be. The biogas will be collected in the degassing tank on top of the IC reactor for gas water separation. The IC reactor and the biogas treatment facilities are closed system.

The biogas is burnt either in the process boiler system or the flare without emission to surroundings.

V) Off Gas Treatment

Odorous components like hydrogen sulphite (H_2S) may be released from the wastewater treatment plant (WWTP). Therefore top of the tanks in pre-treatment units and aeration tank are continuously ventilated. The off gas will be sent to a scrubber for odor removal.

VI) Sludge treatment

Sludge will be collected from the secondary clarifier and the DAF. The sludge discharged from secondary clarifier and the DAF has low dry matter content. To increase the dry matter content of the sludge, the sludge has to be further dewatered by mechanical dewatering equipment.

SECTION 3 SPILLAGE MANAGEMENT

3.1 DEFINITIONS

Personal Protective Equipment (PPE)
The equipment is used to protect a person handling a spill.

Bund
The bund is an embankment or wall of brick, stone, concrete, or other impervious material, which may form part of or the entire perimeter of a compound and provides a barrier to retain liquid. The bund is designed to contain spillages and leaks from liquids used, stored or processed above ground and to facilitate cleanup operations.

In the biodiesel plant, all the tanks for chemicals and raw materials and pump yards are built with the bund.

Dangerous Goods
The hazardous substances are defined by the Dangerous Goods Ordinance (Cap 295). They are classified on the basis of immediate physical or chemical effects that may impact on people, property or the environment – explosive, flammable, corrosive, chemically reactive, highly combustible, acutely toxic, radioactive or infectious.

Sulphuric acid, phosphoric acid, ultra-low sulphur diesel, methanol, potassium hydroxide and sodium hydroxide will be used in the biodiesel plant for biodiesel production or wastewater treatment. Biodiesel and bioheating oil will be the product. They are all classified as Dangerous Goods and required to acquire the licences for storage.

Material Safety Data Sheet (MSDS)
The information sheet provides the technical information in relation to the chemicals and materials. This sheet is obtained directly from the manufacturer or supplier.

Major Spill
A major spill is one that cannot be contained safely with the materials on the site, threatens safety to life, and/or threatens to enter the sewerage system or travel beyond the boundaries of building/property to endanger the environment. The spill is estimated to be more than 20 liters. The Emergency Services shall be contacted.

Minor Spill
A minor spill is one that usually presents little or no hazard to person or property, and is small enough to be safely cleaned up using the emergency spill kit. The spill is estimated to be less than 20 liters.

3.2 ROLES AND RESPONSIBILITIES

Managers from Engineering/Laboratory/Maintenance/Production Department are responsible for ensuring that:

- This plan is implemented within their area of responsibility
- All necessary equipment is available and maintained in the case of a chemical spill and they are clearly labelled and signed
- Risk assessments are carried out to identify risk control measures to protect the staff's health and safety and potential harm to the environment
- All staff receive appropriate training to deal with chemical and material spills where identified as necessary
- All supervisory staff are aware of the legal requirement regarding pollution control from chemical and material spills
- All staff that use, store or manage chemical and material as a minimum requirement should attend the training in environmental awareness and chemical and materials spill management

Supervisors from Laboratory/Maintenance/Production Department and the EHS Officer are responsible for ensuring that:

- This plan is implemented within their area(s) of responsibility
- Information is provided to all relevant staff to safely clean up the spills. This should include emergency services contact details, and other staff as appropriate, location of equipment and materials such as self-contained breathing apparatus or respirator locations
- Appropriate equipment is cleaned, stored and maintained by competent persons
- All new staff are inducted in environmental awareness and chemical spill management

Staffs are responsible for ensuring that:

- They do not place themselves or others at risk of injury
- They place personal safety first - keep clear of a spill unless trained in spill control and clean up
- Immediately reporting of chemical spill to their supervisor
- Only trained and competent staff attempt to clean up a chemical substance spill.
- They know where MSDS's are kept, or how they can be accessed.
- This plan is followed.
- Spill control equipment is used in the proper manner.
- Equipment is stored and maintained as appropriate.

3.3 IDENTIFICATION OF ACTIVITIES OF POTENTIAL SPILLAGE AND PRELIMINARY CONTROL

3.3.1 Identification of Activities of Potential Spillage

The following activities are identified as potential spillage of chemical and materials:

A. Loading/unloading the chemicals and raw materials at the Jetty dike area
B. Loading the final products via the Loading Station;
C. Unloading the raw materials via the Unloading Station;
D. Unloading the chemicals to the chemical tanks for wastewater treatment;
E. Pipe leakage in the process buildings;
F. Overflow from various tanks in the process buildings;
G. Maintenance of flanges, pumps, sensors and valves along the pipelines;
H. GTW tanker arrival at the biodiesel plant; and
I. GTW unloading at the GTWSR.

The below table correlates the spilled chemicals and materials, and their receiving agent

Activities	Chemicals/Materials	Affected Receiving Agent
A	PFAD, UCO, Methanol, Biodiesel	Sea, Land
B	Biodiesel, Bioheating Oil	Land, Storm Water Drainage
C	Methanol, Ultra-low Sulphur Diesel, Sulphuric Acid, Phosphoric Acid,	Land, Storm Water Drainage
D	Ferric Chloride, Sodium Hydroxide	Land, Storm Water Drainage
E, F, G	Intermediate products	Land, Foul Drainage, Storm Water Drainage
H, I	GTW	Land, Storm Water Drainage

3.3.2 Preliminary Control

<u>Sea</u>
The spill will directly contact with sea and cause the pollution with immediate effect depending on the nature of the spilled material.

The floatable oil boom will be laid to surround the marine vessel. If the spillage occurs, it will be confined to limited area to minimize the environmental impact. The spilled material will be skimmed back to the GTWSR and reused for biodiesel production.

<u>Land</u>
The spill will directly contact with land. As the land has been constructed with concrete cement, the spill will not cause significant pollution on land but deteriorate the house-keeping of the workplace to a minor extent.

Storm Water Drainage

The spill will flow to the surface drains and then accumulate in the oil interceptors and finally will flow to the external storm water drainage system via underground pipelines.

The surface drains at the unloading station are equipped with a level sensor and connected to the oil interceptor. In between the surface drains and the oil interceptor, there is a valve which is normally closed. Spillage will be detected by the level sensor which is located at the surface drain of the parking slot. The signal will be feedback to the Control Room and terminate the unloading operation immediately. The spills will be contained in the surface drain which will be cleared and reused to the biodiesel production.

When the product is loading at the loading station, overfill protection system is equipped which interlock with the loading pumps to prevent overfill. Furthermore, the parking slot will be bound by sand bags to prevent any spills to the surface drain. In addition, there is an oil interceptor to trap the oil in case any spills to the surface drain accidentally. The oil interceptor will be regularly cleared and the trapped oil will be reused to the biodiesel production via the GTWSR.

The floors of tank farms are coated with oil- and waterproof, anti-static and acid-resistant coating to minimize leakage out of the farm area. Each tank farm is built with bund wall to surround the tank(s) and to retain potential leakage from the tanks inside the bunds and there are 5 tank farms, namely from tank farms 2A to 2E. The details are summarized in the below table.

Summary of the volume of the tanks and bund storage capacities

Tank Farm	No. of tank(s) in tank farm	Volume of largest tank / m^3	**110% Volume of the largest tank / m^3**	Total volume of the tanks / m^3	**20% Total volume of the tanks* / m^3**	**Volume of bund storage capacity / m^3**
2A	14	2561	**2817.1**	13935	**2787**	**5188.7**
2B	1	518	**569.8**	518	**103.6**	**588.0**
2C	2	160	**176**	320	**64**	**226.1**
2D	1	105	**115.5**	105	**21**	**116.5**
2E	2	54	**59.4**	80	**16**	**72.3**

*Refers to “Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes”

The bunds are built to retain the potential leakage from the tanks and fulfill the requirement of both 110% of the volume of the largest tank and 20% of total volume of the tanks.

Furthermore, leakage detection system is equipped in each of the tank farms which consist of valve pit and level sensor. In normal operation, the valve at valve pit is in close position to avoid any spillage from tank farm to storm water drainage system. In addition, the level sensor detects the spillage which connects to PCS. The signal will be shown and monitored by ASB staff in the Control Room so corresponding corrective action can be carried out. In case of spillage, the spill will be contained at the tank farm. The spilled material will be cleared and returned to the biodiesel production for reuse.

Foul Drainage

The Foul Drainage covers all the process buildings of the biodiesel plant.

The spill will flow to these drains which will lead to the onsite wastewater treatment plant. Even though the major spill occurs, i.e. > 20 liters, the spill will not cause adverse effect as the capability of the WWTP is designed and built to treat 515 cubic meters wastewater daily.

3.4 CONTINGENCY PROCEDURES

The procedures include six steps and should be implemented in sequence:

I Responsibilities of the staff in the scene of the spillage
II Communications
III Remedial actions at scene
IV Clean-up activities
V Disposal of the spill
VI Post Emergency Procedure

The degree of action taken will be dependent upon the severity of the spill. However, these four steps are fundamental to all spills without consideration of the magnitude. Each Production/Maintenance staff must be trained in the use of this Plan.

I Responsibilities of the staff in the scene of the spillage

1. When a spill is occurred and discovered by a staff, the staff must report to the Control Room immediately.

2. Stop the operation that leads to the spillage in reasonably practical means.

3. The following information must be reported

    a. Exact location

    b. Estimated quantity of material spilled

    c. Location and distance to drainage

    d. Nature and extent of any injuries or property damage

    e. An estimate of what response will be further needed

4. If the nature of the spill allows you to safely take action, the staff may attempt to dike the area, place a plastic liner down to collect the material, or otherwise respond to the emergency. Only qualified personnel will attempt to approach a closed unit or handle spilled materials.

5. Maintain communications with the Control Room at a maximum of 5-minute intervals until the Production Manager/Supervisor(s) take in charge of the situation, unless otherwise instructed.

II Communications

Upon a spill or incident has occurred, the staff must keep contact with the Control Room and report in details regarding the spill. After obtaining all essential details, Production Manager/Supervisor(s) must contact relevant parties which include the Plant Manager. Production Manager/Supervisor(s) will make any necessary notifications and coordinate the overall response to the spill.

III Remedial actions at scene

PLAN 1 – MINOR SPILL

In case of minor spill (<20 liters), the staff will take the following actions:

1. Evacuate the area;

2. Inform the Control Room;

3. Check the MSDS for proper spill control measures;

4. Follow the procedures below;

    - Wear personal protective equipment
    - Apply the chemical absorbent pad or neutralizing chemical to the spill depends on its type & nature
    - Clean up the spill
    - Place the spill materials in disposal bag and seal the bag

5. Clean up activities;

6. Dispose of the spill and all the used absorbent as chemical waste; and

7. Post emergency procedures.

PLAN 2 – MAJOR SPILL

In case of a major spill (> 20 Liters), the staff must inform the Control Room and the Control Room must inform the Production Manager/Supervisor(s) for assistance. Similar procedures will be adopted.

1. Evacuate personnel from the immediate spill area

All individuals in the immediate vicinity of the spill should be notified, and if necessary, moved a safe distance away from the spill location. Instruct untrained personnel to keep at a safe distance, well away from the spill area.

2. Identify the spilled materials

The staff who discovers the spill should attempt to recall and communicate what the spilled material is and take note of the present conditions. Identify the chemicals or the raw material from the nearby scene. All these information must be reported to the Control Room.

Estimate the quantity of spilled material, what first aid steps should be taken in case of spill contact.

3. Identify the spilled materials

Once the spilled chemical or raw material is identified, the Emergency Response Team (ERT) will respond appropriately to that type of spill. ERT should always assume the worst and use the highest level of personal protective equipment. Only trained staff equipped with suitable protective clothing and equipment should be allowed to enter and clean up the spill area. ERT member(s) should stand by at the spill area.

4. Assess the sign of spill and determine if material is likely to flow into the drainage system. Block or cover the drainage to prevent spill entering into storm water drainage.

5. Barricade the spill area

The area around the spill should be barricaded with floor signs and/or barricade tape that will notify people to keep away from the hazard.

6. Extinguish All Sources of Ignition

All potential sources of ignition should be eliminated immediately. The flammability of the spilled liquid should be determined. If necessary, the Fire Services Department (FSD) should be contacted to help control the spillage.

7. Contain the spill

Locate where the leak or spill started, stop the leak at the source and try to prevent the spill from spreading. Cover any drains with drain plugs or drain covers so the chemical does not reach a surface drain.

IV Clean-up activities

As soon as possible after the immediate emergency situation is brought under control, the removal and disposal of spilled material should be planned and initiated. The clean-up of the various material collected at the scene will be directed by the Production Manager/Supervisor(s) at the scene. If material is recovered and it is not suitable for reuse or reprocessing, it should be handled, stored and disposed of as a chemical waste in accordance with the Waste Disposal (Chemical Waste) (General) Regulation. The decision on clean-up will be made by ERT in conjunction with FSD.

Clean up the spill

Begin spill treatment by pouring suitable agent, if necessary (e.g. emulsifier, neutralizer spill kits, or any others where applicable, depend on the nature, type and characteristics of the spill) around spill to encircle and dike its perimeter. Taking care to avoid splashing, continue to apply agent evenly onto spill. Using scraper provided, carefully mix agent into spill for the most complete reaction.

