Attachment D

Infrastructure and Operation

D.1 Operational Information Requirements

Infrastructure

Drawing No 001 Site layout Plan shows the proposed layout of the facility including the entire site infrastructure.

Site Security

Site security arrangements are in accordance with the Department of Agriculture food and the Marine specifications as set out in Appendix1 of "*Conditions for Approval and Operation of Biogas Plants Treating Animal By Products in Ireland*".

Design of Roads

Access Road to the facility is via an existing farm road from the L-4021-0. The access road is constructed in accordance with the Department of Agriculture food and the Marine specifications S127 "Minimum Specification for Gravel Roads "

Design of Hard Standing

Hard Standing areas at Reception and Outloading Areas are indicated on Site Layout Plans 001, 002 and 003 with the drainage layout indicated. The hard standing areas are defined as "Dirty, "Process" and "Clean" areas as required by the Animal by-Products regulations implemented by the Department of Agriculture. Design and construction will be in accordance with the Department of Agriculture, Food and the Marine specifications S129 "Minimum Specification for Farmyard Drainage, Concrete Yards and Roads".

Plant

Weigh Bridge

A Weighbridge is located near the entrance to the facility all vehicles entering the facility will pass over the weighbridge.

Materials Handler

Mobile materials handling equipment is maintained on the facility for outloading solid material to bulk road vehicles

Wheel Wash

Vehicles delivering waste will have travelled significant distances on paved roads and will not require wheel cleaning on entry to the facility.

Wheel washing equipment will consist of high pressure power hose permanently fixed within the reception building at the reception tank. The layout of the kerbing and reception area will be in accordance with Drawing No 030 attachment, in accordance with ABP regulations.

Laboratory Facilities

A laboratory will not be provided on site.

Design and Location of Fuel Storage Areas

The facility materials handler requires diesel fuel; it is intended to fill the vehicle as required from local fuel suppliers to eliminate pilferage. To instigate the Biogas process, a tank of LPG will be maintained on the site.

Waste Quarantine Area

Waste quarantine area is located at the South East corner of the reception building.

Waste Inspection

Waste Inspection is carried out at the weighbridge to the following procedure

When waste enters the site:

1. If it's a new customer:
1.1. Fill out and file a feedstock acceptance form and if appropriate obtain MSDS or CoA for the new feedstock.
1.2. Check that material can be taken in under our license and ABP Regulations
1.2.1. Category 2: Manure, Digestive tract content separated by the digestive tract, Milk and colostrums.
1.2.2. Category 3 Catering waste - meaning all waste food including used cooking oil originating in restaurants, catering facilities and kitchens, including central kitchens and household kitchens.
1.3. Assign EWC code to waste type
2. Check that load is covered and sealed
3. Weigh in the load and visually check that the waste conforms to the feedstock acceptance form for that supplier. Record inspection in the Batch/Process Log
4. If waste is not in conformity with permitted feed-stocks or is overly contaminated, reject the load, fill in the load reject log and direct the supplier to another licensed facility.
5. Otherwise accept the load and direct it to the tipping area within the processing building.
6. Fill in a unique weigh bridge docket for each load
7. Tip the load inside the processing building
7.1. If waste is not acceptable, reject the load, reload it, fill in the load reject log and clean the tipping area and loader, note in cleaning & maintenance log
7.2. If acceptable, process as soon as possible
8. Clean delivery vehicles, containers and wheels with power washer and have operator sign off on this
9. Weigh out the load and complete the weigh bridge docket
10. Fill in and complete the Raw Material Intake Log and have driver sign it

Traffic Control

The EIS submitted in support of the application describes the Traffic and Traffic Control in Section 5.

All Services

The EIS submitted in support of the application describes the services in section 4. The layout of the services are indicated on Drawing No 001

Sewage and Surface Water Infrastructure

Section 3.2.2 of the accompanying EIS details the surface water infrastructure including an Integrated Constructed Wetlands.

Plant Sheds Garage and Equipment Compound

The structures and infrastructure on the facility are described in the accompanying EIS section 3.4

Site Accommodation

Office and Toilet facilities are incorporated in the reception building indicated on Drawing No 018 in the appendix to the EIS

Fire Control

The manure storage basins are at the lowest point of the facility, the upper sheet of the basin floats on the contained digestate, in the event of a fire incident, fire water would be directed to the top sheet of the basin for containment.

