ENVIRONMENTAL IMPACT STATEMENT

FOR PROPOSED COMPOSTING FACILITY AT BALLYBEG, LITTLETON, CO. TIPPERARY

Acorn Recycling
Waste Management for the next generation
www.acornrecycling.com

SUMITTED TO; THE ENVIRONMENTAL PROTECTION AGENCY AS PART OF WASTE LICENCE APPLICATION

SUMITTED BY; ACORN RECYCLING LTD

Signed by : Rónán Beasley **Date :** 14/10/08
(on behalf of the organisation)

Print signature name: Rónán Beasley

Position in organisation : Managing Director

CONTENTS

TABLE OF FIGURES

TABLES

SECTION 1: INTRODUCTION

Section 1: Introduction

Acorn Recycling is a waste management and environmental consultancy company specialising in the management of organic wastes. Acorn believes in sustainability and therefore seeks to find solutions that are cost effective, yet environmentally sustainable.

In recent years there has been recognition that new and innovative solutions need to be found for the management of biodegradable waste. From European environmental policy to local development plans there is unanimous agreement that biological treatment facilities have a significant role to play in reducing the quantities of organic materials being landfilled and the environmental degradation and risks that accompany it. According to the National Strategy on Biodegradable Waste (2006) the landfilling of biodegradable waste creates negative impacts on the environment such as;

- Production and release of landfill gas, a potent global-warming gas, which is also odorous.
- Generation of leachate, which must be collected and treated.
- Slow rate of degradation – management of landfill gas and leachate must continue for many years after a landfill is closed.

A more sustainable alternative is to treat the biodegradable waste as a resource which can substitute for primary raw materials and thereby reduce our consumption of natural resources.

The Landfill Directive sets out stringent targets for the reduction of biological waste going to landfill. In Ireland we must reduce the quantity of biological waste going to landfill to 65% less than the quantity in 1995. Since that time the quantity of waste landfilled has only increased, so achieving this target will be extremely difficult.

As well as landfilling, other outlets for organic waste such as landspreading pose significant risks to surface and groundwaters. The Waste Management Plan for

the Midlands Region 2005 – 2010 sets the policy objective to 'Support the development of biological treatment facilities in the region that can be shown to be consistent with the overall objectives of the plan and have regard to principles of good siting'. This location has the advantages of excellent road network being only three kilometres from the N8 (Dublin/Cork Rd). The local access road is well suited and in good condition because of the nearby briquette factory. The site also has the advantages of being not sensitive to visual intrusion and the nearest residents live further than 250 metres away.

Acorn Recycling plan to build an aerobic composting facility capable of treating a range of non-hazardous organic materials including biological municipal waste and wastewater sludges. The organic materials are mixed with wood-chip to a moisture content of 60%. This mixture is then loaded in composting bays where air is forced underneath aerating the mixture. Naturally present mico-organisms within the compost then rapidly breakdown the organic material releasing carbon dioxide, water vapour and heat. Under these optimum conditions high temperatures are reached. As the mixture runs low on biodegradable material it cools leaving a stable and sanitised product. This is then moved to the secondary composting area where it is stabilised further- this stage is known as curing. Finally the compost is screened to remove the larger woodchip material and leave a stable, pathogen free, nutrient rich product suitable for a number of uses including use as a fertiliser, soil conditioner, or use in the production of various horticultural products.

The design of the development is such that no adverse impacts on the environment will occur. All activities will be carried out within a sealed building and air within the building cleaned using a bio-filtration system. All activities on site including a stringent Environmental Management System will be overseen and regulated by the Environmental Protection Agency.

This process is ideal for the treatment of all kinds of biological wastes including; dairy and wastewater sludges, biological municipal waste, and industrial food waste. Without biological treatment facilities such as the proposed development these materials would either be spread onto land or deposited in landfill sites, both of which pose significant risks to the environment.

As well as the environmental benefits of this development, it will also provide economic benefits to the locality. It will employ seven people directly and also employ local service providers regularly.

This environmental impact statement details the impacts, both positive and negative, that the proposed development will have on the local people and on the environment. It also details the means and methods proposed to mitigating against all possible adverse impacts.

SECTION 2:

THE PROPOSED DEVELOPMENT

Section 2: The Proposed Development

2.1 Alternatives

2.1.1 Alternative Process

The waste management system in Ireland at present is unsustainable. The overdependence on landfill as a means of disposal of all types of biodegradable organic waste is causing significant problems in terms of environmental damage, public health risk and increased costs of disposal.

The current EU waste management hierarchy proposes the following options for the management of waste, the first being the most desirable and the last being the least desirable; prevention, minimisation, reuse, recycling, and lastly disposal of waste. Composting, the biodegradation of organic waste into a stable humus like product, is becoming recognised as a benefit to society by not only reducing the waste problem but creating a sustainable process which has many positive merits. As the production and transportation of inorganic fertiliser is so energy intensive, composting offers a sustainable option for the recycling of these nutrients.

Alternative processes available today are not sustainable. Investment in facilities and technologies such as industrial composting are crucial in developing an integrated waste management infrastructure. The Governments policy document “National Strategy on Biodegradable Waste 2006” set out targets detailing a 65% reduction in biodegradable waste consigned to landfill. It called for 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 capable of treating up to 300,000 tonnes of biodegradable waste per annum.

Alternative technologies such as thermal drying of bio-solids and incineration can be unsustainable for treating biodegradable waste because many are energy

intensive and do not create as beneficial a product as organic compost. Also because incinerators require a consistently large supply of waste in order to operate at an optimum level, they act as a deterrent to prevention, minimisation, reuse, and recycling. In contrast, the composting process can easily operate with variable levels of input.

2.1.2 Alternative Location

The proposed site is a desirable location for a composting facility because of the following factors;

1. The site is located just three kilometres southeast of the village of Littleton on the N8 (Dublin-Cork Road). This facilitates good access.
2. Although the area is relatively remote it has excellent road access due to the nearby industrial briquette factory.
3. Surrounding hedgerows and developing willow plantation will shield visual intrusion. The specific location of the building was chosen based on favourable geophysical conditions and in order to cause the minimum impact on the landscape.
4. Favourable geological and hydro-geological conditions.
5. The nearest residents are over 250 meters from the site.

2.1.3 Do nothing scenario

There are many reasons why alternative methods of disposal are being sought to reduce our reliance on landfill. These include potential groundwater pollution, surface water pollution, landscape intrusion and greenhouse gas emissions among others. In particular biological waste going to landfill causes these problems. For this reason European environmental policy is rightly encouraging alternative ways of managing our waste. This strategy is based on the EU waste hierarchy shown in Figure AR2-01.

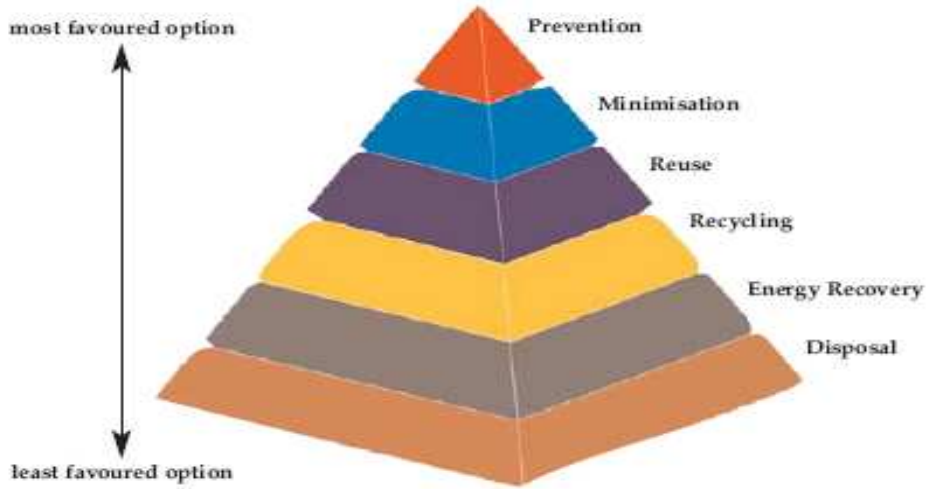


Figure AR2-01: EU Waste Management Hierarchy

The Landfill Directive (EU Directive 99/31/EC) specifies targets for a reduction of biological waste being landfilled. The targets set out are based on the quantity of biological waste landfilled in 1995.

- Minimum 25% reduction by 2010
- Minimum 50% reduction by 2013
- Minimum 65% reduction by 2016

Figure AR2-02 below shows the gap between where Ireland currently stands with regards to its landfilling of biodegradable waste and where it must be in order to comply with the landfill directive.

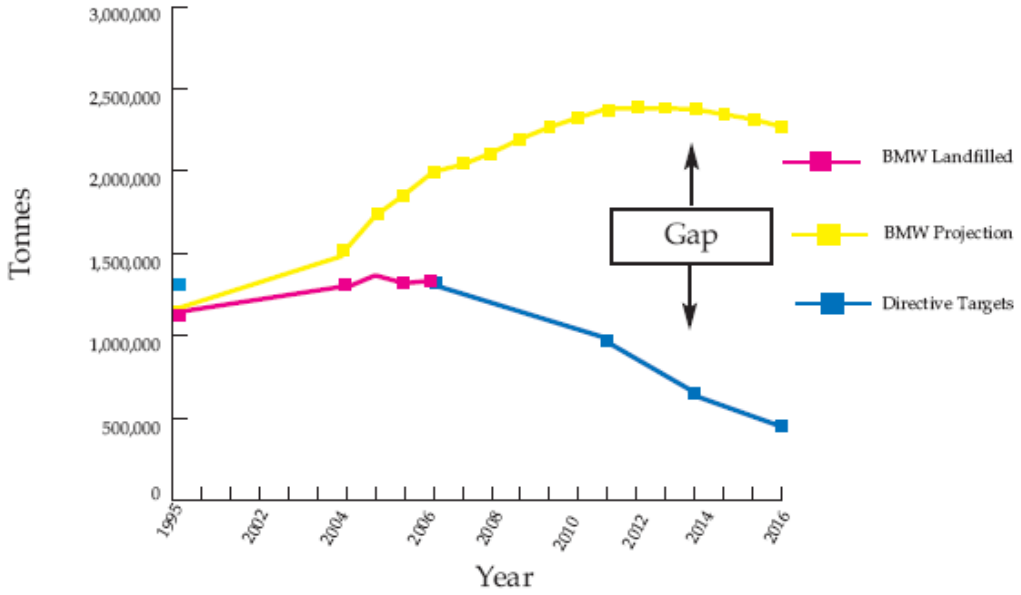


Figure AR2-02: Projected BMW production Vs. Landfill Directive targets

In order to follow the landfill Directive targets shown above the Irish government proposes an Integrated Waste Management Strategy which 'is a strategy for managing waste which utilises a range of environmentally sound systems and processes.

In a Do Nothing alternative the proposed composting facility would not contribute to achieving local, national and European policy, plans and programs. In the absence of composting the wastes would otherwise be disposed of in an environmentally unsustainable manner i.e. landfilled. Landfilling of these materials poses environmental, social and economic problems and is contrary to government policy.

2.2 Layout, Infrastructure, and Operations

Acorn Recycling Ltd is a waste management company that specialises in the handling and treatment of all organic wastes. The proposed development comprises an industrial composting facility for the biological treatment of organic residues and production of Class 1 compost. (According to EU working document, "Biological treatment of Bio-waste", 2nd Draft 12 February 2001).

The area of the proposed site is 3.2 hectares (32,000 sqm).

The development will be constructed over a four-month period. The composting facility will be constructed with a capacity of approximately 45,000 tonnes/annum of bio-waste producing around 20,000 tonnes/annum of compost. The composting process is a forced aeration temperature feedback system. Composting bays have under floor aeration with blowers operating adjacent to the bays.

Waste Handling, acceptance and processing is carried out in the enclosed building. The gross floor space of the proposed composting facility is 3867 sqm.

Main areas within the building

Primary processing = 1094 sqm
Secondary processing = 778 sqm
Primary composting = 1098 sqm
Secondary composting = 780 sqm

A specialised access area for incoming vehicles allows trucks to access and leave the site without disturbing the process within the building. The section is also isolated and has its own air extraction system, roller shutter doors and floor

bonding. Adjacent to this is a materials storage building and on the mezzanine level, the control room with a viewing window of the facility floor.

Other areas surrounding the building include the hardstanding area to the front of the building. This comprises of 3327 sqm of space allowing free vehicular movement, access and turning space. Lanes adjacent to the building along the side allow access to the biofiltration units at the back.

There are a total of 12 composting bays in the factory. Each bay is 30 meters long. The composting bays all have under floor aeration channels. The incoming materials are mixed with amendments such as finished compost and woodchip and placed in the bays. The proposed factory is constructed using 8' mass concrete walls to Engineers details & specifications and grey/green cladding (as agreed with the planning authority).

There is an aeration fan behind each composting bay, to blow air up through the pile, and control temperature. See Internal Layout WL-03. The process is automated through a control panel.

Three 30 kilowatt extraction fans extract air from the building through the bio-filtration system.

Waste is delivered to the facility in covered containers. The roller shutter doors are closed and the section is sealed off from the outside. The delivery trucks tip their loads off the ramp into the acceptance area within the building. The material is mixed with dry amendments in the primary processing area, prior to being placed in the composting bays.

An Acorn operator washes the wheels of all trucks before they leave the building, ensuring they are clean before going on the road.

The site will be secure and locked at all times outside of factory opening hours.

The functional design and layout of the composting facility are shown on drawing numbers WL-02, WL-03, and WL-04

- The road area within the site is to be constructed to accommodate incoming and outgoing vehicles.
- A weighbridge with traffic control is located on the access road.
- Car parks are to be provided for personnel and visitors.
- Offices and toilet facilities are provided.

Buildings Layout

Please see proposed site layout drawing WL-02 & WL-03

- The composting facility will be utilised for bio waste and compost handling, acceptance, preparation and processing. It will also be used for washing of vehicles prior to exiting the building.
- Office space for administration, records and on site laboratory work.
- Storage area for diesel, oils, monitoring equipment and ancillary equipment.
- Control room for process control and air extraction

Fuel Storage

Fuel storage will be provided for the diesel fuel used on site for the following:

- Front end loaders
- Tractors
- Power washers

The fuel storage area will be located in the storage shed room or externally with easy access. This bonded area will be of sufficient volume as to hold 110% of the volume of the largest tank. Refuelling will only take place at a designated

refuelling area. A bonded container within the storage shed will also be provided for the storage of hydraulic oil. A bonded tank will be provided for the deposition of waste oils which will be subsequently collected by a suitable waste company.

Site Accommodation

Site Accommodation at the site will include

- Office for control of weigh bridge & general office functions,
- Canteen
- Toilets showers and changing room

The staff facilities will be located as shown in Map number WL-02, WL-043.

Sewage and Surface Water Drainage Infrastructure

Sewage mains do not service the area. Toilets will be provided. These will be chemical toilets provided by Clonmel Cabins Ltd. Waste will collect in a double bunded storage tank and collected for removal off site on a weekly basis. Therefore, there will be no septic tank or treatment system on the site.

No leachate or runoff will be generated from the composting process because of the forced aeration process and therefore no discharge to surface water. Rain falling on the hard-standing area and the factory roof has been separated but constitute clean runoff. It is proposed that the water is discharged from the site. See accompanying hydrology report by O'Neill Ground Water Engineering on the options considered and chosen.

