BioPower Ltd

Environmental Impact Statement

For the development of a BioPark®

Located at
Ballinphuill,
Tibohine,
Castlerea,
Co Roscommon

Registered office:
48 Main Street,
Schull,
Co Cork.

Registered Number: 355995
Company Directors: Walter Ryan-Purcell, Donall O Laoire, William Daunt

BioPower Ltd

Environmental Impact Statement

Volume 1- Non Technical Summary

For the development of a BioPark®

Located at
Ballinphuill,
Tibohine,
Castlerea,
Co Roscommon

Registered office:
48 Main Street,
Schull,
Co Cork.

Registered Number: 355995
Company Directors: Walter Ryan-Purcell, Donall O Laoire, William Daunt

Table of Contents

1. Introduction

A BioPark® is an integrated method of producing BioEnergy, BioFuel and Biomass fuel pellets from the processes of Rape Seed pressing, BioDiesel production, Anaerobic Digestion and Fuel pellet production. The BioPark® is integrated into the local agricultural industry by both sourcing the raw materials required from local farms and supplying organic fertiliser to farmers that supply the raw materials.

The founder of BioPower Ltd is from an agricultural background, spent ten years in the composting business. He recognizes the opportunity to produce Bio fuel and BioEnergy from agriculture. Initially the company grew 145 acres of Oil Seed Rape in 2005, for Bio fuel production using compost as an organic fertiliser. This progressed to using Rape Straw and Cereal straw for Bio mass pellet production.

Anaerobic digestion produces significant quantities of electricity and heat using local feed stocks, while producing valuable organic fertiliser that can replace significant quantities of inorganic fertiliser.

This led directly to the planning of an integrated agriculturally based Bio energy production facility which the company registered as a BioPark®. Grouping the operations of Rape Seed pressing, BioDiesel production, Anaerobic digestion and Fuel pellet production together results in each operation being able to use the product of another (e.g. Electricity produced by the Anaerobic digester is used to power the Rape Seed processing plant, the Rape Seed oil produced is fed to the Bio diesel plant etc).

A BioPark® produces significant positive net energy producing no waste in a most efficient, environmentally friendly manner.

It creates a sustainable agriculturally based activity in rural economies while producing essential Bio energy for the National economy.

A BioPark® produces Bio fuel for 2,900 cars, Fuel pellets to heat 2,500 homes, provides 10 full time jobs and indirectly provides 42 agricultural jobs off site as well as producing organic fertiliser to replace approx 740 tonnes of imported inorganic fertiliser.

A number of experienced individuals with backgrounds in Farming, Bioenergy, Agri-research, Peak oil, Legal and Financial were invited to join as directors of BioPower Group plc of which BioPower ltd, the applicant, is a wholly owned subsidiary.

A BioPark® needs to be sited in an agricultural area, with an adequate supply of feed stocks, and market for organic fertiliser.

The BioPark® will be extensively landscaped and all buildings will be screened from external view.

This Non Technical Summary is provided as required by Schedule 6 of the Planning and Development Regulations 2001 (Section 94 (c) of S.I 600 of 2001).

In preparation for this E.I.S several studies were carried out. The findings of these studies are included in the appendices and are discussed in Volume 2 of this E.I.S in more detail. The study team and list of contributors can be seen in 1.5 Volume 2**.**

The proposed development falls into the functional area of Roscommon County Council. The scope of this E.I.S deals with the impact of the proposed development on the surrounding environment under the headings of Human Beings, Flora and Fauna, Soils and Geology, Surface Water, Air and Climate, Cultural Heritage, Noise, Material assets, Use of Natural Resources, Traffic and Road Network and Landscape and visual impact.

BioPower intends to apply for planning permission for the development of a BioPark® at a 30 acre site of coniferous and deciduous forestry in Ballinaphuill, Tibohine, Castlerea, Co Roscommon

2. Reasons for development

The need for the development of a BioPark® comes from the following directives, policies and development plans:

- 2003/30/EC Biofuels Obligations This Directive aims at promoting the use of biofuels to replace diesel or petrol for transport purposes in each Member State. A reference value for these targets shall be 5.75 %, calculated on the basis of energy content (Irish target for biofuels 2009
- Landfill Directive (91/31/EC)
- National Strategy on Biodegradable Waste, 2006
- Water Pollution Act
- Waste Management (Use of Sewage Sludge in Agriculture) (Amendment) Regulations 2002(S.I. No. 267 of 2001)
- S.I. No. 788 of 2005 Nitrogen Regulations
- The Bioenergy Action Plan, 2007
- EPA Viewpoint on Anaerobic Digestion

There are a number of reasons for the proposed development of a BioPark® in Ballinaphuill, Tibohine, Castlerea, Co Roscommon, they include:

- Roscommon is a good farming area. This is beneficial as a BioPark is an agriculturally dependant operation.
- The 30 acres of forestry will provide good screening for the BioPark®. BioPower ltd intends to remove approximately 7 acres of coniferous forestry from the centre of the site.
- The N5 provides excellent road access to the BioPark®

3. Description of project

The development of a BioPark® will consist of the construction of three buildings to house the Rape Seed processing equipment, BioDiesel production equipment and Fuel pelleting equipment, one building to act as a raw material storage building and an Anaerobic digester with its associated tanks and buildings. The layout of the BioPark® can be seen in Appendix A

3.1 Description of Project (Rape Seed processing)

The Rape Seed Processing plant has a capacity of 10,000 t/a of Rape Seed. After the pressing of the seed this will result in 3,333 tonnes of Rape Seed Oil and 6,666 tonnes of Rape Seed cake.

The Rape Seed Processing equipment will be housed in a 30m×24m building (8.1 m to the eaves and 11.4m to the apex). The building design can be seen in Appendix A.2. This size of this building will allow for sufficient space for manoeuvring of the incoming loads of Rape Seed and will also provide short term storage capacity for the processing plant.

The Rape Seed processing plant/equipment consists of:

1. Intake Hopper
2. Seed Cleaner
3. Cleaned seed storage tank
4. Heated hopper
5. Oil Seed presses

6. Filtering
7. Oil storage tanks: Filtered oil is then fed into the two 20m³ storage tanks.

Rape Seed Pressing process consists of:

1. Rape Seed will be fed to the intake hopper . This hopper will ensure that the system has a constant supply of raw material.
2. The Rape Seed then proceeds to the seed cleaner where impurities such as particles of straw and small stones are removed.
3. This cleaned seed is stored in a clean seed storage tank.
4. This seed is then fed to the heated hopper where the seed is pre heated before pressing.
5. The cleaned and pre heated seed then travels to the Oil Seed press where the seed is pressed to separate the oil from the cake
6. The oil is then filtered to remove any impurities.
7. The filtered oil is stored in internal storage tanks and is ready for use in the BioDiesel processing plant.

3.2 Description of Project (Bio Diesel Production)

Rape Seed oil from the Rape Seed processing plant will be supplied to the Bio Diesel plant. This plant will be capable of processing the 3,333 tonnes of Rape Seed oil, this equates to approximately 3.5million litres of BioDiesel

The BioDiesel equipment will be housed in a 30m×24m building (8.1m to the eaves and 11.4m to the apex) See Appendix A.2

The BioDiesel processing plant/equipment consists of:

1. Storage tank
2. Sodium Methoxide mixing tank
3. Transesterification tank
4. Filtration and Glycerol removal
5. Storage tank

BioDiesel process consists of:

1. Pure Vegetable oil (Rape Seed oil) is stored in a storage tank within the BioDiesel building.
2. Sodium Hydroxide and Methanol are mixed to form Sodium methoxide.
3. The vegetable oil is pumped to the reaction tank, the oil is heated to 40 º C. Sodium Methoxide is then added to the vegetable oil. The vegetable oil is converted to BioDiesel by a process known as transesterification
4. After the process of transesterification Glycerol settles to the bottom of the tank, this is removed and the BioDiesel is then filtered.
5. This filtered BioDiesel is then pumped to the storage tanks.

3.3Description of project (Anaerobic digester)

The Anaerobic digester produces Biogas from the naturally occurring non-hazardous decomposition of feedstocks. It has a capacity of 20,000t/a. The Biogas is a mix of Methane (60%) and Carbon Dioxide (40%). This equates to approximately 500 kW electricity and 1000 kW Thermal. This gas will be used in a Combined Heat and Power (CHP) plant to produce Electricity and heat. The Anaerobic digester requires the following plant and equipment:

The Anaerobic digestion processing plant/equipment consists of:

1. Weigh bridge - this will weigh the incoming vehicles and determine the weight of the feedstock.

2. Reception area - (building spec can be seen in Appendix A.2) – This will consist of a building of the dimensions 24.4m×9.406m and 8.1m high. The building will be fully grouted and sealed, and fully bunded in case of accidental spillages.
3. Odour control unit- This is present in the reception building. The air in the reception building is pumped through a biological filter (Peat filter)
4. Reception tank – This is an enclosed tank that the raw material delivery tanker "plugs" into. The dimensions of the tank are 7m Diameter and 3.24m high.
5. Anaerobic digestion tank – This comprises of an air tight steel tank with internal radiators to maintain the internal temperature. The dimensions of the tank are 20m Diameter and 5m high
6. Gas scrubbers- Trace levels of gases (Ammonia, Hydrogen Sulphide) are generated during the anaerobic digestion process. A gas scrubber is required to remove these gases before use in the Combined Heat and Power generator(See Appendix N)
7. Bio Gas flare – Any excess gas will be burnt off using the gas flare. This will prevent any excess pressure within the system. This is a safety measure; all gas is intended for use in the Combined Heat and Power generator which will produce electricity.

The Anaerobic digestion process consists of:

1. Incoming loads of raw material are weighed at the weigh bridge.
2. The raw material is then pumped into the reception tank from within the reception building
3. The raw material is then pumped to the digestion tank where anaerobic digestion will take place.
4. During this digestion, biogas is produced this biogas is scrubbed to remove impurities. The gas is then stored in a gas holder before use in the CHP unit
5. The digested raw material is now pumped to the on-site storage tanks. It can now be used as an organic fertiliser.

The proposed plant will have a capacity of 20,000 t/a of raw material. The plant will accept and generate biogas from a materials that will include Municipal and Industrial sludge's, dairy waste, agricultural slurries, precision chopped grass and maize, glycerol, grain screenings, sub standard fuel pellets and Rape Seed cake. No hazardous waste will be accepted into the digester.

The Anaerobic digester is designed so as to reduce the visual impact to the surroundings. (The layout of the Anaerobic digester can be seen in Appendix D.1)

3.4 Description of Project (Fuel pellet production)

The fuel pellet production plant will have a capacity of 10,000 t/a.
The fuel pelleting equipment will be housed in a 30m×24m building (8.1 m to the eaves and 12m to the apex). See Appendix B.2

The Fuel pelleting processing plant/equipment consists of:

1. Material Intake: is made up of rotating blades and a slow moving conveyor belt.
2. Hammer mill: an enclosed unit that is made up of a number of blades.
3. Rotation pelletiser: contains a rotating gear and a die of specified size.
4. At the pelleting stage, materials such as Rape cake, Miscanthus and other energy crops are dded can be added to adjust the properties of the pellet (properties include calorific value, mechanical durability, moisture content etc)
5. Storage tank

The fuel pelleting process consists of:

1. The main feedstock (oaten, barley, wheaten straw) is fed into the material intake machine. The straw is chopped and transported to the hammer mill via conveyor belt
2. The hammer mill futher chops the straw into finer pieces for use in the rotation pelletiser, the finely chopped straw is transported to the pelletiser via conveyor belt.

3. The rotation pelletiser compresses and extrudes the finely chopped straw and additional materials (miscanthus, rape cake and other energy crops) through a die to create a fuel pellet.
4. At the pelleting stage additional materials (energy crops) can be added via auger.
5. The pellets are then blown to storage tanks.

4. Planning context

The proposed development of a BioPark® falls within the planning authority of Roscommon County Council. The following are the main points of the county development plan for Roscommon County

- **Policy 133** Encourage and facilitate small indigenous industries, in recognition of their increasing importance in providing local employment and helping to stimulate economic activity among local communities.
- **Policy 52** Support the location of industries in Ballaghaderreen that have a high level of synergy with the local economy and are sustainable in the long term.
- To develop biological treatment capacity of organic wastes sufficient to meet national and regional targets (from waste management plan)

5. Facility operation

Hours of operation

5.1 Rape Seed processing plant

- Employees will arrive at the plant at 7.45am and will be leaving the plant at 5.45pm
- Rape Seed processing is a continuous process, if the seed press were to stop the cooling oil would clog the machine.
- 24 hour continuous processing
- Proposed hours of Rape Seed delivery/ handling are 8am-5pm
- No deliveries on Sundays

5.2 Bio Diesel production

- Employees will arrive at the plant at 7.45am and will be leaving the plant at 5.45pm
- Proposed hours of BioDiesel production are 8am – 5pm
- No deliveries on Sundays

5.3 Anaerobic digestion

- Employees will arrive at the plant at 7.45am and will be leaving the plant at 5.45pm
- Proposed hours of raw material delivery 8am – 5pm
- The process of Anaerobic digestion is continuous. No noise is generated by digestion process.
- No deliveries on Sundays

5.4 Fuel Pellet production

- Employees will arrive at the plant at 7.45am and will be leaving the plant at 5.45pm
- Proposed hours of Fuel pellet production are 8am – 5 pm
- No deliveries on Sundays

Management

Name	Position	Duties and Responsibilities	Experience/ Qualifications
To be decided	BioPark Manager		-Suitable experience in a similar field. -Biological treatment Certification FAS -Third level qualification in relevant area
Mark O Connor	Anaerobic Digestion Plant Manager	-Accepting waste /feedstock deliveries -Auditing of waste suppliers. -Maintaining records of deliveries, in-line sampling results and the Anaerobic Digesters operational parameters -Supervising on-site employees -Scheduling of any relevant training courses	-Biological treatment Certification FAS 2009 - B.Ag in Science UCD 2006 Certificate in Agriculture 2003
To be decided	Assistant Anaerobic Digester Plant Manager		-Suitable experience in a similar field. -Biological treatment Certification FAS -Third level qualification in relevant area
To be decided	Fuel Pelleting Plant Manager		-Suitable experience in a similar field. -Biological treatment Certification FAS
To be decided	Rape Seed Crushing Plant Manager		-Suitable experience in a similar field. -Biological treatment Certification FAS
To be decided	BioPark General Operative		-Suitable experience in a similar field. -Biological treatment Certification FAS

Environmental Management System

The Environmental Management System (EMS) proposed for the site will be developed and maintained in accordance with Environmental Protection Agency (EPA) waste license requirements. The EMS will be established prior to commencement of waste activities at the site and will incorporate planning and waste license condition requirements. In accordance with EPA license requirements the EMS will be updated on an annual basis.

The EMS will include as a minimum the following elements, which relate directly to standard conditions of an EPA waste license concerning EMS requirements (typically Condition 2 Management of Facility of an EPA waste license):

1 **Management and Reporting Structure**
2 **Schedule of Environmental Objectives and Targets**
3 **Environmental Management Programme (EMP)**
4 **Documentation**
5 **Corrective Action**
6 **Awareness and Training**
7 **Communications Programme**
8 **Maintenance Programme**
9 **Efficient Process Control**

More details on the environmental management system are included in Volume 2 of this EIS.
Biopower Limited is committed to developing and improving each of the above elements prior to commencement of waste activities at the site and on an ongoing basis thereafter.

6. Likely Environmental effects and mitigation measures

6.1 Dust

As part of this assessment, a baseline ambient air quality review was carried out by O Neill Ground Water Engineering. This focused on the ambient dust levels on the site. A baseline reading of the ambient dust levels was taken which indicates that the receiving air quality in the general area is good and is in keeping with typical values for the rural environment (appendix G)

6.1.1 Potential Contamination

- Increased levels of traffic during construction and operation of the BioPark® could increase dust levels on site
- The Anaerobic digester will generate the gases Methane (approx 60%), Carbon dioxide (approx 40%) and trace levels of Ammonia and Hydrogen Sulphide.
- Fossil fuel emissions from the transport vehicles and from the standby oil boiler as well as emissions from the Combined Heat and Power unit are likely to occur, but are unlikely to exert any significant impact on the local air quality.
- The handling of the required raw materials for the Anaerobic digester provides the potential for odour.
- The pelleting process does generate dust during normal operation. This could increase dust levels on site.

6.1.2 Impact of proposed development

- The increased traffic during the construction and operation of the BioPark® will increase dust levels on site

- There will be no gas emissions during the operation of the BioPark®. All gas produced by the Anaerobic digester will be passed through a gas scrubber to remove the trace levels of Ammonia and Hydrogen Sulphide produced.
- Dust will be generated by the Fuel pelleting process during normal operation.
- It is a plug in system whereby the raw material is pumped into an air tight tank; there are no odours generated.

6.1.3 Mitigation measures

- Dust will be created during the construction phase of the project and to a lesser extent during everyday operation due to the increased levels of traffic. Mitigation measures which are proposed by BioPower ltd include wheel washing and sufficient water hoses available on-site to spray roads and driveways during dry periods to ensure a minimization of dust levels.
- The gas generated from the anaerobic reaction will be removed via a gas pump and passed through a gas scrubber. This removes the trace levels of Hydrogen Sulphide (H2S) and Ammonia (NH3) which could contribute to the greenhouse effect if released.
- Feed stocks will be pumped directly into an airtight reception tank.
- Transferring the feedstock via pump to the reception tank will take place indoors.
- The reception building will be under negative pressure, the air within the building will be passed through a peat filter.
- There will be concrete aprons outside all buildings.
- Qualified personnel will be employed in the operation of each of the processes in the BioPark®.
- Effective management will ensure the efficient operation of the BioPark®.

6.2 Soils and Geology

Details of the Soils and Geology of the area were provided by O Neill Ground Water Engineering.

Bedrock Geology

The bedrock in this region of Roscommon age from the Lower Carboniferous which consist of limestone, shale and sandstone. According to the GSI bedrock mapping the northern part of the site is underlain by Oakpork Limestone which comprise bedded, medium to fine grained limestone. The Visean Limestone, which underlie the southern section of the site are undifferentiated, are likely to comprise clean and muddy units. Both limestone types are known to be karstified.

There are no major structural features mapped in the approximate vicinity of the site. However, many of the Carboniferous rocks in Roscommon show gentle folds, uplift and block faulting characteristics. Faulting may have occurred as a result of this.

Subsoils

Bedrock in the surrounding area is mainly overlain with sandstone Tills and cutaway peat.

The sandstone Tills which are mapped in the vicinity of the site are derived from the sandstone rock to the north and west of this region of Roscommon. However, the subsoils within this site appear to have a high organic content indicating peat subsoils partly underlie the site. Tills are often tightly packed, unsorted, unbedded and have many different particle sizes and stone sizes. Tills form elongated hills in this region. They generally have a low permeability as do peat subsoils. (*see 6.17 below).*

6.2.1 Potential Contaminants

- Products from each of the processes from the BioPark® if not managed properly could be a potential source of contamination.

6.2.2 Impact of Proposed development

Geology and Soils

- A positive effect of the proposed development is the proposed landscaping that is to be carried out before and after the construction phase of the development.
- Qualified personnel will be employed in the operation of each of the processes in the BioPark®.
- Effective management will ensure the efficient operation of the BioPark®.

6.2.3 Mitigation measures

Geology and Soils

No mitigation measures are required. Stockpiled soils will be used for restoration.

6.3 Water

The Water section of this EIS was undertaken by O Neill Ground Water Engineering. This section deals with the hydrological and hydrogeological assessment of the site. There were two stages to this investigation: (1) Desk study and analysis (2) Site visits and field work.

6.3.1 Potential Contamination

By-Products and Waste Water

- By-products and waste water, if not managed properly could be potential sources of contamination.
- It is proposed that waste water from office be discharged to ground via a septic tank system and is potentially a contamination source if the system is not designed properly.
- It is proposed that storm water from the buildings and hardstanding areas of the development be discharged to ground via a soakaway system and is potentially a contamination source if not designed to recommended specifications.

