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Environmental Impact Statement
Proposed Bio Energy Facility
The Downs
Mullingar

Client	Revision	Date	Compiled	Checked	Approved
Bio Agrigas Ltd. The Downs Mullingar Co. Westmeath	D1	30/07/2012	CB	DC	
	D2	02/08/2013	DH/RN	DC	

Bio Agrigas Ltd

ORS Consulting Engineers

Non Technical Summary

Roger Goodwillie & Associates

marlin architects
DESIGN - ARCHITECTURE - PLANNING - PROJECT MANAGEMENT

ODOUR monitoring IRELAND

IAC Irish Archaeological Consultancy

MITCHELL + ASSOCIATES

NON TECHNICAL SUMMARY

Introduction

This is a Non Technical Summary (NTS) of the Environmental Impact Statement (EIS) for the development by Bio Agrigas Ltd of a Bioenergy Facility at The Downs, Newdown, Mullingar, Co. Westmeath.

The EIS has been prepared to accompany an application to Westmeath County Council for full planning permission for a Bioenergy Facility at The Downs, Newdown, Mullingar. The Facility will be operated under a Waste Licence to be issued by the Environmental Protection Agency (EPA). The proposed facility will consist of an Anaerobic Digestion (AD) Plant designed to process some 20,000 tonnes of non-hazardous organic wastes originating in the local area. The Bioenergy Facility will be capable of producing approximately 1 Mega Watts (MW) of electrical power.

The anaerobic digesters will be designed to receive c. 20,000 tonnes/year liquid wastes sourced in the local area including agri-industry processing wastes, food processing wastes and will also process Category 2 ABP material. The EIS outlines the scale and scope of the proposed development and describes the existing environment at the development site. The potential impacts resulting from the proposed facility are identified together with the proposed mitigation measures, which will prevent or reduce the identified potential impacts.

Location & Setting

The 2.30 ha development site is located to the north of the existing commercial premises with the surrounding lands mainly agriculture at Newdown, The Downs, Mullingar, Co. Westmeath, off the Dublin Sligo Road (N4) . The site is bounded to the north by the Regional Road, The Downs to Killucan road (R156), to the east by agricultural land, to the west by agricultural lands and proposed N4 The Downs Grade Separation and to the South by N4 Dual Carriageway.

Characteristics of the project

The planned bioenergy facility will combine anaerobic digestion technology to treat non hazardous organic feedstock, generate electrical power & heat and to produce a useful solid soil conditioner.

Deliveries will only be accepted for processing from sources of wastes that have been previously characterised as suitable for treatment at the facility.

The non-hazardous organic feedstock planned to be treated at the waste facility are currently disposed of through land spreading and/or export.

Type of Feedstock	Annual Quantity t/y	Dry Matter Content
Pig Slurry	3,000	8%
Dairy Cow Slurry	2,000	8.5%
Maize Silage	2,000	33%
Grass Silage	3,000	30%
Fodder beet	2,000	20%
Category 2 ABP- Belly Grass	5,000	14%
Bakery Waste – Bread, Dough Fat	3,000	40%
Total	**20,000**	**22%**

The Facility has been designed for continuous operation 24 hours a day throughout the year. Scheduled shut down periods will be kept to a minimum to allow the facility to operate at maximum efficiency.

Waste will be accepted at the Facility in fully enclosed tankers and covered trailers between the hours of 0800 -1900 hours, Monday to Friday, 0800 – 1300 hours on Saturday approximately, with no deliveries on Sundays or public holidays except in emergency situations.

Potential Impacts, Mitigation Measures and Likely Significant Effects

The proposed development has the potential to impact on the receiving environment. However, by designing the facility to the best international standards and by operating the facility under a Waste Licence to be issued by the EPA, the potential for impacting on the environment is greatly reduced.

The proposed development is environmentally friendly utilising a carbon neutral process in terms of carbon dioxide emissions and will have a positive impact on the environment.

There will be potential for impact on air quality from dust, odour and gas engine emissions.

The overall modelling carried out by Odour Monitoring Ireland indicates that the facility will not result in any significant impact on air quality in the surrounding area with all ground level concentrations of pollutants well within their respective ground level concentration limit values.

Air quality mitigation measures include;

- The implementation of a dust minimisation plan prior to commencement of site works,
- All site vehicles and machinery to be switched off or throttled down to a minimum when not in use
- Emissions from the gas engine emission point will be governed by regulatory emission limit values

Continuous emission monitors will be installed to ensure compliance with emission limit values and an odour management plan will be prepared to ensure odour emissions are minimised.

While there is a potential for noise impacts from construction and operation of the proposed development, mitigation measures proposed will ensure that the noise levels in the vicinity of the development are within the EPA stipulated guideline values of 55dB(A) and 45dB(A) for daytime and night time noise activities.

Noise mitigation measures include traffic speed restrictions on site and ensuring that the internal plant layout and design will be to a standard that ensures noise levels outside buildings does not exceed 55dB(A). In addition there will be a regular plant maintenance programme.

The operational phase of the development is not expected to pose any significant risk to groundwater flow or the prevailing hydrological conditions in the locality. It is not anticipated that there will be any adverse impact on the prevailing groundwater quality as there will be no discharges from the proposed process to groundwater at this location. However, a wastewater treatment plant has been proposed and a possibility exists that contamination of the

groundwater may occur as a result of the discharging of treated effluent to the ground. The design and installation of the plant has been and will be completed and supervised by an approved Site Suitability Assessor.

The mitigation strategy contained in the EIS document recommends actions which can be taken to reduce or offset the scale, significance and duration of the impacts on the known and potential soils and geological resource. Many aspects of the soils and geological resources are non-renewable and once impacted upon cannot be replaced.

The purpose of the strategy is to specify mitigation measures where appropriate to minimise the 'risk factor' to all aspects of soils and geological resources such as to minimise the potential for hydrocarbons to contaminate the ground, reduce the risk of erosion, etc. This 'risk factor' is reduced or offset by recommending the implementation of a mitigation strategy in each area of the study. On the implementation of this mitigation strategy, the potential for impact will be lessened. As a result, when the recommended mitigation is implemented, there will be no significant residual negative impacts on the soils or geological/hydrogeological environment.

Along with a Traffic and Transport chapter associated with the EIS, there is also a separate Traffic and Transport Assessment Report associated with the planning application. This Traffic and Transport Assessment Report examines existing and proposed traffic conditions and transport activity to determine the effects on the local road network attributable to a proposal by Bio-Agrigas to construct a Bioenergy Facility to produce electricity from organic feedstock. Existing and collected traffic data have been used to enable accurate assessments of the prevailing existing conditions and predicted future conditions.

Established empirical data have been used to anticipate future traffic generation resulting from the introduction of the proposal and to develop a model of flow conditions following the commencement of the proposed development.

The proposed access arrangements have been analysed using these anticipated flow parameters by means of recognised junction capacity assessment techniques. These analyses have confirmed that the access junction will accommodate anticipated traffic conditions and will comfortably operate within levels of acceptable capacity without undue detrimental effects on the existing road network.

The report also analyses the proposed access junction in accordance with the NRA's DMRB guidelines to ensure that the developments access complies with all existing standards.

Recent programs of archaeological fieldwork have revealed prehistoric activity represented by cremation pits, burnt mounds and 'industrial' pits dating to the Bronze Age and Iron Age in the vicinity of the area of proposed development.

A burnt mound was identified during testing, undertaken in advance of the N4 The Downs Grade Separation Scheme, located immediately to the south of the northwestern limit of the proposed access road. Further testing undertaken in advance of the N4 Grade Separation scheme, which adjoins the proposed development area, revealed a second large burnt mound c. 100m north of the proposed access route. As the site is located on the wetland/ dryland margin it is the ideal location for burnt mound activity and as such has the potential to reveal previously unknown archaeological deposits.

Due to the rich archaeological heritage of the area and the number of recently discovered sites of archaeological activity within the vicinity of the proposed development area it is recommended that a program of archaeological testing be undertaken. Testing should be carried out by a licensed eligible archaeologist. Full provision should be made for the resolution of any archaeological features/deposits that may be discovered, should that be deemed the appropriate way to proceed.

With respect to the ecology of the site, the site for the proposed development is ordinary, nutrient-rich farmland divided between pasture and tillage. Neither it nor the surrounding hedgerows have significant interest for flora and fauna though the presence of an adjacent bog increases the diversity of visiting species.

The effect of the project can be seen as neutral for the area in question but positive for the wider environment since it will reduce atmospheric emissions from farming and lead to tighter control of nutrients and potential pollution.

With respect to visual impact, the site is generally level with the ground falling gradually from the south-west to the north-east across the site. The existing trees are confined to those contained within the hedgerows around the site. The site itself is a small portion of a much larger tract of agricultural land with pockets of residences, commercial premises, a school and some sports pitches.

The primary visual features adjacent to the site are the Flynn Feed agri-industrial storage buildings located to the south-west of the site.

The proposed development will alter the existing landscape character from agricultural to agri-industrial, similar to the buildings and structures that exist on the adjacent Flynn Feeds site.
During the construction phase there will be landscape and visual impacts from normal construction activity such as construction traffic, site compounds, dust, building materials, site hoarding, ground disturbance and vegetation removal.

The proposed development will have a visual impact on views from the surrounding road network and six photomontages were prepared to illustrate the visual impact from these key locations.

Mitigation Measures Construction Phase:
The appropriate site management measures and work practices will be implemented to ensure the site is kept tidy, dust is kept to a minimum (this will include use of a wheel wash facility), and that public areas are kept free from building material, site rubbish etc. Temporary fencing, barriers, traffic management and signage will be removed when no longer required and all remaining spoil and construction material will be removed.

Mitigation Measures Operational Phase:
The visual impact of the development will be mitigated through the design of the buildings and structures by the utilization of colours, textures and materials which will visually diminish the apparent massing of these buildings in the landscape. A comprehensive landscape scheme will be implemented with tree and shrub planting provided to soften the visual appearance of the proposed buildings and structures along with new hedgerow planting at the boundaries to provide screening.

As stated above the proposed development will alter the existing landscape character from agricultural to agri-industrial. Given the small portion of agricultural land that will be taken up by the development and juxtaposed against the existing Flynn Feeds commercial centre, it is assessed that the receiving environment would be tolerant to the proposed change and the impact on the landscape character of the site will not be significant. The subject site offers little or nothing in the way of visual amenity value and has no recreational amenity value. Therefore the landscape and visual impact on the visual and recreational amenity of the subject site will also not be significant.

As all lands within this application are restricted to that outlined within the site boundary, it was concluded that the proposed BioenergyFacility will not result in any significant environmental impacts relating to land severance, land access or disruption to current agricultural land use.

With the listed mitigation measures in place, neither the construction nor operational phases of the development will result in any significant negative impacts on the existing economic assets. When the facility is in operation it will have a significant beneficial impact in the reduction of the quantity of non-hazardous organic waste, carbon emissions, GHG emissions and will provide an economic boost to the area

In addition, the proposed facility will produce approximately 1MW electricity for export to the National Grid. Using residual waste to generate electricity also replaces non-renewable fossil fuels such as coal, oil and natural gas in the generation of electricity. This is seen as a very positive long term residual impact of the Bioenergy Facility.

Conclusion

The EIS concludes that there will be no significant effect on the local environment arising out of the proposed development of the Bioenergy Facility at The Downs, Newdown, Mullingar, Co. Westmeath.

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GLOSSARY OF TERMS

Alternatives
A description of alternatives - as defined by the Regulations - alternative locations, alternative designs and alternative processes.

Anaerobic Digestion (AD)
Is a natural process of decomposition and decay that takes place in the absence of oxygen and by which organic matter is broken down to its simpler chemical components.

Archaeology
The study of past societies of any period through the material remains left by those societies and the evidence of their environment. The material things (objects, monuments, sites, features, deposits) which archaeology uses to study past societies are referred to as 'archaeological heritage'.

Baseline Survey
A description of the existing environment against which future changes can be measured.

Commissioning
The rendering fully operational of a project or process.

Decommissioning
The final closing down, and putting into a state of safety of a development, project or process when it has come to the end of its useful life.

"Do nothing" Scenario
The situation or environment which would exist if no intervention or development were carried out .

Ecology
The study of the relationships between living organisms and between organisms and their environment (especially animal and plant communities), their energy flows and their interactions with their surroundings.

Environmental Impact Statement – EIS
A statement of the effects, if any, which the proposed development, if carried out, would have on the environment.

Emission
a) an emission into the atmosphere of a pollutant within the meaning of the Air Pollution Act 1987.
b) a discharge of polluting matter, sewage effluent or trade effluent within the meaning of the Local Government (Water Pollution) Act 1977 to waters or sewers within the meaning of that Act.
c) disposal of waste,
d) noise.

EPA
The Environmental Protection Agency.

Geology
The science of the earth, including the composition, structure and origin of its rocks.

Ground Water
The water which flows underground through naturally porous parts of the soil or rock.

Habitat
The area in which an organism or group of organisms live.

Hydrology
The science concerned with the occurrence and circulation of water in all its phases and modes, and the relationship of these to man.

Impact
The degree of change in an environment resulting from a development.

Infrastructure
The basic structure, framework or system which supports the operation of a development project for example, installations such as roads and sewers which are necessary to support development projects.

Land-use
The activities which take place within a given area of space.

Methodology
The specific approach or techniques used to analyse impacts or describe environments.

Mitigation
Measures designed to avoid, reduce, remedy or compensate for impacts. Mitigation By Remedy:
Impact Avoidance: When no change is caused.
Impact Reduction: Where the significance of adverse impacts is lessened.
Impact Remedy: When an adverse effect is replaced with a more acceptable effect.

Mitigation Measures
The means by which decisions about a proposed development are modified to avoid, reduce or remedy the adverse environmental effects that are identified.

Monitoring
The repetitive and continued observation, measurement and evaluation of environmental data to follow changes over a period of time, to assess the efficiency of control measures.

Pests
Insects, both flying and crawling.

Physical barrier
Device used to prevent entry of pests and vermin such as insect

Processes
The activities which take place within a development.

Risk Assessment
An analytical study of the probabilities and magnitude of harm to human health or the environment associated with a physical or chemical agent, activity or occurrence.

Scoping
The process of identifying the significant issues which should be addressed by a particular Environmental Impact Assessment.

Significance
The sensitivity of a receiving environment to change or the consequence of change for the receiving environment.

SOP
Standard Operating Procedure

Surface Water
Natural water bodies such as streams, lakes and rivers.

Sustainable Development
Defined by the Brundtland Commission 1987 "Development that meets the needs of the present without comprising the ability of the future generation to meet their own needs".

Vermin
All rodents. Animals excluded from the establishment. Wild birds

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1.0 INTRODUCTION

This Environmental Impact Statement (EIS) has been prepared to accompany an application to Westmeath County Council for full planning permission for the development of an anaerobic digestion / bioenergy facility at Newdown, The Downs, Mullingar.

This EIS will also be submitted to the Environmental Protection Agency (EPA) in support of an application for an operating licence for this waste recovery activity.

The intention is to apply for full planning permission for the development of an anaerobic digestion / bioenergy facility on lands in the town land of Newdown, approximately 6 kilometres east of Mullingar town. Refer to Plate 1.

The applicant site covers 2.30 hectares (ha) as outlined in Drawing No. 111_001_200. The proposed development will be located to the north of the existing premises with the surrounding lands remaining as agriculture

The anaerobic digesters will be designed to receive c. 20,000 tonnes/year of feedstock sourced in the local area including agri-industry slurries, energy crops, food processing wastes and will also process Category 2 ABP material. Refer to Plate 2 indicating locations of feedstock suppliers and receiver locations for the product. All of the feedstock suppliers and the product receivers are within 50 kilometres of the proposed development site thus ensuring that any carbon footprint associated with the delivery of the feedstock / product is kept at a minimum.

Anaerobic processes are largely used for the treatment of industrial wastes and waste waters for more than a century and AD is today a standard technology for the treatment of various industrial waste waters from food-processing, agri-industries, and pharmaceutical industries. AD is also applied to pre-treat organic loaded industrial waste waters, before final disposal. Due to recent improvements of treatment technologies, diluted industrial waste waters can also be digested. Europe has a leading position in the world regarding this application of AD.

In recent years energy considerations and environmental concerns have further increased the interest in direct anaerobic treatment of organic wastes and the management of organic solid wastes from industry is increasingly controlled by environmental legislations.

Agricultural biogas production offers several environmental benefits. Electricity and heat are produced from a renewable energy source, thus CO_2 emissions that enhance the greenhouse effect are reduced. Anaerobic Digestion raises the NH_4-N content and decreases the carbon content of animal manure, therefore its fertilising qualities improve and less mineral N-fertiliser is needed. Production of mineral N-fertiliser is an energy consuming process connected with high CO_2 emissions from burning fossil fuels. Due to the reduced carbon content, greenhouse gas emissions during manure storage decline, the use of organic wastes as co-substrates instead of their dumping additionally reduces methane emissions

Industries using AD for wastewater treatment range from:

- Food processes: e.g. vegetable canning, milk and cheese manufacture, slaughterhouses, potato processing industry
- Beverage industry: e.g. breweries, soft drinks, distilleries, coffee, fruit juices

- Industrial products: e.g. paper and board, rubber, chemicals, starch, pharmaceuticals
- Industrial biogas plants bring about a number of benefits for the society and the industries involved:
- Added value through nutrient recycling and cost reductions for disposal
- Utilisation of biogas to generate process energy
- Improved environmental image of the industries concerned, through environmental friendly treatment of the produced wastes

Although the Bioenergy Faciity associated with this application facilitates primarily agricultural feedstock, it is expected that the environmental and socio-economic benefits of AD, complemented by higher costs/taxation of other disposal methods, will increase the number of applications of industrial biogas in the future.

1.1 Need for Proposed Development & Regulatory Background

The food processing and agricultural industries in Ireland generate substantial quantities of nonhazardous organic wastes and sludges. Also, some 132 million wet tonnes of agricultural slurries, wastewaters, effluent and sludges are generated in Ireland annually. These industrial and agricultural organic wastes are, in the absence of alternative disposal or treatment options, disposed of presently by land spreading or by landfilling.

1.1.1 EPA Support for Anaerobic Digestion

The EPA published a Discussion Document in January 2005 entitled 'Anaerobic Digestion: Benefits for Waste Management, Agriculture, Energy and the Environment'.

The Agency reported;

On page 1 '*Anaerobic digestion is a proven technology that extracts energy in the form of biogas from organic waste. The process provides several environmental benefits. Digestion of agricultural slurries yields a substance that has a lower pollution potential and is more suitable than raw slurries for plant uptake. Global warming dividends arise because electricity generated from biogas displaces fossil fuel generated electricity and thus reduces dioxide emissions to the environment.*'

On page 2 ' *The AD process can be used to turn residues from livestock farming, food processing industries, waste water treatment sludge, water treatment plant sludge among other organic wastes into biogas. The biogas can be used to generate heat and/or electricity; fibre, which can be used as a soil conditioner.'*

On page 16 the Agency concludes '*AD has the potential to deliver multiple environmental benefits, including reduced water pollution, lower greenhouse gas emissions, and reduced odours from agricultural slurries. In places that have high concentrations of animal waste threatening water quality centralised AD can play a significant role in managing the problem. AD is also unique among policy instruments as it can deliver positive outcomes for multiple policy objectives with respect to global warming, renewable energy and water pollution*.'

And finally on page 17 the Agency advocates that 'centralised AD, with suitable support measures, is a viable policy option to address national commitments in the areas of global warming, renewable energy and water pollution. Concerted action is required from the

various stakeholders if a network of centralised anaerobic digesters across the country is to be a reality.'

1.1.2 Greenhouse Gas (GHG) Emissions

Increased levels of atmospheric greenhouse gases (GHGs) such as carbon dioxide (CO_2) act to enhance the natural greenhouse effect and cause climate change. Carbon dioxide arises from the burning of fossil fuels and land use changes. Other GHGs include methane (CH_4), emitted from agriculture and waste landfills and nitrous oxide (N_2O), primarily arising from agriculture. Industrial gases including chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) are also powerful greenhouse gases but are emitted in much smaller quantities.

The objective of the UN Framework Convention on Climate Change (UNFCCC) is to stabilise atmospheric greenhouse gases at a level that would prevent dangerous interference with the climate system. The Kyoto Protocol established emissions reduction targets for developed countries as a step towards achieving this objective. Ireland's emission target for the basket of six GHGs is to limit the increase in their combined emissions during the five-year period 2008-2012 to 13 per cent above 1990 levels. In quantitative terms, Ireland's total allowable emissions in the period 2008-2012, known as the assigned amount, is 314.18 million tonnes (Mt) CO_2 equivalent, which corresponds to an average of 62.8 Mt annually for the five years.

Emissions of GHGs increased by 25.5 per cent from 55.5 Mt of CO_2 equivalent in 1990 to 69.76 Mt in 2006. The transport sector shows the greatest increase in emissions at 165 per cent between 1990 and 2006. This increase is mainly due to the increased number of private cars and goods vehicles on Irish roads and the trend towards purchasing larger vehicles.

Emissions from the energy industries sector in 2006 were 31.6 per cent above 1990 levels, showing an increasing demand for electricity. Emissions in the agriculture sector reached a peak in 1998 and decreased to marginally below their 1990 levels in 2004, due to a decline in both livestock populations and fertiliser use. The variations in emissions from the residential sector over the period, reflects a shift from coal and peat to oil and natural gas, tending to reduce emissions.

The level of Ireland's GHG emissions in 2006 was approximately 7 Mt CO_2 equivalent higher than the indicative average annual emission target level of 62.8 Mt for the years 2008-2012. in population and housing stock, which increase emissions.

1.1.3 Renewable Energy

Ireland is required, under EU Directive 2001/77/EC (repealed by Directive 2009/28/EC from 1 January 2012), to increase electricity produced from renewable energy sources. Locally available biomass energy sources can contribute to the production of electricity to reduce both the reliance on imports and exposure to international markets as well as reducing damaging emissions to the atmosphere.

1.1.4 Nitrates Directive & Regulations

It is recognised and accepted that the land spreading of biosolids has led to groundwater contamination and the deterioration of surface water quality. Ireland is therefore committed, through the full implementation of the Nitrates Directive (91/676/EEC), to reducing water pollution caused or induced by nitrates from agricultural sources and to preventing further such pollution. The provision of an alternative organic waste treatment facility will reduce the need for the storage of such wastes over the recommended non-application periods and would reduce the quantum of organic nitrogen to be applied to the available national land bank through land spreading.

Schedule 4 of the European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2005 also prohibits the application of all organic fertilisers to land from the 15th of October of each year to the following January (with the exact date in January depending on location).

These Regulations will give further effect in Ireland to the following EU Directives;

Directive 75/442/EEC	Waste Management Framework Directive.
Directive 76/464/EEC	Directive on the control of pollution caused by certain dangerous substances discharged into the aquatic environment of the Community
Directive 80/68/EEC	Protection of Groundwater.
Directive 91/676/EC	Protection of waters against pollution caused by Nitrates from Agricultural Sources (Nitrate-Vulnerable Zones.)
Directive 2000/60/EC	Establishing a framework for community action in the field of water policy – Water Framework Directive (WFD).

1.1.5 Water Framework Directive (WFD)

Ireland is required under the WFD (2000/60/EC) to maintain high status waters where they exist, preventing any deterioration in the existing status of waters and achieving at least good status in relation to all waters by 2015. This general improvement in water quality will be achieved through the implementation of a programme of measures across the country. The removal of a substantial quantity of biosolids from land spreading will assist in achieving the objectives of the Water Framework Directive within the supply catchment of the proposed facility.

1.1.6 Drinking Water Quality

Groundwater is often the only source of drinking water in rural areas. Reports have shown that such groundwater sources, particularly Group Water Supplies, can be of poor bacteriological quality. The reduction in the quantity of organic wastes applied to land should lead to an improvement in groundwater quality.

1.1.7 Animal By-Products Regulations

It is proposed that the Newdown Bioenergy Facility will accept and treat Category 2 ABP material.

The EU Regulation (EC) 1774/2002 and the implementing Statutory Instrument S.I. No. 248 of 2003 allows for the treatment of Category 2 material in biogas or composting plants among other disposal routes. The proposed Bioenergy Facility at Newdown will operate under and in accordance with an approval granted for the purposes of Article 15 of the European Regulation.

1.2 Planning & Development Policy Context

This section outlines the planning and development policy context for the proposed development at national and local levels:

1.2.1 National Policy Context

1.2.1.1 Sustainable Development - A Strategy for Ireland 1997

The Department of the Environment published '*Sustainable Development - A Strategy for Ireland*' in 1997; this document contains a framework for applying the principles of sustainable development to different sectors of the economy. The overall aim of the document is to:

"*Ensure that economy and society in Ireland can develop to their full potential within a well protected environment, without compromising the quality of that environment, and with responsibility towards present and future generations and the wider international community*"

The document supports earlier commitments made to sustainable development at the Earth Summit in Rio in 1992, and superseded by the agreements made at Kyoto in 1997. In promoting energy awareness and conservation, the Strategy supports the development of alternative native supplies of energy, given the ongoing depletion of indigenous non-renewable energy sources. Short and medium term targets have been established for electricity generation from renewable energy sources, including waste to energy facilities.

1.2.1.2 Changing Our Ways, 1998

'*Changing Our Ways'* outlines the Government's policy objectives for managing waste from 1998 to 2013. The national waste management policy as set out in this document advocates an integrated national approach to waste management in order to reduce the reliance on landfill. The waste management hierarchy gives priority to prevention, followed by waste minimisation, re-use, re-cycling and recovery.

'Changing Our Ways' promotes *"the development of waste recovery facilities employing environmentally beneficial technologies, as an alternative to landfill, including the development of composting and other feasible biological treatment facilities"*. The document further states that waste to energy incineration *"could prove to be a beneficial option"*. Waste disposal, however, will only be acceptable in the future in respect of *"waste that cannot be prevented or recovered".*

Increased participation by the private sector and public/private partnerships in waste management provision are advocated as a means of delivery. The policy recognises the "proximity principle", that waste should be treated as close as possible to its source of generation.

The objectives set out in the 1998 '*Changing Our Ways'* policy document have been underpinned by later Government reviews such as '*Delivering Change'* (2001) and '*Taking Stock and Moving Forward'*(2004).

1.2.1.3 National Energy and Climate Change Policy

Since the formulation of the Kyoto Protocol in 1997 the issue of climate change has become a more important policy issue at European and National level. In response to the Kyoto commitment the European Union undertook to reduce emissions of GHGs by 8% from 1990 levels. Given the various levels of development of the member state's economies, a burden sharing agreement was drawn up by member states in 1998. Under that agreement Ireland was allowed to increase its emissions of GHGs by 13% above 1990 levels in the period 2008 - 2012.

Due to the rapid economic growth associated with the "Celtic Tiger", Ireland's GHG emissions had increased considerably over the period since the signing of the burden sharing agreement, at one point reaching levels 30% above the 1990 baseline. By the year 2000 the implications of the Kyoto Protocol prompted the Government to publish an initial *'Climate Change Strategy'*, which included the principle of fuel switching for power generation from fossil fuels to less carbon intensive or carbon neutral fuels as one of the measures identified to reduce emissions. Following Russian ratification, the Kyoto Protocol became legally binding in February 2005 on all the signatories who had ratified the Protocol to date, including Ireland.

Throughout the European Union the Emissions Trading Scheme (ETS) will be a key instrument to reduce GHG emissions. The scheme requires member states to draw up a National Allocation Plan for the allocation of CO_2 emissions permits to the various sectors of the economy, including power generation. The fact that Ireland will struggle to meet its agreed Kyoto target will mean that the power generation sector will not receive sufficient CO_2 emissions allowances for the current levels of power generation.

Therefore, in order to maintain national power output it may be necessary to;

- Purchase additional CO_2 emissions allowances;
- Switch power generation to carbon neutral fuels, or
- Reduce power output to match the quantity of emissions allowances allocated under the National Allocation Plan (NAP).

In practice the response to the Kyoto commitments is likely to involve a combination of the first two measures. A reduction in electrical power output is not a credible option.

Given the cost of purchasing emissions allowances the option of switching power generation to carbon neutral fuels will be particularly important for the Irish

economy. The issue is addressed in the Commission Decision of 29/01/2004 *'Establishing Guidelines for the Monitoring and Reporting of Greenhouse Gas Emissions Pursuant to the Directive 2003/87/EC'*. Section 9 of Annex I sets out a list of CO_2 neutral biomass products, by-products and wastes including, inter alia:

- Animal, fish and food meal, fat, oil and tallow
- Primary residues from food and beverage production
- Manure
- Agricultural plant residues
- Sewage sludge and
- Biogas produced by digestion, fermentation or gasification of biomass

The use of these biomass wastes as fuels for power generation would not only be consistent with '*National Climate Change Strategy'*, it would also help to achieve the indicative targets for increases in green energy output set out in "*Options for Future Renewable Energy Policy, Targets and Programmes*". One of the main benefits of biomass in energy generation is that it is capable of generating electricity on demand as opposed to the intermittent generation provided by other renewable energy sources such as wind.

1.2.2 Local Policy Context

1.2.2.1 Westmeath County Development Plan 2008 – 2014 Renewable Energy

Specific policy statements in relation to Renewable Energy are as follows:

At present, most of Ireland and the world's, energy needs are met by fossil fuels; oil, coal and natural gas. Reserves of these fuels are finite, and the present trend of increasing fossil fuel consumption is unsustainable. Combustion of fossil fuels contributes to problems such as air pollution and acid rain, with consequent damage to the environment and human health. The emission of greenhouse gases caused by fossil fuel combustion contributes to climate change.

The development of wind energy resources, replacing the need for conventional power plants, can help to conserve limited fossil fuel reserves, reduce environmental damage and slow the rate of climate change.

An objective of the National Climate Change Strategy (October 2000) is to meet the national Kyoto Protocol target on Green House Gas emissions over the commitment period 2008 -2012.

The strategy encourages the expansion of the renewable energies and calls for a review of Building Regulations to reduce energy use in new housing by up to 20%. Lowering the energy needs of houses is dealt with in the Section 2.8.5 Building Sustainability. The Government has set a target for 30% of our total demand for electricity to come from renewable sources by 2020.

The Council strongly supports all national and international incentives for limiting emissions of greenhouse gases and encourages the development of renewable energy resources.

P-IF16 It is the policy of the Planning Authority to promote renewable forms of energy where it is consistent with the proper planning and sustainable development of an area.

P-IF17 It is the policy of the Council to favour the use of renewable energy as a contribution to the energy demand of all new buildings.

Energy as a rural diversification opportunity

At present, most of Ireland and the world's, energy needs are met by fossil fuels; oil, coal and natural gas. Reserves of these fuels are finite, and the present trend of increasing fossil fuel consumption is unsustainable. In the meantime, combustion of fossil fuels contributes to problems such as air pollution and acid rain, with consequent damage to the environment and human health. The emission of greenhouse gases caused by fossil fuel combustion contributes to climate change. The development of renewable energy resources, replacing the need for conventional power plants, can help to conserve limited fossil fuel reserves, reduce environmental damage and slow the rate of climate change.

An objective of the National Climate Change Strategy (October 2000) is to meet the national Kyoto Protocol target on Green House Gas emissions over the commitment period 2008 -2012. The strategy encourages the expansion of the use of renewable energies and calls for a review of Building Regulations to reduce energy use in new housing by up to 20%.

The Council strongly supports all national and international incentives for limiting emissions of greenhouse gases and encourages the development of renewable energy resources. The development plan seeks to achieve a reasonable balance between responding to overall Government Policy on renewable energy and enabling the wind energy resources of County Westmeath to be harnessed in a manner that is consistent with proper planning and sustainable development.

Renewable energy production provides for sustainable diversification from more conventional forms of agriculture.

Bio-energy

Specific policy statements in relation to Bioenergy are as follows:

There are many bio energy fuel sources, and several conversion alternatives (i.e indirect sources that can be converted into bio fuel). All dry resources; wood and wood residues (forest or sawmill residues) and dry agricultural residues such as straw, can be combusted to produce heat, electricity or both, and can also be co-fired in existing solid fuel systems. Energy crops, principally short rotation coppice, can also produce dry fuels for combustion. Wet resources can be processed through anaerobic digestion, producing a methane-rich gas for combustion. Such resources include agricultural slurries, sewage sludge, food and catering wastes and the biodegradable fraction of municipal solid waste. An additional particular bio-energy resource is landfill gas, which can be collected at landfill sites and then combusted to extract its energy value.

There are significant opportunities for the use of these by-products as bio-fuels. This would convert a cost to the agricultural sector into a gain and also benefit the environment because of low emissions levels of CO2.

Attention is needed now to ensure the development of the energy crops sector, which will be the centre of bio-energy and bio-materials into the future.

P-RDE8 It is the policy of the Council to support the development of the bio-energy industry.