Areas that have been contaminated by chemical waste spillage/leakage should be cleaned. The waste from the cleanup operation should be treated and disposed of as chemical waste.

V Disposal of the spill

Spilled liquids will be cleaned up with absorbent and disposed of properly. If any containers are found to be leaking, they will be immediately segregated and repackaged in a steel container or other suitable container.

Disposal of used absorbent must be handled according to the type of liquid absorbed. Liquids, when contained in any absorbent, will continue to be unsafe. Exercise extreme care when handling, storing or disposing of absorbent containing such liquids. Disposed as chemical wastes at the licenced disposal facilities is a must.

VI Post Emergency Procedure

Post-emergency procedures are designed to prevent reoccurrence, to clean up and dispose of residuals, to decontaminate and to provide personnel debriefing.

Prevention of Reoccurrence

The Engineering/Maintenance/Production Managers and the Production Supervisors will take all necessary steps to ensure that a secondary release does not re-occur after an initial incident. Procedures that will be carried out include:

- Inspection for any leaks or cracks in containers.
- Isolation of all collected waste materials.

In order to improve the Plan, it will be necessary to extract experiences from occurrences in order to prevent a situation from reoccurring.

Equipment Decontamination and Maintenance

After clean-up procedures are completed, all equipment used during the clean-up will be decontaminated and readied for future use. All site personnel will be required to shower and remove any contaminated clothing. Showers are required at the end of each shift as a normal precautionary measure. Absorbent materials will be restocked. Before operations are resumed, an inspection of all safety equipment will be conducted.

Investigation Report

After the spill is under control, the Production Manager/Supervisor(s) will perform an investigation of the cause and prepare a written report in conjunction with the Engineering/Maintenance Manager, and submit to the Plant Manager, giving the causes/reasons of the event and the actions which have been taken and will be taken to prevent its recurrence.

Changes will be implemented in order to prevent reoccurrence. The results of this investigation will be further used as an experience which will be used for training of the various personnel and to update the plan if necessary.

SECTION 4 TRAINING, TESTING AND REVISION OF THE PLAN

4.1 TRAINING & TESTING

All the responsible staff must be trained and should demonstrate the ability of performing the task stated in this plan.

Exercise and drill shall be undertaken in a regular frequency to test the adequacy and effectiveness of this plan in controlled conditions if necessary, and allow the responsible staff to familiarize this plan.

4.2 REVISION

ASB will update this plan if necessary after consultation with the Engineering Department, the Maintenance Department, the Production Department or Senior Management of the Company. Also, the advices from or problems encountered from these departments will be taken into consideration and updated in this plan.

Appendix A

Biodiesel Production Process

Appendix B

Wastewater Treatment Process

Appendix C

Foul Drainage System

Appendix D

Storm Water Drainage System

Appendix E

Emergency Contact List

Emergency Contact List

Emergency Response Team

Name	Title	Office no.	Mobile no.
Sylvia HAR	Engineering Manager	3183 4206	9479 0949
Albert KWAN	Maintenance Manager	3183 4209	9313 6012
Martin HUI	Production Manager	TBA	9866 6333
Stanley KO	Shift Supervisor	TBA	6013 4562
H. TAKEUCHI	Shift Supervisor	TBA	9028 0689
Victor WANG	Production Supervisor	TBA	9653 3721

ASB Biodiesel (Hong Kong) Limited

Name	Title	Office no.	Contact no.
Roberto Vazquez Lucerga	Chief Technology Officer	3183 4222	6903 3478
Eddie WONG	Plant Manager	3183 4228	9091 1567
Rebecca LAU	Laboratory Manager	3183 4207	9272 0795
Matthew TSE	EHS Officer	3183 4205	9409 0630

Government Authorities/Organizations

Name	Contact no.
Emergency	999
Hong Kong Police, Tseung Kwan O Station	2623 9041
Marine Police Harbour Division	2884 9242
Fire Services Department, Tai Chik Sha Fire Station	2723 8787
Drainage Services Department	2877 0660
Electrical and Mechanical Services Department	2333 3762
Environmental Protection Department	2838 3111
Tseung Kwan O Hospital	2208 0111
Ecospace Limited (Chemical Waste Treatment Facility)	2434 6490

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SECTION 2 PROCESS DESCRIPTIONS

The biodiesel plant consists of 2 parts of the operation: 1) biodiesel production & 2) grease trap waste and wastewater treatment.

2.1 BIODIESEL PRODUCTION

The process can be divided in two main parts:
1. Esterification and transesterification of the raw material to biodiesel
2. By-product preparation

The following sections describe the process steps of the biodiesel production. (See Appendix A)

Detail description

The feedstock for biodiesel production will be used cooking oil (UCO) , grease trap oil (GTO), palm oil fatty acid distillate (PFAD) and tallow.

Raw materials with high content of free fatty acids (palm oil fatty acids, grease trap oil) can be directly transferred into methyl ester by esterification using high-pressure, high-temperature reaction conditions without catalyst. The so-formed methyl ester has a certain content of free fatty acids, which can be processed in the following esterification step.

The raw materials with a certain content of free fatty acids as well as fatty acids recycled from the by-product acidification and the oil phase from the high pressure esterification are transferred to the esterification stage. Fatty acids are esterified with methanol under acidic conditions and ambient pressure in a batch process. The oil phase is transferred to the transesterification discontinuously. This step requires a catalyst which makes the transesterification reaction possible under moderate temperatures and normal pressure. The catalyst – a mixture of potassium hydroxide (KOH) and methanol – is prepared in a separate mixing station (solid potassium hydroxide is dissolved in methanol with a certain ratio).

The transesterification process is a two-step process. After dosing methanol and the catalyst the triglycerides are transformed to biodiesel and glycerine. Due to the density difference the glycerine together with the catalyst and the excessive methanol separates from the biodiesel phase and can be discharged to the by-product preparation line. The biodiesel phase of the first reaction step remains in the transesterification vessel and again methanol and the catalyst are dosed to the vessel. With this technology a sufficiently high degree of transesterification is achieved. The glycerine phase is again discharged to the by-product preparation line.

The methyl ester phase contains certain amounts of methanol, catalyst (mainly in form of soaps) and water. The catalyst is removed from the methyl ester phase by several washing steps (the aqueous phase is discharged to the by-product preparation line). The methyl ester phase after the last washing step contains low volatile high boiling contaminants as well as volatile substances such as water and methanol. The volatile substances are removed in the flash column (degasser), the low volatile high boiling substances are removed in the distillation unit. The distillate represents the high quality methyl ester and is transferred to the biodiesel quality tank, and later, to the biodiesel storage tanks.

The volatile substances from the degasser are transferred to the by-product preparation line. The low volatile high boiling substances, namely bioheating oil (BHO), are discharged to a storage tank. They can be further used as heating oil for an oil burner (e.g. thermal oil boiler) and will be used to provide process heat in the plant.

The glycerine phase from the transesterification and the aqueous phases of the methyl ester purification are processed together with the aqueous phase of the esterification in the acidification vessel. In this process step the potassium hydroxide and the potassium soaps are transformed with sulfuric acid to potassium sulfate, glycerine phase and fatty acid phase. The potassium sulfate is a solid phase, the methyl ester forms together with the fatty acids the fatty acid phase, which has a low solubility in the glycerine phase at acidic conditions. This three phase mixture can be separated by the means of a tricanter (continuous operation as well as the acidification). As mentioned above, the fatty acid phase is reused in the esterification unit (increasing the biodiesel output of the process). The generated potassium sulfate is discharged via a screw conveyor to a container as pasty fertilizer. The acidic glycerine phase from the tricanter is neutralized with the basic catalyst in the neutralization tank. The thereby generated potassium sulfate is filtrated off and discharged back to acidification tank. The filtered neutralized glycerine phase is distilled. In the column methanol and water are separated from the glycerine. A second column separates water and methanol.

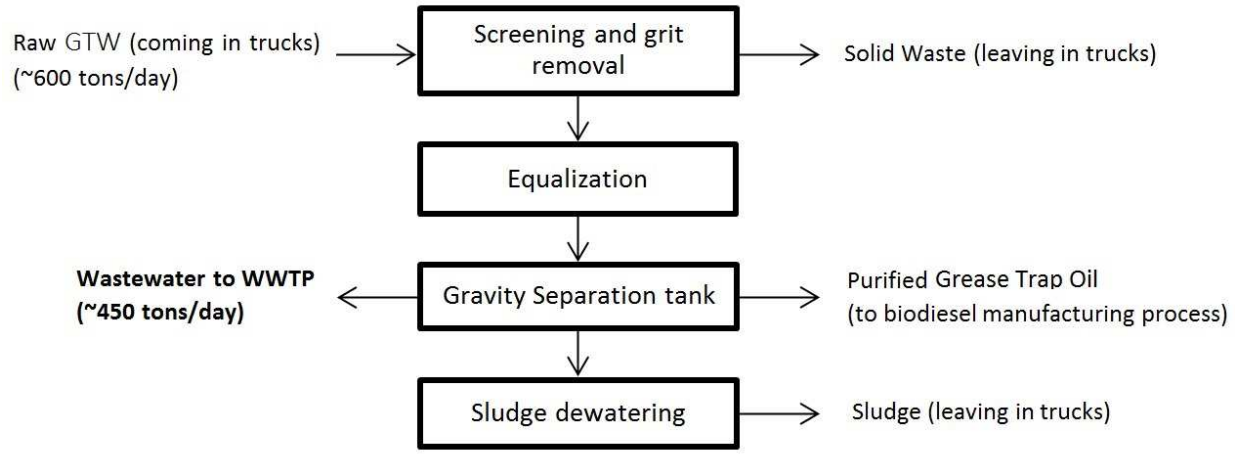
The recovered methanol and water are recycled and reused in the process. The crude glycerine (80% glycerine) is discharged to the storage tank.

2.2 Grease Trap Waste and Wastewater Treatment

Grease Trap Waste Treatment

Grease trap waste (GTW) treatment process is designed to separate oil, wastewater and sludge mixture in the raw GTW. The following figure shows the block flow diagram of the process:

Figure 1 Block flow diagram of Grease Trap Waste (GTW) Pre-treatment Process



The external GTW collectors will deliver and unload the GTW at the Grease Trap Waste Screening Room (GTWSR) where the GTW is screened and removed of grit. In order to reduce the potential problems of clogging of oil at the pipelines, heating coils are equipped.

In the second process, the GTW goes through a process called equalization to provide a buffering volume for overcoming the operational problems caused by variations of flow and characteristics of wastewater. The preliminary treated GTW from the first process is led into and retained in buffer tanks for a period of time where the process of equalization occurs.

Gravity Separation is the most important step in the treatment process, which aims for oil-water separation and solids settling. The tank is designed to separate the three layers in the raw GTW: (i) oil layer at the top, (ii) wastewater at the middle and (iii) sludge at the bottom. Firstly, the GTW from the buffer tank is pumped into the separation tank. Inside the tank, a skimmer is installed to remove the treated GTW at the top layer. The wastewater layer at the middle of the separation tank will be pumped to the wastewater treatment plant. It is estimated that the wastewater capacity is around 450 tons/day. The sludge, which is at the bottom layer, with be collected using a sludge scraper and is pumped out from the bottom of the tank for sludge treatment.

In the final process of sludge dewatering, centrifuges are installed to dewater the sludge collected at the bottom of separation tank. The dewatered sludge will then be delivered to landfill by trucks.

WASTEWATER TREATMENT

Wastewater treatment process comprises I) Pre-treatment, II) Anaerobic Treatment III) Aerobic Treatment IV) Biogas Treatment V) Off Gas Treatment and VI) Sludge Treatment. The process flow diagram is presented in Appendix B

I) Pre-treatment

Wastewater from the production site will be flowing to an influent pit by gravity for collection to remove big solid particles and then will be pumped to an oil-water separator. The oil-water separator is used for free oil removal and the wastewater will flow into the buffer tank by gravity after wastewater undergoes oil removal. The buffer tank is to equalize water quality and flow fluctuation. After the wastewater is equalized in the buffer tank, it will be pumped to the Dissolved Air Floatation Unit (DAF) from buffer tank for further removing total suspended solids (TSS) and oil in wastewater.

II) Anaerobic Treatment

The wastewater will be treated anaerobically in a two stage anaerobic process. In the first stage (Pre Acidification Tank) the wastewater is partly pre-acidified. In the second stage (IC reactor) the organic pollutants of the wastewater are converted into the biogas.

III) Aerobic Treatment

After anaerobic treatment, the wastewater will flow to an activated sludge system for further removal of remained biodegradable chemical oxygen demand (COD). Activated sludge system consists of an aeration tank and a secondary clarifier.

IV) Biogas Treatment

In the IC reactor the by-product, namely the biogas, is produced. The amount of the biogas produced depends on the COD-load applied to the IC reactors. The higher the COD-load is, the higher the biogas production will be. The biogas will be collected in the degassing tank on top of the IC reactor for gas water separation. The IC reactor and the biogas treatment facilities are closed system.

The biogas is burnt either in the process boiler system or the flare without emission to surroundings.