6.3.2 Impact of the proposed development

Surface Water

There is no discharge from the proposed development to any surface water streams. However surface run-off from poorly designed hardstanding areas has the potential to impact on surface water. The risk is considered to be low.

Groundwater

It is not expected that waste water and by-products from process areas will impact on the ground water quality of the site as each process building and tank is to be fully bunded and sealed. There is no discharge to ground from processing plant or digester.

6.3.3 Mitigation measures

Surface Water

- All operations will take place in fully grouted and sealed buildings
- Saw dust will be available near any areas of potential spillage.

Groundwater

- Ground water monitoring wells should be located up-gradient and down-gradient of the process areas to detect any deterioration in the ground water resulting from the proposed development.
- No outdoor operations.

- All parking of vehicles will be carried out on hardstanding areas. The runoff from such paved areas will pass through a hydrocarbon interceptor before being released into the storm water system.
- Qualified personnel will be employed in the operation of each of the processes in the BioPark®.
- Effective management will ensure the efficient operation of the BioPark®.
- All buildings will be bunded.

6.4 Noise

A noise monitoring program was carried out by O Neill Ground Water Engineering at noise sensitive locations on and around the proposed site.

6.4.1 Possible sources of Noise

- As would be expected the impact of this development in relation to noise will be greatest during the construction phase.
- During normal operation the traffic generated will have the most effect on noise levels.
- Boilers and feed pumps used in the processes of Rape Seed processing, BioDiesel production and Anaerobic digestion will have an effect on the sites noise levels.

6.4.2 Mitigation measures

- The primary mitigation measure being employed to minimise noise production from the site will be the placing of plant equipment inside shed units. This will house the primary sources of noise and reduce significantly any noise levels audible from the site.
- Insulation of buildings and the servicing of plant and equipment will ensure minimal noise.
- Set operational hours need to be enforced by site management so as to minimise the potential for delivery vehicles arriving after hours or in early mornings and to mitigate against the need for loading shovels – and the associated reversing alarms, being utilised in the evening and night periods.

6.5 Traffic/ Road network

A traffic survey was carried out and the results can be seen in Appendix E
The site is located along a National road N5. Access to the site is along a county road which joins the N5

6.5.1 Environmental Impacts

- The proposed development of a BioPark® will generate traffic. Projected traffic volumes of the BioPark® as a whole can be seen in more detail in Volume 2 of this EIS. These volumes assume normal operation (not construction vehicles). The estimated traffic volume number at approximately 38 traffic movements per day, this figure includes both agricultural vehicles and light vehicles (employees).

  This increase in traffic and its impact on the existing road traffic volumes can also be seen in more detail in Volume 2 of this EIS.

6.5.2 Mitigation measures

- Effective scheduling of incoming and outgoing vehicles will ensure that there is the least possible disruption to the existing road network; this will be achieved by avoiding the rush hours during the day.

6.6 Ecology

As part of this assessment an ecological survey was carried out to catalogue the types of Flora and Fauna in the area. The site is not located on or near any sites designated for nature conservation. No rare or protected plant or animal species were recorded present at the site. The full Flora and Fauna report can be seen in Appendix I.

6.6.1 Environmental Impact

- The impact of the proposed BioPark® on the local flora and fauna will be greatest during the construction phase. The initial ground works will involve the removal of approximately 6 acres of forestry (see drawing 1) and stripping of the topsoil.

6.6.2 Mitigation measures

- The expected minimal impact will be offset by the proposed landscaping plan (Appendix J); this proposed improvement to the sites landscape will serve to improve the variety of flora and fauna in the area.

6.7 Landscape and Visual impact

The proposed developments impact on the landscape are minimised by the proposed landscaping plan and the plants design (Appendix J).

6.7.1 Environmental Impact

- The vertical profile of the proposed BioPark® can be seen in Appendix D.1, D.2, and D.3+ D.4. This shows the highest points of the buildings and gives an indication of what the operational BioPark® will look like and its impact on the landscape.

6.7.2 Mitigation measures

The proposed measures to reduce the impact of the digester on the surrounding environment are:

- The planting of trees and shrubs in order to reinforce the existing hedgerows (Landscaping Plan Appendix J)
- The use of matt type dark green proprietary oxide paints on suitable surfaces.
- The BioPark® is designed so as to reduce the vertical profile and reduce its visual impact.

6.8 Cultural Heritage

A desktop study of the region in relation to the archaeological significance of the area was undertaken and can be seen in Volume 2. The proposed development does not impact any known archaeological sites or monuments.

6.9 Material assets

The public service, local amenities and industry will not experience any significant negative effects as a result of the proposed development.

BioPower Ltd

Environmental Impact Statement

Volume 2- Main Text

For the development of a BioPark®

Located at
Ballinphuill,
Tibohine,
Castlerea,
Co Roscommon

Registered office:
48 Main Street,
Schull,
Co Cork.

Registered Number: 355995
Company Directors: Walter Ryan-Purcell, Donall O Laoire, William Daunt

Table of Contents

Section 4- Environmental effects and mitigation measures

Section 5- Summary of mitigation measures

5.1 Human beings
5.2 Traffic volume
5.3 Flora and Fauna
5.4 Soil
5.5 Water
5.6 Air
5.7 Dust levels
5.8 Landscape
5.9 Noise
5.10 Cultural heritage

Section 1-Introduction

1.1 Background

BioPower ltd is a renewable energy company which is in the process of setting up a large number of small scale BioPark®s around Ireland and the U.K.

The following is the Environmental Impact Statement for the development of an Anaerobic Digester in Ballinaphuill, Tibohine, Castlerea, Co Roscommon (Planning Ref 08/656). The Anaerobic Digester will form part of an integrated BioPark. A BioPark® is a combination of four complimentary processes in close proximity so that each process can use the by product of another process, This is the definition of a BioPark® and its purpose is to increase the productivity and efficiency of the processes within the BioPark. The four process involved in a BioPark® are Rape Seed processing, BioDiesel production, Anaerobic digestion and Fuel pellet production.

This Environmental Impact Statement forms part of a Waste License Application and as such concentrates only on the Anaerobic Digestion section of the BioPark

Anaerobic digestion

Anaerobic digestion is the naturally occurring process of decomposition of organic raw material in the absence of oxygen. During the non-hazardous digestion process the decomposition produces Methane (BioGas) and heat. This Bio Gas can be used in a Combined Heat and Power boiler in order to generate electricity and heat. This electricity and heat will be supplied to the other facilities within the BioPark®.

The environmental consequences of any project are generally presented in the form of an Environmental Impact Statement (EIS). The EIS contains information on the scale and nature of the project, its emissions and discharges. Such a statement also describes the location of the project site, its environmental setting, resources and infrastructure and a prediction of the likely impacts of the project on the receiving environment and the mitigation measures for these impacts

Irish legislation, The European Communities (Environmental Impact Assessment) Regulations SI No 349 of 1989 specifies classes of projects and what is to be contained in an Environmental Impact Statement (EIS). The local government (Planning and Development) Regulations, SI No 86 of 1994 specifies the types of projects which should be subject to an EIS

Activities that require an Environmental impact statement are shown in Schedule 5 of the Planning and Development Regulations

The proposed project of the BioPark® does not appear to fall into any of the categories in schedule 5, however BioPower ltd decided to submit an EIS in order to illustrate fully that this project is small scale with minimal negative environmental impacts.

The Environmental Protection Act 1992, No7 of 1992 outlines, in Schedule IV activities that are subject to Integrated pollution control licensing which is the responsibility of the Environmental Protection Agency. The proposed development does not require an IPPC license.

The Waste Management Act, 1996 SI No 10 in 1996 indicates what activities will require a Waste Licence from the EPA. The development of an anaerobic digester at this site will require a Waste license, though due to its small scale a waste permit from the local authority would suffice.

To prepare the Environmental Imapct Statement, BioPower ltd along with a number of Environmental specialists (study team can be seen in 1.3 Volume 2) carried out various surveys on the proposed site. The results of these surveys can be seen in the attached appendices and are referenced throughout this text.

1.2 The Applicant

Contact details of the company are as follows:

AD Power Roscommon Ltd,
Ballinphuill,
Tibohine,
Castlerea,
Co Roscommon

The directors of AD Power Roscommon ltd are as follows:

Donal O Laoire,
Walter Ryan-Purcell,
William Daunt

BioPower ltd Registration No: 470612

1.3 Environmental Impact Assessment

This Environmental Impact Statement was prepared for the Waste License application for AD Power Roscommon Ltd's proposed Anaerobic Digester.

The purpose of this document is to identify the potential environmental impacts and describe the mitigation measures. This document will also describe the ongoing monitoring that will be in effect to assure the success of the proposed mitigation measures.

The following environmental aspects of the development will be discussed as part of the assessment:

- Flora and Fauna
- Archaeological and cultural assets
- Human beings
- Visual impact
- Water quality
- Material assets
- Use of Natural resources
- Air and Climate
- Soils and Geology
- Roads and Traffic
- Noise

1.4 Structure of EIS

The structure of this EIS is based on the guidelines provided by the Environmental Protection agency.

The overall EIS is arranged into three volumes

(i) Volume 1- Non-Technical summary

(ii) Volume 2 Environmental Impact statement-Main text

(iii) Volume 3Appendices

Volume 2 is divided into sections as follows

Section 1- Introduction
Section 2- Existing site
Section 3- Description of the proposed development
Section 4- Environmental effects and mitigation measures
Section 5- Summary of the mitigation measures

Appendices:

Appendix A – Location Map
Appendix B – Layout Drawings
Appendix C – Traffic Survey
Appendix D –Flora and Fauna
Appendix E– Landscaping Plan
Appendix F– Drilling Log
Location of Ground water samples
Ground water test results

1.5 Study team and contributors to the EIS

The study team and contributors are as follows:

Walter Ryan-Purcell B.Agr.Sc MMII (Grad)	BioPower Group plc
Donall O'Laoire	BioPower Group plc
Dr Colin J Cambell PHD	BioPower Group plc
David Brodrick	O Neill Ground Water Engineering
Tim Clarke BSc MSc	Waste Works ltd
Michael Butler BEng, BSc	BioPower ltd
Tony Dineen BEng.Civil BEng.Struct	BioPower ltd
Jeremy Scott-Bolton	Landscaping Consultant Cert Forestry and Bio diversity (distinction)

1.6 Orginisations and Bodies consulted:

- Geological Survey of Ireland
- Met Eireann
- National parks and wildlife services
- Roscommon County Council (Planning Department)
- Roscommon County Council (Environment Section)
- Department of Agricultural, Fisheries and Food (ABP Section)

1.7 Planning context

The main Policies and standards that are relevant to the proposed BioPark® are set out below:

- **Policy 52** Support the location of industries in Ballaghaderreen that have a high level of synergy with the local economy and are sustainable in the long term. (Draft Roscommon County Development Plan 2008 – 2014)
- **Policy 133** Encourage and facilitate small indigenous industries, in recognition of their increasing importance in providing local employment and helping to stimulate economic activity among local communities. (Draft Roscommon County Development Plan 2008 – 2014)
- To develop biological treatment capacity of organic wastes sufficient to meet national and regional targets (Replacement Waste Management Plan for Connaught Region 2006 – 2011)

The proposed development is located in the functional of Roscommon County Council. The proposed development fits in to the Roscommon County Development plan in relation to the Policies and Objectives set out in Roscommon County Development Plan.

1.8 Need for the facility

The need for the facility can be seen from the following directives and development plan:

The need for the development of an Anaerobic Digester comes from the following directives, policies and development plans (Not an exhaustive list):

- National Strategy on Biodegradable Waste, 2006
- Landfill Directive (91/31/EC)
- Water Pollution Act
- Waste Management (Use of Sewage Sludge in Agriculture) (Amendment) Regulations 2002(S.I. No. 267 of 2001)
- S.I. No. 788 of 2005 Nitrogen Regulations
- EPA Viewpoint on Anaerobic Digestion

These directives and development plan coupled with the recent emphasis on green issues and increasing cost of energy and fuel all serve to create a suitable and positive climate for the development of an Anaerobic Digester.

The proposed facility will have major beneficial impacts by enabling:

- The generation of electricity in a renewable manner,

- The production of an organic fertilliser (equivalent to approximately 740 tonnes of inorganic fertilliser)

This process and the operation of the aforementioned Anaerobic Digester relies heavily on farming in the local area for the supply of raw material

1.9 Site selection

(Site location maps Appendix A)
The list of attributes required for a suitable site for a BioPark® are:

- Adequate site size (>8 acres)
- Close to 3-phase power.
- Reasonably isolated location.
- Good access to Regional and National road networks
- Suitably located in relation to other BioParks® (each BioPark® has its own catchment area for raw materials. BioParks® that are too close to one another would effectively be working against each other)
- Not located on any areas of protection or conservation, areas of significant archaeological interest etc.

The proposed site was picked as:

- Good farming area
- There is good accessibility to both Regional and National road networks.
- The existing forestry will provide excellent screening for the proposed BioPark®

1.10 Land ownership

Land owner Kevin Flynn has signed a purchase option agreement with BioPower Group plc subject to planning permission being granted. AD Power Roscommon Ltd is a fully owned subsidiary of BioPower Group Plc

1.11 Outline of the development

This section describes the basic characteristics of the four processes of a BioPark® and its site. A more detailed description of the design, operation and layout of the development can be seen in section 4 of the EIS.

The proposed site for the BioPark® is a block of 30 acres of coniferous and deciduous forestry. The proposed BioPark® will require the construction of:

- The construction of a 20,000t/a Anaerobic digester will require a 3 acre site. The Anaerobic digestion plant will require the following tanks and buildings and facilities:

	Number	Construction type/ material
Raw material reception building	1	A-frame steel structure, with mass concrete walls and floor. Blow-on insulation 40mm thick
Control room/ boiler room	1	
Solid separation building	1	A-frame steel structure,

		with mass concrete walls and floor. Airtight acoustic/fire retardant spray on insulation (40mm).
Raw material reception tank	1	Stainless Steel.
Digestion tanks	2	Stainless Steel.
Digestate tanks	4	Stainless Steel.

- The BioPark® will require a weighbridge which will monitor the loads of raw material coming into the BioPark®.
- A minimum 2.4m and maximum 3m high chain link security fence around the perimeter of the BioParkS® operational area.
- All travelled surfaces will be covered with rolled 804 type material and blinding.
- There will be concrete aprons outside all buildings.
- The Anaerobic digesters reception building will have an internal wheel wash.
- Landscaping will be in the form of the existing forestry on site. The landscaping plan that has been prepared involves adding to the existing flora by planting additional plants and trees.

The environment in which this facility will be placed has been investigated and is described in Sections 1 and 2 of the EIS. The characteristics of the facility in terms of the physical works, design, operations, and potential emissions are outlined in Section 3 of the EIS. Section 4 deals with potential impacts of the facility and the mitigation measures that are incorporated in the design and the operation of the facility to ensure that these effects are minimal. Section 5 presents a summary of the mitigation measures and any residual minor impacts.

1.12 Physical dimensions of a BioPark®:

The physical dimensions of the main buildings of the BioPark® are highlighted in the following tables: The BioPark® will occupy a 7 acre section of the 30 acre site.

1.12.3 Anaerobic digestion

Component (Anaerobic digester)	Dimension L×B×H
Reception building	24m×9m (8.1m to apex)
Reception tank × 2	7m radius 3.25m high
Digestion tank × 2	10m radius 6.28m high
Control room/ office/ Gas boiler room	12m×5m×5m
Digestate storage tank × 2	13.2m Radius 6.28m high

Energy Efficiency

During normal operation

Facility Operation and Management

Hours of operation

Rape Seed processing plant

- Employees will arrive at the plant at 7.45am and will be leaving the plant at 5.45pm

- Rape Seed processing is a continuous process, if the seed press were to stop the cooling oil would clog the machine.
- 24 hour continuous processing
- Proposed hours of Rape Seed delivery/ handling are 8am-5pm
- No deliveries on Sundays

Bio Diesel production

- Employees will arrive at the plant at 7.45am and will be leaving the plant at 5.45pm
- Proposed hours of BioDiesel production are 8am – 5pm
- No deliveries on Sundays

Anaerobic digestion

- Employees will arrive at the plant at 7.45am and will be leaving the plant at 5.45pm
- Proposed hours of raw material delivery 8am – 5pm
- The process of Anaerobic digestion is continuous. No noise is generated by digestion process.
- No deliveries on Sundays

Fuel Pellet production

- Employees will arrive at the plant at 7.45am and will be leaving the plant at 5.45pm
- Proposed hours of Fuel pellet production are 8am – 5 pm
- No deliveries on Sundays

Management

There will be two full time employees working at the proposed BioPark®

The two positions are: Plant Manager
Assistant Plant Manager

There will be a number of consultants available to the Plant manager. These include

Tim Clarke B.Sc, M.Sc.

Tim currently operates as a consultant specialising in sustainable waste, water and biomass energy systems. Tim first started work in the field of anaerobic digestion in the UK in 1983 and subsequently founded a successful small company in the UK supplying digesters throughout Europe. In 1996 he moved to Ireland and founded "WasteWorks"; providing consultancy services in sustainable waste and water treatment systems. Projects include detailed process and m/e design of anaerobic digestion systems for treatment of a wide variety of wastes; design and supply of reed bed wastewater treatment systems; and ABPR/license and planning applications. Recent clients include the UK Dept of Trade/Industry, engineering companies, consultants County Councils and private companies in UK and Ireland.

Walter Ryan-Purcell B.Ag.

BioPower founder and General Manager. He was cofounder and General Manager of McGill Environmental Systems (Ireland) Ltd., from 1997 to April 2005, an industrial composting business. McGill operates three factories in Munster, acquired two other sites, one in Cork and one in Meath, obtained planning permission and EPA waste licenses for both.

Peter Carey, B.E. M.Eng.Sc,. M.Sc., D.I.C., M.B.A., C.Eng., M.I.E.I., M.C.I.W.M

Planning and Environmental Consultant. Peter is a Senior Executive with more than 15 years experience in Environmental Management with a special focus on waste and renewable energy. Peter has a wealth of experience of interpreting and applying both National and EU legislation and has the skills and experience

to instigate and manage all types of projects. Peter is a Chartered Civil Engineer and a member of the Chartered Institution of Waste Management. Peter has worked as a General Manager with Bedminster International and also as a Development Engineer with M.C.O Sullivan & Co Ltd. Peter also worked for a time with the EPA as a Regional Inspectorate.

Michael Butler BEng, BSc
Michael Butler, Chief Engineer of BioPower Ltd. Michael has an Honors Degree in Advanced Manufacturing Technologies. He has experience in implementing maintenance programs in small to medium sized plants. He has Combined Heat and Power generator maintenance experience as well as industrial boiler maintenance experience

Name	Position	Duties and Responsibilities	Experience/ Qualifications
To be decided	BioPark Manager		-Suitable experience in a similar field. -Biological treatment Certification FAS -Third level qualification in relevant area
Mark O Connor	Anaerobic Digestion Plant Manager	-Accepting waste /feedstock deliveries -Auditing of waste suppliers. -Maintaining records of deliveries, in-line sampling results and the Anaerobic Digesters operational parameters -Supervising on-site employees -Scheduling of any relevant training courses	-Biological treatment Certification FAS 2009 - B.Ag in Science UCD 2006 Certificate in Agriculture 2003
To be decided	Assistant Anaerobic Digester Plant Manager		-Suitable experience in a similar field. -Biological treatment Certification FAS -Third level qualification in relevant area
To be decided	Fuel Pelleting Plant Manager		-Suitable experience in a similar field. -Biological treatment Certification FAS

To be decided	Rape Seed Crushing Plant Manager		-Suitable experience in a similar field. -Biological treatment Certification FAS
To be decided	BioPark General Operative		-Suitable experience in a similar field. -Biological treatment Certification FAS

Environmental Management System

The Environmental Management System (EMS) proposed for the site will be developed and maintained in accordance with Environmental Protection Agency (EPA) waste license requirements. The EMS will be established prior to commencement of waste activities at the site and will incorporate planning and waste license condition requirements. In accordance with EPA license requirements the EMS will be updated on an annual basis.

