Attachment 7

Decommissioning Management Report

relating to a

Biogas Plant

at

Barryshall, Timoleague, Bandon, Co. Cork

by

Timoleague Agri Gen Ltd.

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1.0 Introduction

Timoleague Agri Gen Ltd, are applying to the Environmental Protection Agency for a Industrial Emissions Activity Licence in relation to a Biogas Plant at Barryshall, Timoleague, Bandon, Co. Cork.

A Closure Restoration and Aftercare Management Plan and an Environmental Liability Risk Assessment have been prepared.

This report addresses the Guidance on Assessing and Costing Environmental Liabilities 2014.

The activity to be carried out at the site falls under the First Schedule of the EPA Act 1992, as amended:

Table 1: Classification of the Activity under the First Schedule of the EPA Act 1992, as amended

Class No	Description
11.4	The use of Heat for the manufacture of fuel from waste

Table 2: Category of industrial activity referred to in Annex 1 of the Industrial Emissions Directive (2010/75/EU)

Category	Description
5.3 (b)	Recovery, or a mix of recovery and disposal, of non-hazardous waste with a capacity exceeding 75 tonnes per day involving one or more of the following activities, and excluding activities covered by Directive 91/271/EEC: (i) biological treatment; When the only waste treatment activity carried out is anaerobic digestion, the capacity threshold for this activity shall be 100 tonnes per day.

1.1 Operational Risk Assessment

An operational risk assessment has been carried out for the site in accordance with *Section 3.3 Risk Assessment*, of the Guidance on assessing and costing environmental liabilities 2014 on the site at Barryshall, Timoleague, Bandon, Co. Cork.

2.0 Closure, Restoration and Aftercare Management Plan

The aim of the Closure Plan is to provide criteria for a successful closure of the current use of the area and how these can be measured. The plan should address the known environmental liabilities such as plant and infrastructural removal. Monitoring undertaken demonstrates that there are no outstanding environmental issues with the site.

2.1 Facility Description

The site at Barryshall, Timoleague, Bandon, Co. Cork is owned by Mr. Colin Bateman, director of Timoleague Agri Gen Ltd. The development will occupy a landscaped site of approximately 3.67 hectares (9.07 acres)

Planning Permission was obtained on September 3rd 2013 to construct a biogas plant at the site, consisting of, 2 no Digester Tanks, 2 no Validation Tanks, 1 no Homogenising Tank, 3 no Geo-membrane lined manure storage tanks, 1 no Fibre Store, 1 no Feed Tank, Reception Building, Plant Building, Pasteurisation Tanks, Weighbridge and associated site works including an Integrated Constructed Wetland to produce renewable energy and fertiliser.

The company applied to the Environmental Protection Agency for an Industrial Emissions Activities Licence on November 6th, 2013.

It is planned to import 25,500 tonnes of organic material per annum to mix with 23,000 tonnes of pig manure to increase the efficiency of the proposed Anaerobic Digester.

Table 3: The Intended Feedstock for Processing

TYPE	Volume (TONNES)
Pig Manure	23,000
Seaweed	5,000
Dairy Flotation Sludge	11,000
Feedmill Residuals	200
Fruit residuals	300
Residuals from vegetables	750
Other slurry fish manufacturing	300
Paunch pigs	300
Paunch cows	5,000
Flotation sludge	1,200
Fat trap waste	600
Draff via Beer Production	750
Bread	100
TOTALS	**48,500**

The proposed facility provides storage on site in three geo-membrane lined storage basins, 4,500 m^3 capacity each. The secondary digester has a 4,300 m^3 capacity. The pre-mix tanks have 220 m^3 and 1,500 m^3 capacity respectively. In addition there are separate plans to provide additional 7,000 m^3 storage on customer farms. This is a total of 22,020 m^3 which is equivalent to 29 weeks output on site.

Facility Processes and Activities
(Read in connection with Drawing No 029 ***Attachment 2****)*

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 tonnes /Day which will be diverted to the adjacent mixing tank. The vehicle would then return over the weighbridge 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**.**

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 1,500m^3 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 20tonnes per batch to a 40tonnes 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.
The energy production from this proposed plant is detailed in the following table - *Table 4: Energy Production*
. The electricity produced will be sold to the grid. The excess heat will be sold to the proposed adjacent glass house. This proposed development has incorporated the most modern efficient and robust technologies to maximise green energy production. It is the intention of the promoters that this facility will set the standard for any future similar developments in this country.

Table 4: Energy Production

Biomass	Input amount in (t)	TS (t)	VS (t)	Production CH4 m3	raw Biogas	Output TS (t)
Total production in digester	48,500	6,743	5,739	2,478,661	3,786,318	3,482
In %		14%	12%		65%	7%
Added in storage	10%			247,866	378,632	
In total output	45,239			2,726,527	4,164,950	
Energy						
Input energy	27,101,682	kWh at	9.94	kWh/m3 CH4		
equal to	3,094	kW at	8,760	hours production		
Electricity						
Total production	9,783,707	kWh at	38%	Efficiency		
		and	5%	service time		
Average load	1,117	kW				
Heat						
Total production	11,382,706	kWh at	42%	Efficiency		
Process demand	3,948,385	kWh at	70	Deg C heating		
For utilisation	7,434,321	kWh	(849kW)			

An application is prepared for the ESB Networks to carry out a grid connection/capacity study to allow the facility to connect to the National Grid. This is expected to be processed in the next 3 months.

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 3,500m^3 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.
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 4,300m^3 sectional circular insulated concrete tank, 30m diameter and 6m high, with a flexible roof to contain the gas**.** The tank will have a horizontally mounted agitator to maintain the biomass in suspension. Like the primary digester, the intended gas 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 by NRGE Ltd. through a feasibility study. 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 for the liquid fraction of digestate is in the proposed 3 no 4,300m^3 Geo-membrane Lined Storage Basins**.** Since digested slurry must be properly stored and land applied afterwards, its management requires storage tanks to be loaded and unloaded with digested effluent. Thus, a traditional gas tight cover would not be sufficient as air must enter the tank in order to avoid the cover collapsing. The floating cover is floated over the digested liquid fraction surface so that it can move upwards and downwards jointly with the liquid level during loading and unloading operations.

All basins will be fitted with an abstraction point where liquid digestate can be collected for delivery to customer farmers.

The solid fraction of the digestate will be stored in the 3 no Fibre stores**.**
In addition a supplementary separate storage system is planned by a customer farmer on his own property to provide additional 2,500 m^3 of off-site storage to the 18,000 m^3 on-site storage. This combined storage capacity is in excess of 6 months storage for the entire process.

Biogas

Biogas production takes place in both of the Digester Tanks at the optimum temperatures and an oxygen free environment. In the vertical Primary Digester the operating temperature is 50 - 55^{O}C. The gas produced occupies the void at the top of the digester tank which has a fixed steel rigid roof; the accumulated gas is piped to the CHP unit and /or boiler.

In the horizontal secondary digester the operating temperature is 38^{o}C. This is a steel sectional tank with a double membrane cover; an air blower maintains a constant pressure of 0.5 Bar between the 2 sheets of the membrane. The gas collection route pipe-work is connected to both digester tanks to maintain a minimum pressure throughout the tanks. This pushes the accumulated biogas to the CHP Unit (The blower is similar to those used by Bouncing Castles).

Conversion of gas to Electricity and Heat is done in a Combined Heat and Power Unit (CHP). This consists of an internal combustion engine coupled to an alternator. The biogas is delivered to the engine using air pressure generated by the double membrane cover on the Secondary Digester. The engine is a spark ignition engine which turns the crankshaft and the alternator to generate electricity which also produces heat around the engine's combustion chambers; water used to cool the engine provides the heat for the digestion process and for space heating.

Gas production is calculated to approximately the capacity of the CHP Unit, in this case approximately 1.1MW of electricity and 1.25MW of heat. The electricity will be exported off-site to a dedicated grid connection, this connection will be a 10/20kv 3 phase line which consists of series of single poles with 3 cables approximately 40mm diameter similar to any existing rural 10/20kv line. It is intended to generate electricity for export to the national grid on a continuous basis with 500 hours down time (5% per year estimated).

Heat produced by the CHP Unit will be utilised to provide process heating for biogas production and exported to the adjoining Glass-House facility (Planning Reference 13/90) using insulated water-pipes to heat exchange at the glass house complex.