V) Off Gas Treatment

Odorous components like hydrogen sulphite (H_2S) may be released from the wastewater treatment plant (WWTP). Therefore top of the tanks in pre-treatment units and aeration tank are continuously ventilated. The off gas will be sent to a scrubber for odor removal.

VI) Sludge treatment

Sludge will be collected from the secondary clarifier and the DAF. The sludge discharged from secondary clarifier and the DAF has low dry matter content. To increase the dry matter content of the sludge, the sludge has to be further dewatered by mechanical dewatering equipment.

SECTION 3 SPILLAGE MANAGEMENT

3.1 DEFINITIONS

Personal Protective Equipment (PPE)
The equipment is used to protect a person handling a spill.

Bund
The bund is an embankment or wall of brick, stone, concrete, or other impervious material, which may form part of or the entire perimeter of a compound and provides a barrier to retain liquid. The bund is designed to contain spillages and leaks from liquids used, stored or processed above ground and to facilitate cleanup operations.

In the biodiesel plant, all the tanks for chemicals and raw materials and pump yards are built with the bund.

Dangerous Goods
The hazardous substances are defined by the Dangerous Goods Ordinance (Cap 295). They are classified on the basis of immediate physical or chemical effects that may impact on people, property or the environment – explosive, flammable, corrosive, chemically reactive, highly combustible, acutely toxic, radioactive or infectious.

Sulphuric acid, phosphoric acid, ultra-low sulphur diesel, methanol, potassium hydroxide and sodium hydroxide will be used in the biodiesel plant for biodiesel production or wastewater treatment. Biodiesel and bioheating oil will be the product. They are all classified as Dangerous Goods and required to acquire the licences for storage.

Material Safety Data Sheet (MSDS)
The information sheet provides the technical information in relation to the chemicals and materials. This sheet is obtained directly from the manufacturer or supplier.

Major Spill
A major spill is one that cannot be contained safely with the materials on the site, threatens safety to life, and/or threatens to enter the sewerage system or travel beyond the boundaries of building/property to endanger the environment. The spill is estimated to be more than 20 liters. The Emergency Services shall be contacted.

Minor Spill
A minor spill is one that usually presents little or no hazard to person or property, and is small enough to be safely cleaned up using the emergency spill kit. The spill is estimated to be less than 20 liters.

3.2 ROLES AND RESPONSIBILITIES

Managers from Engineering/Laboratory/Maintenance/Production Department are responsible for ensuring that:

- This plan is implemented within their area of responsibility
- All necessary equipment is available and maintained in the case of a chemical spill and they are clearly labelled and signed
- Risk assessments are carried out to identify risk control measures to protect the staff's health and safety and potential harm to the environment
- All staff receive appropriate training to deal with chemical and material spills where identified as necessary
- All supervisory staff are aware of the legal requirement regarding pollution control from chemical and material spills
- All staff that use, store or manage chemical and material as a minimum requirement should attend the training in environmental awareness and chemical and materials spill management

Supervisors from Laboratory/Maintenance/Production Department and the EHS Officer are responsible for ensuring that:

- This plan is implemented within their area(s) of responsibility
- Information is provided to all relevant staff to safely clean up the spills. This should include emergency services contact details, and other staff as appropriate, location of equipment and materials such as self-contained breathing apparatus or respirator locations
- Appropriate equipment is cleaned, stored and maintained by competent persons
- All new staff are inducted in environmental awareness and chemical spill management

Staffs are responsible for ensuring that:

- They do not place themselves or others at risk of injury
- They place personal safety first - keep clear of a spill unless trained in spill control and clean up
- Immediately reporting of chemical spill to their supervisor
- Only trained and competent staff attempt to clean up a chemical substance spill.
- They know where MSDS's are kept, or how they can be accessed.
- This plan is followed.
- Spill control equipment is used in the proper manner.
- Equipment is stored and maintained as appropriate.

3.3 IDENTIFICATION OF ACTIVITIES OF POTENTIAL SPILLAGE AND PRELIMINARY CONTROL

3.3.1 Identification of Activities of Potential Spillage

The following activities are identified as potential spillage of chemical and materials:

A. Loading/unloading the chemicals and raw materials at the Jetty dike area
B. Loading the final products via the Loading Station;
C. Unloading the raw materials via the Unloading Station;
D. Unloading the chemicals to the chemical tanks for wastewater treatment;
E. Pipe leakage in the process buildings;
F. Overflow from various tanks in the process buildings;
G. Maintenance of flanges, pumps, sensors and valves along the pipelines;
H. GTW tanker arrival at the biodiesel plant; and
I. GTW unloading at the GTWSR.

The below table correlates the spilled chemicals and materials, and their receiving agent

Activities	Chemicals/Materials	Affected Receiving Agent
A	PFAD, UCO, Methanol, Biodiesel	Sea, Land
B	Biodiesel, Bioheating Oil	Land, Storm Water Drainage
C	Methanol, Ultra-low Sulphur Diesel, Sulphuric Acid, Phosphoric Acid,	Land, Storm Water Drainage
D	Ferric Chloride, Sodium Hydroxide	Land, Storm Water Drainage
E, F, G	Intermediate products	Land, Foul Drainage, Storm Water Drainage
H, I	GTW	Land, Storm Water Drainage

3.3.2 Preliminary Control

<u>Sea</u>
The spill will directly contact with sea and cause the pollution with immediate effect depending on the nature of the spilled material.

The floatable oil boom will be laid to surround the marine vessel. If the spillage occurs, it will be confined to limited area to minimize the environmental impact. The spilled material will be skimmed back to the GTWSR and reused for biodiesel production.

<u>Land</u>
The spill will directly contact with land. As the land has been constructed with concrete cement, the spill will not cause significant pollution on land but deteriorate the house-keeping of the workplace to a minor extent.

Storm Water Drainage

The spill will flow to the surface drains and then accumulate in the oil interceptors and finally will flow to the external storm water drainage system via underground pipelines.

The surface drains at the unloading station are equipped with a level sensor and connected to the oil interceptor. In between the surface drains and the oil interceptor, there is a valve which is normally closed. Spillage will be detected by the level sensor which is located at the surface drain of the parking slot. The signal will be feedback to the Control Room and terminate the unloading operation immediately. The spills will be contained in the surface drain which will be cleared and reused to the biodiesel production.

When the product is loading at the loading station, overfill protection system is equipped which interlock with the loading pumps to prevent overfill. Furthermore, the parking slot will be bound by sand bags to prevent any spills to the surface drain. In addition, there is an oil interceptor to trap the oil in case any spills to the surface drain accidentally. The oil interceptor will be regularly cleared and the trapped oil will be reused to the biodiesel production via the GTWSR.

The floors of tank farms are coated with oil- and waterproof, anti-static and acid-resistant coating to minimize leakage out of the farm area. Each tank farm is built with bund wall to surround the tank(s) and to retain potential leakage from the tanks inside the bunds and there are 5 tank farms, namely from tank farms 2A to 2E. The details are summarized in the below table.

Summary of the volume of the tanks and bund storage capacities

Tank Farm	No. of tank(s) in tank farm	Volume of largest tank / m^3	**110% Volume of the largest tank / m^3**	Total volume of the tanks / m^3	**20% Total volume of the tanks* / m^3**	**Volume of bund storage capacity / m^3**
2A	14	2561	**2817.1**	13935	**2787**	**5188.7**
2B	1	518	**569.8**	518	**103.6**	**588.0**
2C	2	160	**176**	320	**64**	**226.1**
2D	1	105	**115.5**	105	**21**	**116.5**
2E	2	54	**59.4**	80	**16**	**72.3**

*Refers to “Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes”

The bunds are built to retain the potential leakage from the tanks and fulfill the requirement of both 110% of the volume of the largest tank and 20% of total volume of the tanks.

Furthermore, leakage detection system is equipped in each of the tank farms which consist of valve pit and level sensor. In normal operation, the valve at valve pit is in close position to avoid any spillage from tank farm to storm water drainage system. In addition, the level sensor detects the spillage which connects to PCS. The signal will be shown and monitored by ASB staff in the Control Room so corresponding corrective action can be carried out. In case of spillage, the spill will be contained at the tank farm. The spilled material will be cleared and returned to the biodiesel production for reuse.

Foul Drainage

The Foul Drainage covers all the process buildings of the biodiesel plant.

The spill will flow to these drains which will lead to the onsite wastewater treatment plant. Even though the major spill occurs, i.e. > 20 liters, the spill will not cause adverse effect as the capability of the WWTP is designed and built to treat 515 cubic meters wastewater daily.

3.4 CONTINGENCY PROCEDURES

The procedures include six steps and should be implemented in sequence:

I Responsibilities of the staff in the scene of the spillage
II Communications
III Remedial actions at scene
IV Clean-up activities
V Disposal of the spill
VI Post Emergency Procedure

The degree of action taken will be dependent upon the severity of the spill. However, these four steps are fundamental to all spills without consideration of the magnitude. Each Production/Maintenance staff must be trained in the use of this Plan.

I Responsibilities of the staff in the scene of the spillage

1. When a spill is occurred and discovered by a staff, the staff must report to the Control Room immediately.

2. Stop the operation that leads to the spillage in reasonably practical means.

3. The following information must be reported

    a. Exact location

    b. Estimated quantity of material spilled

    c. Location and distance to drainage

    d. Nature and extent of any injuries or property damage

    e. An estimate of what response will be further needed

4. If the nature of the spill allows you to safely take action, the staff may attempt to dike the area, place a plastic liner down to collect the material, or otherwise respond to the emergency. Only qualified personnel will attempt to approach a closed unit or handle spilled materials.

5. Maintain communications with the Control Room at a maximum of 5-minute intervals until the Production Manager/Supervisor(s) take in charge of the situation, unless otherwise instructed.

II Communications

Upon a spill or incident has occurred, the staff must keep contact with the Control Room and report in details regarding the spill. After obtaining all essential details, Production Manager/Supervisor(s) must contact relevant parties which include the Plant Manager. Production Manager/Supervisor(s) will make any necessary notifications and coordinate the overall response to the spill.

III Remedial actions at scene

PLAN 1 – MINOR SPILL

In case of minor spill (<20 liters), the staff will take the following actions:

1. Evacuate the area;

2. Inform the Control Room;

3. Check the MSDS for proper spill control measures;

4. Follow the procedures below;

    - Wear personal protective equipment
    - Apply the chemical absorbent pad or neutralizing chemical to the spill depends on its type & nature
    - Clean up the spill
    - Place the spill materials in disposal bag and seal the bag

5. Clean up activities;

6. Dispose of the spill and all the used absorbent as chemical waste; and

7. Post emergency procedures.

PLAN 2 – MAJOR SPILL

In case of a major spill (> 20 Liters), the staff must inform the Control Room and the Control Room must inform the Production Manager/Supervisor(s) for assistance. Similar procedures will be adopted.

1. Evacuate personnel from the immediate spill area

All individuals in the immediate vicinity of the spill should be notified, and if necessary, moved a safe distance away from the spill location. Instruct untrained personnel to keep at a safe distance, well away from the spill area.

2. Identify the spilled materials

The staff who discovers the spill should attempt to recall and communicate what the spilled material is and take note of the present conditions. Identify the chemicals or the raw material from the nearby scene. All these information must be reported to the Control Room.

Estimate the quantity of spilled material, what first aid steps should be taken in case of spill contact.

3. Identify the spilled materials

Once the spilled chemical or raw material is identified, the Emergency Response Team (ERT) will respond appropriately to that type of spill. ERT should always assume the worst and use the highest level of personal protective equipment. Only trained staff equipped with suitable protective clothing and equipment should be allowed to enter and clean up the spill area. ERT member(s) should stand by at the spill area.

4. Assess the sign of spill and determine if material is likely to flow into the drainage system. Block or cover the drainage to prevent spill entering into storm water drainage.

5. Barricade the spill area

The area around the spill should be barricaded with floor signs and/or barricade tape that will notify people to keep away from the hazard.

6. Extinguish All Sources of Ignition

All potential sources of ignition should be eliminated immediately. The flammability of the spilled liquid should be determined. If necessary, the Fire Services Department (FSD) should be contacted to help control the spillage.

7. Contain the spill

Locate where the leak or spill started, stop the leak at the source and try to prevent the spill from spreading. Cover any drains with drain plugs or drain covers so the chemical does not reach a surface drain.

IV Clean-up activities

As soon as possible after the immediate emergency situation is brought under control, the removal and disposal of spilled material should be planned and initiated. The clean-up of the various material collected at the scene will be directed by the Production Manager/Supervisor(s) at the scene. If material is recovered and it is not suitable for reuse or reprocessing, it should be handled, stored and disposed of as a chemical waste in accordance with the Waste Disposal (Chemical Waste) (General) Regulation. The decision on clean-up will be made by ERT in conjunction with FSD.

Clean up the spill

Begin spill treatment by pouring suitable agent, if necessary (e.g. emulsifier, neutralizer spill kits, or any others where applicable, depend on the nature, type and characteristics of the spill) around spill to encircle and dike its perimeter. Taking care to avoid splashing, continue to apply agent evenly onto spill. Using scraper provided, carefully mix agent into spill for the most complete reaction.

Areas that have been contaminated by chemical waste spillage/leakage should be cleaned. The waste from the cleanup operation should be treated and disposed of as chemical waste.

