ENVIRONMENTAL IMPACT STATEMENT

KILMAINHAMWOOD COMPOST FACILITY EXTENSION

BALLYNALURGAN, KILMAINHAMWOOD, KELLS, CO. MEATH

May 2010

TOBIN CONSULTING ENGINEERS

TOBIN
Patrick J. Tobin & Co. Ltd.

REPORT

PROJECT: **Application for Extension of Existing Composting Facility at Kilmainhamwood, Co. Meath**

CLIENT:

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DOCUMENT AMENDMENT RECORD

Client:	**Thorntons Recycling**
Project:	Application for Extension of Existing Composting Facility at Kilmainhamwood, Co. Meath
Title:	Environmental Impact Statement (EIS) – Waste Licence Application

PROJECT NUMBER: 5361				DOCUMENT REF: 5361-04-07			
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Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
TOBIN Consulting Engineers							

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1 INTRODUCTION

1.1 GENERAL

TOBIN Consulting Engineers have prepared this Environmental Impact Statement (EIS) for an extension to an operational composting facility located at Ballynalurgan, Kilmainhamwood, Kells, Co. Meath. This facility is currently owned and operated by Padraic Thornton Waste Disposal Ltd, trading as Thorntons Recycling.

The facility is currently licensed to process 20,800 tonnes of biodegradable waste per annum. The high quality compost currently produced is used as a soil conditioner in commercial agriculture, as material for landscaping, as organic soil conditioner or as a custom growing media. The facility has been operational since September 2006. Thorntons Recycling proposes to extend the existing facility to accept and treat up to 40,000 tonnes of biodegradable waste per annum.

The location of the composting facility in relation to the surrounding regional setting is shown on Figure 1.1.

The construction activities for the proposed development include:

- Extensions to the existing facility buildings;
- Facility administration building in the form of offices, tea station, toilets and showers; and
- Other works required to integrate the proposed extensions and facility administration building into the existing facility.

1.2 SITE LOCATION AND BACKGROUND

The existing composting facility is located on a landholding in the townland of Ballynalurgan, approximately 4km south of Kingscourt, Co. Cavan and 6km northwest of Nobber, Co. Meath. The R162 regional road runs to the south and southwest of the site. Access to the facility is provided by means of an entrance onto the R162 and a site road of approximately 0.85 km in length.

The location of the site in relation to its geographic surrounds is shown on Figure 1.1 (Regional Site Location Map).

The overall landownership boundary is approximately 13.2ha. The landownership area is shown on Figure 1.2. The site lands are situated at an elevation of between 60m and 88m AoD. To the east and west of the application site, the land rises gently from low hills reaching high points of 173m AoD at Carrickleck to the east and 155m AoD at Boynagh to the west.

The existing hedgerows and an area of coniferous forestry that surrounds the existing facility provide screening.

GENERAL LEGEND

APPLICATION BOUNDARY

ACTIVITY BOUNDARY

SITE NOTICE LOCATION

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

200m 0 200m 400m 600m

Rev	Date	Description	By	Chkd.
B	25.05.10	ISSUED FOR WLA	MN	PON
A	30-06-09	ISSUED FOR EIS	MN	P.O'N

Client: Thorntons recycling

Project: KILMAINHAMWOOD FACILITY EXPANSION

Title: REGIONAL SITE LOCATION MAP

Scale @ A3: 1:20,000

Prepared by: M. Nolan | Checked: P. O'Neill | Date: June 2009

Project Director: D. Grehan

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Drawing No.: Figure 1.1 | Revision: B

PROPOSED FRONT EXTENSION

PROPOSED REAR EXTENSION

PROPOSED SURFACE WATER ATTENUATION

EXISTING COMPOSTING FACILITY

PROPOSED FACILITY ADMIN. BUILDING

SITE BOUNDARY & EXTENT OF LAND IN OWNERSHIP OF APPLICANT

EXISTING ACCESS ROAD

EXISTING SITE ENTRANCE

SITE NOTICE LOCATION

TO KINGSCOURT

TO NOBBER

NEWCASTLE

R162

Top of Bank

Cross-slab

Electricity Lines

1.83m FF

CD

UND

CS

X

GENERAL LEGEND

APPLICATION BOUNDARY

ACTIVITY BOUNDARY

SITE NOTICE LOCATION

X

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

50m 0 50m 100m 150m

Rev	Date	Description	By	Chkd
B	25.05.10	ISSUED FOR WLA	MN	PON
A	30-06-09	ISSUED FOR EIS	MN	PON

Client: Thorntons recycling

Project:

KILMAINHAMWOOD
FACILITY EXPANSION

Title:

SITE LOCATION MAP

Scale @ A3: 1:5000

Prepared by:	Checked:	Date:
N.Vennard	P.O'Neill	February 09

Project Director: D.Grehan

Drawing Status:

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Drawing No.: Figure 1.2

Revision: B

1.3 COMPANY BACKGROUND

Thorntons Recycling is an Irish family-run business that has been in operation since 1979 in the area of materials recovery and waste management. The company operates waste management facilities in Dublin, Meath and Kildare, and provides a full range of professional management services to meet recycling and residual material handling requirements.

The company's customer base encompasses the domestic, public and private sectors with annual sales in excess of €39m. The business has expanded based on delivering excellent customer service, and a philosophy of "on time every time". The proud, dedicated and professional team at Thorntons Recycling meets and exceeds the requirements of our customers on a daily basis. Current company operations involve over 220 staff managing and operating in one of Ireland's most progressive and advanced recycling companies. Operations are organised to handle all non-hazardous waste and recyclable streams with current capacity across all facilities of 350,000 tonnes per annum on sites in Dublin, Meath and Kildare. The company's Headquarters is based in Park West, Dublin 12.

In recent years the company has branched into a number of areas of waste management and now currently operates a number of different facilities/services all of which are managed and operated in compliance with International standards for Quality, Health and Safety and Environmental Management including:

- Materials Recovery Facilities (MRF's)–Killeen Road, D12 and Dunboyne, Co Meath;
- Civic Amenity Sites (CA) – Dunboyne, Co Meath;
- End of Life Vehicle (ELV) - Kylemore Road, Dublin 12;
- Composting site - Kilmainhamwood Compost, Co Meath;
- Wood Re-processing site - Kill, Co Kildare;
- Liquid Waste/Tanker business;
- Confidential Shredding - mobile shredder and secure shredding facility Park West Business Park;

1.4 PROCEDURE AND STRUCTURE OF EIA

Environmental Impact Assessment (EIA) requirements derive from European Communities Directive 85/337/EEC (as amended by Directive 97/11/EC) on the assessment of the effects of certain public and private projects on the environment. This EU Directive was transcribed into Irish Law under S.I. 349 of 1989 (European Communities (Environmental Impact Assessment) Regulation). These regulations have subsequently been amended by the European Communities (Environmental Impact Assessment) (Amendment) Regulations, 1999 (S.I. No. 93 of 1999).

An EIA is a process that examines the environmental consequences, both positive and negative, of a proposed development. This Environmental Impact Statement has been prepared in accordance with

the requirements of Irish implementing legislation namely the European Communities (Environmental Impact Assessment) Regulations 1989-2000.

The objective of the EIA is to identify and predict the scale of impact on the receiving natural environment. Following the assessment of the natural receiving environment and potential impacts on the environment as a result of the development, the EIA describes construction methodologies, development designs and measures by which these impacts may be mitigated and/or reduced. Where it is found that an impact cannot be prevented or mitigated against, or where additional monitoring is deemed necessary, this is also highlighted.

The outcome of the Environmental Impact Assessment process is the production of an Environmental Impact Statement (EIS) and an accompanying Non-Technical Summary. The emphasis of the study is on prevention of impacts, with the resulting information taken into account by the appropriate planning authority when forming their judgements on whether the development should go ahead.

The minimum information that must be contained in an EIS is specified in Part X of the Planning and Development Act, 2000 and Schedule 6 of the Planning and Development Regulations, 2001. The structure and content of this EIS has been based on the legislative requirements as set out in Part X of the Planning and Development Act, 2000 and Part 10 of the Planning and Development Regulations, 2001 and the guidance documents published by the Environmental Protection Agency as outlined above.

The consequences of any major development project are generally presented in the form of an Environmental Impact Statement (EIS). The EIS contains information on the scale and nature of the proposed development, a description of the existing environment, impact assessment of the proposed development and mitigation measures to mitigate and/or reduce the impact on the receiving environment.

The structure and content of the Environmental Impact Statement has been based on the following documents, as published by the Environmental Protection Agency.

- Advice Notes on Current Practice in the preparation of Environmental Impact Statements (September 2003).
- Guidelines on the information to be contained in Environmental Impact Statements. (2002).

To allow for ease of presentation and consistency when considering the various elements of the environment, a systematic structure has been adopted for the main body of the statement. This structure is known as a “Grouped Format”. The structure is used for each particular environmental aspect as given below.

The overall EIS is arranged in four volumes, as follows:

Volume I: Non-Technical Summary;

Volume II: Environmental Impact Statement;

Volume III: Drawings;
Volume IV: Appendices;

Volume I: Non-Technical Summary

This document provides an overview and summary of the main EIS using non technical terminology and detail. It is a means for non-professionals to review the information included in the main EIS document. It is a stand-alone document and should offer a clear and concise summary of the existing environment, characteristics of the development and mitigation measures for the development.

Volume II: Main EIS

To allow for ease of presentation and consistency when considering the various elements of the environment, a systematic structure will be adopted for the main body of the statement. The structure is used for each particular environmental aspect, as given below:

- Chapter 1 of the Main EIS will provide an introduction and a brief background to the project, the legislative requirements under which the document is prepared, EIS consultation and scoping the layout of the EIS.
- Chapter 2 will provide a detailed description of the existing site and proposed development, site infrastructure, site management, facility operation, nuisance controls and environmental monitoring.
- Chapter 3 provides details on the alternatives to the development taking into account the planning/policy context and the existing development. An assessment of the 'do-nothing scenario' will also be assessed.
- Chapter 4 provides details of the policy, planning and development context of the proposed development. The need of the development is also considered in this chapter.

Chapters 5 to Chapter 15 inclusive will deal with the following: -

- Chapter 5 - Human Beings/Socio-Economic
- Chapter 6 - Flora and Fauna
- Chapter 7 - Soils/Geology and Hydrogeology
- Chapter 8 - Water
- Chapter 9 - Air Quality and Climate
- Chapter 10 - Noise and Vibration
- Chapter 11 - Landscape and Visual Impact
- Chapter 12 - Cultural Heritage & Archaeology
- Chapter 13 - Traffic and Road Assessment
- Chapter 14 - Interaction of the Foregoing
- Chapter 15 - Explanation of Technical Terms

Volume III: Drawings

Various chapters of the EIS refer to drawings. All referenced drawings are provided in Volume III of the EIS.

Volume IV: Appendices

All supporting documentation and references, referred to in the EIS text body (Volume II) are included in this volume.

1.5 SCOPING OF THE ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

As part of the EIA process, TOBIN Consulting Engineers contacted the Planning Authority, Meath County Council on 2nd February 2009, to arrange a pre-planning meeting. Meath County Council issued a letter on the 6th February 2009 confirming a date of a pre-planning meeting and requested additional information on the project. On the 19th February 2009 this additional information was delivered to Meath County Council. A formal pre-planning meeting was held on 27th February 2009 to discuss the scope and extent of the EIA. Mr. Padraig O Shea (Meath Co. Co.) and Mr. Tim O Leary (Meath Co. Co.) met with Mr. Tom McDonnell (Thorntons Recycling), Mr. Pat O Neill (TOBIN Consulting Engineers) and David Jenkins (Burke Jenkins) to discuss the proposed development.

On the 25th February 2009 a meeting was held with the Environmental Protection Agency (EPA). TOBIN and Thorntons Recycling met with Mr. Donal Grant and Dr. Helen Creed of the EPA to discuss the proposed development.

TOBIN also undertook a process of consultations with various statutory and interested parties. In accordance with Section 4 of the *Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003)*, the consultation process consisted of consultation with competent bodies, statutory bodies and interested parties. The primary objective of involving competent bodies, statutory bodies and interested parties in the Environmental Impact Assessment process is to aid scoping of the Environmental Impact Assessment and to allow all parties to highlight issues of concern. A copy of correspondence sent to and received from Consultees is included in Appendix 1.1.

Table 1.1 lists the various parties consulted during the preparation of the Environmental Impact Assessment.

Table 1.1 List of Consultees contacted during EIA

Consultees	Date of Correspondence	Date of Response
Meath County Council – Planning	23/03/2009	-
Meath County Council – Environment	23/03/2009	-
Meath County Council – Roads	23/03/2009	24/03/2009
Meath County Council– Sanitary and Water	23/03/2009	25/03/2009
Eastern Regional Fisheries Board	23/03/2009	07/04/2009
Environmental Protection Agency	23/03/2009	26/03/2009
Department of Agriculture, Fisheries and Food	23/03/2009	31/03/2009 and 01/05/2009
National Parks and Wildlife Service	23/03/2009	-

1.6 TECHNICAL DIFFICULTIES AND AVAILABILITY OF DATA

No significant technical difficulties or lack of data were experienced in preparing the Environmental Impact Statement for the proposed development.

1.7 STUDY TEAM AND CONTRIBUTORS TO THE EIA

A team of consultants co-ordinated by TOBIN Consulting Engineers has conducted this EIA. The relevant inputs of the various members of the Study Team are listed in Table 1.2. The EIA was completed in partnership with Thorntons Recycling.

Table 1.2 Relevant Inputs of the EIA Study Team Members

Team Member	Inputs
TOBIN Consulting Engineers	Project Direction, Project Management, Production, Evaluation and Reporting. Introduction, Existing Site and Proposed Development, Alternatives, Policy/Planning and Development Context, Human Beings/Socio Economic, Flora and Fauna, Soils /Geology and Hydrogeology, Water, Air Quality and Climate, Noise and Vibration, Cultural Heritage and Archaeology, Traffic and Road Assessment, Interaction of the Foregoing, Explanation of Technical Terms.
Scott Wilson	Landscape and Visual Impact
Burke Jenkins Consulting Engineers	Preliminary Design and Planning Drawings
Odour Monitoring Ireland	Odour Impact Assessment

2 EXISTING SITE AND PROPOSED DEVELOPMENT

2.1 DESCRIPTION OF THE EXISTING SITE

The site at Ballynalurgan, Kilmainhamwood, Kells, Co. Meath is situated approximately 2.4 km northeast of the village of Kilmainhamwood, 6 km northwest of the village of Nobber, Co. Meath, and 4 km south of Kingscourt, Co.Cavan. The site, of approximately 13.2 hectares, is in the townlands of Ballynalurgan and Newcastle.

The site is made up of two fields. One field, of approximately 7.7 hectares, extends from the Kingscourt to Nobber road (R162) in the southwest to a second inner field, of approximately 5.5 hectares, to the northeast of the site. This 7.7 hectare field, in the form of a narrow strip of land, runs parallel to an original passage/driveway and is set in permanent grass. This field is bordered to the northwest by a wire fence. The original passage/driveway is divided from this strip of land by an earthen bank which is topped with shrubs and some mature trees. The southern end of this field which adjoins the R162 road is bordered by a stream which runs from east to west where it goes under the original passage/driveway passage then under the road where it descends into Newcastle Lough.

The second inner field, of approximately 5.5 hectares, previously planted for commercial forestry, is now the location of the existing Kilmainhamwood Compost facility. Planted trees were cleared from the centre of this field, an area of approximately 1.4 hectares, for the development of the existing facility. This field is bordered on all sides by a traditional earthen bank topped with a variety of trees and shrubs, except for the northern boundary which borders on open ditch where the water flows from west to east. The northern section of the earthen bank to the east of the field borders on open ditch where the water flows from northwest to southeast.