Leak Detection System

All tanks including the geo-membrane lined basins and the fibre stores will be fitted with a leak detection system, which will measure any leak between the inner and outer shells of the containers. A visual and audible alarm will activate if any leak is detected.

This system will comply with the Department of Agriculture, Food and the Marine Specification S126 of November 2002 – *Minimum Specification for Geo-membrane Lined Slurry/Effluent Stores and Ancillary Works* through the following:

Construction
A Department of Agricultural, Food and the Marine (DAFM) approved Lining Installation Contractor shall be assigned to carry out all construction works in relation to the proposed 3no Geo-membrane Lined Basins for Timoleague Agri Gen Ltd. As per the Department of Agricultural, Food and the Marine specification S126 of November 2002: *Minimum Specification for Geo-membrane Lined Slurry/Effluent Stores and Ancillary Works*, any other works which need to be carried out will be done so by the approved Lining Contractor or under the Lining Contractor's instructions.

Certification
The DAFM approved Lining Installation Contractor will issue 3 separate certificates of Ground Preparation and Leak Tightness for Geo-membrane Lined Slurry/Effluent Stores when they are satisfied that the excavation, preparation and construction of the 3 no Geo-membrane lined basins at the site, meet the requirements of the DAFM S126: *Minimum Specification for Geo-membrane Lined Slurry/Effluent Stores and Ancillary Works.*

Leak Detection System

Furthermore, this Certificate of Ground Preparation and Leak Tightness for Geo-membrane Lined Slurry/Effluent Stores will also confirm that the DAFM approved Lining Installation Contractor has tested the integrity of the basin in relation to unwanted leaks and holes, and is satisfied that the 3 no Geo-membrane lined basins are leak tight meeting the requirements of S126: *Minimum Specification for Geo-membrane Lined Slurry/Effluent Stores and Ancillary Works.*

2.1.2 Site Building, Infrastructure and Plant

The following details proposed site buildings, infrastructure and plant at the site Barryshall, Timoleague, Bandon, Co. Cork.

Buildings
All houses and tanks on the site are indicated on the Site Location Map and include the following:

Digested Biomass Store
Biogas Reception Building
Biogas Homogenising Tank
Vertical Biogas Digester
Horizontal Biogas Digester
Digestate Storage Basin 1
Digestate Storage Basin 2
Digestate Storage Basin 3
Hot Water Tank
Feed Tank 1
Feed Tank 2
Feed Tank 3
Gas Purifier
Pasteurising Tank 1
Pasteurising Tank 2
Pasteurising Tank 3
Validation Tank 1
Validation Tank 2
Weigh Bridge
Generator Enclosure
Transformer Room

Infrastructure
Entrance Gates
Hardcore area including buildings
Access Roadway

Plant
Removal of the liquid digestate will be carried out by a local contractor:

Tractor
Tanker - ranging in size from 2050 gallons (10125 litres) to 4500 gallons (20250 litres)

Removal of the solid digestate will be carried out by a local contractor:

Tractor and trailer
Articulated lorry

2.2 Closure Tasks

The Type of Closure can be categorized as a Clean Closure or a Non-Clean Closure.

a) Emergency Response Plan

b) Decommissioning Notification

c) Halting of receiving material

d) Equipment Removal

e) Above Ground Structure Decommissioning

f) Below Ground Structure Decommissioning

g) Site Restoration

2.3 Criteria for successful closure

Upon cessation of operations and subsequent decommissioning there will be no remaining liabilities.

The process will be complete when the entire site is returned to its original agricultural use.

2.4 Closure plan validation

On-going monitoring at the Site will be required as part of the closure process, for a period of 1 year post closure.

2.5 Closure plan costing

Costings for this closure plan are as per Table 6 following.

2.6 Closure plan review and update

On-going monitoring at the Site will be required as part of the closure process, for a period of 1 year post closure.

3.0 Scope of Closure Plan

This Closure Plan deals with the cessation of the operations by Timoleague Agri Gen Ltd. as a Biogas Plant.

3.1 Emergency Response Plan

The decommissioning sequence will commence with the implementation of a suitable emergency to include:

- Identification of potential hazards that may be encountered during the decommissioning phase.
- Emergency telephone numbers including, local doctor, garda station and fire brigade along with numbers for other various response services including contact details for the Environmental Directorate.
- Emergency response procedures for accidental spills, fire or injury to personnel.
- Identification of the person in charge of the site and implementation of the emergency plan.
- The emergency plan will also detail information in relation to the incident which would have to be recorded in order to prevent a similar incident occurring again.

3.2 Decommissioning Notification

Timoleague Agri Gen Ltd. will have to give notice to Cork County Council, the Environmental Protection Agency and the Southern Fisheries Board with regards to the commencement date of decommissioning works at the site.

3.3 Halting of delivery of imported material

Once Timoleague Agri Gen Ltd. has notified all local and statutory authorities, they can cease accepting materials to the site.

3.4 Equipment Removal

- All material in the reception tanks would be pumped to the homogenising tank.
- The reception tanks will be pressured washed inside.
- The wash water from these tanks will also be pumped to the homogenising tank.
- Operations in the reception tank will cease.
- When the retention time is reached in the homogenising tank, the material will be pumped to the Batch Heating Tank, then through the heat exchanger and Pasteurisation Tank and then onto the Main digester. The most appropriate methodology of recovery of materials and washings prior to the pasteurising equipment will be to wash all materials into the pasteuriser and pasteurise them so that they can be recovered to land as fertilizer.
- The Batch Heating Tank will be cleaned out by a pressure washer, as will as the Pasteurisation Tank and when completed the heat will be turned off.

- Once the Batch Heating Tank has been turned off, the Biofilter will be cleaned and power turned off.
- The Validation tanks will also be pressure washed inside once the biomass has passed through them and subsequently powered down.
- When the retention time in the main digester has been achieved, the material will be pumped to the decanter and onto the storage basin. The interior of the main digester will be then pressure washed and the heat turned off.
- Similarly the biomass and gas stored within the secondary digester will be removed; the gas to the gas purification and biomass to the decanter. The secondary digester will subsequently be pressure washed and heat turned off.
- The decanter once emptied of solid biomass (transported off site and sold as solid fertiliser), will be cleaned and powered off.
- Similarly once the secondary digester has been emptied, the connection to the gas purifier will be shut down as will the gas purifier.
- Wash water will be discharged to the Geo-membrane storage basins and landspread in accordance with crop requirements.
- The basins will be fitted with an abstraction point where liquid digestate can be collected for delivery to customer farmers. Once the basins have been emptied, the basins will be washed out. The resulting wash water will be land-spread.
- Much of the equipment on site such as engines, pumps, valves and mixers will be sold or re-located off site for reuse.
- Switchgear, heat manifolds and control systems contain parts and materials that can be re-used and salvaged.
- Piping, ducting, electrical cabling and similar materials can be recycled offsite.

3.5 Above Ground Structure Decommissioning

- Metal materials and cladding will be removed and recycled.
- Insulation will be removed and disposed of off-site by a suitable waste disposal company.
- The concrete structures of the digesters and storage vessels will be demolished once they have been stripped.
- When the control room has been stripped, the building can be demolished – most of the materials can be recycled or reused.
- The security fencing can be removed and reused.
- The transformer can be salvaged and re-used.

3.6 Below Ground Structure Decommissioning

- All foundations and below ground concrete associated with the vessels and tanks can be demolished and removed for recycling.
- Underground wiring can be removed and recycled.
- All underground piping can be removed and disposed of.
- Gravel around the site can be removed and reused off site.

3.7 Removal of Waste

- Digestate (solid and liquid) removal off site will continue as per normal operations. All digestate removed off site will be recorded as per the Closure Plan.

- All miscellaneous waste that arises on site i.e. canteen waste, maintenance, will be removed off-site by a licenced waste contractor. As is with normal operational practices, details of all waste removed off site will be recorded.

3.8 Other Items

Other items that will have to be carried out as part of the Closure Plan include:

- Termination of grid connection
- Termination of gate security
- Termination of supply of digestate – solid and liquid

3.9 Site Restoration

The site can be graded back to its original grade once all the structures and materials over and underground have been removed. Topsoil will be added to the site and seeded with a mix of native species to reinstate the area to its former agricultural use.