1.3 National Waste Report 2009, Conclusions and Recommendations

Although this facility will cater for primarily agricultural feedstock streams it's important to realize that Anaerobic Digestion has an important part to play within the national waste infrastructure framework

The Environmental Protection Agency's (EPA) National Waste Prevention Programme takes responsibility for producing national statistics on waste generation and management in the Republic of Ireland. The objective of this report is to present the most up to date information available on waste generation and management in Ireland, as reported to the EPA. This report is for the calendar year 2009 and deals with municipal solid wastes (household, commercial and local authority cleansing wastes), waste streams subject to producer responsibility initiatives (packaging, waste electrical and electronic equipment, end of life vehicles) as well as construction & demolition and hazardous wastes. Some of the key statistics and findings from the report are set out below.

1.3.1 Biodegradable municipal waste

- The estimate of home composting remained static at 36,733 t;
- The quantity of biodegradable municipal waste disposed at landfill decreased by 11% from 2008 to 1,059,852 t;
- Ireland is on track to meet the first EU Landfill Directive biodegradable municipal waste diversion target due by July 2010;
- Of the 1,939,182 t of biodegradable municipal waste available, 55% was consigned to landfill (down from 57% in 2008), and 45% of it was recycled;
- The quantity of organic waste collected from household kerbsides grew by 65% (62,447 t in 2009, 37,920 t in 2008);
- 11 of the 34 local authority functional areas didn"t have any kerbside collection of organics available to householders in 2009 (down from 16 in 2008).

1.3.2 Waste infrastructure

- A total of 29 active landfills accepted municipal waste for disposal;
- At the end of 2009 the remaining consented landfill capacity for municipal waste was c.28M t;

- At current fill rates, 16 of the existing municipal solid waste landfills will use up their consented capacity within 3 years;
- As a consequence of landfill distribution and closure, significant inter-regional movement of waste will need to be accommodated;
- Local authorities reported that there were 107 civic amenity sites and 1,962 bring banks in operation in 2009, compared to 96 and 1,989 respectively in 2008;
- The reported tonnage of municipal waste brought to civic amenity sites and bring banks was 268,958 t, a decrease of 11% on 2008;
- Ireland"s first municipal waste incinerator is expected to commence operations in 2011 subject to determination of their waste licence review application;
- In 2009, 22 facilities reported accepting municipal organic wastes for composting;
- In 2009, integrated Mechanical Biological Treatment (MBT) was operated at two sites in small or experimental volumes and the biological output did not meet EPA stability standards;
- Refuse Derived Fuel (RDF) manufacture from municipal residual wastes increased significantly in 2009 to c. 48,000 t (up from c. 26,000 t in 2008), principally at four mechanical processing plants;

1.3.3 Progress towards national & EU obligations

There has been progress made towards meeting national and EU recycling, recovery and diversion targets arising from EU Directives and national waste strategies. Ireland is well advanced towards achievement of most of its EU obligations across a broad range of waste legislation.

In relation to national waste management targets, Ireland is at risk of not achieving a number of them. There is a significant distance to the target for the diversion from landfill of 50% of household waste by 2013. For construction & demolition wastes and municipal wastes, the targets set in national policy in 1998 have been achieved. Both public and private waste collectors have been slow to roll-out source separated waste collection services for biowaste from households and commercial premises. This has contributed significantly to the failure to progress a number of the targets specified in the *National Strategy on Biodegradable Waste* (DEHLG, 2006).

1.3.4 Conclusions

The 8.4% decline in the generation of municipal waste mirrored the fall in Gross National Product (GNP) between 2008 and 2009 (refer Figure 2, page 12). The data also show that household waste generation fell despite a rise in population and household and commercial recovery rates also improved in 2009.

There is still some risk that Ireland will fail to meet the July 2013 and 2016 Landfill Directive targets for diversion of biodegradable municipal waste from landfill. The new EU Waste

Framework Directive (2008/98/EC) will be a significant influence and driver of change in waste management practices and governance in Ireland and elsewhere over the coming decade. In relation to achievement of nationally expressed waste management targets Ireland has been less successful.

The economic downturn is having a marked influence on waste generation, particularly in the commercial waste and construction & demolition waste streams. The downturn (and consequent reduction in waste generation) has resulted in Ireland moving towards achievement of the EU Landfill Directive targets for biodegradable waste diversion. The Economic and Social Research Institute predicted economic recovery scenarios for Ireland indicate that municipal solid waste will grow by 1 Mt (to 4 Mt) over the next ten to twelve years. Ireland remains underdeveloped with respect to the sophistication of essential waste infrastructure for the pre-treatment of municipal waste prior to disposal (e.g. anaerobic digestion, waste to energy, etc.). It will be a challenge to meet waste diversion and waste recovery targets if municipal waste generation increases with economic recovery and the necessary waste infrastructure is not in place.

1.3.5 Recommendations

As Ireland moves towards economic recovery, a focus must remain in relation to the policies and actions necessary to decouple waste growth from economic growth. Waste prevention and not mere diversion must remain a priority. The need for businesses and state services to reduce costs in the current difficult economic and budgetary climate underlines the need for continued support for resource efficiency and conservation initiatives in relation to waste, water and energy, such as those provided under the EPA National Waste Prevention Programme, by the Sustainable Energy Authority of Ireland and Enterprise Ireland.

The diversion of very large quantities of food waste from landfill remains a priority that must be addressed, as does the improvement in recycling rates for municipal wastes.
The priority actions for biodegradable municipal waste management in Ireland are similar to those identified in previous National Waste Reports, and include the need to:

- Ensure there is adequate infrastructure to treat the very large quantities of organic (particularly food) waste that must be collected separately and diverted from landfill and also for the organic component of the mixed residual waste stream;

- Put in place services for the separate collection of organic (particularly food) waste at households and commercial premises in all local authority functional areas; and

- Develop outlets for the products of such treatment; to this end successful implementation of the DEHLG sponsored rx3 (Market Development Programme) should provide valuable support mechanisms for the national recyclates industry;

- Update and clarify National waste policy. This will assist in providing certainty within the waste industry in Ireland to better enable the accelerated investment programmes that are necessary if organic waste is to be treated and landfill avoided;

- Promote food waste prevention through National Waste Prevention Programme initiatives such as StopFoodWaste.ie Green Business and Green Hospitality Programme;

- Improved penetration of educational material to households on the use of the third (organics) bin .

While much of the effort to date in relation to biodegradable waste has been around the source separation and treatment of the collected fraction, the waste characterisation surveys undertaken for the EPA demonstrate that a residual bin from a three bin collection service will still contain a considerable fraction of biodegradable materials (up to 47% for household collections). If Ireland is to meet the 2013 and 2016 EU Landfill Directive diversion targets, then infrastructure will have to be developed that will treat this residual fraction.

1.4 Environmental Impact Statement (EIS) Methodology

1.4.1 Requirement for an EIS

This Environmental Impact Statement was produced to accompany the associated planning application to Westmeath County Council and the subsequent waste licence application to the Environmental Protection Agency (EPA).

This EIS has been prepared in accordance with the EPA "Guidelines on the Information to be contained in Environmental Impact Statements" and also "Advice Notes on Current Practice in the Preparation of Environmental Impact Statements", published in 2002 and 2003 respectively.

The Bioenergy Facility will operate under a licence issued by the EPA.

1.4.2 EIS Methodology

The EIS is presented in the "Direct Format Structure" as set down in the "Guidelines on Information to be Contained in an EIS" produced by the Environmental Protection Agency (March 2002). In general, it follows the framework presented in the EPA Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (September 2003).

1.4.3 Contributors to the EIS

The contributors to the Statement are as follows;

ORS Consulting Engineers
Marlin Architects
Roger Goodwillie, Ecological Consultant
Odour Monitoring Ireland
Mitchell & Associates, Landscape Architects
Modelworks, Architectural Presentation
Irish Archaeological Consultants

1.5 Scoping

The contents and scoping of the EIS were determined following consultation with:

- Bioagrigas Ltd
- Westmeath County Council
    - Preplanning Meeting at WCC offices 20/09/2010
    - EIS Scoping Meeting at WCC offices 03/02/2011
- Department of Agriculture, Fisheries and Food
- ESB Networks
- Local Residents
    - Residents meeting held at the Downs GAA hall 26/04/2011

The following were also informed of the plans for the proposed facility;

- Cre, Composting and Anaerobic Association of Ireland
- Irbea, Irish Bioenergy Association
- SEAI, Sustainable Energy Authority of Ireland
- Westmeath Community Development Bioregions Project

1.6 Letters of Contract

Please refer to Appendix H of the Environmental Impact Assessment for signed documentation indicating the individuals / companies who are willing to supply the feedstock to the Bioenergy Facility and accept the digestate / soil conditioner for placement on their lands subject to compliance with the respective nutrient management plans. This documentation gives an indication to the general level of interest and the positive approach in the area to the development proposal

1.7 Inter Relationship

The inter-relationship between the likely significant effects in accordance with Schedule 6 2(b) of the Planning and Development Regulations 2001-2010, and their respective interaction are also assessed. Please refer to Appendix I

2.0 DESCRIPTION OF PROPOSED DEVELOPMENT

2.1 Description of the Development Site

The 2.30 ha development site is located to the north of the existing commercial premises with the surrounding lands mainly agriculture at Newdown, The Downs, Mullingar, Co. Westmeath, off the Dublin Sligo Road (N4) . The site is bounded to the north by the Regional Road, The Downs to Killucan road (R156), to the east by agricultural land, to the west by agricultural lands and proposed N4 The Downs Grade Separation and to the South by N4 Dual Carriageway.

2.2 Site History

The site itself has not been subject to planning applications on the proposed area. The main planning applications have been applied for to the south of the proposed site.

Granted Planning Permissions

07/5267 Demolition of a lean to shed, the erection of an extension to an existing slatted cubicle house measuring 230 Sq.m. and 6.6m high with slatted tank underneath together with a cubicle feed store measuring 432 Sq.m. and 9.8m high both buildings being additions to an established cattle yard.

06/5592 Constructing a single storey extension to existing building for use as a store and workshop and all associated site works and services.

05/5415 To expand existing agri-centre to include a 408 Sq.m. single storey extension to existing building and change of use of existing storage are to retail giving a total of 450 Sq.m. of additional retail area and 138 Sq.m. of storage area, provision of 511 Sq.m. outdoor garden centre compound. Extension to existing carpark and ancillary services.

02/90 Constructing a grain store with drying facility and sampling equipment.

01/840 Erecting a forecourt canopy over existing pump islands.

00/855 Forecourt canopy, 1 petrol pump dispenser and 1 40,000 Lt. capacity underground storage tank.

99/209 Demolishing existing shed and constructing a new grain storage warehouse.

97/863 Installation of 2 X 50,000 Litre oil tanks and extend existing bund area at existing premises.

97/394 Extension to workshop

2.3 Characteristics of the project

The planned bioenergy facility will combine anaerobic digestion technology to treat non hazardous organic feedstock, generate electrical power & heat and to produce a useful solid soil conditioner.

The anaerobic digesters will be designed to receive c.20,000 tonnes/year energy crops and liquid and solid wastes with 10,000 tonnes/year sourced mainly from the local area including agri-industry processing wastes, food processing wastes and will also process Category 2 material which comprises low risk animal by-products derived from healthy animals.

Deliveries will only be accepted for processing from sources of wastes that have been previously characterised as suitable for treatment at the facility. Refer to Plate 2.

The non-hazardous organic feedstock planned to be treated at the waste facility are currently disposed of through land spreading and/or export.

2.3.1 Description of Design, Size and Scale

The proposed development area is within the central part of the total landholding as detailed on Plate 1. The development site including the entrance road from the proposed N4 Downs grade separation will occupy c. 2.3 ha.

The general layout of the proposed facility is shown in drawing no. 111-001-200, which details the location of existing and proposed buildings, extent of facility development and total land holding.

The site layout is illustrated on drawing no. 111-001-200. The site will be constructed and graded over its extent with the lowest finished levels being proposed at the north-eastern end of the site, 94.50m OD, rising gradually to a height of 96.50m OD at the south-western end of the site. The principal areas of the proposed facility are discussed in more detail under the headings below. The location and design of individual buildings are presented in Drawings Nos. 111-001-200 to 111-001-213 with the process also summarised in Plate 3

2.3.1.1 Administration

The administration area is located at the western margin of the proposed facility and will comprise a single storey office and staff facilities. There is one weighbridge located to the south of this building on the main access road for weighing of vehicles entering and exiting the facility.

The weighbridges will be manned from the administration building. The dimensions of all infrastructure associated with the administration area are presented in Drawings Nos. 111-001-206.

2.3.1.2 Waste Acceptance

The waste acceptance building is located in the south western corner of the site, within the waste acceptance building offloading of the waste will take place only when the waste vehicle is suitably parked and the doors to the reception building are closed. An air curtain, or similar, immediately inside the reception building and extractor fans with associated biofilters will mitigate against any odour. The dimensions and capacities of all infrastructure associated with waste acceptance are presented in 111-001-200 to 111-001-214. Pits located to the north of the site will accept maize and grass silage to be fed into the hoppers associated with the digesters. A slurry tank located to the north west of the site will accept slurries from cattle and pigs in the area which will be subsequently pumped directly to the digesters.

2.3.1.3 Process

The process area will comprise the following:

- Reception Building
- Mixing Tank
- Test Digesters
- Raw Material Storage
- Pre-Storage
- Digesters
- Digestate Storage
- Biofilter
- Recycle Water
- Hygenisation
- Gas Cleaning Evaporation
- Cogeneration
- Flare

A description of the proposed process is outlined in drawing no. 111_001_214

2.3.1.4 Storage

The two post digestion storage tanks are located to the south of the facility which will store the liquid fraction product prior to dispatch for use in the agricultural and horticultural industries. The storage area provides for the storage of materials between November and March when land spreading is currently prohibited.

2.3.2 Health and Safety

2.3.2.1 General Operational Safety

Prior to commissioning of the facility detailed standard operating procedures (SOPs) will be drafted which will be implemented during operation of the facility. In accordance with the Safety Health and Welfare at Work Act, 2005, the Safety, Health and Welfare at Work (Construction) Regulations, 2001 and associated Regulations, a site specific Safety Statement will be produced which will incorporate all operating procedures at the facility. Under the EU Animal By-Products Regulations 1774/2002, there is an obligation to implement and maintain a permanent procedure developed in accordance with the system of Hazard Analysis and Critical Control Points (HACCP) which will be based on the following principles:

- Conduct a Hazard Analysis
- Determine the Critical Control Points (CCP)
- Establish Critical Limits
- Establish monitoring procedures
- Establish corrective actions to be implemented when particular CCP not under control
- Establish procedures for verification
- Document and record all procedures, corrective actions and verification results

The following measures will be implemented at the facility to minimise the potential for emergency situations:

- All on-site personnel will be adequately trained in relevant areas of employment

- The facility design will be regularly reviewed for potential safety hazards
- The facility will be designed to incorporate standby/backup plant in emergency situations
- Adequate fire detection and fire fighting infrastructure will be incorporated into the site design
- All staff will be supplied with appropriate personal protective equipment (PPE).

2.3.2.2 Fire Safety

The Operator will provide to the local Emergency Services, prior to commencement of operations, details of the nature of the types of wastes to be accepted at the facility and the health and safety measures to be adopted when working within operational areas. This information will be provided so that in the event of an emergency occurring on the site the Emergency Services will be adequately informed so as to be able to adopt the appropriate procedures for working on this site.

The plant will be provided with adequate infrastructure for fire detection and fire-fighting equipment will include:

- Smoke detectors
- Fire alarms
- 1 No. fire water tank with a capacity of 240m^3
- Hydrants and hose reels
- Fire extinguishers

The following emergency procedures will be implemented to address the possible hazards arising in the unlikely event of fires occurring on site.

All fires on site are to be treated as a major hazard and a potential emergency situation, and as such must be dealt with accordingly. A fire water control tank will be located at the facility with a capacity of 240m^3 and this will be regularly maintained so as to be available for fire fighting at all times. Should an incident such as a fire occur then the Fire Brigade, the Environment Protection Agency (EPA) and Westmeath County Council will be informed by the Operational Supervisor as soon as is practicable. Fires within buildings, and of plant and equipment, will be covered in the Safety Statement.

2.4 Operation of the Project

The following sections detail the operation of the project as outlined in the EPA's Advice Notes on Current Practice in the Preparation of Environmental Impact Statements. The operation of the project is described under a number of headings including; on site processes, staffing, natural resource requirement and emissions.

2.4.1 Description of Principal Processes & Activities

The proposed facility is designed for the acceptance and treatment of biodegradable waste including the following waste types:

- Slurry- Dairy cow
- Slurry- Pigs
- Silage- Maize
- Silage- Grass
- Fodder beet

- Category 2 ABP- Belly Grass
- Bakery Waste – Bread, Dough Fat

The planned bioenergy facility will combine anaerobic digestion technology to treat non-hazardous organic wastes, generate electrical power and produce a useful soil conditioner.

The facility will comprise a number of distinct process units namely;

- Waste acceptance
- Waste conditioning
- Waste processing
- Hygienisation
- Biogas treatment
- Cogeneration Unit
- Biofilter and odour control system
- Storage

2.4.2 Scope of the Project

The proposed facility will be designed to receive c.20,000 tonnes/year of energy crops and liquid & solid wastes sourced in the immediate local area and Leinster area including agri-industry processing wastes, food processing wastes and will also process Category 2 material which comprises low risk animal by-products derived from healthy animals. A breakdown of waste types to be accepted is detailed below.

Type of Feedstock	Annual Quantity t/y	Dry Matter Content
Pig Slurry	3,000	8%
Dairy Cow Slurry	2,000	8.5%
Maize Silage	2,000	33%
Grass Silage	3,000	30%
Fodder beet	2,000	20%
Category 2 ABP- Belly Grass	5,000	14%
Bakery Waste – Bread, Dough Fat	3,000	40%
Total	**20,000**	**22%**

Table 2.1: Accepted Waste Types

2.4.3 General Operation

The facility has been designed for continuous operation 24 hours a day throughout the year. Scheduled shut down periods will be kept to a minimum to allow the facility to operate at maximum efficiency.

Waste will be accepted at the facility in fully enclosed tankers and covered trailers between the hours of 0800 -1900 hours, Monday to Friday, 0800 – 1300 hours on Saturday approximately, with no deliveries on Sundays or public holidays except in emergency situations.

2.4.4 Processes

Waste arriving at the facility will be processed in the following way:

2.4.4.1 Waste Acceptance

All waste vehicles entering and exiting the facility will be weighed on a calibrated weighbridge. Each waste load arriving at the facility will be registered by weight, waste type and supplier. Analytical data regarding testing conducted at source prior to arrival at the facility will also be documented on arrival. A visual assessment of each load will be conducted where suspect loads will be directed for quarantine. Any wastes not deemed acceptable at the site will be returned to the waste producer.

Once a preliminary waste analysis is confirmed to be within the defined parameters for acceptable waste, the waste load will pass into the reception bin and is auger fed to the mixing tanks. Waste which fails to meet the strict waste acceptance criteria will not be accepted into the facility for treatment, and will be returned to the waste producer.

All wastes entering the facility which meets the initial waste acceptance criteria will be directed to the waste reception building. The waste reception building will utilise an air curtain, or similar, immediately inside the door, any malodorous air will be directed to a biofilter via an extraction fan.

2.4.4.2 Waste Conditioning

One tank is foreseen for the storage of liquid waste streams which can be pumped directly towards the mixing tank. The solid waste streams are first crushed and collected in a storage container with a push floor. The solid waste streams are transported to the mixing tank via a series of transport screws.

The liquid, pre-treated, waste streams and dilution water are subsequently mixed in the mixing tank. A top entry mixer ensures an intensive mixing of the three separate flows, solids, liquids and dilution water. The mixing tank also acts to remove heavy objects like stones which sink to the bottom of the tank and are removed through a scraper.

The water requirement for the facility is as follows

- Anaerobic Digestion: 3,000m^3 per year (This will primarily be recycled water from the rainwater harvesting, leachate storage tank from the Silage storage pits)

- Biogas Cleaning: 800m^3 per year (rainwater preferably (softened water))
- Odour Treatment: 800m^3 per year (rainwater and/or tap water)

The input mix is pumped from the mixing tank to the hydrolysis tank where the first degradation of the biomass is achieved.

Hydrolysis is theoretically the first step of AD, during which the complex organic matter (polymers) is decomposed into smaller units (mono- and oligomers). During hydrolysis, polymers like carbohydrates, lipids, nucleic acids and proteins are converted into glucose, glycerol, purines and pyridines. Hydrolytic microorganisms excrete hydrolytic enzymes, converting biopolymers into simpler and soluble compounds as it is shown below:

$$\text{Lipids} \xrightarrow{\text{lipase}} \text{fatty acids, glycerol}$$

$$\text{Polysaccharide} \xrightarrow{\text{cellulase, cellobiase, xylanase, amylase}} \text{monosaccharide}$$

$$\text{Proteins} \xrightarrow{\text{protease}} \text{amino acids}$$

A variety of microorganisms are involved in hydrolysis, which is carried out by exoenzymes, produced by those microorganisms which decompose the undissolved particulate material.

The products resulted from hydrolysis are further decomposed by the microorganisms involved and used for their own metabolic processes.

From the pre-storage tanks all material will pass through a macerator where shredding of waste will occur and particle sizes will be reduced to < 12mm to ensure easier transport of waste though pipes and the heat exchanger. The input mix is further pumped towards the digesters.

2.4.4.3 Waste Processing

The anaerobic degradation of the organic waste streams will occur under thermophilic conditions which mean that the temperatures are maintained between 50°C to 55°C. In order to maintain the design temperature of 54°C, a recycled digestate is heated up in the heat exchanger using the HT heat from the CHP unit. The heated recycled digestate is mixed with the influent flow by means of an inline mixer.

Many modern biogas plants operate at thermophilic process temperatures as the thermophilic process provides many advantages, compared to mesophilic and psychrophilic processes:

- effective destruction of pathogens
- higher grow rate of methanogenic bacteria at higher temperature
- reduced retention time, making the process faster and more efficient
- improved digestibility and availability of substrates
- better degradation of solid substrates and better substrate utilisation
- better possibility for separating liquid and solid fractions

Operation temperature influences the toxicity of ammonia. Ammonia toxicity increases with increasing temperature and can be relieved by decreasing the process temperature. However, when decreasing the temperature to 50°C or below, the growth rate of the thermophilic microorganisms will drop drastically, and a risk of washout of the microbial population can occur, due to a growth rate lower than the actual HRT (ANGELIDAKI 2004). This means that a well functioning thermophilic digester can be loaded to a higher degree or operated at a lower HRT than an e.g. mesophilic one because of the growth rates of thermophilic organisms (Fig 2.1). Experience shows that at high loading or at low HRT, a thermophilic operated digester has higher gas yield and higher conversion rates than a mesophilic digester.

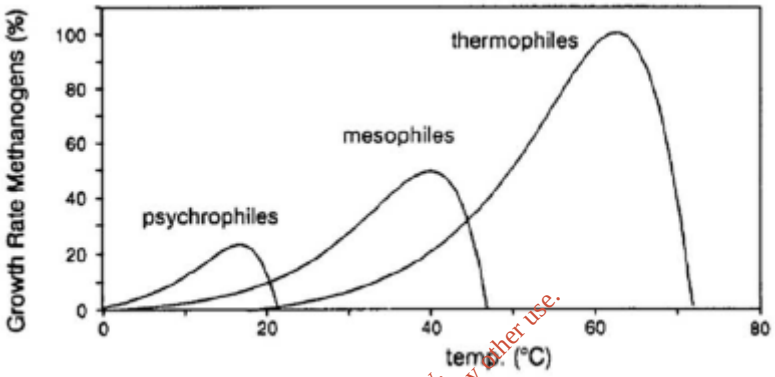

Figure 2.1: Relative growth rates of methanogens (ANGELIDAKI 2004)

The digesters consist of a Continuously Stirred Tank Reactor (CSTR) with a double membrane roof as gas storage. The mixing is done by four side entry mixers, 2 mixers at mid-height and 2 mixers at the gas-liquid phase to avoid crust formation. The produced biogas is sent to a desulphurisation unit and afterwards to the CHP unit.

2.4.4.4 Hygienisation

The effluent from the digester is hygienised in order for the liquid and solid digestate to be used as an agricultural product. Before entering the hygienisation unit, the digestate is continuously heated up in a heat exchanger using the HT-heat form the CHP unit. The heated digestate is pumped into an isolated circular tank where the temperature is maintained at 70°C for at least a one hour period.

2.4.4.5 Biogas Treatment

In order to avoid corrosion in the CHP exhaust line and to achieve low SO_x emissions, the biogas is first desulphurised before entering the CHP. The biogas flow is sent to the biogas washer with a compressor. After the desulphurisation, the biogas is dehumidified in a condensate separator and compressed before entering the CHP. A safety flare is foreseen for burning the biogas during maintenance of the CHP engines.

Biogas production must be maintained as stable and constant as possible. Inside the digester, biogas is formed in fluctuating quantities and with performance peaks. When biogas is utilised in e.g. a CHP unit, the demand for biogas can vary during the day. To compensate for all these variation, it is

necessary to temporarily store the produced biogas, in appropriate storage facilities.

The simplest solution is the biogas storage established on top of digesters, using a gas tight membrane, which has also the function of digester cover. The biogas storage facilities can be operated at low, medium or high pressure. Correct selection and dimensioning of biogas storage facility brings substantial contribution to the efficiency, reliability and safety of the biogas plant while ensuring constant supply of biogas and minimising biogas losses.

All biogas storage facilities must be gas tight and pressure-resistant, and in case of storage facilities which are not protected by buildings, they must be UV-, temperature- and weather proof. Before starting-up the biogas plant, the gas storage tanks must be checked for gas tightness. For safety reasons, they must be equipped with safety valves (under-pressure and over-pressure) to prevent damages and safety risks. Explosion protection must also be guaranteed and an emergency flare is required. The gas storage facility must have the minimum capacity corresponding to one fourth of the daily biogas production. Normally, a capacity of one or two day's gas production is recommended.

2.4.4.6 Cogeneration Unit

The biogas produced during the digestion process is desulphurised in a BELGAS® washer and sent to the CHP units. It is planned to use two CHP units to facilitate the process, the type of engine selected is the Jenbacher J316GMD. With this selection, one CHP engine will run at 100% charge and the other at a charge of 65%.

The use of the different heat sources from the CHP unit is summarised below:

- Part of the HT heat is used for maintaining the temperature in the anaerobic reactor at 54°C.
- Part of the HT heat is used for the hygeinisation process
- The remaining heat can be used by the client*

*It is envisaged that the remaining heat could be put to use external to the application site and could facilitate premises in the area subject to approval with the local authority.

The characteristics of the selected CHP engines are summarised in Table 2.2

J316 GMD – A01			
Engine Power		**1,500 rpm**	
		bhp	***kW***
Load	100%	751	560
	75%	563	420
	50%	375	280
Fuel Consumption		**1,500 rpm**	
		Btu/bhp-hr	***MJ/kWh***
Load	100%	6,595	9.32
	75%	6,853	9.68
	50%	7,365	10.40
Heat Balance		**1,500 rpm**	
Heat rejection to jacket water		***Btu/mn***	***kW***
Load	100%	17,000	299
	75%	14,600	257
	50%	11,367	200
Heat rejection to engine oil			
Load	100%	4,767	84
	75%	4,450	78
	50%	4,017	71
Heat rejection to aftercooler			
Load	100%	4,800	84
	75%	2,083	37
	50%	617	11
Heat rejection to exhaust			
Load	100%	21,550	379
	75%	17,333	305
	50%	17,717	224
Exhaust System		**1,500 rpm**	
Exhaust gas flow rate		***cfm***	***Nm^3/hr***
Load	100%	1,384	2,352
	75%	1,065	1,810
	50%	745	1,265
Exhaust Temperature		***°F***	***°C***
Load	100%	835	446
	75%	866	463
	50%	900	482
Intake System		**1,500 rpm**	
Combustion air inlet flow rate		***cfm***	***Nm^3/hr***
Load	100%	1,315	2,234
	75%	1,011	1,718
	50%	706	1,200

Table 2.2: CHP Characteristics

2.4.4.7 Biofilter and odour control system

In the biofilters the odour components in the air are removed by the bacteria which grow on the substrate inside the biofilters. The biofilters are kept damp using some of the process water.

2.4.5 Occupants/Staffing

There will be approximately 10 full time employees at the proposed facility not including visitors to the site which could be up to 6 visitors some days. Such visitors may comprise general visitors, customers, local authority and Environmental Protection Agency staff. Additional staff movements at the proposed facility may be generated by deliveries, general maintenance staff, cleaning contractors, security and monitoring personnel.

2.4.6 Description of Secondary Process/Activities

2.4.6.1 Off-Site Traffic Movements

Traffic movements to and from the facility are outlined in chapter 12 of this report under the heading roads and traffic. A more detailed study on off site traffic movements are identified in the accompanying traffic impact assessment.

2.4.6.2 On-Site Waste/Personnel Movements

All waste material transported to the proposed facility will be directed to the waste acceptance building for unloading. Movement of materials on-site during the digestion process will be conducted by means of a pumped piping network and belt conveyor system. All facility staff and visitors will be directed to the administration area where parking will be available. No unauthorised personnel will be permitted access beyond the administration area unless permitted to do so or accompanied by a facility employee.

2.4.6.3 De-sludging

De-sludging of process tanks will be required at regular intervals. The process of digester tank desludging will be detailed in the facility SOP's.

2.4.6.4 Monitoring

The facility will have regular facility monitoring which will be documented in the facility SOP's.

2.4.6.5 Security

Site security will be provided by a combination of suitable infrastructure and personnel. It is proposed that the site entrance will have a security entrance gate. This will be a steel palisade gate 2.4m high with security locks. There will be a security fence consisting of plastic coated fencing (2.4m high) placed around the proposed facility. There will be CCTV cameras located at suitable points around the site. Some of these will be mounted on camera towers. Security cameras will be located to cover the site entrance, administration building, process areas and powerhouse. The exact number and location of the cameras will be reviewed on an ongoing basis. Intruder alarm systems will be installed on all buildings and will be monitored on a 24 hour basis.

A record will be kept of all visitors to the site. Visitors will be monitored and supervised at all times. Personnel will be employed to provide security during closed hours and at weekends and bank holidays. The phone numbers of all emergency services will be clearly posted adjacent to all fixed line phones on site.

2.4.7 Energy

2.4.7.1 Connection to Substation

There is a requirement for a connection to the 20kVa Line located immediately to the north of the site. A connection application has been completed and forwarded to ESB Networks

2.4.8 Other

2.4.8.1 Water

The potable water requirements for the facility will be supplied via a 100mm dia watermain located on the existing site (Refer to Drawing No. 111_001_400). Water required for the biogas cleaning may have to softened before use.

2.4.8.2 Sanitary Services

All foul water generated at the facility will be facilitated by an onsite percolation and distribution systems. A site suitability assessment pertaining to same, accompanies the planning application.

2.4.8.3 Telecom

Telecom network including phone lines will be ducted from the site entrance parallel to the roadway to the administration building where a main switch will be provided. The telecommunications network will extend from the administration building to all areas of the site where telemetry or remote monitoring is required. All cables will be underground and ducted in 150mm diameter uPVC ducting.

3.0 HUMAN BEINGS

3.1 Introduction

Human Beings are one of the most important considerations within the environment. Therefore is important to address any likely significant impact on the human environment. This section of the EIS considers the Human environment in the vicinity of the proposed development in terms of population, employment and the community.

3.2 Population

3.2.1 Receiving environment

The proposed development site consists of c. 2.3 ha. of land and is located to the East of Mullingar town, within the townland of Newdown, The Downs, Co. Westmeath. The site is bounded to the north by the Regional Road, The Downs to Killucan road (R156), to the east by agricultural land, to the west by agricultural lands and proposed N4 The Downs Grade Separation and to the South by N4 Dual Carriageway. The nearest residence is to the south which is in excess of 110m. The remain residences are located in all directions from the site which most located in excess of 500m from the site boundaries, Refer to drawing 111_001_201_D1 for location of residences in the local area..

The current site is agricultural land. The surrounding land use is indicated in Table 3.1.

Location in relation to site	Land Use
North	Agricultural land Piggery Residential
South	Commercial Use Royal Canal Residential
East	Killucan Village Agricultural land Residential
West	Mullingar Town Agricultural land The Downs GAA Residential Commercial Use

Table 3.1: Surrounding Land Use

3.2.1.1 Impacts and Mitigation Measures

There will be no material change to the current land use practices within the area and no mitigation measures are required.

3.2.1.2 Census Population

The site is situated in the administrative boundary of Westmeath County Council on the outskirts of Mullingar town.