The original vehicle passage/driveway of approximately 0.7 km in length existed prior to the development of the existing facility and runs from the inner field to the Kingscourt / Nobber road (R162). As part of the development of the existing facility, a 5m wide road of approximately 0.85km in length was constructed from the facility to the R162 regional road to facilitate the movement of delivery vehicles to the composting facility located in the inner field. This road is parallel to the existing passage/driveway and on the opposite side of the earthen bank such that the earthen bank separates the original passageway from the recently constructed road. As this road approaches the R162 regional road, it diverges (to the south) away from the original passage/driveway so as to provide adequate visibility on both sides of the site entrance.

The gross floor area of the existing composting buildings (indoor area) is approximately 4550m^2.The existing facility buildings are a steel portal frame design featuring 3.0m high mass concrete walls and green cladding. The apex of the roof is 12.5m above ground level.

The existing facility comprises of 22 No. positively aerated composting bays and 2 No. positively aerated Animal By-product (ABP) treatment tunnels. Each composting bay is 5.750m wide and

11.575m long, and each ABP treatment tunnel is 7.950m wide and 25.425m long. The existing composting facility also includes a waste reception area, a compost screening area and an odour abatement area. The gross footprint of the existing composting buildings and odour abatement area is approximately 5639m^2.

An ESB substation building is located adjacent to the composting facility buildings as shown on Drawing No. 5361-2402. The floor area of this building is approximately 34m^2.

The existing infrastructure at the site is described in further detail herein.

Plate 1 Existing Kilmainhamwood Compost Facility

2.2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

The facility is currently permitted, as per EPA waste licence W0195-01 and its associated Technical Amendment A (Appendix 2.1), to accept and process 20,800 tonnes of biodegradable waste per annum. The current facility has been operational since September 2006.Thorntons Recycling now propose to extend the existing facility to accept and process up to 40,000 tonnes of biodegradable waste per annum.

Proposed Extensions to Facility Buildings

The current application proposes to extend the existing facility buildings in order to provide sufficient processing capacity for the additional tonnage. It is proposed to construct a 38m x 25m front extension (approximately 1167m^2 – including a 201m^2 ramp for waste acceptance) on the southwest side of the existing facility and a rear extension 39m x 30m (approximately 1043m^2) on the northeast side of the existing facility. The proposed extensions to the facility buildings are shown on Drawing No. 5361–2402 and Drawing No. 5361-2403. The extensions to the buildings will be a steel portal frame design featuring 3.0m high mass concrete walls and green cladding (to match character of the existing buildings). The height of the proposed extensions will not be any higher than the existing buildings.

The existing weighbridge currently located to the southwest of the existing facility buildings will be relocated to facilitate the footprint of the 38m x 25m extension on the southwest side of the existing facility. The proposed location of the weighbridge is shown on Drawing No. 5361-2402.

Planted trees adjacent to the existing facility will be removed to facilitate the proposed extensions. A total area of approximately 3200m^2 of planted trees will be cleared.

Following the construction of the proposed extensions to the facility the gross floor area of the composting buildings (indoor area) will be approximately 6550m^2.

The proposed 38m x 25m front extension on the southwest side of the existing facility will serve as a new waste reception area (thus allowing the existing waste reception area to be replaced by additional positively aerated composting bays). It is proposed to construct a 2m high waste acceptance ramp, with a maximum slope of 1:10, on the southeast side of this extension, as shown on Drawing No. 5361–2402 and Drawing No. 5361-2403. A roller shutter door will be positioned at the top of the ramp. The area of the ramp (approximately 3m x 7m) immediate to the said roller shutter door will be roofed. This ramp will obviate the need for delivery trucks to enter the facility building. Instead, delivery trucks will reverse up the ramp until the rear wheels meet a wheel stop (roller shutter door at top of ramp will be opened in advance by facility operator). The truck positioned on the ramp (located 2m above the floor of the waste reception building) will discharge its waste load into the building. The rear and wheels of the delivery vehicle will be power washed immediately following discharge of waste and prior to moving off the ramp. Wash water will contained and will drain back into the feedstock bunker within the building. The roller shutter door will be immediately closed following departure of the delivery truck following discharge of waste. A second roller shutter door (at finished ground level) on the southeast side of the extension will facilitate the movement of loading shovels in and out of the waste reception area. The facility building, including the proposed extensions to the building, will be maintained under negative pressure when waste is being received at the facility and during the movement of waste between process areas within the building.

The 39m x 30m rear extension (approximately 1043m^2) on the northeast side of the existing facility will serve as an Animal By-product (ABP) treatment and storage area. The existing ABP treatment area and tunnels will be used to mature the additional tonnage proposed. It is proposed to construct 2 No. ABP treatment tunnels in this extension. Each ABP treatment tunnel will be approximately 6m wide, 15m long and 5m high. The tunnels will feature concrete walls and roof and will include a positively aerated floor. A fully sealed and insulated steel door will be positioned at each end of the tunnels (material input end and material output end). Material to be ABP processed (from the screening process (minus 12mm)) will be placed in the tunnels from the input end by a loading shovel that only operates in the maturation area. Following treatment at 70^{o}C for a minimum of 1 hour, the sanitised material will be removed from the ABP tunnels from the output end by a loading shovel that only operates in the clean area. The above ensures that material flows from the maturation area of the facility through the ABP treatment tunnels and into the clean area in a single direction (one way system of flow). The Department of Agriculture, Fisheries and Food (DAFF) desire this material flow methodology and such

a system of “one way flow” minimises the potential for cross contamination of processed feedstock. In summary, as the material is going through the ABP treatment tunnels, it is moving further away from the composting end (designated dirty area) of the plant thus minimising cross contamination.

It should be noted that the existing ABP treatment area, while approved by DAFF, does not provide a “one way system of material flow” through the ABP process. This is due to the fact that the ABP treatment area was not considered in the original design of the facility in 2003, rather it was included at construction stage by way of planning retention. This was as a result of the evolving nature of the specific requirements/conditions for the operation and approval of composting plants in Ireland prior to this time.

The rear extension proposed for ABP treatment and storage is adequately sized to provide adequate storage for finished compost prior to dispatch from the facility. As illustrated on Drawing No. 5361–2403 and Drawing No. 5361-2404, this extension features a roofed “drive through” section which will provide a covered area (controlled environment) for the loading of finished compost into vehicles for dispatch from the facility.

Letters provided by DAFF are included in Appendix 2.4. One of the letters (dated October 5th 2009) relates to a renewed approval (until October 7th 2011) for the operation of the existing Kilmainhamwood facility as a composting plant and to process Animal By-Products. The other letter (dated August 20th 2009) was provided by DAFF as ‘approval in principle’ for the 1st Stage Application submitted by Thorntons Recycling for the proposed extension (ABP Treatment Tunnels in rear extension) to the facility. The next stage of approval (2nd Stage Approval) will only be granted by the Department following a site visit to the extended Kilmainhamwood facility, following the construction stage.

Proposed Facility Administration Building

Presently, office and employee welfare accommodation of a temporary nature is provided at the Kilmainhamwood Compost facility in the form of portacabins. As part of the current application, it is proposed to construct a facility administration building, as shown on Drawing No. 5281-2402 and Drawing 5281-2405, to include:

- Offices;
- Tea station;
- Locker room;
- Toilets;
- Shower area;

This will be a single storey building with a pitched and tiled roof. External walls will be of block work construction with a plastered finish.

The proposed building will be located adjacent to the relocated weighbridge, as shown on Drawing No. 5281-2402, to control waste acceptance into the facility.

Proposed Upgrade to Odour Abatement System

The existing composting system involves material being composted in open bays whereby odourous air is displaced to the building headspace. Hence large odourous air volumes (101,000m^3/hr) require treatment, which is deemed inefficient in regard to power consumption.

The odour abatement system currently in operation at the Kilmainhamwood Compost facility involves biofiltration. The ventilation system consists of three 37kW extraction fans that extract a total of 101,000m^3 of air per hour. This volume of odourous air is processed by two biofilters. One biofilter processes the air stream generated by one 37 kW fan (38,000 m^3/hour) and the other biofilter processes the air stream generated by two fans (63,000 m^3/hour). Each biofilter is 23.5m long, 16.5m wide and 2.1m high. The existing biofilter construction is based on a firm concrete floor and surrounding concrete walls. The bed media consists of a combination of woodchip and carbon media mix.

Thorntons Recycling has commenced the upgrade of the odour abatement system on site in order to further reduce the odour emission rate from the facility. Each existing composting bay within the facility building has been enclosed/roofed (such that the distance from the floor of the composting bay to the underside of the roof is 6m), thus significantly reducing the volumes of process air that require treatment. Works on enclosing existing composting bays were completed on site in January 2010. The displacement of odourous air, from the composting process to the headspace of the building is now prevented thereby implementing double containment features and allowing for the specific treatment of this odourous air.

In addition Thorntons Recycling propose to process the odourous air generated within the enclosed composting bays in an acid scrubber to minimise ammonia carryover to the biofiltration system. The enclosing of existing composting bays and treatment in an acid scrubber will ensure the efficient capture and focused treatment of odours generated by the composting process itself, thereby ensuring that the maximum allowable odour threshold concentration in the exhaust air of the biofiltration system is achieved.

Notwithstanding the above, odour abatement at the facility will still involve treating the air within the building headspace, however as this air will not be a direct product of the composting process, it will be low in ammonia levels and will only require treatment by biofiltration.

Thorntons Recycling employed the services of an independent odour consultant to design the upgrade to the odour abatement system as described above. A range of odour abatement technologies were considered in the design process. The following technologies were examined:

- Thermal Oxidation;
- Chemical Scrubbing and biofiltration;
- Carbon absorption

Chemical scrubbing and biofiltration were deemed to be the most feasible combination of technologies as detailed in the Alternatives section (Section 3.3).

Chemical scrubbing of an air stream is a technique widely used in many industries to remove both solid and gaseous contaminants. The technique is essentially one of mass transfer by absorption when the air contaminants are brought into intimate contact with a liquid solvent in which they have a high solubility. The consumables used in the scrubbing process are water and sulphuric acid. The molecular formula of the acid used is H_2SO_4. The scrubber unit will include a bunded tank for the storage of sulphuric acid.

The existing facility is certified to International Standards for Environmental (ISO14001), Health and Safety (OHSAS 18001) and quality (ISO9001) and operates an Integrated Management System (IMS). In regard to the proposed scrubber unit, all safety and environmental aspects will be incorporated into the Integrated Management System.

The by-product generated by the scrubbing process is ammonium sulphate in solution. This by-product is regarded as a soil fertiliser (ammonium sulphate) and will be added to the composting feedstock. The ammonium sulphate will compliment the nutrient value of the finished compost. This soil fertiliser will be stored in a secure tank for application under controls which will be detailed in the Integrated Management System (IMS).

The proposed inclusion of an acid scrubber combined with changes already undertaken by Thorntons Recycling (enclosing of existing composting bays) to optimise volumes of process air requiring treatment at the Kilmainhamwood Compost Facility are in line with Best Available Techniques (BAT) in the industry and will ensure that the odour concentration at sensitive receptors is lower than the accepted odour impact criterion for such facilities.

Proposed Agricultural Grade Compost

The existing facility is licensed to produce Class 1 compost, Class 2 compost and stabilised biowaste in accordance with the existing waste licence (W0195-01) and its associated Technical Amendment A.

In addition to Class 1 compost, Class 2 compost and stabilised biowaste, it is proposed that the intensified and extended Kilmainhamwood Compost facility will also be permitted to produce agricultural grade compost as detailed in Section 2.5.8 of this EIS.

Proposed Ancillary Works

Other works required to integrate the proposed extensions to the facility buildings and the proposed facility administration building into the existing facility will include:

- Extension to surface water drainage network
- Foul water drainage network from proposed facility administration building to the existing waste water treatment plant

Surface water attenuation infrastructure is also proposed for the Kilmainhamwood Compost facility and details are provided in Section 2.3.7 of this EIS.

The areas adjacent to the proposed extensions to the facility buildings and the proposed facility administration building will be landscaped as detailed on Drawing No. 5361-2409. The landscaping proposal previously submitted to Meath County Council (Appendix 2.5) will also be implemented following completion of construction activities, as illustrated on Drawing No. 5361-2409 and Drawing No.5361-2410.

2.3 SITE INFRASTRUCTURE

The existing site infrastructure includes a weighbridge, site security arrangements, site accommodation in the form of temporary portacabins, site road, waste water treatment plant for site accommodation, surface water drainage, water storage tank for fire fighting measures, car parking, and other services. Existing site infrastructure is shown on Drawing No. 5361-2402.

Planning has already been secured for all the permanent site infrastructure mentioned above as part of the original proposal. Construction of such infrastructure has been completed.

Design notes on the facility infrastructure, prepared by Burke Jenkins Consulting Engineers, are provided in Appendix 2.2.

2.3.1 Weighbridges

A proprietary weighbridge has been installed at the facility. It is proposed that this weighbridge is relocated to the location shown on Drawing No. 5361-2402 so as to facilitate the construction of the extension to the southwest of the existing compost facility buildings. The weighbridge is capable of weighing vehicles with a gross weight of up to 50 tonnes. The weighbridge is linked to the facility office, which includes proprietary customised software (WIMS – Waste Information Management System) to allow for the recording of details of each waste movement to the site including the following:

- Haulier name;
- Vehicle registration;
- Waste source;
- Waste type (EWC Code);
- Gross weight;
- Tare weight;
- Net weight;
- Time; and
- Date.

If necessary the weighbridge may also be used to record details of construction materials required for the proposed development of the facility extensions.

2.3.2 Site Security

Site security arrangements to prevent unauthorised access at the facility include the following:

- Secure composting building involving mass concrete walls and lockable steel doors;
- Fencing around the entire boundary of the composting facility;
- A 2.4m high by 7m wide lockable gate that is closed outside normal operating times, located at the site entrance at the R162;
- A 2.4m high by 7m wide lockable gate that is closed outside normal operating times, located at the inner facility entrance;
- The site access at the R162 includes stonewalls and pillars;
- Stock proof fencing;

In addition to the above, site signage indicating opening times and contact details is maintained at the site entrance. All visitors to the site are required to sign in and out at the site office. The site security infrastructure is checked daily and any damage is immediately temporarily repaired with any additional permanent repair executed within 48 hours of discovery.

2.3.3 Site Accommodation

Presently, office and employee welfare accommodation of a temporary nature is provided at the Kilmainhamwood Compost facility in the form of portacabins. As part of the current application, it is proposed to construct a facility administration building as shown on Drawing No. 5281-2402 and Drawing No. 5281-2405 and described in Section 2.2.

2.3.4 Site Road

As part of the development of the existing facility, a 5m wide road of approximately 0.85km in length was constructed parallel to the original passage/driveway (and on the opposite side of the earthen bank which is topped with shrubs and some mature trees) to facilitate the movement of biowaste delivery vehicles from the R162 regional road to the composting facility. As this road approaches the R162 regional road it diverges (to the south) away from the original passage/driveway so as to provide adequate visibility on both sides of the site entrance.

This is an unpaved road consisting of approximately 300mm of granular material such as recovered construction and demolition waste on rockfill to suitable formation.

2.3.5 Wastewater Treatment Plant

Wastewater to be generated by the proposed facility administration building will be collected and processed in an existing proprietary wastewater treatment plant located on site. Details of this plant are provided in Appendix 2.3. Any sludge removed from this plant will be collected by Thorntons Tankering Services and sent to an approved facility for treatment.

The existing treatment plant on site is designed to process a total flow of 720 litres per day. The proposed facility administration building is designed to serve both office staff and staff directly working at the composting facility. There will be a total of six staff members employed at the facility.

As per the E.P.A. Guidelines for Treatment Systems for Small Communities, Business, Leisure Centres and Hotels – Table 3, the estimated loading rate per person for Industrial Office without canteen is 30 litres per day.

Hence the existing waste water treatment plant and associated percolation area is more than adequate to serve the proposed facility administration building.

2.3.6 Existing On Site Borehole

The existing borehole well (BH3) is located adjacent to the existing water storage tank on elevated ground. An onsite water treatment plant at the point of entry to the facility administration building to treat the well supply to drinking water standard will be developed. It is proposed to provide a package plant in the tea station, within the proposed facility administration building, providing chlorination and filtration.