Civic Amenity

The facility does not provide a civic amenity

Any other waste recovery infrastructure

Details of the infrastructure are described in Section Of the Supporting EIS

Description of Incineration infrastructure

Not applicable

Details of any other infrastructure

Details of the other infrastructure associated with the plant including Integrated Constructed Wetlands is described in section 3.2.2 of the Environmental Impact Statement.

Facility Operation

(Read in connection with Drawing No 029)

Reception and Pre-mixing

The first stage of the Biomass Process is the reception of the biomasses. The imported biomass will be delivered to the facility by a tipping container (hook lift skip or tipping lorry). The load on arrival at the facility is weighed over the onsite weigh bridge, enters the reception building and is tipped into the reception hopper **(TK00 – Drawing No 029)**. The weight and the estimated dry-matter content dictate the quantity of pig manure to add to the reception tank to make the biomass pump-able. The imported biomass mixed with pig manure will then be agitated and pumped into the mix tanks.

There will be 3 further vertical liquid material tanks **(PK03, 04, 05 – Drawing No 029)** located adjacent to the premix tanks which will enable the facility to accept biomass such as glycerine, soya and alcohols. These materials will be delivered in road tankers which will be received by the same route as semi-solid biomass, and will be pumped directly to the storage tanks via flexible pipe-work from the road vehicle coupled to permanent pipe-work associated with the tanks.

The vehicle importing the biomass, once emptied, will be washed with an approved detergent or steam, while at the reception tank using a high pressure washer. This will generate 1.7 M3 /Day which will be diverted to the adjacent mixing tank. The vehicle would then return over the weigh bridge to leave the facility, with the required documentation in compliance with Animal By-Product and Environmental Legislation. The reception area within the Biogas Facility will be segregated from the process and maturation area of the facility by an enclosing fence.

The reception tank and vehicle unloading point will all be incorporated in a Portal Frame Building; the vast majority of the vehicles importing biomass to the facility will be capable of discharging its load within the building. In very exceptional circumstances the delivery vehicle may not be capable of tipping inside the building; in this circumstance a second tipping apron will allow the rear of the vehicle inside of the building for discharging. The Apron is sloped into the reception tank as shown on **Drawing No 018, 019 and 030.**

The biomass from both sources is mixed in the reception tank so that the material is in a pump-able condition in the reception tank for transfer to the mix tank.

The mix tank **(TK01 - Drawing No 029)** is a 1500m3 insulated covered tank with a heating coil system so that the material mix is homogenised. This has a number of benefits, it prevents shock loading on the digester from feed-stock; some gas will be produced in this tank in the mixing process by faster breaking down biomasses which will be collected for use in the CHP unit. The homogenised biomass is transferred on a batch basis to the Pasteuriser

every 3-4 hours transferring approximately 20m3 per batch to a 40m3 batch heating tank **(HK01 - Drawing No 029).**

Pasteurisation

The pasteuriser controller calls up for a batch of digestate to be pumped into the pasteuriser **(PK03 – Drawing No 029).** The high level probe on the pasteuriser tank sends a signal that the required batch contents have been supplied and stops the pump supplying further digestate. The agitator within the pasteuriser tank keeps the digested biomass in constant motion in the pasteuriser tank; the temperature probes within the tank continuously monitor the temperature of the biomass within the pasteuriser. Once the temperature probes within the pasteuriser indicate that all 3 temperature probes are at 70 degrees or greater, the time-temperature recording for the batch begins. The agitation of the biomass within the tank achieves a homogenous heating of the biomass within the pasteuriser.
When the controller has received a signal that the temperature has been maintained for an hour, the batch of pasteurised digestate is transferred to the buffer tank **(PK04 – Drawing No 029)**.The content of the buffer tank is pumped through a heat exchanger simultaneously with the next batch of digestate being called up for the pasteurisation tank. This creates a heat transfer from the pasteurised batch to the next batch for pasteurising being pumped to the pasteurising tank, this reduces the amount of heat required to be applied in the pasteurising tank and also cools the pasteurised product going for treatment.

The pipe routing arrangement from the pasteuriser to the digester is an un-avoidable system where all biomass must go through the pasteuriser.

The air that is displaced while transferring biomass from the pasteuriser **(PK03 – Drawing No 029)** to the buffer tank **(PK04 – Drawing No 029)** or from the secondary digester to the pasteuriser, is vented to the engine CHP unit (combined heat and power system) where it produces electricity and heat from the biogas.

The temperature probes are sufficiently long; therefore they will not be in contact with the body of the pasteurising unit.