V Disposal of the spill

Spilled liquids will be cleaned up with absorbent and disposed of properly. If any containers are found to be leaking, they will be immediately segregated and repackaged in a steel container or other suitable container.

Disposal of used absorbent must be handled according to the type of liquid absorbed. Liquids, when contained in any absorbent, will continue to be unsafe. Exercise extreme care when handling, storing or disposing of absorbent containing such liquids. Disposed as chemical wastes at the licenced disposal facilities is a must.

VI Post Emergency Procedure

Post-emergency procedures are designed to prevent reoccurrence, to clean up and dispose of residuals, to decontaminate and to provide personnel debriefing.

Prevention of Reoccurrence

The Engineering/Maintenance/Production Managers and the Production Supervisors will take all necessary steps to ensure that a secondary release does not re-occur after an initial incident. Procedures that will be carried out include:

- Inspection for any leaks or cracks in containers.
- Isolation of all collected waste materials.

In order to improve the Plan, it will be necessary to extract experiences from occurrences in order to prevent a situation from reoccurring.

Equipment Decontamination and Maintenance

After clean-up procedures are completed, all equipment used during the clean-up will be decontaminated and readied for future use. All site personnel will be required to shower and remove any contaminated clothing. Showers are required at the end of each shift as a normal precautionary measure. Absorbent materials will be restocked. Before operations are resumed, an inspection of all safety equipment will be conducted.

Investigation Report

After the spill is under control, the Production Manager/Supervisor(s) will perform an investigation of the cause and prepare a written report in conjunction with the Engineering/Maintenance Manager, and submit to the Plant Manager, giving the causes/reasons of the event and the actions which have been taken and will be taken to prevent its recurrence.

Changes will be implemented in order to prevent reoccurrence. The results of this investigation will be further used as an experience which will be used for training of the various personnel and to update the plan if necessary.

SECTION 4 TRAINING, TESTING AND REVISION OF THE PLAN

4.1 TRAINING & TESTING

All the responsible staff must be trained and should demonstrate the ability of performing the task stated in this plan.

Exercise and drill shall be undertaken in a regular frequency to test the adequacy and effectiveness of this plan in controlled conditions if necessary, and allow the responsible staff to familiarize this plan.

4.2 REVISION

ASB will update this plan if necessary after consultation with the Engineering Department, the Maintenance Department, the Production Department or Senior Management of the Company. Also, the advices from or problems encountered from these departments will be taken into consideration and updated in this plan.

Appendix A

Biodiesel Production Process

Appendix B

Wastewater Treatment Process

Appendix C

Foul Drainage System

Appendix D

Storm Water Drainage System

Appendix E

Emergency Contact List

Emergency Contact List

Emergency Response Team

Name	Title	Office no.	Mobile no.
Sylvia HAR	Engineering Manager	3183 4206	9479 0949
Albert KWAN	Maintenance Manager	3183 4209	9313 6012
Martin HUI	Production Manager	TBA	9866 6333
Stanley KO	Shift Supervisor	TBA	6013 4562
H. TAKEUCHI	Shift Supervisor	TBA	9028 0689
Victor WANG	Production Supervisor	TBA	9653 3721

ASB Biodiesel (Hong Kong) Limited

Name	Title	Office no.	Contact no.
Roberto Vazquez Lucerga	Chief Technology Officer	3183 4222	6903 3478
Eddie WONG	Plant Manager	3183 4228	9091 1567
Rebecca LAU	Laboratory Manager	3183 4207	9272 0795
Matthew TSE	EHS Officer	3183 4205	9409 0630

Government Authorities/Organizations

Name	Contact no.
Emergency	999
Hong Kong Police, Tseung Kwan O Station	2623 9041
Marine Police Harbour Division	2884 9242
Fire Services Department, Tai Chik Sha Fire Station	2723 8787
Drainage Services Department	2877 0660
Electrical and Mechanical Services Department	2333 3762
Environmental Protection Department	2838 3111
Tseung Kwan O Hospital	2208 0111
Ecospace Limited (Chemical Waste Treatment Facility)	2434 6490

EMERGENCY CONTINGENCY PLAN

For

Chemical and Material Spillage

EP-319/2009/C

Development of a Biodiesel Plant at

Tseung Kwan O Industrial Estate

Version 1: 30 December 2013

22 Chun Wang Street, Tseung Kwan O Industrial Estate, New Territories, Hong Kong

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APPENDICES

A Biodiesel Production Process

B Wastewater Treatment Process

C Foul Drainage System

D Storm Water Drainage System

E Emergency Contact List

SECTION 1 INTRODUCTION

This plan stipulates the actions to be taken in case of accidental spills occurred and prevent any spillages from discharge into the sea in order to minimise effects to health and safety from exposure to chemical and material spills and reduce the impact on the environment. The plan applies to all the staff in the biodiesel plant at the Tseung Kwan O Industrial Estate (TKOIE) where chemical and materials are transported, purchased, stored, handled, or used, including vehicles of visitors or suppliers who bring the chemicals and raw materials into the biodiesel plant that are potentially hazardous.

The biodiesel plant is built with concrete cement with enclosed seawall to prevent the land contamination when the spillage is occurred inside the plant. The foul drainage covers all the process buildings and wastewater treatment units and the potential contaminated wastewater will be diverted to the wastewater treatment plant for onsite treatment so as to fulfill the discharge requirement prior to discharging the treated effluent to the foul drain connecting to the sewerage system of the Tseung Kwan O Industrial Estate (TKOIE). Also, the foul drainage is designed and built separately from the storm water drainage system to avoid cross contamination. The storm water drainage system is built with 2 oil interceptors to contain potentially contaminated surface water and to prevent from seawater contamination. The cleaning of the oil interceptors will be arranged in the regular schedule by the contracted GTW collector and the wastewater will be unloaded via the GTWSR for reuse.

SECTION 2 PROCESS DESCRIPTIONS

The biodiesel plant consists of 2 parts of the operation: 1) biodiesel production & 2) grease trap waste and wastewater treatment.

2.1 BIODIESEL PRODUCTION

The process can be divided in two main parts:
1. Esterification and transesterification of the raw material to biodiesel
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The following sections describe the process steps of the biodiesel production. (See Appendix A)

Detail description

The feedstock for biodiesel production will be used cooking oil (UCO) , grease trap oil (GTO), palm oil fatty acid distillate (PFAD) and tallow.

Raw materials with high content of free fatty acids (palm oil fatty acids, grease trap oil) can be directly transferred into methyl ester by esterification using high-pressure, high-temperature reaction conditions without catalyst. The so-formed methyl ester has a certain content of free fatty acids, which can be processed in the following esterification step.

The raw materials with a certain content of free fatty acids as well as fatty acids recycled from the by-product acidification and the oil phase from the high pressure esterification are transferred to the esterification stage. Fatty acids are esterified with methanol under acidic conditions and ambient pressure in a batch process. The oil phase is transferred to the transesterification discontinuously. This step requires a catalyst which makes the transesterification reaction possible under moderate temperatures and normal pressure. The catalyst – a mixture of potassium hydroxide (KOH) and methanol – is prepared in a separate mixing station (solid potassium hydroxide is dissolved in methanol with a certain ratio).

The transesterification process is a two-step process. After dosing methanol and the catalyst the triglycerides are transformed to biodiesel and glycerine. Due to the density difference the glycerine together with the catalyst and the excessive methanol separates from the biodiesel phase and can be discharged to the by-product preparation line. The biodiesel phase of the first reaction step remains in the transesterification vessel and again methanol and the catalyst are dosed to the vessel. With this technology a sufficiently high degree of transesterification is achieved. The glycerine phase is again discharged to the by-product preparation line.

The methyl ester phase contains certain amounts of methanol, catalyst (mainly in form of soaps) and water. The catalyst is removed from the methyl ester phase by several washing steps (the aqueous phase is discharged to the by-product preparation line). The methyl ester phase after the last washing step contains low volatile high boiling contaminants as well as volatile substances such as water and methanol. The volatile substances are removed in the flash column (degasser), the low volatile high boiling substances are removed in the distillation unit. The distillate represents the high quality methyl ester and is transferred to the biodiesel quality tank, and later, to the biodiesel storage tanks.

The volatile substances from the degasser are transferred to the by-product preparation line. The low volatile high boiling substances, namely bioheating oil (BHO), are discharged to a storage tank. They can be further used as heating oil for an oil burner (e.g. thermal oil boiler) and will be used to provide process heat in the plant.

The glycerine phase from the transesterification and the aqueous phases of the methyl ester purification are processed together with the aqueous phase of the esterification in the acidification vessel. In this process step the potassium hydroxide and the potassium soaps are transformed with sulfuric acid to potassium sulfate, glycerine phase and fatty acid phase. The potassium sulfate is a solid phase, the methyl ester forms together with the fatty acids the fatty acid phase, which has a low solubility in the glycerine phase at acidic conditions. This three phase mixture can be separated by the means of a tricanter (continuous operation as well as the acidification). As mentioned above, the fatty acid phase is reused in the esterification unit (increasing the biodiesel output of the process). The generated potassium sulfate is discharged via a screw conveyor to a container as pasty fertilizer. The acidic glycerine phase from the tricanter is neutralized with the basic catalyst in the neutralization tank. The thereby generated potassium sulfate is filtrated off and discharged back to acidification tank. The filtered neutralized glycerine phase is distilled. In the column methanol and water are separated from the glycerine. A second column separates water and methanol.

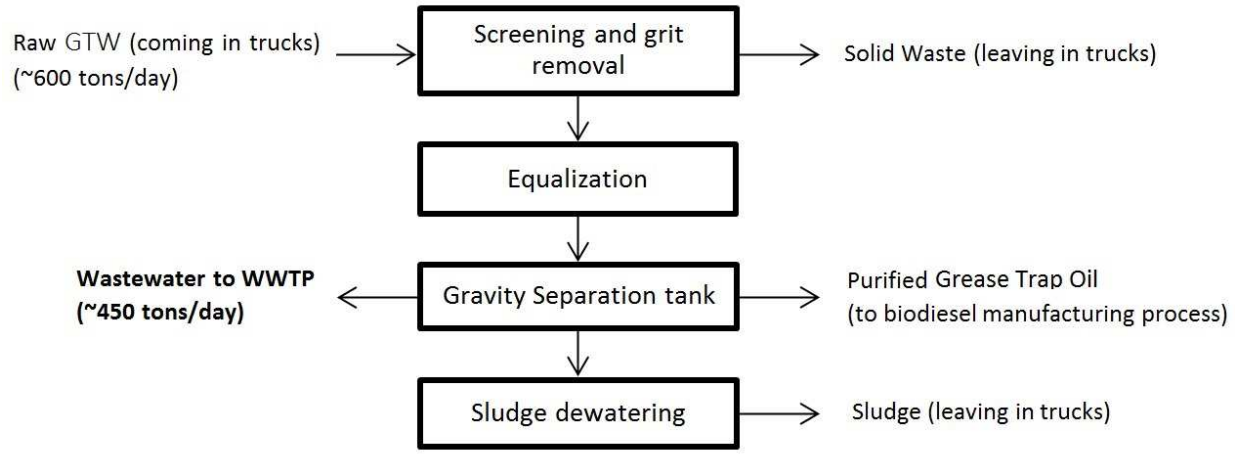
The recovered methanol and water are recycled and reused in the process. The crude glycerine (80% glycerine) is discharged to the storage tank.

2.2 Grease Trap Waste and Wastewater Treatment

Grease Trap Waste Treatment

Grease trap waste (GTW) treatment process is designed to separate oil, wastewater and sludge mixture in the raw GTW. The following figure shows the block flow diagram of the process:

Figure 1 Block flow diagram of Grease Trap Waste (GTW) Pre-treatment Process



The external GTW collectors will deliver and unload the GTW at the Grease Trap Waste Screening Room (GTWSR) where the GTW is screened and removed of grit. In order to reduce the potential problems of clogging of oil at the pipelines, heating coils are equipped.

In the second process, the GTW goes through a process called equalization to provide a buffering volume for overcoming the operational problems caused by variations of flow and characteristics of wastewater. The preliminary treated GTW from the first process is led into and retained in buffer tanks for a period of time where the process of equalization occurs.

Gravity Separation is the most important step in the treatment process, which aims for oil-water separation and solids settling. The tank is designed to separate the three layers in the raw GTW: (i) oil layer at the top, (ii) wastewater at the middle and (iii) sludge at the bottom. Firstly, the GTW from the buffer tank is pumped into the separation tank. Inside the tank, a skimmer is installed to remove the treated GTW at the top layer. The wastewater layer at the middle of the separation tank will be pumped to the wastewater treatment plant. It is estimated that the wastewater capacity is around 450 tons/day. The sludge, which is at the bottom layer, with be collected using a sludge scraper and is pumped out from the bottom of the tank for sludge treatment.

In the final process of sludge dewatering, centrifuges are installed to dewater the sludge collected at the bottom of separation tank. The dewatered sludge will then be delivered to landfill by trucks.