All of the parameters on the water analysis from the existing borehole (BH3) are within the limits set for drinking water under the EU drinking water directive. Chlorination will be introduced to ensure disinfection of the water and filtration to maintain the distribution network clean.

2.3.7 Surface Water Drainage

Two networks of surface water pipes serve the existing facility, the first collecting roof water and the second collecting run off from the yard.

All surface water run off from the roofs of the existing facility buildings is collected and reused where possible within the composting process. Surplus surface water run off is piped to a drainage ditch located along the eastern boundary of the site and flows in a south-eastern direction (See Figure 8.1) prior to eventually discharging into the Dee River.

It is proposed that the additional surface water generated by the proposed facility extensions and facility administration building will be reused where possible within the composting process with any surplus surface water run off diverted to the drainage ditch located along the eastern boundary of the site.

A proprietary grit interception trap and a proprietary oil interceptor (Class 1) have been installed at the existing facility through which all intercepted run off from outdoor hardstanding areas is diverted. The outfall from the grit trap and oil interceptor is discharged to the drainage ditch located along the eastern boundary of the site. The existing grit trap and oil interceptor have sufficient spare capacity to treat additional storm water generated by the proposed facility extension (Please refer to Appendix 2.2).

Surface water attenuation infrastructure is proposed for the Kilmainhamwood Compost facility. A low lying forested area adjacent and south east of the existing facility building will be used to provide storage volume to cater for a 1 in 100 year storm event. The greenfield runoff rate to the existing drainage ditch will be controlled by a hydrobrake. An overflow, downstream of the oil interceptor, will discharge into the storage area. When the storage area fills, some water will infiltrate to ground and the remainder will discharge back to the existing drainage ditch over time. The water level in the storage area, for a 1 in 100 storm event, will be a minimum of 500mm below the finished floor levels of the facility buildings. The proposed surface water attenuation infrastructure is illustrated on Drawing No. 5361-2402 and Drawing No. 5361-2411.

Construction works required to develop the surface water attenuation area will not be significant and are described as follows. A section of the existing berm will be raised at the southeast corner of the storage area. The section of existing berm will be raised by approximately 0.4m to a level of 80.8m. The existing berm, at the northeast corner of the storage area, will be extended. The berm will be extended by approximately 25m. All remaining sections of the existing berm will be inspected and appropriate remedial works will be undertaken, such that the top of the berm is at 80.8m. The existing trees will remain, as their footprint is insignificant. During the operational period, vegetation in the area will be adequately controlled to preserve storage volume.

Minor alternations to the existing drainage network will be required as follows. An overflow pipe will be constructed from a new manhole downstream of the oil interceptor to the attenuation area. The roof water sewer will combine with the yard water sewer (downstream of the oil interceptor) such that there will be a single outfall from the site to the existing drainage ditch. Presently, there are two separate outfalls from the site for roof water and yard water.

Details of the surface water drainage network from the proposed facility building extensions to the surface water attenuation infrastructure are provided in Drawing No. 5361-2402.

2.3.8 Water Storage Tank

A 100m^3 water tank is located at an elevated area of the site, as shown on Drawing No. 5361-2402, and is maintained full at all times. An electric pump is in place to pump water from the tank to all areas of the facility in the event of fire.

2.3.9 Car Parking

Car parking is provided for employees, delivery personnel and visitors at the facility. The location of the car park is detailed on Drawing No. 5361-2402. This is a hardstanding and paved area of concrete construction.

2.3.10 Other Services

Other services that have been provided at the site include:

- Telephone system;
- Water from an on-site borehole;
- 400v three phase electricity (including on site substation);
- A standby diesel generator;
- Double skin fuel bowser;

2.4 SITE MANAGEMENT

The facility manager is responsible for the day to day operation of the facility in compliance with all legislative and regulatory requirements. The facility manager is part of the Thorntons Recycling management team and regularly prepares reports on the operation of the facility for attendance at meetings at Thorntons Recycling headquarters in Parkwest Business Park, Dublin 12.

2.4.1 Working Hours

The facility operates, as permitted, on a daily basis from 8.00am to 6.00pm Monday to Friday and 8.00am to 1.00pm on Saturdays. The hours of operation will be the same for the extended composting facility following the proposed extension.

The aeration of the composting process will operate on a continuous basis (24 hours per day; 7 days per week), and will be computer controlled in the absence of an operator on-site.

Waste that is accepted at the composting facility at or near closure of operating hours will be discharged in the waste reception area, stored overnight and handled during the next working day.

2.4.2 Employment

The existing composting process, as described earlier, is a highly automated process. There are 4 No. personnel currently employed to operate the Kilmainhamwood Compost facility, to process 20,800 tonnes per annum in accordance with current permissions. The current staff is comprised of a facility manager, production supervisor and two general operatives.

The Thornton Recycling recruitment process involves selecting people with experience in the composting industry. Indeed, the present facility manager has a Degree in Agricultural Science, over 17 years composting experience and has attended many training courses specific to the composting industry.

The proposed extension of the Kilmainhamwood Compost facility to process a maximum of 40,000 tonnes per annum of biowaste will require an additional two general operatives.

2.4.3 Health and Safety

The primary concern of Thorntons Recycling is the safety and protection of employees, end users, the public, and the environment, with regard to all aspects of the operation of the facility. The facility operates in compliance with all relevant health and safety legislation, including *The Safety, Health and Welfare at Work Act, 2005.*

All staff employed by Kilmainhamwood Compost receives Environmental, Health and Safety, and in house composting process training. The existing facility is certified to International Standards for Environmental (ISO14001), Health and Safety (OHSAS 18001) and quality (ISO9001) and operates an Integrated Management System (IMS).

2.4.4 Traffic Control

All waste traffic access the facility by turning from the R162 into the site entrance, and then travelling along the facility access road until the inner facility entrance is reached.

Traffic management to the site is dealt with in more detail in Section 13 herein.

Given the length of the access road (0.85km) from the R162, there is no possibility of traffic on the R162 being affected by vehicles queuing to enter the facility.

All waste vehicles, having passed the inner facility entrance gate, pass to the site weighbridge/office, where the weight, source, type etc. of waste are recorded and instructions are given as to where to proceed with the waste.

An adequate number of signs are positioned strategically around the facility to facilitate the efficient movement of waste delivery and compost removal vehicles.

Car parking is provided for employees, delivery personnel and visitors at the facility.

2.5 FACILITY OPERATION

2.5.1 Feedstock

The existing composting process at the Kilmainhamwood Compost facility is capable of processing a range of biodegradable wastes including organic fines, green waste and sludges from wastewater treatement plants. Presently, composting feedstock accepted at the facility includes:

- Brown bin biowaste;
- Grease trap waste;
- Catering waste from hotels and restaurants;

In addition to the above feedstock, amendment materials are needed to optimise the composting process at the facility. Typical amendment materials accepted at the facility include sawdust and woodchip generated from other waste streams.

In compliance with the current EPA Waste Licence, no hazardous waste is accepted at the facility.

The extended facility will be capable of processing increased quantities of biowaste (up to 40,000 tonnes per annum). The additional feedstock is expected to include biowaste derived from brown bin source separated household collections. This is driven by the continuous roll out of the brown bin in the North East Region and the resultant need for biological treatment capacity.

The Kilmainhamwood Compost facility also currently processes commercial biowaste. Indeed, the volumes of this feedstock requiring biological treatment are likely to increase significantly in the North East Region following the:

- Implementation of the Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) for the source separation of commercial food waste.
- Implementation of the Waste Management (Collection Permit) Regulations (S.I. No. 820 of 2007);
- 2008 circular from the Minister for the Environment, Heritage and Local Government requesting local authorities to intensify the roll out of brown bins for the source separation and collection of domestic biowaste for biological treatment;

2.5.2 Waste Acceptance

All feedstock is delivered to the facility in covered/enclosed vehicles. All waste delivery vehicles are required to drive onto the facility weighbridge where the gross weight of the vehicle is recorded. The weighbridge operator records the vehicle registration, driver name, company name, waste category/description, EWC code, date and time on to a computerised software system called WIMS

(Waste Information Management System). The details are cross-referenced with the approved waste contractor list prior to allowing the vehicle to progress to the waste reception area. Similarly, the tare weight of waste delivery vehicles is recorded following tipping of the waste. The net weight of waste delivered by each vehicle is hence recorded.

Vehicles, owned and operated by Thorntons Recycling, currently deliver the majority of waste received and processed at the facility. Other contractors or operators delivering waste to the facility must be holders of a waste collection permit. The facility does not accept waste from the general public.

Waste is only accepted from Contractors who have a contract with Thorntons Recycling. This ensures that all contractors have been assessed in advance and waste characterisation profiling has been carried out. Any contractors who arrive on-site without such a contracted agreement are refused entry and turned away.

All incoming wastes are tipped into the waste reception area at the facility building. There is no waste stored or processed outside the facility building. All processes take place within the building. Following tipping on the reception floor, the waste is inspected by an operator for compliance with supposed feedstock category and level of contamination. If the load is non-compliant in terms of feedstock category or level of contamination then the waste load is removed off site and returned to a Thorntons Recycling licensed facility for further processing or onward disposal.

Prior to leaving the waste reception area of the facility, the rear of the vehicle and the vehicle wheels are steam washed.

2.5.3 Feedstock Blending

Moisture and carbon to nitrogen ratio are important factors in determining the correct composting conditions suitable for high rate aerobic composting. As a result the incoming feedstock, following shredding (if deemed necessary), is mixed with seed compost and other amendments including sawdust and woodchip. These supply a readily available carbon energy source to the micro-organisms. Experienced operators at the facility assess the composition of each load of incoming waste with regard to moisture content, porosity and C:N ratio, and accordingly determine the quantities required for blending to produce an optimum feedstock for composting.

All blending/mixing is performed in doors on the floor of the reception building by loading shovels. A pile of feedstock and amendment is turned a number of times by loading shovel in order to ensure uniform mixing.

2.5.4 The Composting Process

Following the mixing and blending process, the feedstock is moved by loading shovel and placed in the composting bays for the initial phase of composting (typically a one week process) where the level of

microbial activity and hence oxygen consumption are highest. Each composting bay is approximately 5.75m wide and 11.57m long. The feedstock is piled to a height of approximately 3m within the bays. The composting process is a forced aeration temperature feedback system. The composting bays feature an automated forced aeration system. There is an aeration fan behind each composting bay to blow air up through the pile and control temperature. These fans are located in tunnels/corridors behind the composting bays. Air is blown from the underside of the static pile of composting material towards the exterior of the mixture. The system maintains a temperature ceiling of 60°C by means of the on-demand removal of heat by ventilation through temperature feedback control. This encourages a high decomposition rate as significantly higher temperatures inhibit and slow down decomposition by reducing microbial activity. In addition the interior of the composting facility building is a controlled environment, where an atmosphere of negative pressure is maintained.

Temperature probes inserted into the composting mixture can generate a control signal used to adjust the air/oxygen supply and maintain a set point temperature. Temperature is the controlled variable and aeration rate is the manipulated variable during the process. Aeration fans linked to a pre-programmed control panel operate according to the temperature of the individual bays.

Throughout all stages of the composting process, temperature is monitored by use of temperature probes. This helps to ensure that the bays are being adequately aerated. Moisture is checked by means of a "squeeze" test which is a non-quantitative method of estimating moisture.

The high temperatures generated in all stages of the composting process, in combination with the measures taken during feedstock blending/mixing to include sufficient dry amendment to adjust the moisture content to within an optimal range ensures that no leachate is produced by the process under normal conditions. Any leachate produced including leachate from incoming feedstock is contained and reintroduced in the blending/mixing stage of the process.

After the initial phase of high rate composting, the material is moved by loading shovel to composting bays in the maturation area of the facility where the compost is matured by aerating the compost for another 10-12 days.

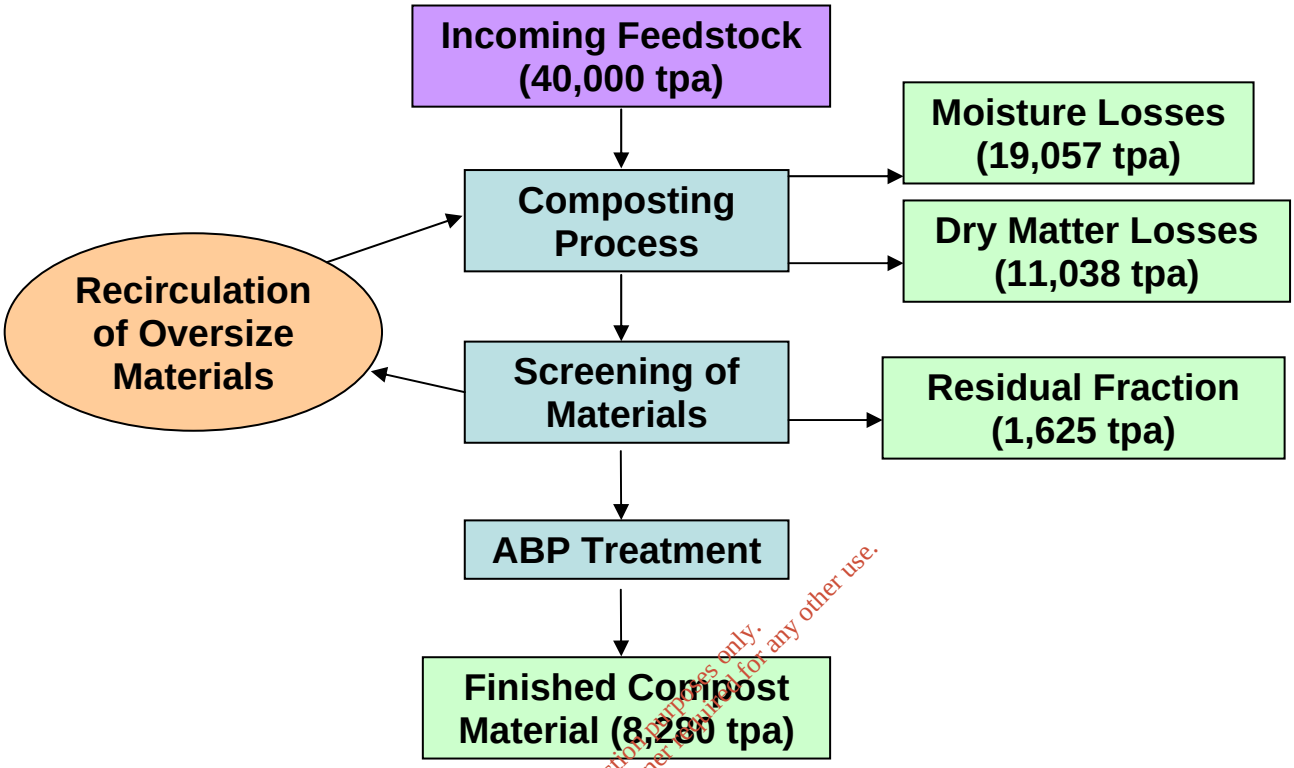
Following this stage, the compost is processed through a trommel screen fitted with 12mm and 40mm screens. The minus 12mm fraction produced by the screening process is placed in a bulking tunnel which allows enough material to be bulked in order to fill the pasteurisation tunnel. This normally takes approximately 3 weeks. The material is then transferred in to an Animal By-product (ABP) treatment tunnel No.2 where the temperature of the material is maintained at 70^{o}C for a minimum of 1 hour, in line with the requirements of DAFF. Samples of compost product are subsequently taken from the ABP treatment tunnel and sent for testing (E. Coli and Salmonella) to a DAFF approved laboratory and compost is left in situ until analysis results are returned from the laboratory. This process from when material enters the ABP tunnel and receipt of final results may take up to 3 weeks. Following a successful outcome to laboratory testing, the compost product is removed from the ABP treatment tunnel for delivery to a customer.