The adjacent Integrated Constructed Wetland System (ICW) designed by Aila Carthy of AESI wetlands to treat the run-off water from the access road-way and entrance yard to this facility will remain a permanent feature of the site. The ICW system is located adjacent to the access road (see *Site Plan* 002 – Attachment 1) will act as a visual feature as one enters the site. The ICW will act as a self maintaining natural habitat.

The entrance gate and access road for the Biogas Plant off of the L-4021-0 local road will remain as is and will act as an agricultural access route for the adjacent farm yard and adjoining lands owned by Timoleague Agri Gen Director Mr. Colin Bateman.

4.0 Programme of Closure Plan

The following graph is programme for completion of the Closure Plan.

Table 5: Programme of Closure Plan

	Decommissioning Period										On-going monitoring and Validation											
Stage	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 6	Month 7	Month 8	Month 9	Month 10	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Emergency Response Plan																								
Decommissioning Notification																								
Halting of delivery of imported material																								
Above Ground Structure Decommissioning																								
Below Ground Structure Decommissioning																								
Site Restoration																								
Validation																								
On-going monitoring																								

The programme for the Closure Plan assumes that the site is restored within a minimum of 10 months of commencement of the operations.

4.1 Criteria for Successful Closure of the Facility

When the following criteria have been completed the Closure will be considered successful:

- Complete decommissioning of all equipment and structures both over and underground i.e. concrete foundations.
- Delivery of imported material halted.
- Removal of all end products i.e. solid and liquid digestate, gas.
- Removal of all raw materials, ancillary materials and fuels.
- All wastes segregated and removed off site for either recycling or disposal.
- Maintenance of all records throughout the decommissioning phase through to the end of the validation phase.

4.2 Closure Considerations

4.2.1 Type of Closure

The site is considered a clean closure and this will be achieved when the required criteria outlined in *Section 3.0 Scope of Closure Plan* is achieved and completed.

4.2.2 Land Use during Processing

The land whereon it is proposed to land-spread the liquid digestate upon emptying of the geo-membrane basins during the Closure Plan consists mainly of tillage crops and grassland for grazing/silage production.

4.3 Validation of Closure Plan

A final validation report with a Certificate of Completion will be prepared upon successful completion of the Closure Plan in accordance with criteria in *Section 3.0 Scope of Closure Plan* above. This validation plan and Certificate of Completion will be issued to the relevant local and statutory authorities.

4.4 Closure Plan Costings

The estimated cost of the Closure for a Clean Closure scenario where subsequent to cessation of the operations and decommissioning at the site is shown in the following *Table 6 - Costings*.

Table 6: Costings

Task	Quantity	Measurement Unit	Unit Rate	Estimated Costs	Source
Emergency Response Plan	1	Month	€3,000	€3,000.00	Any plant/materials on site will be returned to the site company
Decomissioning Sub-Contractor	4	Weeks	3000	€ 12,000.00	Specialist Cleaning & Washing to ABP Standard in Pre pasteurisation Areas
Decomissioning Sub-Contractor	8	Weeks	1500	€ 12,000.00	Conventional power-washing of Pasteurising and Post Pasteurisation Plant
Above Ground Structure Dismantling and Decommissioning	6	Month	Zero		Anticipated that the salvage of the plant and equipment will be on a tender basis
Below Ground Structure Dismantling and Decommissioning	7	Month - Various	Various	€ 97,000.00	Concrete Breaking and recovery of secondary aggregate -3000tonnes @€12. Recovery of Lined Storage 4800m2@ €5.00 , Ancillary Excavation Works @150/Hr (Excavator & dumpers) - €33,000
Biogas removal					
Digestate removal	4000	m3	7	€ 28,000.00	
Site Restoration	3	various	€1,000.00	€ 3,000.00	Infrastructure e.g. all infrastructures will remain after the closure plan has been completed.

Environmental Monitoring	4	Samples	€130.00	€ 520.00	Water Quality analysis to be carried out as per Validation Plan
Verification Report/Audit	1	Month	€600.00	€ 600.00	Independent Validation
Reporting to Environmental Directive	1	Month	€1,000.00	€ 1,000.00	Preparation and submission of Report to Environmental Directive
Other Items				€31,424.00	Contingencies @20%
Total				**€188,544.00**	

4.5 Notice Period

The Environmental Directorate will be notified when closure commences and that the site has been closed. A Validation Report as outlined in the section below will be submitted to the Agency after 1 year.

4.6 Closure Plan Update and Review

The closure plan will be reviewed on an annual basis as part of the Annual Environmental Report. Any changes or updates to the plan will be made aware to the Environmental Protection Agency.

5.0 Restoration/Aftercare Plan

The closure plan will be reviewed while activities on-site are in progress. Any modifications to the Closure Plan will be reported to the Environmental Directorate in the Annual Environmental Report. Aftercare will consist of monitoring of the site for 1 year after the Closure Plan is complete.

Table 7: Contents of a restoration/aftercare plan

Type of Liability	Report Contents
Soil and groundwater contamination	As part of the Validation period, it is the intention to sample and monitor ground and surface water conditions quarterly for 1 year after completion of the Closure Plan. The soil on which the structures sat will also be sampled twice and tested at an independent laboratory for a period of 1 year. The Environmental Directorate will be notified of any changes that may occur regarding same. Costings will be as *Table 6.*

6.0 Environmental Liability Risk Assessment

Risk is defined as the combination of the probability or frequency of an occurrence of a defined hazard and the magnitude of the consequences of the occurrence on the receptor. The Main consideration is the pathway between the identified hazards and receptors. If no pathways exist between the hazard and receptor then there can be no risk.

The framework for Risk Assessments may include the following:

- Source and Hazard Identification
- Pathway Description
- Receptor Identification
- Estimation of Exposure Frequency
- Toxicity Assessment
- Health Risk Assessment

The framework of the assessment is as follows:

- Source Identification
- Hazard Identification
- Pathway Description
- Receptor Identification
- Potential Environmental Liability
- Mitigation Measures and Risk Management

The risk associated with the site may represent environmental risk which may result in financial liability which is inferred to be environmental liabilities against which costs may be assigned.

Other risks associated with the Site may relate to injury or death of human beings or damage to plant equipment or property which may result in financial liabilities against which costs may be assigned.

6.1 Hazards / Pathways / Receptors / Liabilities

The identified Hazards / Pathways / Receptors / Liabilities have been addressed below.

6.1.1 Formation of Leachate

Leachate is any liquid i.e. water, that in passing through matter, extracts solutes, suspended solids or any other component of the material through which it has passed. The strength and hazard associated with leachate is dependent on the nature of the waste, time of contact, the nature of the waste and other physical parameters.

6.1.1.1 Hazards

The volume and constitution of the leachate would be a hazard.

6.1.1.2 Receptors

The receptors of leachate in the environment are groundwater and surface water. Secondary Receptors of leachate in the environmental are humans and livestock. These are only receptors if a pathway is established between leachate contaminated water and the ingestion of same to livestock and humans.

6.1.1.3 Pathways

The primary pathway of leachate from the waste to the receptors is through the ground or overland. The pathway between leachate and the ground and surface water is through the natural geological soils/clay that is underlying the unit. The pathway comprises of material which can filter the constitutes of leachate. The pathway also comprises of surface water flows to surface water bodies.

6.1.1.4 Potential Environmental Risk and Liability

The potential environmental risk and liability is leachate seeping into the ground and surface water.

6.1.1.5 Potential Financial Liabilities

If the groundwater or the surface water was to be compromised, the worst case financial liabilities may include:

- Replacement of wells or the provision of alternative drinking water supply and possible third party injury or property damage claims.
- Integrity testing on the storage tank.

6.1.1.6 Mitigation Measures and Risk Management

- Management of the Unit will be carried out using Good Agricultural Practices.
- Monitoring of all tanks, leak detection systems (LD1 to LD12 on Drawing 001 - *Site Plan* included) and inspection chambers on a regular basis.
- Monitoring of surface waters monitoring points provides an early warning of potential risk to surface water - stormwater monitoring point indicated as SW1 on Site Layout Plan attached – Attachment 1.

6.1.2 Leakage of Fuels/oils during operations

Leakage Diesel Fuel or hydraulic oils used for the onsite plant. Fuel will be stored in a bunded fuel tank onsite. All machinery will be re-fueled in a designated area.

6.1.2.1 Hazards

Hazards include rupture of hydraulic hoses or fuel spillages from plant.