The population of Mullingar and County Westmeath has been growing rapidly in recent times due mostly to its proximity and transportation links to Dublin. The

latest population figures for Mullingar Town and Environs in 2006 during this period the population increased by 18.1%. When compared to the 8.2% for the State and 10.4% county growth experienced, growth within the area is well above the average for the State and the county growth in population. This information is based on the CSO data provides information and recent trends in population within the area over a four year period from 2002 to 2006 as illustrated in Table 3.2.

Area	Electoral Division	2002	2006	Increase
Mullingar Town	Mullingar North Urban Mullingar South Urban	8,824	8,940	1.3%
Mullingar Environs	Mullingar Rural Castle Hopestown Belvidere	6,797	9,476	39.4%
Mullingar Town and Environs	----------	15,621	18,416	18.1%
Killucan-Rathwire	Killucan	575	812	41.2%
The Downs	Heathstown	642	672	4.7%

Table 3.2: Population Statistics for Mullingar and surrounding Area 2002 and 2006

The findings illustrate that within the area the population has increased between 2002 and 2006. This increase in population is reflected throughout the country.

3.2.2 Characteristic of the proposal.

The proposed development comprises of Anaerobic Digestion facility and infrastructure to facilitate the Anaerobic Digestion 20,000 tonnes of organic waste. The proposed development includes Building, Storage tanks, internal roadways, landscaping to cater for the proposed development.

3.2.3 Potential Impact of the proposal

3.2.3.1 Construction Phase

The construction phase is not considered to have any impact on the population of the surrounding area, as it is expected that the work force will travel from their existing place of residence to the construction site, rather than reside in the area during the construction phase of the development,

The proposed link road from the Mullingar Killucan Road (R156) to the new N4 Grade Separation will form the main road to the site and therefore no temporary access road will be required during the construction phase, thus reducing the impact on the residential environment. Although there is a temporary road indicated on the proposed plans this will only be used in the event that the new N4 Grade Separation is not built but the NRA has received funding for the project from the department of Transport.

3.2.3.2 Operational Phase

The development will have no likely significant impact on the existing population. No residential element is proposed as part of the development hence no impact will occur on the local population in this regard.

The proposed development will increase the potential working population of the area in particular The Downs/ Killucan area which has the largest residential settlements within the vicinity of the site. This will give a small rise in increase in traffic levels to the Killucan Road (R156).

There will be no notable increase in demand for community/ recreational facilities arising from the completion of the proposed development as it will not introduce any resident population to the area. Any demand for additional shopping facilities and services will be met by the existing retailing facility 'The Shop' in The Downs as well as local service centres and neighbourhood centres located nearby In Killucan and Mullingar. Accordingly, the presence of any increased visitor population is likely to be of positive economic benefit.

Overall, the proposed development is likely to have a positive impact on the population in terms of employment and economic benefit in the long term.

3.2.4 Do Nothing Scenario

No impact on the population were this to occur only.

3.2.5 Avoidance, remedial or reductive measures

It is considered that the proposed development is unlikely to generate any adverse impact on the demography of the area, either during the construction phase or the operational phase, and may have positive economic impacts. Therefore, no remedial measures are required during the operational phase.

3.2.6 Predicted impact of the proposal

The proposed development will have no likely significant adverse impact, whether direct or indirect, on the population of the surrounding areas during the construction or operational phases.

Both direct and indirect employment will be created during the construction and operational phases of the development and as such the proposal will provide a significant economic benefit to the population of the surrounding area.

3.2.7 Monitoring

No post development monitoring measures concerning population will be necessary.

3.2.8 Reinstatement

No reinstatement measures are required with regard to the population.

3.3 Employment

Trends in employment are analysed at State, County and Local level in terms of unemployment level.

The total resident work force within the Mullingar area in 2006 was 6,399. The largest employment areas are wholesale & retail trade and Health and social work accounting for 34.2% of the employment rate.

3.3.1 Receiving environment

3.3.1.1 Unemployment

Mullingar area has a total population of 18,416 under the CSO Census 2006, out of which there is a total of 1,014 persons unemployed. This represents an unemployment figure of 5.5%. This figure is above that of Westmeath (4.0%) which is in line with the national average, which is 4.2%.

Sub-Region	2006 Total Population Unemployed	2006 % of Total Population Unemployed
State	179,456	4.2%
Leinster	100,426	4.3%
County Westmeath	3,180	4.0%
Mullingar	1,014	5.5%

Table 3.3: Unemployment figures according to area for 2006

3.3.2 Characteristics of the proposal

The proposed development will provide employment opportunities both during the construction phase and at the future operational phase.

3.3.2.1 Construction Phase

There will be a number of construction workers, from a variety of specialties employed on site during the site development work.

3.3.2.2 Operational Phase:

During the Operational Phase of the proposal there are intended to be 10-15 fulltime people employed directly at the facility with transportation of the waste material to and from the facility will be by subcontractors.

3.3.3 Potential Impact of the proposal

The proposed development will give rise to new employment opportunities in terms of the direct employment during the construction phase. There would also be indirect employment opportunities arising form the construction work taking place as a result of this proposal. These opportunities would include an increase in business for local services such as builders' suppliers as well as shops and other such tertiary industries.

The proposed development will provide for a significant gain to the area in terms of employment provision.

3.3.4 Avoidance, remedial or reductive measures

The proposed development will have a positive impact on employment levels in the area and as such no avoidance, remedial or reductive measures would be required.

3.3.5 Predicted impact of the proposal

3.3.5.1 Construction Phase

The development will provide important construction and related employment. Furthermore, it is likely that builder's suppliers and other related services will benefit during the construction phase due to an increase in trade demand. Overall, the construction of the proposed development will contribute a benefit to the local economy due to additional income and expenditure that will occur.

3.3.5.2 Operational Phase

The overall final development will offer direct employment in the light industrial and technology industries. Further indirect employment will be created as a result of the induced benefits of the development. The proposed development, if undertaken, will be of considerable benefit to the area in terms of employment provision and economic gain.

3.3.6 Do Nothing Scenario

The failure of the proposed development to proceed will not lead to any profound, irreversible or life-threatening consequences. However, it will lead to a decrease in employment opportunities in the area generally.

3.3.7 Monitoring

No post development monitoring measures concerning population will be necessary.

3.3.8 Reinstatement

No reinstatement measures are required with regard to employment.

3.4 Community Aspects

3.4.1 Receiving environment

The three principal aspects of the community surrounding the subject site can be defined as follows:

- The resident community
- The working community
- The visiting community

3.4.1.1 The resident community

The site of the proposed development is located south of the established residential area along the Killucan Road, to the east of Mullingar. There is also residential units located to the south and southeast along the existing N4 Dublin Sligo dual carriage way. As such, the wider residential community will become aware of any impact as a result of the proposed development.

3.4.1.2 The working community

The working community in the vicinity of the subject site is mainly located in the existing commercial premises to the south of the site consisting of Flynn Fuels, Flynn Feed and Flynn Machinery. The remaining employment would be agricultural based and Genesis/ Mullingar Pewter located on the N4.

3.4.1.3 The visiting community

The visiting community is likely to consider the area as a typical residential with commuter on the N4 and going to and from Mullingar and Dublin - Sligo.

3.4.1.4 Characteristics of the proposal:

The proposed development comprises of reception building to included reception area, administration area/staff amenity & changing facility, pumps and heat exchangers. Permission is also sought for tank farms to included 2 No. Anaerobic Digesters, 2 No. post digestion storage tanks, 5 No. pre-storage tanks, gas flares and gas cleaning vessel. Ancillary facilities will include 1 No. weighbridge with associated control room, engines, Post digestion loading area, wheel wash area, fencing, gates, roads with all associated works including landscaping, boundaries and services above and below ground, with access from the proposed N4 grade separation to the west.

3.4.2 Potential Impact of the proposal

3.4.2.1 Construction Phase

Given the overall scale of the proposed development, some potential adverse impacts may occur locally during the construction phase. It is expected that these short term temporary localised impacts may be experienced by the resident, working and visiting communities. Such impacts would include an increase in daytime noise levels in the area as a result of the machinery being used for construction purposes and also by construction traffic depending on its frequency and routing.

3.4.2.2 Operational Phase

The proposed development may have the following potential impacts:

- Increased traffic levels, both vehicular and pedestrian in the surrounding area, Refer to chapter 12
- Impact on local services and commercial facilities,
- Impact on the natural and manmade landscape of the area. Refer to chapter 11

3.4.2.3 The resident community

The adjoining resident communities may experience the above impacts in a number of ways. The community may experience a slight change in mobility as a result of

increased traffic on the road network. An alteration to the actual physical environment of the area may affect the spatial perceptions of the community living in the area. Refer to chapter 12

3.4.2.4 The Working Community

The working community may perceive changes to the physical environment at a lesser intensity to those who actually live there. In relation to the proposed development and the impacts that it may have on the existing working community, these may be in the form of accessibility to the work, traffic on the local road network and congestion on the public transport network. The proposed development may also have a potential indirect impact on existing services such as restaurants, cafes and retail facilities serving the working population.

3.4.2.5 The visiting community

The most likely impact to be perceived by the visiting community as a result of the proposed development would be in relation to accessibility to the area. This may occur as a result of increased traffic levels, in particular by Heavy Goods Vehicles (HGV's). Refer to chapter 12.

3.4.3 Do - Nothing Impact

In the event of the proposed development not proceeding, it is likely that the perceptions of the community would remain unchanged. However, in the long term, the overall economic and social benefits that the development would bring to the area would not be experienced by the community in the event of the development not occurring.

3.4.4 Avoidance, remedial or reductive measures

It is considered that the proposed development is unlikely to generate any adverse impact on the demography of the area either during the construction phase or the operational phase, and would actually have positive economic impacts. Therefore, no remedial measures are required during the operational phase.

3.4.5 Predicted impact of the proposal

The development will result in a change in the environment of the area from a community aspect. What is now agricultural lands, being developed into an Bio energy facility.

3.4.6 Monitoring

No post-development monitoring measures concerning population will be necessary.

3.4.7 Reinstatement

No reinstatement measures are required in relation to the Community Aspect.

3.5 Vermin and Pests Control

Rodents can be harmful since they may transfer viruses, micro-organisms, parasites etc. and may, therefore, represent an important factor for the spreading of various diseases. Control

of rodents is a mandatory prerequisite for any waste management facility. Flies and birds can also pose a problem, where they are attracted to raw waste.

Due to the nature of wastes being accepted at the site, feral animals, flies and other vermin may be attracted to the site. Vermin maybe attracted to the facility in search of food sources. Pests such as rodents and flies can not only be a nuisance to users and neighbours, but can also transfer germs and disease and affect the ecological balance of an area.

Sources of potential public health risks associated with vermin and other pest animals include:

- transmission of disease
- threat to native flora and fauna
- threat to livestock.

There is no reason that waste being handled in the Reception buildings will give rise to litter. The proposed treatment facility will process biodegradable waste in an indoor, controlled environment. Any gasses will be routed through a (bio-filter) odour control system that will greatly reduce the odour potential of the facility.

Diverting biodegradable waste from landfills and through the Anaerobic Digester treatment facility will reduce the overall odour potential to the environment.

Due to the nature of the current plant and the probable populous of vermin already present which may be displaced by the construction works, it is intended to employ a specialist pest control firm for the duration of the project to ensure the regular monitoring and control of any vermin present on site or disturbed within the works area as a result of construction work

3.5.1 Background

The presence of vermin or insect pests in or around any waste management facility is a health hazard. Management must have a pest and vermin control standard operating procedure in place, which effectively controls any such presence and prevents possible contamination risk.

3.5.1.1 Responsibilities

Works Manager

- Ensures that resources are available to carry out the scope of this program and participates in reviews of the procedures.
- Ensure responsible persons are trained for the relevant tasks.

Quality Assurance Manager

- Informs management of pest and vermin control program and significant findings.
- Ensures the Pest Control Contractor is fully conversant with legislative requirements, current industry best practices and company requirements.
- Reviews pest and vermin reports and corrective actions.
- Arranges for repairs, maintenance and installations relevant to pest and vermin control.
- Ensures effective integration of other on-plant programs with pest and vermin control e.g., sanitation and hygiene, disposal of waste material and maintenance.

- Audits and updates pest and vermin control standard operating procedure.

Pest Control Contractor:

- Provides regular services and responds promptly to requests for extra servicing made by management in the event of increased activity between services, or ineffective treatments.
- Completes pest report forms.

An important aspect of the Pest Control Contractor's responsibilities is providing recommendations on ways to improve the pest and vermin control program at the establishment.

Engineer/Maintenance Supervisor:

- Maintenance of the physical barriers to pest and vermin entry.

All Plant Personnel:

- Record all pest and vermin sightings and activities encountered.

3.5.2 Procedures and actions

3.5.2.1 General

Pest control will be regularly carried out and results of bait station checks recorded. The management of the facility will be responsible for the pest program including the chemicals used or actions carried out by independent pest control companies. The activity records of bait stations checks are to be clear and unambiguous and must include any follow up action including preventive measures required by the management.

3.5.2.2 Chemicals

Any pest control chemical held at the establishment shall be in a clearly designated secure cabinet or facility used only for pest control. The keys to this facility are to be controlled and limited as far a possible. Persons issued with keys are to be nominated in the standard operating procedure. Chemicals used shall be approved and used only in accordance with the instrument of approval.

3.5.2.3 Physical Barriers

Physical barriers prevent pests entering buildings or eliminate their presence. The barrier must be effective and usually a combination of deterrents is required to achieve the purpose. The effectiveness of these barriers is a key indicator of the effectiveness of the company preventative maintenance program such as self-closing doors mounted in such a way that light cannot be seen between the rubber door seal and the floor or door jam

3.5.2.4 Cleaning, Sanitation and Housekeeping

A broad scope cleaning and sanitation program is necessary to control and prevent pests and vermin presence within the establishment.

The Cleaning and Sanitation standard operating procedure should include:

- Removal of food sources which may attract pests and vermin in production and storage areas and operatives' amenities and compete with baits.

- Cleaning pools of water remaining on the floor of reception building and amenities after the cleaning operation to provide a dry environment.
- Cleaning of high-traffic personnel thoroughfares during the day and at the end of the shifts. Boot cleaning facilities associated with reception building should be provided to prevent material being carried outside.
- Cleaning of the operatives' lunch room after each main work break and again at the end of the production shift.
- Routine cleaning of personnel lockers.

3.5.3 Monitoring

All employees and staff will be responsible for reporting sightings and activity throughout the plant and its surrounding area. These findings must be acted on immediately and all findings drawn to the attention of the Company Pest Control Officer.

- Check condition of rubber door seals.
- Check the number and location of the bait stations and traps.
- Record activity if any found at rodent bait stations and traps.
- Check effectiveness of the fly bait stations.

Maintenance teams play an important role in controlling pest and vermin entry to the plant and shall monitor the barrier for maintenance defects.

3.5.4 Corrective Action

Corrective action for pest and vermin control shall incorporate relevant parts of this program and needs to be specific to each establishment. Must include what is to be done if pests or vermin are detected.
Any pest control facility requiring repair shall be reported.

Responsibilities

The On Plant Supervisor is responsible for:

- recommending the establishment pest control standard operating procedure.
- monitoring the effectiveness of the pest control standard operating procedure.
- monitoring chemical usage.

3.5.5 Do Nothing Scenario

No impact on the population where this to occur.

3.5.6 Predicted impact of the proposal

The proposed development will have no likely significant adverse impact, whether direct or indirect of the surrounding areas during the construction or operational phases.

3.5.7 Monitoring

Post development monitoring measures concerning Vermin and Pests Control will be necessary and as indicated in 3.5.2 above.

3.5.8 Reinstatement

No reinstatement measures are required with regard to Vermin and Pest Controls.

4.0 CLIMATE

4.1 Introduction

This section of the EIS assesses the impact of the proposed development at Newdown, The Downs, Mullingar, County Westmeath. This section should be read in conjunction with the site layout plans and project description sections in the EIS.

4.2 General

The dominant influence on Ireland's climate is the Atlantic Ocean. As a result, Ireland is not exposed to extremes of temperature experienced by other countries at similar latitudes. The main features of the Irish climate are mild winters and cool summers.

The climate of the area is best described by meteorological measurements collected by the National Meteorological Service from Mullingar Synoptic Station is situated approximately 1.7 Km northwest of Mullingar, Co. Westmeath. Meteorological conditions recorded at the Mullingar station are available has been operating at its current location since 1974.

4.2.1 Wind Speed

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
Wind (knots) Mean Monthly Speed	9.7	9.7	10.0	8.5	8.0	7.4	7.3	7.2	7.6	8.4	8.5	9.3	**8.5**

Table 4.1 Wind Speed Data for Mullingar Meteorological Station (1961–1990)

4.2.2 Precipitation

Average monthly and annual precipitation rates over the period 1961 – 1990 for Mullingar are presented in Table 4.2. The results show that the annual average rate of precipitation in this area is 931.6mm over the 30 year period. The average monthly rainfall values at Mullingar vary from around 59.0mm in April to 92.4mm in January. The highest monthly rainfall occurs in the autumn / winter months from August to January and is often associated with Atlantic frontal depressions. In the summer months, high rainfall amounts tend to be associated with intense thunder showers which may be localised in rainfall intensity.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Av.
Mean Monthly Total	92.4	66.3	72.6	59.0	70.9	67.0	61.2	82.9	95.1	94.1	87.9	92.2	**931.6**

Table 4.2 Rainfall Data for Mullingar Meteorological Station (1961–1990)

4.3 Global Climate

4.3.1 Global Warming

Under Directive 2003/87/EC, emissions trading came into effect across all 25 EU member states. The first phase ran from 2005-2007 and the second phase runs from 2008-2012 to coincide with the first Kyoto commitment period. The scheme works on a "Cap and Trade" basis. All 25 EU governments are required to set an emission cap for all installations covered by the scheme. Each installation is allocated allowances for the particular commitment period in question. The number of allowances allocated to each installation for any given period is determined on the basis of the National Allocation Plan.

In an EPA report entitled '*Climate Change Scenarios and Impacts for Ireland*' (EPA, 2000), it is recognised that Ireland will not escape from the impacts of global climate change. It also notes that due to the residence times of greenhouse gases many of the climate change impacts identified for Ireland will occur irrespective of policy decisions taken in Ireland or even Europe over the next few decades. The regulatory authorities will determine whether the proposed facility falls within the remit of this Directive and therefore must apply for a greenhouse gas permit to control emissions of carbon dioxide.

4.3.2 Acidification

'Acid rain' is predominantly caused by the emissions of sulphur dioxide (SO_2) and the oxides of nitrogen (NO_x). SO_2 can be formed when sulphur is burnt in fuel. NO_x is formed from the combustion of nitrogen which is present in both the air and in fuel. When these atmospheric pollutants mix with water vapour in the air, they are converted to sulphuric and nitric acids respectively. These acids make the rain acidic, hence the term 'acid rain'. Acid rain is defined as any rainfall that has an acidity level beyond what is expected in non-polluted rainfall. Acidity is measured using a pH scale, with the number 7 being neutral. Consequently, a substance with a pH value of less than 7 is acidic, while one of a value greater than 7 is basic. Generally, the pH of 5.6 has been used as the baseline in identifying acid rain. Thus, any precipitation that has a pH value of less than 5.6 is considered to be acid precipitation.

In recent years legally binding limits have been placed on national emissions of the major pollutants that contribute to acidification. The most important of these include:

- Council Directive 88/609/EEC on the limitation of emissions of certain pollutants into the air from large combustion plants
- Council Directive 1999/32/EC relating to a reduction in the sulphur content of certain liquid fuels
- Council Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants
- Directive 2001/81/EC on national emissions ceilings for certain atmospheric pollutants

- Council Directive 1999/30/EC relating to the limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air

Various protocols to the UNECE (United Nations Economic Commission for Europe) Convention on Long-Range Transboundary Air Pollution to Abate Acidification (CLRTAP) have culminated in the National Emissions Ceilings Directive to control acidification. This Directive sets emission ceiling limits for SO_2, NO_x, Volatile Organic Compounds (VOCs) and ammonia (NH_3) to be achieved by 2010. The limits set for Ireland for SO_2 and NO_x are 65 and 42 kilotonnes respectively. Emissions of these compounds, where relevant will be controlled by emissions limit values set by the regulatory authorities.

4.4 Potential Impacts of the Proposed Development

4.4.1 Introduction

The proposed development will involve the anaerobic digestion of organic waste to produce biogas for electricity generation. The development will potentially result in the release of pollutants that may impact to some degree on climate, if uncontrolled. The two phases where this will occur include:

- Construction Phase
- Operational Phase

4.4.2 Construction Phase

During the construction phase, the main potential impacts on climate will be those associated with site traffic (HGVs and cars) entering and leaving the site and machinery in use on-site. This will result in emissions of the greenhouse gas, CO_2 and the acid gases, NO_x and SO_2. There will be no ozone depleting substances used or emitted during the construction phase of the project.

4.4.3 Operational Phase

The predominant emissions during the operational phase are likely to arise from the following sources:

- CO_2, NO_x and SO_2 emissions from the flares when running
- CO_2, NO_x and SO_2 emissions from traffic emissions as a result of customers/employees entering/leaving the proposed development in car/vans
- Flaring of methane when gas engines are down.

There will be no ozone depleting substances used or emitted during the operational phase of the project.

4.4.4 Environmental Benefits of Anaerobic Digestion

Anaerobic digestion is a proven technology that extracts fuel in the form of biogas from organic waste. The biogas produced (typically 60-70% methane, 30-40% CO_2, trace levels of hydrogen sulphide and ammonia) can be used as a natural gas substitute. All biogas generated at the facility will be used to generate electricity. As a result it displaces fossil fuel generated electricity and therefore reduces carbon dioxide emissions to atmosphere and hence the dangers of climate change and its potential impacts. It is a carbon neutral process in that it does not generate extra carbon dioxide.

Methane is a major greenhouse gas if it escapes to atmosphere. Current disposal practices for slurry and food residues cause methane to be released through natural processes. The proposed anaerobic digester exploits this process so that the gas can be used as a fuel. The proposed development will therefore assist Ireland in meeting its commitments under the Kyoto protocol and EU Directive 2001/77/EC on electricity from renewable sources.

4.5 Mitigation Measures

The proposed development will result in the release of pollutants that may impact on global climate. The proposed mitigation measures will help to ensure emissions are minimised.

4.5.1 Construction Phase

The following measures will be implemented during the construction phase:

- Personnel will be advised to switch off any idling engines or machinery
- Excess or unnecessary revving of engines will not be permitted
- All contractors will ensure machinery used on-site has been properly maintained

4.5.2 Operational Phase

The anaerobic digestion process is carbon neutral. In other words, there will be no net carbon dioxide increase. In terms of greenhouse gas emissions, further mitigation measures are not necessary. However, as part of proposed landscaping, trees will be planted around the proposed facility. This measure will have a positive effect in terms of reducing CO2 emissions.

Emissions of NO_x and SO_2 from the generators will be controlled by the operating licence emission limits. Continuous and extractive monitoring will ensure that these limits are being met. Furthermore, the use of advanced technology and process abatement (SO_2 scrubber) will ensure emissions are minimised.

The flare will only run when there is excess biogas produced from the anaerobic digestion process. This scenario will occur very seldom as the rate of feedstock introduction will be stringently and automatically controlled.

The proposed flare will have the capability of a sure start and stop procedure and will be able to adjust to any biogas flow. It is anticipated that the flare will only be used for a few hours per year.

To ensure fugitive emissions of methane from the plant are minimised, a daily patrol using a hand held meter that measures methane will be carried out. Where leaks occur, immediate maintenance will be undertaken.

A speed limit will be enforced for all on-site traffic entering and leaving the proposed site. Personnel will be advised of the on-site speed limit and requested not to leave engines idling or cause unnecessary revving of engines.

In summary, the proposed development will adhere to the mitigation measures and good site practices during both the construction and operational phases to ensure emissions of gases that may impact on the local regional and global climate are minimised. The proposed development is environmentally friendly utilising a carbon neutral process and in terms of carbon dioxide emissions will have a positive impact on the environment. Emissions of acidifying gases from the development will be minimal and their impact will not have an adverse impact on the environment.

5.0 AIR QUALITY

5.1 Introduction

Odour Monitoring Ireland was commissioned by ORS Consulting Ltd to perform a dispersion modelling assessment of proposed emission limit values for a range of pollutants which could potentially be emitted from the proposed anaerobic digestion facility to be located in Bio Agrigas Ltd, Newdowns, The Downs, Mullingar, Co. Westmeath.

The assessment allowed for the examination of proposed short and long term ground level concentrations (GLC's) of compounds as a result of the operation of proposed emission points – Gas utilisation engine 1 (AEP1), Gas utilisation engine 2 (AEP2), Odour control unit 1 to 3 (AEP3). The main compounds assessed included Carbon monoxide, Oxides of nitrogen, Sulphur dioxide, Total particulates, total non methane volatile organic compounds (as Benzene) and Odour.

Predicted dispersion modelling GLC's were compared to proposed regulatory / guideline ground level limit values for each pollutant.

The materials and methods, results, discussion of results and conclusions are presented within this document.

5.1.1 Scope of the work

The main aims of the study included:

- Air dispersion modelling assessment in accordance with AG4 guidance of proposed mass emission limits of specified pollutants to atmosphere from the anaerobic digestion facility to be located in Bio Agrigas Ltd, Newdowns, The Downs, Mullingar, Co. Westmeath.
- Assessment whether the predicted ground level concentrations of pollutants are in compliance with ground level concentration limit values as taken from SI 271 of 2002 – Air Quality Regulations, CAFÉ Directive 2008/50/EC, AG4 guidance document and Environment Agency H4 Guidance documents Parts 1 and 2.

The approach adopted in this assessment is considered a worst-case investigation in respect of emissions to the atmosphere from proposed emission points AEP1 to AEP3. These predictions are therefore most likely to overestimate the GLC's that may actually occur for each modelled scenario. These assumptions are summarised and include:

- Emissions to the atmosphere from the emission points – AEP1 to AEP3 process operations were assumed to occur 24 hours each day / 7 days per week over a standard year at 100% output.
- Five years of hourly sequential meteorological data from Clones 2002 to 2006 inclusive was screened to assess worst case dispersion year which will provide statistical significant results in terms of the short and long term assessment. This is in keeping with current national and international recommendations. The worst case year Clones 2004 was used for data presentation.
- Maximum GLC's + Background were compared with relevant air quality objects and limits;
- All emissions were assumed to occur at maximum potential emission concentration and mass emission rates for each scenario.

- AERMOD Prime (09292) dispersion modelling was utilised throughout the assessment in order to provide the most conservative dispersion estimates.
- Five years of hourly sequential meteorological data from Clones 2002 to 2006 inclusive was used in the modelling screen which will provide statistical significant results in terms of the short and long term assessment. The worst case year for Clones met station was 2004 and was used for contour plot presentation. This is in keeping with current national and international recommendations (EPA Guidance AG4 and EA Guidance H4). In addition, AERMOD incorporates a meteorological pre-processor AERMET PRO. The AERMET PRO meteorological preprocessor requires the input of surface characteristics, including surface roughness (z0), Bowen Ratio and Albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of Albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the meteorological station for Bowen Ratio and Albedo and to a distance of 1km for surface roughness in line with USEPA recommendations.
- All building wake effects on all applicable emission points were assessed within the dispersion model using the building prime algorithm (e.g. all buildings / structures / tanks were included).

5.2 Materials and methods

This section describes the materials and methods used throughout the dispersion modelling assessment.

5.2.1 Dispersion modelling assessment

5.2.1.1 Atmospheric dispersion modelling of air quality: What is dispersion modelling?

Any material discharged into the atmosphere is carried along by the wind and diluted by wind turbulence, which is always present in the atmosphere. This process has the effect of producing a plume of air that is roughly cone shaped with the apex towards the source and can be mathematically described by the Gaussian equation. Atmospheric dispersion modelling has been applied to the assessment and control of emissions for many years, originally using Gaussian form ISCST 3. Once the compound emission rate from the source is known, (g s^{-1}), the impact on the vicinity can be estimated. These models can effectively be used in three different ways:

- Firstly, to assess the dispersion of compounds;
- Secondly, in a “reverse” mode, to estimate the maximum compound emissions which can be permitted from a site in order to prevent air quality impact occurring;
- And thirdly, to determine which process is contributing greatest to the compound impact and estimate the amount of required abatement to reduce this impact within acceptable levels (McIntyre et al. 2000).

In this latter mode, models have been employed for imposing emission limits on industrial processes, control systems and proposed facilities and processes (Sheridan et al., 2002).

Any dispersion modelling approach will exhibit variability between the predicted values and the measured or observed values due to the natural randomness of atmospheric environment. A model prediction can, at best, represent only the most likely outcome given the apparent environmental conditions at the time. Uncertainty depends on the completeness of the information used as input to the model as well as the knowledge of the atmospheric environment and the ability to represent that process mathematically. Good input information (emission rates, source parameters, meteorological data and land use characteristics) entered into a dispersion model that treats the atmospheric environment simplistically will produce equally uncertain results as poor information entered into a dispersion model that seeks to simulate the atmospheric environment in a robust manner. It is assumed in this discussion that pollutant emission rates are representative of maximum emission events, source parameters accurately define the point of release and surrounding structures, meteorological conditions define the local atmospheric environment and land use characteristics describe the surrounding natural environment. These conditions are employed within the dispersion modelling assessment therefore providing good confidence in the generated predicted exposure concentration values.

5.2.1.2 Atmospheric dispersion modelling of air quality: dispersion model selection

The AERMOD model was developed through a formal collaboration between the American Meteorological Society (AMS) and U.S. Environmental Protection Agency (U.S. EPA). AERMOD is a Gaussian plume model and replaced the ISC3 model in demonstrating compliance with the National Ambient Air Quality Standards (Porter et al. 2003) AERMIC (USEPA and AMS working group) is emphasizing development of a platform that includes air turbulence structure, scaling, and concepts; treatment of both surface and elevated sources; and simple and complex terrain. The modelling platform system has three main components: AERMOD, which is the air dispersion model; AERMET, a meteorological data pre-processor; and AERMAP, a terrain data pre-processor (Cora and Hung, 2003).

AERMOD is a Gaussian steady-state model which was developed with the main intention of superseding ISCST3 (NZME, 2002). The AERMOD modeling system is a significant departure from ISCST3 in that it is based on a theoretical understanding of the atmosphere rather than depend on empirical derived values. The dispersion environment is characterized by turbulence theory that defines convective (daytime) and stable (nocturnal) boundary layers instead of the stability categories in ISCST3. Dispersion coefficients derived from turbulence theories are not based on sampling data or a specific averaging period. AERMOD was especially designed to support the U.S. EPA's regulatory modeling programs (Porter at al., 2003)

Special features of AERMOD include its ability to treat the vertical in-homogeneity of the planetary boundary layer, special treatment of surface releases, irregularly-shaped area sources, a three plume model for the convective boundary layer, limitation of vertical mixing in the stable boundary layer, and fixing the reflecting surface at the stack base (Curran et al., 2006). A

treatment of dispersion in the presence of intermediate and complex terrain is used that improves on that currently in use in ISCST3 and other models, yet without the complexity of the Complex Terrain Dispersion Model-Plus (CTDMPLUS) (Diosey et al., 2002).

Input data from stack emissions, and source characteristics will be used to construct the basis of the modelling scenarios.

5.2.2 Air quality impact assessment criteria

The predicted air quality impact from the operation of proposed emission points AEP1 to AEP3 for each scenario is compared to relevant air quality objectives and limits. Air quality standards and guidelines referenced in this report include:

- SI 271 of 2002 – Air Quality Standards Regulations 2002.
- EU limit values set out in the Directives on Air Quality 2008/50/EC.
- Horizontal guidance Note, IPPC H4, Parts 1 and 2, UK Environment Agency.
- AG4 guidance document on dispersion modelling, Environmental Protection Agency.

Air quality is judged relative to the relevant Air Quality Standards, which are concentrations of pollutants in the atmosphere, which achieve a certain standard of environmental quality. Air quality Standards are formulated on the basis of an assessment of the effects of the pollutant on public health and ecosystems.

In general terms, air quality standards have been framed in two categories, limit values and guideline values. Limit values are concentrations that cannot be exceeded and are based on WHO guidelines for the protection of human health. Guideline values have been established for long-term precautionary measures for the protection of human health and the environment. European legislation has also considered standard for the protection of vegetation and ecosystems.

The relevant air quality standards for proposed emission sources AEP1 to AEP3 are presented in *Table 5.1*.

5.2.2.1 Air Quality Guidelines value for air pollutants

Table 5.1 illustrates the guideline and limit values for air quality pollutants in Ireland.

Table 5.1. EU and Irish Limit values set out in the SI 271 of 2002, CAFÉ directive 2008/50/EC, H4 Guidance documents Parts 1 and 2 and AG4 guidance document.