The EMS will include as a minimum the following elements, which relate directly to standard conditions of an EPA waste license concerning EMS requirements (typically Condition 2 Management of Facility of an EPA waste license):

1 Management and Reporting Structure

Details of the on-site management structure indicating in particular responsibility levels for environmental management will be provided.

2 Schedule of Environmental Objectives and Targets

A Schedule of Environmental Objectives and Targets will be prepared. This will as a minimum provide for a review of all operations and processes, including an evaluation of practicable options, for energy and resource efficiency, the use of cleaner technology, cleaner production, and the prevention, reduction and minimisation of waste, and will include waste reduction targets. The schedule will include time frames for the achievement of set targets and will address a five year period as a minimum. The schedule will be reviewed annually and amendments notified to the EPA for agreement as part of the Annual Environmental Report (AER).

3 Environmental Management Programme (EMP)

An EMP will be prepared and will include a time schedule for achieving the Environmental Objectives and Targets identified under bullet 2 above. The EMP will include:

- designation of responsibility for targets;
- the means by which they may be achieved;
- the time within which they may be achieved.

The EMP shall be reviewed annually. A report on the programme, including the success in meeting agreed targets, will be prepared and submitted to the EPA as part of the AER. Such reports shall be retained on-site for a period of not less than seven years and shall be available for inspection by authorised persons of the EPA.

4 Documentation

An environmental management documentation system will be established and maintained. Copies of regulatory permits (waste license and planning) will be made available to all relevant personnel whose duties relate to any conditions of the waste license or planning permission.

5 Corrective Action

Procedures will be established to ensure that corrective action is taken should the specified requirements of the waste license not be fulfilled. The responsibility and authority for initiating further investigation and corrective action in the event of a reported nonconformity with the waste license will be defined.

6 Awareness and Training

Procedures will be established and maintained for identifying training needs, and for providing appropriate training, for all personnel whose work can have a significant effect upon the environment. Appropriate records of training will be maintained.

7 Communications Programme

A Public Awareness and Communications Programme will be established and maintained to ensure that members of the public are informed, and can obtain information at the facility, at all reasonable times, concerning the environmental performance of the facility.

8 Maintenance Programme

A programme for maintenance of all plant and equipment (based on the instructions issued by the manufacturer/supplier or installer of the equipment) will be established and maintained. Appropriate record keeping and diagnostic testing shall support this maintenance programme. Responsibility will be allocated for the planning, management and execution of all aspects of this programme to appropriate personnel in accordance with the on-site management structure and responsibilities.

9 Efficient Process Control

A programme to ensure there is adequate control of processes under all modes of operation will be established and maintained. The programme will identify the key indicator parameters for process control performance, as well as identifying methods for measuring and controlling these parameters. Abnormal process operating conditions will be documented, and analysed **to** identify any necessary corrective action.

Biopower Limited is committed to developing and improving each of the above elements prior to commencement of waste activities at the site and on an ongoing basis thereafter.

Security and entry control facilities

- The plants perimeter will be bounded by fencing and gates to the following specification.

  FENCING

  Uprights and strainers shall be embedded in 0.5m square concrete bases, not more than 3.0m apart. Four strands of 3.2mm plain wire shall be strained, and stapled or tied to the uprights with tying wire. Chain link fencing, 2.5mm, (to IS 130:1980), 1.8m high, shall be secured to the outside of the line wires over entire fence. One strand of 1.5mm barbed wire shall be placed along the top of the fence. Posts will be 2.3m long of Galvanised tubular steel, 75mm outside diameter, and 3.2mm thick.

  GATES

  The proposed site gates will be 1.8m high, constructed of galvanised steel and fitted with closing bolts and locks. The only horizontal bars shall be at the top and bottom of the gate. Chain link fencing shall be fitted to the outside of the gates. The gates shall be designed in such a way that neither people or animals can get through when the gates are closed
- All plant visitors will be required to sign in at reception and wear a visitors badge.

- The external lighting will be controlled at night by motion sensors, this will also discourage any potential trespassers.
- All the controls of the onsite equipment as well as the equipment itself (gas pumps, feed pumps etc) will be stored in a secure building to prevent tampering.
- Remote access video surveillance of the whole site.

Section 2- Existing Site

The existing site was looked at under the following headings

- Site location
- Adjoining land users
- Existing land users
- History of site
- Existing road network
- Existing site access
- Available services
- Topography
- Existing flora and fauna

2.1 Site location

The proposed site is located in Ballinaphuill, Tibohine, Castlerea, Co Roscommon. It is 30 acres of coniferous and deciduous forestry. An Ordinance survey map (scale 1:2500, 1:10,560) clearly shows the location of the site.

The nearest towns/villages to the site are:

- Roscommon- 40km to the South East
- Castlerea- 13km South of Tibohine site
- Ballaghadereen- 5k North West of Tibohine site

No part of the site is situated in areas designated as wetlands, coastal zones, mountain and forest areas, nature reserves and parks, special protection areas, densely populated areas or landscapes of historical cultural or archaeological significance

2.2 Adjoining land users

Adjoining land is predominantly agricultural. The site is bordered by existing hedgerows. All existing hedgerows will be maintained as part of the site and will be strengthened by further planting of indigenous trees and plants.

2.3 Existing land use

The site is 30 acres of 7-8 year old coniferous forestry. A belt of deciduous trees makes up the perimeter of the site.

2.4 History of Site

Before the 30 acre site was planted with Coniferous and deciduous forestry 8 years ago, the land was agricultural and was used for animal grazing.

2.5 Existing Road Network

The site is currently accessed via a cul de sac which joins the N5 to Ballaghaderreen. The planned N5 Ballaghadereen bypass will reduce the traffic volume on the access road by approx 70% (Roscommon County Council)

2.6 Site access

The site access is from a cul de sac running North, parallel to the sites western boundary (Appendix A). This county road joins the N5 to Ballaghadereen.

Section 3- Description of proposed development

3.1 Description of development

The description of the BioPark® is split into the 4 processes that make up the BioPark.

Unit Operations of the Anaerobic Digestion Plant

The following are a list of the unit operations involved in the anaerobic digestion process with a brief description of each included.

The process should be looked at in conjunction with the attached process layout DWG D.2 (a) and DWG D.2 (b).

A. Waste Delivery

Incoming loads of waste will be directed by plant personnel to the Reception building. The incoming lorry will proceed into the reception area after which the roller shutter door will close. Suitable liquid sludge's (1%-15%DS (Dry Solids)) will be pumped to the low solids reception tank. Incoming wastes with a Dry Solids content of greater than 15% will be passed through a Vogelslang shredder and then transferred to the Anaerobic Digester feed tank. This feed tank will also be fed by the low solids reception tank to ensure a waste mix of suitable DS% content. There will also be a dedicated glycerol feed tank (30m3) to feed the Anaerobic Digester feed tank. Hygiene measures within the reception building include the following:

-Disinfection spray for exterior of all vehicles prior to leaving the waste reception building
-Steam cleaning for disinfection of internal surfaces of vehicles delivering Cat 3 materials
-Steam cleaning of equipment and internal surfaces of waste reception building
-Mobile high-pressure water hose

B. Odour Control

In the proposed facility we have included a bio filter to treat the displaced air from the reception building and reception tanks. This bio filter is equipped with a radial fan and a water scrubber to treat (adjust temperature and humidity) the displaced air in front of the bio filter in order to attain the minimum requirements for airborne emissions. There is a proposed air exchange rate of 1-3 times per hour for the reception building.

C. Anaerobic Digester Feed tank

The Anaerobic Digester feed tank will be a 500m3 covered tank. Odour control will be present. This feed tank will be preheated.

D. Pasteurisation

The macerated waste is then pumped to the pre-pasteurisation process. The pasteurisation conditions are:

-Minimum temperature of 70degC
-Retention time of a minimum of 1 hour
-Particle size ≤12mm

The pasteurization stage operates as a batch pasteurization tank system.
Temperature records of each batch will be recorded and archived. A heat recovery system will be used to recycle the heat from the pasteurisation stage to the Anaerobic Digestion feed tank. There will be an E-coli sampling station at this stage.

E. Digestion

The described digestion system is designed for an organic waste throughput of 20,000 t/a. There are two 2000m3 digestion tanks. The minimum retention time for the proposed design is 23-25 days. The

two digester tanks will be mixed to maintain a solution with a consistent Dry Matter content. Heating coils are present within the digester tanks to maintain the required temperature of av 38degC. Storage for the produced Biogas is provided by the two digester tanks which are equipped with a double membrane roof. The operational pressure is in the range of approximately 8 mbar. A variety of safeguards are incorporated in the specification to guarantee the highest level of security in the biogas system, these include but are not limited to:

-over/ under pressure security valves protecting the digester
-A hydraulic overflow protection system.
-Flame stoppers in the gas pipes
-Different biogas pressure and level control instruments together with the security programmes in the PLC.
-An over pressure security valve protecting the biogas storage tank.
Flare to burn the biogas in the case of an outage of gas motors.

F. Solid Separation

Post digestion the digestate will be passed through two decanters within the Solid Separation building. This will separate the digestate into a solid and liquid fraction. The liquid fraction will be stored in the digestate storage tanks. The solid fraction will be stored in skips within the Solid Separation building.

G. Digestate Storage

Digestate will be stored in the two digestate storage tanks (3,500m3 radius 13m). These tanks will provide storage of 150 days in order to conform to the Nitrates directive. This digestate will be used as an organic fertiliser. There will be a Salmonella sampling station at this stage.

H. Gas Scrubbing

All produced biogas will be passed through a gas scrubbing unit in order to remove trace impurities (i.e Hydrogen Sulphide) in the Biogas. This gas scrubbing unit will have a capacity of 360m3. This gas scrubber is designed to reduce H2S concentration from potentially high levels of 3,000mg/l to <500mg/l as required by the CHP system.

I. Combined Heat and Power Generator

The CHP boiler room will contain a 499kWe Combined Heat and Power generator. The electrical power produced by the Combined Heat and Power plant will be used to provide the complete electrical power demand for the Anaerobic Digestion plant. The boiler room will also house a 150kWt dual fuel oil-biogas boiler; this will serve as a back-up in the case of maintenance on the CHP unit. Heat produced by the CHP generator will be used to pre- heat the inputs in the Anaerobic digester feed tank, maintain the Anaerobic Digester tanks temperature of av 38degC.

J. Gas Flare

The gas flare is a safety measure in which in the event of an over pressure in the system the excess biogas will be flared.

K. Digestate Recirculation

Part of the digestate will be recirculated back into the reception tank. Liquid digestate can be re-circulated to the reception tank to ensure that the incoming sludge's are of the correct consistency to allow easy handling. Recirculation pipes will be controlled by one-way valves.

Details on Plant emissions/ potential emissions

Plant emissions/ potential plant emissions are highlighted below:

Odour

The reception building and both of the reception tanks will be under negative pressure. During normal operation this displaced air will be passed through a biological filter to remove the potential for odour.

In the event of a malfunction of the biological filter or associated fans there is a potential for odour. Although the enclosed nature of a digestion plant makes this unlikely.

Combined Heat and Power generator

The normal operation of the CHP generator will generate emissions similar to that of a standard combustion engine.

In the event of a malfunction the CHP generator would most likely cease operation. In this scenario the Biogas would be stored in the double membrane gas storage bag within each Anaerobic Digester tank until such a time as the CHP generator is operational again.

Brief details of Laboratory facilities

There will be both Salmonella and Ecoli testing points at critical points during the digestion process. There will be basic laboratory facilities within the Solid Separation building. This laboratory facilities will include:

- Oven (<=600deg C) for Volitile Solids and Dry Matter content testing
- Storage space for lab equipment and Salmonella and Ecoli samples.
- PH meter
- Portable gas analyser
- BOD and COD testing equipment

Anaerobic Digestion Plant Maintenance and Management

Maintenance for the plant will be carried out by specialized sub-contractors. The required maintenance for the CHP generator, pumps and other components that make up the Digestion plant will be scheduled by the Plant Manager and the Assistant Plant Manager. Full machine histories will be developed and from this an effective preventative maintenance program will be adopted and enforced.

Management of the site will be the duty of the Plant Manager and the Assistant Plant Manager. Their roles are outlined in more detail in Attachment C.1.

The Plant Manager will be on call in the event of an incident at the digestion plant.

Unit Operations of the Fuel Pelleting Plant
Unit Operations of the Rape Seed Crushing Plant
Unit Operations of the BioDiesel production plant

3.2 Site operation and management

Anaerobic digestion

- Employees will arrive at the plant at 7.45am and will be leaving the plant at 5.45pm Monday-Saturday)
- Proposed hours of raw material delivery 8am – 5pm
- The process of Anaerobic digestion is continuous. No noise is generated by digestion process.
- No deliveries on Sundays

3.2.2 Security and entry control facilities

- The plants perimeter will be bounded by a 2.4 metre (min) 3 metre (max) fence to prevent trespassers.
- All plant visitors will be required to sign in at reception and wear a visitors badge.
- Lorries will be allowed free entry in to the BioPark® yard so as not to hold up any traffic on the road.
- The external lighting will be controlled at night by motion sensors, this will also discourage any potential trespassers.
- All the controls of the onsite equipment (gas pumps, feed pumps etc) will be in a secure building to prevent tampering.
- Remote access video surveillance of the whole site.

3.2.4 Raw material delivery acceptance procedure

3.2.4.1 Rape Seed delivery

The procedure for accepting Rape Seed is as follows:

- Deliveries of Rape seed will proceed straight to the weigh bridge and office.
- The load of Rape seed is weighed, the tractor/lorry driver is required to sign in at reception at this stage.
- The load of Rape seed is then transported to the Raw material storage building and tipped out.
- The empty delivery vehicle then returns to the weigh bridge to be weighed again.
- A weight docket showing the gross weight of the vehicle and Rape seed, the net weight of the Rape seed, the time, where it came from, date, material delivered and the names of the person operating the weighbridge and the tractor/ lorry driver is produced.
- This weight docket will have to be signed by both parties.

3.2.4.2 Raw material delivery (Anaerobic digester)

The procedure for accepting raw material is as follows:

- For the raw material to be accepted at the site the raw material will have to be accompanied by a manifest form. A manifest form will contain such information as the registration of the vehicle, where the material came from, time of arrival, time of departure, quantity of raw material and name of the haulier. The driver will be required to sign it.
- It is the responsibility of the facility manager to make sure the manifest form is checked and signed by the lorry driver.
- This is carried out to ensure that the raw material is traceable
- The lorry then proceeds to the weigh bridge.
- Samples will be taken from batches of raw material to ensure the suitability of the raw material for anaerobic digestion.
- Each supplier will be randomly tested four times a year.
- No hazardous raw material will be accepted.

3.3 Vehicle parking

There is a parking area for the BioParks® employees included in the parks design (see Appendix C.1)

3.4 Water supply

Water needs at the site will be limited to the requirements of the truck wash, office canteen and BioDiesel production process. The water demand on the site will be met by an existing water well (shown in Appendix C.1). The expected water demand for the BioPark® will be 350m3 per year. Dirty water will be pumped to the Anaerobic digester.

3.5 Traffic

This traffic impact assessment shows the predicted impact that a BioPark® will have on the local road network. Included is also a traffic survey which was conducted on the N5 and access road to the site. This shows the typical traffic volume for the roads in question. (Appendix D)

3.6 Fire safety plan

- The facility manger and the assistant facility manager along with all employees will both do a fire safety training course prior to operation start-up.

- Fire extinguishers will be placed at the following locations (types according to their applications- advised by the supplier):

Inside main entrance
Inside the office
Beside electrical and control panels.

In the case of a fire there will be a defined, clearly marked fire assembly point in the yard, at a reasonable distance from the shed.

The risk levels, though low, will be reassessed annually.

The site will be equipped with a telephone. The Fire Brigade, Garda, County Council and EPA will be notified in the case of an emergency. If a spill occurs on or off site it will be cleaned up immediately.

3.7 Construction

The construction of the BioPark® will be phased over 6 months.
The work will be carried out in general accordance with the following basic programme:
Phase 1:

- Erection of site notices (Notices of commencement, trespassing signs etc)
- Buffer tree planting
- The erection of security fences and walls
- Ground works and Site preparation
- Commissioning of basic services (canteen, water, power etc)
- Digging catch pits for managing surface water on site
- Designate areas of work (required for construction scheduling and materials management.)
- Preparation of construction wheel washing facilities.

Phase 2

- Foundation construction for all buildings and tanks (Rape Seed building, BioDiesel building, Reception building, Solid separation building, Fuel pellet building, Raw material building, Passive Office and Anaerobic digestion tanks.
- Erection of the tanks.
- Building construction

Phase 3

- Installation of pump and equipment
- Completion of the installation of required piping and pumps etc
- Mechanical commissioning of CHP boiler, feed pumps, and the system as a whole
- Commissioning of the BioParks® electrical services and controls.

Section 4 – Environmental effects and Mitigation measures

The following is a list of potential effects that the development will have on the surrounding area. This section also examines the effects under the following headings:

- Human beings
- Traffic volume
- Flora and Fauna
- Soil
- Water
- Air
- The landscape
- Noise
- The interaction between any of the foregoing
- Material assets
- The cultural heritage

4.1 Human beings

This section describes the environment surrounding the proposed site in terms of people. The potential impacts on people in the area comes from expected traffic volumes, visual impact, noise, odour and dust.

4.1.1 Likely Environmental Impacts

Traffic volume

- The BioPark® will have an effect on the local road network. The traffic survey showing the typical traffic volumes of the road network and the traffic impact assessment showing the predicted traffic volumes generated by the BioPark® can be seen in Appendix D

Visual Impact

- The proposed BioPark® affects the landscape visually, the standard building type used for BioDiesel production, Rape Seed processing, Fuel pellet production and raw material storage has the dimensions of 30.4m×24.4m (12m high, 10m to the eaves).

Noise

- Inbound and outbound Traffic will have the greatest effect on the people in the area in relation to noise. The everyday noise from the BioParks® plant and machinery will be minimal. Existing noise levels can be seen in the following noise section 4.9

Odour

- In relation to the Anaerobic digester, odour will not be a problem as all tanks are airtight and the reception building is under negative pressure, the air within the reception building is passed through a peat filter.

Dust

- Existing dust levels on the proposed site can be seen in appendix G. The biggest source of dust will come from the traffic volume entering and exiting the BioPark®.

The biggest effect on the surrounding population will be during the estimated three months of construction to get it to a point where the BioPark® is at full operation. These effects will be in the form of an increase in construction equipment, machinery and material in the area.

4.1.2 Mitigation measures

Traffic volume

- There will be no restriction on vehicles entering the BioPark® during working hours, this will allow open access to the site and prevent a hold up on the access road.
- Effective supply chain management on the part of the BioParks® manager will ensure that there will be an even spread of the daily traffic volume throughout the working day. The supply chain management of the BioParks® incoming and outgoing traffic will also involve avoiding rush hour times and school times.

Visual Impact

- The planting of trees and shrubs in order to reinforce existing hedgerows and to provide screening for the BioPark® from external view.
- The use of matt type green proprietary oxide paint on Building roofs and other suitable surfaces.

Noise

- Traffic from the BioPark® will be during working hours only. Effective supply chain management on the part of the BioParks® manager will ensure that there will be an even spread of the daily traffic volume throughout the working day thereby reducing the noise impact.
- The noise generated from every day operation of the BioPark® will be minimal, all buildings are insulated and all operations will take place indoors with closed doors.
- All noise generating pumps in the Rape Seed processing plant, BioDiesel production plant and Anaerobic digester will be enclosed in their own acoustic enclosure.

Odour

- The digester is a "plug in" system, the raw materials are pumped directly from the delivering tanker to the enclosed raw material reception tank. Raw material will not come in contact with the atmosphere.
- The pumping of this raw material takes place completely indoors behind closed doors.
- In the most unlikely event that odour becomes an issue a bio filter will be used, this will involve extraction of the air in the raw material reception building and pumping it through a peat filter.

Dust

- All travelled surfaces will be covered with 804 type material and blinding
- All operations will take place indoors.

Housing density

- The site is not in close proximity to any major towns and the housing density in the locality is low.