6.1.2.2 Receptors

Receptors would be soil and groundwater beneath the site. Secondary receptors would be humans and animals.

6.1.2.3 Pathways

The horizontal pathway would be on the surface of the site to any neighbouring water bodies and surrounding environments.
The vertical pathway would be vertically into the soil and potentially impacting on soils and ground water beneath the site.

6.1.2.4 Potential Environmental Risk and Liability

The potential environmental risk and liability is fuel leaching into the soil, surface water or ground water**.**

6.1.2.5 Potential Financial Liabilities

The potential financial liability relates to clean up of minor spills that have a low risk. The risk of a major spill is unlikely as plant will be fuelled in a designated area and checked regularly for leaks and damages.

6.1.2.6 Mitigation Measures and Risk Management

To mitigate the potential risk of oil/fuel leaks the following measures will be in place:

- The risk of spilling of fuel is at its greatest during refuelling of plant. Refuelling will be carried out in a designated area.
- A spill kit will be readily available at all times.
- Vehicles will never be left unattended. Hoses and valves will be regularly checked for signs of wear and ensure that they are turned off and securely locked when not in use.
- Diesel pumps and similar equipment used during cleaning of the geo-membrane storage basins will be placed on drip trays to collect minor spillages. These will be checked regularly and any accumulated of oil removed for disposal.

6.1.3 Lorries or Plant involved in Accidents

Collisions between plant or vehicles and pedestrians / workers on the site and vehicles overturning are the type of accidents associated with the site. There is the possibility of risk to human health and damage to third party property.

6.1.3.1 Hazards

The hazards are moving vehicles and/or plant.

6.1.3.2 Pathway

The pathway is interaction between vehicles and or humans.

6.1.3.3 Receptors

The receptors are humans and third party property.

6.1.3.4 Potential Environmental Risk and Liability

The potential environmental risk and liability would be imported material or digestate (liquid/solid) spilled from an overturned vehicle.

6.1.3.5 Potential Financial Liabilities

Financial Liability may involve third party claims for injury or property damage.

6.1.3.6 Mitigation Measures

The environmental risks and financial liabilities are mitigated by the following measures:

- Adequate maintenance of the access road as per Industrial Emissions Activity Licence Conditions and Planning Permission Conditions.
- Maintaining a maximum speed on the entire site i.e. 30 mph.
- Signage on the main road to indicate to road users the existence of machinery.

6.1.4 Fugitive Emissions

The potential fugitive emissions from the site are dust and noise.

6.1.4.1 Hazard

- Dust from the access road and from lorries particularly in dry weather.
- Dust arising from the dismantling of the structures and the concrete yards/foundations.
- Noise from Road Vehicles and decommissioning works.

6.1.4.2. Pathway

The pathway for these emissions is air.

6.1.4.3 Receptors

The receptors of these emissions are humans (operatives and residents of the area).

6.1.4.4 Environmental Risk and Liabilities

Excessive levels of dust and noise at the site can affect the health of the operatives on the Site and may be a source of nuisance to neighbouring residents. The financial liability would be third party claims and court defence costs. Good on site management and maintenance will ensure that environmental risks are managed and financial liabilities are minimised.

6.1.4.5 Potential Financial Liability

The potential financial liability would include third party claims for nuisance from dust and noise.

6.1.4.6 Mitigation Measures and Risk Management

The following mitigation measures will be employed:

Dust – onsite during Decommissioning works

Decommissioning activities have the potential to generate dust emissions. The potential for sut to be emitted depends on the type of construction activity being carried out in conjunction with ambient conditions including rainfall, wind speed and wind direction.

The potential for impact from dust depends on the distant to potentially sensitive locations and whether the wind can carry the dust to these locations. Most of the dust would be deposited close to the potential source and any impacts from dust deposition would typically be within several hundred metres or so of the construction area.

Mitigation Measures

- All operations to be carried out in accordance with the conditions attached to the Planning Permission and the Industrial Emissions Activity Licence for the Site
- The site access road onto the public road will be regularly cleaned and maintained as appropriate.
- The site will be regularly dampened during dry and/or windy conditions if required.
- Vehicles removing materials from the site will be enclosed or covered with tarpaulins, where necessary.
- A wheel wash will be provided on the construction site if needed.
- Minimising speed of lorries entering and leaving the Site
- Maintaining cowling and exhausts on all plant used on the Site
- Material handling systems and stockpiling of materials on site will be arranged to minimise exposure to wind.
- During movement of soil/fill material both on and off site, trucks will be covered with tarpaulins, where required.
- Dust suppression measures, particularly during dry weather periods, will be implemented to ensure the aerial deposition of dust material to the water bodies is minimised.

The above procedures will be monitored by the Site Manager. The dust minimisation plan will be reviewed at regular intervals with the closure plan during the decommissioning phase by the Site Manager and Timoleague Agri Gen Ltd to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust nuisance through the use of best practice procedures.

Noise – onsite during Decommissioning works

Noise impacts from decommissioning may vary greatly depending on the duration of the project. Noise will occur due to the dismantling of the tanks and associated buildings, removal of machines, the excavation of foundations and concrete aprons and from the emptying of the Geo-membrane Storage Basins.

Noise from vehicles and machinery needed for certain aspects of the decommissioning works will occur on local roads and on the access road. This traffic is likely to increase the existing traffic noise level at this location for the duration of closure works, however, this will be a slight increase and the impact will be minimal.
The noise levels generated by the equipment/vehicles will vary greatly depending on factors such as the type of equipment/vehicle, the specific model, the operation being performed, and the condition of the equipment.

During the decommissioning phase, the potential noise impact during daytime is slight due to the site location of the development. No special mitigation measures are likely to be required during the closure plan. The "best practical means" to minimise noise on site during the closure plan will be used and employees and contractors will adopt the recommendations of BS 5228 Noise Control on Construction and Demolition Sites where practicable. However, the following will help control noise nuisance:

- Screening provided by the existing vegetation surrounding the site will mitigate any noise.
- Sensitivity to noise increases during the night-time hours. Therefore, all work will be carried between the normal working hours of 08:00 – 18:00.
- Operating earth-moving equipment on the construction site will be kept away from vibration sensitive sites as possible.
- Selecting plant and equipment with low potential for the generation of noise.
- Proper use and maintenance of plane and equipment.
- Locating pumps and generators in positions that cause the least noise disturbance.
- Access roads will be maintained to control noise emitted from moving vehicles i.e. banging caused by empty trucks.
- Appropriate speed limits will be applied to access roads i.e. 30km.
- All vehicles servicing the site will be properly maintained especially exhaust systems.

6.1.5 Suspended Solids, Silt and water quality

Activities that can cause water pollution include: poorly located or managed operations onsite and the storage of relatively large volumes of animal manure and organic materials, from various sources, on site

6.1.5.1 Hazards

- Accidental spillages and runoff into surface and ground water which could lead to eutrophication of water courses.

- Suspended solids can clog fish gills, either killing them or reducing their growth rate. They also reduce light penetration. This reduces the ability of algae to produce food and oxygen. When the water slows down, the suspended sediment settles and drops to the bottom, a process called siltation. This causes the water to clear, but as the silt or sediment settles it may change the river bed. The silt may smother bottom-dwelling organisms, cover breeding areas, and smother eggs.

- Deterioration of ground water quality

6.1.5.2 Receptors

Receptors would be ground/surface water.

6.1.5.3 Pathways

The pathway would be on the surface of the lands surrounding the facility and also through the soil beneath the facility.

6.1.5.4 Potential Environmental Risk and Liability

The potential environmental risk and liability is to aquatic life as per section *6.1.5.1 Hazards*.

6.1.5.5 Potential Financial Liabilities

The potential financial liability relates to the cleanup of surrounding water bodies. The risk of a major spill is unlikely as all material will be stored in the reception tank as indicated on the site layout plan.

6.1.5.6 Mitigation Measures and Risk Management

Pig manure deliveries along with the importation of the various organic materials will be stopped once the closure plan commences. This will limit the amount of material stored on site during the closure phase.

Materials delivered onsite are stored in the reception building which is fitted with a leak detection system, LD 6 on the Site Layout Plan attached – Attachment 1. There are 12 Leak Detection chambers located on the site which will further go to indentifying whether there is a leak in the system. Attached is the log of leak detection monitoring points – Attachment 3. These monitoring points will be inspected on an ongoing basis throughout the entire closure plan to ensure the integrity of all tanks and storage basins.