Electricity

There is a requirement for three phase electricity on site. The site is close to a three phase power supply due to the large peat drying industrial complex located near the proposed site. We have proposed a sub-station close to the roadside and this will be detailed in conjunction with the ESB requirements.

Water

Three wells were bored on the site for the purposed of monitoring the baseline groundwater characteristics. These are for monitoring purposes, but another previously existing well on the site has an adequate water supply for the facility.

Fire Safety

The well water supply on site will be used for the fire safety requirements. An application for a fire certificate will be made, and the requirements that will be put in place. The facility will be fully compliant with the Building Regulations with regard fire safety.

Site Layout

The 3.2 hectare site in is divided into a large field area bordered by an existing willow plantation, naturally occurring hedgerows and boundary ditches. The site does not contain any existing property. (Please refer to figure AR3-19).

It is on the large grassland area that the proposed factory will be built See existing site layout drawing WL-02. The walls of the factory will be constructed of mass concrete, and will be a uniform grey or green colour (or as agreed with planning authority). The roof will be built from grey / green cladding, and will blend into the environment with a very gentle slope. Surrounding the facility a young willow plantation is already well established. There is an existing gateway from the site onto which will be landscaped with a traditional earthen bank and planted with hedge shrubs. See landscape plan.

Facilities Operation

The Composting Process

The Acorn Recycling facility is divided into two main sections, the primary processing and secondary processing area. These are further sub-divided into materials handling areas and composting areas. See proposed ground floor plan WL-03.

Operations are carried out in designated areas. The composting section is essentially a separate building which will have roller shutter doors at the entrance of each compost bay. Twelve bays will form the entire composting area in both primary and secondary areas. The materials handling section is where dry amendments, finished compost, wood chip and waste is mixed and where the front end loaders operate. A specialised waste acceptance area is located in the primary processing building. This allows high tipping trucks, tankers and other vehicles enter the building and tip off without disturbing the work happening in the processing area. The waste acceptance area is self contained, has roller shutter doors, preventing any fugitive emissions and has its own air extraction system. An operator allows the unit to enter the building, closes the doors and directs the driver to tip off the material. Once that is completed, the operator ensures the wheels and axle are washed of any heavy debris prior to signalling the driver to move off.

The design of the tipping area is such that waste is contained within a bunded area. The sloping floors are such that a loader can remove and mix the entire quantity from different angles. The position of the waste acceptance area is beside the screening area in the adjacent secondary processing area, which means that finished compost or indeed recycled wood chip, can be conveyed into the area for mixing.

The closeness of these facilities and the isolation of the waste acceptance area ensures that all incoming waste is mixed and processed the same day. This ensures that minimum downtime is assured from the loader drivers perspective and that an efficient materials handling system is in place for finished compost and amendment.

The waste is converted into compost using a controlled static pile, forced aeration system. The mixing and composting takes place entirely within the sealed building. The incoming wastes will be mixed with dry finished compost and other amendments. The amendments used are sawdust and shredded woodchips.

The 12 composting bays contain aeration channels that allow air to blow evenly through the compost pile. When the waste is mixed according to standard operating procedures the resulting admixture is at approximately 60% moisture. This is sufficient for high rate composting, creating relatively high temperatures within 12 hours of blending.

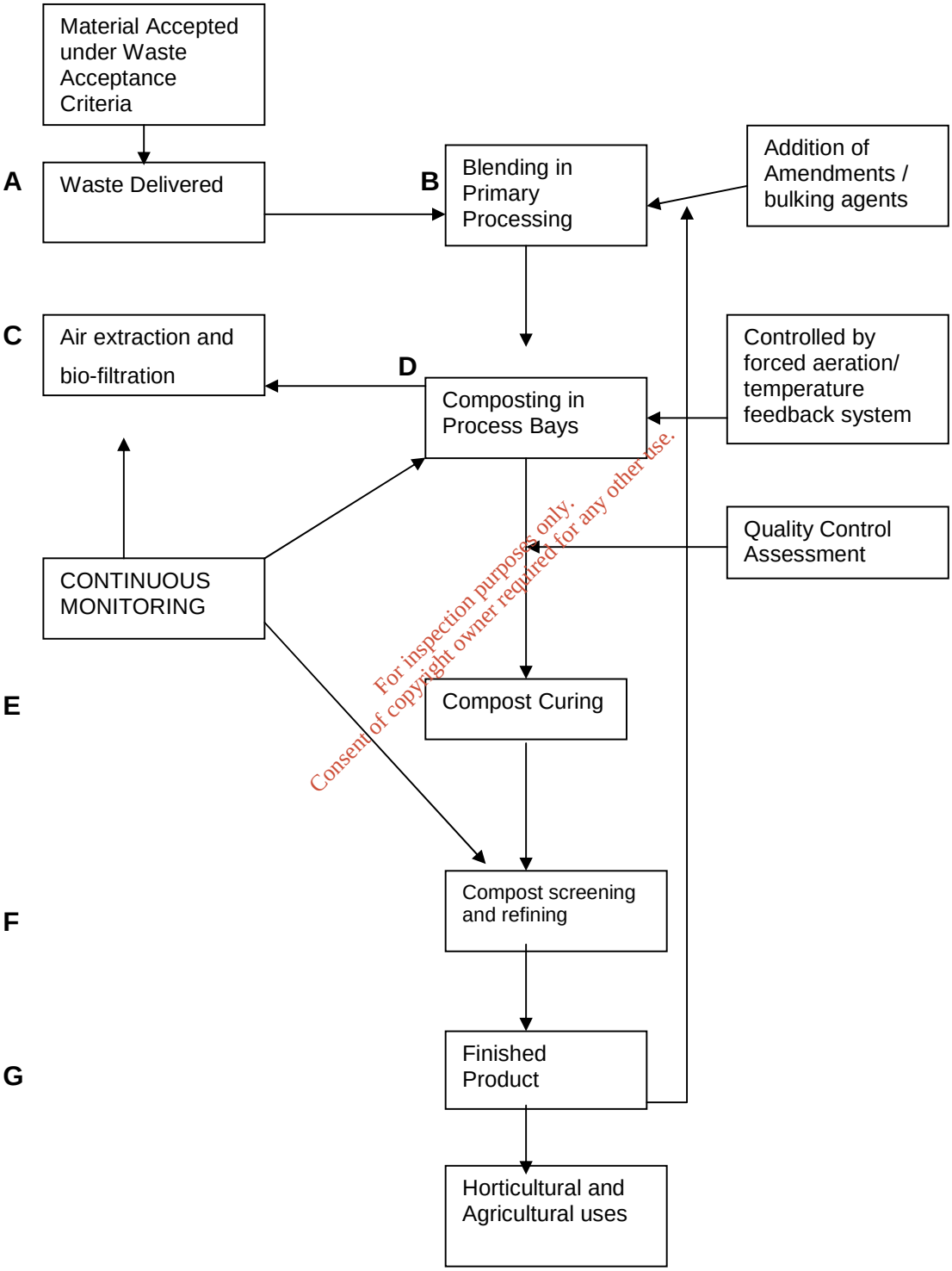
The mixture is brought by the loader into the composting bays behind the primary processing area. It is loaded into the bays until the bay is full. Temperature probes are placed in the middle of the bay. These relay the temperature of the pile to a control panel located at the front of the building in the control room. When sufficient temperatures are reached for controlling pathogens, speed regulators on the fans adjust the air volume entering the bay according to the temperature within the bay. If the bay is getting very hot, for example, more air is added which cools the bay to the ideal temperature inputted. Once this is reached the air volume reduces again to prevent further cooling. This controls the process and allows the composting process to meet the guidelines envisaged in the EPA Waste Licence. It also allows the complete breakdown of material in the bay under highly controlled aerobic conditions. On/Off systems are less reliable and utilise more electricity than speed controlled systems.

Once the compost reaches the ideal temperatures for a week it continues to hold high temperatures for approximately 2 to 3 more weeks. Water levels, breakdown of material and lack of food supply for microbes reduces the temperatures down naturally after this time. However when the material is removed from the bay and put back into another it starts the high temperature process again. The reason is because the material breaks up during the handling process and becomes mixed up though the system releasing nutrients to the microbes again. A high level of activity starts again but temperatures reduce rapidly this time in the second phase of composting. Once this happens the material is sent over to a secondary composting are where the curing process occurs. Compost in these bays is stacked higher here and the aeration rate is reduced. Odour potential in these bays is very low and in this phase the compost becomes stable, dry and is ready to be shipped from site. Once the compost is assessed for maturity indicators it is screened. Three things happen here: Some compost is sent back over to the primary processing area, some compost is stockpiled in the corner to await transit from site and the heavy "overs" from the screening process are sent also back to the primary processing area for mixing with incoming waste materials.

The controlled aerobic system eliminates any possibility of odour from the facility.

All incoming waste is non-hazardous. The waste requires analysis to meet specific waste acceptance criteria. Once this is met and documented permission is granted to allow the material to enter the premises. A number of trial loads are required to fully integrate the waste into the facilities waste list. Ultimately, waste needs to produce compost which meets Acorn Recyclings' own compost standard as well as the standard set out in the EPA Waste Licence.

Figure AR2-03: Process Flow Diagram



Advantages of Composting

The composting of non-hazardous organic residues produces a very valuable end product from material that was previously considered a waste. Compost has a large variety of applications and uses.

In an integrated waste management system, composting is considered a sustainable process that manages the problems associated with liquid and semi solid waste. It contributes to the reduction of these wastes going to landfill, reduces environmental impacts associated with direct application of raw bio-solids to land, and eliminates the risk concerning pathogens affecting people. Composting contributes to pollution control, is a public health benefit and aids resource recovery.

The compost produced by Acorn would be considered a Class 1 according to the European Commission Working Document Biological Treatment of Bio-waste 2nd Draft. It is a dry, stable material, which can be stored, and applied on land when ground conditions allow. There is also a large market for compost for landscaping and in general horticulture in Ireland and abroad.

Acorn Recycling has made significant progress in developing markets for the products abroad and has committed to key customers who require specific product blends for use in commercial horticulture and as a soil amendment. Such is the demand for products such as this internationally, Acorn has established links with compost producers in Ireland and UK to supply centralised blending facilities with compost suitable for export. Acorn has stringent acceptance criteria for products such as this which will be further blended in Ireland and the UK prior to shipment in specialised bulk containers.

The Air Handling System

Integral to the composting system is the air handling system that controls the flow of air from the composting bays through to the air purifying bio filter. 12 5.5kw fans will supply air to the composting bays. Three 30 kilowatt extraction fans will extract air from the composting bays and from the waste intake area. Two extraction fans will be located in the primary composting building and one will be located in the secondary composting building, due to the reduced aeration requirements in these composting bays. A negative air pressure will be maintained within the building and the roller shutter doors which effectively shut off the composting sections from the processing areas means that the units are completely sealed off from the atmosphere. The processing areas are internal and sealed with air extraction in the waste intake area. This secondary barrier allows unprecedented control of air within a composting building.

The composting process itself, being fully aerobic and controlled through supply of oxygen to the micro organisms, produces very few gases that would be considered odorous, such as mercaptans, methane and hydrogen sulphide. These gases are normally considered to be produced during an anaerobic activity and if produced during composting, would indicate that the process is being run ineffectively. The air handling system proposed has a number of features which enables the entire air volume to be stopped. The composting sections are already sealed from the materials handling area. Also the biofilter extraction fans can be turned to 0, preventing the escape of air from the building.

In the event of an electrical fault or circumstances where the bays are shut down, a slow start up procedure can be implemented. This involves the shut down of extraction fans, and the slow start up of composting bays. Once an assessment of the composting bays has been made that shows aerobic activity has again commenced, only then do the extraction fans begin winding up slowly until full power is resumed.

This Odour Prevent System effectively eliminates any air from leaving the facility unless it is from aerobic composting bays.

The Biofiltration System

Biofiltration is an air pollution control technology adapted from a naturally occurring soil process that uses micro-organisms to break down volatile organic compounds (VOC) and oxidisable inorganic gases and vapours contained in the air. It is an effective and efficient means of removing biodegradable compounds from the air. For these reasons, industrial applications of biofiltration have gained acceptance and have increased in numbers during the past 15 years.

The biofiltration process involves bacteria and fungi that are dispersed throughout the woodchip media. As exhaust air passes through the media, the bacteria degrade odorous gases. Therefore, a biofilter is a living ecosystem of micro-organisms that continually destroy the trace gases. To support this living ecosystem, a biofilter are managed with respect to the correct moisture content, oxygen level, temperature and substrate availability

.

Acorn will incorporate biofiltration into its process in order to purify air emissions from its enclosed facility.

The air will be cleaned of dust particles, biological particles and trace gas from the composting process. The air essentially contains food which the microbes living on the surface of the woodchip metabolise.

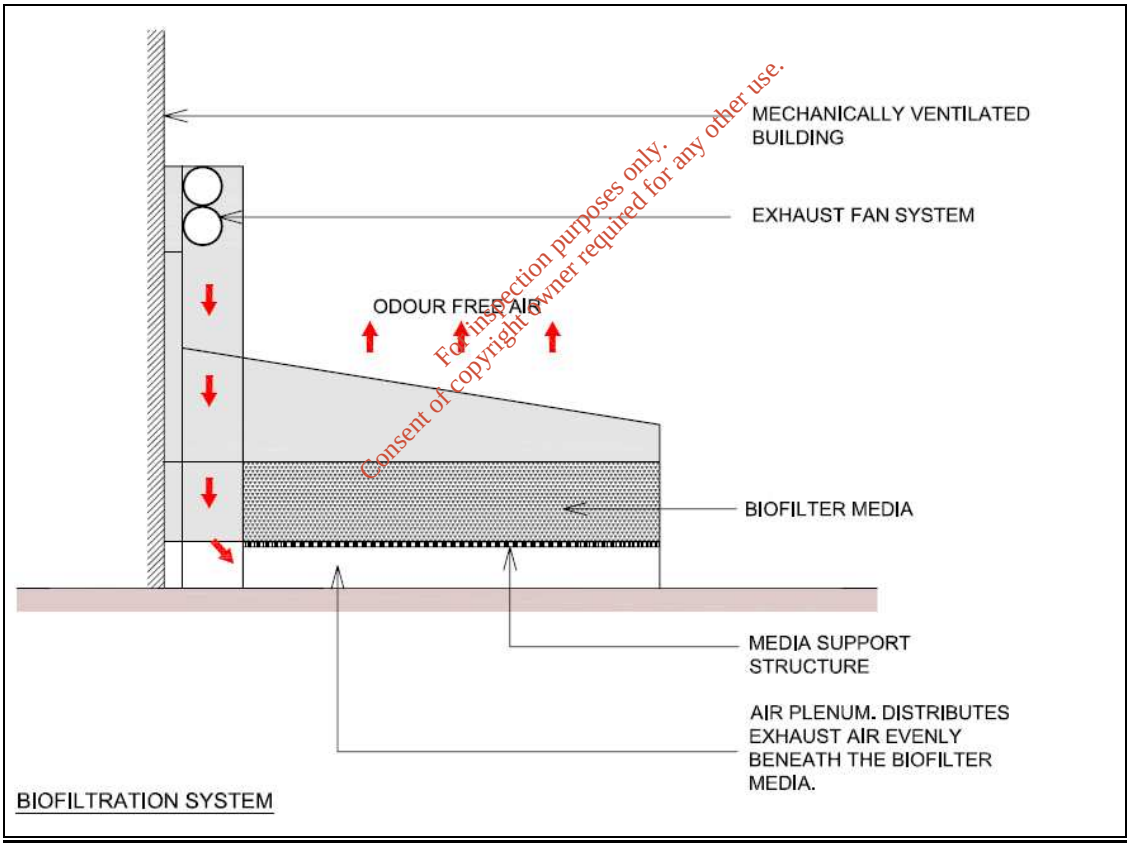
Biofilter Configuration

The biofilters operating at the facility will consist of:

1. A mechanically ventilated building that controls gaseous emissions.
2. An exhaust fan system to bring the air to the biofilter.