POLLUTANT	Objective				TO BE ACHIEVED BY[4]
	Concentration[2]	Maximum No. Of exceedences allowed[3]	Exceedence expressed as percentile[3]	Measured as	
Nitrogen dioxide and oxides of nitrogen	300 µg m^{-3} NO_2 200 µg m^{-3} NO_2 40 µg m^{-3} NO_2	18 times in a year 18 times in a year --	99.79th percentile 99.79th percentile --	1 hour mean 1 hour mean Annual mean	19 Jul 1999[4] 1 Jan 2010 1 Jan 2010
Particulates (PM_{10}) (2008/50/EC)	50 µg m^{-3} 40 µg m^{-3} 20 µg m^{-3}	35 times in a year None None	90.40th percentile -- --	24 hour mean Annual mean Annual mean	1 Jan 2010[6] 1 Jan 2005 1 Jan 2010[6]
Particulates ($PM_{2.5}$) (2008/50/EC)	25 µg m^{-3} – Stage 1 20 µg m^{-3} – Stage 2	None None	 --	Annual mean Annual mean	1 Jan 2015 1 Jan 2020
Carbon monoxide (CO)	10 mg m^{-3}	None	100th percentile	Running 8 hour mean	31st Dec 2003
Sulphur dioxide (SO_2)	350 µg m^{-3} 125 µg m^{-3} 20 µg m^{-3}	24 times in a year 3 times in a year --	99.73th percentile 99.18th percentile --	1 hour mean 24 hour mean Annual mean and winter mean (1st Oct to 31st March	1st Jan 2005 1st Jan 2005 19th Jul 2001[5]
Total non-methane VOC's as Benzene	5 µg m^{-3}	None	--	Annual mean	---
Odour	<1.50 Ou_E/m^3	175 times in a year	98th percentile	1 hour mean	--

5.2.3 Existing Baseline Air Quality

The EPA has been monitoring national Air quality from a number of sites around the country. This information is available from the EPA's website. The values presented for PM10, SO2, NO2, and CO give an indication of expected rural emissions of the compounds listed in *Table 5.1*. *Table 5.2* illustrates the baseline data expected to be obtained from rural areas for classical air pollutants. Since the proposed facility is located in a rural area, it would be considered located in a Zone D area according to the EPA's classification of zones for air quality. Traffic and industrial related emissions would be medium.

The results of $PM_{2.5}$ monitoring at Station Road in Cork City in 2007 (EPA, 2007) indicated an average $PM_{2.5}/PM_{10}$ ratio of 0.53 while monitoring in Heatherton Park in 2008 (EPA, 2008) indicated an average $PM_{2.5}/PM_{10}$ ratio of 0.60. Based on this information, a conservative ratio of 0.60 was used to generate a background $PM_{2.5}$ concentration in 2008 of 9.0 µg/m3 with a value of 10 µg/m3 recorded in 2010 (*see Table 5.2*)

Table 5.2. Baseline air quality data used to assess air quality impact criterion in a number of Zone D region – Navan and Kilkitt.

Reference air quality data – Source identity	Sulphur dioxide-SO_2 ($\mu g\ m^{-3}$)	Nitrogen dioxide-NO_x as NO_2 ($\mu g\ m^{-3}$)	Particulate matter-PM_{10} ($\mu g\ m^{-3}$)	Carbon monoxide – CO ($mg\ m^{-3}$)	Details
Navan – annual mean (Zone D)	4.20	16.90	23	-	Measured 2008
Navan – 98%ile & mean 24 hr value (Zone D)	9.60	-	23	-	Measured 2008
Navan – 8 hr max (Zone D)	-	-	-	1.04	Measured 2008
Zone B - Heatherton Park – Annual mean $PM_{2.5}$	-	-	9.0 ($PM_{2.5}$) (Heatherton Park)	-	Measured 2008
Kilkitt – annual mean (Zone D)	4.0	8.0 (Castlebar)	8.0		Measured 2009
Kilkitt – 8 hr max (Zone D)				0.40 (Newbridge zone C)	Measured 2009
Zone C - Ennis – Annual mean $PM_{2.5}$	-		10	-	Measured 2009
Zone C – Newbridge Benzene Annual mean	-		1.40 (Benzene)	-	Measured 2009

Notes: [1] denotes taken from Air quality monitoring report 2008 and 2009, www.epa.ie.

5.2.4 Meteorological data

Five years of hourly sequential meteorological data was chosen for the modelling exercise (i.e. Clones 2002 to 2006 inclusive). A schematic wind rose and tabular cumulative wind speed and directions of all seven years are presented in *Section 7*. All five years of met data was screened to provide more statistical significant result output from the dispersion model.

This is in keeping with national and international recommendations on quality assurance in operating dispersion models and will provide a worst case assessment of predicted ground level concentrations based on the input emission rate data. Surface roughness, Albedo and Bowen ratio were assessed and characterised around each met station for AERMET Pro processing.

5.2.5 Terrain data

Topography effects were accounted for within the dispersion modelling assessment Individual sensitive receptors were inputted into the model at their specific height in order to take account of any effects of elevation on GLC's at their specific locations. Topographical data was inputted into the model utilising the AERMAP algorithm.

5.2.6 Building wake effects

Building wake effects are accounted for in modelling scenarios through the use of the Prime algorithm (i.e. all building features located within the facility) as this can have a significant effect on the compound plume dispersion at short distances from the source and can significantly increase GLC's in close proximity to the facility.

5.3 Results

This section describes the results obtained for the dispersion modelling exercise. All input data and source characteristics were developed in conjunction with engineering drawings and documentation supplied to OMI for the development.

5.3.1. Dispersion model input data – Source characteristics

Table 5.3 illustrates the source characteristics utilised within the dispersion model. Grid reference location, stack height (A.G.L), maximum volume flow and temperature of the emission point are presented within this table for reference purposes.

Parameter	Emission point AEP1 – Gas Engine 1[1]	Emission point AEP2 – Gas Engine 2[1]	Emission point AEP3–OCU 1 to 3[2]
X coordinate	251118	251118.9	251093.1
Y coordinate	250579.1	250580.4	250590.2
Elevation (A.O.D) (m)	96.67	96.67	96.67
Stack height (m)	15	15	15
Orientation	Vertical	Vertical	Vertical
Temperature (K)	453	453	303
Efflux velocity (m/s)	15.2216	15.2216	15.12226
Max volume flow (Nm3/hr)	3,000	3,000	41,064 Am^3/hr
Stack tip diameter (m)	0.34	0.34	0.98
Max building height (m)	12.50	12.50	12.50
Building ground level (m)	96.67	96.67	96.67

Table 5.3. Source characteristics for proposed emission points AEP1 to AEP3**.**

Notes: [1] denotes referencing conditions for emission point AEP1 to AEP2 are 273.15K, 101.3KPa, dry gas, 5% O2.

[2] denotes referencing conditions for emission point AEP3 is 303K, 101.3KPa, wet gas, 20.9% O2.

5.3.2 Process emissions - Volume flow rate and flue gas concentration guarantees

The input mass emission rate data used in the dispersion model for each emission point is presented in *Tables 5.3, 5.4 and 5.5* for each scenario. All source characteristics and location are reported in *Table 5.3.* These will be utilised as process guarantees for the operating process emission point so as to ensure compliance with the stated guideline limits

Parameters – Exhaust stack AEP 1	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 5% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	1,400	mg/Nm_3 5% O_2	3,000	1.1667
Oxides of nitrogen (NO_x as NO_2)	500	mg/Nm_3 5% O_2	3,000	0.4167
Sulphur dioxide (SO_2)	150	mg/Nm_3 5% O_2	3,000	0.1250
Total particulates	130	mg/Nm_3 5% O_2	3,000	0.1083
Total non methane Volatile organic compounds	50	mg/Nm_3 5% O_2	3,000	0.0417

Table 5.4. Emission values from exhaust stack of the emission source AEP1.

Parameters – Exhaust stack AEP 2	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 5% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	1,400	mg/Nm_3 5% O_2	3,000	1.1667
Oxides of nitrogen (NO_x as NO_2)	500	mg/Nm_3 5% O_2	3,000	0.4167
Sulphur dioxide (SO_2)	150	mg/Nm_3 5% O_2	3,000	0.1250
Total particulates	130	mg/Nm_3 5% O_2	3,000	0.1083
Total non methane Volatile organic compounds	50	mg/Nm_3 5% O_2	3,000	0.0417

Table 5.5. Emission values from exhaust stack of the emission source AEP2.

Parameters – Exhaust stack AEP 3	Conc. Limit Values	Units	Volume flow (Am^3/hr)	Mass emission rate (Ou_E/s)
Odour Control Units 1-3	1,000	Ou_E/m^3	41,064	11,407

Table 5.6. Emission values from exhaust stack of the emission source AEP3.

5.3.3 Dispersion modelling assessment

AERMOD Prime (09292) was used to determine the overall ground level impact of proposed emission points AEP1 to AEP3 to be located in the anaerobic digestion facility Bio Agrigas Ltd, Newdowns, The Downs, Mullingar, Co. Westmeath. These computations give the relevant GLC's at each 50-meter X Y Cartesian grid receptor location that is predicted to be exceeded for the specific air quality impact criteria.

Individual receptor elevations were established at their specific height above ground and also included a 1.80 m normal breathing zone. A total Cartesian + individual receptors of 1,722 points was established giving a total grid coverage area of 4.0 square kilometres around the emission point.

Five years of hourly sequential meteorological data from Clones (Clones 2002 to 2006 inclusive) and source characteristics (*see Table 5.3*), including emission date contained in *Tables 5.4 to 5.6* were inputted into the dispersion model.

In order to obtain the predicted environmental concentration (PEC), background data was added to the process emissions. In relation to the annual averages, the ambient background concentration was added directly to the process concentration. However, in relation to the short-term peak concentrations, concentrations due to emissions from elevated sources cannot be combined in the same way. Guidance from the UK Environment Agency advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum short-term concentration due to emissions from the source to twice the annual mean background concentration.

5.3.4 Dispersion model Scenarios

AERMOD Prime (USEPA ver. 09292) was used to determine the overall air quality impact of the five combined emission points while in operation at 100% capacity for named air pollutants.

Impacts from the five stack emission points were assessed in accordance with the impact criterion contained in Directive 2008/50/EC, SI 271 of 2002, H4 guidance and AG4 guidance documents.

Twelve scenarios were assessed within the dispersion model examination for each of the classical air pollutants.

The dispersion modelling is carried out in line with the requirements of guidance document AG4- Dispersion modelling.

The output data was analysed to calculate the following:

Ref Scenario 1
Predicted cumulative ground level concentration of Carbon monoxide emission contribution of cumulative emissions for the 100th percentile of 8 hour averages for Clones meteorological station year 2004 for a Carbon monoxide concentration of less than or equal to 100 µg/m3 assuming 24 hr operation (*see Figure 5.2*).

Ref Scenario 2
Predicted cumulative ground level concentration of Oxides of nitrogen emission contribution of cumulative emissions for the 99.79th percentile of 1 hour averages for Clones meteorological station year 2004 for an Oxides of nitrogen concentration of less than or equal to 58 µg/m3 assuming 24 hr operation (*see Figure 5.3*).

Ref Scenario 3
Predicted cumulative ground level concentration of Oxides of nitrogen emission contribution of cumulative emissions for the Annual average for Clones meteorological

station year 2004 for an Oxides of nitrogen concentration of less than or equal to 11 µg/m3 assuming 24 hr operation (*see Figure 5.4*).

Ref Scenario 4
Predicted cumulative ground level concentration of Sulphur dioxide emission contribution of cumulative emissions for the 99.73th percentile of 1 hour averages for Clones meteorological station year 2004 for an Sulphur dioxide concentration of less than or equal to 35 µg/m3 assuming 24 hr operation (*see Figure 5.5*).

Ref Scenario 5
Predicted cumulative ground level concentration of Sulphur dioxide emission contribution of cumulative emissions for the 99.18th percentile of 24 hour averages for Clones meteorological station year 2004 for an Sulphur dioxide concentration of less than or equal to 10 µg/m3 assuming 24 hr operation (*see Figure 5.6*).

Ref Scenario 6
Predicted cumulative ground level concentration of Sulphur dioxide emission contribution of cumulative emissions for the Annual average for Clones meteorological station year 2004 for an Sulphur dioxide concentration of less than or equal to 2 µg/m3 assuming 24 hr operation (*see Figure 5.7*).

Ref Scenario 7
Predicted cumulative ground level concentration of Total particulates as PM10 emission contribution of cumulative emissions for the 98.08th percentile of 24 hour averages for Clones meteorological station year 2004 for an Total particulates as PM10 concentration of less than or equal to 10 µg/m3 assuming 24 hr operation (*see Figure 5.8*).

Ref Scenario 8
Predicted cumulative ground level concentration of Total particulates as PM10 emission contribution of cumulative emissions for the 90.40th percentile of 24 hour averages for Clones meteorological station year 2004 for an Total particulates as PM10 concentration of less than or equal to 10 µg/m3 assuming 24 hr operation (*see Figure 5.9*).

Ref Scenario 9
Predicted cumulative ground level concentration of Total particulates as PM10 emission contribution of cumulative emissions for the Annual average for Clones meteorological station year 2004 for an Total particulates as PM10 concentration of less than or equal to 4.0 µg/m3 assuming 24 hr operation (*see Figure 5.10*).

Ref Scenario 10
Predicted cumulative ground level concentration of Total particulates as PM2.5 emission contribution of cumulative emissions for the Annual average for Clones meteorological station year 2004 for an Total particulates as PM2.5 concentration of less than or equal to 4.0 µg/m3 assuming 24 hr operation (*see Figure 5.11*).

Ref Scenario 11
Predicted cumulative ground level concentration of TNMVOC as Benzene emission contribution of cumulative emissions for the Annual average for Clones meteorological

station year 2004 for an TNMVOC as Benzene concentration of less than or equal to 1.0 µg/m3 assuming 24 hr operation (*see Figure 5.12*).

Ref Scenario 12
Predicted cumulative ground level concentration of Odour emission contribution of cumulative emissions for the 98th percentile of hourly averages for Clones meteorological station year 2004 for an Odour concentration of less than or equal to 1.0 Ou_E/m^3 assuming 24 hr operation (*see Figure 5.13*).

5.4. Discussion of results

This section will present the results of the dispersion modelling.

AERMOD GIS Pro Prime (Ver. 09292) was used to determine the overall named air pollutant air quality impact of the proposed emission points AEP1 to AEP3 during operation.

Various averaging intervals were chosen to allow direct comparison of predicted GLC's with the relevant the relevant air quality assessment criteria as outline in *Section 2.2.1*. In particular, 1-hour, 24 hour, percentile and annual average GLC's of the specified pollutants were calculated at 50 metres distances from the site over a fine and coarse grid extent of 9.0 kilometres squared. Relevant percentiles of these GLC's were also computed for comparison with the relevant pollutant Air Quality Standards to include SI 271 of 2002, Directive 2008/50/EC and AG4 guidance document.
In modelling air dispersion of NOx from combustion sources, the source term should be expressed as NO_2, e.g., NOx mass (expressed as NO_2). Some of the exhaust air is made up of NO while some is made up of NO_2. NO will be converted in the atmosphere to NO_2 but this will depend on a number of factors to include Ozone and VOC concentrations. In order to take account of this conversion the following screening can be performed.

Use the following phased approach for assessment:

Worst case scenario treatment
35% for short-term and 70% for long-term average concentration should be considered to assess compliance with the relevant air quality objective.

This is in accordance with recommendations from the Environmental Agency UK for the dispersion modelling of NO2 emissions from combustion processes, www.environmentagency.gov.uk

Table 5.7 illustrates the tabular results obtained from the assessment for Clones meteorological station for:

- Worst case scenario treatment as detailed above (for NOx only).

Maximum predicted GLC's are presented within this table to allow for comparison with Directive 2008/50/EC and SI 271 of 2002. In addition, the predicted ground level concentrations at the selected residential receptors are presented in the Discussion of Results section of the document for all pollutants. A total of 41 individual sensitive receptors were included within the dispersion model and the location of same is presented in Appendix B, *Figure 5.1*. Illustrative contour plots for information purposes only are presented in *Appendix B* of this report for each modelled scenario.

Averaging period	Maximum ground level conc (GLC)
Carbon monoxide - 8 hr maximum GLC (µg/m^3)	401
Oxides of nitrogen - 1 hr max 99.79th percentile (µg/m^3)	64.40
Oxides of nitrogen - Max Annual average (µg/m^3)	18.20
Sulphur dioxide - 1 hr Max 99.73th percentile (µg/m^3)	54.60
Sulphur dioxide - 24 hr Max 99.18th percentile (µg/m^3)	35.13
Sulphur dioxide – Max annual average (µg/m^3)	7.83
Total particulates - 24 hr Max 98.08th percentile (µg/m^3)	23.88
Total particulates - 24 hr Max 90.40th percentile (µg/m^3)	18.87
Total Particulates as PM_{10} - Max annual average (µg/m^3)	6.78
Total Particulates as $PM_{2.5}$ - Max annual average (µg/m^3)	6.78
TNMVOC as benzene – Max Annual average	2.61

Table 5.7. Predicted ground level concentrations for various averaging periods for proposed emission points AEP1 to AEP3 for each pollutant at or beyond the boundary of the facility.

5.4.1 Assessment of air quality impacts for pollutants from proposed emission points AEP1 to AEP3

Predictive air dispersion modelling was used to ascertain the maximum ground level concentrations at or beyond the boundary of the facility of selected worst case pollutant concentration to allow for comparison with the ground level limit values contained in *Table 5.1*. *Table 5.8* illustrates the results of the dispersion modelling assessment for each pollutant and comparison with the air quality guideline and limit values contained in *Table 5.1*.

Table 5.8. Comparison between predicted GLC's + baseline national air quality data and limit values contained in *Table 5.1*.

Identity	Predicted %ile GLC - ($\mu g\ m^{-3}$)	Baseline concentration value ($\mu g\ m^{-3}$)[1]	Baseline + Maximum predicted GLC ($\mu g\ m^{-3}$)	Impact criterion ($\mu g\ m^{-3}$)[2]	% of Criterion
Carbon monoxide - 8 hr maximum GLC ($\mu g/m^3$)	401	1,040	1,441.0	10,000	14.41
Oxides of nitrogen - 1 hr max 99.79th percentile ($\mu g/m^3$)	64.40	33.80 (Twice annual mean as per EA)	98.2	200	49.10
Oxides of nitrogen - Max Annual average ($\mu g/m^3$)	18.20	16.90	35.1	40	87.75
Sulphur dioxide - 1 hr Max 99.73th percentile ($\mu g/m^3$)	54.60	8.0 (Twice annual mean as per EA)	62.6	350	17.89
Sulphur dioxide - 24 hr Max 99.18th percentile ($\mu g/m^3$)	35.13	8.0	43.1	125	34.50
Sulphur dioxide – Max annual average ($\mu g/m^3$)	7.83	4.0	11.8	20	59.15
Total particulates - 24 hr Max 98.08th percentile ($\mu g/m^3$)	23.88	23	46.9	50	93.76
Total particulates - 24 hr Max 90.40th percentile ($\mu g/m^3$)	18.87	23	41.9	50	83.74
Total Particulates as PM_{10} - Max annual average ($\mu g/m^3$)	6.78	23	29.8	40	74.45
Total Particulates as $PM_{2.5}$ - Max annual average ($\mu g/m^3$)	6.78	10.0	16.8	25	67.12
TNMVOC as benzene	2.61	1.40	4.0	5.0	80.20

Notes: [1] denotes based on data presented in *Tables 5.3, 5.4, 5.5, 5.6 and 5.7,*

[2] denotes for impact criterion *see Table 5.1.*

As can be observed in *Table 5.8*, the predicted maximum averaging ground level concentration and baseline concentration are presented as a % of the impact criterion contained in *Tables 5.1*.

5.4.1.1 Carbon monoxide – Ref Scenario 1

The results for the potential air quality impact for dispersion modelling of CO based on process guaranteed emission rates in *Tables 5.4 to 5.64* are presented in *Tables 5.7 and 5.8.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 5.7 and 5.8,* the maximum GLC+Baseline for CO from the operation of the facility is 1,441 µg m^3 for the maximum 8-hour mean concentration at the 100th percentile. When combined predicted and baseline conditions are compared to the Irish guideline/limit values and EU Limit values set out in SI 271 of 2002 and Directive 2008/50/EC, this is 14.41% of the impact criterion.

In addition, the predicted ground level concentration of Carbon monoxide at each of the 41 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

5.4.1.2 Oxides of nitrogen – Ref Scenario 2 and 3

The results for the potential air quality impact for dispersion modelling of NO_X as NO_2 based on process guaranteed emission rates in *Tables 5.4 to 5.6* are presented in *Tables 5.7 and 5.8.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 5.7 and 5.8,* the maximum GLC+Baseline for NO_2 from the operation of the facility is 98.20 µg m^{-3} for the maximum 1-hour mean concentration at the 99.79th percentile. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 49.10% of the impact criterion.

An annual average was also generated to allow comparison with values contained in SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 35.10 µg/m3. When compared the annual average NO_2 air quality impact criterion is 87.75% of the impact criterion.

In addition, the predicted ground level concentration of Oxides of nitrogen at each of the 41 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table* 5.*1*.

5.4.1.3 Sulphur dioxide – Ref Scenario 4, 5 and 6

The results for the potential air quality impact for dispersion modelling of SO_2 based on process guaranteed emission rates in *Tables 5.4 to 5.6* are presented in *Tables 5.7 and 5.8.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 5.7 and 5.8,* the maximum GLC+Baseline for SO_2 from the operation of the facility is 62.60 and 43.10 µg m^{-3} for the maximum 1-hour and 24 hr mean concentration at the 99.73th and 99.18th percentile respectively. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 17.87 and 34.50% of the set target limits established for the 1 hour and 24 hour assessment criteria.

An annual average was also generated to allow comparison with SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 11.80 µg/m^3. When compared the annual average SO_2 air quality impact criterion is 59.51% of the impact criterion.

In addition, the predicted ground level concentration of Sulphur dioxide at each of the 41 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

5.4.1.4 Particulate matter – Ref Scenario 7, 8, 9 and 10

The results for the potential air quality impact for dispersion modelling of Particulate matter based on process guaranteed emission rates in *Tables 5.4 to 5.6* are presented in *Tables 5.7 and 5.8.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 5.7 and 5.8,* the maximum GLC+Baseline for Particulate matter 10µm from the operation of the facility is 46.90 and 41.90 µg m-3 for the maximum 24-hour mean concentration at the 98.08th and 90.40th percentile, respectively. When combined predicted and baseline conditions are compared to Directive 2008/50/EC, this is 93.76 and 83.74% of the impact criterion.

An annual average was also generated to allow comparison with the SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 29.80 µg/m^3. When compared, the annual average Particulate matter air quality impact is 74.45 % of the impact criterion.

An annual average was also generated for PM2.5 to allow comparison with Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 16.80 µg/m^3. When compared, the annual average PM2.5 air quality impact is 67.12% of the impact criterion.
In addition, the predicted ground level concentration of Particulate matter at each of the 41 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

5.4.1.5 TNMVOC as Benzene – Ref Scenario 11

The results for the potential air quality impact for dispersion modelling of TNMVOC as Benzene based on process guaranteed emission rates in *Tables 5.5 to 5.6* are presented in *Tables 5.7 and 5.8*. TNMVOC as Benzene modelling results indicate that the ambient ground level annual average concentrations could be up to 80.20% of the impact criterion (assuming all TNMVOC is Benzene which will not be the case).

In addition, the predicted ground level concentration of TNMVOC as Benzene at each of the 41 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

5.4.1.6 Odour – Ref Scenario 12

The results for the potential air quality impact for dispersion modelling of Odour based on the process guaranteed emission rates in *Tables 3.5 to 3.6* are presented in *Table 5.9 and Figure 5.13*. Odour modelling results indicate that the ambient ground level concentrations are below the relevant guideline odour air quality guideline value.

As can be observed in *Figure 5.13*, it is predicted that odour plume spread is in a north westerly south easterly direction of approximately 30 to 50 metres from the emission point with no sensitive receptors impacted by the plume. All resident locations in the vicinity of the proposed facility operations will perceive an odour concentration less than 1.50 Ou_E/m^3 at the 98th percentile of hourly averages for worst case meteorological year Clones 2004. In accordance with odour impact criterion presented in *Table 5.1*, and in keeping with currently recommended odour impact criterion in this country, no long-term odour impacts will be generated by receptors in the vicinity of the proposed facility operations.

In addition, the predicted ground level concentration of Odour at each of the 42 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

A number of key mitigation measures will need to be implemented into the design of the odour containment, capture and treatment system to include:

1. All buildings should be fitted with a high integrity building fabric with a leakage rate of no greater than 3 $m^3/m^2/hr$.
2. The facility buildings should be capable of attaining a negative pressure value of at least 10 Pa when ventilation is applied and the facility is in operation.
3. All sumps, tanks etc. should be sealed with tight fitting high containment efficiency covers so as to prevent the release of odours from such processes.
4. All mechanical processes within the pre-treatment building should be placed under appropriate negative pressure so as to ensure no significant odour release to the headspace of the building.
5. All buildings should be fitted with appropriate roller doors / access points of sealed nature (max leakage rate of 10 $m^3/m^2/hr$).
6. All buildings / processes holding or processing material with the potential to generate odours shall be placed under negative ventilation with all odourous air ducted to an appropriate odour control system for treatment. The odour control system shall be capable of providing treatment of odourous air to a level of less than or equal to 600 Ou_E/m^3 in the treated exhaust air stream.
7. All process specifications shall be independently processed proved including odour control system performance, building integrity testing (leakage rate, smoke integrity testing and applied absolute pressure testing) so as to ensure the containment, capture and treatment systems installed at the facility are functioning adequately. This shall

be only carried out by personnel experienced in this method of testing.

8. An odour management plan shall be developed for the operating facility so as to ensure adequate operation of all odour management systems on a day to day basis.

Table 5.9. Predicted ground level concentration (excluding baseline) of each pollutant at each identified sensitive receptor locations Rec 1 to Rec 24 for Scenarios 1 to 8 (*see Section 5.4 and Figure 5.1*).

Receptor identity	X coord (m)	Y coord (m)	Scen 1 - (µg/m³)	Scen 2 - (µg/m³)	Scen 3 - (µg/m³)	Scen 4 - (µg/m³)	Scen 5 - (µg/m³)	Scen 6 - (µg/m³)	Scen 7 - (µg/m³)	Scen 8 -(µg/m³)
R1	251652	249621.8	40.5	16.2	0.3	4.6	1.1	0.1	0.7	0.31
R2	251731.6	249753.7	28.8	16.2	0.4	4.6	1.1	0.1	0.8	0.36
R3	251716.7	249855.6	30.8	17.7	0.4	5.1	1.2	0.1	0.9	0.40
R4	251662	249890.4	35.2	20.8	0.5	5.9	1.3	0.1	1.0	0.46
R5	251617.2	249920.3	39.8	23.7	0.5	6.3	1.4	0.2	1.2	0.50
R6	251430.7	249984.9	79.7	35.7	0.7	8.9	2.1	0.2	1.5	0.68
R7	251373.5	249997.4	58.6	48.4	0.7	11.6	2.1	0.2	1.4	0.78
R8	251316.3	250029.7	58.2	53.0	0.7	13.3	2.2	0.2	1.8	0.75
R9	251164.6	250042.1	87.3	56.6	0.7	15.4	2.5	0.2	1.8	0.69
R10	251055.1	250119.2	75.5	74.1	0.7	21.5	2.7	0.2	1.8	0.79
R11	251010.4	250141.6	95.1	71.5	0.7	18.5	2.7	0.2	1.9	0.62
R12	251002.9	250164	109.8	69.7	0.7	19.8	2.8	0.2	2.0	0.70
R13	250629.9	250400.3	96.4	87.5	1.0	25.2	3.2	0.3	2.0	1.09
R14	250570.2	250395.3	88.3	78.2	0.9	23.1	3.1	0.3	1.7	0.95
R15	250535.3	250492.3	156.3	78.2	0.7	20.8	2.1	0.2	1.4	0.77
R16	250254.3	250815.6	33.4	22.8	0.3	5.4	1.2	0.1	0.8	0.24
R17	250271.7	250922.6	39.0	17.8	0.3	5.0	1.2	0.1	0.7	0.28
R18	250279.2	250994.7	19.5	16.5	0.2	4.6	0.9	0.1	0.6	0.23
R19	250284.2	251069.3	21.2	14.2	0.2	4.1	0.8	0.1	0.5	0.23
R20	250411	251004.6	23.9	18.9	0.3	5.1	0.9	0.1	0.7	0.34
R21	250331.4	251138.9	21.1	15.3	0.2	4.3	0.8	0.1	0.6	0.22
R22	250445.8	251134	26.7	19.1	0.3	5.1	1.0	0.1	0.7	0.27
R23	250490.6	251129	29.3	20.9	0.3	5.6	1.0	0.1	0.7	0.30
R24	250522.9	251124	28.4	24.3	0.3	6.3	1.0	0.1	0.7	0.31

Table 5.9 continued. Predicted ground level concentration (excluding baseline) of each pollutant at each identified sensitive receptor locations Rec 1 to Rec 24 for Scenarios 9 to 12 (*see Section 5.4 and Figure 5.1*).

Receptor identity	X coord (m)	Y coord (m)	Scen 9 - (µg/m³)	Scen 10 - (µg/m³)	Scen 11 - (µg/m³)	Scen 12 - (µg/m³)
R1	251652	249621.8	0.08	0.08	0.03	0.046
R2	251731.6	249753.7	0.10	0.10	0.04	0.052
R3	251716.7	249855.6	0.11	0.11	0.04	0.064
R4	251662	249890.4	0.12	0.12	0.05	0.069
R5	251617.2	249920.3	0.13	0.13	0.05	0.071
R6	251430.7	249984.9	0.17	0.17	0.07	0.104
R7	251373.5	249997.4	0.18	0.18	0.07	0.108
R8	251316.3	250029.7	0.19	0.19	0.07	0.114
R9	251164.6	250042.1	0.18	0.18	0.07	0.103
R10	251055.1	250119.2	0.19	0.19	0.07	0.095
R11	251010.4	250141.6	0.18	0.18	0.07	0.085
R12	251002.9	250164	0.19	0.19	0.07	0.085
R13	250629.9	250400.8	0.27	0.27	0.10	0.137
R14	250570.2	250395.3	0.23	0.23	0.09	0.101
R15	250535.3	250492.3	0.18	0.18	0.07	0.084
R16	250254.3	250815.6	0.07	0.07	0.03	0.041
R17	250271.7	250922.6	0.08	0.08	0.03	0.042
R18	250279.3	250994.7	0.06	0.06	0.02	0.040
R19	250284.2	251069.3	0.06	0.06	0.02	0.036
R20	250411	251004.6	0.08	0.08	0.03	0.049
R21	250331.4	251138.9	0.06	0.06	0.02	0.036
R22	250445.8	251134	0.07	0.07	0.03	0.042
R23	250490.6	251129	0.08	0.08	0.03	0.044
R24	250522.9	251124	0.08	0.08	0.03	0.044

Table 5.9 continued. Predicted ground level concentration (excluding baseline) of each pollutant at each identified sensitive receptor locations Rec 25 to Rec 42 for Scenarios 1 to 8 (*see Section 5.4 and Figure 5.1*).

Receptor identity	X coord (m)	Y coord (m)	Scen 1 - (µg/m^3)	Scen 2 - (µg/m^3)	Scen 3 - (µg/m^3)	Scen 4 - (µg/m^3)	Scen 5 - (µg/m^3)	Scen 6 - (µg/m^3)	Scen 7 - (µg/m^3)	Scen 8 -(µg/m^3)
R25	250545.3	251124	29.7	24.8	0.3	6.5	1.1	0.1	0.7	0.31
R26	250570.2	251124	35.5	25.9	0.3	6.6	1.2	0.1	0.7	0.32
R27	250610	251186.2	48.1	21.8	0.3	6.1	1.0	0.1	0.8	0.27
R28	250644.8	251109.1	45.9	30.8	0.4	7.1	1.5	0.1	0.9	0.36
R29	250669.6	251188.7	44.0	23.7	0.4	6.6	1.4	0.1	0.8	0.34
R30	250716.9	251186.2	55.8	32.5	0.5	8.5	1.4	0.1	1.0	0.42
R31	250769.1	251181.2	62.4	36.5	0.5	10.6	1.6	0.2	1.1	0.54
R32	250813.9	251161.3	53.5	50.5	0.6	13.5	1.7	0.2	1.2	0.60
R33	250838.8	251161.3	70.6	55.6	0.7	14.9	1.9	0.2	1.3	0.73
R34	250910.9	251156.3	68.1	50.9	0.8	13.6	2.5	0.3	1.8	0.77
R35	251174.5	251074.3	76.1	83.2	1.8	22.8	3.9	0.5	2.6	1.39
R36	251229.2	251007.1	80.6	89.0	2.5	24.4	4.0	0.7	3.2	1.82
R37	251448.1	251141.4	77.3	68.9	1.8	19.2	3.2	0.5	2.4	1.40
R38	251542.6	251096.6	59.7	60.9	1.6	15.0	2.6	0.5	2.0	1.15
R39	251895.8	250741	46.2	36.9	0.8	10.6	1.4	0.2	1.1	0.58
R40	251647	250188.9	63.8	42.4	1.0	11.9	2.1	0.3	1.6	0.93
R41	251746.5	250069.5	59.4	31.9	0.7	7.3	1.4	0.2	1.1	0.63
R42	251127.9	250358.2	220.5	116.5	2.3	33.3	7.7	0.7	5.5	1.96

Table 4.3 continued. Predicted ground level concentration (excluding baseline) of each pollutant at each identified sensitive receptor locations Rec 25 to Rec 42 for Scenarios 9 to 12 (*see Section 5.4 and Figure 5.1*).