WASTEWATER TREATMENT

Wastewater treatment process comprises I) Pre-treatment, II) Anaerobic Treatment III) Aerobic Treatment IV) Biogas Treatment V) Off Gas Treatment and VI) Sludge Treatment. The process flow diagram is presented in Appendix B

I) Pre-treatment

Wastewater from the production site will be flowing to an influent pit by gravity for collection to remove big solid particles and then will be pumped to an oil-water separator. The oil-water separator is used for free oil removal and the wastewater will flow into the buffer tank by gravity after wastewater undergoes oil removal. The buffer tank is to equalize water quality and flow fluctuation. After the wastewater is equalized in the buffer tank, it will be pumped to the Dissolved Air Floatation Unit (DAF) from buffer tank for further removing total suspended solids (TSS) and oil in wastewater.

II) Anaerobic Treatment

The wastewater will be treated anaerobically in a two stage anaerobic process. In the first stage (Pre Acidification Tank) the wastewater is partly pre-acidified. In the second stage (IC reactor) the organic pollutants of the wastewater are converted into the biogas.

III) Aerobic Treatment

After anaerobic treatment, the wastewater will flow to an activated sludge system for further removal of remained biodegradable chemical oxygen demand (COD). Activated sludge system consists of an aeration tank and a secondary clarifier.

IV) Biogas Treatment

In the IC reactor the by-product, namely the biogas, is produced. The amount of the biogas produced depends on the COD-load applied to the IC reactors. The higher the COD-load is, the higher the biogas production will be. The biogas will be collected in the degassing tank on top of the IC reactor for gas water separation. The IC reactor and the biogas treatment facilities are closed system.

The biogas is burnt either in the process boiler system or the flare without emission to surroundings.

V) Off Gas Treatment

Odorous components like hydrogen sulphite (H_2S) may be released from the wastewater treatment plant (WWTP). Therefore top of the tanks in pre-treatment units and aeration tank are continuously ventilated. The off gas will be sent to a scrubber for odor removal.

VI) Sludge treatment

Sludge will be collected from the secondary clarifier and the DAF. The sludge discharged from secondary clarifier and the DAF has low dry matter content. To increase the dry matter content of the sludge, the sludge has to be further dewatered by mechanical dewatering equipment.

SECTION 3 SPILLAGE MANAGEMENT

3.1 DEFINITIONS

Personal Protective Equipment (PPE)
The equipment is used to protect a person handling a spill.

Bund
The bund is an embankment or wall of brick, stone, concrete, or other impervious material, which may form part of or the entire perimeter of a compound and provides a barrier to retain liquid. The bund is designed to contain spillages and leaks from liquids used, stored or processed above ground and to facilitate cleanup operations.

In the biodiesel plant, all the tanks for chemicals and raw materials and pump yards are built with the bund.

Dangerous Goods
The hazardous substances are defined by the Dangerous Goods Ordinance (Cap 295). They are classified on the basis of immediate physical or chemical effects that may impact on people, property or the environment – explosive, flammable, corrosive, chemically reactive, highly combustible, acutely toxic, radioactive or infectious.

Sulphuric acid, phosphoric acid, ultra-low sulphur diesel, methanol, potassium hydroxide and sodium hydroxide will be used in the biodiesel plant for biodiesel production or wastewater treatment. Biodiesel and bioheating oil will be the product. They are all classified as Dangerous Goods and required to acquire the licences for storage.

Material Safety Data Sheet (MSDS)
The information sheet provides the technical information in relation to the chemicals and materials. This sheet is obtained directly from the manufacturer or supplier.

Major Spill
A major spill is one that cannot be contained safely with the materials on the site, threatens safety to life, and/or threatens to enter the sewerage system or travel beyond the boundaries of building/property to endanger the environment. The spill is estimated to be more than 20 liters. The Emergency Services shall be contacted.

Minor Spill
A minor spill is one that usually presents little or no hazard to person or property, and is small enough to be safely cleaned up using the emergency spill kit. The spill is estimated to be less than 20 liters.

3.2 ROLES AND RESPONSIBILITIES

Managers from Engineering/Laboratory/Maintenance/Production Department are responsible for ensuring that:

- This plan is implemented within their area of responsibility
- All necessary equipment is available and maintained in the case of a chemical spill and they are clearly labelled and signed
- Risk assessments are carried out to identify risk control measures to protect the staff's health and safety and potential harm to the environment
- All staff receive appropriate training to deal with chemical and material spills where identified as necessary
- All supervisory staff are aware of the legal requirement regarding pollution control from chemical and material spills
- All staff that use, store or manage chemical and material as a minimum requirement should attend the training in environmental awareness and chemical and materials spill management

Supervisors from Laboratory/Maintenance/Production Department and the EHS Officer are responsible for ensuring that:

- This plan is implemented within their area(s) of responsibility
- Information is provided to all relevant staff to safely clean up the spills. This should include emergency services contact details, and other staff as appropriate, location of equipment and materials such as self-contained breathing apparatus or respirator locations
- Appropriate equipment is cleaned, stored and maintained by competent persons
- All new staff are inducted in environmental awareness and chemical spill management

Staffs are responsible for ensuring that:

- They do not place themselves or others at risk of injury
- They place personal safety first - keep clear of a spill unless trained in spill control and clean up
- Immediately reporting of chemical spill to their supervisor
- Only trained and competent staff attempt to clean up a chemical substance spill.
- They know where MSDS's are kept, or how they can be accessed.
- This plan is followed.
- Spill control equipment is used in the proper manner.
- Equipment is stored and maintained as appropriate.

3.3 IDENTIFICATION OF ACTIVITIES OF POTENTIAL SPILLAGE AND PRELIMINARY CONTROL

3.3.1 Identification of Activities of Potential Spillage

The following activities are identified as potential spillage of chemical and materials:

A. Loading/unloading the chemicals and raw materials at the Jetty dike area
B. Loading the final products via the Loading Station;
C. Unloading the raw materials via the Unloading Station;
D. Unloading the chemicals to the chemical tanks for wastewater treatment;
E. Pipe leakage in the process buildings;
F. Overflow from various tanks in the process buildings;
G. Maintenance of flanges, pumps, sensors and valves along the pipelines;
H. GTW tanker arrival at the biodiesel plant; and
I. GTW unloading at the GTWSR.

The below table correlates the spilled chemicals and materials, and their receiving agent

Activities	Chemicals/Materials	Affected Receiving Agent
A	PFAD, UCO, Methanol, Biodiesel	Sea, Land
B	Biodiesel, Bioheating Oil	Land, Storm Water Drainage
C	Methanol, Ultra-low Sulphur Diesel, Sulphuric Acid, Phosphoric Acid,	Land, Storm Water Drainage
D	Ferric Chloride, Sodium Hydroxide	Land, Storm Water Drainage
E, F, G	Intermediate products	Land, Foul Drainage, Storm Water Drainage
H, I	GTW	Land, Storm Water Drainage

3.3.2 Preliminary Control

<u>Sea</u>
The spill will directly contact with sea and cause the pollution with immediate effect depending on the nature of the spilled material.

The floatable oil boom will be laid to surround the marine vessel. If the spillage occurs, it will be confined to limited area to minimize the environmental impact. The spilled material will be skimmed back to the GTWSR and reused for biodiesel production.

<u>Land</u>
The spill will directly contact with land. As the land has been constructed with concrete cement, the spill will not cause significant pollution on land but deteriorate the house-keeping of the workplace to a minor extent.

Storm Water Drainage

The spill will flow to the surface drains and then accumulate in the oil interceptors and finally will flow to the external storm water drainage system via underground pipelines.

The surface drains at the unloading station are equipped with a level sensor and connected to the oil interceptor. In between the surface drains and the oil interceptor, there is a valve which is normally closed. Spillage will be detected by the level sensor which is located at the surface drain of the parking slot. The signal will be feedback to the Control Room and terminate the unloading operation immediately. The spills will be contained in the surface drain which will be cleared and reused to the biodiesel production.

When the product is loading at the loading station, overfill protection system is equipped which interlock with the loading pumps to prevent overfill. Furthermore, the parking slot will be bound by sand bags to prevent any spills to the surface drain. In addition, there is an oil interceptor to trap the oil in case any spills to the surface drain accidentally. The oil interceptor will be regularly cleared and the trapped oil will be reused to the biodiesel production via the GTWSR.

The floors of tank farms are coated with oil- and waterproof, anti-static and acid-resistant coating to minimize leakage out of the farm area. Each tank farm is built with bund wall to surround the tank(s) and to retain potential leakage from the tanks inside the bunds and there are 5 tank farms, namely from tank farms 2A to 2E. The details are summarized in the below table.

Summary of the volume of the tanks and bund storage capacities

Tank Farm	No. of tank(s) in tank farm	Volume of largest tank / m^3	**110% Volume of the largest tank / m^3**	Total volume of the tanks / m^3	**20% Total volume of the tanks* / m^3**	**Volume of bund storage capacity / m^3**
2A	14	2561	**2817.1**	13935	**2787**	**5188.7**
2B	1	518	**569.8**	518	**103.6**	**588.0**
2C	2	160	**176**	320	**64**	**226.1**
2D	1	105	**115.5**	105	**21**	**116.5**
2E	2	54	**59.4**	80	**16**	**72.3**

*Refers to “Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes”

The bunds are built to retain the potential leakage from the tanks and fulfill the requirement of both 110% of the volume of the largest tank and 20% of total volume of the tanks.

Furthermore, leakage detection system is equipped in each of the tank farms which consist of valve pit and level sensor. In normal operation, the valve at valve pit is in close position to avoid any spillage from tank farm to storm water drainage system. In addition, the level sensor detects the spillage which connects to PCS. The signal will be shown and monitored by ASB staff in the Control Room so corresponding corrective action can be carried out. In case of spillage, the spill will be contained at the tank farm. The spilled material will be cleared and returned to the biodiesel production for reuse.

Foul Drainage

The Foul Drainage covers all the process buildings of the biodiesel plant.

The spill will flow to these drains which will lead to the onsite wastewater treatment plant. Even though the major spill occurs, i.e. > 20 liters, the spill will not cause adverse effect as the capability of the WWTP is designed and built to treat 515 cubic meters wastewater daily.

3.4 CONTINGENCY PROCEDURES

The procedures include six steps and should be implemented in sequence:

I Responsibilities of the staff in the scene of the spillage
II Communications
III Remedial actions at scene
IV Clean-up activities
V Disposal of the spill
VI Post Emergency Procedure

The degree of action taken will be dependent upon the severity of the spill. However, these four steps are fundamental to all spills without consideration of the magnitude. Each Production/Maintenance staff must be trained in the use of this Plan.

I Responsibilities of the staff in the scene of the spillage

1. When a spill is occurred and discovered by a staff, the staff must report to the Control Room immediately.

2. Stop the operation that leads to the spillage in reasonably practical means.

3. The following information must be reported

    a. Exact location

    b. Estimated quantity of material spilled

    c. Location and distance to drainage

    d. Nature and extent of any injuries or property damage

    e. An estimate of what response will be further needed

4. If the nature of the spill allows you to safely take action, the staff may attempt to dike the area, place a plastic liner down to collect the material, or otherwise respond to the emergency. Only qualified personnel will attempt to approach a closed unit or handle spilled materials.

5. Maintain communications with the Control Room at a maximum of 5-minute intervals until the Production Manager/Supervisor(s) take in charge of the situation, unless otherwise instructed.

II Communications

Upon a spill or incident has occurred, the staff must keep contact with the Control Room and report in details regarding the spill. After obtaining all essential details, Production Manager/Supervisor(s) must contact relevant parties which include the Plant Manager. Production Manager/Supervisor(s) will make any necessary notifications and coordinate the overall response to the spill.

III Remedial actions at scene

PLAN 1 – MINOR SPILL

In case of minor spill (<20 liters), the staff will take the following actions:

1. Evacuate the area;

2. Inform the Control Room;

3. Check the MSDS for proper spill control measures;

4. Follow the procedures below;

    - Wear personal protective equipment
    - Apply the chemical absorbent pad or neutralizing chemical to the spill depends on its type & nature
    - Clean up the spill
    - Place the spill materials in disposal bag and seal the bag

5. Clean up activities;

6. Dispose of the spill and all the used absorbent as chemical waste; and

7. Post emergency procedures.

PLAN 2 – MAJOR SPILL

In case of a major spill (> 20 Liters), the staff must inform the Control Room and the Control Room must inform the Production Manager/Supervisor(s) for assistance. Similar procedures will be adopted.

1. Evacuate personnel from the immediate spill area

All individuals in the immediate vicinity of the spill should be notified, and if necessary, moved a safe distance away from the spill location. Instruct untrained personnel to keep at a safe distance, well away from the spill area.

2. Identify the spilled materials

The staff who discovers the spill should attempt to recall and communicate what the spilled material is and take note of the present conditions. Identify the chemicals or the raw material from the nearby scene. All these information must be reported to the Control Room.

Estimate the quantity of spilled material, what first aid steps should be taken in case of spill contact.

3. Identify the spilled materials

Once the spilled chemical or raw material is identified, the Emergency Response Team (ERT) will respond appropriately to that type of spill. ERT should always assume the worst and use the highest level of personal protective equipment. Only trained staff equipped with suitable protective clothing and equipment should be allowed to enter and clean up the spill area. ERT member(s) should stand by at the spill area.

4. Assess the sign of spill and determine if material is likely to flow into the drainage system. Block or cover the drainage to prevent spill entering into storm water drainage.

5. Barricade the spill area

The area around the spill should be barricaded with floor signs and/or barricade tape that will notify people to keep away from the hazard.