3. An air plenum to distribute the exhaust air evenly beneath the biofilter media.
4. A media support structure that supports the media with a sufficient opening that does not cause a high back pressure for the exhaust fan.
5. Biofilter media to serve as a surface for microbial activity. The porosity of biofilter media will be sufficient, both for the passage of exhaust air and to provide area for bacterial growth.

Figure AR2-04: Biofilter configuration.



Media Material

Media selection is a critical factor in biofilter design. For a biofilter to operate efficiently, the media must provide a suitable environment in which micro-organisms can live and reproduce, have good moisture holding capacity, and have a high porosity for minimal back pressure. Clean woodchip will form the entire media capacity. Woodchip creates enough porosity to allow even circulation of the air volume through the pile. The woodchip only biofilter provides no food to the microbes, only the air provides this. This ensures that the air is purified entirely. No odour would be evident from the biofilter itself as the material enters its final stage of its use. In fact, the woodchip only biofilter has a lifetime expectancy of 3 to 5 years.

Moisture Control

Biofilter moisture is essential for adequate odour reduction through the biofilter. The high humidity of the air contained in the building provides the biofilters with adequate moisture throughout the year. Nevertheless, the moisture content will be regularly analysed using a gravimetric moisture analyser.

Biofilter Maintenance

The biofilter design allows easy access to the media. The media will need to be agitated once every year, and changed every two to three years. The biofilters will be totally sealed. The equipment used to change the filter media will be a DISAB centurion, a truck mounted air moving system that is capable of removing and replacing the woodchip. This reduces downtime of the biofilter sections to a minimum.

Biofilter Shutdown

In case of power failure, the fans are shut down leaving no route for air to escape. The building will be sealed and insulated, and the door will be kept closed. This will eliminate the possibility of any fugitive emissions.

Bio-filter Monitoring

Table AR2-01 below outlines the monitoring schedule proposed by Acorn Recycling to ensure optimum performance.

Table AR2-01: Bio-filter monitoring schedule

Parameter	Monitoring Frequency	Analysis Method/Technique
Bed Media		
Odour Assessment	Daily	Inspection
Condition of Biofilter	Daily	Inspection
Moisture Content	Annually	Standard Method
PH	Annually	PH Probe
Ammonia	Annually	Standard Method
Total Viable Counts	Annually	Standard Method
Inlet and Outlet Gas		
Ammonia	Annually	Colourimetric Indicator Tubes
Hydrogen Sulphide	Annually	Colourimetric Indicator Tubes
Mercaptans	Annually	Colourimetric Indicator Tubes

2.3 Construction and Decommissioning

Construction of the site will take place over a four month period. A full geophysical assessment of the facility site will have taken place to determine the exact construction process for the building foundation. The hydrogeology report has indicated the soils type present on the site. The ground preparation will take place so that winter conditions will be avoided.

The construction site will be developed to facilitate the workers on site, their requirements and the sites requirements. The construction sites facilities will include: office for reception, lock up store, mess room, toilets, materials storage area, scaffold storage and tower crane. The site will take into consideration road access, temporary road access into the site and the needs and requirements of local road users. Health and Safety, road signage and operation hours will be controlled in order to reduce impacts of the construction project on the local environment.

Construction of the project would generate excavation solids (soil, rock), workers generated solid waste and miscellaneous construction debris.
The largest number of construction employees on site would be 25 at any one time. The solid waste would be collected from portaloos on site and transported off site by a permitted haulier. No significant adverse effects would result from the employee generated waste during construction activities.

The proposed plant has a total floor area of 34,751 sqm. Excavation for the site roads, buildings and hardstanding areas would generate approximately 138,000 m^3 of solid material. The earth would be utilised on site for earthen embankments, roadway embankments and landscaping. Soil would be collected and transported off site by a permitted haulier who could put the remainder of the material to a variety of uses including clean fill. Any material which may require landfilling would be sent to Murphy Environmental, The Naul, Co. Dublin. This

site is EPA licensed and the material is utilised as landfill to remediate the old quarry site. Additional solid waste would be generated as a by product of construction. The materials would be highly variable; it would include concrete, packaging, pipe work and electrical materials. This waste would be disposed or recycled in accordance with best practise. Wheel washes will be constructed on the site to minimise the accumulation of mud on tyres and axles of trucks leaving the site.

It is anticipated that the solid waste would not result in a significant impact on local or regional waste streams, given the level of works being carried out close to the site, i.e. major motorway infrastructure projects and the massive requirements for topsoil for motorway embankments. Indeed there is a general shortfall for this material in the area as a result of this material.

Noise levels and vibrations will increase during the construction phase of the project. The site will be closed at hours deemed unacceptable to work. The site will not be 24 hours a day operation. The bulk of the construction will be carried out at the farthest part of the site from the main road and away from any residential areas. This will not create an adverse impact as a result.

2.3.1 Decommissioning

A residual management plan (RMP) will be drawn up in the event that the facility is decommissioned. The RMP contains a breakdown of the site, its storage contents, including raw materials processed materials, equipment etc. The RMP states the requirements be they disposal or reuse of the entire plant and contents. A budget is estimated in the RMP and a bond is secured to ensure that this is carried out in the event of decommissioning. The plant is run down so that no waste materials are present, so there is a minimal risk to the environment from storage of raw unprocessed materials in this event.

SECTION 3: ENVIRONMENTAL ASSESSMENT

Section 3: Environmental Assessment

3.1 Human Beings

3.1.1 Existing Environment

The proposed site is located 2 kilometres from the village of Littleton. The following map shows the approximate location of the village of Littleton in relation to the town of Thurles.

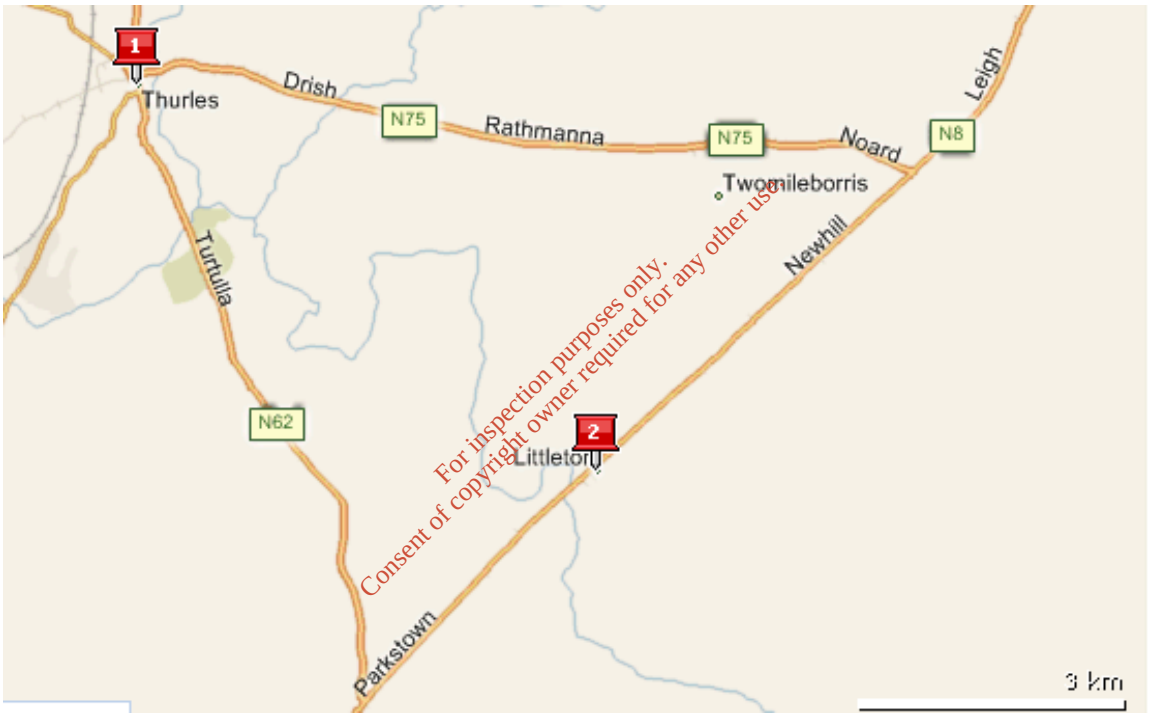


Figure AR3-01: Map of road network

Littleton is a small rural village. According to the 2006 census the population of the village and the nearby area is 1138 persons (581 men and 557 women). The population of Littleton in 2002 was 1153 persons (600 men and 553 women) showing a population decrease of 1.3% since the census taken in 2002. (*Central Statistics Office 2006*).

The services available in the village are similar to any small rural village. There are two public houses, a hairdresser, 6 shops, a band hall, a primary school, two playing pitches, a creamery, one Roman Catholic Church and one Church of Ireland. There is no secondary school in Littleton. Pupils travel to one of the 4 secondary schools located in the town of Thurles.

The majority of housing in the village of Littleton are local authority houses. There are a large number of settled travellers in the area of Littleton both in the village itself and in a local authority built development near the site. Figure AR3-02 shows travellers camped near the proposed site while Figure AR3-03 on the following page shows all dwellings in the vicinity of the site. As can be seen from Figure AR3-03 there are no houses located within 250 meters of the centre of the site with the nearest dwelling being approximately 350 meters away.

Figure AR3-02: Travellers encampment located near the site.

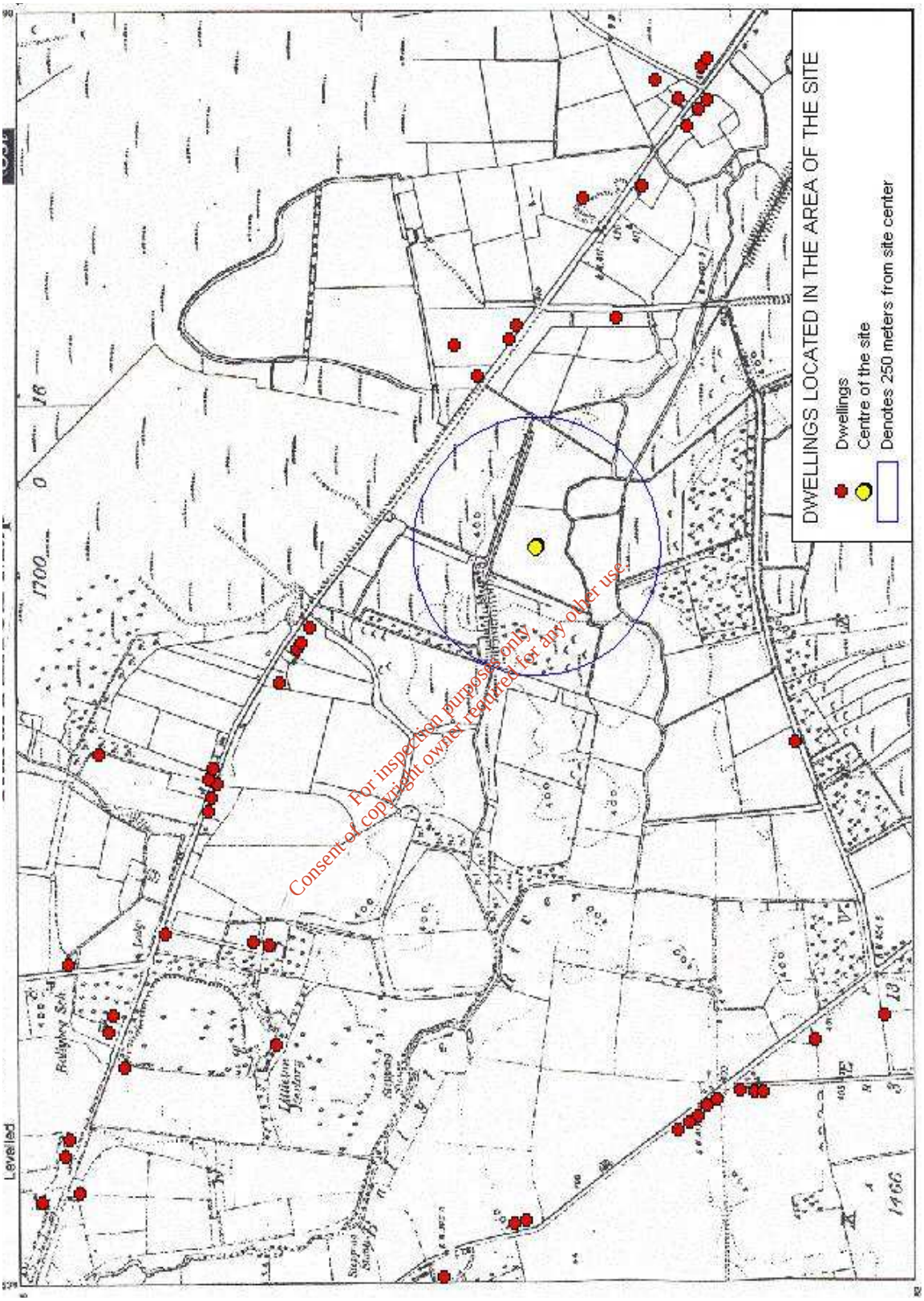


Figure AR3-03: Dwellings in the vicinity of the site

The main income for the area would be from agriculture with just one major business in the immediate locality, this being the Bord Na Mona briquette factory located approximately 2 miles from the village. This plant employ's approximately 130 people, mostly from the surrounding area.

Figure AR3-04: Bord Na Mona Briquette Factory

Current Road Infrastructure

The village of Littleton is located next to the main Dublin-Cork road (N8). This is a busy single lane national primary road at the moment and carries all traffic travelling from Dublin to Cork (See Figure AR3-05 on following page). The road narrows as it passes through Littleton with a statutory speed limit of 50Km/h and has several traffic calming measures put in place over the last number of years.

Access to the proposed site from Littleton is by a regional road (See Figure AR3-06) that was upgraded by Bord na Mona in order to facilitate Heavy Goods Vehicles and extra traffic volume associate with the briquette factory during the peak of it's production (See traffic survey for details of current use).

Figure AR3-05: Main Dublin-Cork Road passing through Littleton

Figure AR3-06 below shows the view along the road serving the proposed development looking in two directions. The left side of the picture shows the roads direction towards Killenaule. The right side of the picture shows the road towards Littleton/Thurles.

Figure AR3-06: Road serving proposed development

Traffic Survey

A traffic survey was carried out on Tuesday the 27th of June 2006 along the road serving the site (Littleton to Killenaule road). The survey was carried out during normal working hours (8am to 6pm). As the survey was carried out during the school summer break fewer buses were counted than normal. This absence is not deemed significant in proportion to the traffic actually monitored.

The following table shows an hour by hour breakdown of the traffic passing the site entrance. As expected the busiest periods were from 8-9 am and from 5-6 pm when people are commuting to and from work.