The 12-40mm fraction (seed compost) produced by the screening process is moved to the beginning of the process where it is mixed with incoming feedstock to adjust the porosity, moisture content and C:N ratio of the blended mix. The plus 40mm fraction primarily comprises of plastic film and other large contaminants and is hence stored for dispatch from the facility to a licensed facility for recovery/disposal.

It is proposed that approximately 8,280 tonnes per annum of finished product and approximately 1,625 tonnes per annum of residual waste will be generated by the extended and intensified Kilmainhamwood facility. Given that the process proposed for the additional feedstock is the same as the existing process, it is reasonable that the mass balance for the extended and intensified facility is based on the mass balance for the existing facility.

Process losses are due to a combination of reductions in dry matter content and moisture content. The microbial activity in the process consumes carbon, as an energy source, and releases carbon dioxide and heat. The heat generated results in the evaporation of moisture within the feedstock. In summary, the process losses are represented in terms of carbon dioxide and water vapour emissions at the biofilter. Process losses in excess of 60% are typical of a well managed in-vessel composting process. A flow diagram of the process at Kilmainhamwood Compost is provided below. On the basis of the data compiled for the existing process, losses have been approximated for the treatment of 40,000 tonnes per annum and are included in the flow diagram below.

Process Flow Diagram for Kilmainhamwood Compost Facility



The incoming feedstock, derived from commercial and domestic biowaste, will contain sufficient moisture to sustain the composting process. As a result, water usage is only required for the washing of trailers, equipment and floors. Water for washing will be utilised from the rainwater storage tank, the composting process will not place any demand on the onsite borehole. The facility building is fully bunded and therefore all waters from washing activities are contained and incorporated back into the composting process. The proposed extensions to the facility building will also be fully bunded. There will be no wash water or leachate transported out of the facility for treatment.

2.5.5 Composting Process Parameters

Important parameters which affect the composting process are temperature, moisture, oxygen, substrate availability and C:N ratio.

Temperature

Micro-organism activity during composting releases large amounts of energy in the form of heat. Temperature can vary from ambient temperature to greater than 70^{o}C. As temperature is the controlled variable, effective monitoring is necessary. Temperature is monitored by means of temperature probes and the automated process control system with feedback to a computerised system in the facility manager's office. Temperatures are maintained during the initial composting phase at 60^{o}C so that the

rate of decomposition is not compromised, and for greater than 70°C for 1 hour for pathogen destruction at the Animal By-Product (ABP) treatment stage.

Moisture

The composting mixture, before being placed in the composting bays is adjusted to between 55% and 65% moisture by blending with amendment material. This ensures adequate water availability for the growth of micro-organisms while being sufficiently dry to prevent anaerobic conditions.

Oxygen

Oxygen levels throughout the process can range from 14% to 21% depending on the rate of activity within the pile. If there is insufficient oxygen, the process can go anaerobic. The composting process operates by supplying air continuously to the pile and maintaining aerobic conditions.

Carbon to Nitrogen ratio

The C:N ratio is used by the composting industry as a measure of a proper nitrogen balance. This is monitored regularly when samples of compost are sent for analysis. Generally C:N ratios of between 25 and 30 are adequate at the beginning of the composting process and reduce during the process to between 12 and 20. This is a good indication of compost stability.

Substrate Availability

The amount of different substrate within a compost formulation depends on the moisture content of incoming wastes. The amendments have consistent moisture levels. The appropriate substrate mixtures are blended so that the initial moisture content ranges from 55% to 65% moisture.

2.5.6 Water Usage

The incoming feedstock, derived from commercial and domestic biowaste, will contain sufficient moisture to sustain the composting process. Indeed, as noted in Section 2.5.5 above, it is necessary to introduce amendment materials to reduce the moisture content of the blended feedstock to between 55% and 65%.

As a result, water usage is only required for the washing of trailers, equipment and floors. Water for washing will be utilised from the rainwater storage tank, the composting process will not place any demand on the onsite borehole. The facility building is fully bunded and therefore all waters from washing activities are contained and incorporated back into the composting process.

A water management plan is provided in Table 2.1, below, for the extended and intensified Kilmainhamwood Compost Facility:

Table 2.1 Water Management Plan

Facility Area	Water Use	m^3 per Day	Water Source
Composting Building	Washing Requirements	0.6	Rainwater Storage Tank
Facility Administration Building	Washing Requirements and Potable Water	0.3	On Site Borehole (BH3)

The capacity of the rainwater storage tank is 36m^3. Given that:

- The rainwater storage tank can provide wash water requirements for a dry weather period of 60 days; and
- 4.5mm of rainfall will replenish the tank on the basis of a total roofed area of 7961m^2;

It is reasonable to assume that all water usage for washing requirements within the composting building can be provided by collection of rainfall.

An onsite water treatment plant is proposed at the point of entry to the facility administration building to treat the borehole (BH3) supply to drinking water standards. It is proposed to provide a package plant in the Tea Station providing chlorination and filtration.

Surplus roof rainwater will overflow from the rainwater storage tank to the roof water sewer and will combine with the yard water sewer (downstream of the oil interceptor). The green field runoff rate to the existing drainage ditch will be controlled by a hydrobrake. An overflow, downstream of the oil interceptor, will discharge into a proposed attenuation area as shown on Drawing No. 5361-2402.

2.5.7 Odour Abatement System

The odour abatement system currently in operation at the Kilmainhamwood Compost facility involves biofiltration.

Biofilter Principle

It is widely accepted that the wide range of micro-organisms found in soils can oxidise many compounds, including both volatile organic compounds and other odourous compounds. Prepared beds have therefore been used for odour control for about 40 years. With adequate construction and maintenance of biofilter beds, they can be very effective for odour abatement. Mixtures of porous, well structured material with some compost are typically used and the bed is kept open by turning the top layer two or three times per year. Adequate bottom drainage is essential, as is the facility to keep the bed moist in dry weather.

The residence time in a biofilter depends largely on the substrate. For most odorous air or gases, a residence time of approximately 28 seconds is required. The typical height of biofilter beds is 1 to 2 metres, so that a linear flow rate of approximately 130 m3 (h) (m2) is provided. Greater bed heights will

decrease the ground area required and hence the bed cost, but at the expense of higher power costs due to greater bed resistance (greater pressure drop across the bed).

Existing Biofilters at the Facility

The existing 2 No. biofilters at the Kilmainhamwood Compost facility comprise of a firm concrete floor and surrounding concrete walls. The floor has a fall towards a drained sump situated at one end of the chamber for water drainage. A false floor acts as the support for the biofilter media. The sump liquid is pumped back to the waste reception area within the composting building.

The incoming air has a high relative humidity to provide a suitably moist surface for the micro-organisms. The bed media consists of a combination of woodchip and carbon media mix. This media provides a large available (external and internal) surface for the microbes and an adequate supply of nutrients, while being sufficiently permeable to allow for a reasonably fast air flow rate without excessive pressure drop (both after initial construction and following settlement of the biofilter media).

The bed pressure drop is a most important parameter, since the power required to pass the air through the bed is often the largest component of the total operating cost.

The odour abatement system currently in operation at the Kilmainhamwood Compost facility consists of three 37kW extraction fans that extract a total of 101,000m^3 of air per hour. This volume of odourous air is processed by two biofilters. One biofilter processes the air stream generated by one 37 kW fan (38,000 m3/hour) and the other biofilter processes the air stream generated by two fans (63,000 m^3/hour). Each biofilter is 23.5m long, 16.5m wide and 2.1m high.

A sump pump pumps rainwater and condensate from the biofilter into the waste reception area where it is added to the compost feedstock. The biofilter is completely sealed preventing the release of rainwater and condensate.

Details of the proposed upgrade to the Kilmainhamwood Compost facility odour abatement system are provided in Section 2.2.

Plate 2 Existing Biofilters at Kilmainhamwood Compost Facility

Maintenance

The biofilter is maintained and inspected regularly. Daily inspections are carried out to check if the sump area requires condensate to be pumped out and that the biofiltration system is operating effectively (no odorous emissions or short-circuiting of the airflow).

The biofilter media is regularly inspected to ensure correct moisture levels are present and that the material is sufficiently porous so it cannot cause significant backpressure for the fans. The material is maintained moist, porous and uniform, preventing short-circuiting of the airflow throughout the biofilter.

2.5.8 Compost Product

Kilmainhamwood Compost is a truly innovative company and is actively involved in promoting the benefits of commercial composting in Ireland.

Currently, the high quality compost produced at the Kilmainhamwood Compost facility is used as a soil conditioner in commercial agriculture, as material for landscaping, as organic fertiliser and as a custom growing media.

It is proposed that the additional compost generated by the proposed extension and intensification of the Kilmainhamwood facility will be used as a soil conditioner in commercial agriculture. The compost, produced by the facility, has the benefit of providing particular nutrients to nutrient deficient lands. For example, compost from the facility is currently spread on lands in County Louth where a deficiency in zinc has been identified. The compost, being a valuable source of nutrients, is applied to lands in conjunction with nutrient management plans.

Working in association with a local agronomist, the facility has developed a land-bank of local long term arable land that can accommodate all compost produced at the facility. This land-bank (approximately 1,500 hectares), within 50 kilometres of the facility, of long term arable land can accommodate all

compost produced at the existing facility and all additional compost that will be produced by the proposed extension and intensification of the facility. The land-banks are located in Dunsany in County Meath and Ardee in County Louth. Refer to Figure 2.1.

The agronomist liaises with landowners and, using maps and soil analysis, recommends the spread rate of compost per acre and outlines buffer zones where compost should not be spread. Additionally the agronomist monitors the crops at crop establishment and advises the farmer on nutrition in order to achieve optimum results.

To ensure a uniform spread rate of compost, the facility invested in a state of the art compost spreader which is used in conjunction with a 200 HP John Deere tractor.

Plate 3 Spreading of Compost using Compost Spreader with John Deere Tractor

Product development is never ending at the facility. Thorntons Recycling currently provide finished compost to landscape gardeners. The facility has also facilitated a 'take back scheme' for Dublin City council, where 10,000 bags of compost were made available at Dublin civic amenity centres to members of the public. A scheme was also undertaken at the civic amenity centre in Dunboyne, in County Meath, where the public could collect compost.

The production of bagged compost for sale is a further potential outlet for high quality product produced by the facility.

As part of the review of the current EPA waste licence (W0195-01) required for extension of the facility and intensification of waste acceptance, Thorntons Recycling propose the production of 'agricultural grade compost' specifically for use as a fertiliser and soil improver on agricultural land. It is proposed that this compost, while not meeting the high stability requirements specified in Schedule E of the current waste licence (W0195-01), will meet all other requirements specified in the current waste licence and its associated Technical Amendment A including trace elements and pathogens.

Agricultural grade compost can be produced following the initial and intensive phase of composting (typically a 4 week process) where easily degradable components of the feedstock, such as proteins,

sugars, fats and starches, are broken down. Agricultural grade compost will also be processed to Animal By-Product (ABP) treatment standards as required by the Department of Agriculture, Fisheries and Food. The conversion of proteins, sugars, fats and starches by way of the composting process renders the resultant material unattractive to animals, birds and other wildlife, thereby avoiding related nuisances when spread on agricultural land.

Thorntons Recycling propose that the stability of agricultural grade compost produced at the Kilmainhamwood Compost Facility is less than or equal to 20 mmol O2/kg organic solids/h (OUR – Oxygen Uptake Rate Method). In the EPA Strive Report on the "Development of an Industry-Led Quality Standard for Source-Separated Biodegradable Material Derived Compost" published in 2009, the OUR method (Veeken et al., 2003) of stability measurement is proposed as a very reliable and consistent method. Presently and in the past, farmyard manures and other organic materials (including sludges from wastewater treatment plants) having a lower stability and a greater potential for odour nuisance than the 'agricultural grade compost' proposed by Thorntons Recycling are spread on agricultural lands.

In comparison to finished compost where all biodegradable components (including cellulose and lignin structures) have been broken down, agricultural grade compost has an improved readily availability of nutrients for plant uptake. Nutrients from finished compost are slowly realised to the plants, over more than one growing season, and hence artificial fertilisers are still required for the viable production of crops. It is widely accepted that the "immediate unavailability" of nutrients in finished compost is a significant barrier to widespread use of compost in place of artificial fertilisers in modern agriculture. The poor nutrient availability of compost compared to artificial fertilisers is highlighted in the following statement taken from a Report (Quality compost as part of a Winter Wheat Fertilizer Programme) produced by WRAP in 2008:

"Yields for compost only treatments increased in line with increased compost application but yields were significantly lower than the inorganic fertilizer treatments. Low yield on compost only treatments was due to poor nutrient availability, specifically for nitrogen, and hence poor plant uptake and crop development"

The production of compost which is not fully stabilised, and therefore with a greater immediate availability of nutrients, for agricultural applications is an environmentally acceptable method in other European countries (such as Germany). In such countries, compost, produced to a Rottegrad III standard (based on self heating test), is spread on agricultural land as a fertiliser and soil improver. Proven practices in Germany are confirmed by the following statement taken from the EPA Strive Report previously mentioned.

"For example, in Germany, compost used on agricultural land is called 'fresh compost' which is half-matured compost with a relatively high biological activity but still would have reached a high temperature phase to kill pathogens (Timmermann et al., 2003; Anonymous, 2008b)."

On the basis of comparisons available in international papers on the topic of compost stability, the stability of Rottegrad III compost (produced and applied to agricultural land in Germany) is comparable to compost produced to a stability of 20 mmol O2/kg organic solids/h (OUR).

The production of an agricultural grade compost with readily available nutrients for plant uptake will create and open significant markets for compost produced in Ireland, thereby stimulating the composting industry and ultimately diverting biodegradable municipal waste from landfill. These markets would be sustainable in the long term in comparison to the application of compost (derived from source separated waste) as daily cover in landfills, a market likely to diminish as the role played by landfill in Irish waste management decays.

It is widely accepted that for agricultural applications, the presence of heavy metals and the level of contamination (particularly in the form of glass or plastic) in compost is a more critical factor than overall stability. Indeed, the production of finished compost (very stable) does not reduce the levels of heavy metals and/or contamination in compost. Indeed the levels of contaminants and heavy metals are concentrated due to the reduced overall mass of fully stabilised compost.

Any compost produced at the Kilmainhamwood Compost facility for other uses such as horticulture and landscaping would be stabilised to the proposed industry compost quality standard for Ireland as detailed in the EPA Strive Report (13 mmol O2/kg organic solids/h (OUR)).