4.2 Traffic volumes

The traffic generated during construction and during the every day operation will be the biggest impact of the proposed BioPark® on the surrounding environment. The figures below show the expected traffic volume coming in an out of the BioPark®.

Commercial vehicle movements-Incoming Organic raw material

8 Vehicle movements per day (Tractor + tanker/ lorries)

Commercial vehicle movements-Outgoing BioGrow
Outgoing material is the same volume as that of incoming raw material

8 Vehicle movements per day (Tractor + tanker/ lorries)

Rape Seed processing (10,000 t/a)

4 Vehicle movements per day (Tractor + tanker/ lorries)

Bio Diesel production
Vegetable oil used in the production of Bio Diesel will be sourced from the on site Rape Seed processing plant. No traffic will be generated from the supply of vegetable oil.

2 Vehicle movements per day (required for Bio Diesel production)

Fuel pellet production (10,000 t/a)

4 Vehicle movements per day

Total vehicle movements per day for a fully operating BioPark®
26 Vehicle movements per day

The estimated increase in traffic movements per day as a result of the development of this BioPark® is 26 (agricultural and commercial) plus employees (assume 10 employees)

4.2.1 Likely environmental Impacts

The likely impacts of such a traffic volume coming to and from the site are:

- Increased noise levels
- Increased dust levels
- Possible interference with existing traffic volumes.

4.2.2 Mitigation measures

- Supply chain management will ensure an even spread of vehicles throughout the day, this will prevent a large build up of traffic going into and out of the site and would therefore reduce the noise levels.
- As above effective supply chain management of the raw material supply will prevent a large build up of traffic and reduce dust levels.
- Un-restricted access to the BioPark® for delivery vehicles during the working day will allow delivery tractors and lorries free access to the site and will prevent the drivers having to open the gate or wait for the gate to automatically open. This will reduce disruption to the road which provides access to the site.
- Sprinklers will be in use during dry months to keep the dust to a minimum.

4.3 Flora and Fauna

A full ecology report was undertaken by Jeremy Scott-Bolton, this catalogued the species of Flora and Fauna present on-site. The report identified that the flora and fauna are typical of what would be found in this type of habitat and that no rare or uncommon animal or plant species were identified or seen. Mr Jeremy Scott Bolton goes on to say that the proposed development along with his proposed landscaping plan would have a limited impact on the existing flora and fauna.

4.3.1 Likely Environmental Impacts

- If effort is not made on behalf of BioPower ltd then there is a danger that the construction and operation of the proposed BioPark® could damage the native flora and fauna.

4.3.2 Mitigation measures

- Effective management of the construction phase will ensure the least disruption to the site as possible.
- The proposed landscaping plan will mitigate any impact of the site and will improve the existing habitats.

4.4 Soil

The proposed BioPark® will not have any negative impacts on the soils in the area.
The proposed anaerobic digester will not have any negative effect on the soil quality in the area. The BioGrow® will be used as an organic fertilliser. This will actually improve the quality of the soil in the surrounding area.

The bedrock in this region of Roscommon age from the Lower Carboniferous which consist of limestone, shale and sandstone. According to the GSI bedrock mapping the northern part of the site is underlain by Oakpork Limestone which comprise bedded, medium to fine grained limestone. The Visean Limestone, which underlie the southern section of the site are undifferentiated, are likely to comprise clean and muddy units. Both limestone types are known to be karstified.

4.4.1 Likely Environmental Impacts

- Soil will be excavated during the initial ground works and the foundation construction.
- Fuel spillages(diesel for the plants tractor). Spillages of diesel fuel could contaminate the soil in the area.

4.4.2 Mitigation Measures

- The proposed fuel storage areas (within the BioDiesel building) will be in designated and fully bunded in case of spillages.
- Access to this fuel storage area will be restricted to the BioPark®s employees
- Spill kits will be provided on site. The BioPark®s employees will be trained in the use of these spill kits.

4.5 Water

O'Neill Ground Water Engineering Ltd. (OGE) were commissioned by BioPower ltd to prepare a Water Section, noise and dust monitoring for an Environmental Impact Statement (EIS) for a proposed BioPark® at Ballinaphuill, Tibohine, Castlerea, Co Roscommon

This section deals with the hydrological and hydro geological assessment of the site as well as noise and dust monitoring. Landscape, soils and geology will be included in this report in as far as they impact on the hydrology and hydrogeology of the site.

The site is located near Tibohine, approximately 13km north of Castlerea and 5km south-east of Ballaghaderreen . The site which is currently under forestry has a total area of approximately 12.44 Ha (0.1244 sq km).
The objectives of the Water Section of the EIS are to:

- Characterise the current hydrological and hydro geological systems within the area of study;
- Assess the impact of the proposed development on the following:
  - Geology and soils in the context of the hydrogeology;
  - Surface water flows;
  - Surface water hydrochemistry and quality;
  - Ground water flows;
  - Ground water hydrochemistry and quality;
  - Aquifer vulnerability, with regard to the proposed development;
  - Resource protection
- Provide mitigation measures to minimise the potential impacts and maintain a good water quality status for all waters which may be potentially impacted upon by the proposed development.

BioPower ltd provided OGE with site maps and background information on proposed operations at the BioPark®. All other relevant data was compiled and collated by OGE, from data sourced at the Geological Survey of Ireland (GSI), Environmental Protection Agency (EPA), Ordnance Survey of Ireland (OSI) and Met Eireann.

A site visit, walkover survey and surface and ground water sampling was carried out on the 3rd of March 2008 by OGE.

METHODOLOGY – WATER SECTION

There were two stages to this investigation: (1) Desk study and analysis; and (2) Site visits and fieldwork.

Desk Study & Analysis

A desk study and analysis were conducted with data collected from the GSI. Data from the EPA, Met Eireann and the OSI was also reviewed at the offices of OGE.

Site Visits & Field Work

The site and environs were surveyed from a surface and groundwater perspective. Surface watercourses, drains, drainage patterns, topography, discharge, land use and other features were recorded. Water samples were collected from an on-site well and a nearby surface water stream for hydrochemical analysis.
Fieldwork at the site was undertaken on the 3rd March 2008. The site and environs were surveyed from a surface and groundwater perspective. Surface watercourses, drains, drainage patterns, topography, discharge, land use and other features were recorded. Water samples were collected from an on-site monitoring well and a surface water stream for hydrochemical analysis.

TOPOGRAPHY AND LAND USE

The topography of this region is generally low-lying and flat to undulating, with a number of till ridges spread across the region. The land slopes gently to the northwest.

The main type of land uses in the area is agricultural and forestry. A large proportion of the land to the north of the site comprise cutaway/cutover peat. Raised bog which was very common in the low-lying regions of County Roscommon has been worked for peat, whether on a commercial basis with machinery, or on a local scale.

GEOLOGY

Bedrock Geology
The bedrock in this region of Roscommon age from the Lower Carboniferous which consist of limestone, shale and sandstone. According to the GSI bedrock mapping the northern part of the site is underlain by Oakpark Limestone which comprise bedded, medium to fine grained limestone. The Visean Limestone, which underlie the southern section of the site are undifferentiated, are likely to comprise clean and muddy units. Both limestone types are known to be karstified.

There are no major structural features mapped in the approximate vicinity of the site. However, many of the Carboniferous rocks in Roscommon show gentle folds, uplift and block faulting characteristics. Faulting may have occurred as a result of this.

Subsoil
Bedrock in the surrounding area is mainly overlain with sandstone Tills and cutaway peat.

The sandstone Tills which are mapped in the vicinity of the site are derived from the sandstone rock to the north and west of this region of Roscommon. However, the subsoils within this site appear to have a high organic content indicating peat subsoils partly underlie the site. Tills are often tightly packed, unsorted, unbedded and have many different particle sizes and stone sizes. Tills form elongated hills in this region. They generally have a low permeability as do peat subsoils.

Depth to Bedrock
The Groundwater Protection Scheme for Co. Roscommon indicates that subsoil thickness vary over the county and range from very thin to over 20 meters.

The GSI Geodata database (of well records) provided no depth to bedrock information for the immediate area around the site. A monitoring well drilled on the site encountered bedrock at 2.5m. See Appendix G for drilling log.

HYDROLOGY & HYDROGEOLOGY

Hydrology
There is relatively high density of surface water features in this region of the county. The Lung River, which meanders in a northerly direction approximately 1.5km to the west of the site, drains into Lough Gara 3km to the north of the site.

A stream, which is a possible tributary of the Lung River, flows in a northerly direction along the east boundary of the site before turning in a northwest direction. This is one of hundreds of streams in the Boyle catchment which make up the drainage network of the Lung River. The high density of streams indicates thick subsoils of poor permeability within the catchment or a high water table.

Within the site and the surrounding area there is a high density of drainage ditches to facilitate improvement of the land for forestry and agriculture. Ditches are orientated in a north-south and east-west directions. These ditches facilitate the drainage of water northwards in the direction of the stream.

Water Balance

Rainfall and evapotranspiration data were sourced from Met Éireann. The average annual rainfall (AAR), based on data from two rainfall stations nearest to the site, was determined to be 1153 mm (*Table No. 1*). The rainfall stations are: Ballaghaderreen, 5 km northwest of the site and Loughglinn, 8 km southeast of the site.

The closest synoptic station to the site is at Claremorris, approximately 30 km west of the site. The average Potential Evapotranspiration (PE) for Casement Aerodrome is 409 mm/yr. This value is used as a best estimate of the site PE. Actual Evapotranspiration is estimated as 368 mm/yr (=0.9 PE). The multiplication factor allows for the reduction in evapotranspiration during periods when a soil moisture deficit is present. The multiplication factor used by the GSI is equivalent to 0.95 (Water Framework Directive, 2004). OGE use a more conservative multiplication factor equal to 0.9.

Table No. 1: 30 year mean monthly rainfall data (in mm) supplied by Met Éireann (long term averages).

Station		**Grid Ref.**		**Ht (mAOD)**		**Opened**		**Closed**				
Ballaghaderreen		*M617947*		*87*		*1944*		1993				
Jan	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***July***	***Aug***	***Sept***	***Oct***	***Nov***	***Dec***	**Annual**
127	85	99	63	80	73	67	96	100	128	121	123	**1162**
Station		**Grid Ref.**		**Ht (mAOD)**		**Opened**		**Closed**				
Loughglinn		*M634860*		*98*		*1949*		*n/a*				
Jan	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***July***	***Aug***	***Sept***	***Oct***	***Nov***	***Dec***	**Annual**
124	87	96	62	78	75	66	98	101	126	120	123	**1156**
										Average		**1159**

The Effective Rainfall (ER) for the site is determined from:

ER = AAR – AE.

= 1159 mm/yr – 368 mm/yr

ER = 791 mm/yr

The site occupies an area of approximately 12.44 hectares. Based on the ER value determined above, the average volume that is available for runoff or recharged directly on the site foot print is 97,654m^3/yr and is given by:

Site Recharge / Runoff = Area x ER

= (124,400 m^2)*(0.791 m/yr)

= 98,400m^3/yr (269 m^3/d or 3.1 l/s)

Due to the poor natural drainage of the subsoils underlying the site a high percentage of effective rainfall enters the surface drainage system and leaves the site as surface water.

Table No. 2: ***Mean Annual Water Balance for the Site Foot Print***

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Site Area (m^2)	**Mean annual precipitation (mm)**	**Mean annual Potential Evaporation (mm)**	**Effective evaporation (mm)**	**Effective annual precipitation (mm) (2)–(4)**	**Annual volume of water falling on site (m^3)**	**Mean flow of water moving through area (m^3/d)**	**Annual ground water recharge (m^3)**
124,400	1153	409	368	791	98,400	269	24,600

To determine the percentage of recharge at the site the hydrogeological setting is evaluated. *Table No. 3* which was developed by the Water Framework Directive Working Group (2005) estimates recharge coefficients related to different settings. Using this information the best estimate of recharge coefficient at the site is 5-15%. Due to a subsoil thickness of less than 3m a value of 25% was used to calculate recharge. Therefore, the amount of precipitation that is likely to reach the aquifer is 24,600m^3/yr.

Table No. 3: Recharge Coefficient Calculation Method from *Working Group on Groundwater (WFD), 2005.*

Vulnerability category		**Hydrogeological setting**	**Recharge coefficient (rc)**		
			Min (%)	Inner Range	Max (%)
Extreme	1.i	Areas where rock is at ground surface	60	**80-90**	100
	1.ii	Sand/gravel overlain by 'well drained' soil	60	**80-90**	100
		Sand/gravel overlain by 'poorly drained' (gley) soil			
	1.iii	Till overlain by 'well drained' soil	45	**50-70**	80
	1.iv	Till overlain by 'poorly drained' (gley) soil	15	**25-40**	50
	1.v	Sand/ gravel aquifer where the water table is ≤ 3 m below surface	70	**80-90**	100
	1.vi	Peat	15	**25-40**	50
High	2.i	Sand/gravel aquifer, overlain by 'well drained' soil	60	**80-90**	100
	2.ii	High permeability subsoil (sand/gravel) overlain by 'well drained' soil	60	**80-90**	100
	2.iii	High permeability subsoil (sand/gravel) overlain by 'poorly drained' soil			
	2.iv	Moderate permeability subsoil overlain by 'well drained' soil	35	**50-70**	80
	2.v	Moderate permeability subsoil overlain by 'poorly drained' (gley) soil	15	**25-40**	50
	2.vi	Low permeability subsoil	10	**23-30**	40
	2.vii	Peat	0	**5-15**	20
Moderate	3.i	Moderate permeability subsoil and overlain by 'well drained' soil	25	**30-40**	60
	3.ii	Moderate permeability subsoil and overlain by 'poorly drained' (gley) soil	10	**20-40**	50
	3.iii	Low permeability subsoil	5	**10-20**	30
	3. iv	Basin peat	0	**3-5**	10
Low	4.i	Low permeability subsoil	2	**5-15**	20
	4.ii	Basin peat	0	**3-5**	10
High to Low	5.i	High Permeability Subsoils (Sand & Gravels)	60	**90**	100
	5.ii	Moderate Permeability Subsoil overlain by well drained soils	25	**60**	80
	5.iii	Moderate Permeability Subsoils overlain by poorly drained soils	10	**30**	50
	5.iv	Low Permeability Subsoil	2	**20**	40

Hydrogeology
The site is underlain by the Oakport Limestone (OK) to the north and the Undifferentiated Limestone (VIS) to the south. The Oakport Limestone is classified as a Regionally Important Aquifer by the GSI. Visean Limestone where clean are equivalent to the Oakport Limestone and can be prone to karstification.

Regionally Important Karstified Aquifers are usually characterised by a predominance of localised flow through solutionally enlarged conduits and fissures. The predominant conduit flow means aquifers of this type have low storage where movement of water through the aquifer is rapid. The permeability of competent limestone is very low which could also explain the high density of surface water features.

In this region of Roscommon recharge to aquifers tends to occur in higher topographical area rather than lower areas. Lower topographical areas in this region tend to be covered in low permeability subsoils such as peat and tills. Effective precipitation tends to run-off as surface drainage.

Well Inventory
A search of the GSI well database was undertaken as part of the desk study. However, no wells were located within a 5km radius of the site. A door to door well survey was also carried by OGE and no wells were located in the vicinity.
Ground Water Levels and Gradients
There is currently one monitoring well on the site and the static water level was 7.64m below ground level on the 3rd of March 2008. There are insufficient wells to determine the exact ground water gradient. However, based on topography flow is thought to be to the northwest.

Aquifer Vulnerability
The vulnerability of the aquifer is dependent on the nature of the geology, and the nature and thickness of the overburden. The GSI classify the aquifer beneath the development site as been Low to Medium vulnerability. However this is not based on site specific data. The vulnerability increases to 'High' towards the southeast of the map as the topography rises, see *Figure No. 5*.

Surface and Ground Water Hydrochemistry
To determine the water quality and the hydrochemical make up of the surface and ground water in the vicinity of the proposed development a ground water sample was taken from the on-site monitoring well (ID 11201) and from the stream (ID 11200). The location of the sampling points is shown in Appendix G.2. Samples were analysed at Bord na Mona Environmental, Newbridge, Co. Kildare which is an accredited laboratory. Results of hydrochemical and microbiological analysis are presented in *Table No. 5* below.

Table No. 5: Hydrochemical Results for Surface and Ground Waters

Parameter	Units	Borehole Sample ID 11201	Stream Sample ID 11200	Interim Guideline Values for Ground Water (EPA - IGV)	Surface Water Regulation (1989)
Conductivity	μS/cm	923	570	1000	1000
pH	pH	7.8	8.3	6.5 – 9.5	5.5 – 8.5
BOD	mg/l	< 2	< 2		<5
T. Dissolved Solids	mg/l	504	292	1000	-
Suspended Solids	mg/l	< 5	< 5	-	50
COD	mg/l	292	29	-	-
TOC	mg/l	< 5	8	*	-
Orthophosphate - P	mg/l	0.02	0.06	0.03	0.03
Ammonia NH3	mg/l	0.08	0.15	0.15	0.02
Calcium	mg/l	57	66	200	
Total Alkalinity	mg/l $CaCO_3$	348	193	*	-
Total Hardness	mg/l	442	236	200	-
Chloride	mg/l	15	48	30	250
Iron	mg/l	<0.1	< 0.1	0.2	0.2
Magnesium	mg/l	29	3	50	-
Manganese	mg/l	0.107	0.016	0.05	0.05
Potassium	mg/l	2	2	5	-
Sodium	mg/l	18	22	150	200
Sulphate	mg/l	75.48	8.8	200	200
Nitrate - N	mg/l	< 0.2	0.5	5	11.6
Nitrite - N	mg/l	<0.02	<0.02	0.03	0.1
Total Nitrogen	mg/l	< 1.0	< 1.0		
Arsenic	mg/l	< 0.002	<0.002	0.01	0.05
Aluminium	mg/l	0.009	0.009	0.2	-
Cadmium	mg/l	<0.002	<0.002	0.005	0.005
Lead	mg/l	<0.002	<0.002	0.01	0.05
Mercury	mg/l	<0.001	<0.001	0.001	0.001
Total Phosphorus	mg/l	0.05	0.07	-	-
Total Coliforms	cfu/100ml	< 1	-	0	5000
Faecal Coliforms	cfu/100ml	< 1	-	0	1000
Phenols	mg/l	<0.01	<0.01	0.0005	0.005

Results of groundwater analysis show all parameters to be below the EPA Interim Guideline Value for ground water except hardness and manganese. Concentrations of both parameters vary enormously in ground water and are influenced primarily by the geological make up of the aquifer. Ground water in boggy areas such as this commonly has elevated concentrations of manganese. Limestone aquifers generally have 'hard' waters.

The Chemical Oxygen Demand (COD) of the ground water is also relatively high. This is also possibly due to the highly organic subsoils. Elevated COD with other parameters such as chloride and ammonia may indicate nearby organic pollution.

Results of surface water analysis show all parameters to be below Surface Water Standards except for Ammonia and Orthophosphate which slightly exceed the limit by 0.13mg/l and 0.03mg/l respectively. The elevated ammonia generally is indicative of organic pollution.

CONCEPTUAL HYDROGEOLOGICAL MODEL

The bedrock in the area of the site is overlain by low permeability Sandstone Tills and peat which is 2.5m in thickness at the southern end of the site.

The bedrock underlying the Sandstone Tills consist of two formation types; the Oakport and Visean Limestones. Both formations are karstic aquifers where ground water flow occurs in discrete solutionally enlarged conduits and fissures. Intrinsically limestone has a very low permeability, however ground water flows within conduits can range from between 32 – 50m/hr.

Due to the low permeability nature of the overburden, recharge to the aquifer in this area is thought to occur in higher topographical areas southeast of the site. Recharge to the aquifer in the vicinity of the site is thought to be low. In the absence of sufficient water level data, ground water flow is predicted to be to the northwest.

4.5.1 POTENTIAL CONTAMINATION

By-Products and Waste Water

The BioPark® consists of four main process areas – Rape seed processing, Bio-diesel production, Fuel-pellet production and Anaerobic digestion. Each process is linked by the raw material needed and the products and by-products been produced. Waste water produced during rape seed processing and Bio-diesel production will be fed to the anaerobic digester for digestion. Digestate from the anaerobic digester will be removed from the site and landspread. By-products and waste water, if not managed properly could be potential sources of contamination.