All structures will be built to the Department of Agricultural, Food and the Marine Farm Building and Structures Specifications.

In the event of cracks being discovered in any tanks during any phase of the closure period, the following repair method would be implemented to ensure that the site, including the integrity of the tanks, is deemed safe and secure:

- The observed crack area is thoroughly cleaned both sides if possible
- A dovetail would be cut max 50mm deep would be made into the tank wall
- Regulated set cement applied to the joint to manufacturers instruction
- The repaired joint monitored

6.1.6 Fire

6.1.6.1Hazards

AD biogas production is composed of three main constituents: methane, hydrogen sulphide and carbon dioxide. Each of these gases can be dangerous under certain circumstances. Common hazards associated with biogas include fire or explosion potential. Methane, the main component of biogas, is flammable when it mixes with air.

6.1.6.2 Receptors

Receptors to a fire incidents onsite would be humans both operatives and residents of the area and also surface and ground water.

6.1.6.3 Pathways

Pathways would be interaction between the fire and humans and also interactions between the resulting impacts of the fire in contact with surface and ground water.

6.1.6.4 Potential Environmental Risk and Liability

Environmental risks associated with a fire onsite include the release of emissions to air and the release of emissions to surface/ground water which could have harmful effects on aquatic life.

6.1.6.5 Potential Financial Liabilities

The potential financial liability would include third party claims for nuisance from dust and personal injury.

6.1.6.6 Mitigation Measures and Risk Management

Risk Management
Before decommissioning begins, an emergency response plan should be out in place to include:

- Prior identification of potential hazards on site that may be encountered during the decommissioning phase.
- Emergency telephone numbers including garda, fire and medical response services.
- Emergency procedures for spills, fire or personal injury including the contact made with all the relevant authorities to inform them of the incident.
- Identification of the person responsible for responding to an emergency.
- Provide the documentation showing the details of the incident along with the response measures carried out following the incident. Also included will be a set of procedures to prevent a similar situation for occurring.

6.2 Review of Risk Assessment

A review of the measurable hazards will be carried out continuously throughout the period of the decommissioning.

After the closure plan has been successfully completed, there will be no pig manure, organic material, digestate (solid/liquid), gas remaining onsite or waste of any nature.

Good housekeeping during the removal of the liquid/solid digestate and the refuelling of machinery will ensure that the likelihood of spillages occurring will be minimal.

6.3 Risk Classification and Identification

The principal source of risk at the site is the pig manure/digestate reaching surface or ground water. Other activities such as vehicle movements and fuel/oil leakage may give rise to environmental risks and liabilities. Vehicle movements may cause noise or dust nuisance. Fuel/oil leak could result in an undesirable discharge to surface water.

The Table below summarises the potential environmental liabilities at the site.

Table 8: Summary of Potential Environmental Liabilities

Risk ID	Process	Potential Risks	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
1	Leachate formed by Waste in contact with water	Reaching ground/surface water. Ingestion by animals/humans.	Contamination of water – surface and ground	4	Potential for fish deaths and aquatic eco-systems decline	1	Good onsite housekeeping during the removal f the pig manure from the storage tanks.	4
2	Fuel/Oil leakage from plant	Leaching into soils and surface/ground water	Contamination of water – surface and ground	4	Potential for fish deaths and aquatic eco-systems decline	1	spill kit maintained, all machinery to be re-fueled in a designated area	4
3	Operational Waste Vehicles/Plant	Spillages. Third party claims due to injuries and damage to property.	Contamination of water – surface and ground from leaching	2	Potential for fish deaths and aquatic eco-systems decline Injuries/Damages	2	Adequate access and low speeds on access road. Refueled in a designated area.	4
4	Fugitive Emissions - Dust and Noise Emissions	Risk to health and welfare of humans.	Health issues and ambient noise impacts	3	Risk to health and welfare of human/animals	3	All equipment maintained, roads dampened in dry periods	9
5	Suspended Solids and water quality	Risk to aquatic life in the un-named Stream	Depleted Oxygen levels in the water Deterioration of ground water quality	3	Risk to health and welfare of eco-system life	3	Good onsite housekeeping, adherence to good agricultural practices. All equipment maintained, roads dampened in dry periods, adherence to Good Agricultural Practices and the Nitrates Directive S.I. 610 of 2010 Tank integrity testing	9
6	Fire	Risk of fire, explosions and damage to employees or third	Pollution and contamination of water bodies and soil.	3	Risk to employees/third parties,	3	Risk Management Plan, continual surveillance of all	9

		parties			surface/ground water, soil and aquatic life.		aspects of the unit for defaults which may lead to potential fires	

The Risk Classification follows the EPA's Guidance Tables 3.4 and 3.5 Risk Classification Tables. Each potential risk or liability is assigned a rate for Basis of Likelihood and Consequence.

The above table has identified the Basis of Likelihood and Consequence (see Table 3.8 of EPA Guidance) to be the lowest level risk and indicates the requirement for monitoring. The Guidance note identifies the risks currently low or very low.

Table 9: Statement of measures

Risk ID	Process	Risk Score (Consequence x Likelihood)	Mitigation Measures to be taken	Outcome	Action	Completion date	Contact person
1	Leachate formed by Waste in contact with water	4	Separating clean and dirty water on the farm in order to improve the efficiency of manure storage and to reduce the risk of dirty/contaminated water entering watercourses. The raw pig manure will be extracted from designated points from the underground tanks by vacuum tank. Visual inspection of the leak detection system chamber. Landspreading will be carried out with adherence to buffer zones as per the Nitrate Directive Regulations S.I. No. 610 of 2010.	Protection of surface/ground water	Adherence to good agricultural practices and S.I.610 of 2010 Visual inspections of leak detection system to be carried out by Timoleague Agri Gen Ltd. Training of site managers, foremen and workforce, including all subcontractors, in the pollution risks and the preventative measures. Ensure all staff is trained in the implementation of the Emergency Response Plan and the use of any spill control equipment as required.	Immediate	Timoleague Agri Gen Ltd.
2	Fuel/Oil leakage from plant	4	Refueling of machinery in a designated area. Spill kit maintained and readily available	Protection of surface/ground water	All vehicles to be refuelled in a designated hard core area.	Immediate	Timoleague Agri Gen Ltd.
3	Operational Vehicles/Plant	4	Adequate access road and low speeds on access road	Having a speed limit will	Speed signs in place on access roads	Immediate	Timoleague Agri Gen Ltd.

				decrease the likelihood of accidents			
4	Fugitive Emissions - Dust and Noise Emissions	9	All equipment maintained, roads dampened in dry periods	Improved air quality and lessened impact on the ambient noise in the vicinity of the site	Use vacuum tanker to dampen roads. Ensure all vehicles have valid tests and are road worthy	Immediate	Timoleague Agri Gen Ltd.
5	Suspended Solids and water quality	9	Adherence to Nitrates Directive, S.I. 610 of 2010, good agricultural management practices and also maintain good housekeeping. Ongoing monitoring of the storage tank.	Protection of surface/ground water	Monitoring of tanks, leak detection inspection chambers and surface water monitoring points	Immediate	Timoleague Agri Gen Ltd.
6	Fire	9	Risk Management Plan, continual surveillance of all aspects of the unit for defaults which may lead to potential fires	Protection of employees, third parties and the environment	Risk Management Plan to be implemented, continual surveillance.	Immediate	Timoleague Agri Gen Ltd.

6.4 Quantification of Unknown Environmental Liabilities

The known environmental liabilities of the site were calculated as part of the Closure Restoration Aftercare Management Plan in this report and as per Table 3.10 of the EPA's Guidelines on Assessing and Costing Environmental Liabilities 2014.