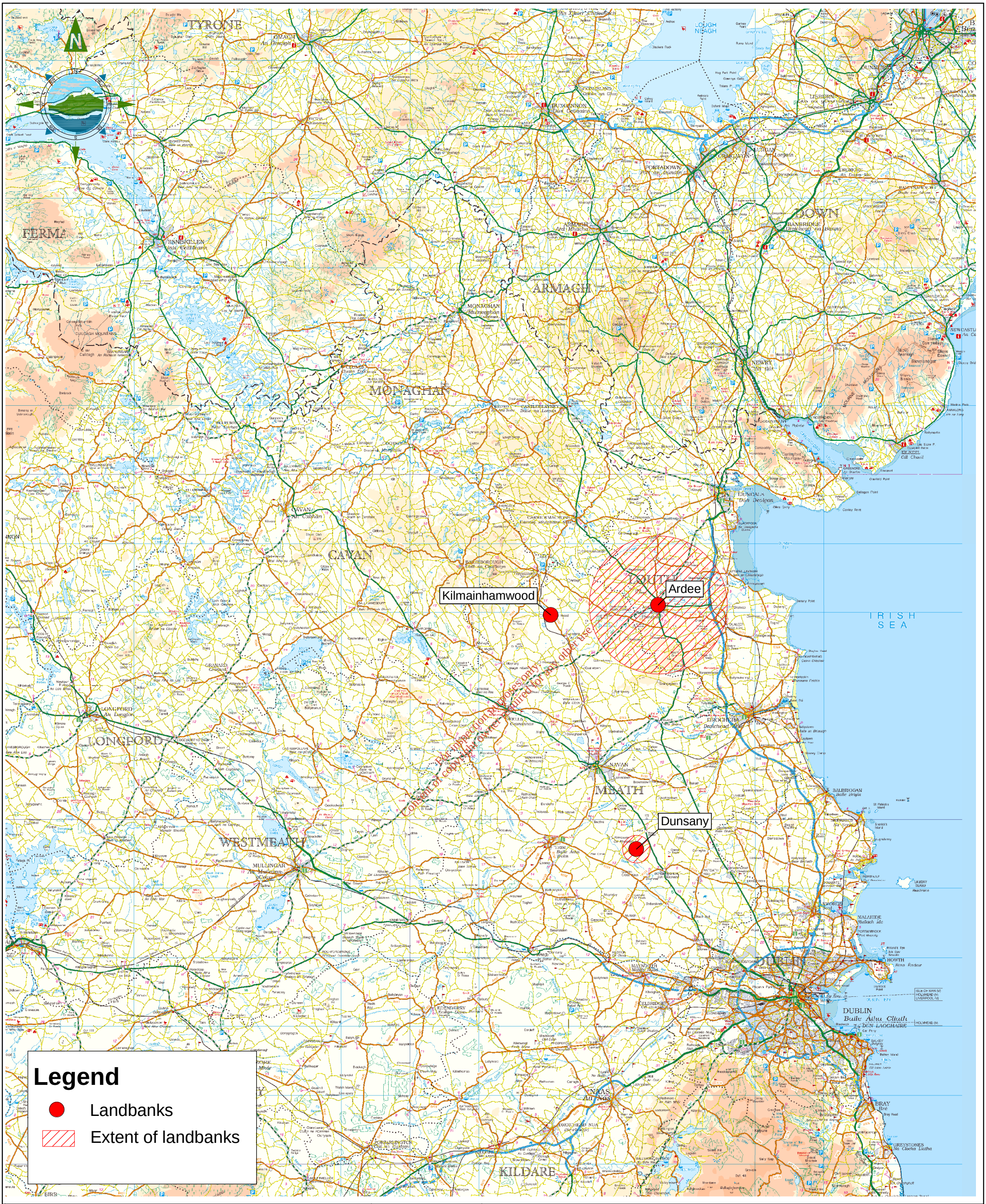
Thorntons Recycling propose that the revision of the facility waste licence by the EPA would include two individual maturity requirements, one maturity standard for 'agricultural grade compost' (20 mmol O2/kg organic solids/h (OUR)) and a second maturity requirement (13 mmol O2/kg organic solids/h (OUR)) for all other compost produced at the facility.

Stablised Biowaste

Kilmainhamwood Compost is currently licensed to accept other biodegradable materials, such as organic fines (from mechanical treatment of municipal waste), to produce a stabilised biowaste. To date no stabilised biowaste has been produced at the facility as all feedstock is from source segregated wastes. Notwithstanding the above, the Kilmainhamwood Compost facility will continue to be licensed to produce stabilised biowaste.

In regard to applications for stabilised biowaste, Technical Amendment A to the existing waste licence (W0195-01) includes a condition requiring EPA approval of outlets for stabilised biowaste.

Condition 5.8.4 of Technical Amendment A is as follows:
"Outlet sites for stabilised biowaste shall be submitted in advance to the Agency for its agreement".



Legend

- Landbanks
- Extent of landbanks

Client: Thorntons recycling	Prepared by: A.Gruschka	Consulting, Civil and Structural Engineers, Block 10-4, Blanchardstown Corporate Park, Dublin 15, Ireland. tel: +353-(0)1-8030406 fax:+353-(0)1-8030409 e-mail: info@tobin.ie www.tobin.ie
Project: KILMAINHAMWOOD FACILITY EXPANSION	Checked: E.Delaney	
	Date: January 2010	
Title: LOCATION OF LANDBANKS	Project Director: D. Grehan	
	Scale @ A3: 1:500,000	

TOBIN
Patrick J. Tobin & Co. Ltd.

0 3.5 7 14 21 28
Kilometers

Figure 2.1

Issue: B

2.6 NUISANCE CONTROLS

2.6.1 General

The waste management facility is operated in compliance with EPA waste license (W0195-01) and its associated Technical Amendment A. The facility is certified to international standards for Environmental (ISO14001), Health and Safety (OHSAS 18001) and quality (ISO9001) and operates an Integrated Management System (IMS).

The conditions of the licence include measures to minimise or prevent nuisance to the public occurring as a result of the operation of the facility. A complaints register detailing any complaint received from the general public in respect of the operation of the facility is maintained at the site. The following sections detail the nuisance control measures undertaken at the site.

2.6.2 Bird Control

The presence of scavenging birds such as crows and gulls is continuously monitored. Environmental nuisance resulting from the activities of scavenging birds at the facility is controlled and minimised by the following measures:

- The composting process is completely enclosed, including the storage of biowaste, mixing of biowaste, compost refinement and storage;
- Compost is not particularly attractive for birds, as it has the characteristics of a humus-like material (comparable to peat) rather than raw biowaste.

2.6.3 Fire Control

A number of fire control measures have been put in place at the site. These include the following:

- An emergency response plan is in place;
- All site operatives and employees are trained in fire prevention, control and emergency response procedures;
- Emergency response contact numbers (fire service, Gardaí, ambulance and other agencies) are posted in prominent locations;
- Fire extinguishers and smoke detectors are provided in all site buildings;
- Smoking is not permitted at the waste management facility;
- A firewater storage tank is located at an elevated area of the facility. The capacity of this tank is 100m^3. In the event of a fire, an electric pump is available to displace water to all areas of the facility;

- In the event of a fire any excess firewater within the compost building will be contained within the building. This firewater will subsequently be analysed prior to possible tankering off-site to an approved wastewater plant.

With regard to the extended facility building, a fire safety certificate will be secured from Meath County Council Fire Department. The design of the facility building extensions is in accordance with Technical Guidance Document B of the Building Regulations.

2.6.4 Litter Control

The following measures are employed at the site to control litter:

- All waste entering the facility is covered. Thorntons Recycling excludes any contractor failing to comply with this requirement from entering the site;
- The approach roads to the site are monitored on at least a daily basis and in the event of litter being found on these roads, site staff promptly remove it and deposit it in an appropriate manner;
- The waste that will be composted on site will consist of separately collected biowaste, which contains only very limited amounts of components that could potentially cause litter problems (e.g. plastic, paper).
- Waste will only be stored within the facility buildings.
- Residues hauled to landfill from the composting facility will be in covered vehicles;
- All site areas will be inspected and cleaned regularly.
- The facility has access to a road sweeper when required.

2.6.5 Odour Control

The main reasons for the occurrence of nuisance odour emissions from composting facilities are:

- Existence of anaerobic conditions in the fresh biowaste or in the composting material;
- Composition of the biowaste in the composting process, especially:
    - High concentrations of sulphur containing materials;
    - High concentrations of nitrogen containing components causing ammonia emissions;
- Temperatures in the composting process exceeding 65°C;
- Ineffective odour abatement system;

Consequently, the main measures for reducing odour emissions can be divided into five categories:

1. Management of the fresh biowaste handling and influencing the composition of the material fed into the composting process
2. Prevention of anaerobic conditions, i.e. allow sufficient active aeration of the composting material and prevention of very wet process conditions;
3. Monitoring and maintaining of temperature below 65°C;
4. Application of emission reduction techniques;
5. Implementation of an effective odour abatement system specifically designed for the

composting process and feedstock to Best Available Techniques (BAT);

Management of fresh biowaste and material composition

Fresh biowaste as delivered to the facility is likely to be partially anaerobic, due to storage at the location of production and transport. As long as the biowaste is contained in a waste collection/transport vehicle this will not lead to emissions, since the material is not being handled/disturbed. However, unloading of the material at the site and further handling may lead to odour emissions. To prevent emissions to the surroundings, all biowaste is discharged into the facility building which is under negative pressure with roller shutter doors closed at all times.

The mixing of the biowaste prior to composting is executed in the same enclosed building. The building is equipped with air ducts on the underside of the roof, which collect the air and transport the air to a biofilter. As part of the upgrade of the odour abatement system, it is proposed that the composting bays are enclosed and the process air is treated in an ammonia acid scrubber prior to biofiltration. Since the building is under negative pressure, the emissions via open doors are minimised when accepting incoming biowaste.

To prevent delivered biowaste from getting anaerobic and odorous, all biowaste is pre-treated and placed into the composting bays within one day of arrival and acceptance at the facility.

Appropriate mixing of feedstock and amendment materials (carried out in enclosed building under negative pressure) prior to composting is required to allow for a proper composting process and for the production of the desired quality compost. However this mixing is also essential to minimise odour emissions. The mixing ensures that the composting mass:

- Has the appropriate dry solids content (approximately 45%-35%) and has an adequate porosity, such as to facilitate the aeration process and prevent the formation of anaerobic zones in the composting mass during the process. This is achieved by mixing relatively dry and wet feedstock and if required, the adding of a structure material e.g. wood chips;
- Has the appropriate C/N-ratio (approximately 25/30:1) to prevent excessive emissions of N-containing odour components. This is achieved by mixing feedstock which is low in N-content (e.g. green waste) with feedstock that has a higher N-content (household biowaste);

Aeration of composting material

The first stage of composting is the most critical with respect to odour emissions, since easily biodegradable components, e.g. sugars, proteins and fats are degraded at a high rate, thus causing gaseous by-products.

The entire composting process is executed in an enclosed composting building which is maintained under negative pressure. The interior of the building is coated with an expanded foam membrane sealing to provide near complete sealing. Applying a high aeration rate, thus ensuring the supply of sufficient oxygen to the composting mass, prevents occurrence of anaerobic conditions in the first phase of the composting process in the composting bays. As the composting process proceeds in the

maturation area, less easily biodegradable components are degraded (e.g. cellulose and lignin structures) at a lower rate, reducing the risk of anaerobic conditions. The air supplied to the maturation area in the later stages of the process is regulated as required. All process air from the composting bays is collected and treated by the biofilter. It is proposed to include an ammonia acid scrubber as part of the upgrade to the odour abatement system to further improve odour removal efficiency at the facility.

Monitoring of temperature

If composting temperatures exceed approximately 65°C, odour emissions increase significantly, due to the changes in process biochemistry. Excessive increases in composting temperatures are especially relevant in the first stage of composting when, due to the fast degradation, a lot of energy will be released.

Temperature sensors are used to measure the temperature in the composting bays and subsequently in the maturation area. The computer control system ensures that the composting temperature does not exceed 65°C (with the exception of the Animal By-Product treatment stage where a temperature of greater than 70^{o}C is only required for one hour), by adding more fresh process air to the biowaste. This reduces the odour load in the process air, which is transported to the biofilter.

Due to the slow degradation in the maturation stage, temperatures normally do not rise above 60°C. If this happens incidentally, the variable blowers increase the fresh process airflow to cool the maturating biomass.

Application of emission reduction techniques

As described earlier, all process air from the composting process is collected and treated in biofilters. It is proposed to include an acid scrubber to the odour abatement system, to remove ammonia from process air prior to biofiltration

Practical experiences with ammonia acid scrubber and biofilter configurations show that, if properly designed and operated, an odour removal efficiency of a minimum of 95% can be achieved. To assess the potential impact of odour emissions from the composting facility due to the proposed increase in tonnage, odour dispersion calculations have been carried out as detailed in Section 9.2 herein.

Implementation of an effective odour abatement system to Best Available Techniques (BAT)

The existing composting system involves material being composted in open bays whereby odourous air is displaced to the building headspace. Hence large odourous air volumes (101,000m3/hr) require treatment to ensure three air changes per hour in the building. As part of the proposed upgrade of the odour abatement system, each of the individual composting bays have been enclosed in order to allow for the capture and treatment of reduced volumes (80,000m^3/hr) of odourous air. In addition the odourous air generated by the enclosed composting bays will be treated within an acid scrubber to minimise ammonia carryover to the biofiltration system. Displacement of odourous air, from the composting process, to the headspace of the building is now prevented thereby implementing double containment features and allowing for the specific treatment of this air in an acid scrubber. The building

headspace air is no longer contaminated with high concentrations of ammonia thereby negating the need to treat this air within an acid scrubber. This approach ensures the efficient capture and focused treatment of odours generated by the composting process itself ensuring that the maximum allowable odour threshold concentration in the exhaust air of the biofiltration system is achieved.

In terms of the proposed upgrade, improvements in double containment and scrubbing of the composting air itself will lead to increased odour removal efficiencies on each biofiltration system. The efficient capture and zoned treatment of the odourous air will ensure sustained performance of the odour control system. Improvements in the biofiltration system design will ensure efficient air distribution within the biofilter bed. The implementation of acid scrubbing on the composting air itself will minimise the carryover of ammonia to the biofiltration bed and thereby minimise acidification of the media.

From the proposed upgrade facility design conducted by an independent odour specialist, a maximum allowable odour threshold concentration of 800Ou_E/m^3 was determined for biofiltration system 1 and 2. This equates to a total maximum odour emission rate of 17,778 Ou_E/s for a total volumetric airflow treatment capacity of 80,000 m^3/hr. When compared to the existing odour emission rate this is approximately 64% lower and is significantly lower than existing conditions. Following dispersion modelling utilising AERMOD Prime, no odour impact will be perceived by residential receptors in the vicinity of the facility. All residential locations will perceive an odour concentration less than 1.10 Ou_E/m^3 at the 98th percentile of hourly averages for 5 years of hourly sequential meteorological data. In addition, all residential locations will perceive an odour concentration less than 2.60 Ou_E/m^3 for the 99.5th percentile of hourly averages for 5 years of hourly sequential meteorological data. This is approximately 13% and 27% lower than the accepted odour impact criterion for such facilities.

2.6.6 Roads

The deposition of mud and debris on the local and regional road network is both unsightly and dangerous. Currently, following the discharge of waste into the facility building, the wheels and rear of delivery vehicles are power washed. Indeed, as part of the current application, it is proposed that the delivery vehicles do not enter the facility building, instead it is proposed that vehicles reverse up a 2m high ramp and discharge waste from a height into the waste reception area of the building. Hence the wheels of vehicles will be less susceptible to picking up waste and contaminating site roads and surrounding roads.

The adjoining roads are monitored on a regular basis. The Kilmainhamwood Compost facility has access to a road sweeper when required.

2.6.7 Traffic Control

The traffic control measures are outlined in Sections 13 herein.

2.6.8 Vermin Control

It is recognised that poorly managed composting facilities have the potential to attract vermin such as rats and flies. Strict control procedures have been put in place at the Kilmainhamwood Compost facility in order to control the population of vermin. The composting process is completely enclosed, including storage of biowaste, mixing, composting and compost refinement.

A detailed Vermin Control Plan has been developed as part of the Environmental Management Plan for the waste management facility. This Plan incorporates the following elements:

- A site map showing the positions and numbers of each bait point;
- A bait point monitoring routine has been established. A vermin control company inspects the facility eight times per annum. Inspection records for the facility are filled up by the vermin control company following each inspection and signed by the facility manager;
- Inspection records for the bait points describe any signs of vermin and highlight any vermin attractions on site;
- The facility manager is responsible for acting on the findings of the monthly inspection records;

A vermin control manual containing the bait point location maps, product details/specifications for the baits used and the monthly inspection records is maintained and kept at the facility.

A firm of professional vermin control experts have implemented the Vermin Control Plan. Baiting has been undertaken in a professional manner and every precaution has been taken to avoid non-target species. In particular the bait is placed in areas, which are not accessible to non-target species and where possible dead or dying vermin are removed as soon as possible. It should be noted however that vermin such as rats normally return to their nests to die.

In response to a regular monitoring regime for the presence of unacceptably high fly populations, the facility is sprayed with a residual insecticide by a professional vermin control company.

2.7 ENVIRONMENTAL MONITORING

The following sections describe the monitoring programmes that have been established at the Kilmainhamwood Compost facility.