It is proposed that storm water from the buildings and hardstanding areas of the development be discharged to ground via a soakaway system and is potentially a contamination source if not designed to recommended specifications.

4.5.2 IMPACT OF PROPOSED DEVELOPMENT

Geology & Soils

Removal of topsoil for construction purposes will be required. However, no impact is anticipated.

Surface Water

There is no discharge from the proposed development to any surface water streams. However surface run-off from poorly designed hardstanding areas has the potential to impact on surface water. The risk is considered to be low.

Groundwater

It is not expected that waste water and by-products from process areas will impact on the ground water quality of the site as each process building and tank is to be fully bunded and sealed. There is no discharge to ground from processing plant or digester.
Hydrocarbon spills and leaks from plant machinery and lorries could have an impact on ground water if hardstanding and storm water systems were not designed adequately. The risk is low.

4.5.3 MITIGATION MEASURES

Geology & Soils
No mitigation measures are required.

Surface Water
There is no discharge of effluent to the stream.

Groundwater
Ground water monitoring wells should be located down gradient of the process areas to detect any deterioration in the ground water resulting from the proposed development. There is currently one up gradient well.

To prevent contamination reaching the ground water via run-off from the hardstanding areas of the site, the storm water system should be designed using the appropriate year storm return event (50 year storm event).

Using the site plan provided by Biopower Ltd the total area of hardstanding and roofing was calculated to be 17,710m^2. Using the methodology set out in *Cunnane, C. & Lynn, M.A.* (1976) the 100 year and 50 year storm events were calculated (see *Appendix No. 3*).

The on-site storm water and soakaway system should be designed to cope with a 50-year return period storm with a duration of 24hrs. Therefore, the system should be designed for a flow rate of approximately 1275m^3/d (14.7l/s).

All maintenance, filling and parking of vehicles will be carried out on hardstanding areas. The runoff from such paved areas will pass through a hydrocarbon interceptor before being released into the storm water system.

The treated effluent from the on-site waste water treatment system which serves the office and canteen will be discharged to the anaerobic digester. Therefore no site suitability assessment will be required.

The BioPark® requires approximately 350m^3 of water, this water will be sourced from an on site water well.

4.6 Air

This section looks at the impact of the proposed development on the sites air quality, it focuses on the gas emissions from the BioPark® and the dust levels of the site.

Air pollution could be caused by the trace levels of Hydrogen Sulphide and Ammonia escaping to atmosphere. These trace levels of H_2S and NH_3 will be removed via a gas scrubber.

Methane is also a very effective greenhouse gas, it is approximately 20 times more effective at trapping heat in the atmosphere than Carbon Dioxide. If the methane generated is vented to atmosphere it would be contributing to the greenhouse effect.

4.6.1 Potential contaminants

- Trace levels of H_2S and NH_3 along with the main product of CH_4 if released could contribute to the greenhouse effect.
- Odour

4.6.2 Impact of proposed development

- The proposed development will not release harmful gases (Methane, hydrogen sulphide or ammonia) to atmosphere
- Odour will not be an issue due to the fact that the raw materials for the anaerobic digester will be pumped straight to an air-tight tank and will have no contact with the outside atmosphere.

4.6.3 Mitigation measures

- A gas scrubber will be used to remove the trace levels of Hydrogen Sulphide and Ammonia before the gas is used in the Combined Heat and Power unit.
- Odour control is built into the deign of the plant. Raw material intake is by means of a "plug in" system, the raw material lorry "plugs into" the raw material reception tank and pumps in its contents. This takes place in the raw material reception building which is fully bunded, grouted and sealed. Odour will not expected to be a problem as the raw material never comes into contact with the outside air.
- The anaerobic digesters reception building will be under negative pressure, this air will be passed through a biofilter

4.7 Dust levels

O'Neill Ground Water Engineering (OGE) Ltd was commissioned by Michael Butler of BioPower ltd to conduct a dust assessment at Ballinphuill, Tibohine, Co. Roscommon.

Dust monitoring was designed to assess the background level of environmental dust arising at the proposed site and to assess the potential dust arising from the proposed BioPark.

Appendix C.1 shows the location of the proposed site for the BioPark on the Ordnance Survey Discovery Map.

The surrounding lands are dominated by agricultural activities, with grass been the predominant crop. Local topography is gently undulating with mature hedgerows along field boundaries. The site is dominated by a young mixed forestry plantation, with deciduous trees predominately along the edges and coniferous trees planted within the actual field for development. The land is noted to be very damp during the site visit on the 5th February 2008. Land drains are evident throughout the fields for development and along site boundaries.

The site is bounded by the N5 National Road (Longford to Westport) along its southern edge and a Country Road is located to the west of the development. Once off housing is located along both of these roads.

DUST MONITORING METHODOLOGY

The Ballinphuill site was visited by ENVIROCO Management Ltd on the 5th February 2008 and a walkover survey was conducted.

From this walkover survey 4 suitable monitoring stations were identified and dust monitors set up. Dust deposition monitoring was based on a modified version of the Bergerhoff method VID 2110 'Measurement of dustfall using the Bergerhoff instrument (standard method)'.

Dust monitors were left in-situ for 29 days from the 5th February 2008 to the 5th March 2008. They are identified as:

Table No. 4: Identification of Dust Monitoring Locations

Station ID	Location Description	Irish Grid Reference
ON BBP DS 001	North Boundary	IM 66520 93661
ON BBP DS 002	East Boundary	IM 66664 93277
ON BBP DS 003	South Boundary	IM 66665 93017
ON BBP DS 004	West Boundary	IM 66541 93108

DUST MONITORING RESULTS

All dust monitoring stations were collected and sent to an Accredited Laboratory for analysis. The results are listed in *Table No. 5* below. The certificates of analysis are shown in *Appendix No. 2.*

Table No. 5: Dust Results

Monitoring Ref. & Location	Dust Deposition (Feb 08/Mar 08) mg/m^2/d	EPA Limit Mg/m^2/d
ON BBP DS 001 North Boundary	60.40	350
ON BBP DS 002 East Boundary	60.40	350
ON BPP DS 003 South Boundary	129.04	350
ON BPP DS 004 West Boundary	71.38	350

Weather conditions can have a noticeable impact upon the level of dust recorded at a station. Drier weather with strong winds will noticeably increase the level of dust in an area, while heavier precipitation and light winds will reduce recorded levels of dust generation. The Met Eireann data for the Knock Synoptic Station is shown in *Table No. 6*. This table shows the recorded values for precipitation and temperature for the months monitored and the mean values for precipitation and temperature for February and March.

Table No. 6: Met Eireann Data for the Claremorris Synoptic Station – Feb/Mar 08

Parameter	February 2008	Mean (Feb)	March 2008	Mean (Mar)
Total Rainfall (mm)	116.3	82.9	43.3	95.8
Mean Temperature (°C)	6.1	4.5	6.0	5.9

(March 2008 values are based upon the first 10 days of the month)

DUST MONITORING DISCUSSION

Existing Environment

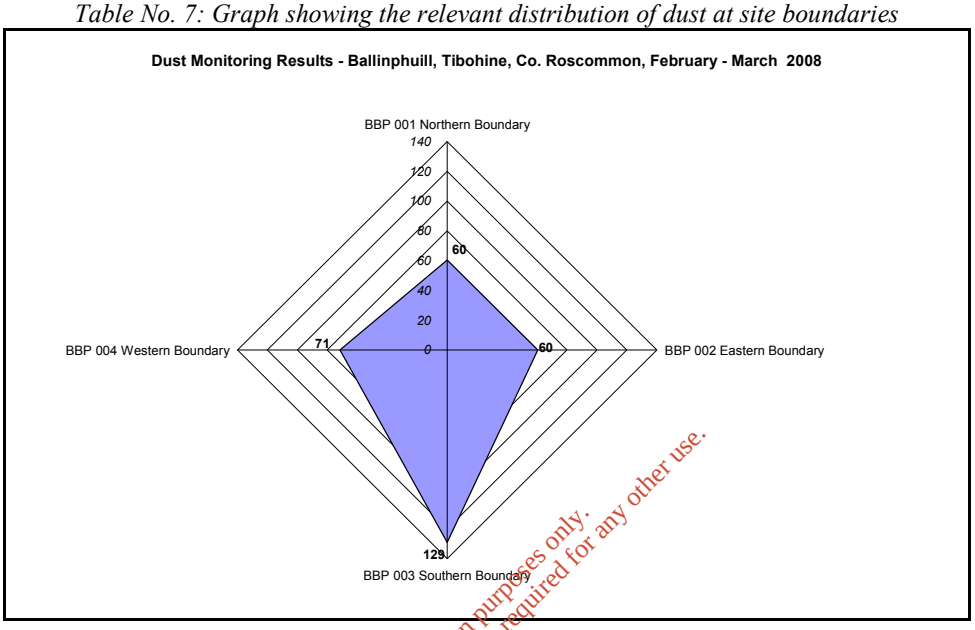
Stations DS 001, 002 and 004 are within typical ranges for dust fall on agricultural land (<70 mg/m2/day). These stations are all located on the boundaries of the proposed site. Each station was positioned near the existing forestry, and surrounding lands were dominated by either forestry or agricultural grassland.

The southern boundary received an elevated dust result, when compared to the other three stations. DS 003, located near the centre of the southern boundary, shows a dust fall result of 129 mg/m2/day. This station was located on the southern boundary, adjacent to the N5. The existing hedging separating the site from the N5 is mature, though patchy, with little to no growth in the lower regions of the hedging (*Plate*

No. 1). Dust fall elevations at this boundary arise from the movement of traffic on the adjacent national road.

A marginal increase in dust levels is recorded at station DS 004 compared to stations DS 001 and DS 002, of approximately 11 mg/m2/day. This elevation could be sourced to the proximity to a working farmyard area to this station. Clearing of land drains within the field this station was established were also noted during the collection of the dust monitor.

Table No. 7: Graph showing the relevant distribution of dust at site boundaries



Current background dust levels are relatively low. Dust levels at the site boundaries are within expected levels for a rural area. The southern boundary does show a marked increase, arising from the movement of traffic on the nearby National Road – N5, due to dust been lifted from the road by road-tyre interaction.

Possible Impacts

The proposed development of this site will include the creation of roadways throughout the site and the erection of storage bays/sheds on site and an anaerobic digestion plant, offices, canteen and ancillary activities. Landscaping of the boundaries is proposed along with the southern and western perimeters of the anaerobic digester plant.

The potential for dust arising on site remains if the open ground areas to the south of the development area, within the site boundaries is not re-planted, from the movement of vehicles in/out of the site and from material been blown from trailers emptying in the storage areas

Proposed Mitigation

The proposed development will replace an area of planted coniferous trees with a hard-standing area, several shed units for the storage of raw and processed materials and an anaerobic digestion plant. The existing deciduous plantation that currently surrounds the coniferous plantation will be maintained and improved where necessary.

All primary activities at the site will be conducted within the shed buildings, including the storage of raw materials (rapeseed) and processed materials (rapeseed cake and oil) and processing of materials (anaerobic digestion, rapeseed cleaning and pelleting, biodiesel production). This will reduce the potential for any dust to arise from the daily operation of the plant.

The development is to be laid out in a long narrow set-up, with an orientation of a right angle to the N5 Road. This will increase the distance of the site boundaries from any individual sensitive receptors.

Hedging along the field boundary with theN5 should be improved to create a full and healthy hedge. This will aid in the reduction of any potential dust arising from the plant affecting residences to the south. Speed restrictions for all vehicles entering along the proposed access road from the cul-de-sac road to the southwest boundary, and throughout the site should be enforced, to minimise the possible elevation of dust from road-tyre interaction. Speed restrictions of 40 kph for asphalt/tar macadam road surfaces or 20 kph for concrete and other hard standing surfaces.

A log of any complaints concerning dust arising from the site should be maintained at the site office. Clear management protocol for the investigation of any dust incidents and complaint reports should be in place, including the contracting of independent consultants for dust measurement, where deemed appropriate.

4.8 Landscape

The surrounding landscape can be seen in the photographic survey in Appendix F.
The proposed BioPark® will have an impact on the surrounding environment.

4.8.1 Likely Environmental Impacts

- The proposed buildings will affect the visual amenity of the existing site.

4.8.2 Mitigation measures

- The BioPark® is designed so as to reduce the vertical profile of the plant as far as possible, this will reduce the plants affect on the landscape.
- The use of matt type green proprietary oxide paint on Building roofs and other suitable surfaces will help reduce the BioPark®s visibility.
- The forestry that will surround the BioPark will reduce the BioParks® visibility and its impact on the local landscape.
- The proposed landscaping plan can be seen in appendix F. This will reduce further any impact that the plant has on the surrounding landscape

4.9 Noise

INTRODUCTION NOISE MONITORING
O'Neill Ground Water Engineering (OGE) Ltd was commissioned by Michael Butler of Biopower Ltd to carry out environmental noise monitoring at Ballinphuill, Tibohine, Co. Roscommon. The noise monitoring was carried out as part of an Environmental Impact Statement in respect of a planning application for a proposed biopark.

The objective of the monitoring survey was to provide a baseline environmental noise record against which to compare any future environmental noise emissions from the proposed facility when it is operational. The site area is approximately 12 Ha in size, and is located with a young forestry development north of the N5 Road near Ballaghaderreen.

Noise monitoring was carried out on the 5th March 2008. Appendix A.1 shows the location of the proposed site, just north of the N5, southeast of Ballaghaderreen.

NOISE SURVEY METHODOLOGY
Noise monitoring was carried out to the international standard ISO 1996/1 Acoustics- Description & Measurement of Environmental Noise using a Bruel & Kjaer 2250 Sound Level Meter with wind muffler.

Monitoring was carried out over a 4.2 hour period from 11.30 to 16.00 on the 5th March 2008. Weather conditions were overcast and cold, with a light breeze. Occasional light rain and strong gusts was

encountered. *Table No. 1* below shows the Met Eireann data for the Knock Weather Station during the day of monitoring.

Table No. 1: Climate data for Knock synoptic station – 5th March 2008

Rainfall	Temperature (max)	Temperature (min)	Sunshine	Gusts	Wind speed	G min
(mm)	˚C	˚C	Hours	Knots	Knots	˚C
0.7	9.3	2.7	1.4	36	12.9	1.6

Table No. 2: Noise monitoring locations

Monitoring Location	Grid Reference	Description
BBP BN 001	IM 66928 93083	Tibohine National School, located on the playground looking onto the N5 National Road
BBP BN 002	IM 66342 92995	Yellow Dormer Bungalow, 1st house on Cul-de-sac, located on the front lawn
BBP BN 003	IM 66236 93332	White Bungalow, 2nd house on left down cul-de-sac road, located on side lawn, to the south of the dwelling
BBP BN 004	IM 66389 93702	Entrance to old bungalow, last on cul-de-sac
BBP BN 005	IM 66610 93698	Forestry Road at end of cul-de-sac road
BBP BN 006	IM 66579 93053	Western boundary – Adjacent to site forestry
BBP BN 007	IM 66613 93002	Southern boundary, adjacent N5 road

NOISE SURVEY RESULTS

The environmental noise levels L_{Aeq} are summarised and discussed below.

Table No. 3: Noise Monitoring Levels and Comments

Location	Start Time	L_{Aeq} (dB)	Comments
BBP BN 001	11:28	62	Road traffic on the N5, car entering and later leaving the National School Car-park, birdsong, reversing alarms from forklift near Tibohine Church, plane passing overhead,. Traffic Count on the N5 (11:40-12:00): 63 cars, 21 vans, 13 rigid body trucks, 13 articulated body trucks (total 110 vehicles)
BBP BN 002	12:08	58	Traffic movement on the N5, rustling of trees and nearby hedging, birdsong
BBP BN 003	12:59	66	Traffic on the N5, car leaving house, rustling of trees in nearby forestry, birdsong, dog barking close to monitor, plane passing overhead, activities around farm shed & yard near N5 audible (banging of metal, low diesel engine noise)
BBP BN 004	13:34	49	Wind rustling tress and hedging, traffic noise in distance, birdsong
BBP BN 005	14:09	50	Wind rustling trees, traffic on the N5, birdsong, horses 'neighing' in adjacent field
BBP BN 006	14:53	58	Birdsong, road traffic on the N5, wind rustling trees in plantation, activities from nearby farmyard (cleaning and machinery maintenance by appearance)
BBP BN 007	15:12	69	Birdsong, cockerel crowing, wind moving trees, N5 traffic noise, people talking at entrance to the site

NOISE DISCUSSION

There are currently no statutory limits for the control of environmental noise in Ireland. However, the EPA has issued a guidance note on noise emissions that states, '*Ideally, if the total noise level from all sources is taken into account, the noise level* ***at sensitive locations*** *should be kept below an L_{Aeq} value of 55dB(A) by daytime. At night, to avoid disturbance, the noise level at noise sensitive locations should not exceed a $L_{Aeq\ T}$ value of 45dB(A).*

The Ballinphuill Site is located in an agricultural area, located off the main N5 Westport – Longford Road. The proposed site is within a youthful planted forestry (6-10 years old). The plantation is primarily coniferous, with deciduous trees circling. The ground was noted to be damp on both site visits (February & March) with increasing wetness of the ground to the north of the site. The site is criss-crossed with land drains. A cul-de-sac Country Road is present to the west of the proposed site, with a spur of this Country Road also present along the northern boundary of the site. The National N5 Road bounds the southern perimeter of the site. Agricultural grass land is located to the east of the site.

The scope of this background monitoring is to establish current levels of noise in the area and to assess the likely impact the location of the proposed facility may have upon the local acoustic environment.
Five Noise Sensitive Locations were identified around the proposed site, 4 local dwelling houses and 1 national school. Two monitoring stations were also established on the site to assess current site background noise levels. The locations chosen for noise monitoring cover the immediate surrounds of the proposed site and give an indication of the current noise profile for the locality. The primary noise source identified at all stations was the movement of traffic on the N5, though this was noticeably muted at monitoring stations located along the northern boundary of the site. There are no current activities occurring on site (site is dominated by coniferous and deciduous tree plantations).

Noise results are typically shown as LAeq – the continuous equivalent noise rating, this is the generally the parameter to which noise limits and guidance are issued. The 'A' weighting indicates that values have been weighted to better express how the human ear will respond to the recorded noise values. Statistical values relate to the percentile levels at which noise was exceeded for. The primary statistical values of note at this site are the LA90 (the level of noise exceeded for 90% of the time) which represents background noise, and the LA10 (the level of noise exceeded for 10% of the time) representing short duration noise values – typically associated with traffic noise.

The National School of Tibohine is located adjacent to the N5 National Road. The school has a low boundary wall separating the playground area from the road edge. The noise meter was established near

the mid way point between the boundary wall and the school building. During the monitoring period, classes were in progress, so no noise was noted from school children (they were all inside the main school building). A L_{eq} value of 62 dB(A) were recorded at this station. The primary noise noted at this station was the movement of traffic on the N5. A short duration traffic count, conducted during the noise monitoring period recorded 110 vehicles passing the meter during a 20 minute period, with nearly 43% been either light (vans) or heavy commercial vehicles(rigid & articulated trucks).
The first dwelling house located along the cul-de-sac road was selected as a potential sensitive receiver. This dwelling received a L_{eq} value of 58 dB(A). Noise levels outside this residence were dominated by the movement of traffic along the N5 National Road and to a lesser extent, occasional traffic movements on the adjacent cul-de-sac road.

A bungalow dwelling house, the second dwelling located to the west of the cul-de-sac road was monitored, the noise meter placed on the lawn to the side of the dwelling. Noise levels at this station gave a L_{eq} value of 66 dB(A). Traffic noise from the N5, general workings around a farmyard area to the south, wind induced noise in the nearby forestry, to the east and west and the occasional barking from the owner's dog, all contributed to this value. Statistical analyses at this station show a general increase in sound pressure, from the L99 to the L01 value. This indicates a general mix of sound been present.