Receptor identity	X coord (m)	Y coord (m)	Scen 9 - (µg/m^3)	Scen 10 - (µg/m^3)	Scen 11 - (µg/m^3)	Scen 12 - (µg/m^3)
R25	250545.3	251124	0.08	0.08	0.03	0.044
R26	250570.2	251124	0.09	0.09	0.03	0.045
R27	250610	251186.2	0.08	0.08	0.03	0.047
R28	250644.8	251109.1	0.10	0.10	0.04	0.054
R29	250669.6	251188.7	0.10	0.10	0.04	0.058
R30	250716.9	251186.2	0.12	0.12	0.05	0.070
R31	250769.1	251181.2	0.14	0.14	0.05	0.089
R32	250813.9	251161.3	0.17	0.17	0.06	0.105
R33	250838.8	251161.3	0.18	0.18	0.07	0.108
R34	250910.9	251156.3	0.22	0.22	0.08	0.149
R35	251174.5	251074.3	0.47	0.47	0.18	0.274
R36	251229.2	251007.1	0.64	0.64	0.25	0.337
R37	251448.1	251141.4	0.48	0.48	0.18	0.198
R38	251542.6	251096.6	0.42	0.42	0.16	0.176
R39	251895.8	250741	0.20	0.20	0.08	0.100
R40	251647	250188.9	0.27	0.27	0.10	0.145
R41	251746.5	250069.5	0.19	0.19	0.07	0.100
R42	251127.9	250358.2	0.59	0.59	0.23	0.529

5.5. Conclusions

Odour Monitoring Ireland was commissioned by ORS consulting Ltd to perform a dispersion modelling study of a new proposed anaerobic digestion facility to be located in Bio Agrigas Ltd, Newdowns, The Downs, Mullingar, Co. Westmeath. Following a detailed impact and dispersion modelling assessment, it was demonstrated that no significant environmental impact will exist if the source characteristics and emission limit value in the waste gases are achieved.

The following conclusions are drawn from the study:

1. The assessment was carried out to provide information in line with standard information to be provided to the EPA and regulatory bodies for such projects.

2. Specific dispersion modelling was performed for Carbon monoxide, Oxides of nitrogen, Sulphur dioxide, Particulate matter, TNMVOC as Benzene and Odour.

3. With regards to Carbon monoxide, the maximum GLC+Baseline for CO from the operation of the facility is 1,441 µg m^{-3} for the maximum 8-hour mean concentration at the 100th percentile. When combined predicted and baseline conditions are compared to the Irish guideline/limit values and EU Limit values set out in SI 271 of 2002 and Directive 2008/50/EC, this is 14.41% of the impact criterion. In addition, the predicted ground level concentration of Carbon monoxide at each of the 42 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

4. With regards to Oxides of nitrogen, the maximum GLC+Baseline for NO_2 from the operation of the facility is 98.20 µg m^{-3} for the maximum 1-hour mean concentration at the 99.79th percentile. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 49.10% of the impact criterion. An annual average was also generated to allow comparison with values contained in SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 35.10 µg/m^3. When compared the annual average NO2 air quality impact criterion is 87.75% of the impact criterion. In addition, the predicted ground level concentration of Oxides of nitrogen at each of the 42 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

5. With regards to Sulphur dioxide, the maximum GLC+Baseline for SO_2 from the operation of the facility is 62.60 and 43.10 µg m-3 for the maximum 1-hour and 24 hr mean concentration at the 99.73th and 99.18th percentile respectively. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 17.87 and 34.50% of the set target limits established for the 1 hour and 24 hour assessment criteria. An annual average was also generated to allow comparison with SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 11.80 µg/m3. When compared the annual average SO_2 air quality impact criterion is 59.51% of the impact criterion. In addition, the predicted ground level concentration of Sulphur dioxide at each of the 42 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

6. With regards to Particulate matter, the maximum GLC+Baseline for Particulate matter 10µm from the operation of the facility is 46.90 and 41.90 µg m-3 for the maximum 24 hour mean concentration at the 98.08th and 90.40th percentile, respectively. When combined predicted and baseline conditions are compared to Directive 2008/50/EC, this is 93.76 and 83.74% of the impact criterion. An annual average was also generated to allow comparison with the SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 29.80 µg/m3. When compared, the annual average Particulate matter air quality impact is 74.75 % of the impact criterion. An annual average was also generated for PM2.5 to allow comparison with Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 16.80 µg/m3. When compared, the annual average PM2.5 air quality impact is 67.12% of the impact criterion. In addition, the predicted ground level concentration of Particulate matter at each of the 42 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

7. With regards to the results from the assessment of TNMVOC as Benzene ground level concentrations, the results indicate that the ambient ground level maximum annual average concentrations anywhere in the vicinity of the facility could be up to 80.20% of the impact criterion (assuming all TNMVOC is Benzene which will not be the case). In addition, the predicted ground level concentration of TNMVOC as Benzene at each of the 41 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1*.

8. With regards to odour, it is predicted that odour plume spread is in a north westerly south easterly direction of approximately 30 to 50 metres from the emission points with no sensitive receptors impacted by the plume. All resident locations in the vicinity of the proposed facility operations will perceive an odour concentration less than 1.50 Ou_E/m^3 at the 98th percentile of hourly averages for worst case meteorological year Clones 2004. In accordance with odour impact criterion presented in *Table 5.1*, and in keeping with currently recommended odour impact criterion in this country, no longterm odour impacts will be generated by receptors in the vicinity of the proposed facility operations. In addition, the predicted ground level concentration of Odour at each of the 42 sensitive receptors is presented in *Table 5.9*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Table 5.1.* A number of key mitigation measures as outlined in Section 5.4.1.6 will need to be implemented into the design of the odour containment, capture and treatment system to ensure compliance.

9. The overall modelling indicates that the facility will not result in any significant impact on air quality in the surrounding area with all ground level concentrations of pollutant well within their respective ground level concentration limit values.

6.0 NOISE

6.1 Introduction

ORS Environmental Consultants, Marlinstown Office Park, Marlinstown, Mullingar, Co. Westmeath have been appointed by Bio Agrigas Ltd to conduct an assessment into the likely noise impacts associated with the construction and operational phase of a proposed bio energy facility. This noise documentation has been compiled in support of a planning application and Environmental Impact Statement (EIS) at The Downs, Mullingar, Co. Westmeath.

This report will assess the potential noise impacts associated with the construction and operation phases of development on noise sensitive locations surrounding the site. Typical noise sources associated with the construction phase works will be short-term plant and machinery noise. The inward impact of noise from the proposed bio energy facility has been considered and appropriate mitigation measures proposed where necessary.

This assessment of noise has been undertaken in accordance with the Draft Guidelines on the Information to be contained in Environmental Impact Statements (Environmental Protection Agency, 2002) and also Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (Environmental Protection Agency, 2003).

6.2 Study Methodology

The methodology adopted for this noise assessment is as follows:

- Characterisation of the receiving environment
- Characterisation of the proposed development
- Prediction of the noise impact associated with the proposed development
- Evaluation of noise impacts

In all cases, predictions and impact assessments have been taken at the nearest noise sensitive residential locations surrounding the proposed site. Due to the nature of noise propagation, there is significant attenuation of noise as it dissipates away from the source, hence noise levels at more remote noise sensitive locations will be lower than noise levels predicted at the nearest residential locations. Therefore, noise impacts predicted at the nearest residential locations are taken to be the 'worst case' scenario.

6.3 Environmental Noise Survey

An environmental noise survey was conducted in March 2011 at the four nearest noise sensitive locations in order to quantify the existing noise environment.

6.3.1 Measurement Locations

Four measurement locations were selected and both are representative noise sensitive locations (NSL) during the daytime and night time. Each location was used for a short-term attended survey. The locations are presented graphically in the attached map.

A noise sensitive location is defined in the EPA, Environmental Noise Survey Guidance Document 2003, as “any dwelling, house, hotel or hostel, health building, educational establishment, or any other facility or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels".

In order to assess the current noise climate in the vicinity of the site measurements were taken at the nearest noise sensitive locations to the site. In total, the existing noise climate was monitored at four locations. A description of the monitoring locations is presented below in Table 6.1. In all cases the sound level meter (SLM) was located 1.5 meters above ground level and at least 2 meters away from any sound reflecting objects.

Location	Description
NSL 1	Located c.495m to the north west of the proposed plant
NSL 2	Located c.500m to the north east of the proposed plant
NSL 3	Located c.360m to the south west of the proposed plant
NSL 4	Located c.370m to the south east of the proposed plant

Table 6.1: Monitoring Locations

6.3.2 Durations of Survey

Noise measurements were conducted over the course of one day as follows:

March 11th 2011 Day-Time:

NSL 1 13:32 – 14:02
NSL 2 14:08 – 14:38
NSL 3 14:42 – 15:12
NSL 4 15:14 – 15:44

March 14th 2011 Night-Time:

NSL1 22:17 – 22:32
NSL2 22:40 – 22:55
NSL3 23:00 – 23:15
NSL4 23:46 – 00:01

The proposed site will operate a 24 hour cycle 7 days a week. The measurement periods were selected in order to provide a typical representative snapshot of the existing noise climate, with the primary purpose being to ensure that the proposed development noise criteria are commensurate with the prevailing environment.

The weather conditions throughout the survey period were considered to be neutral.

6.3.3 Instrumentation and Methodology

The noise survey was carried out in accordance with the requirements of ISO 1996: Acoustics – Description and Measurement of Environmental Noise.

Measurements were made using a Type 1 integrating sound level meter (SLM).

All sample measurements at each of the selected measurement locations were taken over a 30 minute period during the day and 15 minutes during the night. Daytime was considered to be between the hours of 08:00 and 22:00 while night time was considered to be between the hours of 22:00 and 08:00.

6.3.4 Measurement Parameters

The noise survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period. This parameter is representative of the specific noise from plant when plant is the dominant noise source, i.e. there is no extraneous noise from other sources such as traffic.

L_{Amax} is the instantaneous maximum sound level measure during the sample period.

L_{Amin} is the instantaneous minimum sound level measured during the sample period. This parameter is representative of the specific noise from plant when there is extraneous noise from an almost continuous source such as continuous traffic.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor of traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix denotes that the noise levels have been "A-weighted" in order to account for the non-linear nature of human hearing. All sound levels are expressed in terms of decibels (dB) relative to 2x10-5 Pa.

6.4 Receiving Environment

6.4.1 General Description

The proposed site is located in the Downs Mullingar parallel to the N4 Dual-Carriageway. The site is currently farmland with access from the R156.

There are four occupied residences situated to the north-west, north-east, south-east and south-west of the proposed site.

6.4.2 Measurement Data

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Location	Time	Measured Noise Levels (dB re. $2x10^{-5}$Pa)		
		$L_{Aeq,30min}$	$L_{A10,30min}$	$L_{A90,30min}$
NSL 1	13:32 – 14:02	74	76	46
NSL 2	14:08 – 14:38	68	71	40
NSL 3	14:42 – 15:12	74	78	65
NSL 4	15:14 – 15:44	69	67	58

Table 6.2: Daytime Noise Measurement Data

Location	Noise Sources
NSL 1	Traffic noise from R156, distance traffic noise from N4.
NSL 2	Traffic noise from R156, distance traffic noise from N4.
NSL 3	Traffic noise from N4.
NSL 4	Traffic noise from N4.

Table 6.3: Daytime Noise Sources

Location	Time	Measured Noise Levels (dB re. $2x10^{-5}$Pa)		
		$L_{Aeq,30min}$	$L_{A10,30min}$	$L_{A90,30min}$
NSL 1	22:17 – 22:32	71	71	46
NSL 2	22:40 – 22:55	67	64	38
NSL 3	23:00 – 23:15	69	74	54
NSL 4	23:46 – 00:01	59	62	51

Table 6.4: Night-time Noise Measurement Data

Location	Noise Sources
NSL 1	Traffic noise from R156, distance traffic noise from N4.
NSL 2	Traffic noise from R156, distance traffic noise from N4.
NSL 3	Traffic noise from N4
NSL 4	Traffic noise from N4

Table 6.5: Night-time Noise Sources

6.4.3 Evaluation of Measurement Data

Table 6.2 & 6.4 summarises the monitoring data for each noise location surveyed.

Noise levels ranged from of 74dB L_{Aeq} to 68dB L_{Aeq} and background noise levels ranged from 65dB L_{A90} to 40dB L_{Aeq} for the daytime survey. The night-time survey ranged from 71dB L_{Aeq} to 59dB L_{Aeq} with background noise levels ranging from 54dB L_{A90} to 38dB L_{A90}.

6.5 Characteristics of the Proposed Development

Bio Argigas Ltd propose to build and operate a bio energy facility in The Downs, Mullingar Co. Westmeath. The site is situated between the N4 dual carriageway and the R156 road. Bio Agrigas ltd will operate an anaerobic digestion plant, this is a proven technology that extracts energy in the form of biogas from organic waste.

The AD process can be used to turn residues from livestock farming, food processing industries, waste water treatment sludge, water treatment plant sludge among other organic wastes into biogas. The biogas can be used to generate heat and/or electricity; fibre, which can be used as a soil conditioner. AD is also unique among policy instruments as it can deliver positive outcomes for multiple policy objectives with respect to global warming, renewable energy and water pollution.'

The potential noise elements of the facility are process machinery, traffic movements, and extraction fans during the operational stage.
When considering a development of this nature, the potential noise impact on the surroundings must be considered for each of the two distinct stages: the short term impact of the construction / preparation phase and the longer term impact of the facility operational phase.

The construction phase will involve earthworks throughout the entire length of the site, and general site preparation. This impact is considered relatively short-term in nature and is assessed in a later section.

The primary sources of noise during the construction phase of the proposed development will be short-term and are listed below:

- Haul route construction phase – excavators, dump trucks and dozers for ground excavation
- Hardcore foundation laying – excavators, HGV movements and compactors
- Construction of weighbridge

The primary sources of noise during the operational phase of the proposed development will be long-term and are listed below:

- Truck movements on haul routes
- Vehicular movements on site
- Machinery and plant operations
- Extraction Units

6.5.1 Potential Impacts of the Proposed Development

6.5.1.1 Noise Criteria

Construction Phase

During the construction phase of the proposed development, noise levels at the site when measured at noise sensitive locations in the vicinity shall not exceed 75dB(A) between 07:00 and 19:00 hours Monday to Saturday inclusive, excluding public holidays and Sunday, and 45dB(A) at any other time.

Table 6.6 summarises the construction noise limits applicable at the façade of dwellings during the construction period.

Days and Times	Noise Levels $L_{Aeq, 1hr}$ (dB re. 2x10-5 Pa)
Monday to Saturday 07:00 to 19:00hrs	70

Table 6.6: Construction Noise Limits

No piling will take place on site and rock breaking is not anticipated. The distances to sensitive receptors and site topography will act as a break for any potential vibrations which may occur. Potential vibration sources include the use of plant machinery involved in earthworks, dump trucks, bulldozers and compacting equipment. It is noted; however, that potential vibration impacts from such sources will only be experienced in the immediate vicinity of the operation itself. If during construction, rock is encountered, monitoring will be undertaken in order to verify that appropriate vibration criteria for the following standards are not exceeded.

- BS 7385: parts 1 and 2:1990 and 1993 respectively, provide guidance on the measurement and evaluation of vibration and its effects on buildings, and a guide to damage levels from ground borne vibration

- Building Research Establishment (BRE) Digest 353 (July 1990): Damage to structures from ground borne vibration

- BS 5228:1997 - Noise and Vibration Control on Construction and Open Sites Part 1

Ground borne vibration propagation from construction activities is difficult to predict and relies on a detailed knowledge of the machinery and construction techniques being used together with geotechnical information describing earth types and soil compaction levels. This provides an early warning of activities that may be producing strong vibration levels and alerts the contractor to take immediate corrective action (e.g. use of alternative equipment). Table 6.7 presents guidance on allowable vibration velocity (Peak Particle Velocity) at the closest part of any sensitive receptor for construction activities:

Frequency (Hz)	Peak Particle Velocity (mm/s)
Less than 10	8

10 to 50	12.5
50 to 100 (and above)	20

Table 6.7: Allowable Peak Particle Velocity at the Closest Part of any Sensitive Receptor

Operational Phase

Due consideration must be given to the nature of the primary noise sources when setting criteria. In this instance, there are four primary sources of noise with the development once operational as outlined above. Criteria for noise from operations on the site will be set in terms of the L_{Aeq}, T parameters (the equivalent continuous sound level).

For such a site as the proposed, the Local Authority or Environmental Protection Agency (EPA) will generally set the following noise limits at the façades of the nearest residential dwelling closest to the development:

Daytime (08:00hrs to 18:00hrs)	55dB L_{Aeq}, 30min
Night-time (22:00hrs to 08:00hrs)	45dB L_{Aeq}, 30min

Whilst the application of absolute noise limits to a development ensures that overall impact is kept within acceptable margins, it does not assist with the assignation of relative impacts. In order to do this, it is necessary to consider the likely changes in ambient noise levels as a result of the project under consideration. Table 6.8 gives a degree of guidance as to the likely impact on the surrounding environment associated with a change in the ambient noise level.

Change in Sound Level (dB)	Subjective Reaction	Impact
< 3	Inaudible	Imperceptible
3 – 5	Perceptible	Slight
6 – 10	Up to a doubling of loudness	Moderate
11 – 15	Over a doubling of loudness	Significant
> 15		Profound

Table 6.8: Likely impact associated with change in ambient noise level

6.5.1.2 Construction Phase

There are number of primary sources of noise during the construction phase of the proposed development including;

- Haul Route Construction Phase
- Site Clearance/Excavation
- Hardcore Foundation Laying

- Steel Erection
- General Construction
- Construction of Weighbridge

Each noise source will be discussed in detail.

During the construction phase of the proposed development, a variety of items of plant will be in use, such as excavators, dump trucks and loaders. Due to the nature of the activities undertaken during construction, there is the potential for generation of significant noise levels close to sensitive locations. Table 6.8 indicates typical noise levels that would be expected from the proposed temporary construction phase. Noise levels have been predicted at the noise sensitive location in close proximity to the proposed site.

NSL 3 was chosen as a reference for the calculation of the construction noise limits due to its proximity to the proposed construction area. For the purposes of this calculation, it is assumed that machinery will be operating at a distance as close as possible to the sensitive location for a relatively short period to the north east of the proposed facility.

It should be noted that for most of the time, plant and machinery will be operating at a greater distance from the nearest residential dwelling than that used for the calculations in Table 6.9 and consequently will have lesser impact on local residents. This assessment is therefore representative of a 'worst case' scenario'.

The predicted noise impact was determined using the 'inverse square rule' for noise attenuation due to distance only. This law is based on the principle that as you double the distance from a source the noise level decreases by 6dB in a free-field environment.

Construction Phase	Item of Plant (BS5228 Ref)	L_{Aeq} at 10m (dB)	L_{Aeq} at NSL 3 (dB)
Haul Road Construction	Wheeled Loader	84	54
	Track Excavator	85	
Site Clearance /	Wheeled Loader	84	54

Excavation	Track Excavator	85	
Hardcore Foundations	Track Excavator	85	55
	Tipper Lorry	85	
	Vibratory Roller	78	
	Surfacing	80	
Steel Erection	Crane Operations	80	52
	Articulated Lorry	70	
General Construction	Surfacing	80	51
	Pneumatic Circular	70	
	Internal Fit-Out	70	
Weighbridge Construction	Crane Operations	80	50
	Articulated Lorry	70	
Road Works / Landscaping	Surfacing	80	50

Table 6.9: Typical Noise Levels at nearest sensitive location during Construction Phase

The predictions indicate that the daytime construction limit of 70dB L_{Aeq} will not be exceeded during the construction phase of the proposed bio energy facility. In practice the above levels will be much lower as tree screening and ground attenuation have not been taken into account for construction phase noise. The predicted noise levels are based on items of plant and machinery operating at 100% at site boundaries as a 'worst case scenario' prediction.

The impact on the noise environment due to the construction phase will be temporary and the long term impact is not likely to be significant.

6.5.1.3 Operational Phase

The operation of the proposed development is not envisaged to create any significant noise impacts than already exist. There are 4 primary sources of noise in the operational context of the proposed development.

- Truck movements on haul route & on-site
- Extraction Unit
- Plant Machinery
- Process Noise

<u>Prediction Methods</u>

Prediction calculations for earth moving plant and equipment have been conducted generally in accordance with ISO 9613: Acoustics – Attenuation of sound outdoors, Part 2: General method of calculation, 1996. The selected software to conduct these calculations is Bruel & Kjaer Type 7810 Predictor Version 6.

Bruel & Kjaer Type 7810 Predictor is a proprietary noise calculation software package for predicting noise levels in the vicinity of noise sources. Predictor is used to predict noise levels for various applications depending on the relevant standard selected. The calculated noise levels are arrived at by taking into account a number of factors which affect the propagation of sound:

- The magnitude of the noise source in terms of sound power
- The distance between source and receiver
- The presence of reflective surfaces

The prediction calculations have been performed using Predictor in accordance with ISO 9613. The degree of accuracy is detailed in Table 6.10 below:

Height (m)	Distance	
	0<d<100m	100m<d<1,000m
0<h<5m	±3dB	±3dB
5m<h<30	±1dB	±3dB

Table 6.10: Estimated accuracy for broadband noise of L_{AT}(DW)

Data

Sound power data for each item of plant considered in the noise model is given in Table 6.11. The sound power levels were calculated using Source dB Version 1.1. Reference was also made to BS5228 Part 1 noise database for prediction of noise on construction and open sites.

The existing and proposed layouts including building heights have been taken from drawings supplied by Marlin Architects.

Ground topography and location data for noise sensitive locations have been taken from survey drawings supplied by ORS Surveying Department and Ordnance Survey Ireland maps.

Description	Octave Band Centre Frequency (Hz)								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Articulated HGV	77	86	90	95	98	96	89	82	107
Extraction Fan 7kW x2	66	74	84	87	81	79	71	59	95
Generator x2	54	59	69	73	76	74	69	60	85
Wheel Wash	68	78	78	79	79	73	67	63	90

Table 6.11: Sound Power Levels utilised in noise model

Single frequency band noise sources (500Hz) have been assumed for each of the plant items not mentioned above (no frequency specified). These are as follows:

- Flare (55dB)
- Bioscrubber (55dB)
- Pre-Digestion Storage Pumps x8 (55dB)
- General Operational Noise (55dB)

- Digester Fans x4 (55dB)

Note: For the purpose of the model all noise sources are determined to be emitted from the highest point of the source. The only exception is the digesters which have mixers mounted at 5m and 10m i.e. in the middle and top of the digester.

Output Data

Predictor calculates noise levels for a set of receiver locations specified by the user. The results include an overall level in dB(A) and a frequency spectrum for each noise source contributing to elevated levels at the receiver location.

For the purpose of this assessment, the noise levels have been predicted at the façade of the two nearest noise sensitive locations.

6.6 Results

Noise levels were predicted at 4 noise sensitive/receiver locations and are summarised in Table 6.12 and presented graphically in Appendix C.

Receiver Location Ref.	Description of Receiver Location
RL 1	Is located at NSL 1 c.495m north-west of the proposed plant.
RL 2	Is located at NSL 2 c.500m north-east of the proposed plant.
RL 3	Is located at NSL 3 c.360 south-west of the proposed plant.
RL 4	Is located at NSL 4 c.370 south-east of the proposed plant.

Table 6.12: Details of Receiver Locations

Tables below compares the predicted noise levels with the adopted criterion at the 4 sensitive locations under considerations.

Location	Daytime Predicted L_{Aeq} (dB)	Daytime Criterion L_{Aeq} (dB)	Compliance
RL 1	28	55	YES
RL 2	21	55	YES
RL 3	27	55	YES
RL 4	18	55	YES

Table 6.13: Daytime Predicted Noise Levels at Noise Sensitive Locations

Table 6.13 shows that the predicted noise levels at noise sensitive locations are within typical criterion of 55dB $L_{Aeq,30min}$.

Location	Daytime Predicted L_{Aeq} (dB)	Daytime Criterion L_{Aeq} (dB)	Compliance
RL 1	28	45	YES

RL 2	21	45	YES
RL 3	28	45	YES
RL 4	18	45	YES

Table 6.14: Night-Time Predicted Noise Levels at Noise Sensitive Locations

Table 6.14 shows that the predicted noise levels at noise sensitive locations are within typical criterion of 45dB $L_{Aeq,30min}$.

Location	Predicted/Measured Noise Levels, L_{Aeq} (dB)				Impact
	Predicted Noise level from site	Existing ambient level	Cumulative level	Change	
RL 1	28	46	46	0	Imperceptible
RL 2	21	40	40	0	Imperceptible
RL 3	27	65	65	0	Imperceptible
RL 4	18	58	58	0	Imperceptible

Table 6.15: Predicted Noise levels and Impact at Sensitive Locations Daytime

No change in ambient noise levels is predicted at the 4 receptor locations the daytime prediction. Reference to Table 6.8 indicates that this is an imperceptible change in the background noise level and the resulting impact on this resident is none.

Location	Predicted/Measured Noise Levels, L_{Aeq} (dB)				Impact
	Predicted Noise level from site	Existing ambient level	Cumulative level	Change	
RL 1	28	46	46	0	Imperceptible
RL 2	21	38	38	0	Imperceptible
RL 3	28	54	54	0	Imperceptible
Rl 4	18	51	51	0	Imperceptible

Table 6.16: Predicted Noise levels and Impact at Sensitive Locations Night-time

No change in ambient noise levels is predicted at the 4 receptor locations for the night-time prediction. Reference to Table 6.11 indicates that this is an imperceptible change in the background noise level and the resulting impact on this resident is none.

It must be noted that the predicted levels are worse-case scenario and may be less in real-time working conditions. No noise attenuation was taken into account in order to present a 'worst case scenario' situation.

The calculated values take into account the combined affect from the operational phase of the compost facility operations in conjunction with truck movements along the proposed haul road.

6.7 Mitigation Measures

In order to limit any likely noise impacts on the nearest sensitive location during the construction and operational phases of the proposed development a number of noise control measures have been recommended.

6.7.1 Construction Phase

The assessment of construction noise in Section 6.5.1.2 indicates that the noise criterion is unlikely to be exceeded during the construction phase of the project.
Regarding general construction activities, reference should be made to BS5228: Noise control on construction and open sites. Various mitigation measures should be considered and applied during the haul road construction such as:

- Controlling the hours during which site activities are likely to create high levels of noise
- Selection of plant with low noise emissions
- Erection of barriers / berms as necessary
- Situate any noisy plant as far away from sensitive locations

6.7.2 Operational Phase

Noise predictions indicate that predicted noise levels from the proposed development will not exceed the 55dB(A) limit generally set by the Local Authority or Environmental Protection Agency (EPA).

As stated in Table 6.13 & 6.14 above the predicted noise level without appropriate screening is in the magnitude of 28dB(A). When assessed using the guidance of BS 4142 is that a difference of between the rated noise level and the background noise level of around 10dB(A) or more indicates that complaints are likely whilst a difference of around 5dB(A) is of marginal significance. When assessing a new development the Local Authority and Environmental Protection Agency impose a stricter limit such as the rated noise level which should be no more than the background noise level plus 5dB(A), which was applied in this instance.

BS 4142 also states that a 5dB correction can be employed if one or more of the following features occur, or are expected to be present for new or modified noise sources:

- The noise contains a distinguishable, discrete, continuous note (whine, hiss, screech, hum, etc.)
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps)
- The noise is irregular enough to attract attention.

In this instance no further corrections are applied given the lack of noise impact predicted at NSL 1, NSL 2 NSL 3 & NSL 4.

6.8 Predicted Impacts of the Proposed Development

6.8.1 Construction Phase

During the construction phase of the proposed development, there may be a certain degree of impact on nearby residential properties due to noise emissions from site

traffic and other plant and machinery. It is considered that the various noise sources will not be excessive.

It is predicted that the construction noise related impacts would be short-term and not significant. Furthermore, the application of limits for hours of operation and the implementation of appropriate noise control measures as out lined in section 6.7.1 will ensure that noise impacts are kept minimal.

6.8.2 Operational Phase

As mentioned in Section 6.7.2 the operational phase of the proposed development will not give rise to noise levels off site which would exceed the expressed limit of 55dB(A). The resultant noise impact from the proposed development on the local community will therefore not be significant. It should be noted that BS 4142 states that a 5dB increase in the background noise level is of marginal significance and an increase of 10dB or more is likely to give rise to complaints. However it is important to point out that the ambient noise levels at locations NSL 3 & NSL 4 are currently above the stated limit of 55dB (A).

6.9 Monitoring

During the operational phase of the proposed composting facility monitoring will be required at sensitive locations to ensure the threshold limit of 55dB(A) is complied with. Monitoring should be carried out throughout the various stages of the development and as requested by the EPA.

6.10 Further Information Report

Westmeath County Council issued a further information request stating “Guidance documents recommend sampling over different days at different times or at least over a typical 4 hour daytime period and a minimum of 2 hours during night- time.” The result of this resurvey and subsequent submission to the local authority are available to in Appendix C – Further Information Report October – November 2011.

7.0 SOILS, GEOLOGY and HYDROGEOLOGY

7.1 Introduction

This section of the EIS has been prepared by ORS Consulting Engineers and assesses the impact the proposed development is likely to have on the soils, geology and hydrogeology in the vicinity of the proposed development and the potential impacts that may arise during both the construction and operational phases. It should be noted that apart from a site suitability assessment to facilitate the onsite waste water system, no preliminary ground investigations have been undertaken for the proposed development at this stage.

7.2 Methodology

7.2.1 Existing Environment

A desk-based assessment was used to assess baseline soils, geology and hydrogeology for the receiving environment of the proposed site. The baseline information that is detailed in this section of the statement was obtained from publicly available information.

The following documents and sources were referenced:

- Aquifer classification and vulnerability identification from the Geological Survey of Ireland (GSI web page)
- Search of GSI and Westmeath County Council files to determine the location of groundwater wells within a 2km radius;
- 1:50,000 Discovery Series Maps and 6" maps
- Water Quality in Ireland 1990-1994 (EPA);
- Water Quality in Ireland 1995-1997 (EPA);
- Water Quality in Ireland 1998-2000 (EPA);
- Other Maps and plans published by the Ordnance Survey of Ireland (OSI).
- Meteorological data from Met Eireann and hydrometric data from the Office of Public Works (OPW).
- Reports, maps and data published by the Geological Survey of Ireland (GSI) and the National Soil Survey of Ireland.
- General Soil Map of Ireland 2nd Edition, (1980), The National Soil Survey, An Fóras Taluntais.
- Reports, maps and data published by the Environmental Protection Agency (EPA).

7.2.2 Impact Assessment Methodology

This section provides an assessment of the environmental impacts of the proposed development on the bedrock geology, drift geology and hydrogeology. Consideration is given to the nature of the underlying limestone bedrock and the implications this may have on the subterranean drainage and groundwater quality. The environmental impacts due to the proposed development are described in terms of predicted impacts during the construction and operational phases of the proposed development.

The importance or sensitivity of the geological and groundwater interest of the study area was determined using the criteria set out below in Table 7.1:

Sensitivity of Geological Interest	Description
High	Areas containing geological or geomorphological features considered to be of national interest, for example, Special Areas of Conservation (SAC). Designated sites of nature conservation importance dependent on groundwater.
Medium	Areas containing geological features of designated regional importance, for example regionally important geological sites, considered worthy of protection for their educational, research, historic or aesthetic importance. Exploitation of local groundwater is not extensive and/or local areas of nature conservation known to be sensitive to groundwater impacts.
Low	Geological features not currently protected and not considered worthy of protection. Poor groundwater quality and/or very low permeabilities make exploitation of the aquifer(s) unfeasible. Changes to groundwater not expected to impact on local ecology.

Table 7.1: Geology and Groundwater Sensitivity

The assessment of the magnitude of predicted impacts on solid and drift geology and groundwater was based on the criteria defined in Table 7.2 and the combination of sensitivity and magnitude are used to derive the impact significance as detailed in Table 7.3.