VEHICLES	HOURS FROM 8AM TO 6PM											
	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	TOTAL	%
CARS	106	75	56	57	70	70	72	70	116	136	**828**	65%
SMALL VANS	9	6	5	8	6	3	5	3	10	15	**70**	5%
COMMERCIAL VANS & JEEPS	27	22	13	20	26	20	15	25	32	24	**224**	17.5%
TRUCKS	10	14	5	10	13	10	17	16	17	6	**118**	9%
AGRICULTURAL	1	2	2	2	1	2	3	5	2	2	**22**	2%
BUS & MINI BUS	2	0	1	1	1	0	2	2	1	2	**12**	1%
MOTORBIKES	1	1	0	0	2	0	0	1	1	0	**6**	0.5%
HOURLY TOTAL	**156**	**120**	**82**	**98**	**119**	**105**	**114**	**122**	**179**	**185**	**1280**	**100%**

Table AR3-01: Traffic Survey Data

The pie chart on the following page clearly shows the percentage, type and frequency of the different vehicles recorded during the survey. Car traffic represents is by far the majority with 65%. Commercial vans and jeeps also have a significant presence with 17.5%. The number of trucks and small vans present on the road was also significant (9% and 5% respectively) whilst agricultural vehicles, buses and motorbikes were less significant (3.5% between all 3 categories).

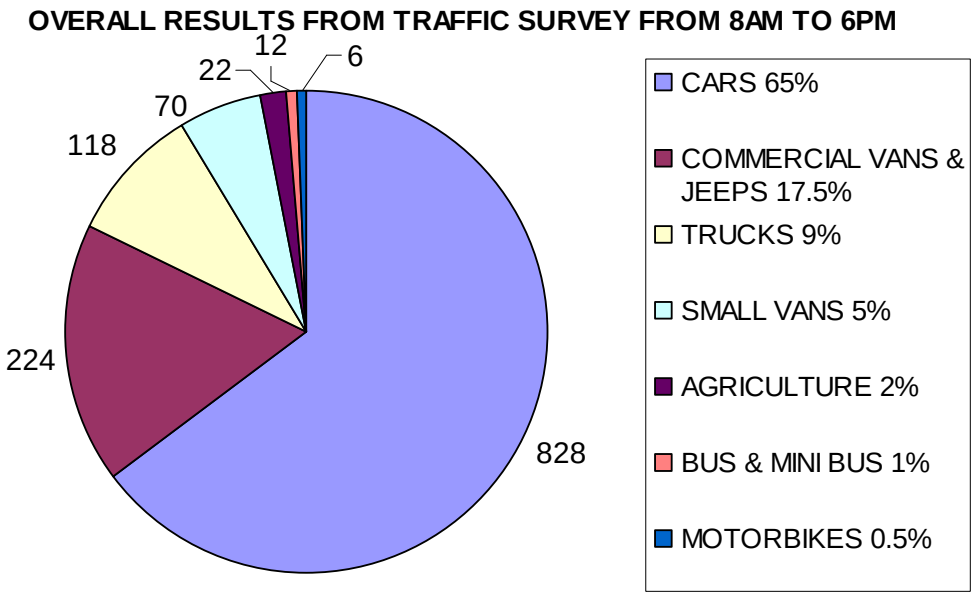


Figure AR3-07: Road Traffic Results

Proposed New Road Infrastructure

Work is to commence on a Motorway/Dual carriageway to link up to the Cullahill-Cashel bypass projects at the beginning of 2007 alleviating heavy traffic flow on the current main road leaving a good quality primary road (N8) in the locality of the site. The new road development is to comprise of two sections, these will be a 10.5km of 2x2 motorway from Cullahill to Urlingford and the section nearest to the site will be a 29km 2x2 high quality dual carriageway from Urlingford to Cashel. The nearest junctions to the proposed development will be at the Horse and Jockey and Two-Mile-Borris. Traffic joining the new road at the Horse and Jockey junction will be able to travel both northbound and southbound while traffic joining at the Two-Mile-Borris junction will be able to travel northbound only.

Land Use

Past land use of the site was solely agricultural. Developments on the site will not interfere with any public rights of way, amenities or other public access on the site as none of the aforementioned are present. There are no Special Areas of Conservation (SACs), or National Heritage Areas (NHAs) on the site or in the immediate locality of the site.

3.1.2 Potential Impacts

Any detrimental significant impact on air quality, noise, flora and fauna, soils, Water and hydrogeology, material assets, climate, and landscape will also have a detrimental impact on the health and/or well being of human beings.

Human beings are particularly sensitive to a number of different impacts that would not affect other organisms to such an extent. These include the sensitivity of human beings to the deterioration of an area in terms of recreation, cultural value, and economic value. Industrial developments have the potential to have significant impacts on residents from excessive noise from machinery and traffic, odour and dust, and reduced recreational value of the area in terms of the impact on the aesthetics of the landscape. Since the developers of this development have been aware of these potential impacts since project conception, the layout, processes, and sighting of the facility have been planned so as to prevent or minimise these impacts. The details of how the design of the development has mitigated against each of these potential impacts is discussed within their respective sections.

In recent years agriculture has generally declined as a lucrative source of income. As a result the populations of many rural communities are in decline as younger people move to urban areas in order to find employment. This development will directly employ 7 people in management, operations and administrations. Indirect employment will include jobs in logistics, deliveries, site maintenance and spin off services for local mechanics, electricians' etc all of

which will provide benefits for the local economy. To the environs of Ballybeg and Littleton, these impacts are significant.

Impacts on Traffic

As can be seen from the table below, it is anticipated that this development will result in an increase in traffic movements of 4.83 percent from a total of 1280 movements to 1341.77. The main increase that will occur will be the number of trucks increasing from 9 percent to 12 percent of total movements.

Table AR3-02: Predicted increase in traffic movements

Vehicle Type	Current daily movements	Predicted additional movements per day	Total movements during operations per day	Percentage increase
Cars*	828	14*	842	**1.69**
Commercial vans and jeeps**	294	6**	300	**2.04**
Trucks***	118	41.77***	159.77	**35.39**
Others	40	0	40	**0**
Total	**1280**	**61.77**	**1341.77**	**4.83**

* No of movements based on 7 employees making two car journeys (in and out of work), equals 14 additional car movements per day.

** An estimated 2 deliveries per day (4 movements), plus 2 movements from on-site commercial vehicles equals 6 movements in total

***See Table AR3-03 below

Table AR3-03 below shows the approximate numbers of trucks that will service the development in order to deliver waste and amendments, and collect the finished product. It illustrates the methodology used in estimating the increase and shows a breakdown of the types of vehicles that will service the facility.

Table AR3-03: Materials transportation

Materials Moved	Total Annual Weight (tonnes)	Truck Type	% of Material Transported	Capacity of truck type (tonnes)	Required Movements/day
Waste (sludge)	45,000	Hook loader	50	15	**11.54**
		Chain-lift truck	15	8	**6.49**
		Articulated tanker	15	27	**1.92**
		Combined jetting tanker	10	12	**2.88**
		Dewatering tanker	10	12	**2.88**
Amendments	11,000	Tipper trailer		20	**4.23**
Compost	20,000	Articulated tanker		13	**11.83**
Total	**76,000**	---		---	**41.77**

Figure AR3-08: Vehicles estimated to service facility

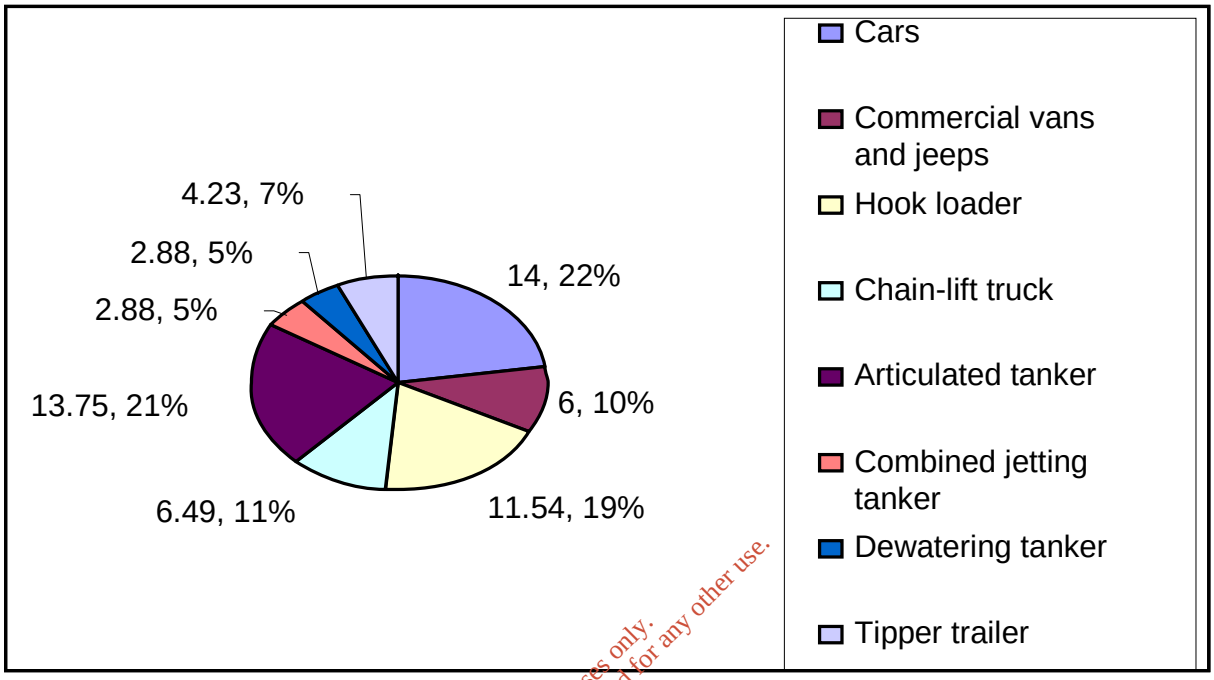
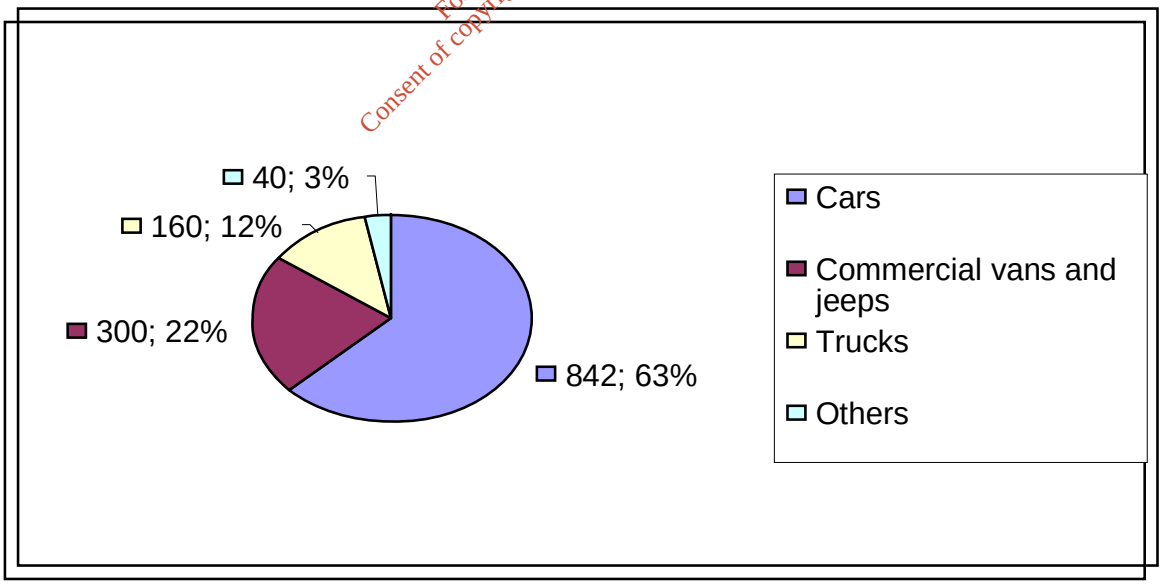


Figure AR3-09: Overall Predicted Traffic 8am-6pm during operations



3.1.3 Mitigation Measures

This site has been located at a distance from human dwellings that eliminates any risk to human health and positioned so as not to impact negatively on the landscape. The growth of the surrounding willow plantation will actually increase the amenity value of the landscape. As discussed further in each impact category the site location is such that all of the detrimental impacts on human beings are eliminated.

Because increased traffic volumes has the potential to cause nuisance to local residents, in the form of noise pollution, waste will only be accepted on site between the hours of 8am-5pm Monday to Friday and 8am-1pm on Saturday.

The positive impacts of the development on human beings such as on the local economy need not be mitigated against. Acorn's policy of employing local people as much as is reasonably practicable will maximise these economic benefits for the environs of Ballybeg.

3.2 Flora and Fauna

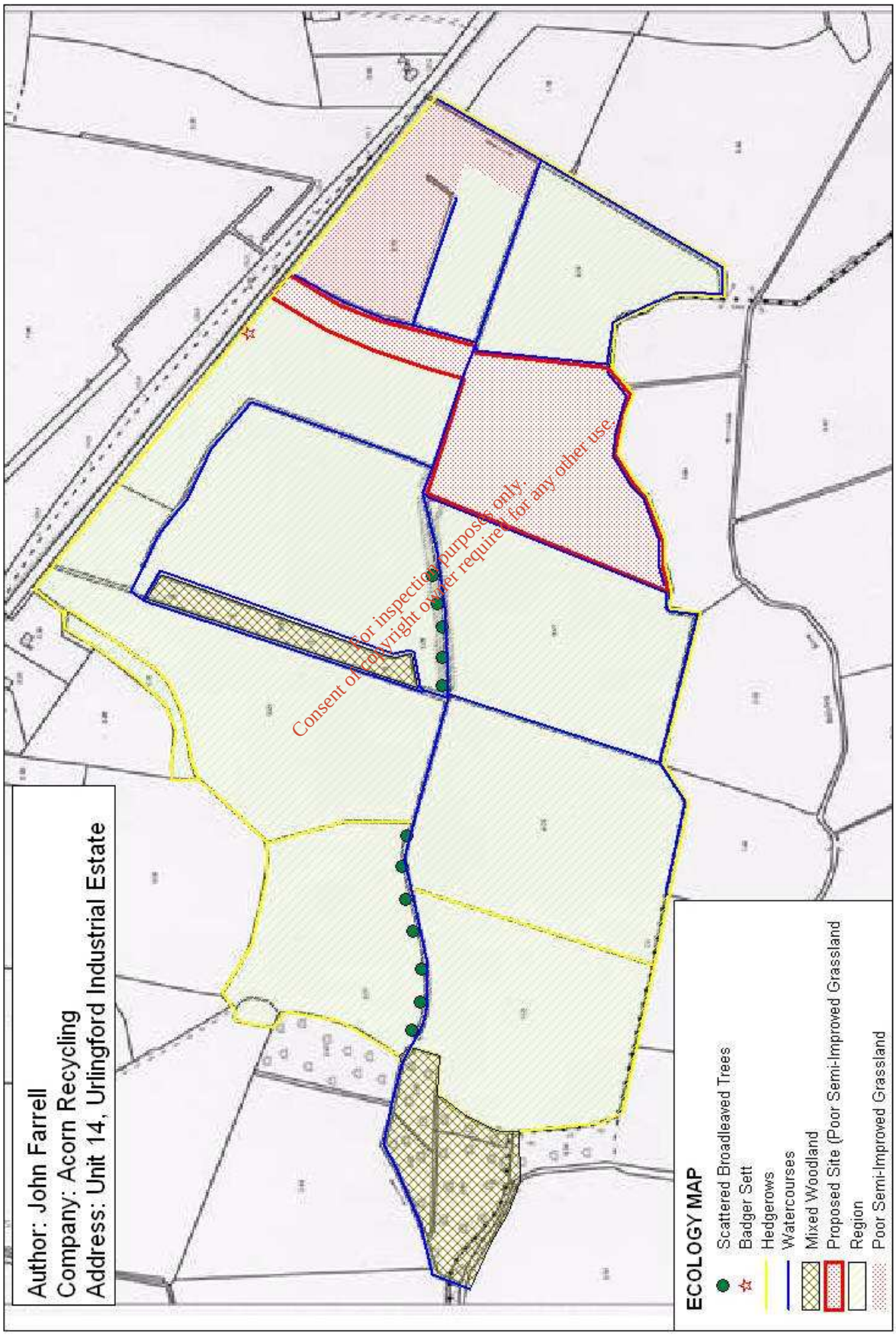
3.2.1 Existing Environment

Introduction

The site examined for the purpose of this Environmental Impact Statement is a traditional grassland site previously used for the grazing of livestock. The land immediately next to the site is pasture land and a recently established willow plantation. The main ecological aspects of the site are detailed in Figure AR3-10 on the following page.