All environmental monitoring is carried out under the conditions of the waste licence (W0195-01) for the facility, issued by the EPA. The extended facility will be operated in compliance with a revised waste licence following a waste licence review by the EPA. Emission Limit Values (ELV) has been set by the EPA for many of the parameters to be monitored. Exceeding these values is treated as an incident and the EPA are notified accordingly.

The primary aims of these monitoring programmes are to comply with legislation, the requirements of the EPA, to monitor the quality of the environment in the vicinity of the site and identify any adverse impacts from the operation of the facility.

As part of the Waste Licence an Annual Environmental Report (AER) is formulated that collates and reports all monitoring data each year (Appendix 2.4). A comparative assessment is made with data from previous years. This report is submitted to the EPA before the March 31st each year.

Refer to Drawing No. 5361-2406 for existing monitoring locations (noise, dust, air and groundwater) at the Kilmainhamwood Compost facility.

2.7.1 Dust and Micro-organisms Monitoring Programme

Dust is monitored using Bergerhoff gauges, as specified in the German Engineering Institute VDI 2119 document "Measurement of Dustfall Using the Bergerhoff Instrument (Standard Method)".

Dust monitoring is carried out on a quarterly basis. The limit of activity derived dust deposition measured at the above monitoring points is 350 mg/m^2/day, based on 30 day composite samples.

In addition to the above the facility and site road are inspected on a daily basis for evidence of excessive generation of airborne dust. Thorntons Recycling personnel carry out this inspection. Any remedial actions, such as road cleansing, are then implemented.

Monitoring for bacteria and aspergillus fumigatus is carried out on an annual basis. Enumeration of colonies is carried out as described in Standardised Protocol for the Sampling and Enumeration of Airborne Micro-organisms at composting Facilities' the Composting Association 1999.

2.7.2 Groundwater Monitoring Programme

Groundwater quality is monitored at both upgradient and downgradient sampling locations. A number of boreholes (3 No.), as illustrated on Drawing No. 5361-2406 were drilled at the site in 2003.

An independent firm of consultants carry out all groundwater sampling and all off-site analyses is carried out by an accredited laboratory.

- The wells are sampled in accordance with industry standard protocols and guidelines prepared by the EPA. Samples are handled and transported in accordance with the same accepted protocols;
- The samples recovered from these wells are analysed for the list of parameters in Table 2.2, which is in accordance with the parameters set out in the facility waste license (W0195-01).
- Data is collated, tabulated and reported, including interpretation and comparison with the previous year's data. The data is presented within the AER, which is submitted to the EPA.

Table 2.2 Groundwater Monitoring Frequency

Parameter	Monitoring Frequency
Groundwater Level (wells)	Biannual
Ammoniacal Nitrogen	Biannual
Chloride	Biannual
PH	Biannual
Sulphate (SO_4)	Biannual
Metals/ non metals	Annually
List I/II organic substances (Screen)	Annually
Nitrate	Annually
Total P/orthophosphate	Annually
Faecal Coliforms	Annually
Total Coliforms	Annually

2.7.3 Noise Monitoring Programme

Noise monitoring is carried out on a quarterly basis. The survey is undertaken in accordance with the methodology specified in the 'Environmental Noise Survey Guidance Document' published by the EPA.

There is one noise monitoring location as shown on Drawing No. 5361-2406.

Noise emission limits are as follows:

Day dB(A) L_{Aeq}(30 minutes) ***= 55***

Night dB(A) L_{Aeq}(30 minutes) ***= 45***

Suitably qualified staff undertake noise monitoring. The results of the noise monitoring undertaken at the facility and an interpretation of these results are reported in the AER submitted to the EPA.

2.7.4 Surface Water Monitoring Programme

Surface water monitoring is carried out on a quarterly basis at the location illustrated on Drawing No. 5361-2406.

A suitably qualified staff member carries out all surface water sampling and an accredited laboratory carries out all off-site analysis.

The samples recovered are analysed for the list of parameters in Table 2.3, which is in accordance with the parameters set out in the facility waste license (W0195-01).

Table 2.3: Surface Water Monitoring Frequency

Parameter	Monitoring Frequency
PH	Quarterly
Ammonia (as NH4)	Quarterly
Suspended Solids	Quarterly
Mineral Oils	Quarterly
Chloride	Quarterly

2.7.5 Odour Abatement Monitoring Programme

The generation of anaerobic conditions and an incorrect C/N ratio in the compost are two conditions with potential for the generation of significant odours. In either case the predominant odour components are Ammonia and Hydrogen Sulphide, both of which are easily recognisable and can be detected using colorimetric indicator tubes. Odour monitoring at the site is therefore based on these compounds to enable a practical routine monitoring system to be put in place. The current monitoring schedule is as per the existing EPA waste licence (W0195-01) and is as outlined in Table 2.4:

Table 2.4: Odour Abatement Monitoring Programme

Control Parameter	Monitoring Required	Monitoring Equipment
Biofilter		
Inlet and Outlet Gas		
Ammonia	Monthly	Colorimetric Indicator Tubes
Hydrogen Sulphide	Monthly	Colorimetric Indicator Tubes
Mercaptans	Monthly	Colorimetric Indicator Tubes
Bed Media		
Odour Assessment	Daily	Subjective Impression
Condition and depth of biofilter	Daily	Visual Inspection
Moisture content	Monthly	Standard laboratory method
PH	Bi-annually	
Ammonia	Bi-annually	Standard laboratory method
Total viable counts	Bi-annually	Standard laboratory method
General		
Sprinkler System	Check operation Daily	Visual Inspection
Fan	Check operation Daily	Visual Inspection
Negative Pressure	Monthly	Air Current Tubes

3 ALTERNATIVES

Schedule 6 of the Planning and Development Regulation (2001) specify that the EIS should include '*An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking account the effects on the environment*'.

The EPA publication, Guidelines on the information to be contained in Environmental Impact Statements, states '*The consideration of alternatives also needs to be set within the parameters of the availability of land (it may be the only suitable land available to the developer) or the need for the project to accommodate demands or opportunities which are site specific. Such considerations should be on the basis of alternatives within the site, e.g. design, layout*'.

3.1 ALTERNATIVE PROCESSES

Ireland's approach to dealing with waste is based on the internationally adopted waste management hierarchy, which states that the most preferred option for waste management is prevention and minimisation, followed by re-use and recycling, energy recovery and the least favoured option which is disposal.

The National Strategy on Biodegradable Waste was published in April 2006 and sets out measures to progressively divert biodegradable municipal waste from landfill in accordance with the agreed targets in EU Directive 1999/31/EC on the landfill of waste.

The National Strategy on Biodegradable Waste (2006) is based on the integrated waste management approach established as Government policy since the publication of 'Changing Our Ways' in 1998. The options, in order of preference, for dealing with Biodegradable Municipal Waste (BMW) are:

- Prevention and minimisation – avoiding generating the waste;
- Recycling – mainly of paper and cardboard but also of textiles;
- Source separated collection followed by biological treatment – mainly of kitchen and garden waste;
- Residual treatment – thermal treatment with energy recovery or by way of Mechanical Biological Treatment (MBT);

The Strategy sets specific objectives for the contributions that each of these measures will contribute to the achievement of the 2016 target for diversion of BMW from landfill.

It is clear that source separated collection followed by biological treatment is the preferred option for the treatment of organic waste (including kitchen and garden waste). In the absence of source separated collection of organic waste, residual treatment would be required to manage organic waste generated in Ireland.

Residual treatments include thermal treatment and Mechanical Biological Treatment (MBT) and are the least preferred treatment options. The residual treatment of organic waste is considered undesirable for many reasons including the following:

- Organic material recovered by MBT typically emerges as a low quality material (stabilised biowaste) that has limited applications outside of landfill. On the other hand, compost generated by the biological treatment of the source separated collection biowaste is recognised as a sustainable product which can be utilised for beneficial landscaping and agricultural purposes;
- Organic waste is high in moisture content (>50%) and hence has low calorific value in comparison to waste paper and plastic. Therefore, the use of organic waste as a feedstock in a thermal treatment plant results in minimal energy recovery and the loss of a sustainable natural resource (high quality compost) for the improvement of agricultural land;

Alternative Biological Treatment Processes:

The existing Kilmainhamwood Compost facility biologically treats a range of biodegradable wastes to produce a high quality product for agricultural and landscaping applications. The biological process, which has been operated successfully at the facility since September 2006, is composting. Composting is defined as the biodegradation of organic waste into stable humus like product. Nonetheless, for the purpose of completeness of this document, alternatives biological treatment processes are explored herein.

Alternative biological treatment processes to composting include:

- Anaerobic digestion;
- Vermiculture;
- Ethanol production.

Anaerobic digestion

Anaerobic digestion has been used to treat sewage since the late 19th Century and has also in more recent times been widely applied in European countries for the treatment of agricultural and municipal biodegradable wastes. The process is therefore proven at full-scale. The process is undertaken within sophisticated enclosed facilities, which have been carefully designed to optimise the conditions for decomposition. This is especially the case for solid waste digesters, which operate at dry solids contents > 10-20% (as opposed to slurry digesters with lower dry solids content).

As a result, the capital and operational cost of an anaerobic digestion facility for the envisaged solid waste streams are significantly higher than for a conventional composting facility. A composting process is therefore preferred to anaerobic digestion for the proposed extension of the Kilmainhamwood Compost facility.

Vermicomposting

Vermicomposting is a method of composting biodegradable waste that utilises earthworms (*Vermes*) to speed up the composting process and produce a richer end product. Since the earthworms used in

vermicomposting are not present in fresh biowaste (unlike the micro-organisms in conventional composting) the worms have to be reared separately and added to the biowaste prior to composting. Vermicomposting facilities do not have the same flexibility as other systems and can be problematic at higher capacities due to the need to optimise and regularise the feedstock and living environment for the worms to function. The optimisation of the process can also take some time to perfect particularly with varying feedstock.

Vermicomposting processes are typically extensive in nature, as high aeration rates are not applied. Vermicomposting systems therefore require a large facility footprint, and are not compatible with high-rate controlled indoor composting systems. The degree of control of emissions is also not as efficient as that of enclosed/indoor composting systems. Based on the above an enclosed/indoor composting system is preferred to vermicomposting for the proposed extension of the Kilmainhamwood Compost facility.

Ethanol production

Municipal biodegradable waste contains a substantial amount of plant biomass. Over half of plant biomass typically consists of cellulose, which is composed of glucose units. Micro-organisms can be used to break down this glucose source in order to produce alcohol. Fermentation produces a medium strength alcohol, while subsequent distillation can produce a concentrated alcohol such as ethanol. The calorific value of ethanol is typically 60% that of petroleum and it also has excellent combustion properties. These attributes provide obvious potential for the use of the ethanol derived from the cellulose fraction of biodegradable waste on an industrial scale. There is every prospect that the production of ethanol from biodegradable waste can, in the future, be used to assist in delivering a solution to both energy and waste issues.

At present, the technology is not yet commercially viable and therefore has not been considered as a suitable option for the processing of the biowaste for the proposed extension of the Kilmainhamwood Compost facility.

3.2 ALTERNATIVE COMPOSTING TECHNOLOGIES

The most obvious and simple form of composting is the straightforward compost heap, where biowaste is simply left in a pile where natural processes take their course and compost is produced. The development of different, more industrialised forms of compost production systems has been driven by a desire to manipulate one or more of the process parameters in order to optimise the composting process in terms of emissions control (particularly odour), compost quality, production time or space requirements.

The classification of every composting system is beyond the scope of this assessment; hence for the purpose of this section composting systems have been classified into four categories as follows:

- Outdoor systems;
- Hangar systems;

- Tunnel and bay systems;
- Continuous flow systems;

The last three categories listed can generically be referred to as enclosed or in-vessel systems where the process conditions including air supply, moisture content and temperature can be controlled and all potential emissions (air and effluent) can be contained, collected and treated.

Outdoor systems

Outdoor systems are generally simple in design and construction. The two main types of system applied are the windrow system and the static pile system. In the windrow system, feedstock is placed in rows and turned periodically, usually by mechanical equipment. Oxygen is supplied primarily by natural ventilation resulting from the buoyancy of hot gases in the windrow, and by gas exchange during turning. In the static pile system no agitation or turning of the static bed occurs during the compost cycle. An air distribution system is applied underneath the composting material to allow either forced (blown air) or induced aeration (sucked air). In practice, intermediate systems, e.g. aerated windrows or periodically turned static piles, are common.

Process and emission control possibilities for outdoor systems are limited, apart from induced static pile systems, where the process air might be transported through a biofilter. Since prevailing weather conditions directly affects operations, the composting process usually takes several months.

Of particular relevance is the fact that outdoor systems do not comply with the requirements of the Department of Agriculture, Fisheries and Food for the processing of Animal By-Products. An enclosed system is required to achieve the process parameters and hygiene requirements stipulated by the Department.

Hangar systems

Hangar systems can be very simple in design and construction, when a static pile system is applied indoors. However, in addition, air control systems and machinery for automatic turning and transport of biowaste and compost can be utilised, which make hangar systems technically more complex and provide for significantly more process control within the facility. The hangar system therefore allows for the flexibility to begin operations at a relatively low process control level and eventually to modify the plant to provide for a higher level of process control and therefore produce a higher quality compost.

The treatment capacity of hangar systems in the short term is more or less fixed within a specific range, since modular enlargement cannot be achieved very easily. However the operational capacity of the facility is quite flexible, within a specific range, as the height and length of the static pile and rate of aeration can be adjusted according to the required tonnage of feed biowaste.

A hanger system is not a ‘batch’ system, instead the composting mass generally forms a single pile of material where fresh material is added to, and processed material is removed from, the single pile on a daily basis. In relation to Animal By-Products, if a sample of material fails a laboratory test for E.Coli or

Salmonella, the entire mass of composting material would require re-processing under the requirements of the Department of Agriculture, Fisheries and Food. Such an event would have significant financial and operational consequences. Hence, hanger systems are becoming increasingly undesirable for the composting of waste. In addition, hanger systems require the odour abatement system to process all the air space within the building in comparison to enclosed tunnel or bay systems where only the process air within the tunnel or bay requires intensive treatment. As a result, hanger systems demand significantly more energy per unit of compost processed in comparison to enclosed tunnel or bay systems.

Tunnel and Bay composting systems

Tunnel and bay composting systems allow extensive process control, since the biowaste is composted in relatively small tunnels or bays.

Various process parameters including aeration rates, air moisture and oxygen levels can be controlled from a central process computer. In addition, due to the modular layout of tunnel or bay systems, several units can be operated independently, which guarantees significant flexibility in treating different biowaste streams independently at the same time. The optimally controlled process conditions furthermore allow the composting to be executed in the shortest possible timeframe.

Tunnel or bay composting systems are ideally suited to satisfying the requirements of the Department of Agriculture, Fisheries and Food with respect to the processing of Animal By-Products. Such a plant which comprises of a number of tunnels or bays facilitates the processing of feedstock in a number of 'batches'. Hence, in the event of a failed batch, the quantity of material that requires re-processing is not significant. In addition, a failed batch can be easily isolated thereby satisfying hygiene requirements.

Continuous flow composting systems

In continuous flow systems the biowaste flows horizontally or vertically through a reactor while the forced aerated composting process occurs. Well known systems includes the Wright Environmental system. Continuous flow composting systems allow adequate control of the process conditions. However, since the retention time in the reactor is relatively short (typically 12-14 days) an extensive post-composting step is required.

A continuous flow composting system is not a 'batch' system, hence similar difficulties arise with respect to Animal By-Products as previously noted for hanger systems.

Preferred Technology

As outlined previously, an outdoor system does not allow for the provision of process and emission control measures which could lead to odour nuisances at or near the facility. The composting process is dependent on the prevailing weather conditions leading to extended composting time requirements. In addition the final quality of the product cannot be guaranteed consistently using an outdoor system and Animal By-Product requirements cannot be satisfied. An indoor composting facility will therefore be required.

Hanger composting systems and continuous flow composting systems are unsuitable due to the difficulties (previously outlined) associated with satisfying Animal By-Product conditions stipulated by the Department of Agriculture, Fisheries and Food.