6. Extinguish All Sources of Ignition

All potential sources of ignition should be eliminated immediately. The flammability of the spilled liquid should be determined. If necessary, the Fire Services Department (FSD) should be contacted to help control the spillage.

7. Contain the spill

Locate where the leak or spill started, stop the leak at the source and try to prevent the spill from spreading. Cover any drains with drain plugs or drain covers so the chemical does not reach a surface drain.

IV Clean-up activities

As soon as possible after the immediate emergency situation is brought under control, the removal and disposal of spilled material should be planned and initiated. The clean-up of the various material collected at the scene will be directed by the Production Manager/Supervisor(s) at the scene. If material is recovered and it is not suitable for reuse or reprocessing, it should be handled, stored and disposed of as a chemical waste in accordance with the Waste Disposal (Chemical Waste) (General) Regulation. The decision on clean-up will be made by ERT in conjunction with FSD.

Clean up the spill

Begin spill treatment by pouring suitable agent, if necessary (e.g. emulsifier, neutralizer spill kits, or any others where applicable, depend on the nature, type and characteristics of the spill) around spill to encircle and dike its perimeter. Taking care to avoid splashing, continue to apply agent evenly onto spill. Using scraper provided, carefully mix agent into spill for the most complete reaction.

Areas that have been contaminated by chemical waste spillage/leakage should be cleaned. The waste from the cleanup operation should be treated and disposed of as chemical waste.

V Disposal of the spill

Spilled liquids will be cleaned up with absorbent and disposed of properly. If any containers are found to be leaking, they will be immediately segregated and repackaged in a steel container or other suitable container.

Disposal of used absorbent must be handled according to the type of liquid absorbed. Liquids, when contained in any absorbent, will continue to be unsafe. Exercise extreme care when handling, storing or disposing of absorbent containing such liquids. Disposed as chemical wastes at the licenced disposal facilities is a must.

VI Post Emergency Procedure

Post-emergency procedures are designed to prevent reoccurrence, to clean up and dispose of residuals, to decontaminate and to provide personnel debriefing.

Prevention of Reoccurrence

The Engineering/Maintenance/Production Managers and the Production Supervisors will take all necessary steps to ensure that a secondary release does not re-occur after an initial incident. Procedures that will be carried out include:

- Inspection for any leaks or cracks in containers.
- Isolation of all collected waste materials.

In order to improve the Plan, it will be necessary to extract experiences from occurrences in order to prevent a situation from reoccurring.

Equipment Decontamination and Maintenance

After clean-up procedures are completed, all equipment used during the clean-up will be decontaminated and readied for future use. All site personnel will be required to shower and remove any contaminated clothing. Showers are required at the end of each shift as a normal precautionary measure. Absorbent materials will be restocked. Before operations are resumed, an inspection of all safety equipment will be conducted.

Investigation Report

After the spill is under control, the Production Manager/Supervisor(s) will perform an investigation of the cause and prepare a written report in conjunction with the Engineering/Maintenance Manager, and submit to the Plant Manager, giving the causes/reasons of the event and the actions which have been taken and will be taken to prevent its recurrence.

Changes will be implemented in order to prevent reoccurrence. The results of this investigation will be further used as an experience which will be used for training of the various personnel and to update the plan if necessary.

SECTION 4 TRAINING, TESTING AND REVISION OF THE PLAN

4.1 TRAINING & TESTING

All the responsible staff must be trained and should demonstrate the ability of performing the task stated in this plan.

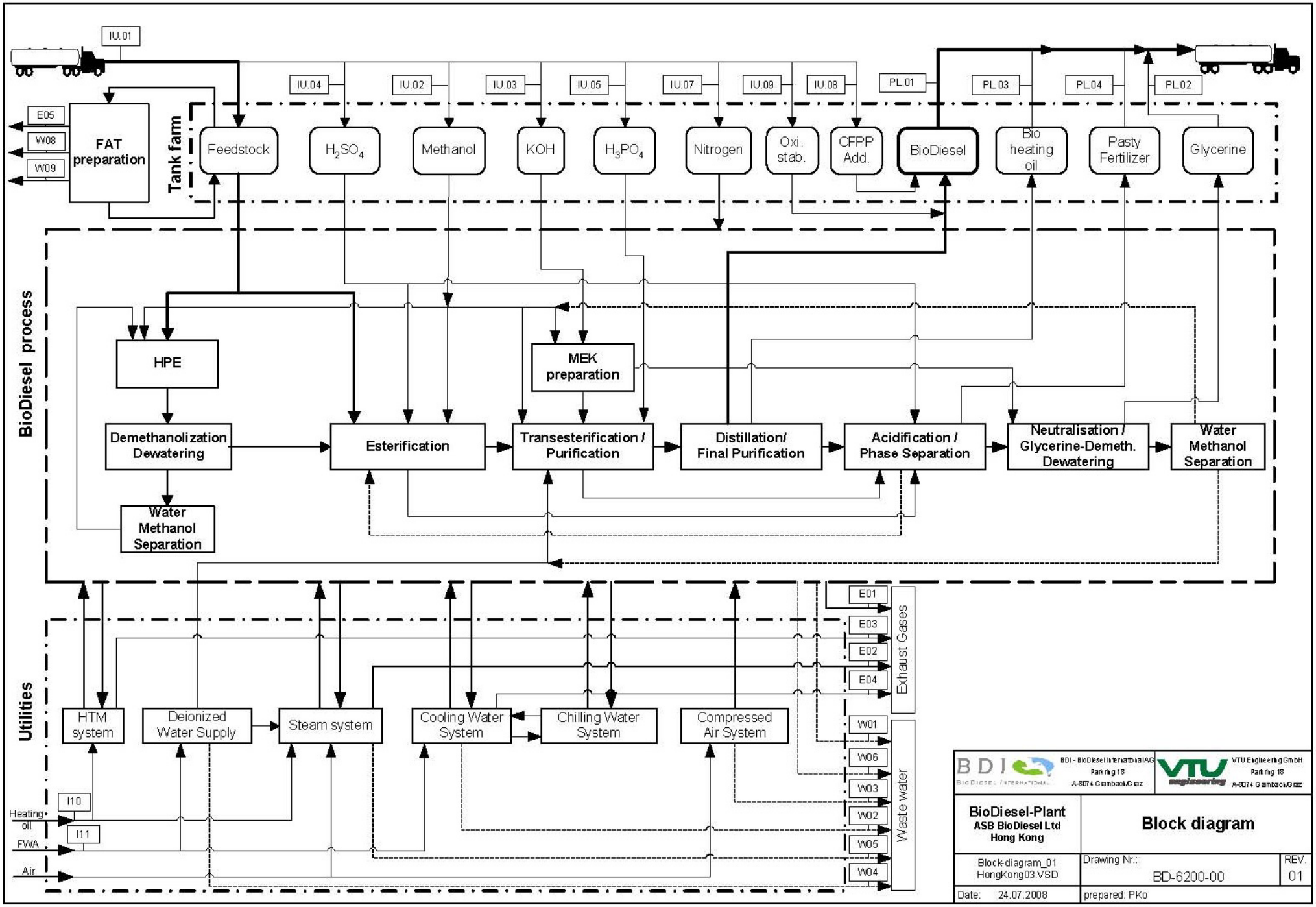
Exercise and drill shall be undertaken in a regular frequency to test the adequacy and effectiveness of this plan in controlled conditions if necessary, and allow the responsible staff to familiarize this plan.

4.2 REVISION

ASB will update this plan if necessary after consultation with the Engineering Department, the Maintenance Department, the Production Department or Senior Management of the Company. Also, the advices from or problems encountered from these departments will be taken into consideration and updated in this plan.

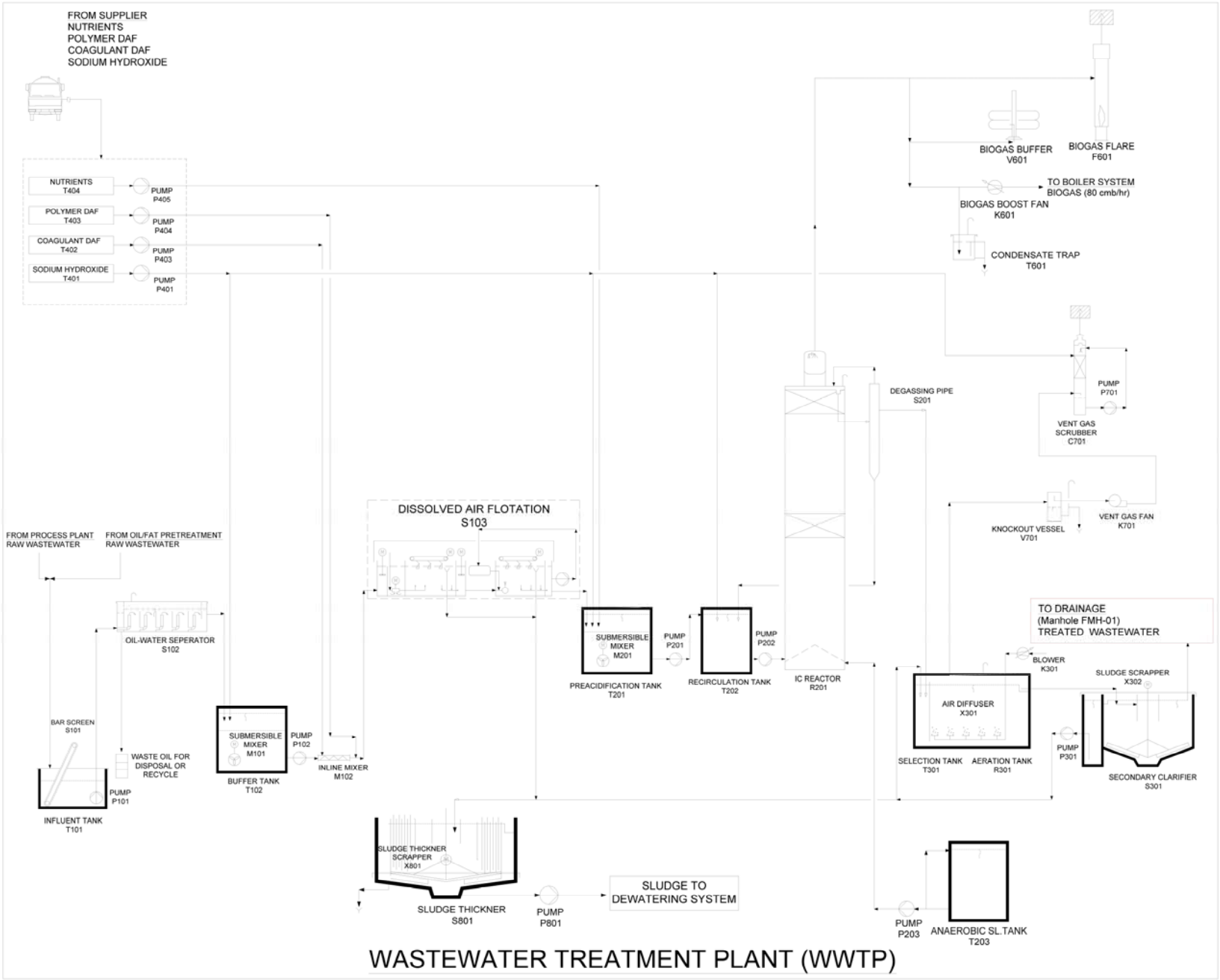
Appendix A

Biodiesel Production Process


IU.01
IU.04
IU.02
IU.03
IU.05
IU.07
IU.09
IU.08
PL.01
PL.03
PL.04
PL.02
E05
W08
W09
FAT preparation
Tank farm
Feedstock
H_2SO_4
Methanol
KOH
H_3PO_4
Nitrogen
Oxi. stab.
CFPP Add.
BioDiesel
Bio heating oil
Pasty Fertilizer
Glycerine
BioDiesel process
HPE
MEK preparation
Demethanolization Dewatering
Esterification
Transesterification / Purification
Distillation/ Final Purification
Acidification / Phase Separation
Neutralisation / Glycerine-Demeth. Dewatering
Water Methanol Separation
Water Methanol Separation
Utilities
HTM system
Deionized Water Supply
Steam system
Cooling Water System
Chilling Water System
Compressed Air System
E01
E03
E02
E04
Exhaust Gases
W01
W06
W03
W02
W05
W04
Waste water
I10
I11
Heating oil
FWA
Air
BDI - BioDiesel International AG
Parkring 18
A-8074 Grambach/Graz
VTU Engineering GmbH
Parkring 18
A-8074 Grambach/Graz
BioDiesel-Plant
ASB BioDiesel Ltd
Hong Kong
Block diagram
Block-diagram_01
HongKong03.VSD
Drawing Nr.:
BD-6200-00
REV.
01
Date: 24.07.2008
prepared: PKo

Appendix B

Wastewater Treatment Process



WASTEWATER TREATMENT PLANT (WWTP)

B. D. REF. NO. BD 2/3090/08 (P)
F.S.D. REF. NO. FP 8/28984

NOTES
DO NOT SCALE DRAWING. FIGURED DIMENSIONS ARE TO BE FOLLOWED
READ THIS DRAWING IN CONNECTION WITH GENERAL ARCHITECTURAL PLANS, STRUCTURAL PLANS, AND OTHER RELATED DRAWINGS. THE ARCHITECT SHALL BE NOTIFIED IMMEDIATELY OF ANY DISCREPANCY FOUND THEREIN.