Following an initial site walkover it was decided that due to the small area of the proposed site (3.47 ha) and the uniform vegetation cover the area did not need to be divided into separate sections. Information on the site regarding Special Area's of Conservation (SAC's), Special Protection Area's (SPA's) and Natural Heritage Area's (NHA's) was compiled from the heritage council's website (www.heritagedata.ie), none of these conservation areas were identified.

Figure AR3-10: Ecology map of the site and surrounding land



Data collection for the flora and fauna present across the site was carried out using 5 different methods.

These methods were:

1. Quadrants (Ground Flora)
2. Complete Count (Trees)
3. Sightings (Birds, Mammals, Insects Reptiles and Water Dwellers)
4. Droppings (Mammals)
5. Soil Disturbance Around Burrows (Mammals)

Ground Flora

For the ground flora 5 randomly placed meter square quadrants were used. Due to the small site area (approximately 3.2 ha) and the low plant diversity across the site 5 sample points were adequate to get a good representation of the ground flora present.

Figure AR3-11 on the following page shows the approximate locations of each of the 5 quadrant locations.

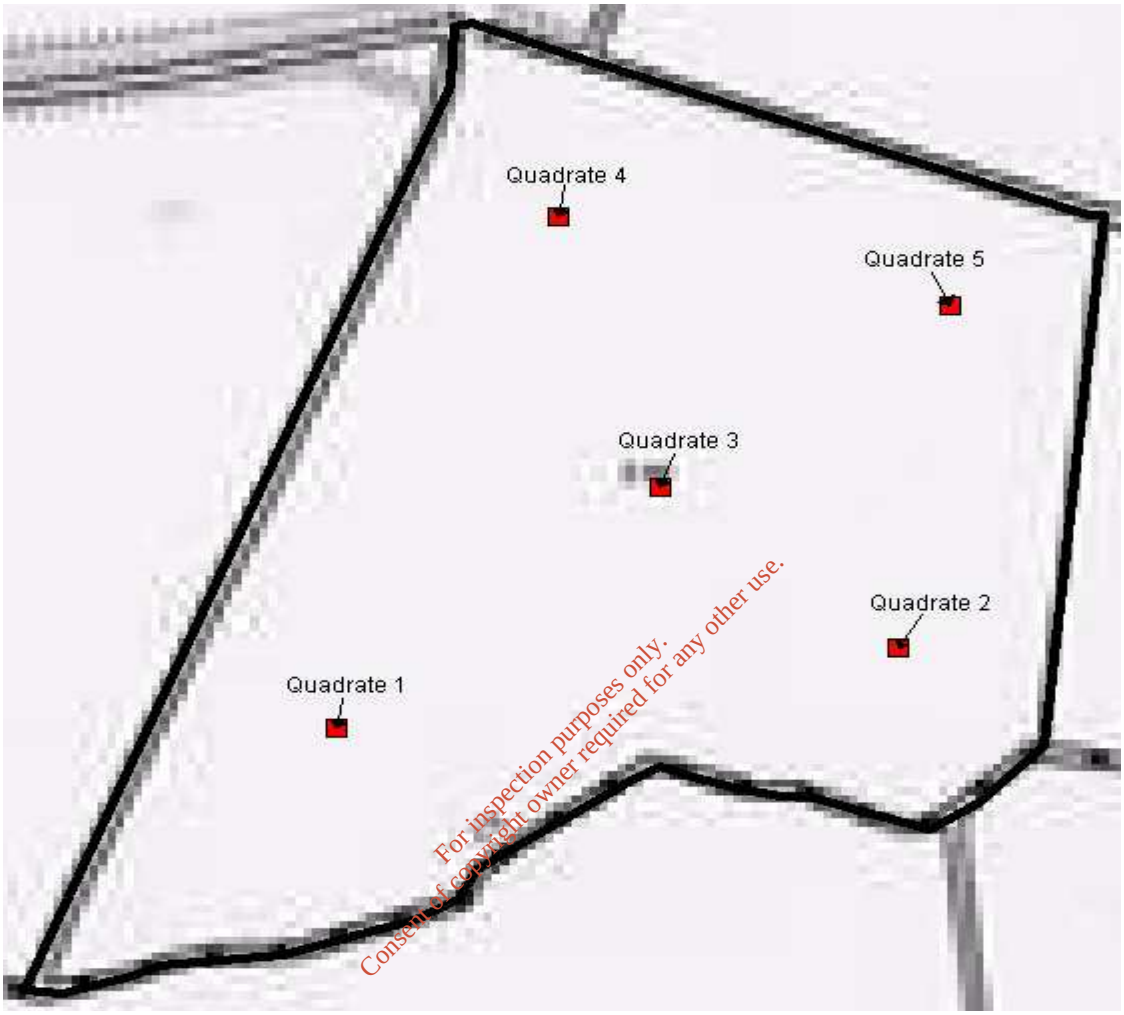


Figure AR3-11: Locations of the 5 Quadrats.

Ground Flora Results

The following table shows the recorded plant species and in which quadrant they were recorded. From the results of the flora found on the site it would indicate that the site and the soil type is at present consistent with the characteristics of a Wet Grassland, Code GS4 as defined in “A Guide to Habitats in Ireland” (2000).

Quadrant No.	Common Name	Scientific Name
1	Tormentil	*Potentilla erecta*
	White clover	*Trifolium repens*
	Purple moor grass	*Molina caerulea*
	Rough meadow grass	*Poa trivialis*
	Common nettle	*Uttica dioica*
2	marsh bedstraw	*Galium palustre*
	rushes	*Juncus sp.*
	Tormentil	*Potentilla erecta*
	Purple moor grass	*Molina caerulea*
	Rough meadow grass	*Poa trivialis*
	Curled dock	*Rumex crispus*
	Meadow sweet	*Filipendula ulmaria*
3	Purple moor grass	*Molina caerulea*
	Rough meadow grass	*Poa trivialis*
	rushes	*Juncus sp.*
	Creeping buttercup	*Ranunculus repens*
4	Purple moor grass	*Molina caerulea*
	Rough meadow grass	*Poa trivialis*
	Tormentil	*Potentilla erecta*
	Moss	*Sphagnum subnitens*
	rushes	*Juncus sp.*
	Creeping buttercup	*Ranunculus repens*
5	Rough meadow grass	*Poa trivialis*
	Tormentil	*Potentilla erecta*
	Common foxtail	*Alopecurus pratensis*
	Creeping buttercup	*Ranunculus repens*
	marsh bedstraw	*Galium palustre*
	Moss	*Sphagnum subnitens*

Table AR3-04: Ground Flora Results

The graph below shows clearly the percentage frequency of each plant species.

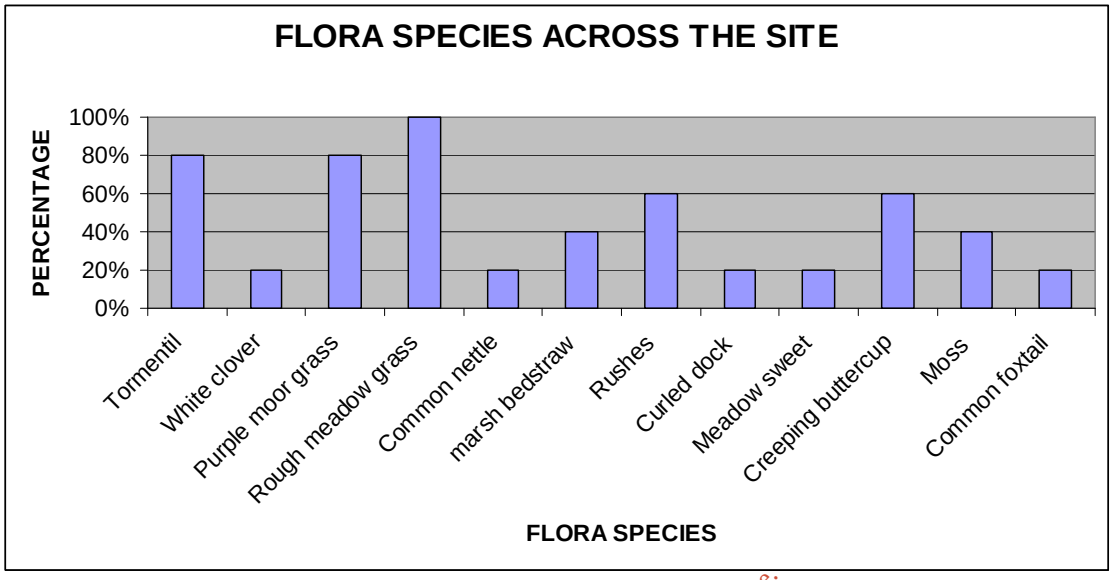


Figure AR3-12: Results of Flora Species

Tree Species

Due to the small number of trees surrounding the site a complete count of all the trees was carried out.

Table AR3-05 below lists all the tree species present and also shows their frequency around the site. It is worthwhile noting that the trees counted were confined to the boundary ditches of the site and that no trees were present across the actual site itself.

Tree Species (Common Name and Scientific Name)	Frequency
Ash (*Fraxinus excelsior)*	111
Whitethorn (*Crataegus mongyna*)	45
Alder (*Alnus glutinosa*)	20
Willow (*Salix*)	9
Crab apple (*Malus sylvestris*)	7
Elm (*ulmus laevis*)	4
Sycamore (*Acer pseudoplatanus*)	2

Table AR3-05: Trees Species on Site

The pie chart below illustrates clearly the varying number of tree species around the site.

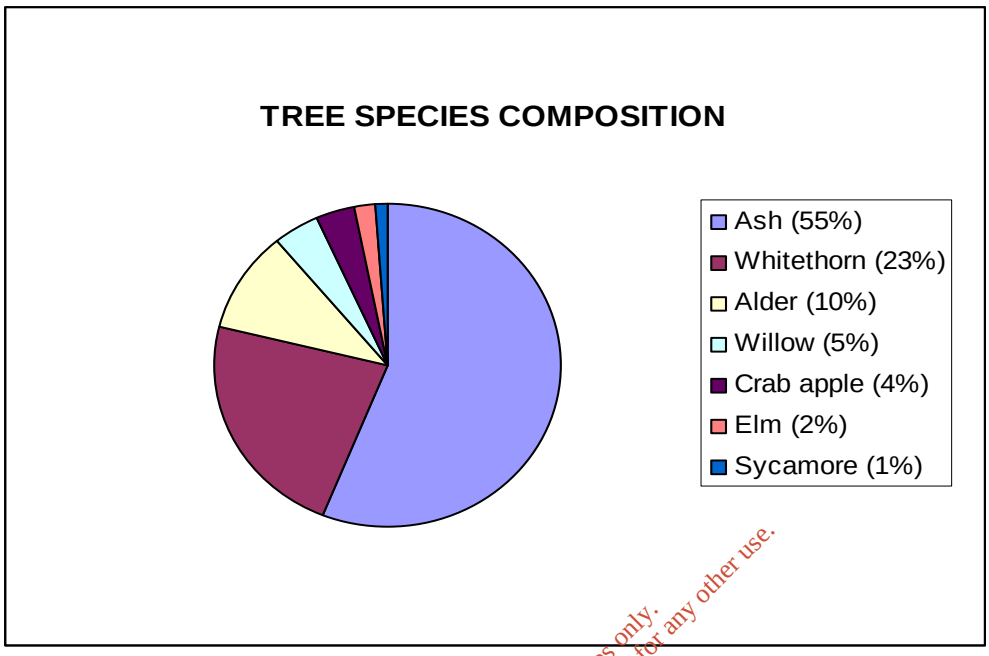


Figure AR3-13: Tree Species Composition

Fauna

The data on the fauna on site was collected using various methods over approximately 4 months. These methods were sightings, droppings, disturbances of earth around burrows indicating occupancy and sightings across the site whilst carrying out the flora survey.

The fauna on site has been categorised for ease of presentation, these categories will be;

- Birds
- Mammals
- Insects, Reptiles and Water Dwellers.

Birds

The data collected for birds on the site was done primarily through sightings. Species were noted on a daily basis as work was carried out on the site and the surrounding area. The data collection began in the middle of January and continued for approximately 4 months to ensure an accurate and complete account of all birds in the vicinity of the site.

Table AR3-06 below shows the birds seen on the site and the frequency of these sightings.

BIRDS PRESENT ON SITE		
Common Name	**Scientific Name**	**Sightings***
Blackbird	*Turdus merula*	Daily
Blue Tit	*Parus caeruleus*	Daily
Bullfinch	*Pyrrhula prrrhula*	Several Times a week
Chaffinch	*Fringilla coelebs*	Daily
Coal Tit	*Parus ater*	Several times a week
Great Tit	*Parus major*	Daily
Grey Heron	*Ardea cinerea*	2 sightings
Hooded (Grey) Crow	*Corvus corone cornix*	Daily
Jackdaw	*Corvus monedula*	Daily
Magpie	*Pica Pica*	Daily
Mistle Thrush	*Turdus viscivorus*	Several times a week
Pheasant	*Phasianus colchicus*	21 sightings
Pied Wagtail	*Motacilla alba*	Daily
Robin	*Erithacus rubecula*	Daily
Rook	*Corvus frugilegus*	Daily
Snipe	*Gallinago gallinago*	Daily
Song Thrush	*Turdus philomelos*	Several times a week
Starlings	*Sturnus vulgaris*	Daily
Swallow	*Hirundo rustica*	Daily since mid April
Woodpigeon	*Columba palumbus*	Daily
Wren	*Troglodytes troglodytes*	Several times a week

Table AR3-06: Bird Species Present on Site

* Recorded in a folder daily and compiled at the end of observation period.

None of the bird species recorded appear on the red or amber list of protected bird species.

Mammals

The following table shows the mammals present on the site. Rabbits and foxes were seen on site but pellets consistent with badgers were found on site along with footprints.

Common Name	Scientific Name
Red Fox	*Vulpes vulpes*
Badger*	*Meles meles*
Rabbit	*Oryctolagus cuniculus*

Table AR3-07: Mammals Present on Site

*Badgers are protected under schedule 5 of the wildlife act 1976 and are also listed in the Irish Red Data Book. A badger sett was discovered near the proposed site but not within the proposed development area (See Figure AR3-10 for location of the sett).