Table 10: Worst case scenario – quantification and costing

Task	Description	Quantity (No.)	Measurement Unit	Unit Rate	Cost (€)	Source of Unit Rate
Response to:	Surface water monitoring	10	sample	130	1,300	NRGE Ltd.
Risk ID 1: Leachate spill to ground/surface water and/or soil contamination	Ground water monitoring	10	sample	130	1,300	NRGE Ltd.
	Soil Monitoring	10	sample	130	1,300	NRGE Ltd.
	Off site transport and disposal of leachate spill	2	day	510	1020	Local Contractor
Response to:	Excavation of contaminated soil (hazardous)	150	M3	10	1500	Local Contractor
Risk ID 2: Fuel/Oil leakage to ground/surface water and/or soil contamination	Excavation of contaminated soil (Non-hazardous)	40	M3	10	400	Local Contractor
	Transport of contaminated soil (hazardous)	50	tonne	70	3,500	Local Contractor
Response to:	Transport of contaminated soil (non hazardous)	40	tonne	30	1,200	Local Contractor
Risk ID 3:	Disposal gate fee for contaminated soil (hazardous)	50	tonne	150	7,500	Local Contractor

Waste Vehicles / Plant spillages	Disposal gate fee for contaminated soil (non hazardous)	40	tonne	50	2,000	Local Contractor
	Consultancy fees	10	day	500	5,000	NRGE Ltd.
	Importation of topsoil	20	tonne	11	220	Local Contractor
	20 tonne track machine with driver	1	day	800	800	Local Contractor
Response to: **Risk ID 4**: Fugitive Emissions, (noise dust)	Air Monitoring	10	sample	130	1,300	NRGE Ltd.
					0	
	Noise Monitoring	10	sample	130	1,300	NRGE Ltd.
Response to: **Risk ID 5:** Suspended Solids and water quality	20 tonne track machine with driver	1	day	800	800	Local Contractor
	Ground water monitoring	10	sample	130	1,300	NRGE Ltd.
	Surface water monitoring	10	sample	130	1,300	NRGE Ltd.
	Tank repairs - Washing effect area , cutting joint & Grouting	2	Day	500 2 Staff @250 per day	1,000	Local Contractor
	Materials	n/a	materials	200	200	Local Contractor
	Consultancy fees	10	day	500	5,000	NRGE Ltd.
Response to: **Risk ID 6:** Fire	20 tonne track machine with driver	1	day	800	800	Local Contractor
	Ground water monitoring	10	sample	130	1,300	NRGE Ltd.
	Surface water monitoring	10	sample	130	1,300	NRGE Ltd.

	Tank repairs - Washing effect area , cutting joint & Grouting	2	Day	500 2 Staff @250 per day	1,000	Local Contractor
	Materials	n/a	materials	200	200	Local Contractor
	Consultancy fees	10	day	500	5,000	NRGE Ltd.
Sub Total (€)					**48,840**	
Plus Contingency at 15% (€)					**7,326.00**	
					56,166.00	
Plus VAT at 23% (€)					**12,918.18**	
Total					**69,084.18**	

Environmental Pollution Liabilities could include:

- Leachate formation and migrating to surface water and ground water
- Fuel/Oil leakage causing pollution to ground and surface water
- Fuel/Oil leakage causing pollution of soils
- Spillage from delivery vehicles
- Fugitive dust emissions causing excessive deposits on adjoining properties
- Silt laden waters
- Turbidity
- Toxicity
- Fire

According to the EPA Guidance a review of the Environmental Liability Risk Assessment should be undertaken annually to reflect any changes in the environmental risk.

7.0 Identification of Financial Provision

The main objective of Financial Provision is to ensure that sufficient financial resources are available to cover:

- Known environmental liabilities that will arise at the time of closure
- Known environmental liabilities that are associated with the aftercare and maintenance of the Site until the Site no longer poses a risk to the environment
- Unknown environmental liabilities that may occur during the operational life of the site.

Financial Provision encompasses the following:

- Quantifying the financial amount of environmental liabilities
- Selecting of appropriate financial instrument to underwrite the liabilities.

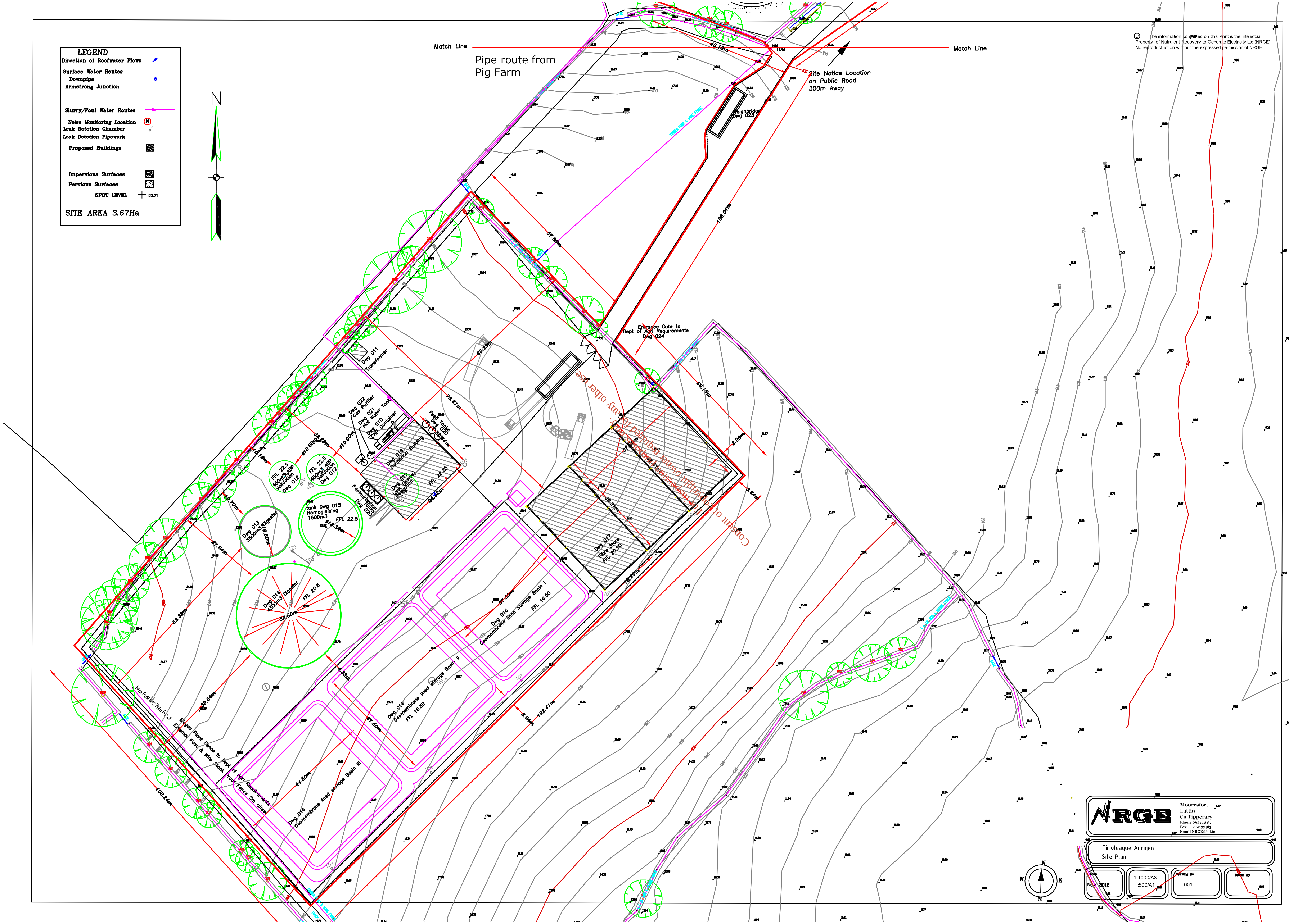
7.1 Calculation of Financial Provision

The Financial Provision has been based on the combined risks that pose the worst case scenario. This is the maximum liability that may be incurred and as such, financial provision is calculated as **€69,084.18** based on this event.

8.0 Closure

The Risk Management will be reviewed annually after the Industrial Emission Activity Licence has commenced at the site. Modifications to these reports will be addressed in the Annual Environmental Return for the Site.