Magnitude of Impacts	Description of Degree of Impact
High	Partial (greater than 50%) or total loss of a geological site, or where there would be complete severance of a site such as to affect the value of the site. Major permanent or long term change to groundwater quality or available yield. Existing resource use is irreparably impacted upon. Changes to quality or water table level will impact upon local ecology.
Medium	Loss of part (between approximately 15% to 50%) of a geological site, major severance, major effects to the setting, or disturbance such that the value of the site would be affected, but not to a major degree. Changes to the local groundwater regime are predicted to impact slightly on resource use but not rule out any existing supplies. Minor impacts on local ecology may result.
Low	Minimal effect on the geological site (up to 15%) or a medium effect on its setting, or where there would be a minor severance or disturbance such that the value of the site would not be affected. Changes to groundwater quality, levels or yields do not represent a risk to existing resource use or ecology.
Negligible	Very slight change from baseline condition. Change hardly discernible, approximating to a 'no change' condition.

Table 7.2: Definition of Magnitude of Impacts Criteria

Site Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Substantial	Substantial	Moderate	Slight
Medium	Moderate	Moderate	Slight	Negligible
Low	Slight	Negligible	Negligible	Negligible

Table 7.3: Assessment of Significant Criteria for Impacts on Geology & Groundwater.

7.3 EXISTING ENVIRONMENT

7.3.1 Background

This section of the statement provides the baseline information in relation to geology, soils, and hydrogeology that exists in the vicinity of the proposed development. The subject site works occupies a total area of approximately 2.3 ha (5.68 acres) and is situated in Newdown, The Downs, Mullingar, Co. Westmeath. The site is situated immediately to the north of an existing business development operated by Thomas Flynn & Sons and lies approximately 7.7km South East of Mullingar town centre.

Both the geology and soils play an important part in determining the environmental characteristics of a region. The underlying geology has a major influence on landform and rocks provide the parent material from which soils are created. The nature of the rock helps to determine not just the nature and chemistry of the soil formed, but also the rate at which it forms. This in turn strongly affects the natural vegetation and the type of agriculture or horticulture that can be sustained.

7.3.2 Receiving Environment

The receiving environment is described below for the proposed development under the following headings:

- Topography
- Drift Geology
- Bedrock Geology
- Hydrology
- Hydrogeology

7.3.2.1 Topography

The ground levels on the subject site fall gently from a height of approximately 97.5 metres O.D. at the south-western boundary to a height of approximately 94 metres O.D. metres along the north-eastern boundary. The ground levels along the strip of land which will form the entrance / access road to the site is generally at a height of approximately 96 metres O.D.

7.3.2.2 Drift Geology

Drift is a general term applied to all mineral material (clay, silt, sand, gravel and boulders) transported by a glacier and deposited directly by or from the ice or as fluvioglacial deposits deposited by water from the ice. It generally applies to deposits laid down during the Pleistocene (Quaternary) glaciations. Drift can also be included under Holocene (Quaternary) deposits. Quaternary mapping is not available for the area and there is no information as to the depth of overburden. As the proposed development has not progressed to detailed design stage yet, no site investigative work

has been completed. The drift geology of the area principally reflects the depositional process of the last glaciation. Typically during the ice advance, boulder clays were deposited subglacially as lodgement till over the eroded rock head surface, whilst moraine granular deposits were laid down at the glacier margins. Subsequently, with the progressive retreat of the ice sheet from the region, granular fluvio-glacial deposits were laid down in places by melt waters discharging from the front of the glacier.
EPA Soils Classification maps identify the subject site as comprising two known soil types. The Southern part of the site consists of a deep well drained mineral (BminDW) classified as derived from mainly calcareous parent materials. The Northern part of the site consists of a peat material described as cutaway / cutover peat

EPA Subsoil Classification maps identify the subject site as comprising two known subsoil type, classified as cutover peat on the northern part of the site and limestone till (Carboniferous) on the southern part of the site.

In view of the proposed development, the soils which are likely to be affected by the development represent a notable resource particularly in a local context. In a regional context, this soil resource is less significant as such soils occur in abundance in the area.

7.3.2.3 Bedrock Geology
This sub-section deals with bedrock underlying the area. Bedrock is defined as a consolidated aggregate of minerals underlying the ground surface and any soils present. Above the bedrock is usually an area of broken and weathered unconsolidated rock in the basal subsoil. Sedimentary rock lies in beds which may comprise different rock types and which may be horizontal or inclined, so that the rock encountered at the ground surface may change over a short distance.

According to the Geological Survey of Ireland and the National Draft Generalised Bedrock Map, the bedrock underlying and surrounding the subject site comprise Dinantian Pure Unbedded Limestone. These Dinantian limestone strata date from the Early Carboniferous period and are a dark fine grained limestone with calcareous shale, and typically offer a strong and stable substrate.

The GSI 1:1,000,000 Bedrock Solid Geology Map indicates that the site lies within the Waulsortian mudbank limestone formation. The limestone is often referred to as Reef Limestone and is generally a pale to medium grey biomicrite with some sparite banding and very little non-calcareous (intra-mudbank) material. Previous investigations on similar limestones have shown that there are no significant variations in observable characteristics of the limestone which is typically a moderately strong rock, with widely spaced, tight discontinuities. The Rock Quality Designation has been shown to be well over 95%.

The nearest fault to the proposed development is located approximately 5.6 miles away to the West with a North East – South West trend.

7.3.2.4 Hydrology
The proposed development lies within Hydrometric Area 7 (Boyne Catchment). The existing drainage regime in the area is generally comprised of watercourses which flow in a North West – South East direction. The dominant influence on drainage in the area is the Riverstown River to the south of the N4 and the Royal Canal.

The Riverstown River rises near the village of Cloghan Co. Westmeath and flows in an easterly direction for ten miles before joining with the River Deel one mile downstream from the village of Raharney. The River Deel derives its source from Lough Lene, Lough Bane, and the Ben Loughs and then flows for 22 miles in a south easterly direction through Raharney County Westmeath before joining with the River Boyne one mile upstream of Inchamore Bridge. The River Deel is a limestone river and it is characterised by the clarity of its water.

The Deel then flows into the River Boyne. The River Boyne and its tributaries comprise nearly 330 miles of river channel which drain an area of approximately 1,000 sq. miles. The River Boyne rises near Newberry Hall in Co. Kildare and meanders its way in a north easterly direction for seventy miles through counties Offaly, Meath and Louth before entering the Irish Sea below the historic town of Drogheda, between the townlands of Mornington and Baltray.

This whole area comes under the control of the Easter River Basin District. The Eastern River Basin District incorporates all or part of twelve local authority areas: Dublin City, Meath, Kildare, Wicklow, Cavan, Dun Laoghaire-Rathdown, Fingal, Offaly, South Dublin, Westmeath and small portions of Wexford and Louth.

Characteristic	Classification	Comment
Receiving Water Name and Type	Riverstown	Joins the River Deel one mile downstream of Raharney
Resource	None	No drinking water abstractions
Applicable Regulations	Phosphorous Regulations **Note 1**	Compliant
	Dangerous Substances **Note 2**	Compliant
	UWWT Regulations **Note 3**	Receiving water is not a designated area under UWWT Regulations
Designations	None	
EPA Monitoring Stations	07RO10100	Riverstown Bridge
	07RO10200	Bridge Upstream of the confluence of the River Deel
WFD Status	Moderate	
WFD Protected Area	None	

Table 7.4: Description of Receiving Waters.

Note 1: Local Government (Water Pollution) Act, 1977 (Water Quality Standards for Phosphorous) Regulations, 1998, 5.1. No 258 of 1998
Note 2: Water Quality (Dangerous Substances) Regulations S.I. No. 12 of 2001
Note 3: Urban WW Treatment Regulations 2001, S.I. No. 254 of 2001 and Urban WW Treatment (Amendment) Regulations 2004, S.I. 440 of 2004

Under the Water Framework Directive, a River Basin Management plan was conducted on the River Deel to safeguard its aquatic ecology. In geographic terms, 87% of the River Deel is in Co. Westmeath. The four main objectives of the management plan are to:

- Prevent deterioration and in particular maintain High or Good status of the waters
- Improve waters to achieve Good Status where appropriate
- Progressively reduce chemical pollution
- Achieve the protected area objectives of the ERBD

In the report produced by the Easter River Basis District, it found that the Agriculture sector was putting most pressure ecologically on the River Deel catchment area. The Eastern River Basin District identified a number of measures which should be addressed in order to protect the river catchment area. Out of the Top Ten Supplementary Measures, contained in the Draft Programme of Measures – Deel Water Management Unit, the proposed bio-energy facility will address at least three of these main issues. The issues namely being:

- Implementation of community Digesters for Alternative Energy
- Reduce water demand through improved conservations, plumbing code changes, reduce unaccounted for water, rainwater harvesting, domestic water metering, universal water charging, or restricting development where water resources are over-subscribed
- Alter the availability of supply through conjunctive use or integrated water resources management, water reuse, implementing S.U.D. schemes in developed areas, implementation of abstraction controls, use of additional storage or alternative water source

The proposed Bio-energy facility will utilise anaerobic digestors as a source of alternative energy. Feedstock in the form of energy crops, slurries and Animal by-products will be used to produce a biogas which in turn will be used to produce renewable electricity. The electricity will then feed the national grid producing 1MW annually. Throughout the design stage of this project, every effort was made to remain cognisant of the local environment while also adhering to the strictest planning and development guidelines.

The bio-energy plants' water demand will rely for the most part on water collected on site through a series of rainwater harvesting methods, tank work and infrastructure thus reducing the demand on the public water supply.

The Water Framework Directive sets out the framework for achieving good status in all our rivers in Ireland. In the Eastern River Basin District 80% of our rivers are below good status. The progressive reducing of chemical pollution is also a main objective of the EDRB. The process will have removed 80-90% of the pathogens and odours associated with the slurries and animal by-products. This has many benefits including reducing odour levels and reducing nitrate pollution by decreasing run-off to water courses.

Due to the nature of this bio-energy process reusing water through rainwater harvesting and surface-run off, there may be a slight decrease in the amount of water available for aquifer recharge. However, having discussed the points above, it can be clearly seen that the benefits of this bio-energy process would far outweigh any impact that reducing aquifer recharge might have on the local environment. The anaerobic digestion process addresses numerous issues identified by the Eastern Basin River District in improving the overall quality of water in the Riverstown River catchment area. Approximately 1/3 of the overall site footprint will consist of permeable surfaces. This will go towards naturally recharging the local aquifer. The Riverstown River catchment area is listed as being 77sq kms (EPA-River Boyne Water Quality Management Plan 1997). The impermeable area associated with the proposed site therefore represents 0.015% of the total catchment area of the Riverstown River.

7.3.2.5 Hydrogeolology

Hydrogeology is the study of groundwater, including its origin, occurrence, movement and quality. Rocks which store and transmit groundwater are known as bedrock aquifers. Different bedrock types have differing abilities to store and transmit water, depending on their permeability and fracture intensity. The Geological Survey of Ireland has classified all aquifers in Ireland in three main categories based on potential yield and extent:

- Regionally Important
- Locally
- Poor

County Westmeath has been mapped for Aquifer Classification. The subject site is located in an area which is designated by the GSI (National Draft Bedrock Aquifer Map) as a Locally Important Aquifer – Moderately Productive Only In Local Zones (Classification reference - Ll).

There are further sub-categories based on the geology of the subsoil, the type of recharge (i.e. either point or diffuse) and the thickness of the unsaturated zone through which potential contaminants can move. The Geological Survey of Ireland uses a matrix comprising four groundwater vulnerability categories - extreme, high, moderate and low - for mapping purposes and in the assessment of risk to groundwater. The categories are based on the thickness of cover (overburden), which provides some attenuation for contaminants migrating toward the groundwater table from the surface or near subsurface.

Where the overburden is less than 3 metres thick, the Matrix Vulnerability Rating of the aquifer is considered extreme (i.e. the potential for contamination to reach the aquifer is extremely high). Where the overburden is greater than 10 metres thick and has a low permeability the vulnerability is considered to be low. According to the GSI Aquifer Vulnerability Map, in the wider Westmeath area, there are areas of high, moderate and low vulnerability. The area underlying the proposed site itself is classified as being of moderate vulnerability.

Provisional information on the hydrogeological classification of the bedrock beneath the subject site was obtained from the Geological Survey of Ireland (GSI). The Dinantian Pure Unbedded Limestone beneath the site is considered by the Geological Survey of

Ireland to be a Locally Important Aquifer. This aquifer category has been assigned taking account of the following:

- The overall potential groundwater resources in each rock unit;
- The area of each rock unit;
- The localised nature of the higher permeability zones (e.g. fractures) in the bedrock unit;
- The highly karstic nature of some limestones; and
- The fact that all bedrock types give enough water for domestic supplies (therefore are called aquifers).

Groundwater abstractions have defined Source Protection Areas around them in order to give an indication of the likelihood of contamination from activities in the area reaching an abstraction point. These have an Inner Protection Area and an Outer Protection Area associated with them. According to the GSI Source Protection Area map, there are no Protection Areas in the vicinity of the site.

There are a number of groundwater wells located within 5 kilometres of the proposed development. (Well Search conducted by the Geological Survey of Ireland, requested in 2011). Refer to Appendix E

Surface water is expected to infiltrate the overburden to the North of the site and flow in a South West – North East direction. As discussed previously, the soil consists of a deep well drained mineral (BminDW) classified as derived from mainly calcareous parent materials and a peat material described as cutaway / cutover peat. Site investigations took place in the form of trial holes as part of a site suitability assessment in February 2011. Hand tests to BS5930:1999 with top soil classified as a CLAY and subsoil classified as SILT/CLAY. Trial Pits were also dug as part of the Groundwater Vulnerability Assessment. Refer to Appendix E

7.4 GROUNDWATER VULNERABILITY ASSESSMENT

7.4.1 Background

Groundwater Vulnerability is a term used to represent the intrinsic geological and hydro geological characteristics that determine the ease with which groundwater may be contaminated by human activities. It is usually dependent on the nature (sandy, gravely, clay, etc.,) and depth of soil/subsoil overlying an aquifer (i.e. its shallowness). The travel time, attenuation capacity of the subsoils (i.e. ability to filter contaminants) and the nature of the contaminants are also important elements in determining the vulnerability of groundwater.

In the context of groundwater protection, Groundwater Vulnerability is the most important factor in determining control measures in areas where potential hazardous discharge to groundwater might take place. This is because the type, permeability and thickness of the soil and subsoil play a critical role in preventing groundwater contamination by acting as a protecting filtering layer over the groundwater.

7.4.2 Methodology

In compiling this report, ORS consulted with **EPA guidance notes ("Guidance on Groundwater Vulnerability Assessment of Land")**, to ensure proper protocol was followed. The groundwater vulnerability assessment comprises of three main steps, Desk Study, Field Work and Reporting. These are discussed in further detail below.

7.4.2.1 Desk Study

In order to become familiar with the site a desk study was conducted. In doing this ORS prepared field maps, data record sheets and to consulted with other relevant information from the Geological Survey of Ireland, the EPA and Teagasc among others. This allowed access to a range of geological / hyddrogeological information deemed relevant to the site and therefore the Groundwater Assessment.

The desk top based assessment was used to assess baseline soils, geology and hydrogeology for the receiving environment associated with the proposed site. The baseline information that is detailed in this section of the statement was obtained from publicly available information.

The following documents and sources were referenced:

- Aquifer classification and vulnerability identification from the Geological Survey of Ireland (GSI web page)
- Search of GSI and Westmeath County Council files to determine the location of groundwater wells within a 2km radius;
- 1:50,000 Discovery Series Maps and 6" maps
- *Water Quality in Ireland 1990-1994* (EPA);
- *Water Quality in Ireland 1995-1997* (EPA);
- *Water Quality in Ireland 1998-2000* (EPA);
- Other Maps and plans published by the Ordnance Survey of Ireland (OSI).
- Meteorological data from Met Eireann and hydrometric data from the Office of Public Works (OPW).
- Reports, maps and data published by the Geological Survey of Ireland (GSI) and the National Soil Survey of Ireland.
- General Soil Map of Ireland 2nd Edition, (1980), The National Soil Survey, An Fóras Taluntais.
- Reports, maps and data published by the Environmental Protection Agency (EPA).

7.4.2.2 Field Work

Following the desk study and compilation of all available information, a walkover survey was carried out, to verify the location and depths of, if any, drains, noted outcrops, karst features or boreholes etc. A number of trial pits were dug at specific points around the proposed site location. Due to the topographical nature of the site, one bore hole was place upstream and two downstream of the site. The following Table 7.5 is a ***summary of the sampling requirements for the EPA*** for such field work, as set out in the ***"Guidance on Groundwater Vulnerability Assessment of Land"*** Report.

GWPS exists	**Vulnerability**	**Sampling Requirements**
	LOW MEDIUM HIGH	Simple walkover survey to confirm what has been established in the GWPS, i.e., no evidence of outcrop, depth to bedrock information from wells, etc.[1] If walkover survey indicates that the lands do not have sufficient thickness of subsoil (i.e. rock outcrops) then site specific information may be required.
	EXTREME[2]	Regionally Important Aquifers - Prove that 2m depth of soil/subsoil cover exists. Minimum of 1 data point per hectare is required.
		Locally Important and Poor Aquifers – Prove that 1m depth of soil/subsoil cover exists. Minimum of 1 data point per 5 hectares is required.
GWPS does not exist	**Aquifer Type**	**Sampling Requirements**
	Locally Important / Poor Aquifers	Prove that 1m depth of soil/subsoil cover exists. Minimum of 1 data point per 5 hectares is required. Site investigation points can be based on existing information. New information only required where existing information is insufficient.
	Regionally Important Aquifers	Prove that 2m depth of soil/subsoil cover exists. Minimum of 1 data point per hectare is required. Site investigation points can be based on existing information. New information only required where existing information is insufficient.
Source Protection Areas [3]	**Source Protection Zone**	**Sampling Requirements**
	Outer	A minimum thickness of 3m of subsoil should be demonstrated at a minimum depth to rock data point frequency of one point per hectare.
	Inner	It is not generally acceptable to landspread unless there is no alternative area available and that the area has been defined as having moderate vulnerability (i.e. > 10m of moderate permeability subsoil or > 5m of low permeability subsoil) overlying the aquifer. The depth to rock should be demonstrated at a minimum frequency of one point per hectare.

Table 7.5: Summary of Sampling Requirements (Guidance on Groundwater Vulnerability Assessment of land, EPA 2004)

1. The classification to Low / Medium / High class as part of GWPS indicates that minimum of 3m soil/subsoil depth can be anticipated

2. To give a rough picture of "extreme vulnerability" areas we can use: GSI Outcrop data & Teagasc Shallow Rock data

3. In general landspreading of organic wastes should not be carried out within the source protection area (SPA) of a water supply. However, there are cases where if the subsoil is sufficiently thick it may be deemed acceptable subject to conditions

7.4.2.3 Reporting

The final part of conducting a Groundwater Vulnerability Assessment is to consolidate all information gathered in the previous two stages into one report.

7.4.3 Resource Protection Zone

As this area of Westmeath is not classified as a Source Protection Area, therefore different criteria is used when it comes to determining if the proposed site would be vulnerable to groundwater contamination. The groundwater resources protection zone map is a land-use planning map, and therefore is the most useful map for the decision-making process. It is the final map as it is obtained by combining the aquifer and vulnerability maps. The aquifer map boundaries, in turn, are based on the bedrock map boundaries and the aquifer categories are obtained from an assessment of the available hydrogeological data. The vulnerability map is based on the subsoils map, together with an assessment of relevant hydrogeological data, in particular indications of permeability and karstification. Refer to Appendix E

The location and management of potentially polluting activities in each groundwater protection zone is calculated by means of a groundwater protection response matrix. The level of response depends on the different elements of risk: the vulnerability, the value of the groundwater (with sources being more valuable than resources and regionally important aquifers more valuable than locally important and so on) and the contaminant loading. By consulting the Response Matrix, it can be seen: (a) whether such a development is likely to be acceptable on that site; (b) what kind of further investigations may be necessary to reach a final decision; and (c) what planning or licensing conditions may be necessary for that development. The groundwater protection responses are a means of ensuring that good environmental practices are followed.

The matrix in Table 7.6 below gives the result of integrating the two regional elements of land surface zoning (vulnerability categories and resource protection areas) – a possible total of 24 resource protection zones. In practice this is achieved by superimposing the vulnerability map on the aquifer map. Each zone is represented by a code e.g. **Rf/M**, which represents areas of regionally important fissured aquifers where the groundwater is moderately vulnerable to contamination. In land surface zoning for groundwater protection purposes, regionally important sand/gravel **(Rg)** and fissured aquifers **(Rf)** are zoned together, as are locally important sand/gravel **(Lg)** and bedrock which is moderately productive **(Lm)**. All of the hydrogeological settings represented by the zones may not be present in each local authority area.

Vulnerability Rating	Resource Protection Zones					
	Regionally Important Aquifers (R)		Locally Important Aquifers (L)		Poor Aquifers (P)	
	Rk	Rf/Rg	Lm/Lg	LI	PI	PU
Extreme (E)	Rk/E	Rf/E	Lm/E	LI/E	PI/E	Pu/E
High (H)	Rk/H	Rf/H	Lm/H	LI/H	PI/H	Pu/H
Moderate (M)	Rk/M	Rf/M	Lm/M	LI/M	PI/M	Pu/M
Low (L)	Rk/L	Rf/L	Lm/L	LI/L	PI/L	Pu/L

Table.7.6 Matrix of Resource Protection Zones from EPA Guidance Notes on Groundwater Protection

Combing the proposed site vulnerability rating of – Moderate(Please refer to Appendix E); and aquifer classification of – Locally Important; we therefore have a site that is classified as **(LI/M)**

7.4.4 Groundwater Protection Responses

The Groundwater Protection Responses (see DoE/GSI/EPA publication, 1999) recommends that a consistent minimum thickness of 1m of soil/subsoil must be demonstrated overlying Locally Important Aquifers and Poor Aquifers to ensure that ***EPA Guidelines are being adhered too***. This refers to areas where Groundwater Protection Schemes do not exist and the proposed site location.

Vulnerability Rating	SOURCE PROTECTION AREA		Resource Protection(Aquifer Category)					
			Regionally Important Aquifers (L)		Locally Important (L)		Poor Aquifers (P)	
	Inner	Outer	Rk	Rf/Rg	Lm/Lg	LI	PI	Pu
Extreme (E)	R4	R4	$R3^2$	$R3^2$	$R3^1$	$R3^1$	$R3^1$	$R3^1$
High (H)	R4	$R2^1$	R1	R1	R1	R1	R1	R1
Moderate (M)	$R3^3$	$R2^1$	R1	R1	R1	R1	R1	R1
Low (L)	$R3^3$	$R2^1$	R1	R1	R1	R1	R1	R1

Table 7.7: Groundwater Protection Responses – Summary (DoE/EPA/GSI, 1999) Response Matrix

R1 Acceptable, subject to normal good practice.

$R2^1$ Acceptable subject to a maximum organic nitrogen load (including that deposited by grazing animals) not exceeding 170 kg/hectare/yr.

$R3^1$ Not generally acceptable, unless a consistent minimum thickness of 1 m of soil and subsoil can be demonstrated.

R3[2] Not generally acceptable, unless a consistent minimum thickness of 2 m of soil and subsoil can be demonstrated.

R3[3] Not generally acceptable, unless no alternative areas are available and detailed evidence is provided to show that contamination will not take place.

R4 Not acceptable.

7.4.5 Conclusion

From desktop and field investigations it can be determined that the development site is located on a locally important aquifer of moderate vulnerability with the site being classified as LI/M. From the trial pit investigation it was apparent that there was no evidence of bedrock to at least a depth of 2 metres on the site, Refer to appendix E. The groundwater protection response recommends that a consistent thickness of 1m of soil / subsoil must be demonstrated overlying locally important aquifers to ensure that EPA guidelines are being adhered to.

This study has indicated that the proposed facility will not have any detrimental impact on the underlying aaquifer or more importantly any wells in the area. Although the GSI supply well date which would indicate that there are no wells within the immediate area, it is safe to assume that there are houses in the area which have wells not on the GSI maps. It is also safe to assume that there may be more wells in the area in the future with new dwellings being built.

The response matrix would indicate that the development location is acceptable with respect to groundwater protection. It is important to recognise however that the proposed facility is being designed with a view to being built and operated with best practice procedures in mind. The tankwork will be sealed; the drainage network will be attenuated, flow will be restricted and interceptors will be placed prior to any discharge. The facility will utilise rainwater harvesting technology to limit both the amount of water required to operate the facility and limit, further still the discharge to the network.

7.5 Environmental Impacts

The assessment focuses on predicted impacts in relation to bedrock geology, drift geology and hydrogeology. The assessment relates to impacts occurring during both the construction and operational phase.

7.5.1 Construction Phase Impacts

7.5.1.1 Drift Geology & Topography

General

Development works proposed for the site will not radically change the existing topography of the site. It is intended that the existing topography of the site and its surrounds will be used to an advantage in the design of the Plant.

It is expected that some of the topsoil and overburden overlying the proposed development site will be removed to allow for construction of the Plant and associated access road, yard etc. This topsoil currently has little significance for intensive agriculture. Given the relatively small quantity which will be removed it is not considered to be a resource of any regional significance. It is expected that all of the excavated topsoil will be reused in landscaping throughout the site. The impact on soils locally as a result of the development will not be significant.

If a spillage of contaminated material (such as oil or fuel) should occur during the construction stage at the site the potential exists for pollution of the soils in the area to occur. The drift geology in the locality is of low sensitivity and therefore predicted effects will have negligible or no significance to the drift deposits.

7.5.1.2 Bedrock Geology

The depth to bedrock beneath the proposed facility is unknown at present. It is expected that construction on the site will not affect the bedrock.

No sites or features designated or identified as being of geological interest will be affected by the construction of the proposed facility. The geology in the locality is of low sensitivity and therefore predicted effects will have negligible or no significance to geology.

7.5.1.3 Hydrology and Hydrogeology

Locally Important Aquifers are generally not a significant source of water. They are aquifers with a limited and relatively poorly connected network of fractures, fissures and joints, giving a low fissure permeability which tends to decrease further with depth. A shallow zone of higher permeability may exist within the top few metres of more fractured/weathered rock, and higher permeability may also occur along fault zones. These zones may be able to provide larger 'locally important' supplies of water. In general, the lack of connection between the limited fissures results in relatively poor aquifer storage and flow paths that may only extend a few hundred metres.

Due to the low permeability and poor storage capacity, the aquifer has a low 'recharge acceptance'. Some recharge in the upper, more fractured/weathered zone is likely to flow along the relatively short flow paths and rapidly discharge to streams, small springs and seeps. Groundwater discharge to streams ('baseflow') can significantly decrease in the drier summer months. It is not intended to utilise a groundwater well for the development however there is the necessity to install a wastewater treatment system and thus discharge to groundwater. This system has been subject to a full site suitability assessment by a registered assessor.

During the construction phase, there is a possibility of a spillage of contaminants such as fuels and oils to exposed fractured rock excavation which in turn could negatively impact on the quality of the receiving water body (i.e. the potential exists for pollution of the groundwater in the area to occur). With an appropriate emergency response plan and staff training, mitigation measures can be put in place to minimise the possibility of groundwater pollution from the spillage of fuels and oils.

The excavation and construction activities will cause quantities of excavated materials to be reused on site or removed from site for disposal or recovery. It is not anticipated

that these activities will have any adverse impacts on the groundwater quality or quantity in the vicinity of the proposed development. Overall, there are no anticipated significant impacts predicted from the construction of the proposed development from a hydrological/hydrogeological perspective.

7.5.2 Operational Phase Impacts

7.5.2.1 Topography, Drift & Bedrock Geology

General

Operational impacts are not considered relevant in the context of geological bedrock or topography due to the nature and scale of the proposed development. The impacts from the operational phase of the proposed development are considered to be negligible as the drift geology in the locality is of low sensitivity.

7.5.2.2 Hydrology and Hydrogeology

The operational phase of the development is not expected to pose any significant risk to groundwater flow or the prevailing hydrological conditions in the locality. It is not anticipated that there will be any adverse impact on the prevailing groundwater quality as there will be no discharges from the proposed process to groundwater at this location. However, a wastewater treatment has been proposed and a possibility exists that contamination of the groundwater may occur as a result of the discharging of treated effluent to the ground. If the rock is fissured the potential risk is higher as a direct pathway allows potential pollutants to reach the groundwater table below. As above the design and installation of the plant has been and will be completed and supervised by an approved site suitability assessor.

Surface water runoff from the proposed development will be captured and directed through attenuation features and petrol/oil interceptors if required. It will then be discharged to a watercourse at a controlled rate as specified by Westmeath County Council. Please refer to Chapter 10.0 on Material Assets.

Any storage tanks will be bunded and any fuel or chemicals on site will be stored as follows;

- Suitably certified tanks within areas bunded to a capacity of 110% of the tank
- Where two tanks are bunded, bund capacity will be to 120% of the largest tank.
- No pipe work will go through the bund at any point to reduce the risk of leakage.

A public water supply will be available to the site and, as such, it is not intended to install boreholes to extract groundwater.

7.5.3. 'Do Nothing' Impact

The existing environment at the site of the proposed development and surrounding area, is underlain by subsoils comprising two known subsoil types, classified as cutover peat on the northern part of the site and limestone till (Carboniferous) on the southern part of the site.

Beneath the subsoils, the area is underlain by Dinantian Pure Unbedded Limestone (Reef Formation), which is defined as a dark fine grained limestone with calcareous shale. The

existing water environment at the proposed site is made up of a series of surface and groundwater interactions, which give rise to, or feed into surface and groundwater receptors. Groundwater is not utilised in the immediate area and there are no wells hydraulically down gradient of the proposed development.

7.5.4. "Worst-Case Sceario" Impact

Where the mitigation measures outlined in paragraph 7.5 are not implemented correctly or fail, worst case impacts on the existing environment may include a significant deterioration in groundwater quality and the sediment characteristics of the receiving environment, both during construction and operational phases of the proposed development.

7.6 Mitigation Measures

Mitigation measures proposed in this section relate primarily to the preservation of the existing subterranean drainage regime, the protection of groundwater and also the re-use of excavated materials.

7.6.1 Construction Phase

Where it is necessary to remove overburden or topsoil to facilitate construction, where possible and in the context of an agreed landscaping plan, any soils removed to allow for construction of development will be reused for the construction of landscaping features around the development site. These measures will ensure that any loss of existing topsoil or overburden resource is minimised.

In the case where the Contractor is required to dispose of surplus or unsuitable excavated materials, this will be to an appropriately licensed landfill site or permitted recovery facility in order to comply with the Waste Management Acts, 1996-2003 and associated regulations. Strict control of erosion and sediment generation and other pollutants associated with the construction process will be implemented.

The main threat posed to soils and hydrogeology arising from the development is the potential for spillages of contaminating materials during the construction phase. Some substances used during the construction phase may be harmful to the environment. In most cases, good housekeeping (daily site clean-ups, use of disposal bins, etc.) on the project site, and the proper use, storage and disposal of these substances and their containers can prevent soil contamination. The potential for spillages and the possibility for materials to enter the groundwater will be mitigated by proper construction management on site.

Measures which will be implemented include;

- Establishment of bunded oil and chemical storage areas if required
- Protection of excavations and exposed surfaces
- Re-fuelling of mobile plant in designated areas provided with spill protection
- An emergency response plan
- Training for on-site personnel

7.6.2 Operational Phase

As there are no foreseeable impacts on geology, no mitigation measures are recommended. The proposed development is therefore considered to have a neutral impact on the existing geological environment.

The potential for accidental spillages can be mitigated by proper management on site. Measures which will be implemented include;

- Establishment of bunded oil and chemical storage areas;
- An emergency response plan
- Training for on-site personnel

7.7 Residual Impacts

According to Environmental Protection Agency guidelines, Residual Impact is described as 'the degree of environmental change that will occur after the proposed mitigation measures have taken place.' The mitigation strategy above recommends actions which can be taken to reduce or offset the scale, significance and duration of the impacts on the known and potential soils and geological resource. Many aspects of the soils and geological resources are non-renewable and once impacted upon cannot be replaced.

The purpose of this statement is to specify mitigation measures where appropriate to minimise the 'risk factor' to all aspects of soils and geological resources such as to minimize the potential for hydrocarbons to contaminate the ground, reduce the risk of erosion, etc. This 'risk factor' is reduced or offset by recommending the implementation of a mitigation strategy in each area of the study. On the implementation of this mitigation strategy, the potential for impact will be lessened. As a result, when the recommended mitigation is implemented, there will be no significant residual negative impacts on the soils or geological/hydrogeological environment.

8.0 CULTURAL HERITAGE

8.1 Introduction

8.1.1 General

Irish Archaeological Consultancy Ltd has prepared this report for ORS Consulting Engineers on behalf of Bio Agrigas Ltd to assess the impact, if any, on the archaeological, architectural and cultural heritage resource of a proposed Bio-Energy Plant at Newdown, County Westmeath (Figure 8.1).