Insects, Reptiles and Water Dwellers

Data collection for insects, reptiles and water dwellers was carried out on sightings and while carrying out the flora survey.

COMMON NAME	SCIENTIFIC NAME
Common Blue Damselfly	*Enallagma cyathigerum*
Common Woodlouse	*Oniscus asellus*
Common Yellow Dung Fly	*Scatophaga stercoraria*
Crane Fly Larva (leatherjacket)	*Tipula maxima*
Frog and Tadpoles**	*Rana temporaria*
Green Veined White	*Artogeia napi*
Orange-Tip Butterfly	*Anthocharis cardamines*
Pill Woodlouse	*Armadillidium vulgare*
Red Ant	*Myrmica rubra*
Small Wolf Spider	*Lycosa pullata*
Wandering Pond Snail	*Lymnaea peregra*
Whirligig Beetle	*Gyrinus substriatus*

Table AR3-08: Insects, Water Dwellers and Reptiles present on site

**Despite been in decline in Ireland the Common Frog is not protected under either the wildlife (1976) or the Wildlife Amendment Act (2000).

3.2.2 Potential Impacts

As with any development a certain quantity of habitat will be lost. In this case the lost habitat comprises of a site of approximately 3.2 hectares of poor semi-improved grassland (See Figure AR3-10). This land does not have any great biodiversity and does not contain any species of special significance or sensitivity. The loss of this habitat is therefore not considered significant.

Because of the small size of the site it is not envisaged that any movements of migratory birds or mammals will be significantly affected by this development. As there are no trees on the site none will need to be felled and all hedgerows will be maintained as highways for the migration of wildlife.

A badger sett opening is located near the site (See Figure AR3-10). Because of its proximity to the site and the fact that it is protected under the Wildlife Act, 1976, any detrimental impact on it would be considered significant. Badger setts generally however, include a complex underground network of tunnels with at least 3 openings, sometimes many more and including hundreds of metres of tunnels. As a result the proximity of one such opening to the proposed development does not constitute a threat to that population of badgers, as the badgers will simply use their other openings if they feel threatened by any activities nearby. Furthermore, the nocturnal habits of the badger are such that they will not be disturbed when foraging for food at night. As the willow plantation surrounding the site develops it will create an ideal habitat within which badgers can forage for food.

3.2.3 Mitigation Measures

As part of the proposed development extensive tree planting and landscaping will be carried out in order to mitigate against any negative impacts on the local ecosystem. This will include the maintenance of existing hedgerows and the planting of a variety of native trees in order to enhance the habitats for wildlife.

In addition to this there is an extensive 25 hectare Willow plantation surrounding much of the site. This plantation was planted in the spring of 2006 and will be first harvestable in 2009. Each February and estimated fifth of the plantation will be harvested leaving four fifths of the plantation constantly available as a habitat for wildlife. Because of the speed with which willow grows all of the plantation will be an available habitat most of the year. This plantation, although not part of the proposed development, will create a unique habitat within which a wide biodiversity can be sustained.

In order to ensure that no badgers are harmed or their sett damaged in any way during the construction of the facility, the location of the sett opening will be communicated to workers.

3.3 Soils, Geology and Water

O'Neill Ground Water Engineering Ltd. was commissioned by Acorn Recycling to carry an environmental impact assessment in relation to Soils, Geology and Water for the proposed development. For the full study please see Appendix B.

3.4 Air

3.4.1 Existing Environment

A comprehensive baseline air quality survey was carried out at the site of the proposed development (See Appendix C for full report). Subsequent to this study a comprehensive odour and bioaerosols risk assessment was carried out proposed development (See appendix E for full report).

Standard methods were used to determine the presence of odorous substances that are potentially emitted from a composting facility namely; ammonia, hydrogen sulphide, and mercaptans. None of these substances were present above normal background levels.

Standard methods were also employed in carrying out a dust deposition survey. Of the four sampling locations two had levels of dust deposition above the standard BATNEEC limit of 350mg/m^3-day. It was concluded that these levels were likely due to agricultural activity in the vicinity of the site.

3.4.2 Potential Impacts

The main potential impacts on air quality from the proposed development are of three main types; dust, odorous emissions and bio-aerosols.

Odorous substances that can be produced during the composting process include; Hydrogen Sulphide, Mercaptans, and Ammonia. Once formed these substances have the potential to travel considerable distances in air and causing significant nuisance to human beings within the vicinity.

Dust emission can also cause significant nuisance to human beings and in extreme cases can be a risk to health. The peak risk of dust production for the proposed development comes during the construction of the facility. During dry weather exposed earth and vehicle movements can cause significant dust

production which will then blow in the direction of the wind. With the nearest dwelling lying North-East of the site (in the direction of the prevailing wind), the risk of nuisance from dust production during the construction phase is significant. Dust production during regular operations can also be a significant environmental issue at composting facilities. This dust comes from the movements of organic waste and as direct emissions from the composting process itself if moisture levels are allowed to drop.

Bio-aerosols are generated when organic matter including bacteria, fungi, and yeasts become airborne. These organic particles then have the potential to travel within the air and cause adverse health effects to residents exposed. One of the most concerning constituents of bio-aerosols that have been known to cause adverse health effects in humans is *Aspergillus Fumigatus*. The disease caused from exposure to this fungus is called Asperigillosis. This disease mainly affects immuno-compromised individuals, in fact healthy individuals even if exposed to high concentrations are rarely affected. Asperigillus is a ubiquitous fungus to which every individual has daily contact throughout their lives and there is little evidence to suggest that concentrations arising from even conventional outdoor windrows composting pose any risk to the public health.

3.4.3 Mitigation Measures

This type of composting process is ideally suited to minimise the creation of odorous substances, dust and bio-aerosols. Because all of the activities will be carried out within a sealed building there will be no uncontrolled emissions to the atmosphere. In the event of a serious problem with odour or dust creation all emissions can be stopped immediately.

Furthermore, emissions of odours substances and dust from composting are a sign that the processes are not being controlled properly. The composting

processes to be carried out in the proposed development will be constantly monitored and optimised, to an extent not possible in outdoor facilities, so that the production of these substances is minimised (See Section 2. for details on optimum composting conditions)

Finally, all air within the facility will pass through a bio-filtration system which will filter the air, reducing emissions of odorous substances, dust and bio-aerosols to insignificant levels (See Section 2. for details on bio-filtration system).

With regard the potential risk from *Aspergillus Fumigatus* this composting facility will operate to criteria that will minimise the production of spores. All process and movements of organic material will take place within the facility so that no direct emissions to atmosphere will occur. Also temperatures within the compost will exceed 60^{o}C for 7 days which will significantly reduce *Aspergillus,* which grows between 20 ^{o}C and 50 ^{o}C.

Daily process control monitoring of both composting and bio-filtration will ensure that air pollutants are not created. In the event a serous problem with emissions they can be stopped immediately.

Taking into consideration the recommendations contained in the baseline air quality survey report and standard practice, Acorn Recycling proposes the following monitoring schedule. This schedule is only a proposal as the monitoring requirements will ultimately be decided upon by the EPA as conditions within a Waste Licence.

Air monitoring samples will be taken from locations; AA1, AA2, DD1, DD2, DD3, and DD4 (See Figure AR3-14 and Drawing No. WL-05)

Table AR3-09: Air Quality Monitoring Schedule

Parameter	Monitoring Frequency	Technique	Locations
Dust Deposition (mg/m2/day)	Three times a year	Standard Method (VDI 2119)	DD1, DD2, DD3, DD4
Aspergillus Fumigatus	Annually	See Note 1	AA1, AA2
PM_{10}(µg/m²/day)	Annually	See Note 2	AA1, AA2

Note 1: Enumeration of colonies to be carried out as described in 'Standardised Protocol for the Sampling and Enumeration of Airborne Micro-organisms at composting Facilities' the UK Composting Association 1999.

Note 2: As described in prEN12341 "Air Quality - field test procedure to demonstrate reference equivalence of sampling methods for PM10 fraction of particulate matter" or an alternative agreed in writing by the Agency.

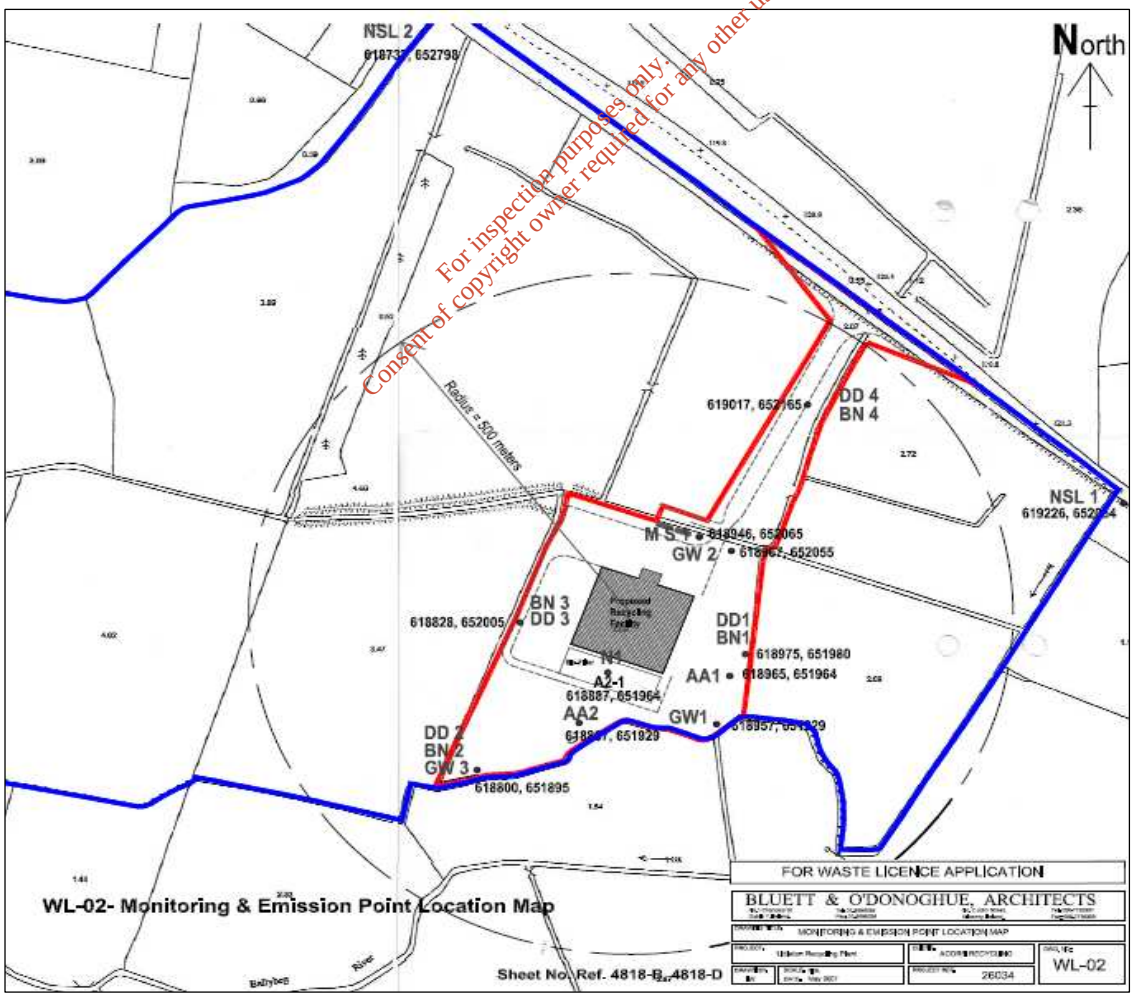


Figure AR3-14: Monitoring and Emission Point Location Map

See Drawing : PL-04 for full scale version.

3.5 Climate

3.5.1 Existing Environment

Climate information for the site in Ballybeg was obtained from the MET Éireann's nearest meteorological station to the site, that been the weather station in Kilkenny approximately 30 miles from the site.

The information displayed in the following tables is the averages for the last 30 years.

Monthly and Annual Mean and Extreme Values													
TEMPERATURE (degrees Celsius)	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***	***Year***
mean daily max.	7.7	7.9	10	12.4	15.1	18.1	19.9	19.6	17.2	13.9	10.1	8.4	**13.4**
mean daily min.	1.4	1.6	2.3	3.4	5.6	8.4	10.4	9.9	7.9	6.1	2.8	2.1	**5.2**
mean	4.6	4.8	6.1	7.9	10.3	13.3	15.2	14.7	12.6	10	6.4	5.3	**9.3**
absolute max.	14.1	15.1	18.5	22.5	26	31.5	31.4	30.5	25.6	22.2	17.4	14.8	**31.5**
absolute min.	-14	-11	-7.9	-5.4	-3.7	0.5	2.3	1.2	-1.6	-4.4	-7	-11	**-14.1**
mean no. of days with air frost	10.8	8.7	7.4	4.1	0.8	0	0	0	0.4	2	8.4	10.5	**53**
mean no. of days with ground frost	18.2	14.9	14.3	12.4	7.3	2	0.4	0.8	3.4	6.8	14.2	16.8	**111.5**

Table AR3-10: The Monthly and Annual Mean and Extreme Values Over The Past 30 Years

RELATIVE HUMIDITY *(%)*	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***	***Year***
Mean at 0900UTC	88	87	85	79	76	76	78	82	85	88	89	89	**84**
Mean at 1500UTC	80	74	68	64	64	65	65	66	69	76	78	82	**71**

Table AR3-11:The Average Relative Humidity Over 30 Years Taken at 0900UTC

Table AR3-12: The Average Rainfall Over 30 Years

RAINFALL *(mm)*	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***	***Year***
mean monthly total	86	66	64	51	61.9	51	53	69.4	74	85	74	89	**823**
greatest daily total	32	32	30	25	23.9	30	66	49.8	30	35	29	46	**66.4**
mean no. of days with >= 0.2mm	19	15	17	15	17	14	13	15	15	18	17	18	**192**
mean no. of days with >= 1.0mm	15	11	12	10	12	10	9	11	11	13	12	13	**137**
mean no. of days with >= 5.0mm	7	5	5	4	5	4	3	4	5	6	5	6	**58**

(Coordinated Universal Time)* and 1500UTC.

Coordinated Universal Time (UTC) is more commonly known as Greenwich Mean Time (GMT)*

Table AR3-13: The Average Wind Figures For a 30 Year Period

WIND *(knots)*	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***	***Year***
mean monthly speed	7.4	7.4	7.7	6.7	6.4	5.8	5.6	5.6	5.9	6.4	6.4	7.1	**6.5**
max. gust	77	72	60	53	54	45	46	56	65	74	56	65	**77**
max. mean 10-minute speed	44	39	36	33	32	28	27	29	40	45	35	40	**45**
mean no. of days with gales	0.5	0.3	0.1	0	0	0	0	0	0	0.1	0.1	0.3	**1.4**

Table AR3-14: 30 Year Averages of Snow, Hail, Thunder and Fog.