Attachment 1



LEGEND

- Direction of Roofwater Flows
- Surface Water Routes
- Downpipe
- Armstrong Junction
- Slurry/Foul Water Routes
- Noise Monitoring Location
- Leak Detection Chamber
- Leak Detection Pipework
- Proposed Buildings
- Impervious Surfaces
- Pervious Surfaces
- SPOT LEVEL 123.21

SITE AREA 3.67Ha

N

Site Notice Location

172.69m

161.10m

Pond 3
2,900m²
B.L 8.75

Passing Lay-by

163.99m

Pond 2
1,000m²
B.L 12.00

114.22m

140.43m

46.19m

Match Line

Match Line

Pipe route from Pig Farm

TBM

Site Notice Location on Public Road 300m Away

Neighbridge Dwg 023

SITE TBM ELEV=9.98

NRGE

Mooresfort
Lattin
Co Tipperary
Phone 062 53385
Fax 062 53483
Email NRGE@iol.ie

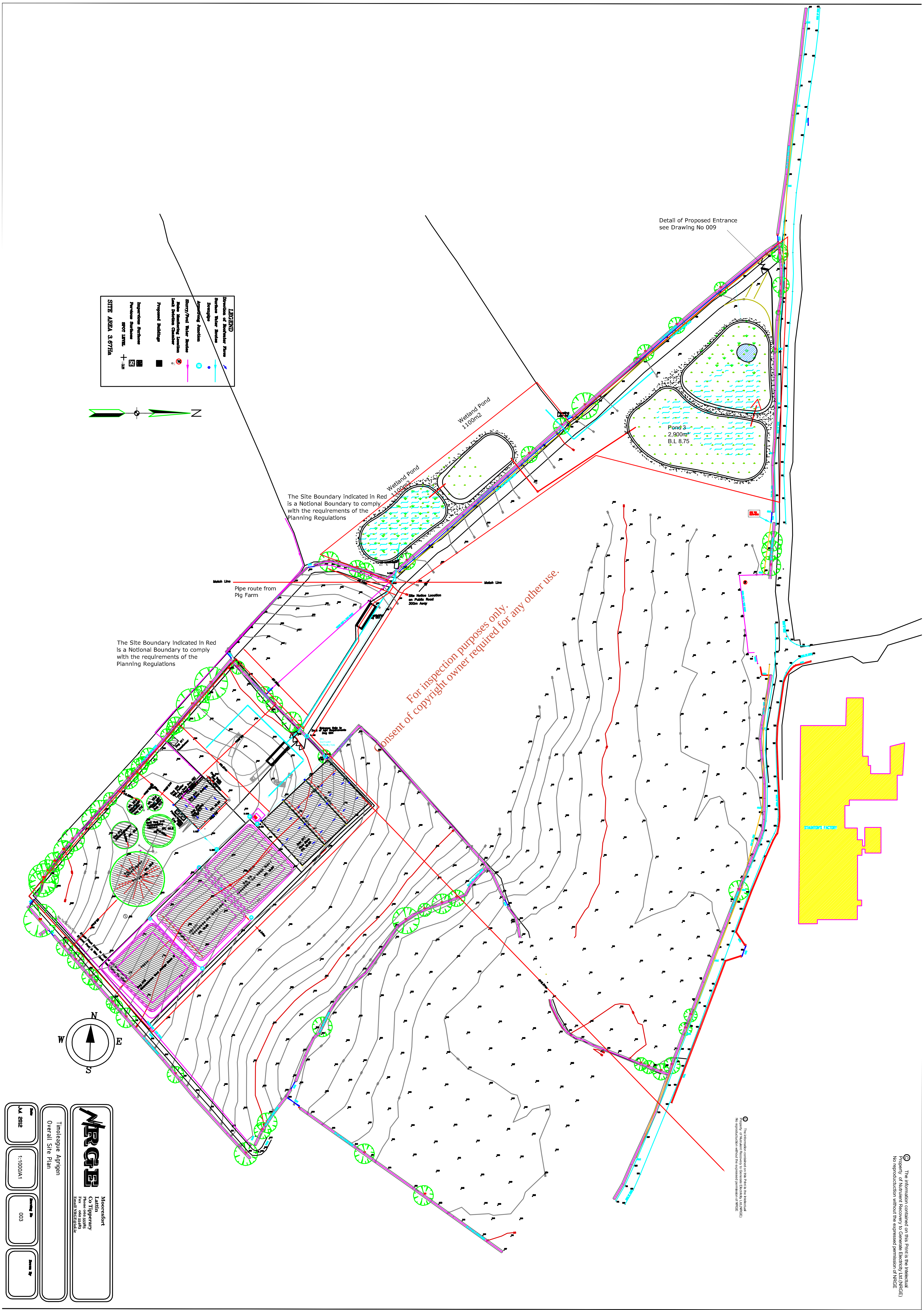
Title: Timoleague Agrigen
Site Plan

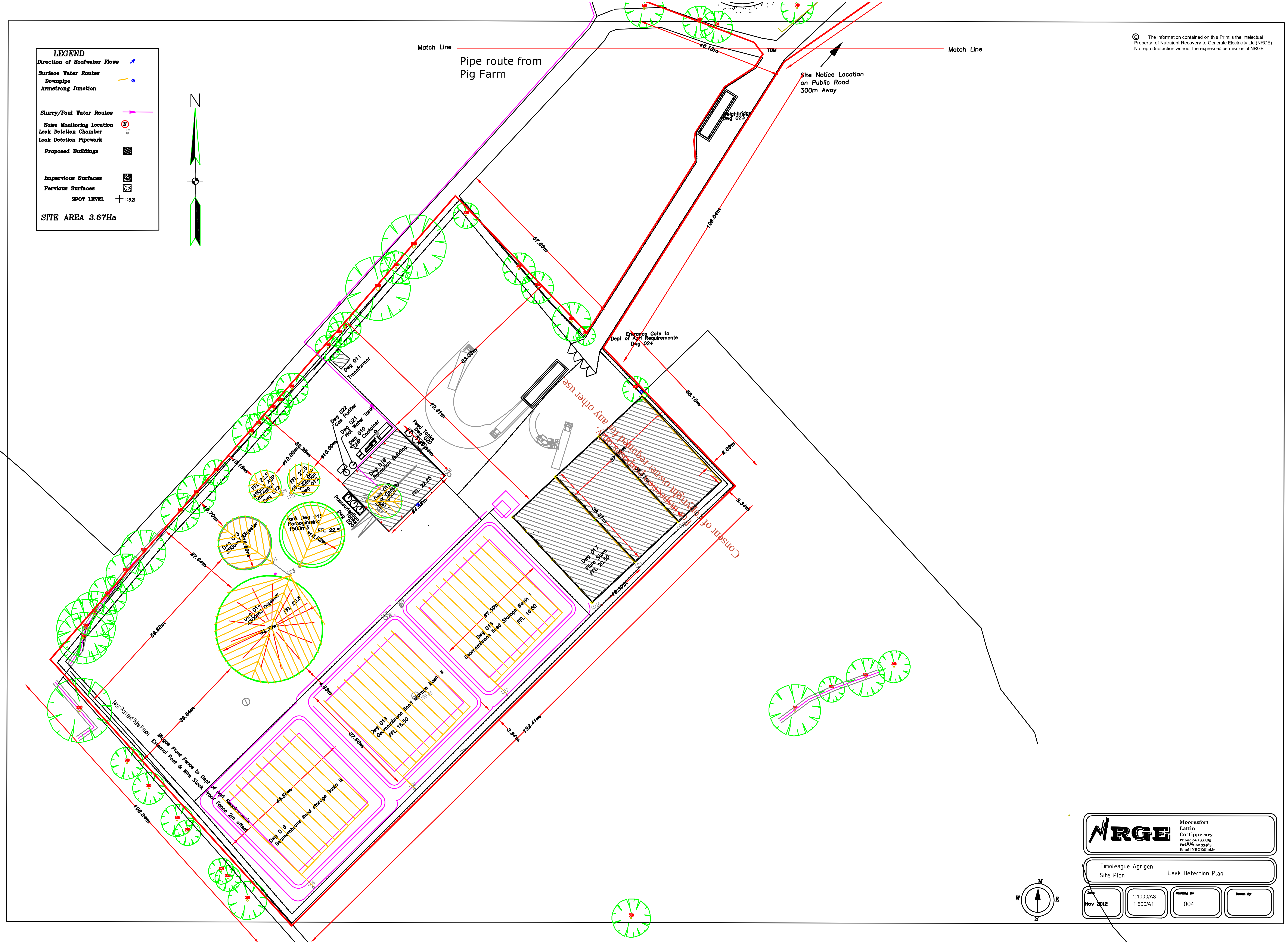
Date: Nov 2012

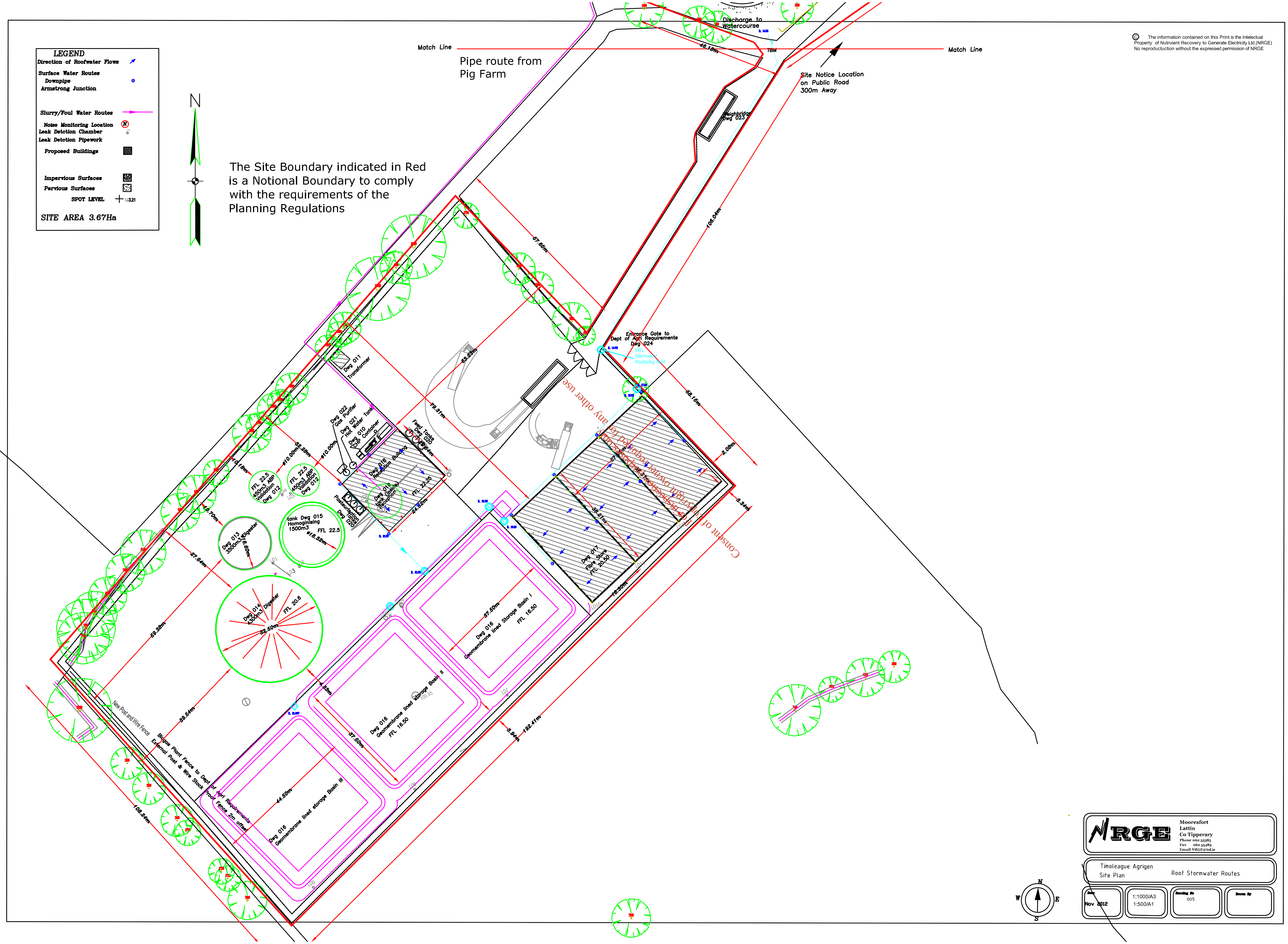
1:1000/A3
1:500/A1

Drawing No: 002

Drawn By







LEGEND
Direction of Roofwater Flows
Surface Water Routes
Downpipe
Armstrong Junction
Slurry/Foul Water Routes
Noise Monitoring Location
Leak Detection Chamber
Leak Detection Pipework
Proposed Buildings
Impervious Surfaces
Pervious Surfaces
SPOT LEVEL
SITE AREA 3.67Ha
N
The Site Boundary indicated in Red is a Notional Boundary to comply with the requirements of the Planning Regulations
Match Line
Pipe route from Pig Farm
Match Line
Discharge to Watercourse
Site Notice Location on Public Road 300m Away
Weighbridge Dwg 023
Entrance Gate to Dept of Agri Requirements Dwg 024
Dwg 011 Transformer
Dwg 022 Gas Purifier
Dwg 021 Hot Water Tank
Dwg 010 CHP Container
Feed Tanks Dwg 020
Dwg 018 Reception Building
FFL 22.25
Pasteurisation Dwg 020
FFL 22.5 450m3 ABP Validation Dwg 012
tank Dwg 015 Homogenising 1500m3 FFL 22.5
Dwg 013 3500m3 Digester
Dwg 014 4300m3 Digester FFL 20.6
Dwg 017 Fibre Store FFL 20.50
Dwg 016 Geomembrane lined Storage Basin I FFL 16.50
Dwg 016 Geomembrane lined storage Basin II FFL 16.50
Dwg 016 Geomembrane lined storage Basin III
New Post and Wire Fence
Biogas Plant Fence to Dept of Agri Requirements External Post & Wire Stock proof Fence 2m offset
57.66m
106.04m
48.16m
68.16m
2.08m
3.34m
63.63m
79.31m
10.00m
10.70m