This study determines, as far as reasonably possible from existing records, the nature of the cultural heritage resource within the area of proposed development using appropriate methods of study. Desk based research is defined as an assessment of the known or potential archaeological resource within a specified area consisting of a collation of existing written and graphic information. The assessment takes place in order to identify the likely character, extent, quality and worth of the known or potential archaeological resource in order to make an assessment of its merit in context, leading to one or more of the following:

- The formulation of a strategy to ensure the recording, preservation or management of the cultural heritage resource;
- The formulation of a strategy for further investigation, whether or not intrusive, where the character and value of the resource is not sufficiently defined to permit a mitigation strategy or other response;
- The formulation of a proposal for further archaeological investigation within a program of research (Institute of Field Archaeologists 2001a).

The study involved detailed interrogation of the archaeological and historical background of the development area. This included information from the Record of Monuments and Places of County Westmeath, the County Development Plan, the topographical files of the National Museum of Ireland and cartographic and documentary records. Aerial photographs of the study area held by the Ordnance Survey of Ireland were also consulted. A field inspection was carried out on 10th February 2011 in an attempt to identify any known cultural heritage sites and previously unrecorded features, structures and portable finds within the proposed development area.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential adverse impacts that the proposed development may have on the cultural heritage resource, while the mitigation strategy is designed to avoid, reduce or offset such adverse impacts. The definitions of the degree of impact on the potential archaeological resource are described in figure 8.4.

8.1.2 The Development

The proposed development will be located to the north of the existing commercial premises with the surrounding lands remaining as agriculture. The anaerobic digesters will be designed to receive c. 20,000 tonnes/year wastes sourced in the local area including agri-industry slurries, energy crops, food processing wastes and will also process Category 2 ABP Material. The majority of the feedstock suppliers and the

product receivers are within 50km of the proposed development site thus ensuring that any carbon footprint associated with the delivery of the feedstock / product is kept at a minimum. A temporary access road will run from the eastern limit of the proposed development area to join with the existing local road.

In recent years energy considerations and environmental concerns have further increased the interest in direct anaerobic treatment of organic wastes and the management of organic solid and liquid wastes from industry and agriculture is increasingly controlled by environmental legislations.

The foundations for the buildings on site will be (subject to detailed design) standard foundations for industrial buildings.

- The main areas that will be excavated will be the 2 large post storage tanks to the south of the site. The bottom of these tanks will be 2m below ground with the tank base and foundation below that.
- There is an area in the reception building that is a pit for the reception of food waste. This will be approximately 4.5m(w) x 11m(l) x 4.5m(d).
- The 3 silage storage pits to the northeast of the site will range from ground level for pit no. 3 to approximately 1.0m below existing ground level for pit no. 1.
- There will also be 2 large tanks for below ground storage, leachate and slurry. Both of these are located beside the silage storage pits. These tanks have not been finalized but will be big tanks.
- a 240 cubic metre underground fire water tank which will be no more than 2 metres deep.
- The remaining structures will not require substantial foundations as they are at surface level.

8.1.3 Definitions

In order to assess, distil and present the findings of this study, the following definitions apply:
'Cultural Heritage' where used generically, is an over-arching term applied to describe any combination of archaeological, architectural and cultural heritage features, where

- the term 'archaeological heritage' is applied to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD1700 (and recorded as archaeological sites within the Record of Monuments and Places)
- the term 'cultural heritage', where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural associations. This designation can also accompany are archaeological designation.

Impact Definitions
Imperceptible Impact
An impact capable of measurement but without noticeable consequences

Slight Impact
An impact that causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate Impact
An impact that alters the character of the environment in a manner that is consistent with existing or emerging trends.

Significant Impact
An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.

Profound Impact
An impact that obliterates sensitive characteristics.
Impacts as defined by the EPA 2002 Guidelines (pg 23).

8.1.4 Project Team

Rob Lynch BA Dipl EIA Mgmt MIAPA
Managing Director / Senior Archaeologist
Rob Lynch graduated from University College Dublin in 1994 and is a Senior/ licence eligible archaeologist. He has extensive and wide-ranging archaeological fieldwork experience including directing large-scale multi-period excavations throughout Ireland. In his capacity as Managing Director of IAC Ltd., Senior Archaeologist and PSCS/Health and Safety Co-ordinator, Rob Lynch has extensive experience of large scale archaeological project management and consultancy on the following projects: Dundalk Sewerage Scheme - Contract 3, M1 Northern Motorway – Contract 7, Dundalk Western Bypass, Limerick Tunnel PPP Southern Contract, N11 Gorey to Arklow Link, N2 Carrickmacross Bypass and the N15 Bundoran-Ballyshannon Bypass, as well as numerous private sector developments.

Rob Lynch has also completed a Post-graduate Diploma course in EIA Management at University College Dublin and has received a diploma in Building Conservation from Dublin Civic Trust.

Maeve Tobin MA, MIAI, MIAPO
Archaeologist / Osteoarchaeologist
Maeve graduated from the University College Cork in 2004, having gained a joint honours degree in archaeology and geography. She continued in UCC studying for a Master of Arts degree in Osteoarchaeology, from which she graduated with honours in 2005. She was involved in the excavation and osteological analysis of the human remains from an early medieval site and *Cillín* at Caherlehillan, Co. Kerry and in the excavation of a later medieval church at Toureen Peakaun, Co. Tipperary (UCC research excavations). She has undertaken the analysis of human remains from several other sites including a large early medieval cemetery at Holdenstown, Co. Kilkenny and

Maeve has gained field experience in Counties Westmeath, Louth, Waterford, Kilkenny and Kerry on Prehistoric, early medieval and medieval excavations. Maeve has been involved in the assessment of a number of large developments at Constraints, Route Selection and EIS stages. She has been a Project Officer within the research and report production department of IAC since 2007.

8.1.5 Consultations

Following the initial research a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the background environment, receiving environment and study area, as follows:

- Department of Environment, Heritage and Local Government – the Heritage Service, National Monuments and Historic Properties Section: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database; Preservation Orders; Register of Historic Monuments
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland;
- Westmeath County Council: Planning Section;
- Trinity College Dublin, Map Library: Historical and Ordnance Survey Maps;

8.2 BASELINE ENVIRONMENTAL STUDY

8.2.1 Methodology

Research has been undertaken in two phases. The first phase comprised a paper survey of all available archaeological, architectural, historical and cartographic sources. The second phase involved a field inspection of the proposed development area.

8.2.2 Paper Survey

This is a document search. The following sources were examined and a list of areas of archaeological, architectural and cultural heritage potential was compiled:

- Record of Monuments and Places for County Westmeath;
- Sites and Monuments Record for County Westmeath;
- Monuments in State Care Database;
- Preservation Orders;
- Register of Historic Monuments;
- Database of current archaeological investigation licences (2008–2011);
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- County Westmeath Development Plan 2008–2014;
- Place name analysis;
- Aerial photographs;
- Excavations Bulletin (1970–2007)

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Section, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National

Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result these are omitted from the Record of Monuments and Places. SMR sites are also listed on the recently launched website created by the DoEHLG – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

The Minister for the Department of Environment, Heritage and Local Government may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Register of Historic Monuments was established under Section 5 of the 1987 National Monuments Act, which requires the Minister to establish and maintain such a record. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

Database of current archaeological investigation licences is a listed held by the National Monument Section of the DoEHLG that provides details of licences issued that have yet to appear within the Excavations Bulletin (2008–2011).

Topographical files of the National Museum of Ireland is the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape.

Sir William Petty, 1685*, The County of Westmeath*
Ordnance Survey 6" maps of County Cavan (1838, 1878 1914)

Documentary sources were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the proposed development area.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey and Google Earth.

Place Names are an important part in understanding both the archaeology and history of an area. Place names can be used for generations and in some cases have been found to have their root deep in the historical past.

Development Plans contain a catalogue of all the Protected Structures and archaeological sites within the county. The County Westmeath Development Plan (2008-2014) was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed route.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2007 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970-2007.

8.2.3 Field Inspection

Field inspection is necessary to determine the extent and nature of archaeological and cultural heritage remains, and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

The archaeological field walking inspection entailed:

- Walking the proposed development area and its immediate environs.
- Noting and recording the terrain type and land usage.
- Noting and recording the presence of features of archaeological or cultural heritage significance.
- Verifying the extent and condition of recorded sites.
- Visually investigating any suspect landscape anomalies to determine the possibility of their being anthropogenic in origin.

8.3 RESULTS AND ANALYSIS - ARCHAEOLOGY

General

The area of proposed development is located within the townland of Newdown, The Downs, Co. Westmeath c. 6km southeast of Mullingar town and c. 6km west of Killucan. The site is located c. 300m northeast of the N4 and c. 400m south of the R156. The Royal Canal runs southeast-northwest c. 600m south of the area of proposed development to the south of the N4. The surrounding landscape to the east and south comprises marginal wetland terrain. There are six recorded monuments located within 1km radius of the site, including three ringforts (WM027-002, WM020-105 and WM020-106), two earthwork sites (WM027-001 and WM027-004) and a trackway (WM027-003). Two burnt mounds were recently identified in close proximity to the proposed access road to the proposed development area (Licence Refs: 11E020 and 08E0325).

8.3.1 Archaeological and Historical Background

Prehistoric Period (*c. 7000BC–AD500)*

The earliest recorded archaeological activity within proximity to the proposed development area dates to the Bronze Age period (c. 2500–800BC). A cist grave (WM020-104) is located c. 1.05km to the northeast. The site was discovered during construction works in the townland of Greatdown in 1979 which produced evidence of a crouched burial and accompanying food vessel.

Bronze Age activity is further evidenced by the presence of *fulachta fiadh* or burnt mounds in the landscape. Over 4500 *fulachta fiadh* or burnt mounds have been recorded in the country making them the most common prehistoric monument in Ireland. Burnt mounds comprise of a mound of burnt stone commonly in horseshoe shape and found in low lying marshy areas or close to streams. These sites are generally uncovered in or near riverine and waterlogged environments which provide the ideal circumstances for the construction and preservation of burnt mounds (*fulachta fiadh*). Burnt mound sites are principally Bronze Age monuments and reach their pinnacle of use in the middle/late Bronze Age (Brindley *et al*. 1989–90; Corlett 1997). The presence of a probable burnt mound, identified in aerial photographs and site inspection, was confirmed by testing of the site in 2008 (O'Neill 2008a; Licence Ref. 08E0325). The burnt mound is located to the immediate south of the northwestern limit of the proposed access route to the development site.

Further testing has been carried out recently in advance of the N4 Downs Grade Separation scheme. This was undertaken in February 2011 (Bayley forthcoming, Licence Ref. 11E020). A large burnt mound was identified c. 100m north of the proposed access route to the development area, which joins with the proposed interchange road (Figure 8.4).

Two *fulachta fiadh* were identified at Newdown, c. 1km southeast of the proposed development area during archaeological works undertaken in advance of the widening of the N4 (Hayes 2003, Licence Ref. 03E1666). The site consisted of two areas of burnt-mound material, located 15m apart. *Fulacht* A, located to the east of *Fulacht* B, consisted of a roughly circular deposit of burnt stone, c. 12m in diameter. The trough of *Fulacht* A consisted of a rectangular fill which overlay a series of fragmentary and decayed timbers. *Fulacht* B was an irregularly shaped deposit, 12m north-south by 7m.

Furthermore a number of pits discovered along the N4 The Downs Realignment scheme have been identified as industrial pits (Dennehy 2002 Licence Ref. 00E0076 and 00E0095). Although no burnt mounds or hearths were identified in proximity to the pits it was suggested by the excavator that the pits may have functioned in a similar way as *fulacht fiadh* troughs.

A total of four cremation pits were discovered in Newdown townland during archaeological works undertaken before and during construction of the N4, The Downs Realignment scheme. Two of the pits were located in Area D (Licence Ref. 00E0091) with a further pit located in Area C (Licence Ref. 00E0097) and Area E (Licence Ref. 00E0092) situated c. 500m southeast, 300m SSW and c. 400m west of the proposed development area respectively (Dennehy 2002, 2–3). Analysis of the cremated bone confirmed the presence of both juvenile and adult human bone from the pits. Iron Age dates have been confirmed for both the cremation pit in Area C and the cremation pit in Area E (*ibid*.). A small spread of burnt material was identified to the north of Area E during testing in February 2011 (Bayley forthcoming, Licence Ref. 11E020).

In addition to the cremation pits, various pits, attributed to the prehistoric period, have been excavated over five areas as part of the same scheme (Dennehy 2002, 5). Two of the pits excavated in Area G (Licence Ref. 00E0094) located c. 300m south of the proposed development area contained decorated Bronze Age pottery (*ibid*.).

A trackway site (WM027-003) is located c. 500m east of the area of proposed development. Trackways are a monument type which is prevalent in the midlands regions where anaerobic conditions of raised wetland bogs enable the preservation of organic matter. The most famous example in Ireland was identified at Corlea, near Keenagh, Co. Longford, where large oak planks were discovered during mechanised peat cutting. The trackway extended for a distance of almost 1km across the bog and was radiocarbon dated to Iron Age period. More recent archaeological discoveries as part of the N4 Dromod to Roosky realignment scheme identified a bog trackway at Edercloon, Co. Longford (Moore 2007) which has been dated from the Neolithic to the medieval period.

Early Medieval period *(AD500–1100)*

Ireland underwent radical change from the 5th century AD. An upsurge in grasses and weeds is demonstrated in the pollen record, associated with increased pasture and arable farming. A combination of factors led to a revolution in the landscape. Foremost amongst these was the introduction of Christianity in the early 5th century. The new religion was readily accepted and it spread throughout the country in the 5th and 6th and later centuries presenting a catalyst for change. Population expansion was also central to the transformation that swept across Ireland around this time which resulted in a complete, if uneven, spread of settlement across the country. Secular habitational sites in the early medieval period include *crannógs,* cashels and ringforts.

The ringfort or *rath* is considered to be the most common indicator of settlement during the early medieval period, a time which is depicted in the surviving sources as entirely rural, characterised by the basic territorial unit known as the *túath* (Stout 1997). The ringfort is usually defined as a defended farmstead with a broadly circular enclosure delimited by a bank and ditch. Entrance to the sites was usually by means of a causeway across the ditch or in the case of platform ringforts, by means of a ramp.

Entrances are often located at the south-east quadrant of the enclosure. Ringforts can be divided into three broad categories – univallate, bivallate/multi-vallate and raised. The most common structures found within ringforts are the remains of buildings, generally houses, either circular or rectangular.

The Record of Monuments and Places (RMP) list three ringforts (WM027-002, WM020-105 and WM020-106) and three earthworks (WM027-001, WM027-004 and WM027-005) within proximity to the proposed development area. Ringfort (WM027-002) comprises upstanding earthworks that are clearly visible in the surrounding landscape while the earthworks (WM027-001 and WM027-004) have been levelled. Recent archaeological testing undertaken in advance of the proposed N4 The Downs Grade Separation road scheme investigated the nearest of these earthworks (Licence Refs: 08E0326 and 08E0324). Testing of site WM027-001 revealed two concentric sub-circular enclosures and a fire spot, or possible hearth (O' Neill 2008b). Further testing of site WM027-004 confirmed the presence of a probable sub-circular enclosure (O' Neill 2008c). In both of these cases O' Neill concludes that the investigated sites conform to the morphological definition and topographical siting of ringforts. Testing undertaken in February 2011 (Licence Ref.: 11E020) identified two groups of pits located to the immediate west of the ringfort/enclosure (WM027-001). These pits will be preserved *in situ*.

Excavations undertaken in advance of the N4 The Downs Realignment scheme revealed a ditch and hearth located c. 300m SSW of the area of proposed development in Area C (Licence Ref.: 00E0097). It was thought that these features may relate to enclosures (WM027-001 and WM027-004) located to the immediate east of the site (Dennehy 2002, 7).

A holy well site (WM019-086) is located 1.1km to the northwest of the proposed development area in the townland of Greatdown. While these sites continue to be venerated into the 20th century it is thought that many have their origins in the early medieval period.

Two artefacts are recorded from Newdown townland in the topographical files of the National Museum of Ireland. A gold ornament from the bog at Newdown (NMI File 1929:1516) and a lignite ring dating to the early medieval period also found in a bog (NMI File 1948:17).

Anglo Norman Period

The piecemeal conquest by the Anglo-Normans of Ireland had a fundamental impact on the Irish landscape. By the end of the 12th the Anglo-Normans had succeeded in conquering much of the country. The Anglo-Norman invasion stimulated the development of towns such as Athlone and Mullingar and while some stone castles were constructed, earthen mottes or motte-and-bailey castles were more typical of the era. A castle (WM020-103) is located c. 1.2km north of the proposed development area however no further detail is known with regards to its form or date. There are no other recorded medieval sites located in or within the immediate vicinity of the proposed development area.

Post Medieval Period

The area of proposed development is located within the footprint of the original demesne lands for Woodfort House as shown on the first edition OS map (1842).

Woodfort House, located 100m south of the proposed development area was established during the 18th century at a time when the management of land led to vast improvements in drainage and reclamation of wetlands. The house and demesne were altered in 1850 leading to changes in the limits of the demesne boundary as shown on the second and third edition OS map. The house is still present although it is surrounded by commercial premises. Woodfort House is included within the National Inventory of Architectural Heritage for County Westmeath (NIAH Ref. 15402710). Woodfort house is not listed as a protected structure on the Westmeath County Development Plan (2008-2014).

The road from Mullingar to Dublin (now the N4), was improved in the 1830s, transforming Mullingar into a busy coaching centre. This was followed by the construction of the Royal Canal from 1790, with the stretch from Dublin to Mullingar opening in 1809. The arrival of the Midland Great Western Railway in 1848 was of great economic importance to the local economy becoming one of the town's largest employers. The most notable buildings of industrial heritage merit are attributed to structures which were constructed in tandem with the arrival of the railway in this region (Rynne 2006).

8.3.2 Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970–2007) and review of the database of current archaeological licences (2008–2011), held by the DoEHLG has revealed that six programs of archaeological fieldwork have been carried out in proximity to the proposed development area. All of the work undertaken in this area has been carried out in advance or during the N4 improvement, realignment and Grade Separation schemes.

Archaeological testing of the The N4 Downs Grade Separation scheme was undertaken in February 2011 by IAC Ltd (Licence Ref.: 11E020). A total of 13 areas were tested in the townlands of Clongawny, Greatdown and Newdown. Three areas of archaeological significance were identified in Newdown within proximity to the area of proposed development (Bayley 2011 forthcoming). A large burnt mound was identified in the field to the immediate west of the proposed access route which connects with the proposed N4 Downs interchange (Figure 8.4). Two small groups of pits were identified to the west of ringfort / enclosure WM027-001 and a small spread of burnt material was noted to the north of the pits recorded in Area E (Dennehy 2002, see below).

Archaeological testing and geophysical survey was undertaken at three sites in proximity to the proposed development area during 2008 by Headland Archaeology Ltd and Target Geophysics (Nicholls 2008a-c) respectively. Archaeological testing of the two enclosure sites (WM027-001 and WM027-004) confirmed the presence of ditches and banks and provided an estimation of the diameter each enclosure (O' Neill 2008b Licence Ref.: 08E0326; O' Neill 2008c Licence Ref.: 08E0324). The third site comprised an area identified during field inspection as a possible burnt mound located immediately south of the northwestern limit of the proposed access route. The presence of a burnt mound was confirmed during testing (O'Neill 2008a Licence Ref.: 08E0325).

A program of archaeological excavation was undertaken in advance of the N4 The Downs Realignment scheme in 2000 which revealed eight areas of archaeological

activity (Dennehy 2002; Licence Refs: 00E0076, 00E0091, 00E0092, 00E0093, 00E0094, 00E0095 and 00E0097). Three sites contained cremation pits, two of which are dated to the Iron Age located c. 300m south and c. 400m west of the area of proposed development (Figure 8.4). In addition to these several 'industrial' pits and some 'prehistoric' pits were also recorded.

Archaeological testing was undertaken within proximity of two levelled earthwork sites (WM027-001 and WM027-004) c. 300m SSW of the proposed development area. Testing was undertaken as part of an environmental impact statement for the proposed widening and realignment of the N4 to the east of Mullingar (Kiely 1999, Licence Ref.: 99E0359). The two levelled earthwork sites are to the immediate north and south of the construction corridor. Four test-trenches were excavated in the area of the construction corridor between the levelled archaeological sites. No archaeological stratigraphy was recorded, and no artefacts were recovered in any of the trenches.

A *fulacht fiadh* was identified in Newdown during centre-line testing of the N4 road improvements from McNead's Bridge to Kinnegad (Hayes 2003, Licence Ref.: 03E1666). The site consisted of two areas of burnt-mound material, located 15m apart. *Fulacht* A, located to the east of *Fulacht* B, consisted of a roughly circular deposit of burnt stone, c. 12m in diameter. The trough of *Fulacht* A was located to the north-east of the deposit. It consisted of a rectangular fill which overlay a series of fragmentary and decayed timbers. The timbers lined the sides of a shallow rectangular cut. *Fulacht* B was an irregularly shaped deposit, 12m north-south by 7m. As with *Fulacht* A, the trough for *Fulacht* B was located to the north-east of the deposit. The trough was oval in shape and, upon excavation of the charcoal-rich fill, nine decayed stake-holes were noted lining the basal edge of the cut.

Testing was conducted at an earthwork site (WM027-005) in Newdown townland (Egan 2003, Licence Ref.: 03E0805). Testing was one of a series of investigations undertaken for the N4 McNead's Bridge to Kinnegad road realignment scheme. The site is marked on the third edition OS map as a former earthwork, which has been partially disturbed by quarrying. There were no visible remains of the earthwork prior to testing, only evidence of quarrying. Testing failed to reveal any remains of archaeological significance. However, the extent of the quarry was established within the field, as well as two former field boundaries. A geophysical survey of the area by Earthsound, licence No. 03R080 was consistent with these results.

8.3.3 Cartographic Analysis

Sir William Petty, Map of the County of Westmeath, 1685
This map lacks topographical detail as it was meant to depict land ownership. As a result major rivers and towns are indicated, along with large buildings. The 'reat Downe' is annotated surrounded by wetland to the east of Mullingar town in the Barony of Farbill.

First Edition Ordnance Survey Map, 1838, scale 1:10560
The area of proposed development is located partially within the demesne lands for Woodfort House (Figure 8.5). The site is divided between four irregular-shaped, tree-lined fields. The proposed access route runs along an existing field boundary. The majority of the estate lands lie to the south surrounding a large rectangular house with

ancillary buildings located to the southwest. A large wooded area is located to the northeast of the house. Woodfort house is accessed from the current N4 via a long tree-lined avenue. To the SSW of the proposed development area two circular enclosures are illustrated (WM027-001 and WM027-004) while a third enclosure (WM027-002) is barely visible in the wooded area to the southeast. Large tracts of unenclosed land are shown to the south of the Royal Canal and to the east of the area of proposed development, probably representing marginal terrain.

There are no previously unrecorded sites of archaeological potential located in or within the immediate vicinity of the proposed development area.

Second Edition Ordnance Survey Map, 1878, scale 1:10560
Further subdivision of the surrounding landscape has taken place in the years since the first edition. The boundary to the immediate northeast of the area of proposed development has been formalized and straightened to allow for the construction of a roadway from the current R156 to the N4. Woodfort house has undergone some structural changes and the outbuildings have been relocated to the north, west, southeast and northeast of the main house. The wooded area to the east has been reduced in size. Newdown Cottage is shown for the first time to the south of the proposed development area, between the current N4 and the canal. The Midlands Great Western Railway is shown for the first time further to the south of the Royal Canal.

Third Edition Ordnance Survey Map, 1914, scale 1:10560
The demesne lands have been curtailed resulting in the area of proposed development now being located outside of this boundary (Figure 8.6). The field pattern has been standardised and appears now in its current layout. The area of proposed development is now mostly contained within one field with a small section (access route) located to the northwest in a separate field and existing trackway. There are no other major changes to note within the cartography of this map that relate to the proposed development area.

8.3.4 County Development Plan (2008–2014)

The County Development Plan recognises the statutory protection afforded to all RMP sites under the National Monuments Legislation (1930–2004). Furthermore, it states that any previously unrecorded sites of archaeological importance that are discovered by accident are also subject to the same legislation. The county development plan lists a number of aims and objectives in relation to archaeological heritage that are summarised in figure 8.3 of this report. A total of six Recorded Monuments and Places (RMPs) are located within 1km radius of the proposed development area

Townland:	Classification:	RMP No.:	Distance from proposed development area:
Newdown	Earthwork	WM027-001	c. 200m southwest
Newdown	Ringfort	WM027-002	c. 120m southeast
Newdown	Road/ trackway	WM027-003	c. 500m east
Newdown	Earthwork	WM027-005	c. 1km southeast
Newdown	Earthwork	WM027-004	c. 350m southwest
Newdown	Ringfort	WM020-105	c. 800m north
Newdown	Ringfort	WM020-106	c. 700m north

There are no protected structures listed in the townland of Newdown. Woodfort house therefore is not a protected structure.

8.3.5 Aerial Photographic Analysis

Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995, 2000 and 2005) revealed no previously unrecorded features of archaeological potential in or within the immediate vicinity of the proposed development area.

8.3.6 Field Inspection

A field inspection was undertaken on Thursday 10th February 2011. The weather was dry and the ground was soft underfoot.

The proposed development area traverses two fields: Field 1 (south) and Field 2 (north) and an access road to the northwest to join proposed N4 interchange (Figure 8.4).

Field 1

Field 1 comprised of flat slightly undulating grassland and the terrain was soft underfoot (Plate 8.1). There were no discernable features identified within the field. A field clearance cairn (Plate 8.2) with rubble is located at north-eastern end of proposed development area. The field is bordered to the northwest by a mature hedge, farm access lane and a deep drainage ditch. The majority of southeastern half of the field, outside of the proposed development area, accommodates a farmyard and grain silos (Flynns). The boundary between Field 1 and 2 is defined by a post and wire fence.

Field 2

Field 2 comprised of undulating waterlogged grassland which was very soft underfoot (Plate 8.3). The northern half of Field 2 appears to represent the transitional ground between wetland and dryland and as such is the prime location for burnt mound activity. The adjoining fields to the northwest have 1.8m of peat deposits (how do we know this?). There was surface water present at time of site visit after a day of light occasional rain. A slight rise, measuring c. 20m in diameter, was noted in the northeast corner of the proposed development area which has been designated as an Area of Archaeological Potential (AAP) (Plate 8.4). This might represent the levelled remains of a burnt mound. Field 2 is bordered to the northeast by mature hedge and a deep drainage ditch. The far northeast boundary is dominated by woodland.

Southeast to northwest access road
This access road is aligned along an existing farm access lane (Plate 8.5) with a deep drainage ditch along its southern edge. The lane is constructed with a rough gravel surface. A burnt mound was previously identified at the junction of the proposed access road and the N4 The Downs Grade Separation Scheme (O'Neill 2008a Licence Ref.: 08E0325).

8.3.7 Conclusions

The area of proposed development is located within a rich archaeological landscape. There are six RMPs located within c. 1km radius of the proposed development area. These include three ringforts (WM027-002, WM020-105 and WM020-106) and three earthwork sites (WM027-001, WM027-004 and WM027-005). The nearest of these sites is the ringfort (WM027-002) located 120m southeast of the proposed development area. Testing has been carried out at all three of the earthwork sites and the two nearest to the area of proposed development have been reinterpreted as ringforts (O' Neill 2008b and c). No signs of archaeological activity was identified at the site of the levelled enclosure (WM027-005) (Egan 2003 Licence Ref.: 03E0805).

The area of proposed development is situated in the wetland / dryland margin and as such would be a favourable location for burnt mound activity. A burnt mound (O'Neill 2008a Licence Ref.: 08E0325) was identified immediately south of the northwestern limit of the proposed access route during recent testing. Further testing undertaken in advance of the N4 Grade Separation scheme, which adjoins the proposed development area, revealed a second large burnt mound c. 100m north of the proposed access route (Bayley 2011 forthcoming, Licence Ref.: 11E020).

Testing and excavation undertaken in 2000 in advance of the N4 The Downs Realignment scheme revealed eight sites of archaeological activity, six of which were located within 600m of the area of proposed development (Dennehy 2002). Three of these sites contained cremation pits, two of which were dated to the Iron Age (c. 400m SSW and west of the proposed development area). Two of the pits excavated in Area G (*ibid*.) located c. 300m south of the proposed development area contained decorated Bronze Age pottery.

The area of proposed development was partially located within the original demesne lands of Woodfort House at the time of the first edition OS map (1842). Changes in land divisions towards the end of the 19th century consolidated the surrounding fields resulting in the removal of field boundaries within the development area. The second edition OS map shows that the area of proposed development was excluded from the demesne lands and that the surrounding field boundaries had been formed into their current layout. No previously unrecorded features of archaeological potential were noted in or within the immediate vicinity of the proposed development area, within either the cartographic sources or aerial photographs.

8.4 RESULTS AND ANALYSIS – CULTURAL HERITAGE

The proposed development area is located within the townland of Newdown, parish of Kilucan, within the Barony of Farbill, County Westmeath. The surrounding townlands comprise of Greatdown, Castledown, Windtown, Knockmant and Ballytrasna.

8.4.1 Place name Analysis

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long forgotten site, and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main reference used for the place name analysis is *Irish Local Names Explained* by P.W Joyce (1870). A description and possible explanation of each townland name in the environs of the proposed development are provided in the below table.

Name	Derivation	Possible Meaning
The Downs	*Na Dúnta*	The forts
Newdown	*Dún Nua*	New fort
Killucan	*Cill Lucainne*	Church or Cell of Lucan

8.4.2 Townlands

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word 'town' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun land* and meant 'the land forming an estate or manor' (Culleton 1999, 174). The townland of Newdown, which contains the proposed development, is particularly large, consisting of 1417 acres.

Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (*ibid.* 179).

The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully 'laid downe' on paper at a scale of forty perches to one inch. Therefore most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (*ibid.*). Larger tracks of land were divided into a number of townlands, and named Upper, Middle or Lower, as well

as Beg and More (small and large) and north, east, south and west (Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

This process can be clearly seen in the townland names surrounding the area of proposed development. 'The Downs' probably derived it's name from '*na dúnta*'/ the forts, highlighting the high frequency of ringforts and enclosures in the region. The Downs was probably subdivided during the post-medieval period into smaller land holdings and renamed to suit, i.e. Newdown, Greatdown and Castledown.

There are no townland boundaries in or within the immediate vicinity of the development area.

8.4.3 Cultural Heritage Sites

The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architectural. However, it also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period. There are no cultural heritage sites located within the area of proposed development. Woodfort House, although recorded in the National Inventory of Architectural Heritage (NIAH Ref. 15402710), is not listed as a protected structure on the Westmeath County Development Plan (2008–2014). The house remains present however the demesne context has almost been completely disturbed by commercial premises.

8.4.4 Conclusions

A review of the townland names within the landscape that will contain the proposed development has revealed some common topographical terms, which were used to describe portions of the landscape. The locale is known as 'The Downs' which probably reflects the high frequency of ringforts and enclosure sites in the vicinity – *na dúnta* / the forts. The number of settlement sites in the region indicates a high level of activity during the early medieval period while the substantial nature of the sites signifies a degree of affluence in the area.

During the post-medieval period it is probable that management of the land caused a subdivision of the landscape and as such the townlands. It is suggested that the townlands of Newdown, Greatdown and Castledown are subdivisions of the greater 'Downs' area and the names reflect this.

8.5 ASSESSMENT OF POTENTIAL IMPACTS

8.5.1 Potential Impacts

8.5.1.1 Archaeology

- The area of proposed development lies within a rich archaeological landscape. A number of recently discovered archaeological sites are located within the immediate environs of the area of proposed development, which date to the prehistoric and early medieval periods. It is possible that the proposed development may have a direct negative impact on previously unrecorded archaeological feature or deposits, associated with the nearby ringforts and prehistoric activity, that have the potential to survive beneath the current ground level. This will be caused by ground disturbances associated with the proposed development.

- While there are no archaeological sites located within the area of proposed development two burnt mounds were recently identified to the immediate southwest and north of the proposed access road. The area of proposed development is situated in the transitional wetland / dryland margin and as such is an ideal location for burnt mound activity. It is possible that the proposed development may have a direct negative impact on previously unrecorded burnt mound activity that has the potential to survive beneath the current ground level in this area. This will be caused by ground disturbances associated with the proposed development.

- There may be a significant or profound impact on previously unrecorded archaeological feature or deposits that have the potential to survive beneath the current ground level. This will be caused by ground disturbances associated with the proposed development.

8.5.1.2 Cultural Heritage

- With the exception of the above impacts, there will be no adverse impacts on any specific site of cultural heritage significance.