Primary Digestion

The Primary Digester **(DK01)** is the centre of the biogas producing process. The Digester tank proposed for Timoleague Agri gen Ltd is a 3500m3 steel, vertical, digester tank with 150mm insulation and PVC coated cladding surrounding the tank. The digester will operate at between 50 and 55 degrees Celsius - Thermophilic process. The external dimensions of the tank will be 15.0m diameter and 18.7m high. Internally the tank has a central roof mounted vertical shaft agitator. The tank will have 17 flanges of various sizes for the agitator, access, level, temperature and pressure probes. **Drawing No 013** has the schedule of the size, use and location of the apertures. The digester tank will have internal heating coils. It is intended to heat the biomass to the required temperature in the Batch heating chamber **(HK01 – Drawing**

No 029) and the Pasteuriser **(PK03 – Drawing No 029)** prior to discharge into the digester **(DK01 – Drawing No 029).** The calculated retention time for yielding gas is 20 days. A batch quantity will have to discharge from the primary digester **(PK02 – Drawing No 029)** to the secondary digester **(DK02 – Drawing No 029)**, to create the capacity within the primary digester for the new batch in the pre-heating tank to be pumped in.

The gas recovered from primary and secondary digester, is passed through and series of condensate wells. The content of these wells is the condensate from the gas. This is collected and piped to the reception tank, so that this condensate is also pasteurised.

Secondary Digestion

The Secondary Digester **(DK02 – Drawing No 029)** is a sectional circular insulated concrete tank 30m diameter and 6m high, with a flexible roof to contain the gas ***(Drawing No 015).*** The tank will have a horizontally mounted agitator to maintain the biomass in suspension. The intended retention time is also approximately 20 days.

Separation

During Post Pasteurisation, the digestate is passed through a decanter separator where the solid fraction is separated from the liquid fraction. The liquid fraction is then stored in a geo-membrane lined covered storage basin for delivery to customer farms. The options for the fibrous portion are currently being investigated. A final decision will be made when all possibilities have been assessed to determine which the best practice for this proposed facility is and which has the best potential to generate income.

Final Storage

Final Storage is in the Geo-membrane Lined Storage Basins which have an abstraction point where digestate can be collected for delivery to customer farmers. In addition a supplementary separate storage system is planned by a customer farmer on his own property to provide additional 2,500 m3 of off-site storage to the 18,000 m3 on-site storage. This combined storage capacity in excess of 6 months storage for the entire process.

D.2 Additional requirements for waste activities

D.2.1 Wastes to be accepted

In addition to the pig manure produced on Martin O' Donovan's Pig Farm, it is proposed to import additional organic waste streams (i.e. Dairy Floating Sludge, Paunch Bovine, Paunch Pigs, Flotation Sludge, Fat Trap Waste, Fish Waste, Fruit Residuals, Vegetable Residuals, Draff via Beer production, Seaweed, Feed Mill Residuals and Bread), from local identified sources. It is planned to bring the total volume of organic material to be treated at the proposed Anaerobic Digester to 48,500 m3.

A estimate calculation of the volumes along with the nutrient content of both the liquid and fibrous digestate that will be produced on site as shown in Table 4. The liquid digestate will be recovered on lands whose owners who are currently customers for pig manure

Table 1: Digestate Production

DIGESTATE CALCULATIONS FOR TIMOLEAGUE AGRIGEN			
TYPE	**Volume**	**KGS N/M3**	**KGS P/M3**
	M3		
PIG MANURE	23000	4.2	0.8
DAIRY SLUDGE	11000	5.5	3.7
PAUNCH BOVINE	5000	5	1
PAUNCH PIGS	300	5	1
FLOTATION SLUDGE	1200	5.3	3.9
FAT TRAP WASTE	600	5	1
FISH WASTE	300	5.5	1.5
FRUIT RESIDUALS	300	4.3	1
VEGETABLE RESIDUALS	750	4.3	1
DRAFF VIA BEER PRODUCTION	750	4	0.05
SEAWEED	5000	5	0.4
FEED MILL RESIDUALS	200	4	0.05
BREAD	100	5	1
TOTALS	**48500.00**	**4.7**	**1.5**
VOLUME REDUCTION DUE TO GAS EXTRACTION @ 10%	**4850.00**		
ACTUAL VULUME DIGESTATE PRE SEPERATION	**43650.00**	**5.2**	**1.7**
PROPOSED SEPERATION PROCESS TO REMOVE MIN 70% P & 15% N WITH FIBRE			
TYPE	**ESTIMATED VOLUME M3**	**KGS N/M3**	**KGS P/M3**