Overall a tunnel or bay composting system is recommended for the extension to the Kilmainhamwood Compost facility due to the modularity of the system, its inherent flexibility, the limited need for mechanical plant, its robustness and low maintenance requirements. On the basis of the proven track record of the existing indoor bay composting system (which has operated successfully since September 2006) to produce a high quality compost product in a controlled environment with minimal impact on the environment, it is recommended that additional composting bays are constructed to facilitate the extension to the facility.

In order to optimise the volumes of process air that require treatment, it is recommended that both the existing and additional compost bays are enclosed by way of a concrete roof and canopy door, thus significantly reducing the volumes of process air that will require treatment. Only the volume of air between the composting mass and the roof of each composting bay will require intensive odour treatment as opposed to the entire volume of the facility building.

3.3 ALTERNATIVE ODOUR ABATEMENT TECHNOLOGIES

Thorntons Recycling considered a number of alternative odour abatement technologies during the preliminary design of the extension to the Kilmainhamwood Compost Facility. The following technologies were examined:

- Thermal Oxidation;
- Chemical Scrubbing and biofiltration;
- Carbon absorption;

Thermal Oxidation;

Thermal oxidation is a highly effective means of destructing concentrated odorous gases. It is generally accepted that destruction of odours is achieved when they are held at around 1000^{o}C for 0.3 seconds. Thermal oxidation involves the direct combustion of odorous gases. In an odour abatement application for a composting facility, the thermal oxidation process requires fuel to maintain the operating temperature at a level suitable for destruction of odours. The main disadvantage of thermal oxidation for the treatment of odours at composting facilities is the significant operating cost due to the consumption of fuel as part of the process.

Chemical Scrubbing and Biofiltration

Biofiltration technology can be used to treat a variety of biodegradable, water soluble contaminants. In a biofilter, the odour contaminants are solubilised from the vapour phase into an aqueous phase on the surface of an organic medium such as woodchips, compost, mulch or peat. The compounds are then degraded by the bacteriological population on this media. Biofilters are very effective at removing

sulphur based odour compounds such as hydrogen sulphide, organic sulphides and mercaptans. Biofilters generally are not effective at removing nitrogen based compounds such as ammonia and amines.

Chemical scrubbing of an air stream is a technique widely used in many industries to remove both solid and gaseous contaminants. The technique is essentially one of mass transfer by absorption when the air contaminants are brought into intimate contact with a liquid solvent in which they have a high solubility. An acid scrubber (acid solvent used) consisting of a PH monitoring/dosing system is commonly used for composting applications. The acid scrubber treats ammonia/amine gases and operates at a pH of 3.5. This process captures the vast majority of the particulate and the ammoniacal gases. The pH is controlled by the addition of phosphoric / sulphuric acid.

Carbon Absorption

In a carbon adsorption system, the air stream is passed over a bed of adsorbent (carbon) and the odour causing compounds are attracted to and adhere to the surface of the adsorbent. There is no on-going chemical supply to the system, and there are no biological processes to be upset. Adsorption is applicable to a wide range of compounds. Hydrogen sulphide and related sulphur based compounds are removed effectively by carbon adsorption systems, but ammonia and other nitrogen based compounds are not effectively treated. Various carbon type systems including activated and impregnated can be used independently or in combinations to remove many different contaminants. The spent carbon media has to be replaced on a regular basis.

Preferred Technology

The odour abatement technology proposed for the extension of the Kilmainhamwood Compost Facility is chemical scrubbing followed by biofiltration. Thermal oxidation was not feasible due to the high operating costs associated with this technology. Carbon adsorption is not suitable for handling wet air streams and is not effective for the treatment of ammonia and other nitrogen based compounds, which are known to be produced in high concentrations at composting facilities processing source separated biowaste.

Chemical scrubbing followed by biofiltration has been proven at numerous composting facilities for the effective treatment of sulphur based odour compounds (such as hydrogen sulphide, organic sulphides and mercaptans) and nitrogen-based compounds (such as ammonia and amines) at acceptable and justifiable operating costs.

3.4 ALTERNATIVE LOCATIONS

The existing site at Ballynalurgan, Kilmainhamwood, Kells, Co. Meath is situated approximately 6 km north west of the village of Nobber, Co. Meath, and 4 km south of Kingscourt, Co.Cavan. This site was chosen as the location for the existing composting facility for a number of reasons. These include;

- Although situated near the national road network and industry in the North East, the location is relatively remote, with the nearest resident being approximately 0.4km from the composting facility building;
- Surrounding forestry present naturally prevents visual intrusion;
- Favourable geological and hydrogeological conditions;
- The North East Region and surrounding counties produce large quantities of biowaste with very little treatment options available to significantly reduce the quantities of unstable organic material being sent to landfill;

The site location is central to areas in the North East region. The R162 is a well developed road which links to the N52 (south of Nobber) and leads to Dundalk. The site is less than 40 km from Dundalk and less than 75km from Monaghan town.

The current application comprises of an extension to the existing facility. Hence due to the acceptance of the current facility location in the last planning decision, economies of scale and operational reasons, alternative site locations have not been contemplated. It is considered that extending an already existing facility is a more sustainable approach than the development of a new facility on a green field site.

3.5 DO NOTHING SCENARIO

The do-nothing scenario would represent a missed opportunity to make a contribution towards Ireland meeting its obligations under the EU Landfill Directive to divert biodegradable waste from landfill.

Article 5 of the EU Landfill Directive 1999/31/EC sets out the targets for diversion of biodegradable municipal waste (BMW) from landfill. However, Member States which consigned more than 80% of collected municipal waste to landfill were allowed to postpone the attainment of these targets by a period not exceeding four years. Ireland has qualified for this four year derogation. Hence the biodegradable municipal waste landfilled in Ireland should be reduced to:

- 75% of the amount of BMW landfilled in 1995 by 2010
- 50% of the amount of BMW landfilled in 1995 by 2013
- 35% of the amount of BMW landfilled in 1995 by 2016

The recycling and recovery of biodegradable waste is an integral part of Irelands waste management plan. A minimum of 65% reduction in biodegradable wastes consigned to landfill by 2013 is envisaged in a Government policy statement (Changing our ways, 1998).

In a do nothing alternative, the absence of composting facilities will not contribute to local, national and European policy. Organic wastes would otherwise be disposed of by landfilling or thermal treatment both of which are the least preferred option for the treatment of biodegradable municipal waste and hence contrary to government policy.

4 POLICY, PLANNING AND DEVELOPMENT CONTEXT

4.1 INTRODUCTION

This section will examine the planning history and the planning and development context in relation to extension of an existing composting facility at Ballynalurgan, Kilmainhamwood, Kells, Co. Meath. The site is located in a rural area approximately 6km northwest of Nobber, Co. Meath and 4km south of Kingscourt, Co. Cavan.

This section refers to relevant national, regional and local plans for the area. It will illustrate how the proposed extension to the existing composting facility will be an important player in the implementation of these plans.

4.2 PLANNING AND LICENSING HISTORY FOR THE EXISTING FACILITY

The composting facility is currently owned and operated by Padraic Thornton Waste Disposal Ltd, trading as Thorntons Recycling. The construction of the facility commenced in October in 2005 and the facility was operational in September 2006. Relevant planning and licensing history for the facility includes;

Planning Reference KA30304
The initial application by McGill Environmental Systems (Ireland) Ltd. for an indoor composting facility was refused planning permission from Meath County Council in July 2004 (Meath Coco Ref; KA30304). An appeal was lodged with An Bord Pleanála (ABP) and permission was granted with conditions in December 2004 (ABP Ref; PL17 208236).

Planning Reference KA60349
In August 2006, Meath County Council granted permission for permanent retention of extensions and other ancillary infrastructure (Meath Coco Ref; KA60349).

Waste Licence Reference W0195-01
In July 2005, a waste license (EPA Ref; W0195-01) was granted by the EPA to McGill Environmental Systems (Ireland) Ltd. for the operation of the facility. McGill Environmental Systems sold the site complete with regulatory permissions to Thorntons Recycling in September 2005. The EPA granted license transfer in January 2006.

Waste Licence (W0195-01) - Technical Amendment A
In October 2006, a technical amendment was granted by the EPA to Thorntons Recycling in regard to waste licence (W0195-01). The technical amendment to the waste licence principally relates to the permitting of the acceptance and biological treatment of organic fines (mechanically separated from mixed municipal waste). Schedule E (Standards for Compost Quality) is also technically amended to

include maximum trace element concentration limits for Class 1 compost, Class 2 compost and stabilised biowaste.

4.3 PLANNING AND DEVELOPMENT CONTEXT OF THE DEVELOPMENT

4.3.1 National Level

4.3.1.1 Waste Management Policy

Since the publication of Changing our Ways in 1998, the policy framework has been firmly rooted in the "integrated waste management" approach, based on the internationally adopted hierarchy of options which places greatest emphasis on waste prevention, followed by minimisation, re-use, recycling, energy recovery and, finally, the environmentally sustainable disposal of residual waste.

This policy statement includes a number of provisions relating to waste management infrastructure, including biological treatment facilities, waste transfer facilities and C&D waste recovery facilities, which are seen as necessary elements of an integrated waste management system for the country. This Policy Statement includes the following targets over a fifteen-year timescale (by 2013):

- Diversion of 50% of household waste from landfill;
- The development of composting and other biological treatment facilities capable of treating up to 300,000 tonnes of biodegradable waste per annum;
- Recycling of 35% of municipal waste;

Preventing and Recycling Waste: Delivering Change (March 2002), established a series of objectives in terms of the implementation of the waste hierarchy based on minimisation of waste generation and improving levels of recycling of generated waste.

Taking Stock and Moving Forward (April 2004), built on previous policies, and set the agenda for the regional waste management plan review by identifying 20 'Key Points' for improvement in waste management in Ireland in the coming years. This includes;

Key Point 7- '*The draft National Biodegradable Waste Strategy now being published for consultation will be finalised by end-June 2004. Implementation of the Strategy (aspects of which are already in progress) will move ahead in accordance with the timetable set out in the Strategy itself.'*

The facility at Kilmainhamwood and its proposed extension is in line with waste management policy in terms of diversion of waste from landfill and the development of biological treatment facilities.

4.3.1.2 Waste Management (Food Waste) Regulations (S.I. No. 508 of 2009)

These Regulations are designed to promote the segregation and recovery of food waste arising in the commercial sector. They will facilitate in particular the achievement of the targets set out in Directive

99/31/EC on the landfill of waste for the diversion of biodegradable municipal waste from landfill sites to composting and biogas plants and to other forms of waste recovery.

The proposed extension of the Kilmainhamwood facility will provide additional capacity for the composting of additional biodegradable waste that will arise when the Food Waste Regulations are fully implemented.

4.3.1.3 Biodegradable Waste Policy

The National Strategy on Biodegradable Waste (2006) outlines Government policy for the diversion of biodegradable municipal waste (BMW) from landfill, building upon the key objectives established in policy documents Changing Our Ways (1998), Delivering Change - Preventing and Recycling Waste (2002) and Waste Management: Taking Stock and Moving Forward (2004). This sets ambitious targets for operational capacity to treat source separated food and garden waste by composting and anaerobic digestion for the following years;

- By 2010 - 250,000 tonnes minimum
- By 2013 - 320,000 tonnes minimum
- By 2016 - 330,000 tonnes minimum

The report states that a significant increase in biological treatment capacity is required to meet the targets set out by the Landfill Directive. This strategy is designed to secure the diversion of biodegradable municipal waste from landfill, the key benefit is to reduce the methane emissions from landfills and to encourage the separate collection of biodegradable waste.

The proposed development is a component in achieving government policy and in fulfilling the requirements under the landfill directive.

4.3.1.4 Animal By-Products Policy

Animal By-Products Regulation (1774/2002/EC)

Conditions for Approval and Operation of Composting Plants Treating Animal By-Products in Ireland – Department of Agriculture, Fisheries and Food

The Department of Agriculture, Fisheries and Food (DAFF) Conditions for Approval and Operation of composting and biogas plants were finalised in March 2009. These Conditions are based on EU Regulation No.1774/2002 laying down health rules concerning animal by-products not intended for human consumption. This EU Regulation is enforced by Animal By-Products National Legislation - S.I.252 of 2008 and S.I.253 of 2008. The DAFF document sets out criteria of the conditions for approval of a Plant involved in the transformation of Animal By-Products in Ireland. This document provides details on requirements for feedstock, premises, hygiene requirements, processing/treatment standards, record keeping, sampling of compost, plant HACCP (Hazard Analysis and Critical Control Points) plans, collection and transport of organic fertiliser and soil improvers derived from compost residues.

The design of the proposed extension to the Kilmainhamwood Compost facility is in line with the latest requirements of the Department of Agriculture, Fisheries and Food. These requirements favour a “one way system of material flow” of waste to prevent cross contamination.

4.3.1.5 Planning Policy

National Spatial Strategy (NSS) 2002-2020

In 2002, the Government published the National Spatial Strategy (NSS) for Ireland 2002 to 2020. NSS is a coherent national planning framework, which covers Ireland’s seven regions, and also provides the framework for spatial policy for the Greater Dublin Area. There is a strong emphasis placed upon securing Greater Dublin’s vital national role through improved mobility, urban design, social mix and transport (both national and international).

This strategy states that waste management is a particular current priority and that efficient, effective and cost competitive waste management facilities are essential if industrial and enterprise activity is to thrive and develop in a balanced way across Ireland. The proposed extension to the existing composting facility will contribute to, and support the requirements of the NSS.

4.3.2 Regional Level

4.3.2.1 Waste Management Policy

North East Waste Management Plan (2005-2010)

The Waste Management Plan for the North East Region (2005-2010) states that progress is required to meet the planned targets of 2015. The targets set include:

- 43% recycling
- 39% thermal treatment
- 18% landfill

This Plan sets out the following policy objectives for biological treatment;

‘It will be a priority of the Plan to ensure that biological treatment of separately collected organic waste is developed in the Region. This treatment is required to meet our requirements under the Landfill Directive as well as to meet the recycling targets set in the Plan.

The Local Authorities will ensure:

The provision of Green Waste Composting facilities for garden and landscaping waste. Two to three facilities are encouraged with capacity up to 10,000 tonnes/annum. (2006 – 2007)
The development of Biowaste Treatment Plants to treat source-separated organic waste from households, businesses and industry. (2007)

It is the policy of the Plan to allow flexibility in the type of biological treatment plant provided. The onus will be on the developer to provide sufficient details at procurement and planning stage to ensure a sustainable proposal, which can meet the highest environmental standards' (Ref Section 3.7).

The following policy for siting Biological Treatment facilities is set out in this plan,

'The primary legislation and technical guidance referring to biological treatment facilities are:-
The Waste Management Acts, 1996 - 2003
Working Document, Biological Treatment of Biowaste, 2nd Draft, February 12, 2001, DGENV.A.2
Animal By-products Regulation (1774/2002/EC)

The Working Document on the Biological Treatment of Biowaste – Annex V sets out a number of criteria that should be considered when selecting a composting site. These are as follows:-

- *Location, taking into account requirements relating to the feedstock waste and technology used*
- *Distance to such things as residential and recreational areas*
- *The proximity of waterways, waterbodies and other agricultural and urban sites*
- *The existence of protection zones in the area and the protection of the local environment*

Cognisance should also be taken of the Animal By-Products Regulation which is now in force and the Draft Conditions for Treatment of Animal By-products in approved composting or biogas plants in Ireland issued by the Department of Agriculture and Food in 2004' (Ref Section 3.13.4).

The proposed development is in line with requirements of the North-East Waste Management Plan 2005-2010 which are needed in order to meet our requirements under the Landfill Directive and the requirement to meet the recycling targets set in the Plan.

The proposed development will comply with the policy for siting Biological Treatment Facilities. The existing composting facility is currently in operation; however the criteria that should be considered when selecting a composting site will be addressed in relevant sections of this EIS.