8.5.2 Do Nothing Impact

If the proposed development were not to proceed there would be no negative impact on the archaeological or cultural heritage resource.

8.5.3 Worst Case Impact

Under a worst case scenario, the proposed development would disturb previously unrecorded and unidentified deposits and artefacts without proper excavation and recording being undertaken.

8.6 RECOMMENDATIONS AND MITIGATION MEASURES

8.6.1 Impacts

8.6.1.1 Archaeology

Due to the archaeological nature of the surrounding landscape, and the topography of the proposed development area, the following recommendations have been made.

- It is recommended that a program of archaeological testing be undertaken across the proposed development area to determine the presence or absence of previously unknown archaeological features. This should be carried out by an archaeologist licenced to the Department of Environment, Heritage and Local Government. Full provision should be made for the resolution of any archaeological features/deposits that may be discovered, should that be deemed the appropriate way to proceed.

- It is recommended that all ground disturbances associated with the proposed development, such as topsoil stripping or site investigations, be monitored by a suitably qualified archaeologist. Full provision should be made for the resolution of any archaeological features/deposits that may be discovered, should that be deemed the appropriate way to proceed.

8.6.1.2 Cultural Heritage

- With the exception of the above mitigation measures, recommendations in relation to specific cultural heritage sites are deemed necessary.

8.6.2 Monitoring

The mitigation measures recommended above would also function as a monitoring system to allow the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.

Please note that all recommendations are subject to approval by the National Monument Section of the Heritage and Planning Division, Department of Environment, Heritage and Local Government.

9.0 ECOLOGY

9.1 Introduction

The site consists of parts of two fields north of the existing Flynn's Feeds in Newdowns townland. At present the main field is split between pasture and tillage and has a slight fall to the northeast while the access roadway runs through further tillage, alongside a field boundary.

The area was visited in February 2011 to describe its flora and fauna and assess their level of ecological interest. Although this was a winter visit it was possible to evaluate the habitat because of its relative simplicity.

9.2 Methodology

The method used corresponds to a Phase I Habitat Survey (JNCC1991) but uses the habitat types of the Heritage Council publication (Fossitt 2000). It depends on a thorough walkover to list the habitats and plant species while keeping a lookout for mammal traces and a record of the bird species.

9.3 The Existing / Receiving Environment

9.3.1 Fields

When visited the field contained improved agricultural grassland (GA1 in Fossitt 2000) in its upper part and recently ploughed land (tilled land BC3) below this, separated by a fence. The grassland was poached by cattle and had a certain amount of surface puddling. Ryegrass Lolium perenne, meadowgrass Poa trivialis and P.annua are the main grasses while there is a locally a little sweet grass Glyceria fluitans in run-off from the nearby yard. Broad-leaved species are few, among them.

Rumex obtusifolius	broad-leaved dock
R.crispus	curled dock
Stellaria media	chickweed
Cirsium vulgare	spear thistle
Cerastium glomeratum	sticky mouse-ear
Trifolium repens	white clover
Ranunculus repens	creeping buttercup
Brachythecium rutabulum	a moss

A little soft rush Juncus effusus and hard rush J.inflexus occur in the western corner and there is also brooklime Veronica beccabunga close to the edge.

9.3.2 Field boundaries

A fringe of nettle Urtica dioica occurs around the existing feed plant and this species is also abundant along the hedges to the west. The hedges are based on a bank and consist mostly of hawthorn Crataegus monogyna and bramble Rubus fruticosus with occasional beech trees Fagus sylvatica of small size. A field away, at the end of the access road, there are a few ashes Fraxinus excelsior and some wild rose Rosa canina grows here too.

The flora of the hedge bases is limited but the following were seen

Geum urbanum	wood avens
Viola riviniana	common violet
Lapsana communis	nipplewort
Stellaria media	chickweed
Veronica chamaedrys	germander speedwell
V.serpyllifolia	thyme-leaved speedwell
Heracleum sphondylium	hogweed
Arctium minus	burdock
Cirsium arvense	creeping thistle

9.3.3 Adjacent habitats

The site is surrounded by similar fields which are mostly tilled. To the northeast however is a raised bog whose cutaway margin is about 100m away. The ground here carries a fringe of scrub and small trees consisting of downy birch Betula pubescens, grey willow Salix cinerea and eared willow S.aurita. There is much cover of bramble Rubus fruticosus, wild raspberry R.idaeus and bracken Pteridium aquilinum with some gorse Ulex europaeus. The trees have colonized along drains bordering the turbary properties on the bog so that they cover a strip of 200m in width in places.

9.4 Fauna

The fauna of the site is very limited because of the lack of cover and the uniformity of the habitat. The only mammal that there was evidence of was brown rat though foxes and hares are likely to visit in the course of feeding. Frogs may also be present in summer but there is no breeding water closer than the bog drains.

Birdlife is similarly limited and only farmland birds such as rook, jackdaw, hooded crow and woodpigeon were seen on the site visit. Starling, redwing and meadow pipit flew over, as did a few black-headed gull. Other winter visitors that are likely to occur are snipe and woodcock. They feed widely by night on agricultural land and roost during the day in cover such as occurs on the bog or surrounds.

Sporadic visitors, depending on the state of growth or harvest in the tillage fields, would be redpoll, linnet, reed bunting and feral pigeon – of which there were several in the feed store. Goldfinch, greenfinch and chaffinch would be more regular and could nest in the surrounding hedgerows.

Summer visitors would be aerial feeders such as swallow, swift and sand martin though there are no breeding sites for them within the red-line boundary.

9.5 Evaluation

The site consists of ordinary, nutrient-rich farmland without any features of ecological interest. All species seen or likely to visit are common ones (cf Preston et al 2002) though the presence of the bog area to the east increases the diversity of visiting species, especially of birds.

The area is not designated as of ecological interest and the closest such site is the Royal Canal, a pNHA (Code 2103). This lies 1km to the southwest and there is no ecological connection between the two as the stream from the bog edge passes under the Canal.

The nearest Natura site is the River Boyne and River Blackwater (Site Code 2299) which lies 6.6km away at a tributary near Clonlost. Once again there is no ecological connection with it.

9.6 Impact of Development

The process in outline is that the plant receives farm and other non-hazardous wastes, breaks them down anaerobically and uses the resulting methane gas to generate electricity. The end product is organic soil conditioner, much reduced and more concentrated than normal slurry. There is no liquid effluent arising from the process.

The impact of the plant will be total on a part of the site in that the existing habitat will be removed and replaced by hard standing, tanks and storage pits. However since the land has no feature of heritage or biodiversity interest this cannot be seen as a significant negative impact. There will be no impact on groundwater and the aerial effluents produced by combustion are carbon dioxide and water.

In the wider context the plant will reduce the amount of methane produced from the housing of farm animals, with benefit to the atmospheric content of the gas and the greenhouse effect. By creating a more concentrated soil additive it will also reduce potential run-off from land spreading to sensitive habitats

9.6.1 Appropriate assessment

Since there is no escape of liquid or nutrients during the process of waste treatment there is no way the plant can affect Natura 2000 sites. It has a potential benefit in reducing the amount of slurry spread in an untreated form and therefore the general eutrophication of soil and waterways.

9.7 Mitigation Measures

Since there will not be negative impacts on flora or fauna from the development there are no specific actions required to mitigate them. However the boundary hedge will have a benefit to local wildlife by adding to the habitat available. Suitable native species include oak, ash, alder, hawthorn and grey willow Salix cinerea.

10.0 MATERIAL ASSETS

10.1 Introduction

This section of the EIS assesses the impacts, if any of the proposed anaerobic digestion facility at Newdown, The Downs, Mullingar, Co. Westmeath during both the construction and operation phases. This section should be read in conjunction with the site layout plans and Section 2.0 Description of the Proposed Development.

Material Assets are generally considered to be the physical resources in the environment which may be either of human or natural origin. The object in assessing these resources is to identify the impact of the development on individual enterprises or properties and to ensure that natural resources are used in a sustainable manner in order to ensure availability for future generations.

This chapter will evaluate the following areas:

- Land Use and Ownership
- Local Settlement
- Infrastructure and Utilities
- Natural Resources
- Waste Management

10.2 Methodology

A desk study was carried out on the existing material assets associated with the site of the proposed development. Projections of resource use were made, for both the construction and operational phases of the development, and the impact assessed. Mitigation measures are proposed where appropriate. Where relevant, impacts on particular material assets such as the road network, and construction waste disposal facilities are considered in detail elsewhere in this EIS.

10.3 Land Use and Ownership

The proposed facility will be located on un-zoned lands at Newdown, The Downs, approximately 7 kilometres east of Mullingar town centre and 6 kilometres west of Killucan Village. The site is used for agricultural purposes. The applicant site covers 2.3 hectares (ha) as outlined in Plate 1.

10.4 Local Settlement

The nearest settlement to the development is the town of Mullingar in County Westmeath. A number of other settlements in the area include Killucan, Coralstown and The Downs. These local settlements are evaluated in detail in Section 3 - Human Beings. The proposed facility will provide employment opportunities, both directly on the site, and indirectly for spin-off and service providers during both construction and operational phases.

10.5 Electricity Supply

There is an electrical supply to the northeast corner of the site adjacent to the site boundary. From this an existing 20kVA electrical distribution line crosses the site in a north-south direction.

The waste-to-energy plant will convert the thermal energy produced by the combustion of the waste to produce a 1MW of electricity. Refer to Chapter 2, Description of the Proposed Environment for more information on the site and scheme description. The line on the proposed site will be installed as an underground cable and hence will not have any visual impact. Planning permission is not required for an underground cable of this size and the final route for the cable will be determined by the ESB. Connection to the National Grid may be the subject of a separate application. This will be the responsibility of the ESB. A licence to export electricity through the transmission network will be obtained from the Commission of Electricity Regulation.

10.6 Gas Supply

Discussions with An Bord Gais highlighted that there is no gas main on the area of the proposed development. It is not envisaged that the development will require connection to this main.

10.7 Road Network

The site is located adjacent to the N4 Dual Carriageway and will be accessed via the new Killucan Road which will link the N4 Dublin Road and R156 Killucan Road. Construction and operational traffic entering and leaving the site will use the new R156 Killucan Road crossing the new bridge over the N4. Refer to the chapter on Roads and Traffic of this EIS for further details.

10.8 Water Supply & Usage

For further details on water demand refer to Civil Engineering Specification accompanying this application.

10.8.1 Process Water

The process water requirements will be in two stages (i) Start up Demand (priming the system) and (ii) Operational Demand.

- **Start up Demand**

To prime the system will take a period of approximately 45 days. Refer to Chapter 2, Description of the Proposed Development for more information on processes involved. This process will be continuous i.e. 24 hours a day, 7 days a week, meaning no peak demand will occur. For further details on water demand refer to Civil Engineering Specification accompanying this application.

- **Operational Demand**

After the 45 day start-up period the waste will enter the building and receive further treatment. This process will be continuous meaning no peak demand will occur.

A rainwater harvesting system is proposed to be installed to supply the required water for toilets in the building and some of the required process water.

For further details on water demand refer to Civil Engineering Specification accompanying this application.

10.8.2 Potable Water

At peak operation it is envisaged that 10 persons would be employed on site throughout the day. Potable water will be supplied by connection to the existing watermain to the Southwest of the proposed site. For further details on water demand refer to Civil Engineering Specification and Drawings accompanying this application.

10.8.3 Fire Water/ Water Storage Tank

To ensure a regular supply of water for the treatment process a water storage tank will be provided. A water storage tank for fire fighting purposes shall also be installed.

10.8.4 Foul Water

There is no foul sewage system on the site at present. During the construction phase effluent generated on site will discharge to temporary sewage containment facilities prior to transport and treatment off site.
During operation, domestic sewage from toilets, changing and kitchen areas will discharge via the foul drainage system into on site effluent treatment systems, from which it will then be discharged to percolating area. Refer to civil specification for further details.

10.8.5 Surface Water

All surface water runoff will be contained and treated on site. Refer to the Civil Engineering Specification accompanying this application for drawings and details.

10.9 Waste Management

10.9.1 Construction Phase

During construction an approach should be taken to engage in waste prevention and reduce the amount of waste generated in the first place i.e. minimise the resources needed to do the job. Prevention and management which will reduce the purchase of construction materials and subsequently reduce the need to remove wastes from site should be followed. To achieve this, the following steps should be followed:

- Materials to be ordered on an “as needed” basis thereby preventing over supply to site;
- Purchasing coverings, panelling or other materials in shape, dimensions and form that minimises the creation of excessive waste on site;
- All materials should be stored adequately on site to reduce/prevent damaged materials/waste
- Ensuring correct sequencing of operations; and material that is generated should be reused on site or salvaged for subsequent reuse to the where possible and disposal should only be considered as a last resort. Initiatives should be put in place to maximise the efficient use/reuse of materials such as reusing excavated spoil/topsoil as landscaping material in the completed development.

10.9.2 Operational Phase

Within the site adequate provision will be made for the installation of refuse collection bins. Domestic waste generated on site will be recycled where appropriate or treated in the anaerobic digestion process.

Provisions for the installation of recycling collection bins will be provided on site where necessary. Domestic waste generated on site from canteen areas etc will be recycled where appropriate. Any hazardous waste generated on site including cleaning agents, oils, batteries, paints etc will be sent to an Environmental Protection Agency approved waste disposal company for appropriate disposal/recovery.

10.10 Site Utilities

Some site utilities will require upgrading for the development of the waste-to-energy facility. Among the changes that will be required will be the relocation of the existing 20kVA line which crosses the site in a North to South direction, connecting the electricity transmission network to the existing commercial premises.

10.11 Agriculture

As noted, the proposed facility will be located on an area of 2.3 hectares of agricultural lands.

10.12 Mitigation Measures

As all lands within this application are restricted to that of the site boundary, the proposed Anaerobic Digestion facility will not result in any significant environmental impacts relating to land severance, land access or disruption to current agricultural land use.

Procedures shall be followed to ensure the use of utilities, resources and assets will be in accordance with good practice in energy and resource conservation, and efficiency. Water conservation measures will be implemented i.e. rainwater will be collected for use in the process, to reduce the consumption of potable water and water recycled in the system where possible Waste management on site will be conducted in accordance with best practice to encourage as much segregation and recycling on site. Wastes arising on site will be sent off site to be recycled if they are suitable, or treated in the Anaerobic Digestion Process. Any waste removed from site will be by carriers in receipt of valid waste permits and to disposal facilities approved by the EPA.

10.13 Residual Impacts

With the above mitigation measures in place, neither the construction nor operational phases of the development will result in any significant negative impacts on the existing economic assets. When the facility is in operation it will have a significant beneficial impact in the reduction of the quantity of non-hazardous industrial, commercial and municipal solid waste going to landfill.

In addition, the proposed facility will produce approximately 1MW electricity for export to the National Grid. Using residual waste to generate electricity also replaces non-renewable fossil fuels such as coal, oil and natural gas in the generation of electricity. This is seen as a very positive long term residual impact of the Anaerobic Digestion facility.

11.0 LANDSCAPE AND VISUAL CHAPTER

11.1 RECEIVING ENVIRONMENT

11.1.1 Introduction

This chapter of the Environmental Impact Statement summarises the landscape and visual impact of the proposed anaerobic digestion / bioenergy facility at Newdown, The Downs, Mullingar. It describes the impact on the visual and landscape amenity of the subject site itself and the contiguous area. It also describes the landscape character of the subject site and its hinterland.

11.1.2 Methodology

The basis for the assessment follows the guidance utilised for Environmental Impact Statements:

- Guidelines on the information to be contained in Environmental Impact Statements, the Environmental Protection Agency (EPA) 2002
- Advice Notes on Current Practice in the preparation of Environmental Impact Statements, the Environmental Protection Agency (EPA) 2003

The analysis of the site environment, taken together with its hinterland, was based on a site visit, an examination of available aerial photography, Ordnance Survey mapping data, and a detailed topographical survey of the site itself.

The significance criteria used for the visual and landscape assessment are based on those given in the 'EPA Guidelines on the information to be contained in Environmental Impact Statements - 2002 - 5. 'Glossary of Impacts', and are as follows:

Imperceptible Impact: An impact capable of measurement but without noticeable consequences
Slight Impact: An impact which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Impact: An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Significant Impact: An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Profound Impact: An impact which obliterates sensitive characteristics.

The quality of potential visual and landscape impacts are assessed according to EPA guidelines as follows:
Positive: A change which improves the quality of the environment
Neutral: A change which does not affect the quality of the landscape
Negative: A change which reduces the quality of the environment

Potential impacts arising from a proposed development may also be considered in terms of duration as described in the EPA Guidelines:
Temporary: Impact lasting one year or less
Short-term: Impact lasting one to seven years
Medium-term: Impact lasting seven to fifteen years
Long-term: Impact lasting fifteen to sixty years
Permanent: Impact lasting over sixty years

11.2 EXISTING CONDITIONS

The subject site is agricultural land located approximately 6 Km to the east of Mullingar Town adjacent to the Flynn Feed commercial premises located along the N4 and covers an area of 2.3 hectares. (See Figure 11.1 Site Context).

11.2.1 Topography

The ground levels on the subject site fall gently from a height of approximately 97.5 metres O.D. at the south-western boundary to a height of approximately 94 metres O.D. metres along the north-eastern boundary. The ground levels along the strip of land which will form the entrance / access road to the site is generally at a height of approximately 96 metres O.D.
(See Fig.11.2 Topography Map).

11.2.2 Slope Regime

The slope regime indicates the potential developabilty of the site, in terms of its ability to accept development. Shallow slopes, i.e. those in the 1 in 20 to 1 in 50 range are ideal for development, and require little in the way of secondary site works. Slope angles in the 1 in 10 to 1 in 20 range require substantial site works, in the form of benching, retaining walls etc. Slopes in the 1 in 10 and over range are generally regarded as undevelopable from an economic point of view.
The slopes to be found on the subject site are all in the developable range with the majority being in the 1 in 20 to 1 in 50 and the 1 in 50 and less range. (See Fig. 11.3 Slope Map)

11.2.3 Vegetation

Trees on site are confined to those contained within the hedgerows which form the field boundary along the north-western edge of the site and along the strip of land which will form the access road to the site. There are no significant woodlands or stands of trees on or around the site. The primary hedgerow tree species are Beech (Fagus Sylvatica) and are typical of those contained within the surrounding hedgerows, with a single Spruce tree (Pinea) located on the site boundary. (See Fig. 11.4 Existing Vegetation Map)

11.2.4 Land Use

The subject site itself is agricultural in the form of pasture. The immediate surrounding environment, located between the R156 Killucan Road to the north and the N4 National Route to the south, is also agricultural land with a mix of pasture and tillage. Flynn Feeds agri-industrial premises is located immediately to the south of the site. Further south the land is primarily agricultural with pockets of residences along the N4, with the Royal Canal located further to the south. To the east the agricultural land reduces in quality with much of the area covered in scrub woodland and marshland. To the north and north-west, located along the R156 Killucan Road, are a number of residences forming ribbon development along the road,

which also includes a school, shop and GAA sports pitches. Further west there is a small business park located along the N4 National Route. (See Fig. 11.5 Land Use Map)

11.2.5 Visual Analysis

The landscape character of the general area is of land in extensive agricultural use with pockets of residential units forming ribbon development along the approach roads to the town centre. The subject site itself is visually unremarkable being a small portion of a much larger tract of agricultural lands located to the east of Mullingar Town. The primary visual features on or around the site are the Flynn Feed agri-industrial storage buildings located adjacent to the south-west boundary of the subject site. There are also existing overhead powerlines which run in a northerly direction across the site.
The site offers little or nothing in terms of visual amenity value in the area and there are no protected views or scenic routes in relation to the site. (See Fig. 11.6 Visual Analysis Map)

11.2.6 Landscape Character Designation

The site is located within the landscape character area assessed as '4. Central Hills and Lakes' in Westmeath County Development Plan 2008 -2014:-
'The Central Hills and Lakes Character Area is located to the north of the centre of the County. This area is typified by undulating hills and lakes, the most prominent of which are Lough Derravaragh and Lough Owel. These lakes are designated Areas of High Amenity, SAC and SPA. A number of Fens occur throughout the area, the most notable being Scragh Bog which is of international importance. The high scenic quality and amenity value of this LCA is reflected by the high number of preserved views. There are a number of demesne landscapes in the area and associated valuable areas of semi-natural woodland, including Oak on some upland areas, such as around Lough Derravaragh at Knockeyon and Crookedwood. This area has a number of small settlements such as Crookedwood, Multyfarnham and the larger settlement of Castlepollard. The character area reflects the historic landscape also from Bronze Age Sites on Lough Derravaragh and Frewin Hill at Lough Owel to the monastic associations of Portloman Abbey and Franciscan Friary at Multyfarnham. The lake edges are attractive locations for recreation and amenity.'

The site is also located adjacent to the landscape character area assessed as '5. Royal Canal Corridor':-
'The Royal Canal has been a historic feature of the Westmeath landscape since the early 1800s running east- west through the county and is an important amenity feature. The canal runs largely through low-lying areas with the surrounding corridor typified by grassland, peatland and some areas of conifer plantation. The canal corridor is largely rural in nature apart from the urban centre of Mullingar. To the west of Mullingar the canal traverses a rural landscape of high scenic quality with undulating landform and mature vegetation cover of hedgerows and treelines. Some large conifer plantations border the canal towpath is feature of the landscape and dominate the visual corridor where present. The canal corridor includes features of vernacular architecture such as stone bridges, lock keeper's cottages, lock gates and milestones which enhance the waterway.'

11.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development will consist of the installation of an anaerobic digestion / bioenergy facility into the landscape. Access to the site will be off the proposed R156 Killucan Road, which will run in a north-south direction approximately 225 metres to the west of the subject site. The proposed buildings / structures on site will be as follows:-

- Administration Building (approximately 3.65 metres high)
- Waste reception building (approximately 11.9 metres high)
- 5 pre-storage tanks (approximately 11.4 metres high)
- 2 anaerobic digester tanks (approximately 12.2 metres high)
- 2 post digestion storage tanks (approximately 12.9 metres high)
- 3 silage storage pits
- Slurry Tank
- Leachate Tank
- Post digestion loading area (approximately 7.6 metres high)
- Gas flare stack (approximately 7 metres high)
- Gas cleaning vessel (approximately 8.7 metres high)
- ESB transformer building (approximately 3.4 metres high)
- Associated delivery yard, car parking, lighting, weigh-bridge, landscaping etc.

11.4 POTENTIAL IMPACT OF PROPOSED DEVELOPMENT

In landscape and visual terms the proposed development will have an impact in varying degrees upon the inter-related aspects, as follows:-

- The perceived character of the area.
- The existing views.
- Its visual and recreational amenity.

11.4.1 Impact on Landscape Character

The subject site presents as a portion of much larger tract of agricultural landscape, typical of much of the land located to the east of Mullingar Town. There are no designations on or around the subject site in the form of National heritage or conservation areas and it is not valued for its scenic quality and therefore, the existing landscape character is assessed as being of low quality. The proposed development will alter the existing landscape character from agricultural to a character more agri-industrial in nature with the introduction of the administration building, storage tanks and associated anaerobic aeration facilities. Given the small portion of agricultural land that will be taken up by the development and juxtaposed against the existing Flynn Feeds commercial centre, it is assessed that the receiving environment would be tolerant to the proposed change and the impact on the landscape character of the site will be moderate and neutral.

11.4.2 Impact on Views

Construction Phase:

Prior to the proper mitigation measures being implemented during the construction stage, the development has the potential to have significant and negative landscape and visual impacts. These impacts may be caused by the following elements associated with construction work:

- Dust
- Construction traffic
- Site compound
- Building materials
- Ground disturbance (e.g. topsoil stockpiles etc.)
- Site hoarding/security fencing
- Construction work
- Construction site lighting
- Hedgerow and tree removal

The duration for the construction works is programmed to be completed in approximately a one year timeframe and therefore, the landscape and visual impacts will be temporary and will terminate upon completion of the development. Given the low level of visual amenity value and low quality landscape character the landscape and visual impact during the construction stage is judged as being moderate and negative.

Operational Phase:
Six key viewpoint locations were chosen to assess the visual impact of the development on the landscape. The existing view from each viewpoint is illustrated together with the proposed development as seen from the same viewpoint. In some of the photomontages a portion of the development may not be visible and is indicated with a red line. The locations of the photomontages are shown on the view location map which precedes the images.

View 1: View looking south-west towards the site from the R156 Killucan Road
Existing View:
The existing Flynn Feeds commercial buildings and structures are visible in the distance beyond the existing hedgerows and agricultural fields in the foreground. The existing trees are not in leaf in this view offering more open views into the site than there would be during the summer and autumn months.

Proposed View:
The digestion storage structures are visible juxtaposed against the existing structures on the Flynn Feeds site. Some of the proposed structures will be screened by the intervening vegetation as indicated by the red line.
The proposed development, seen set against the existing structures, will not result in any significant alteration to this viewpoint. Therefore, the visual impact will be slight and neutral from this location.

View 2: View looking south-east towards the site from the R156 Killucan Road
Existing View:
This view is similar to View 1 with the existing Flynn Feeds storage buildings and structures visible in the distance beyond the existing hedgerows and agricultural fields in the foreground. There are a number of mature trees located in the hedgerows which assist in reducing the apparent massing of the existing buildings in the landscape. To the left of view an electricity pole and overhead powerlines intrude into the view at this location. Again the hedgerow planting is not in leaf offering more open views into the site than there would be during the summer and autumn months.

Proposed View:
The digestion storage structures are visible juxtaposed against the existing structures on the Flynn Feeds site in the middle distance. A portion of the proposed structures will be screened by the intervening vegetation as indicated by the red lines.
The proposed development, seen set against the existing Flynn Feeds structures, will not result in any significant alteration to this viewpoint. Therefore the visual impact from this location will be slight and neutral.

View 3: View looking south-west towards the site adjacent to the GGA pitches along the R156 Killucan Road
Existing View:
The primary visual focus in this view is the hard standing and fencing located around the sport pitches. The basketball court dominates the foreground of view along with the single storey

pavilion building to the left of view. Views in to the subject site are obstructed by the intervening hedgerow forming the boundary around the edge of the sports grounds.
Proposed View:
The proposed development is not visible from this location as indicated by the red line. Therefore, there will be no visual impact from this viewpoint.

View 4: View looking east towards the site from the N4
Existing View:
This view, taken along the N4 carriageway, is a transient view as viewed by motorists travelling in a west to east direction along the carriageway. The commercial structures and buildings on the Flynn Feeds site are visible between the gaps in the hedgerow and tree planting along the verge of the carriageway. There are some of the trees located on the subject site visible in the middle of view to the left of the Flynn Feeds structures.

Proposed View:
The proposed reception building and post digestion storage tanks are visible in the middle of view juxtaposed against the existing Flynn Feeds buildings. Viewers travelling along the N4 will see glimpses of the proposed structures between the gaps in the hedgerow and tree planting along the verge of the carriageway. The scale and massing of the structures are similar to those on the Flynn Feeds site and the development will be seen as a part of an overall development on the Flynn site. Given that the view is a transient one and the similarity in the scale of the development juxtaposed against existing development the visual impact from this location will be slight and neutral.

View 5: View looking north-west towards the site from the N4
Existing View:
This view taken along the N4 is a transient view as viewed by motorists travelling in an east to west direction along the carriageway. There is dense shrub planting (Cornus alba) along the N4 verge obstructing views towards the houses located on a lower road running parallel to the N4 carriageway. The tops of the houses, tree planting and overhead powerlines are visible along the lower road above the shrub planting. A small portion of the subject site is visible in the distance to the right of the house in the centre of view

Proposed View:
A small portion of one of the anaerobic digestor tanks and post digestion tanks are visible in the distance to the right of the house in the centre of view. A large portion of the proposed development is not visible from this viewpoint, screened by the intervening buildings and topography, as indicated by the red line.
Given the distance from the view and the intervening obstructions the visual impact from this viewpoint is slight and neutral.

View 6: View looking east towards the site from the field where the proposed R156 Road is located.
Existing View:
This view is taken looking east along the track located between the agricultural fields where the proposed access road will be located. The primary visual focus in this view is the agricultural land with a post and wire fence visible to the left of the track and a hedgerow to the right. The buildings on the Flynn Feeds site are visible to the right of view in the middle distance, while to the left of view, in the distance, is a tract of scrub woodland planting.

Proposed View:
The view is dominated by the new access road which will connect to the proposed R156 Road. The new road surfacing, grass verges and footpaths along with the new fencing and tree planting will alter the character of the landscape in this location from agriculture to one of a more agri-industrial nature. The new access road will be in keeping with the proposed R156 Road which will run in a north to south direction to the west of the subject site. Given the scale of the access road in comparison to the proposed R156 Road and along with the proposed landscaping / tree planting the visual impact from this location will be moderate and neutral.

View 7: View looking North East towards the site from the proposed over bridge on the N4 the Downs Grade Separation Junction
Existing View
This view, taken from the proposed over bridge, is viewed by motorists travelling in a north to south direction along the proposed N4 the Downs Grade Separation Junction. The existing commercial structures and buildings on the Flynn Feeds site are clearly visible from this elevated vantage point. The most prominent features are a telecommunications mast to the centre of the view, the existing commercial buildings which occupy at least 50 % of the view and some trees and hedgerows.

Proposed View
The proposed reception building and post digestion storage tanks are visible in the middle of view juxtaposed against the existing Flynn Feeds buildings. Viewers travelling along the N4 over bridge will see glimpses of the proposed structures behind the existing commercial buildings, telecommunications mast and existing vegetation. The scale and massing of the structures are similar to those on the Flynn Feeds site and the development will be seen as a part of an overall development on the Flynn site.

11.4.3 Impact on Visual/Recreational Amenity

The subject site offers little or nothing in the way of visual amenity value and has no recreational amenity value being as it is in agricultural use. Therefore the landscape and visual impact on the visual and recreational amenity of the subject site will be slight and neutral.

11.5 MITIGATION MEASURES.

Construction Phase:
Along with the implementation of appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material, site rubbish etc. the following mitigation measures will be implemented to assist in reducing the landscape and visual impacts during construction:

- Preparation of a tree protection methodology to ensure that trees being retained are protected during the works in accordance with BS 5837
- All trees to be retained will be clearly marked on all contractors drawings to avoid accidental removal.
- Site hoarding of 2.0m (minimum height) will be used at the construction compound to enclose and screen the works to reduce visual impacts as much as possible, where such visual impacts are identified.
- Wheel wash facility will be provided for construction traffic leaving site.
- Materials and machinery will be stored in an appropriate manner during the works. Portable machinery will be stored within the work sites.
- Lighting of compounds and work sites will be restricted to prescribed working hours and that which is necessary for security.

- Temporary fencing, barriers, traffic management and signage will be removed when no longer required.
- On completion of construction, all remaining spoil and construction material will be removed.
- During the construction process, topsoil will be stripped and stored for reinstatement in the same location where appropriate in line with industry best practice for treatment, handling and storage of topsoil.

Operational Phase:
The visual impact of the development will be mitigated in the following ways:

- By the utilization of colours, textures and materials on the buildings and structures which will visually diminish the apparent massing of these buildings in the landscape.
- Provision of tree and shrub planting to soften the visual impact of the hard surface area.
- Provision of new hedgerow screen planting along the boundaries of the proposed scheme
- Implementation of a landscape maintenance and management contract to ensure the successful establishment and ongoing success of the landscape works.

11.6 PREDICTED IMPACT OF PROPOSAL

The existing low quality landscape and visually unremarkable tract of agricultural land amenity will be replaced by a development more industrial in character. The development will be seen juxtaposed against the existing Flynn Feeds commercial premises to form part of an overall commercial development on the site. Therefore, the significance of the landscape and visual impact of the proposed development will be slight to moderate and the quality of the impact will be neutral.

11.7 RESIDUAL IMPACTS/MONITORING

The proposed landscaping for the development generally and the construction of the proposed scheme will reinstate disturbance arising from the works.
The proposed planting will be subject to on-going maintenance strategies and monitoring, to ensure the satisfactory establishment of the planting installation and therefore the effectiveness of its screening potential over time.

11.8 SUMMARY

The application site presents as small portion of a larger tract of agricultural land on the eastern side of Mullingar town. The topography and slope regime of the subject site makes the site suitable for development in that there will be no requirement for retaining structures, terracing etc. There are no significant stands of trees or woodland on the site that would hinder development. The existing land use is agriculture having a low quality landscape character with little in the way of visual amenity value. There is a significant commercial development (Flynn Feeds), which is similar in nature to the proposed scheme, located immediately to the south of the subject site. Views in to the site from the surrounding road network are limited due to the distance of the development from the roads and visual obstruction from the existing hedgerow structure. The proposed development will consist of an administration building, storage and aeration tanks and associated facilities, new entrance road, landscaping, lighting etc. It will be seen juxtaposed against the existing Flynn Feeds development and will not create a significant landscape and visual impact on the existing environment.