REVISIONS

No	DATE	REMARKS
1	3/7/2013	WPCO License Application Supplement Document

CLIENT :
ASB BIODIESEL (HONG KONG) LIMITED
Office units 2607-2609, 26th Floor, Prosperity Millennia Plaza, 663 King's Road, North Point, Hong Kong TEL: (852) 3741 1640 FAX: (852) 3741 1661

PROJECT MANAGER :
AECOM
8F, Tower 2, Grand Central Plaza, 138 Shatin Rural Committee Road, Shatin, N.T., Hong Kong Tel: 852 3922 9000 Fax: 852 2691 2649 www.aecom.com

ENVIRONMENTAL CONSULTANT :
CINOTECH
Rm 1710, Technology Park, 18 On Lai Street, Shatin, New Territories, Hong Kong Tel: 852 2151 2083 Fax: 852 3107 1388

PROJECT :
Proposed Biodiesel Plant at T.K.O.T. Lot No. 39 S.Q ss.1, ss.2 and the Ext. Thereto, Chun Wang Street, Tseung Kwan O Ind. Estate, Tseung Kwan O, N.T.

TITLE :
Schematic Flow Diagram for Wastewater Treatment Plant

STAMP OF APPROVAL :

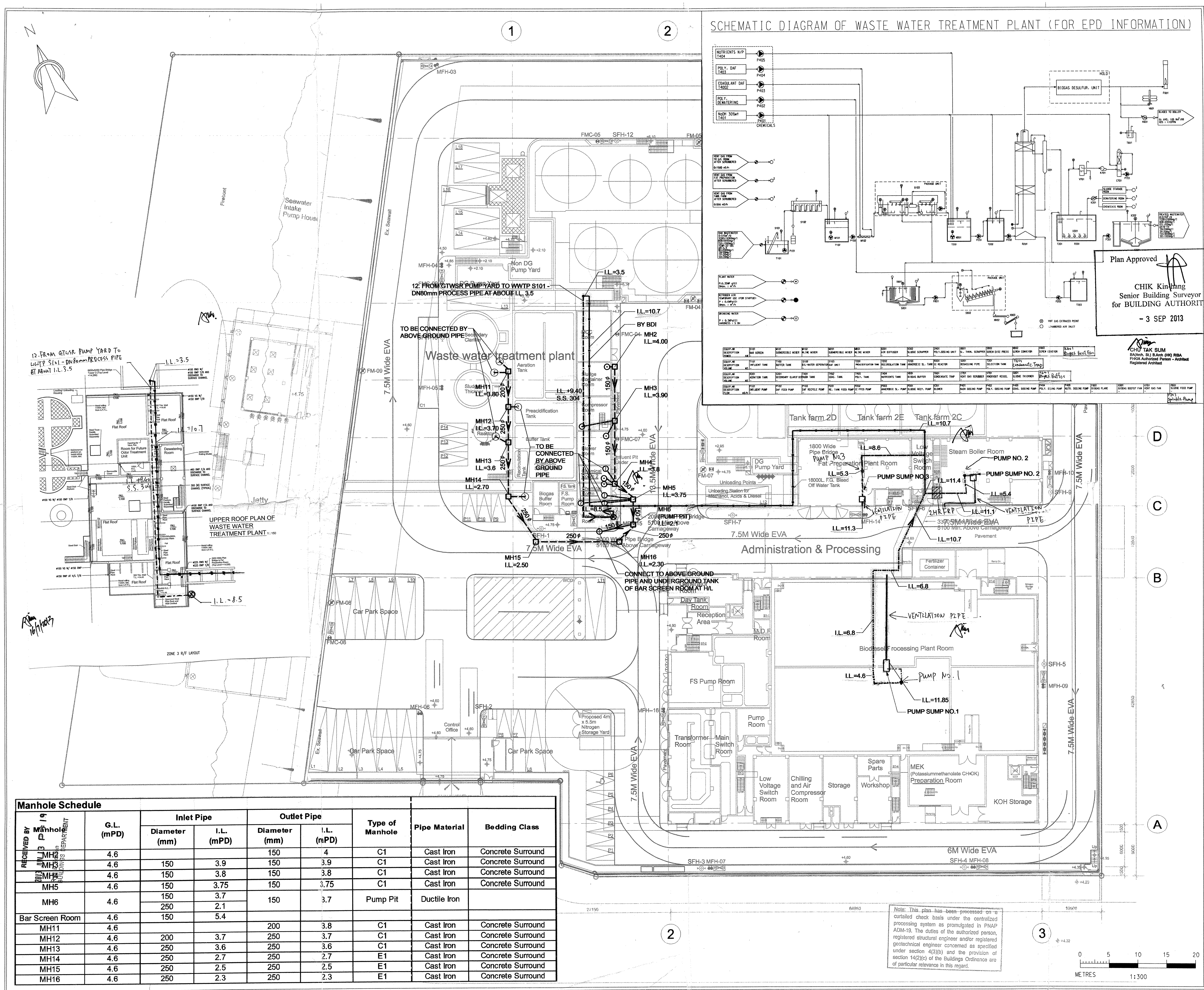
DATE :	SCALE :
July 2013	N.T.S.
DRAWN BY :	CHECKED BY :
K.Chan	S.Har

DRAWING NO.
EPD_WPCO_001

JOB NO.

Appendix C

Foul Drainage System



Manhole Schedule

Manhole	G.L. (mPD)	Inlet Pipe Diameter (mm)	Inlet Pipe I.L. (mPD)	Outlet Pipe Diameter (mm)	Outlet Pipe I.L. (mPD)	Type of Manhole	Pipe Material	Bedding Class
MH2	4.6			150	4	C1	Cast Iron	Concrete Surround
MH3	4.6	150	3.9	150	3.9	C1	Cast Iron	Concrete Surround
MH4	4.6	150	3.8	150	3.8	C1	Cast Iron	Concrete Surround
MH5	4.6	150	3.75	150	3.75	C1	Cast Iron	Concrete Surround
MH6	4.6	150	3.7	150	3.7	Pump Pit	Ductile Iron	
		250	2.1					
Bar Screen Room	4.6	150	5.4					
MH11	4.6			200	3.8	C1	Cast Iron	Concrete Surround
MH12	4.6	200	3.7	250	3.7	C1	Cast Iron	Concrete Surround
MH13	4.6	250	3.6	250	3.6	C1	Cast Iron	Concrete Surround
MH14	4.6	250	2.7	250	2.7	E1	Cast Iron	Concrete Surround
MH15	4.6	250	2.5	250	2.5	E1	Cast Iron	Concrete Surround
MH16	4.6	250	2.3	250	2.3	E1	Cast Iron	Concrete Surround

RECEIVED BY 2013 JUN 13 P 5:19 BUILDINGS DEPARTMENT

B.D. REF NO.
F.S.D. REF NO.

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.
2. ALL LEVEL ARE IN METER PRINCIPLE DATUM (mPD).
3. PUMP WITH CAPACITY OF 10L/S SHALL BE PROVIDED.
4. VENTILATION PIPE TERMINATED AT 2500mm AFFL.

LEGEND:
- PROPOSED SEWERAGE MANHOLE
- PROPOSED 150 DIA. UNDERGROUND D.I. PIPE
- PROPOSED 150 DIA. UNDERGROUND CAST IRON PIPE
- PROPOSED 100 DIA. UNDERGROUND CAST IRON PIPE
- DN65, STAINLESS STEEL 1.4301
- DN32, STAINLESS STEEL 1.4301
- DN40, STAINLESS STEEL 1.4301
- DN100, STAINLESS STEEL 1.4301
- DN80, STAINLESS STEEL 304
- PROPOSED PUMP
- PROPOSED DOWNPIPE
- PROPOSED OTG
- PIPE BREAK POINT

COLOUR CODE:
PURPLE - INDUSTRIAL WASTE
VENTILATION PIPE

Rev.	Description of Revision	Date	Ckd.
A	GENERAL REVISION	JAN 13	BL
B	GENERAL REVISION	JUN 13	BL

THE WORKS SHOWN ON THESE PLANS ARE TYPE II WORKS Drainage (Std. & Ext. Sewage) IN RESPECT OF WHICH THE BUILDING AUTHORITY'S CONSENT IS APPLIED FOR

Client
ASB BIODIESEL (HONG KONG) LIMITED

Civil and Structural Engineer
JACOBS

Architect and Authorized Person
T.S. CHU ARCHITECTS LTD.

Building Services Engineer
CSA (M&E) Limited Consulting Engineers

Biodiesel Processing Designer
BDI BioDiesel International

Waste Water Treatment Designer
PAQUES

Contractor
CHINA HARBOUR ENGINEERING CO. LTD

Drainage Works Designer
MANNINGS (Asia) Consultants Limited

Project
PROPOSED BIODIESEL PLANT AT T.K.O.T. LOT No. 39 S.Q ss.1, ss.2 & EXT. THERETO CHUN WANG STREET, TSEUNG KWAN O IND. ESTATE, KLN.

Title
DRAINAGE LAYOUT PLAN

Drawing No.	Revision
F1005/DR/001 B. D.	B

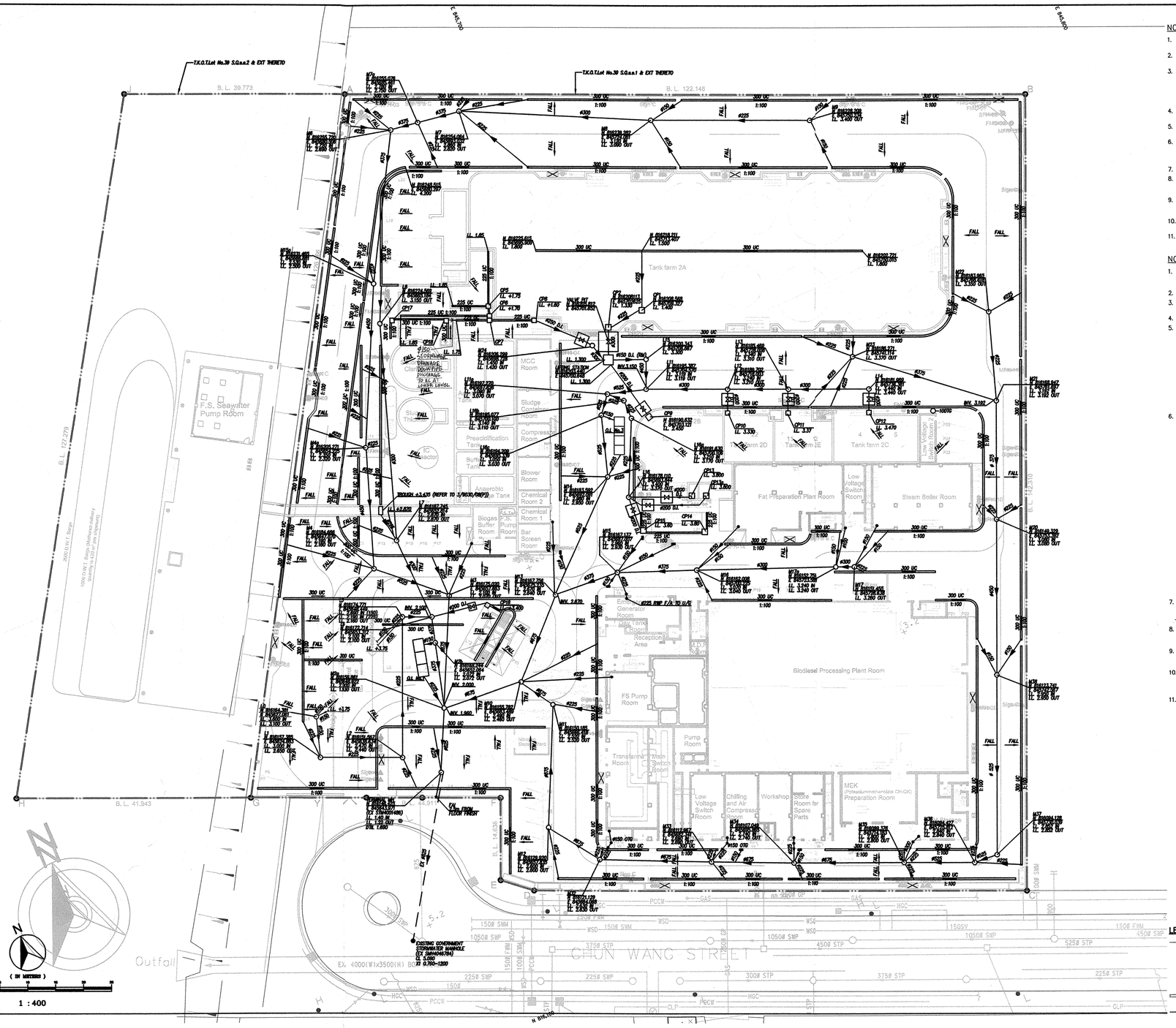
K:#F1005 - Biodiesel Drainage#ustation#DR-001B.dgn