Stations BN 004 and 005 were located to the north of the development, at the entrance to the avenue to a bungalow dwelling and on a forest road respectively. Both stations show similar L_{eq} values at 49 and 50 dB(A). Along the northern boundary traffic noise arising from the N5 National Road is audible though distant. The primary sources of noise at this station originated from nearby horses in the field to the west of station BN 005 and wind induced noise in the forestry to the south and north. Birdsong was also clearly evident at both stations. Rural noise sources are predominant along the northern boundary.

BN 006 was established for a short duration within the site boundary, to assess the current noise levels close to where the proposed development will be built. A L_{eq} value of 58 dB(A) was recorded at this station. This station was located close to the proposed entrance to the site and within the deciduous plantation of trees. The primary noise audible at this station arose from the continual movement of vehicles on the N5 National Road, with minor sources attributable to activities in the adjacent yard area to the west and the movement of tree leaves and branches due to the wind.

A second onsite station was established on site, near the existing entrance into the field. This station was predominated by traffic noise. Station BN 007 received a L_{eq} value of 69 dB(A). This stations proximity to the N5 National Road and relatively open nature to noise arising from traffic noise resulted in this figure. The meter was established at a similar distance from the edge of the N5 carriageway as the neighbouring residence to the west, to best simulate the noise audible at this residence from current background sources.

4.9.1 PROPOSED SOURCES & MITIGATION OF NOISE
There are four distinct areas proposed for development at the Ballinphill Site – **A**naerobic Digestion Plant, **R**ape Seed Processing Plant, **B**io-diesel Production Plant and **F**uel Pellet Production Plant. Each area is linked by the raw materials needed and the products and by-products been produced.

Noise levels and the nature of the noise arising from the proposed developments at this site , cannot be exactly predicted. All production will be carried out indoors, the insulation of buildings, type and servicing of plant and equipment, location of extraction fans, doors and ventilation areas on buildings will all have an effect on the overall noise generation from the site. On-site boundary monitoring, after site commissioning, will assess the cumulative effect of these factors.

The proposed development is to be located within the coniferous plantation to the North of the site. Storage, Pelleting, Rape Seed Processing and Biodiesel production plants will be established in order from the National Road towards the north of the site, with the Anaerobic Digester Plant been set-up in the northern section of the development area. Noise will arise from vehicle movements in/out of the site, movement of site vehicles (loading shovels/forklifts), pressure valves and hydraulic pressure release valves from on site plant and pumping systems.

The primary mitigation measure been employed to minimise noise production from the site will be the placing of plant equipment inside shed units. This will house the primary sources of noise and reduce significantly any noise levels audible from the site.

The location of all plant within the existing young forestry plantation and the maintenance of a minimum hedge and tree screening around the proposed site will offer some attenuation of noise sources on site. The primary mitigation measure to noise arising at this development will be the encasing of all processing operations within shed buildings reducing outdoor noise sources to the arrival and departure of delivery trucks and the movement of material on site by loading shovels/forklift type units.

Set operational hours need to be enforced by site management so as to minimise the potential for delivery vehicles arriving after hours or in early mornings and to mitigate against the need for loading shovels – and the associated reversing alarms, been utilised in the evening and night periods.

The placement of all facility processing equipment inside buildings will decrease the potential noise arising from the processing operations on site (as opposed to outdoor / exposed processing units). All shed units should be fully insulated and any exits – ventilation shafts, should be designed for the northern and eastern faces of buildings – thereby directing escaping noise and ingress/egress points for vehicles furthest from dwellings along the cul-de-sac road.

Best Available Techniques (BAT) should be involved in the building and equipping of all site units and machinery to ensure that onsite noise levels do not approach accepted nuisance levels - ($L_{Aeq(30\ min)}$ values of 55 dB 8am to 8pm and $L_{Aeq(15\ min)}$ value of 45 dB from 8pm to 8am) at noise sensitive locations. A complaints record should be maintained at the site office and immediate assessment and remediation measures investigated, should there be any complaints received concerning noise arising from the plant. Dual tone reversing alarms should be examined for use on all facility vehicles to reduce the potential noise arising from site vehicles on site.

4.10 Cultural heritage

The cultural heritage of the area was assessed from consultation with the local site owner, examination of Ordanance survey maps of the area and desktop studies.

- Proposed Candidate Special area of conservation, Tullaghan Rock Bog
  2.5 km from the site
- Special Protection Area SPA048, Lough Gara
  4k from the site
- Proposed Candidate Special Area of Conservation
  2.5km from the site
- National Monument 46
  Approx 200m from the North boundary of the site.

These areas will in no way be affected by the proposed BioPark®

4.10.1 Likely Environmental Impacts

- There will be no effects on the cultural heritage of the area.

4.10.2 Mitigation measures

- As there are no likely impacts of the proposed development there are no mitigation measures proposed.

Section 5 – Summary of mitigation measures

- Human beings

- Traffic volume
- Flora and Fauna
- Soil
- Water
- Air
- Dust levels
- The landscape
- Noise
- The interaction between any of the foregoing
- Material assets
- The cultural heritage

5.1 Human beings

All of the following mitigation measures are designed to reduce the impact of the BioPark® on the local Human beings living and working in the area

- Effective supply chain management on the part of the BioParks® manager will ensure that there will be an even spread of the daily traffic volume throughout the working day. The supply chain management of the BioParks® incoming and outgoing traffic will also involve avoiding rush hour times, and school times.

- The planting of trees and shrubs in order to reinforce existing hedgerows and to provide screening for the BioPark® from external view.

- The use of matt type green proprietary oxide paint on Building roofs, side sheeting. and other suitable surfaces.

- Traffic to and from the BioPark® will be during working hours only.

- Effective supply chain management on the part of the BioParks® manager will ensure that there will be an even spread of the daily traffic volume throughout the working day thereby reducing the noise impact.

- All buildings are insulated and all operations will take place indoors with closed doors to reduce noise levels.

- All noise generating pumps in the BioPark® will be enclosed in their own acoustic enclosure.

- Raw material for the digester will not come in contact with the atmosphere (ie enclosed tanks)

- A biofilter control unit (see appendix N) will be used, this will involve extraction of the air in the raw material reception building and pumping it through the biological filter. This will eliminate any possibility of odour.

- All travelled surfaces will be covered with 804 type material and blinding in order to reduce dust levels.

- A wheel wash facility is to be provided at the entrance to the BioPark® to reduce dust levels.

- A wheel wash facility is also provided within the anaerobic digesters reception building.

- There will be no restriction on vehicles entering the BioPark® during working hours, this will allow open access to the site and prevent a hold up on the access road.

5.2 Traffic volume

- Effective supply chain management for the incoming raw material and outgoing finished product will reduce the traffic levels, noise levels and dust levels
- Un-restricted access to the BioPark® during the working day will allow delivery tractors and lorries free access to the site and will reduce disruption to the road which provides access to the site.

5.3 Flora and Fauna

- Efficient Management of the construction phase will ensure the least disruption to the site.
- The proposed landscaping plan will mitigate any impact of the proposed development and will improve the existing levels of flora and fauna..

5.4 Soil

Excavation of top soil during site ground works is the only impact that the BioPark® will have on the soil on the site.

- Displaced topsoil will be used in bunding the relevant operations in the BioPark®.

5.5 Water

Mitigation measures for possible water pollution:

- The yard and the anaerobic digesters raw material reception area will be fully bunded in case of any spillages.
- Water quality will be monitored bi-annually and these results will be included in the Annual Environmental Report.
- Raw material water from the BioDiesel process will be fed to the Anaerobic digester to undergo digestion.
- ***Geology & Soils***
  No mitigation measures are required. Stockpiled soils will be used for restoration.
- ***Surface Water***
  No mitigation measures are required.
- ***Groundwater***
  Ground water monitoring wells should be located up gradient and down gradient of the process areas to detect any deterioration in the ground water resulting from the proposed development.
- To prevent contamination reaching the ground water via run-off from the hardstanding areas of the site, the storm water system should be designed using the appropriate year storm return event. An appropriately sized hydrocarbon interceptor should also be included as part of the storm water system.
- All parking of vehicles will be carried out on hardstanding areas. The runoff from such paved areas will pass through a hydrocarbon interceptor before being released into the storm water system.
- The proposed waste water treatment system which will be used to treat domestic waste water from the office needs to be designed using EPA and GSI guidelines.

5.6 Air

- A gas scrubber will be used to remove the trace levels of Hydrogen Sulphide and Ammonia produced during the digestion process.

Odour will be monitored periodically and will be controlled by:

- All raw material handling will take place in the reception building of the anaerobic digester.
- A biofilter will be placed next to the reception area of the anaerobic digester.
- The system will be a "plug in" system. This means that the raw materials will not come into contact with the outside environment.

5.7 Dust levels

- The landscaping of the site boundaries will improve the site appearance and if planted with native trees and bushes, may act as an effective dust barrier.

- The most effective mitigation measure for the BioPark is to have all operations indoors, this will greatly reduce the dust generated.

5.8 Landscape

The proposed BioPark® will affect the landscape to some degree, although the combination of the proposed landscaping and the BioParks® design will serve to minimize this.

Mitigation measures to minimize the impact of the BioPark® on the landscape:

- Fully landscaped site in order to screen the plant from external view.
- The use of matt type dark green proprietary oxide paint on all the tanks, roofs and side sheeting of sheds.

5.9 Noise

Mitigation measures adopted in order to reduce noise levels include:

- The primary mitigation measure been employed to minimise noise production from the site will be the placing of plant equipment inside shed units. This will house the primary sources of noise and reduce significantly any noise levels audible from the site.

- All production will be carried out indoors, the insulation of buildings, type and servicing of plant and equipment, location of extraction fans, doors and ventilation areas on buildings will all have an effect on the overall noise generation from the site.

- On-site boundary monitoring, after site commissioning, will assess the cumulative effect of these factors.
- Set operational hours need to be enforced by site management so as to minimise the potential for delivery vehicles arriving after hours or in early mornings and to mitigate against the need for loading shovels.

- Supply chain management will ensure an even spread of vehicles throughout the working day. This will prevent a large traffic build up and a large impact on the noise levels

5.10 Cultural heritage

- No mitigation measures are proposed

BioPower ltd

Environmental Impact Statement

Volume 3- Appendix A

Location Maps

A.1 Location map 1:10,560
A.2 Location map 1:2,500

For the development of a BioPark®

Located at
Ballinaphuill,
Tibohine,
Castlerea,
Co Roscommon

48 Main Street, Schull, Co Cork
Tel: 353 28 27837
mbutler@biopowerplc.com

Registered office as above. Registered Number 355995

Surveyed 1994
Revised 2007
Levelled

Rural PLACE Map

166269 293750 166844 293750

Site Location Map 1:2500
Ballinaphuill, Tibohine, Castlerea,
Co Roscommon
Drawing 2

ITM CENTRE PT. COORDS.
566515,793303

DESCRIPTION

MAP SHEETS
1:2500
1918-B 1918-D

Drawings prepared by:
Michael Butler BEng, BSc

BioPower ltd
48 Main Street,
Schull,
Co Cork

License No:

Site Notice Location

Existing Buildings

Road

Site Boundry

Produced by National Map Services,
Unit 7, South Ring Business Park,
Kinsale Road,
Co. Cork
On behalf of Ordnance Survey
Ireland, Phoenix Park, Dublin 8.

292827 166269 166844 292827

Scale:- 1:2,500
Scála:- 1:2,500

0 40 80 120 160 200 Metres
0 150 300 450 600 750 Feet

Plot Ref. No. 1282303_1_5
Plot Date 31-JAN-2008

N

Surveyed 1837-1838
Revised 1911-1914
Levelled 1915

Record PLACE Map

165342 295237 167771 295237

Site Location Map 1:10,560
Ballinaphuill, Tibohine,
Castlerea, Co Roscommon

Drawing 1

ITM CENTRE PT. COORDS.

566515,793303

DESCRIPTION

MAP SHEETS

6 inch
SO046 RN014
RN008 MO074+08

Drawing 1
Site Notice
Location

Drawings prepared by:
Michael Butler BEng, BSc

BioPower ltd
48 Main Street,
Schull,
Co Cork

NATIONAL MAP SERVICES
ORDNANCE SURVEY IRELAND ©

Authorised Selling Agent

Produced by National Map Services,
Unit 7, South Ring Business Park,
Kinsale Road,
Co. Cork
On behalf of Ordnance Survey Ireland, Phoenix Park, Dublin 8.

291340 165342 167771 291340

Scale:- 1:10,560
Scála:- 1:10,560

0 100 200 400 600 800 1,000 Metres
0 300 600 1,200 1,800 2,400 3,000 Feet

Plot Ref. No. 1282303_1
Plot Date 31-JAN-2008

N

BioPower ltd

Environmental Impact Statement

Volume 3- Appendix B

Layout Drawings

B.1 BioPark Layout
B.2 Anaerobic digester layout

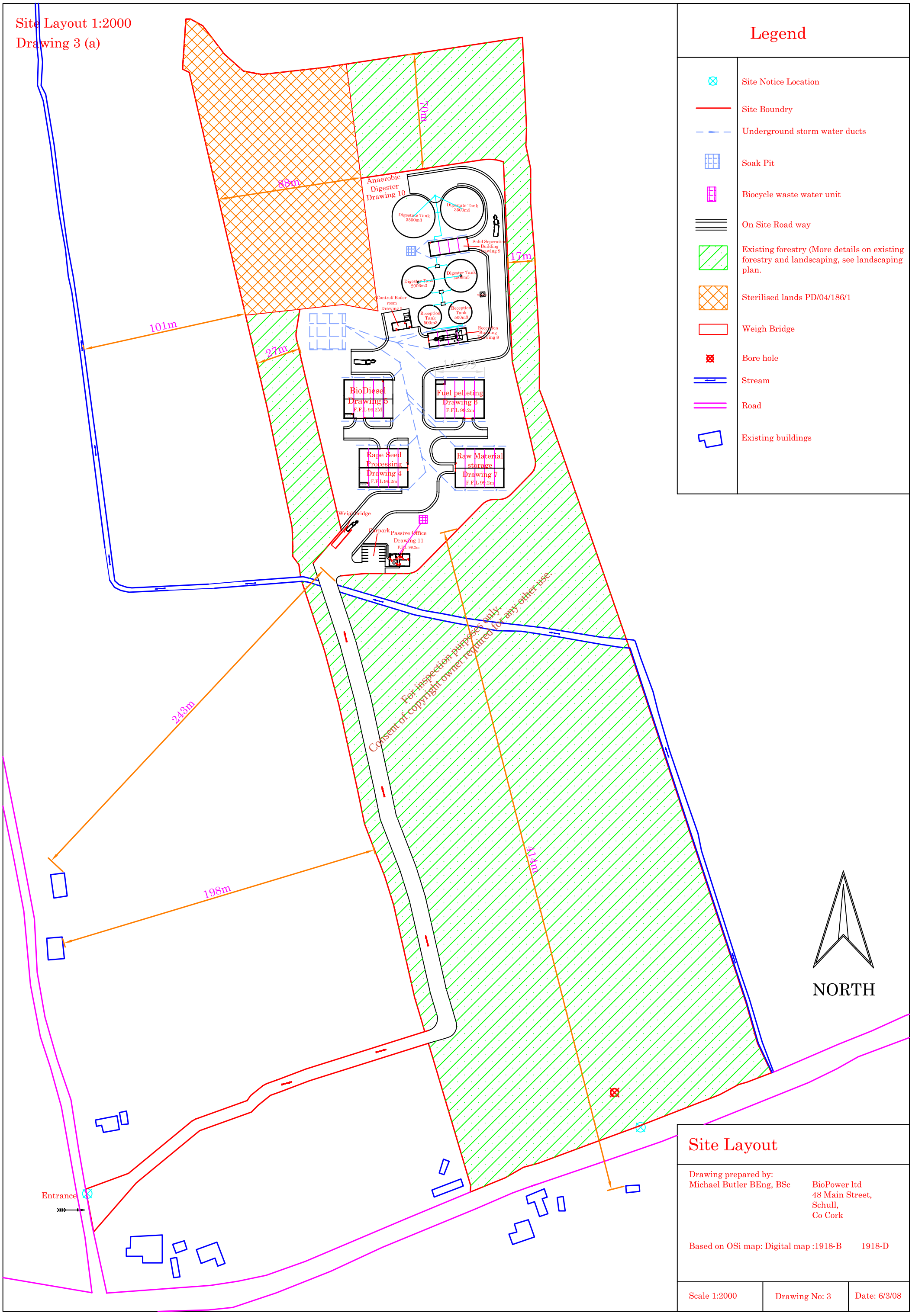
For the development of a BioPark®

Located at
Ballinaphuill,
Tibohine,
Castlerea,
Co Roscommon

48 Main Street, Schull, Co Cork
Tel: 353 28 27837
mbutler@biopowerplc.com

Registered office as above. Registered Number 355995

Site Layout 1:2000
Drawing 3 (a)



Legend

- Site Notice Location
- Site Boundry
- Underground storm water ducts
- Soak Pit
- Biocycle waste water unit
- On Site Road way
- Existing forestry (More details on existing forestry and landscaping, see landscaping plan.
- Sterilised lands PD/04/186/1
- Weigh Bridge
- Bore hole
- Stream
- Road
- Existing buildings

Site Layout

Drawing prepared by:
Michael Butler BEng, BSc

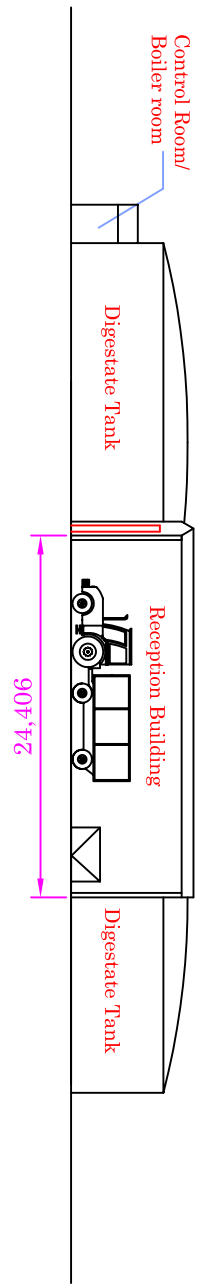
BioPower ltd
48 Main Street,
Schull,
Co Cork