WEATHER *(mean no. of days with...)*	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***	***Year***
snow or sleet	5.1	5	3.1	0.8	0.1	0	0	0	0	0	0.5	2.6	**17.3**
snow lying at 0900UTC	1.7	1.5	0.4	0.1	0	0	0	0	0	0	0.1	0.4	**4.1**
hail	1.1	1	2.7	2.4	1.3	0.5	0.1	0.1	0.1	0.3	0.4	0.3	**10.4**
thunder	0.1	0.1	0.2	0.4	0.8	0.9	1.1	0.8	0.3	0.2	0	0.1	**5**
fog	4.6	2.9	2.3	2	2.4	2.3	2.6	4.6	5.6	5.9	4.3	4.9	**44.4**

From the data provided by Met Éireann the following are the main points noted:

1. The approximate average annual rainfall for the site is 822.8mm
2. Mean monthly wind speed is 6.5 knots.
3. The mean annual temperature is 9.3 degrees Celsius.

From the three previous points the climate for this region of the country is found to be normal with no extremes present.

Potential Impacts

The factory at Ballybeg, Littleton will have no effect on local climatic conditions.

Under the Kyoto protocol the European Union aims to reduce the emissions of gases by at least 5% below 1990 levels by the period 2008-2012. As a result Ireland has agreed to limit the increase in its net greenhouse emissions to 13% above 1990 levels by the period 2008-2012.

Carbon dioxide resulting from the bioconversion of organic waste is not considered a net contributor to greenhouse gas emissions because the carbon was stored in the biomass for a limited number of years (short carbon cycle), where as in the case of fossil fuels the carbon was stored for thousands or millions of years. In fact, a certain quantity of the wastes that will be composted at this site such as sewage sludge would degrade anaerobically if disposed of by landfill or land-spreading. This would result in methane gas emissions which is 21 times more potent greenhouse gas than carbon dioxide. In this way, composting has a positive impact on the global climate.

The use of compost as an amendment to soils has the additional benefit of increasing the organic matter content in soils. According to Campbell and Janzen 1999, agricultural soils have lost between 15 and 60 per cent of original Organic Matter levels. With world soil organic carbon 3.3 times atmospheric carbon and 4.5 times biotic carbon, reductions in soil organic carbon could be contributing significantly to global climate change. The use of compost in soils therefore could sequester significant quantities of carbon.

3.5.3 Mitigation Measures

Because the only impacts on climate are positive no mitigating measures are therefore desirable.

For monitoring purposes, a mini weather station will be installed on site. This will record temperature, wind speed and wind direction. It consists of a wind anemometer and thermometer will be located on site. It will be linked to a computer, and data will be downloaded and saved daily. A record of all data downloaded will be kept on file.

The following pictures are an example of the monitoring equipment that will be used.

Figure AR3-15: Example of base unit for monitoring station

Figure AR3-16: Example of wind anemometer for measuring wind speed and direction

3.6 The Landscape

3.6.1 Existing Environment

The proposed site is located 8km south east of Thurles and approximately 2km south east of Littleton in the townland of Ballybeg. The land lies on the south western side of a rural road within 2km of the N8 National Primary Route.

The Topography of the area is characterised by flat ground typically around 120 mOD. The bulk of the landscape is comprised of farmland, predominantly used as pasture. These fields are enclosed by a combination of hedgerows and post and wire fences. The hedgerows are mainly continuous, with few gaps, and are in many places very thick and overgrown. These hedgerows are characterised by an abundance of mature deciduous trees, mainly ash (See Table AR3-05 for list of trees). These thick hedgerows with mature trees and the flat nature of the land mean that the landscape of the area is not sensitive to visual intrusion.

Surrounding the site is an emerging willow plantation that will shield the development from view on three sides. This willow plantation comprises approximately 25 hectares. Figure AR3-17 shows the view towards the site from the road.

Figure AR3-17: View towards site from entrance

Figure AR3-18: Mature hedgerow east of site

Figure AR3-19: Existing willow plantation (May 2007)

3.6.2 Potential Impacts

Any large building placed without sensitivity has the potential to intrude on the landscape. In this location the development has minimal potential to impact on the existing landscape due to the flat nature of the land and the fact that the site is enclosed by thick hedgerows and a quickly developing willow plantation. By the time of the expected commencement of construction (August 2008) the willow trees will be approximately 20ft tall. This plantation covers approximately 25 hectares and involved the planting of 440,000 trees. This plantation will impact on the landscape positively.

3.6.3 Mitigation Measures

Because the site location is so visually enclosed extensive mitigation measures are not required for this development. The existing willow plantation and mature hedgerows will ensure that the enclosed nature of the site remains and is indeed strengthened (as willow plantation develops).

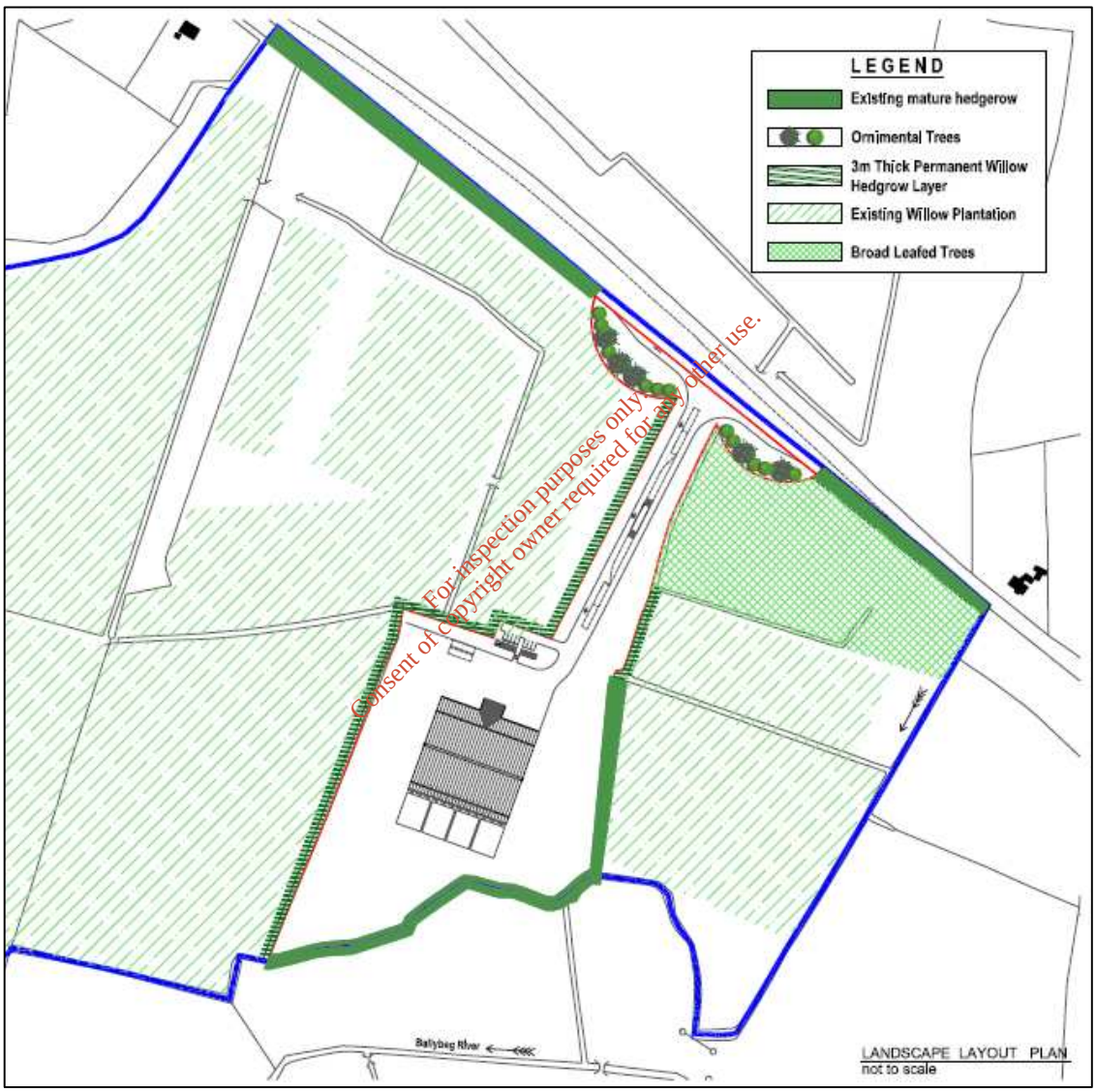


Figure AR3-20: Landscaping Plan

Figure AR3-20 illustrates the landscaping plan for the site. As shown a layer of willow (3 meters thick) will be maintained at all times along the access road to the

site and surrounding the western border. This will ensure that a visual barrier is maintained at all times. The existing thick hedgerows to the east and south of the site will also be maintained as well as the hedgerows that obscure the view towards the site at the roadside.

A deciduous plantation is planned for a patch of land to the left of the entrance (See Figure AR3-20). This plantation will include native Irish trees such as Oak, Ash, Beech, Birch, etc and will enhance the landscape for humans and wildlife.

At each side of the entrance there will be a small embankment that will be planted with ornamental trees such as; Beech, Holly, Elder, Cherry etc.

The design of the building itself will be sympathetic to the agricultural character of the area. It will resemble an agricultural building and will be coloured grey or green subject to agreement with planning authority.

Overall the development, surrounding willow plantation, and woodlands will enhance the existing landscape (See Willow Plantation Layout from complete landscaping plan).

3.7 Material Assets

3.7.1 Existing Environment

Cultural Heritage

Littleton (Littletown) takes its name from the Gaelic name Baile Beag meaning small town. Over 250 years ago there are thought to have been only a few settlers in the area of Littleton due to the inhospitable landscape and bog lands surrounding the area particularly on the eastern side of the village. The development of the area as a village is mainly down to the development of what was know as the Turnpike Routeway in 1739. This road linked the towns on Tipperary, Cashel and Timahoe (See Figure AR3-21 below).

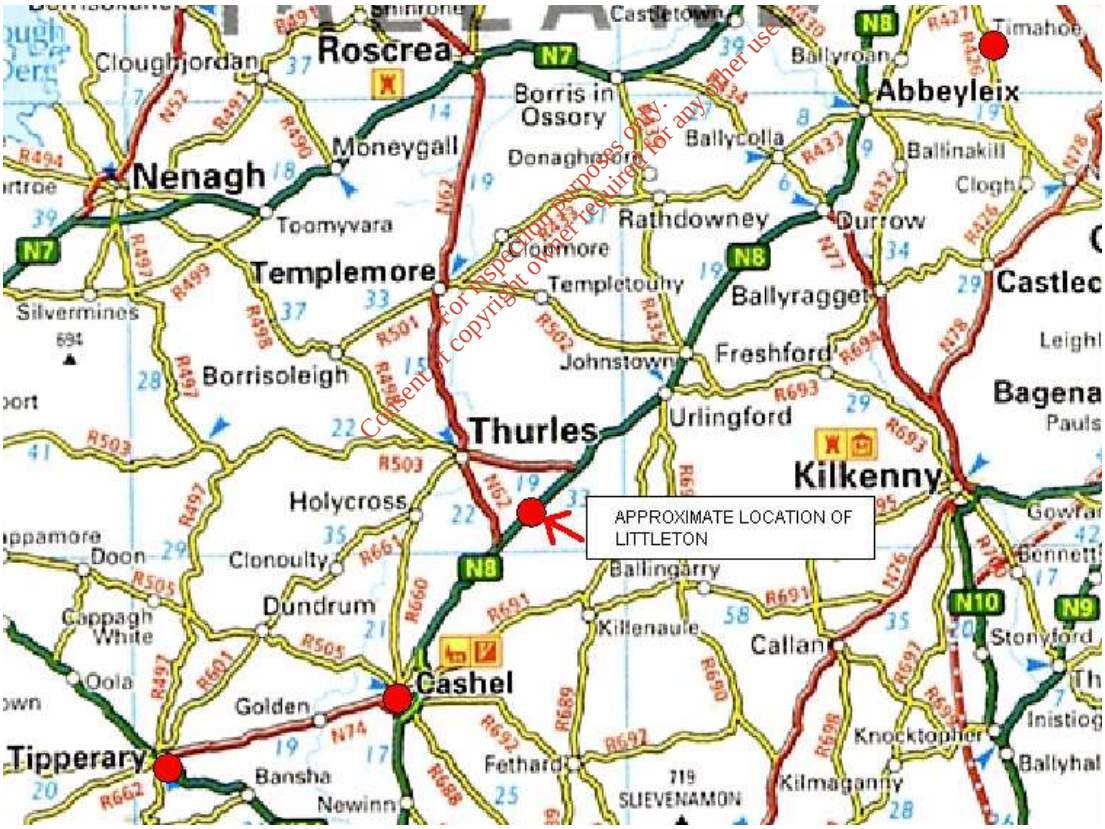


Figure AR3-21: Map showing the towns linked up by the Turnpike Routeway

As can be seen from Figure AR3-22 Littleton was one of the few villages on this arterial road considering Urlingford and Johnstown were not yet developed as

villages or settlements. As the mail service became established around Ireland, the village of Littleton became a central stopping point for coaches travelling to and from Dublin to Cork. The village inn as well as providing refreshments for the coach drivers provided fresh post horses for the mail service.

The village has seen substantial development since the 1830's when the population was 388 persons and 65 houses, a ratio just short of 6 persons to a house. These houses were of poor quality with the majority of them located on Puddle Street (Now Thurles Road). The following map (Figure AR3-22) shows what would have been the village centre in the 1830's and the new developments that have taken place since that time.

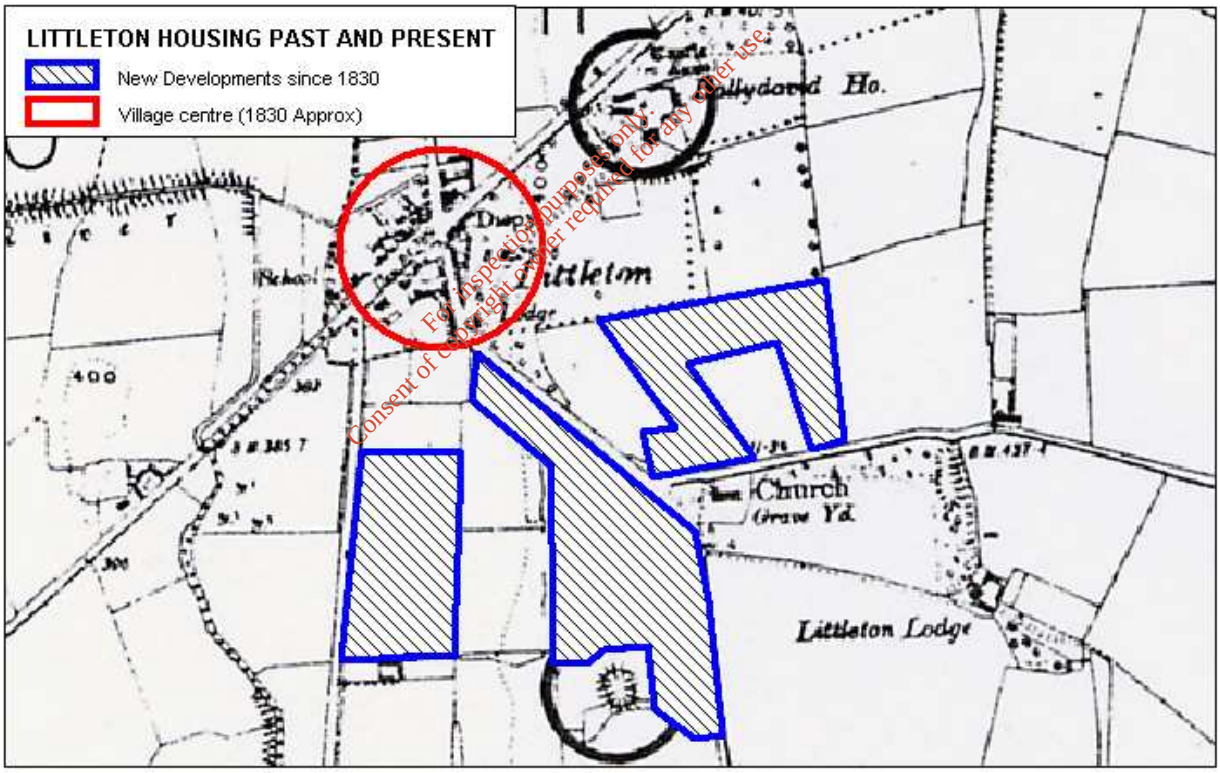


Figure AR3-22: Past and present populated areas in the village of Littleton.