PRESEPERATION	**43650.00**	**5.2**	**1.7**
LIQUID DIGESTATE	**39285.00**	**4.94**	**0.6**
FIBEROUS DIGESTATE	**4365.00**	**7.8**	**11.8**

LIQUID DIGESTATE FOR LAND APPLICATION AS FERTILIZER		
		TOTAL KGS
VOLUME M3	**39285.00**	
KGS P/M3	**0.6**	**21998.3**
KGS N/M3	**4.9**	**194161.3**

FIBEROUS DIGESTATE FOR USE OFF SITE		
		TOTAL KGS
VOLUME M3	**4365.00**	
KGS P/M3	**11.8**	**51329.3**
KGS N/M3	**7.8**	**34263.8**

D.2.2 Waste Acceptance Procedures

When waste enters the site:

1. If it's a new customer:
1.1. Fill out and file a feedstock acceptance form and if appropriate obtain MSDS or CoA for the new feedstock.
1.2. Check that material can be taken in under our license and ABP Regulations
1.2.1. Category 2: Manure, Digestive tract content separated by the digestive tract, Milk and colostrums.
1.2.2. Category 3 Catering waste - meaning all waste food including used cooking oil originating in restaurants, catering facilities and kitchens, including central kitchens and household kitchens.
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5. Otherwise accept the load and direct it to the tipping area within the processing building.
6. Fill in a unique weigh bridge docket for each load
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7.1. If waste is not acceptable, reject the load, reload it, fill in the load reject log and clean the tipping area and loader, note in cleaning & maintenance log
7.2. If acceptable, process as soon as possible
8. Clean delivery vehicles, containers and wheels with power washer and have operator sign off on this
9. Weigh out the load and complete the weigh bridge docket
10. Fill in and complete the Raw Material Intake Log and have driver sign it

D.2.3 Waste and material outputs from waste activities

Biogas is the ultimate waste product of the bacteria feeding off the input material feedstock and is mostly methane and carbon dioxide. This Biogas can be used for the production of electricity which may be sold to the national gridline, and for the production of heat which can be recycled back into the facility or utilised into a parallel project, (i.e. Horticulture Projects).

Fiber Digestate is the solid remnants of the original input material to the digesters that the microbes cannot use. Digestate discharged from the Anaerobic Digester can be fed into a separator which further separates the material into liquid and fibre.

With regards to Pig Manure, the objective of using Anaerobic Digestion is the substitute the manure with a product that has a low content of phosphorus for land application helping to control the risk of water pollution, and ensure compliance with the new Phosphorus regulations. Digestate can be separated in an Opti Press Liquid Solid Separator leaving the main part of the phosphor in the fibre and the main part of the N in the liquid.

The liquid can be supplied to nearby farms that need a product rich in available nitrogen utilising the nutrients. The fibre can be supplied to other external users as a compost substitute.

Biogas produced in the digester consists of 80% methane and 20% carbon dioxide. The methane fraction of the biogas can be used to generate electricity and heat which can be recycled back into the Digester facility or sold to the National Grid. The carbon dioxide fraction can be utilised into parallel projects e.g. Glasshouse projects.

D.2.4 Principles of self-sufficiency and proximity

The objective of the facility is to maximise the regional and national waste recovery capacity through the recovery of the resultant fertiliser products locally whilst also helping to achieve the regional and national waste recovery targets and to manage organic wastes in accordance with the Waste Hierarchy.

Traditionally, the pig manure arising from the pig farm has been supplied to neighbouring farms in a fertiliser substitution system, as is the paunch, dairy sludge and other organic materials to be treated in the proposed anaerobic digester. Grass and tillage are the predominant crops in South West Cork. In the main the slurry is spread in early spring replacing inorganic nitrogen and phosphorous fertilisers. Silage re-growth areas receive a top dressing in the June/ July period. The autumn application is generally combined with the farmers own bovine slurry. All applications are carried out in accordance with crop nutrient requirements as defined by the Nitrates Directive Regulations (S.I. 610 of 2010).

Clearly there is no shortage in demand within the Timoleague catchment for manure based fertilisers. Because of this and because of the advantages Digestate has over Raw Manure (i.e. the removal of carbon through the digestion of organic compounds results in the ionization of nutrients making these nutrients more readily available for crop uptake upon land-spreading and ultimately increasing crop yields), there should be no issues regarding the ability to distribute the digestate locally.