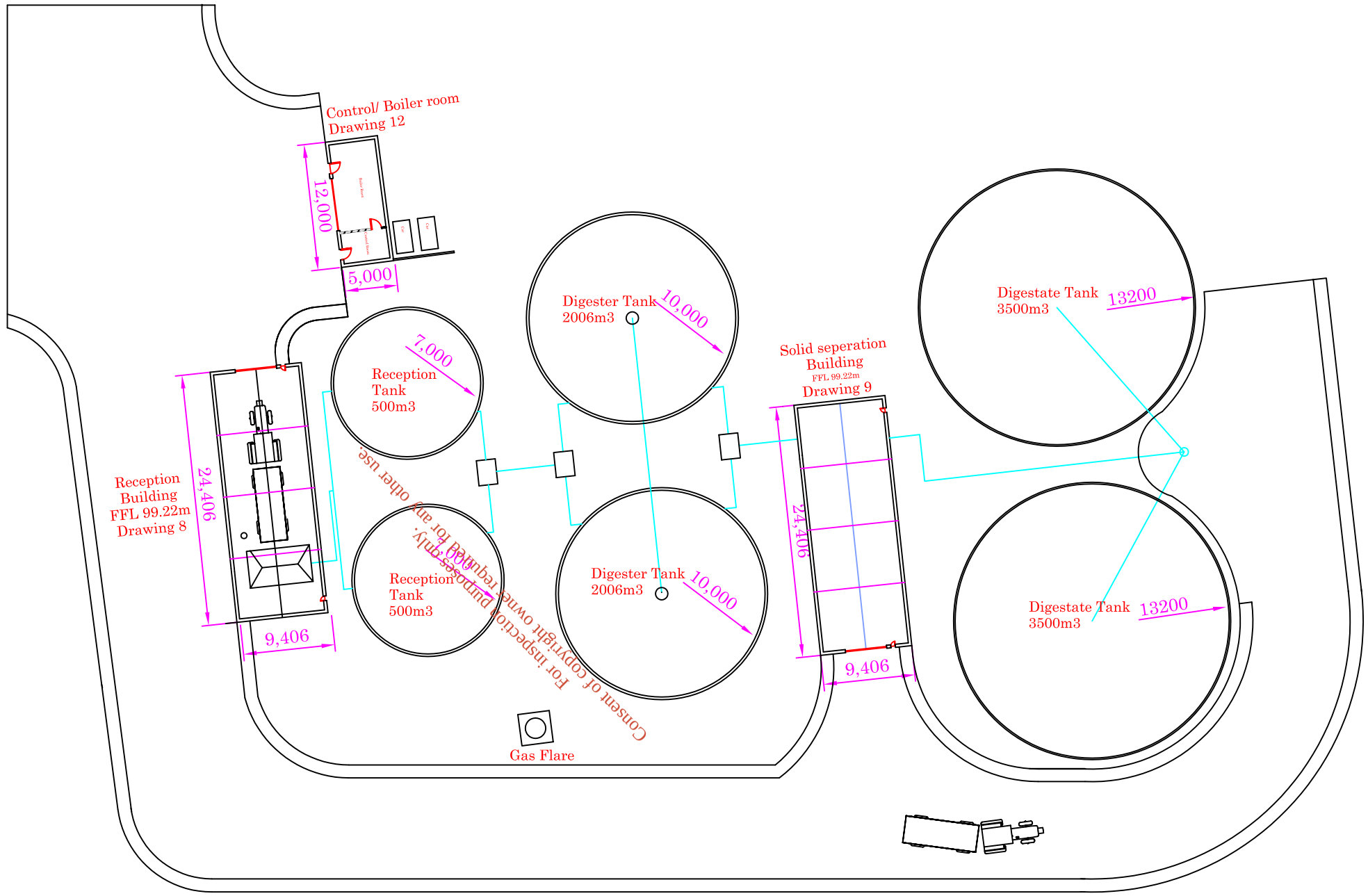
Based on OSi map: Digital map :1918-B 1918-D

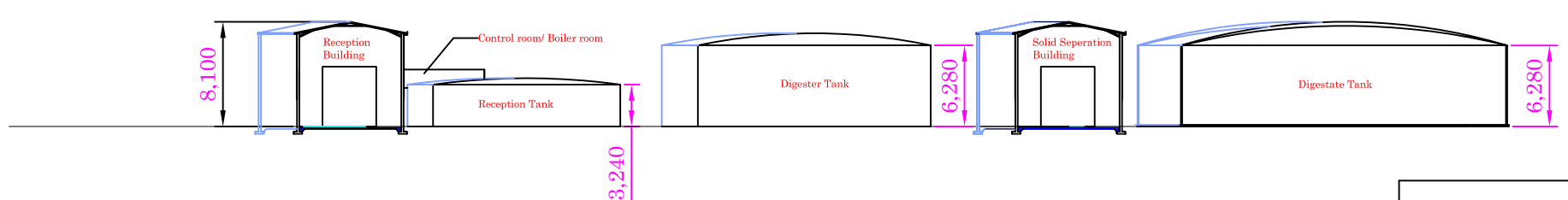
Scale 1:2000	Drawing No: 3	Date: 6/3/08

Anaerobic Digestion Layout

Drawing 10







NOTES:
ALL BUILDING, CONSTRUCTION MATERIALS AND SPECIFICATIONS TO COMPLY WITH THE CURRENT BUILDING REGULATIONS AND THE DEPARTMENT OF THE ENVIRONMENT RECOMMENDATIONS. FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALE. CONTRACTOR TO CHECK ALL DIMENSIONS ON SITE BEFORE STARTING WORK. ARCHITECT TO BE INFORMED OF ANY DISCREPENCIES BEFORE WORK PROCEEDS. LARGE SCALED DRAWINGS TAKE PREFERENCE OVER SMALLER DRAWINGS.

NOTES: All dimensions in mm

North

Anaerobic Digestion layout

Drawings prepared by: Tim Clarke BSc MSc
Waste Works
Ventry,
Tralee,
Co.Kerry

Scale: 1:500	Date: 11/1/08	Drg No: 10

BioPower ltd

Environmental Impact Statement

Volume 3- Appendix C

Traffic Survey

For the development of a BioPark®

Located at
Ballinaphuill,
Tibohine,
Castlerea,
Co Roscommon

48 Main Street, Schull, Co Cork
Tel: 353 28 27837
mbutler@biopowerplc.com

Registered office as above. Registered Number 355995

Attachment E

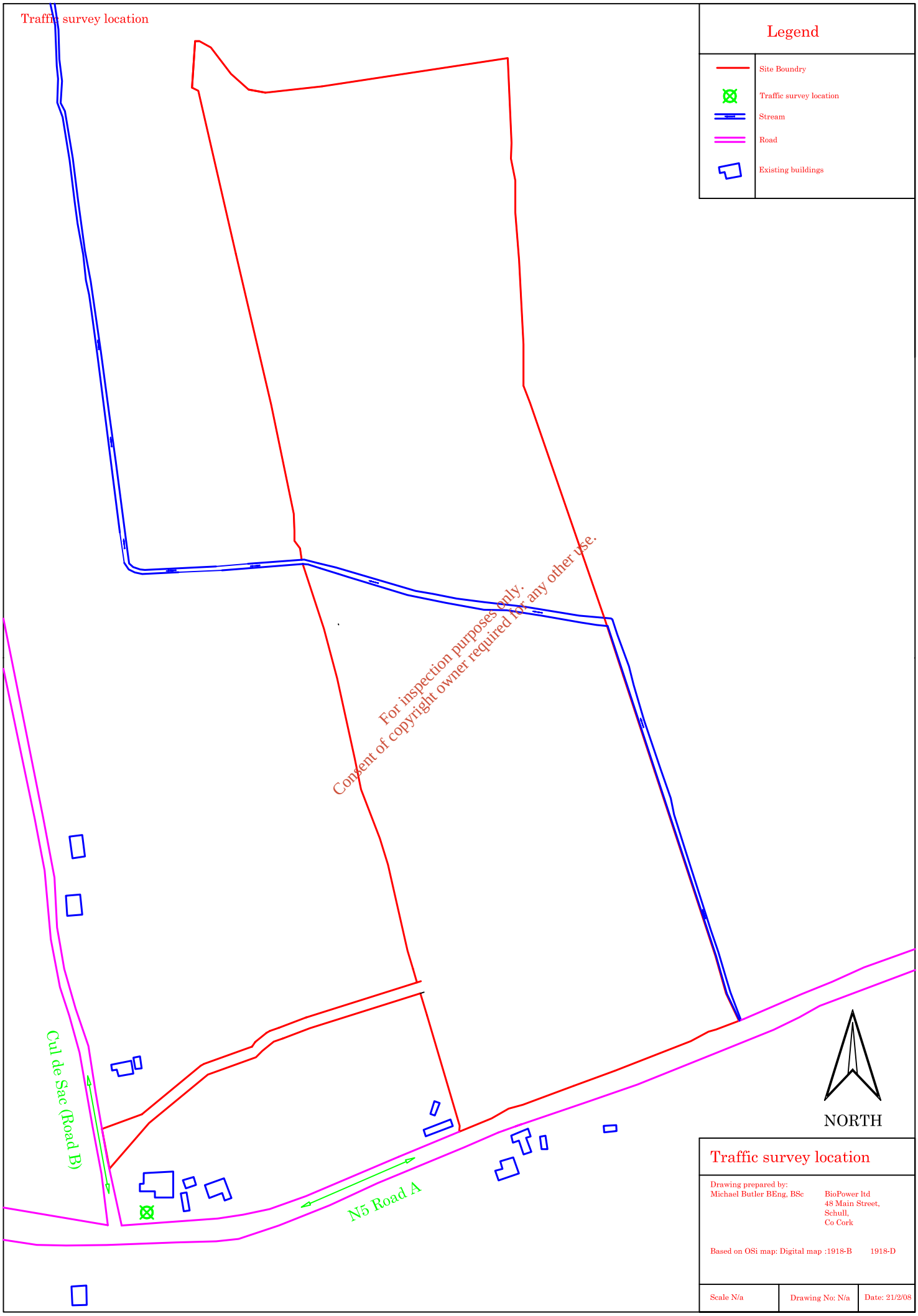
Traffic Suvey

The following pages are the result of a traffic survey conducted by Michael Butler BEng. BSc. The survey shows the volume of traffic passing the site on the N5 and the cul de sac that provides access to the site. The survey was conducted on 21/2/08 from 8am to 6pm.

This is in addition to a short traffic count conducted by O Neill GroundWater Engineering this showed

"110 vehicles passing the meter during a 20 minute period, with nearly 43% been either light (vans) or heavy commercial vehicles(rigid & articulated trucks). "

The proposed BioParks® expected traffic volume is included. It shows that the majority of the traffic during normal operation will be agricultural in nature with commercial making up the minority.



Traffic Survey

		Date:21/2/08			Day:Thursday			Recorded By:Michael Butler			
		Traffic survey A N5									
		Cars	**Tractors**	**Lorries**	**School Buses**	**Buses**	**Vans**	**Motor Bikes**	**Bicycles**	**Walking Pedestrians**	**Other**	**Specify**
8.00-8.30		94	0	25	0	6	54	0	0	0	1	Crane
8.30-9.00		124	1	32	0	4	41	0	0	1	0	0
9.00-9.30		138	0	30	0	1	36	0	1	0	1	Drilling machine
9.30-10.00		127	0	37	0	0	43	0	0	0	0	0
10.00-10.30		102	0	25	0	4	35	0	0	0	0	0
10.30-11.00		99	0	22	0	1	36	0	0	1	0	0
11.00-11.30		103	0	32	0	1	21	0	0	0	0	0
11.30-12.00		110	0	31	0	1	25	0	0	0	0	0
12.00-12.30		119	0	39	0	1	26	0	0	1	0	0
12.30-13.00		110	0	37	0	1	16	0	0	0	0	0
13.00-13.30		120	1	22	0	0	14	0	0	0	0	0
13.30-14.00		133	2	36	0	2	30	0	0	0	0	0
14.00-14.30		121	0	25	0	3	30	0	0	0	0	0
14.30-15.00		131	2	31	0	0	30	0	0	0	1	Garda car
15.00-15.30		157	2	41	0	0	46	0	0	0	0	0
15.30-16.00		171	0	31	0	1	34	0	0	0	0	0
16.00-16.30		169	0	25	0	3	34	0	0	1	1	Ambulance
16.30-17.00		149	1	17	0	3	41	0	0	0	0	0
17.00-17.30		195	0	22	0	1	41	0	0	0	0	0
17.30-18.00		178	0	22	0	2	53	0	0	0	0	0
Total		**2650**	**9**	**582**	**0**	**35**	**686**	**0**	**1**	**4**	**4**	

Traffic Survey

	Date:21/2/08	Day:Thursday	Recorded By:Michael Butler							
	Traffic survey B Site entrance									
	Cars	**Tractors**	**Lorries**	**School Buses**	**Buses**	**Vans**	**Motor Bikes**	**Bicycles**	**Walking Pedestrians**	**Other**	**Specify**
8.00-8.30	4	0	0	0	0	0	0	0	0	0	0
8.30-9.00	2	0	0	0	0	0	0	0	0	0	0
9.00-9.30	2	0	0	0	0	0	0	0	0	0	0
9.30-10.00	3	0	0	0	0	0	0	0	0	0	0
10.00-10.30	3	0	0	0	0	1	0	0	0	0	0
10.30-11.00	3	0	0	0	0	0	0	0	0	0	0
11.00-11.30	3	0	0	0	0	0	0	0	0	0	0
11.30-12.00	1	0	0	0	0	0	0	0	0	0	0
12.00-12.30	0	0	0	0	0	1	0	0	0	0	0
12.30-13.00	5	0	0	0	0	0	0	0	0	0	0
13.00-13.30	3	0	0	0	0	0	0	0	0	0	0
13.30-14.00	3	2	0	0	0	2	0	0	0	0	0
14.00-14.30	1	0	0	0	0	3	0	0	0	0	0
14.30-15.00	2	0	0	0	0	1	0	0	0	0	0
15.00-15.30	4	0	0	0	0	0	0	0	0	0	0
15.30-16.00	0	0	0	0	0	0	0	0	0	0	0
16.00-16.30	2	0	0	0	0	0	0	0	0	0	0
16.30-17.00	1	0	0	0	0	0	0	0	0	0	0
17.00-17.30	3	0	0	0	0	1	0	0	0	0	0
17.30-18.00	8	0	0	0	0	0	0	0	0	0	0
Total	**53**	**2**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	0

Traffic Impact of a BioPark

Anaerobic digester (20,000t/a)

Commercial vehicle movements-Incoming Raw Material

20,000 t/a	Organic waste (Capacity of Anaerobic digester)
	Assume 16 tonne per load
1,250	loads of raw material
	Assume 330 days/ year (330 delivery/working days)
3.78	Loads per day
4	Loads per day

8 Vehicle movements per day

6 Commercial Vehicles
2 Agricultural vehicles

Commercial vehicle movements-Outgoing BioGrow (Organic fertiliser)
Outgoing material is the same volume as that of incoming raw material

8 Vehicle movements per day

8 Agricultural vehicles

The BioGrow® organic fertiliser will be removed from the Anaerobic digester and transported to a number of storage tanks on local farmers land. This BioGrow organic fertiliser will be spread to tillage land. The out going loads of organic fertiliser will be transported to these storage tanks at a steady rate of 4 loads per day

Rape Seed Pressing (10,000 t/a)

10,000 t/a	Rape Seed
	Assume 15 tonne per load
667	Loads of Rape Seed
	Assume 330 days/ year (330 delivery/working days)
2	Loads per day

4 Vehicle movements per day

4 Agricultural vehicles

Rape Seed will be transported to the Rape Seed pressing plant from the storage buildings of the Rape Seed suppliers. This Rape Seed will be transported to the Rape Seed pressing plant at a steady rate of 2 loads per day.

Bio Diesel production

Vegetable oil used in the production of Bio Diesel will be sourced from the on site Rape Seed crushing plant. No traffic will be generated from the supply of vegetable oil.

3,333 t/a	Delivery of the Bio Diesel to the end user Assume 20 tonne per load
167	Loads of Bio Diesel Assume 330 days/ year (330 delivery/working days)
0.5	Loads per day (delivery of BioDiesel)
590	Tonnes of Methanol required for reaction Assume 20 tonne per load
30	Loads of Methanol Assume 330 days/ year (330 delivery/working days)
0.09	Loads per day
13	Tonnes of Anhydrous Sodium Hydroxide required for reaction Assume 12 tonne per load
1.08	Loads of Sodium Hydroxide
0.003	Loads per day
1.186	Vehicle movements per day (required for Bio Diesel production)
2	**Vehicle movements per day**

2 Commercial vehicles

Fuel pellet production (10,000 t/a)

10,000	Tonnes of straw required Assume 11.4 tonnes per load Assume one large square bale weighs 380Kg Assume 30 bales to a trailer
878	Loads of straw Assume 3 weeks of harvesting (21 days)

41 Loads per day (within 3 week time frame)

1.99 Loads per day (Assuming storage of bales on the farm where the straw is produced

4 Vehicle movements per day

4 Agricultural vehicles

Raw material for the pelleting plant will be transported to storage buildings. This raw material will be transported to the pelleting plant at a steady rate of 2 loads per day.

26 Vehicle movements per day

8 Commercial vehicle movements per day
18 Agricultural vehicle movements per day

BioPower ltd

Environmental Impact Statement

Volume 3- Appendix D

Flora and Fauna survey

For the development of a BioPark®

Located at
Ballinaphuill,
Tibohine,
Castlerea,
Co Roscommon

48 Main Street, Schull, Co Cork
Tel: 353 28 27837
mbutler@biopowerplc.com

Registered office as above. Registered Number 355995

ECOLOGY REPORT

INTRODUCTION

The proposed facilities site was visited on the 07th and 08th February 2008 and a habitat survey was carried out.

The work consisted of the following:-

- Identification of the habitat type of the site and surrounding area in the book Fossit 2000 – A Guide to Habitats in Ireland
- Identification of the predominant plant and animal species within each habitat.
- Identification of any rare or threatened habitats, if present, potentially impacted upon by the proposed development. This also included the identification of any areas of conservation within 5 kilometres of the proposed site

METHODS

This study consisted of both desk study and a field study.
The desk study involved:-

- Inspection of relevant maps and aerial photographs
- Consultation with relevant authorities and groups
- Review of existing and proposed designation

The field study was carried out as follows:-

Vegetation classification was carried out by walking through and visually inspecting the site. The site was then divided and described by habitat type according to "A guide to Habitats in Ireland (Fossitt 2000)".

The Fauna survey consisted of the identification of principally the different bird species observed over the two days.

SURVEY CONSTRAINTS

The visit was carried out in February. It is possible therefore, that species may be under recorded due to seasonal factors.

ECOLOGICAL DESCRIPTION

The site is situated approximately 4km from Ballaghaderreen in the townland of Tibohine, Co. Roscommon. The site area is approximately 12 hectares.

FLORA

The area was split into the following areas where the predominant flora was identified.

- Commercial Forestry
- Earth Banks & Hedge
- Farmland

Commercial Forestry: Under a "Guide to Habitats in Ireland (Fossitt 2000)", the habitat can be described as;-

- Conifer plantation WD3

Earthen Banks and Hedges: The site is sub divided by a number of earthen banks which are topped by native hedging and the occasional standard tree boarded by an open ditch. Under "A Guide to Habitats in Ireland (Fossitt 2000)", the habitat can be described as:-

- Hedgerows WL1
- Drainage Ditches FW4

Farmland: To the East of the forestry block is farmland composed of grazing land subdivided by hedgerows. Under Fossits (2000) this would be described as:-

- Improved agricultural grassland GA1
- Hedgerows WL1

FLORA IDENTIFIED:

Broad leaved dock (Rumex obtusijolias)
Creeping buttercup (Ranunculus repens)
Spear thistle (Cirsium Vulgare)
Creeping thistle (Cirsium arrenses)
Common nettle (Urtica dioica)
Ribwort plantain (Plantago lanceolata)
Bramble (Rubus spec.)
Common rush (Juncus effusus)
Hogweed (Heracleum sphondylium)
White clover (Trifolium repens)
Daisy (Bellis perennis)
Common ragwort (Senecio jacobaea)
Speedwell (Veronica spec.)
Herb-robert (Geranium robertianum)
Sitka spruce (Picea sitchesis)
Blackthorn (Prunus spinosa)
Wild cherry (Prunus avium)
Holly (Ilexaquifolium)
Rowan (Sorbus aucuparia)
Larch (Larix Spp)
Willow (Salix spec.)
Common alder (Alnus glutinosa)
Common ash (Fraxinus excelsior)
Sallow (Salix spp.)
Hawthorn (Crataegus monogyna)
Broad leaved pond weed (Potamogeton Spec.)
Frogbot (Hydrocharis morsus – range)
Brooklime (Veronica beccabunga)
Water starwort (Callitriche stagnalis)
Common sorrel (Rumex acetosa)
Yellow iris (Iris pseudacorus)
Cleavers (Galium aparine)
Ivy (Hedera helix)
Lesser celandine (Ranunculus ficarial)
Dog rose (Rosa canina)
Greater willowherb (Epilobium hirsutum)
Common knapweed (Centaurea nigra)
Shepherds Purse (Capsella bursa – pastoris)
Gorse (Ulex europaeus)
Yarrow (Achillea millefolium)
Vetch (Vicia spec.)
Tormentil (Potentilla erecta)
Ferns (Dryopteris spp and Asplenium spp

FAUNA IDENTIFIED:

MAMMALS
Fox (Vulpes vulpes)

BUTTERFLIES
Small tortoiseshell (Aglais veticae)

BIRDS
Common snipe (Gallinago gallinago)
Carrion crow (Corvus corone corone)
Blue tit (Parus caeruleus)
Magpie (Pica pica)
Blackbird (Turdus merula)
Starling (Sturnus vulgaris)
Common pheasant (Phasianus colchicus)
Great tit (Parus major)

The flora and fauna identified on site are typical of what would be found in these habitats. No rare or uncommon animal or plant were identified or seen. There would be very limited impact on the habitats described – with the proposed landscaping design these habitats would improve especially with the additional planting of trees and shrubs.