Appendix D

Storm Water Drainage System

4/9030/08(P) (Pt. II) 1 (5) Set II

B.D. REF. NO.
F.S.D. REF. NO. 4/9030/08 (P)



RECEIVED BY
13 JUN 3 P 3:20
R & D Section
BUILDING DEPARTMENT

L:\ADS\3001 HK Biodiesel TKO\E\Working\Drainage\5th Amendment\D-3001-E-3500.dwg

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM.
2. ALL PRECAST CONCRETE PIPES AND FITTING SHALL COMPLY WITH BS5911 : PART 100.
3. ALL PRECAST CONCRETE PIPES AND FITTINGS SHALL HAVE FLEXIBLE JOINTS OF SPIGOTS AND SOCKET OR REBATED TYPE. THEY SHALL BE DESIGNED TO INCORPORATE AN ELASTOMETRIC RING COMPLYING WITH TYPE D OF BS2494. THE TEST FOR JOINT SHALL COMPLY WITH BS5911 : PART 100 & GENERAL SPECIFICATION FOR CIVIL ENGINEERING WORKS.
4. DIRECTION CHANGE OF CONCRETE PIPELINES SHALL BE MADE AT MANHOLE ONLY.
5. MANHOLE COVERS AND FRAMES WITHIN THE CARRIAGEWAY AND PROPOSED FOOTPATH SHALL BE HEAVY DUTY TYPE UNLESS OTHERWISE INDICATED.
6. ALL DI PIPES AND FITTING SHALL COMPLY WITH BS EN545 & GENERAL SPECIFICATION FOR CIVIL ENGINEERING WORKS. PIPES AND FITTINGS SHALL BE LINED INTERNALLY WITH CEMENT MORTAR AND SHALL BE COATED EXTERNALLY WITH BITUMINOUS COATING.
7. CONCRETE PIPE CLASS (L, M & H) SHOULD REFER TO BS 5911 : PART 100.
8. THE JUNCTION OF A SINGLE BRANCH DRAIN WITH ANOTHER DRAIN AT AN ANGLE OF NOT MORE THAT 45° IN THE DIRECTION OF FLOW MAY BE MADE BY MEANS OF A PURPOSE-MADE PRECAST Y-JUNCTION.
9. GROUND SURFACE PAVING SHALL BE LAID TO FALL AT A GRADIENT OF NOT LESS THAN 1 IN 80 TO A GULLY TRAP OR DRAINAGE CHANNELS CONNECTED TO A SURFACE WATER DRAIN.
10. ENLARGED PLANS AND DETAILS FOR OIL INTERCEPTORS SHOULD REFER TO DRAWING No.D/3001/E/3504.
11. ENLARGED PLANS AND DETAILS FOR LIFTING STATION SHOULD REFER TO DRAWING No.D/3001/E/3504.

NOTES FOR MANHOLE :

1. CONCRETE GRADE :
   40D/20 FOR STRUCTURAL CONCRETE.
   10/20 FOR BLINDING & MASS CONCRETE.
2. ALL GALVANIZED STEEL ITEMS TO BE HOT-DIPPED.
3. MINIMUM COVER TO OUTERMOST REINFORCEMENT TO BE 40mm UNLESS OTHERWISE STATED.
4. RADII AND BENDS FOR REINFORCEMENT TO BE IN ACCORDANCE WITH BS4466.
5. BAR REFERENCING :
   EXAMPLE : 16T32-01-200 ABBRE
   NUMBER OF BARS 16
   TYPE OF STEEL T (REFER TO NOTES 8 & 9)
   DIAMETER OF BARS 32mm.
   MARK NO. (IF REQUIRED) 01
   PITCH OF BARS (IF APPLICABLE) 200mm
   ABBREVIATIONS MAY BE ADDED TO THE STRING:
   B BARS IN BOTTOM OF SLAB
   B1 FIRST LAYER OF BOTTOM REINFORCEMENT
   B2 SECOND LAYER OF BOTTOM REINFORCEMENT (ABOVE B1 LAYER)
   T BARS IN TOP OF SLAB
   T1 FIRST LAYER OF TOP REINFORCEMENT
   T2 SECOND LAYER OF TOP REINFORCEMENT (BELOW T1 LAYER)
6. UNLESS OTHERWISE STATED, ANCHORAGE BOND LENGTHS AND LAP LENGTHS OF REINFORCEMENT SHALL AS BE FOLLOWS:-

CONCRETE GRADE	ANCHORAGE BOND LENGTHS & LAP LENGTHS (MULTIPLES OF BAR DIAMETER)	
	MILD STEEL	HIGH YIELD STEEL
40D/20	31	32

NOTES:-
(A) i) TENSION LAP LENGTHS (DENOTED BY T.L.L.) SHALL BE AT LEAST TO THE ANCHORAGE BOND LENGTH.
ii) WHERE A LAP OCCURS AT THE TOP OF A SECTION AS CAST AND THE MINIMUM COVER IS LESS THAN TWICE THE SIZE OF THE LAPPED REINFORCEMENT, THE REQUIRED LAP LENGTH SHOULD BE MULTIPLIED BY A FACTOR OF 1.4.
iii) WHERE A LAP OCCURS AT THE CORNER OF A SECTION AND THE MINIMUM COVER TO EITHER FACE IS LESS THAN TWICE THE SIZE OF THE LAPPED REINFORCEMENT OR WHERE THE DISTANCE BETWEEN ADJACENT LAPS IS LESS THAN 75mm OR SIX TIMES THE SIZE OF THE LAPPED REINFORCEMENT, WHICHEVER IS THE GREATER, THE REQUIRED LAP LENGTH SHOULD BE MULTIPLIED BY A FACTOR OF 1.4.
iv) IN CASES WHERE BOTH CONDITIONS (ii) AND (iii) APPLY, THE REQUIRED LAP LENGTH SHOULD BE MULTIPLIED BY A FACTOR OF 2.0.
(B) i) NOMINAL LAP FOR DISTRIBUTION BARS SHALL BE 300.
(C) i) LAP LENGTH FOR UNEQUAL SIZE BARS SHALL BE BASED UPON THE SMALLER BAR.

7. ALL CONCRETE WORKS SHALL COMPLY WITH THE CODE OF PRACTICE FOR STRUCTURAL USE OF CONCRETE 2004. ~~RECOMMENDATIONS OF BRITISH STANDARD CODE OF PRACTICE BS3810 THE STRUCTURAL USE OF CONCRETE 1997.~~ 2nd Ed.
8. ALL REINFORCEMENT DENOTED BY MARK R INDICATED PLAIN ROUND BARS TO COMPLY WITH CS2:1995 WITH A CHARACTERISTIC STRENGTH OF 250N/mm².
9. ALL REINFORCEMENT DENOTED BY MARK T INDICATES HOT ROLLED DEFORMED BARS TO COMPLY WITH CS2:1995 WITH A CHARACTERISTIC STRENGTH OF 460N/mm².
10. UNLESS OTHERWISE STATED, ALL CONCRETE SHALL BE DESIGN MIX 40D/20 CONCRETE AND THE GRADE DESIGNATIONS GIVEN ARE THE CHARACTERISTIC CUBE STRENGTH AT 28 DAYS AND THE MAXIMUM AGGREGATE SIZE.
11. THE REACTIVE ALKALI OF CONCRETE EXPRESSED AS THE EQUIVALENT SODIUM OXIDE PER CUBIC METER OF CONCRETE SHOULD NOT EXCEED 3.0 KG WHEN DETERMINED IN ACCORDANCE WITH PNAP 180.

12. MINIMUM GRADIENT FOR PIPES

PIPE DIAMETERS (mm)	GRADIENT
225	1 IN 100
250	1 IN 100
300	1 IN 150
375	1 IN 180
450	1 IN 216
600	1 IN 324
675	1 IN 324
825	1 IN 400

13. DESIGN OF OIL INTERCEPTOR SHALL COMPLY WITH ENVIRONMENTAL PROTECTION DEPARTMENT'S STANDARD.
14. ALL GATE VALVES SHALL BE "CLOSED" AT ALL TIME IN SPITE OF DURING A STORM EVENT. ALL SURFACE RUN-OFF SHALL BE RETAINED INSIDE THE BUNDS. OPERATOR WILL INSPECT THE RETAINED SURFACE RUN-OFF QUALITY PRIOR TO "OPEN" THE VALVES. SUCH OPERATION PROCEDURES SHALL COMPLY WITH THE APPROVED ENVIRONMENTAL IMPACT ASSESSMENT REPORT (REGISTER No. AEIAR-131/2009).
15. THE UPSTREAM INVERT LEVEL OF ALL U-CHANNEL IS 4.3mPD UNLESS OTHERWISE STATED.
16. ALL DRAINAGE U-CHANNEL SHALL BE 300mm WIDTH WITH FALL 1:100 UNLESS OTHERWISE STATED.
17. ALL BRANCH PIPES CONNECTED BETWEEN U-CHANNEL AND MANHOLE SHALL BE 225 DIAMETER CAST IRON PIPE WHICH COMPLY WITH BS437, WITH FLEXIBLE JOINTS TO BS EN887.
18. ALL GULLY PIPE SHALL BE 150mm DIAMETER CAST IRON PIPE WHICH COMPLY WITH BS437, WITH FLEXIBLE JOINTS TO BS EN887.

Plan Approved
CHIK Kin-hang
Senior Building Surveyor
for BUILDING AUTHORITY
- 3 SEP 2013

Note: This plan has been processed on a curtailed check basis under the centralized processing system as promulgated in PNAP ADM-19. The duties of the authorized person, registered structural engineer and/or registered geotechnical engineer concerned as specified under section 4(3)(b) and the provision of section 14(2)(c) of the Buildings Ordinance are of particular relevance in this regard.

LEGEND :

- SITE BOUNDARY
- CATCH PIT
- GULLY (STANDARD HIGHWAY'S DEPARTMENT)
- DRAINAGE MANHOLE
- 300 UC — U-CHANNEL (WITH SIZE AS INDICATED)
- ø300 — STORMWATER DRAINAGE PIPE (WITH DIAMETER AS INDICATED)
- +4.60 — PROPOSED FINISH GROUND LEVEL
- ø150(RM) — RISING MAIN (PN16)
- OIL INTERCEPTOR (WITH 3 COMPARTMENT)
- GATE VALVE PIT

"Statement II : The works shown on these plans are Type II works (External Drainage) in respect of which consent is applied for the purpose of Fast Track consent application under regulation 33 of the Building (Administration) Regulations."

Rev	Revision Date	Purpose of revision	Drawn	Checked	Approved
5	7 JUN 2013	FINAL AMENDMENT TO BD	CCK	CKY	CTS
4	28 JAN 2013	4TH AMENDMENT TO BD	CCK	CKY	CTS
3	27 JUL 2012	3RD AMENDMENT TO BD	-	-	-
2	31 MAR 2011	2ND AMENDMENT TO BD	-	-	-
1	29 OCT 2010	1ST AMENDMENT TO BD	-	-	-
0A	17 FEB 2009	AMENDED TO BD APPROVAL	-	-	-
0	21 JUL 2009	1ST SUBMISSION	-	-	-

Client
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CHU TAK SUM
BA(Arch. St.) B.Arch (HK) RIBA
R100A Authorized Person - Architect
Registered Architect

Building Services Engineer
CSA (M&E) Limited
Consulting Engineers
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Biodiesel Processing Designer
BDI BIODIESEL INTERNATIONAL

Waste Water Treatment Designer
Natural Solutions PAQUES

Project
Proposed Biodiesel Plant at
T.K.O.T. Lot No. 39 S.Q ss.1, ss.2 and Ext. thereto
Chun Wang Street, Tseung Kwan O Ind. Estate, Kln.

Drawing title
STORM WATER DRAINAGE LAYOUT PLAN

Drawing status
BD SUBMISSION

Scale	AS SHOWN	Do not scale
Job no.		
Client no.		

Drawing number
D/3001/E/3500 B.D.
Rev 5

Appendix E

Emergency Contact List

Emergency Contact List

Emergency Response Team

Name	Title	Office no.	Mobile no.
Sylvia HAR	Engineering Manager	3183 4206	9479 0949
Albert KWAN	Maintenance Manager	3183 4209	9313 6012
Martin HUI	Production Manager	TBA	9866 6333
Stanley KO	Shift Supervisor	TBA	6013 4562
H. TAKEUCHI	Shift Supervisor	TBA	9028 0689
Victor WANG	Production Supervisor	TBA	9653 3721

ASB Biodiesel (Hong Kong) Limited

Name	Title	Office no.	Contact no.
Roberto Vazquez Lucerga	Chief Technology Officer	3183 4222	6903 3478
Eddie WONG	Plant Manager	3183 4228	9091 1567
Rebecca LAU	Laboratory Manager	3183 4207	9272 0795
Matthew TSE	EHS Officer	3183 4205	9409 0630

Government Authorities/Organizations

Name	Contact no.
Emergency	999
Hong Kong Police, Tseung Kwan O Station	2623 9041
Marine Police Harbour Division	2884 9242
Fire Services Department, Tai Chik Sha Fire Station	2723 8787
Drainage Services Department	2877 0660
Electrical and Mechanical Services Department	2333 3762
Environmental Protection Department	2838 3111
Tseung Kwan O Hospital	2208 0111
Ecospace Limited (Chemical Waste Treatment Facility)	2434 6490