As can be seen above the development of the village has been primarily south of the village itself. This had to do mainly with village improvements initiated by a Church of Ireland Reverend named Thomas Grady, of Tinseyfield, Co. Limerick.

After buying the town, lands and wood of Ballybeg for £5,500 he set about building a new church called St Mary's which still stands (See Figure AR3-23 below). He is also responsible for the construction of the Glebe House a kilometre south of St Mary's Church. After these early developments to the south of the village most all residential development in the village was undertaken in this area. The most recent developments in the village and the surrounding area have been the conversion of a dwelling house into a Jehovah's Witness church. The Horse and Jockey Hotel approximately 2.2 miles west of Littleton is developing a modern gymnasium and leisure centre to add to the substantial development already present.

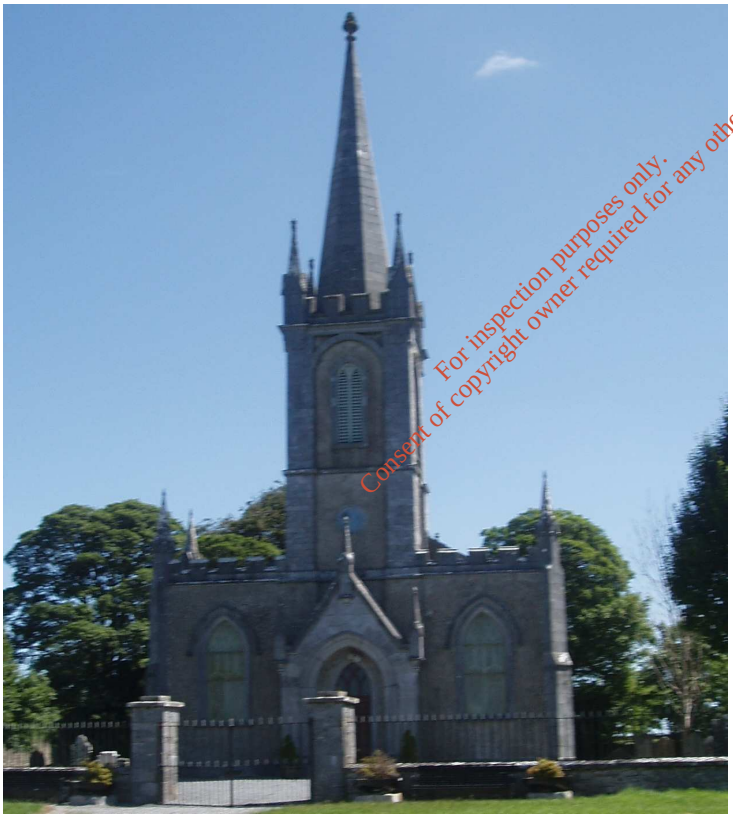


Figure AR3-23: Saint Mary's Church in the village of Littleton.

Archaeology and Architecture

The village of Littleton has a number of registered monuments in the surrounding area, notably the tower house in the town land of Ballybeg (See Figure AR3-24 below).

Figure AR3-24: Ballybeg Tower House

Any other archaeological sites in the vicinity of the site are showing on the map on the following page (See Figure AR3-25). The proposed site however, has no sites of archaeological interest on it or in the immediate surrounding area. (See Appendix A, Archaeological Report, for additional information).

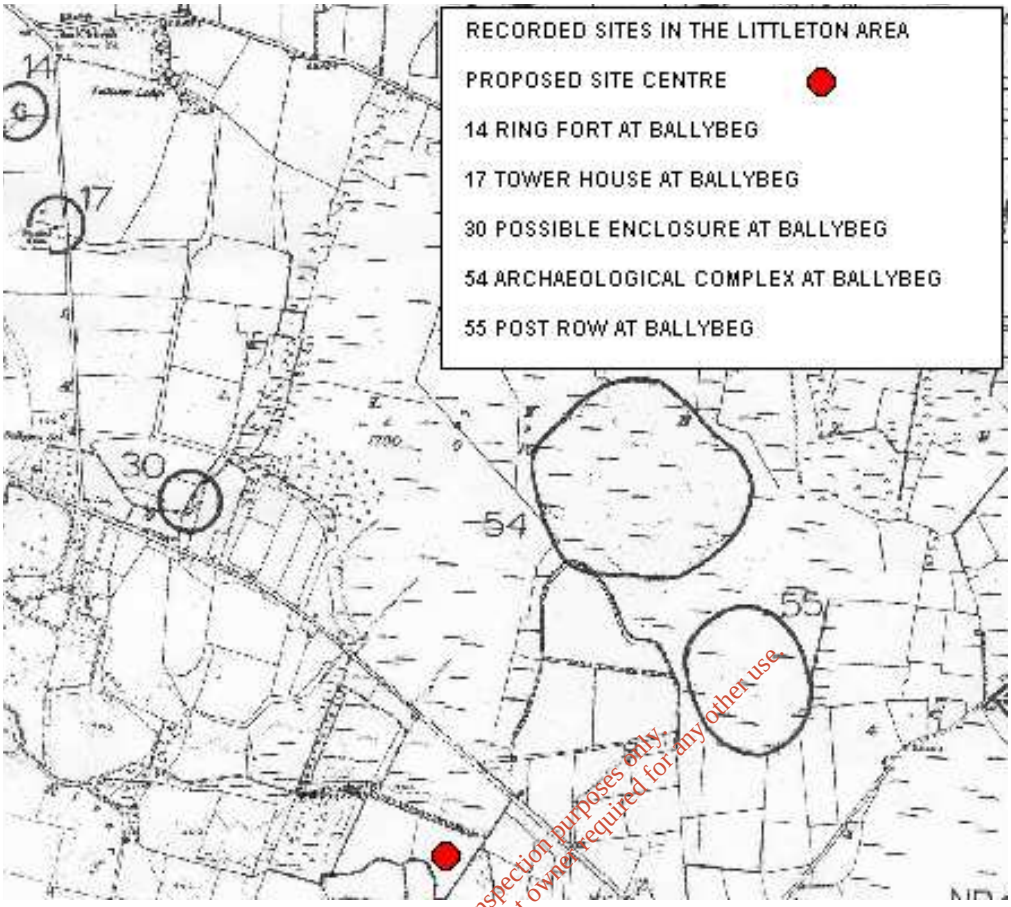


Figure AR3-25: Map Of Recorded Sites in the Vicinity of the site

3.7.2 Potential Impacts

The proposed development is not likely to have any significant impacts on the archaeological, architectural, cultural Heritage, or other material assets at Ballybeg or the surrounding area.

As with any proposed site there is a slight risk that something of archaeological significance may be disturbed during earthworks (See Archaeology Report: Appendix A).

3.7.3 Mitigation Measures

In order to safeguard any material of archaeological significance that may be uncovered, a qualified archaeologist will supervise all appropriate soil stripping and earthworks. If any such finds are made, work in the vicinity of the find will cease immediately and all appropriate authorities contacted (See Appendix A for Archaeology Report).

3.8 Noise

3.8.1 Existing Environment

A comprehensive baseline noise survey was carried out around the proposed site. The survey concluded the following; The results of this survey which was conducted during both day-time and night-time monitoring periods indicate that the existing noise climate in the vicinity of the proposed development site is typical of a rural environment with low background noise. At locations NSL1 and NSL2 daytime traffic influences the average noise levels. (See Appendix D for the complete noise survey report).

3.8.2 Potential Impacts

The proposed development will result in daytime average noise levels increasing. This increase will be caused by increased traffic volumes and general noise from the facility itself. Because the nearest sensitive noise location is over 250m from the facility and the fact that all the on-site activities will be carried out within the facility building, it is not envisaged that noise levels will exceed recommended values (WHO; Daytime $LAeq_{60}$ of 55dB (A), or Night-time $LAeq_{15}$ of 45dB(A)) where they do not already. Although noise levels will not exceed WHO guideline values there is the potential for aeration fans to cause noise nuisance during night time hours. This noise will be mitigated by the use of silencers.

During the construction of the proposed development additional noise levels can be expected in the vicinity of the site from increased traffic volumes and machinery operations.

3.8.3 Mitigation Measures

In order to prevent any nuisance during the construction of the proposed development, construction activity will be restricted to between 8am and 6pm. All

machinery will be maintained in good working order so as to prevent unnecessary noise caused by faulty machinery.

In order to assess the extent of the impact on the local environment from noise during the operation of the facility annual noise surveys' will be carried out as detailed in Table AR3-15 below.

Table AR3-15: Proposed Noise Monitoring Schedule

Parameter	Monitoring Frequency	Analytical Method/ Technique	Locations
L(A)eq (30 minutes)	Annual	Standard* note 1	NSL1, NSL2, BN1, BN2, BN3, BN4
L(A)eq (30 minutes)	Annual	Standard* note 1	NSL1, NSL2, BN1, BN2, BN3, BN4
L(A)eq (30 minutes)	Annual	Standard* note 1	NSL1, NSL2, BN1, BN2, BN3, BN4
Frequency Analysis (1/3 Octave band analysis)	Annual	Standard* note 1	NSL1, NSL2, BN1, BN2, BN3, BN4

Note 1: "International Standards Organisation. ISO 1996. Acoustics - description & Measurement of Environmental noise. Parts 1, 2 & 3."

In addition to the baseline noise survey a comprehensive noise impact assessment was carried out by URS for the proposed development. The report concluded the following; All scenarios (except for the night time un-silenced aeration fans) were predicted to generate noise levels less than the background noise levels at the NSLs. According to BS4142, it is recommended that to reduce the likelihood of complaints, the noise levels from the Proposed Development at the NSLs are less than the measured background noise levels. Therefore, it is recommended that silencers be fitted onto the aeration fans.

Acorn will therefore fit silencers onto the aeration fans to reduce the likelihood of complaints. Please see Appendix E: Noise Impact Assessment for full report.

3.9 Inter-Relationships

Table AR3-16 below illustrates the existence of inter-relationships between the potential impacts on the various environmental categories caused by the proposed development.

	Human Beings	Flora and Fauna	Soils	Water and Hydrogeology	Air	Climate	Landscape	Material Assets
Human Beings								
Flora and Fauna	*							
Soils	*	*						
Water and Hydrogeology	*	---	*					
Air	*	---	---	---				
Climate	*	---	---	---	---			
Landscape	*	---	---	---	---	---		
Material Assets	*	---	---	---	---	---	*	
Noise	*	*	---	---	---	---	---	---

Table AR3-16: Inter-relationships between environmental categories.

Below is a brief summary of the inter-relationships between potential impacts. Each of the above inter-relationships are discussed in more detail within their respective chapters.

Human Beings/Flora and Fauna; Any significant impact on the flora and fauna of the area will impact negatively on local residence and visitors, as their ability to enjoy the observation of the local ecology will be impacted on (See Section 3.2).

Human Beings/Soils

Soil is a natural resource hugely important to human beings. Contamination of soils would seriously reduce the value of the land as a resource for human beings. Design characteristics will eliminate risk of soil contamination (See Section 3.3).

Human Beings/Water and Hydro-geology

Water is the most important natural resource. Groundwater can be used for abstraction for human consumption so if polluted, cannot be used, or may pose a health hazard. Surface waters can also be for human consumption, recreation and are important habitats for wildlife. Pollution of these waters therefore, has the potential to impact on human beings in terms of loss of amenity and the financial cost of water treatment. The Design characteristics will eliminate the risk of water or groundwater pollution (See Section 3.3).

Human Beings/Air;

Dust, bio-aerosols, and odour have the potential to cause adverse impacts on the health and well being of human beings. Section 3.4 details how emissions of these potentially hazardous or nuisance causing substances will be minimised.

Human Beings/Climate;

Global climate change has the potential to cause incalculable damage to human populations worldwide. This development will contribute to reducing greenhouse gas emissions by controlling the biodegradation process, thereby reducing emissions of the highly potent greenhouse gas, methane, which would be produced to varying degrees during the degradation of organic wastes by other means (See Section 3.5).

Human Beings/Landscape;

Any development such as this has the potential to impact on the landscape of the area. Human beings will be affected adversely if they perceive any changes as being detrimental to the character of that landscape. Because of the thick hedgerows and flat nature of the landscape, it is not sensitive to visual intrusion (See Section 3.6).

Human Beings/Material Assets;

An adverse impact on the cultural heritage, archaeology, or architecture would impact on the amenity value of the area for human beings. Section 3.7 details the risks to material assets caused by this development.

Human Beings/Noise;

Excessive noise can cause significant nuisance to human beings. The design characteristics are such (indoor facility) that little additional noise will be imposed on the local residence during the operation of the facility. During construction phase mitigating measures will be employed to minimise nuisance from noise (See Section 3.8).

Flora and Fauna/Soils;

A change in soil quality or removal of soils has the potential to impact on flora and fauna. Section 3.2 discusses these impacts and notes that the removal of land habitat within the site will present no significant ecological impact.

Flora and Fauna/Noise;

An increase in noise levels could cause a disruption to fauna habitats on or near to the site. The greatest risk of this occurrence is during the construction of the facility when elevated noise levels are anticipated. The only fauna of significance identified was the badger sett. As badgers' are nocturnal they will not be disturbed during the construction, because all construction will take place between 8 am and 6 pm (See section 3.2).

Soils and Agriculture/Water and Hydro-geology;

At this site water and groundwater pollution would inevitably be caused from substances passing through the soil and subsoil. The design of the facility is such that the risk of soil followed by water or groundwater pollution is not significant (See Section 3.3).

Landscape/Material Assets;

Features of Archaeological and Architectural cannot alone be viewed in isolation; they must also be viewed in terms of their landscape context. A significant impact on the landscape will therefore impact on these features and visa versa. No significant impacts are envisaged on features of archaeological or architectural significance, nor landscape (See section 3.7).

Section 4: Attachments

ATTACHMENT A: ARCHAEOLOGY REPORT
(ATTACHED SEPARATELY)

ATTACHMENT B: SOILS, GEOLOGY AND WATER SECTION
(ATTACHED SEPARATELY)

ATTACHMENT C: AIR QUALITY REPORT
(ATTACHED SEPARATELY)

ATTACHMENT D: ENVIRONMENTAL NOISE SURVEY
(ATTACHED SEPARATELY)

ATTACHMENT E: NOISE IMPACT ASSESSMENT
(ATTACHED SEPARATELY)

ATTACHMENT F: ODOUR AND BIOAEROSOLS RISK ASSESSEMENT

(ATTACHED SEPARATELY)

ATTACHMENT G: DECOMMISSIONING AND SITE RESTORATION PLAN

(ATTACHED SEPARATELY)

ATTACHMENT H: MAPS AND DRAWINGS
(ATTACHED SEPARATELY)