Walter Ryan-Purcell, founder of BioPower ltd, has a keen interest in biodiversity and landscaping in sympathy with the local countryside. While manager of McGill Environmental systems (Ireland) ltd, he organized the planting of thousands of native trees of over thirty varieties around the composting facilities at Castletownroche in Co Cork, Molaisin, Cappoquin in Co Waterford, Kilmainham wood in Co Meath and Glenville in Co Cork. Wildflowers were also sown on earthen banks at the Castletownroche site as well as a fox earth, pond and birds nest boxes. The diversity and level of population of fauna increased enormously as a result at rural sites, along with the composting facilities.

BioPower ltd

Environmental Impact Statement

Volume 3- Appendix E

Landscaping plan

For the development of a BioPark®

Located at
Ballinaphuill,
Tibohine,
Castlerea,
Co Roscommon

48 Main Street, Schull, Co Cork
Tel: 353 28 27837
mbutler@biopowerplc.com

Registered office as above. Registered Number 355995

LANDSCAPING REPORT

The proposed development at Tibohine is most fortunate in that the site is screened from the surrounding area with the existing conifer plantation.

The main objective of the landscaping is to screen the proposed facility from the surrounding area. BioPower also has the commitment to maximise the biodiversity and conservation value of the site. To achieve this end, natural species would be planted. They are more readily colonised for food and shelter by the local fauna. They also integrate into the local landscape more naturally than foreign species. The proposed landscaping will enhance the natural beauty of the whole area.

OBJECTIVES

- Increase the planting of trees to screen the factory site.
- Concentrate on the planting of native species.
- Create an area for bio-diversity and conservation incorporating the existing ponds and enhance these for wildlife.
- Planting of trees and shrubs to enhance the beauty of the area ie Spring Blossom and Autumn berries which will also be used by feeding winter birds.
- The planting of the site will quickly form into a shelter belt which will benefit its neighbours and create its own micro climate.
- To create a wildlife corridor between the facility and the surrounding farmland.

ENTRANCE

The entrance to the facility is off the road to the South West of the site. The entrance is well set back from the road. This is bounded by a post and rail fence.

It is proposed that a native hedge will be planted running parallel to the post and rail fence. This will produce a more natural boundary blending into the surrounding countryside. The land either side of the entrance roadway will be landscaped with both trees and shrubs which will help enhance the visual aspect of the area.

The entrance driveway to the forestry section of the site will be banked and hedged on both sides and some of this will incorporate an existing hedgerow which already provides natural screening. These hedgerows will be allowed to mature and offer a full visual screen to any motor vehicle using the site. Some of the existing conifer will be replaced with native trees to visually create a more natural aspect to the landscape and to benefit the local bio diversity.

LANDSCAPING PLANS

It is proposed to plant:-

- 1,200 Native Hedging Plants
- 350 Native Trees
- 25 Ornamental Shrubs either side of the entrance drive.

All trees and shrubs will be protected from rabbits with guards.

It is also planned to erect bird boxes on the larger established trees in the hedgerow to enhance the area for the local breeding bird population

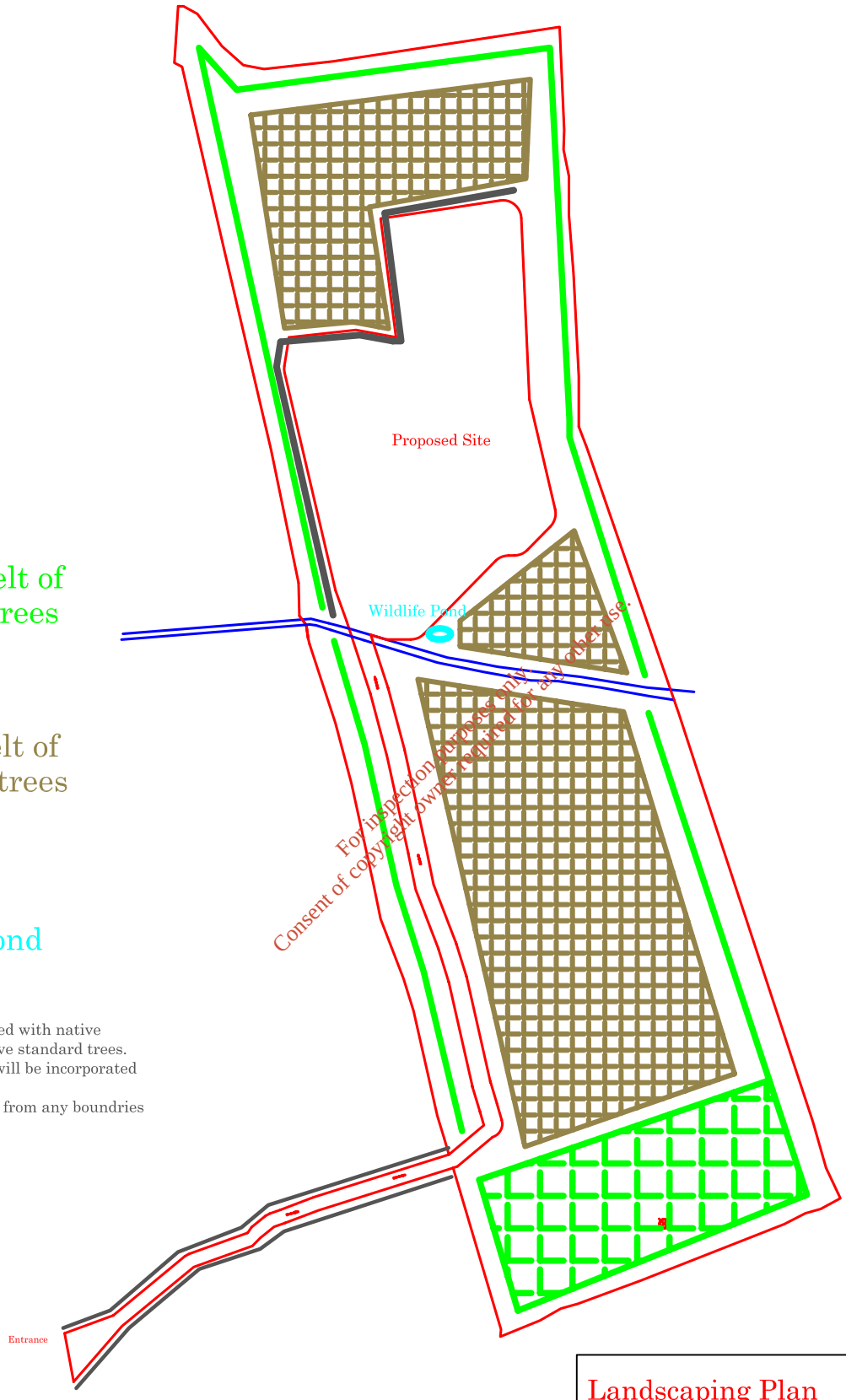
SPECIES TO BE PLANTED

1. Oak (Quercus robur) 1, 3, 4, 5, 8
2. Beech (Fagus Sylvatica) 1, 3,4,5,8
3. Ash (Fraxinus Exelsior) 1, 3, 4, 5, 8
4. Wild Cherry (Prunus avarium) 1, 3, 4, 5, 6, 8
5. Mountain Ash (Sorbus aucuparia) 3, 4, 5, 6, 8
6. Common Alder (Alnus glutinosa 1,2,3,9
7. Silver Birch (Betula pendula) 1, 3, 5, 8
8. Downey Birch (Betula pubescens)
9. Guilder Rose (Viberium Opulus) 3, 4, 5, 6, 8
10. Hazel (Corylus avellana) 3, 4, 5, 8
11. Hawthorn (Crataehus Monogyna) 1, 3, 4, 6, 8
12. Blackthorn (Prunus Spinosa) 1, 3, 4, 6, 8
13. Spindleberry (Buonymus europaeus) 3, 4, 6, 8
14. Holly (Ilex aquifolium) 1, 2, 3, 4, 8, 9
15. Elder (Sambucas nigra) 3, 4, 6, 8

Key

1. Shelter belt
2. Evergreen
3. Conservation value
4. Berries/Nuts
5. Autumn colouring
6. Blossom
7. Coniferous
8. Good for wildlife
9. Winter shelter for birds and insects

Landscaping Plan
Scale 1:2,500



Existing belt of deciduous trees

Existing belt of coniferous trees

Wildlife Pond

Earthen Bank, Planted with native hedgegrows and native standard trees.
Existing hedgegrow will be incorporated into the scheme
Incorporating shrubs from any boundries removed

NORTH

Landscaping Plan

Landscaping Plan by	Jeremy Scott-Bolton Churchtown Landscaping Coolmore, Churchtown, Co Cork
Drawings prepared by:	Michael Butler BEng BSc BioPower ltd 48 Main Street, Schull, Co Cork

Scale: 1:2,500	Date: 11/1/08	Drg No: 14

BioPower ltd

Environmental Impact Statement

Volume 3- Appendix F

F.1 Drilling log
F.2 Location of water samples
F.3 Groundwater test results

For the development of a BioPark®

Located at
Ballinaphuill,
Tibohine,
Castlerea,
Co Roscommon

48 Main Street, Schull, Co Cork
Tel: 353 28 27837
mbutler@biopowerplc.com

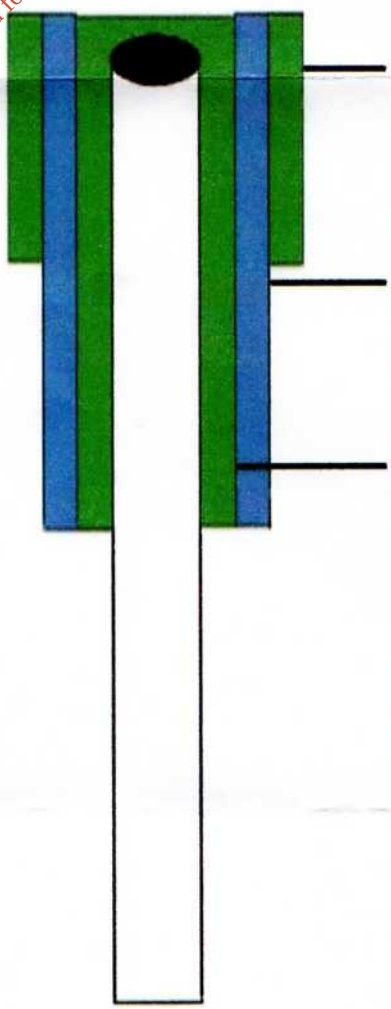
Registered office as above. Registered Number 355995

Drilling Log

Borehole No:
Date of Drilling:
Total Depth:

Archerstown Industrial Estate
Thurles,
Co. Tipperary.
Tel: 0504 57843
Fax: 0504 57837
Email:

HYDRO LOGIC
A SOLUTION FOR EVERY DROP

From	To	Description	Construction Diagram	Details
G.L	2.5	Brown Clay		
2.5	5m	Broken Limestown		3m: Drilled in 6" Casing into Rock
5m	F.S	Pale Greylime Stone		
	At 7.5m	Fissure in Limestone		
7.5	22m	GreyLimestone		
22	40	Greylimestone		Drilled in 6" casing into Rock
40	50	Greylimestone		Installed Concrete Plug to seal out
50	58	Greylimestone		Ground Water
		End of Borehole: 58		
Estimated output of well = 600 Litres per hour				

5

Ordnance Survey Ireland Licence No. EN 0006108
Ordnance Survey of Ireland and
Government of Ireland

O'Neill
ground water engineering

Unit D5, M7 Business Park,
Newhall, Naas,
Co. Kildare, Ireland
Ph:+353 45 895668
Fax:+353 45 881705
Mob:+353 87 2300933
info@groundwatereng.ie

Client:
Biopower plc

Project:
EIS - Water Section for
a Proposed Biopark at Ballinphuil,
Tibohine, Castlerea, Co. Roscommon

Title:
Current Site Layout

Key:

- Site boundary
- Stream
- Surface water sample
- Upgradient Monitoring Well

Scale: As per scale bar	**Datum:** n/a
Date: April 2008	**Checked:** AVZ
Author: D Broderick	**Figure no:** 4
Drawn by: D Broderick	**Reference:** 0320801

BORD NA MÓNA

BORD NA MÓNA ENVIRONMENTAL LIMITED

Analysis Report

ISO 17025 INAB ACCREDITED TESTING

Project Code : 08-14456 **Report Unique ID:** 16842

Report Date : 27-Mar-2008 **Commen. Date:** 04/03/2008

Customer: David Broderick

O'Neill Groundwater

UNIT D7 M7 BUSINESS PARK NEWHALL NAAS CO. KILDARE

Contact Details:

Approved by : Roisin Kavanagh

Team Leader

Sample Number : 146153 Client ID: 11200

Sample Type:Groundwater Received: 04/03/2008 Condition: Good

Analysis	*Component*	*Specification*	*Result*	*Units*
Alkalinity	*Total Alkalinity	-	193	mg/L CaCO3
BOD	*BOD	-	<2	mg/l
Chloride	Chloride	-	48	mg/l
COD	*COD	-	29	mg/l
Total Hardness	*Total Hardness	-	236	mg/L CaCO3
Anions	*Sulphate	-	8.83	mg/l
Nitrate as N	*N03-N	-	0.5	mg/l
Nitrite as N	*N02-N	-	<0.02	mg/l
Orthophosphate	*P04-P	-	0.06	mg/l
Suspended solids	*Suspended solids	-	<5	mg/l
Dissolved Solids	*Total dissolved solids	-	292	mg/l
Total Nitrogen	Total Nitrogen	-	<1.00	mg/l
Total Phosphorous	Total Phosphorus	-	0.07	mg/l
	Turbidity	-	1	NTU Units

Project Code : 08-14456

Report Unique ID: 16842

Sample Number : 146154 Client ID: 11201

Sample Type:Groundwater Received: 04/03/2008 Condition: Good

Analysis	*Component*	*Specification*	*Result*	*Units*
Alkalinity	*Total Alkalinity	-	348	mg/L CaCO3
Ammonia	*NH3-N	-	0.08	mg/l
BOD	*BOD	-	<2	mg/l
Chloride	Chloride	-	15	mg/l
COD	*COD	-	294	mg/l
Total Hardness	*Total Hardness	-	442	mg/L CaCO3
Anions	*Sulphate	-	75.48	mg/l
Nitrate as N	*N03-N	-	<0.2	mg/l
Nitrite as N	*N02-N	-	<0.02	mg/l
Orthophosphate	*P04-P	-	0.02	mg/l
Suspended solids	*Suspended solids	-	<5	mg/l
Dissolved Solids	*Total dissolved solids	-	504	mg/l
Total Nitrogen	Total Nitrogen	-	<1.00	mg/l
Total Phosphorous	Total Phosphorus	-	0.05	mg/l
	Turbidity	-	<1	NTU Units

Sample Number : 146155 Client ID: 11200

Sample Type:Groundwater Received: 04/03/2008 Condition: Good

Analysis	*Component*	*Specification*	*Result*	*Units*
Conductivity	*Conductivity @ 25°C	-	570	µS/cm
Phenol	Phenol	-	<0.1	mg/l
pH	*pH	-	8.3	pH units
Organic Carbon	Total Organic Carbon	-	8	mg/l

Sample Number : 146156 Client ID: 11200
Sample Type:Groundwater Received: 04/03/2008 Condition: Good

Analysis	Component	Specification	Result	Units
Ammonia	*NH3-N	-	0.15	mg/l

Sample Number : 146157 Client ID: 11200
Sample Type:Groundwater Received: 04/03/2008 Condition: Good

Analysis	Component	Specification	Result	Units
Metals	*Arsenic (diss)	-	<2	µg/l
	Aluminium (diss)	-	9	µg/l
	Calcium (diss)	-	66	mg/l
	*Cadmium (diss)	-	<2	µg/l
	Iron (diss)	-	<0.1	mg/l
	Potassium (diss)	-	2	mg/l
	Magnesium (diss)	-	3	mg/l
	*Manganese (diss)	-	16	µg/l
	Sodium (diss)	-	22	mg/l
	*Lead (diss)	-	<2	µg/l
Mercury	Mercury (diss)	-	<1	µg/l

Sample Number : 146158 Client ID: 11201
Sample Type:Groundwater Received: 04/03/2008 Condition: Good

Analysis	Component	Specification	Result	Units
Conductivity	*Conductivity @ 25°C	-	923	µS/cm
Phenol	Phenol	-	<0.1	mg/l
pH	*pH	-	7.8	pH units
Organic Carbon	Total Organic Carbon	-	<5	mg/l

Project Code : 08-14456 **Report Unique ID: 16842**

Sample Number : 146159 Client ID: 11201
Sample Type:Groundwater Received: 04/03/2008 Condition: Good

Analysis	Component	Specification	Result	Units
Metals	*Arsenic (diss)	-	<2	µg/l
	Aluminium (diss)	-	9	µg/l
	Calcium (diss)	-	57	mg/l
	*Cadmium (diss)	-	<2	µg/l
	Iron (diss)	-	<0.1	mg/l
	Potassium (diss)	-	2	mg/l
	Magnesium (diss)	-	29	mg/l
	*Manganese (diss)	-	107	µg/l
	Sodium (diss)	-	18	mg/l
	*Lead (diss)	-	<2	µg/l
Mercury	Mercury (diss)	-	<1	µg/l

Sample Number : 146160 Client ID: 11201
Sample Type:Groundwater Received: 04/03/2008 Condition: Good

Analysis	Component	Specification	Result	Units
e.Coli	e.Coli	-	<1	MPN/100 mls
Total Coliforms	Total Coliforms	-	<1	MPN/100 mls

Project Code : 08-14456 **Report Unique ID: 16842**

Methods of Analysis

Analysis Name:	Method:
Alkalinity	G/69 Based on Standard Methods for examination of Water + Waste Water,2005,21st Edition,4500-P.E.
Ammonia	G/67 Based on APHA 2005,21st Edition,4500-NH3 and bluebook Ammonia in waters 1981
Anions	Ion Chromatography
BOD	G/04: Based on APHA, 2005, 21st Edition, Method 5210B. TCMP Nitrification inhibition.
COD	G/03: Based on APHA, 2005, 21st Edition, Method 5220D
Chloride	Based on G67 Konelab
Conductivity	G/06 Based on APHA, 2005, 21st Edition, Method 2510B
Dissolved Solids	G/65 Based on Standard Methods,2005,21st Edition,Method 2540B
ICP-MS Mercury - Dis	ICP-MS
Mercury	ICP-MS
Metals	G57 Based on EPA Method 200.8
Nitrate as N	G/67 Based on APHA 2005,21st Edition,4500-N02B colorimetric method
Nitrite as N	G/67 Based on APHA 2005,21st Edition,4500-N02B.Colorimetric method
Organic Carbon	TOC Analyser
Orthophosphate	G/67 Based on APHA,2005,21st Edition,4500-P.E. Ascorbic Acid Method
Phenol	HPLC
Suspended solids	G/19 Based on APHA, 2005, 21st Edition, Method 2540D
Total Coliforms	MPN based on IDEXX defined substrate method
Total Hardness	G/68 Based on Standard Methods for examination of Water + Waste Water,2005,21st Edition,4500-P.E.
Total Nitrogen	Based on ENV 12260 1996
Total Phosphorous	Persulphate digest followed by colourimetric analysis
Turbidity	G/54 Based on APHA 21st Edition- 2005, 2130A
e.Coli	G/72 MPN based on IDEXX defined substrate method
pH	G/05 Based on APHA,2005,21st Edition,Method 4500 H+B

Notes

* = INAB accredited test ** = subcontracted test *** = outside accredited range

Conditions

1. Reports shall not be reproduced except in full, without the expressed approval of Bord Na Mona Technical Services Analytical Laboratory
2. Results contained in this report relate only to the items tested.
3. All Comments concerning this report or its contents should be forwarded to the Laboratory Manager