27.64m
59.38m
89.64m
108.24m
192.41m
44.60m
37.60m
37.50m
32.50m
16.30m
36.41m
Mooresfort
Lattin
Co Tipperary
Timoleague Agrigen
Site Plan
Roof Stormwater Routes
Nov 2012
1:1000/A3
1:500/A1
005

Attachment 2

Stale Air to be diucted to the Air Intake of the CHP Unit

Biofilter

Reception Intake point for Exceptional Loads, Tipping Point Exteral to the Building

Reception Intake point for Normal Operation, Tipping Point Interal in the Building

Inside Building

Reception pit 220m³
TK00

NRV
NRV
Manure From Pig Houses

Materials tank 1 40m³
PK03
Filled from Road Tanker

Materials tank 2 40m³
PK04
Filled from Road Tanker

Materials tank 3 40m³
PK05
Filled from Road Tanker

Air

Homoginising Tank 1500m³
TK01
District heating

Gaspipe with drain ø160

HLS02 LS
HLS01 LS
HBH01
HPM01
HV01

Digester 2000m³
DK01

Gas
Gasmeter

Gaspipe With drain ø168,3

Air

Gas storage– secondary digester 4000m³
DK02

ø160 55°C

35°C

Gaspipe with drain ø160

5,5kW Gasbooster

Gaspipe with drain ø100

Gas purification
GK01

Gaspipe with drain ø100

Gas– meter

Boiler

Engine

District heating

Batch Heating Tank 20m³
HK01
District heating

ø114 steel pipe 55°C

Heat Exchanger Manure to Manure

Mecerator

70°C

55°C

Sample Draincock

Pasturisation Tank 40m³
PK03
District heating
70°C

Buffer Tank 40m³
PK04

Validation Tank 300m³
PK03

Validation Tank 300m³
PK04
District heating

Storage Basin

Decanter

Inside Building

Inside Building

Legend

- Biomass Untreated
- Biomass (Post Pasturisation 70°C)
- Biogas
- Hot Water 80°C
- Condensate
- Foul Air Extraction

NRGE
Mooresfort
Lattin
Co Tipperary
Phone 062 55385
Fax 062 55483
Email NRGE@iol.ie

Title: Timoleague Agrigen Ltd
Flow diagram

Date	Scale	Drawing No	Drawn By
July 12	NTS	029	

Attachment 3

Schedule of Leak Detection Monitoring Points

Timoleague Agri Gen Ltd. – Anaerobic Digester

(Indicated on 001 – Site Plan)

Reference	Location
LD1	Primary Digester
LD2	Homogenising Tank
LD3	Secondary Digester
LD4	Validation Tank 1
LD5	Validation Tank 2
LD6	Reception Tank
LD7	Geo-membrane Lined Basin I
LD8	Geo-membrane Lined Basin II
LD9	Geo-membrane Lined Basin III
LD10	Fibre Store
LD11	Fibre Store
LD12	Fibre Store