4.3.2.2 Planning Policy

Regional Planning Guidelines for the Greater Dublin Area (GDA 2004-2016)

The Regional Planning Guidelines for the Greater Dublin Area (GDA) 2004-2016 provides a statutory planning framework for the functional areas of Dublin City Council, and the County Councils of Fingal, South Dublin, Dun-Laoghaire Rathdown, Wicklow, Kildare and Meath.

'From a strategic perspective, the waste management industry (which includes Planning Authorities and private operators) should aim to develop integrated waste management facilities infrastructure in the GDA. This infrastructure includes new landfills, waste to energy plants, biological treatment and recycling facilities. In developing this infrastructure, provision should be made to:

Develop biological treatment facilities for organic waste, further recycling and waste to energy plants to serve the needs of the GDA' (Section 8.6.3).

'Waste management options should be determined according to a waste hierarchy which considers first waste minimisation, then re-use, recycling, composting and energy recovery (including incineration), and finally disposal to landfill. Waste should generally be managed as near as possible to its place of production in order to minimise the environmental impact of waste transportation' (Section 9.2).

The proposed extension to the existing Kilmainhamwood composting facility is in line with these guidelines and the requirement to develop biological treatment facilities.

4.3.3 Local Level

Meath County Development Plan (2007-2013)

The development plan sets out the general policies and development standards of Meath County Council. The development plan sets out the following policies in relation to waste management, rural development and infrastructure.

Economic Development Policy 19

'To normally permit development proposals for the expansion of existing industrial or business enterprises in the countryside where the resultant development is of a size and scale which remains appropriate and which does not negatively impact on the character and amenity of the surrounding area; and the proposal demonstrates that it has taken into account traffic, public health, environmental and amenity considerations and is in accordance with the policies, requirements and guidance contained in this plan.

In all instances, it should be demonstrated that the proposal would not generate traffic of a type and amount inappropriate for the character of the access roads or would require improvements which would affect the character of these roads' (Ref Section 3.1.9).

Infrastructure Policy 74

'To implement the provisions of the Waste Management Hierarchy and the Replacement North East Regional Waste Management Plan. All prospective developments in the county will be expected to take account of the provisions of the Replacement Regional Waste Management Plan and adhere to those elements of it that relate to waste prevention and minimisation, waste recycling facilities, and the capacity for source segregation. Account will also be taken of the proximity principle and the inter regional movement of waste as provided for under the Section 60 Policy Direction by the Minster for the Environment, Heritage & Local Government (Circular WIR:04/05)' (Ref Section 4.9.3).

Infrastructure Policy 79

'To support the development of recycling sites/ waste disposal sites or transfer stations and associated developments in appropriate locations, subject to normal planning and environmental sustainability considerations. In assessing applications for these types of development, the Planning Authority will have regard to the Groundwater Protection Plan and appropriate response matrix' (Ref Section 4.9.3).

The proposed development is in line with the policies of Meath County Council. The proposed extension of the existing composting facility will not negatively impact on the character and amenity of the surrounding area. This is dealt with in more detail in Chapter 11 (Landscape and Visual Impact) of this EIS. This proposal has taken into consideration traffic and this is addressed in Chapter 13 (Traffic & Road Assessment) of this EIS. Environmental and amenity considerations have been dealt with in Chapter 5 (Human Beings/Socio Economic), Chapter 6 (Flora & Fauna), Chapter 7 (Soils/Geology & Hydrogeology), Chapter 8 (Water), Chapter 9 (Air Quality And Climate), Chapter 10 (Noise and Vibration) and Chapter 12 (Cultural Heritage & Archaeology) of this EIS.

The existing facility and its proposed extension will continue to operate in line with current policies, and regulations.

4.4 THE NEED FOR THE DEVELOPMENT

Policy Drivers

The Waste Management Plan for the North East Region (2005-2010) sets out the following policy objectives for biological treatment:

'It will be a priority of the Plan to ensure that biological treatment of separately collected organic waste is developed in the Region. This treatment is required to meet our requirements under the Landfill Directive as well as to meet the recycling targets set in the Plan' (Ref Section 3.7, Northeast WMP).

The Minister for the Environment, Heritage and Local Government, in a 2008 circular, requested local authorities to intensify the roll out of brown bins for the source separation and collection of domestic biowaste for biological treatment.

Following a consultation period and subsequent publication of a guidance document titled 'Municipal Solid Waste – Pre-treatment & Residuals Management', the EPA has recently reviewed all landfill waste licences to include pre-treatment conditions for Ireland to fulfil its obligations under the EU Landfill Directive. Essentially, conditions have been imposed on landfill facility operators requiring that all municipal waste received is pre-treated prior to disposal.

In the reviewed licences, the EPA has set limits on the Biodegradable Municipal Waste (BMW) content in Municipal Solid Waste (MSW) accepted at landfill of 40% (by weight) for 2010; 24% (by weight) for 2013; and, 15% (by weight) for 2016 and subsequent years. The limits will be subject to periodic review, by the EPA, as demanded by annual waste statistical returns, however significant fluctuations in the limits presented are not expected.

The diversion of biowaste from landfill by the implementation of a separate collection for food and garden waste is regarded as pre-treatment. Hence the review of all landfill waste licences to include specific pre-treatment conditions will further stimulate the roll out of brown bins in urban areas in Ireland

with the resultant generation of additional biowaste which will require biological treatment. It should also be noted that, as recognised by the EPA, the source separation, collection and treatment of biowaste alone will not be sufficient to meet the looming landfill diversion targets. Biological treatment of the organic fraction within residual waste (black/grey bin content) or thermal treatment of residual waste will also be necessary going forward.

The proposed Kilmainhamwood Compost facility extension is regarded as fundamental infrastructure, required for Ireland to fulfil the requirements of the Landfill Directive.

The 2008 EPA National Waste Report (NWR) report states that Ireland landfilled 1,196,044 tonnes of biodegradable waste in 2008, which is 280,000 tonnes adrift of the stated first EU obligation due to be achieved by July 2010. The NWR 2008 data suggests that municipal waste generation (and household waste) is down 5% on previous years, and the tonnage consigned to landfill is down 1% on previous years.

The Economic and Social Research Institute, with financial support from the Environmental Protection Agency (EPA), has developed a Sustainable Development Research Model for Ireland entitled ISus. This model used an environmental input-output model to forecast emissions, waste and water use out to 2020. The ISus model predicts further reductions in waste generation until 2011/2012, and shows that waste generation will increase again after this period. Reference will be made to the ISus model in the following sections.

Household Biowaste in the North East Region

The NWR 2008 shows that 166,291 tonnes of household waste was generated in the North East Region in 2008. It was forecasted in the North East Waste Management Plan 2005-2010 that the level of household waste generated in the region will be in excess of 200,000 tonnes by 2010. However as these figures were calculated in 2004 they need to be updated to reflect the economic changes which have taken place in the last number of years. The following data sources and assumptions have been used to generate estimated future household biowaste arisings for the North East Region, from the baseline tonnage of 166,291 tonnes of household waste in 2008.

Data sources include;

- Figures outlined in the NWR's for 2005-2008
- Predicted figures for Biodegradable Municipal Waste (BMW) set out in the ISus model

Assumptions include;

- All urban areas will have a source separated collection scheme for biowaste;
- 43% of population live in urban areas (as per the North East Waste Management Plan 2005-2010) and therefore 43% of waste will arise in urban areas;

- 23% of household waste is biowaste (organic and green waste calculated from the breakdown of household waste provided in Table F-1 of the EPA National Waste Report for 2008);
- Percentage change in domestic biowaste in the North East Region will be similar to predicted changes in National Biodegradable Municipal Waste (BMW) (as determined by the ISus model).

Based on these data sources and assumptions (ISus model used to predict the changes in the generation of biowaste from 2008 onwards) it is estimated that there will 15,468 tonnes of domestic biowaste generated in 2010 in urban areas in the North East Region.

Commercial Biowaste in the North East Region

Following the implementation of the Waste Management (Food Waste) Regulations in 2010, the quantities of food waste separately collected in commercial premises and requiring biological treatment in the North East Region will increase significantly.

It is forecasted in the North East Waste Management Plan 2005-2010 that the level of commercial/industrial (C&I) waste generated in the region will be in excess of 143,000 tonnes by 2010. As stated previously, as these figures were calculated in 2004 they need to be updated to reflect the economic changes which have taken place in the last number of years.

C&I waste arisings are inextricably linked to Gross Domestic Product (GDP). Using the 2003 baseline figure for C&I waste outlined in the North East Waste Management Plan and actual GDP figures from 2004 to 2008 (sourced from the Central Statistics Office), commercial waste arisings for 2008 are estimated at 124,000 tonnes. The following data sources and assumptions have been used to generate estimated future C&I biowaste arisings for the North East Region, from the estimated baseline tonnage of 124,000 tonnes of C&I waste in 2008.

Data sources include;

- Figures outlined in the NWR's for 2005-2008
- Predicted figures for Biodegradable Municipal Waste (BMW) set out in the ISus model

Assumptions include;

- All commercial premises will have a source separated collection scheme for biowaste;
- 36% of commercial waste is biowaste (provided in Table F.5 of the EPA NWR 2008);
- Percentage change in commercial biowaste in the North East Region will be similar to predicted changes in National Biodegradable Municipal Waste (BMW) (as determined by the ISus model).

Based on these data sources and assumptions (ISus model used to predict the changes in the generation of biowaste from 2008 onwards) it is estimated that there will 41,981 tonnes of commercial biowaste generated in 2010 in the North East Region.

Total Biowaste Arisings in the North East Region

In total, there is potential for the generation of 57,449 tonnes (15,468 + 41,981) of biowaste (generated by source separated collection schemes) in the North East region in 2010.

Household Biowaste in the Dublin Region

In terms of planning, County Meath is located within the Greater Dublin Area. As the Kilmainhamwood Compost facility is currently the only composting facility in the Greater Dublin Area approved by the Department of Agriculture, Fisheries and Food to accept Animal By-Products, figures for waste arisings have also been calculated for the Dublin Region.

The NWR 2008 shows that 478,042 tonnes of household waste was generated in the Dublin Region in 2008. It was forecasted in the Dublin Waste Management Plan 2005-2010 that the level of household waste generated in the region will be in excess of 550,000 tonnes by 2010. However as these figures were calculated in 2004 they need to be updated to reflect the economic changes which have taken place in the last number of years. The following data sources and assumptions have been used to generate estimated future household biowaste arisings for the Dublin Region from the baseline tonnage of 478,042 tonnes of household waste in 2008.

Data sources include;

- Figures outlined in the NWR's for 2005-2008
- Predicted figures for Biodegradable Municipal Waste (BMW) set out in the ISus model

Assumptions include;

- All urban areas will have a source separated collection scheme for biowaste;
- 23% of household waste is biowaste (organic and green waste calculated from the breakdown of household waste provided in Table F.1 of the EPA National Waste Report for 2008);
- Percentage change in domestic biowaste in the Dublin Region will be similar to predicted changes in National Biodegradable Municipal Waste (BMW) (as determined by the ISus model).

Based on these data sources and assumptions (ISus model used to predict the changes in the generation of biowaste from 2008 onwards) it is estimated that there will 103,595 tonnes of domestic biowaste generated in 2010 in the Dublin Region.

Commercial Biowaste in the Dublin Region

Following the implementation of the Waste Management (Food Waste) Regulations in 2010, the quantities of food waste separately collected in commercial premises and requiring biological treatment in the Dublin Region will increase significantly.

It is forecasted in the Dublin Waste Management Plan 2005-2010 that the level of commercial/industrial (C&I) waste generated in the region will be in excess of 750,000 tonnes by 2010. As stated previously, as these figures were calculated in 2004 they need to be updated to reflect the economic changes which have taken place in the last number of years.

C&I waste arisings are inextricably linked to Gross Domestic Product (GDP). Using the 2003 baseline figure for C&I waste outlined in the Dublin Management Plan and actual GDP figures from 2004 to 2008 (sourced from the Central Statistics Office), commercial waste arisings for 2008 are estimated at 809,000 tonnes. The following data sources and assumptions have been used to generate estimated future C&I biowaste arisings for the Dublin Region, from the estimated baseline tonnage of 809,000 tonnes of C&I waste in 2008.

Data sources include;

- Figures outlined in the NWR's for 2005-2008
- Predicted figures for Biodegradable Municipal Waste (BMW) set out in the ISus model

Assumptions include;

- All commercial premises will have a source separated collection scheme for biowaste;
- 36% of commercial waste is biowaste (provided in Table F.5 of the EPA NWR 2008);
- Percentage change in commercial biowaste in the Dublin Region will be similar to predicted changes in National Biodegradable Municipal Waste (BMW) (as determined by the ISus model).

Based on these data sources and assumptions (ISus model used to predict the changes in the generation of biowaste from 2008 onwards) it is estimated that there will 274,454 tonnes of commercial biowaste generated in 2010 in the Dublin Region.

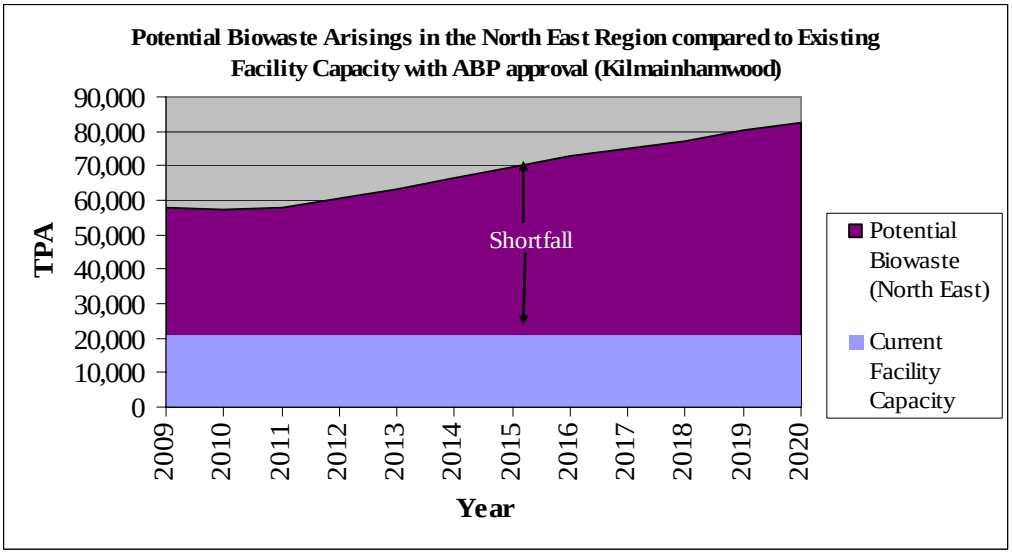
Total Biowaste Arisings in the Dublin Region

In total, there is potential for the generation of 378,049 tonnes (103,595 + 274,454), of biowaste (generated by source separated collection schemes) in the Dublin region in 2010.

Capacity Assessment

The Kilmainhamwood Compost facility is the only composting facility in the North East region currently approved by the Department of Agriculture, Fisheries and Food to accept Animal By-Products. Figure 4.1 below illustrates the predicted biowaste arisings and existing biological treatment capacity (with Animal By-Product approval) in the North East Region. This figure clearly illustrates that there is currently a shortfall in biological treatment capacity in the North East Region.

Figure 4.1 Potential Biowaste Arisings (NE Region) versus ABP Approved Capacity



There are other facilities with planning permission for biological treatment plants within the North East Region. If constructed and subsequently approved by the Department of Agriculture, Fisheries and Food, such facilities could accept and process biowaste. These facilities include:

- Organic Gold in Co. Meath (25,000 tpa);
- Panda Waste in Co. Meath (20,000 tpa);
- Enrich Environmental in Co. Meath (20,000 tpa);

Should these facilities secure the necessary remaining regulatory permissions and be constructed, there would be adequate biowaste treatment capacity available to meet the requirements of the North East Region in the long-term. However, if some or all of these facilities are not developed, or if construction or Animal By-Product approval is delayed, then there will be a clear shortfall of biological treatment capacity in the North East Region for the treatment of source separated biowaste.

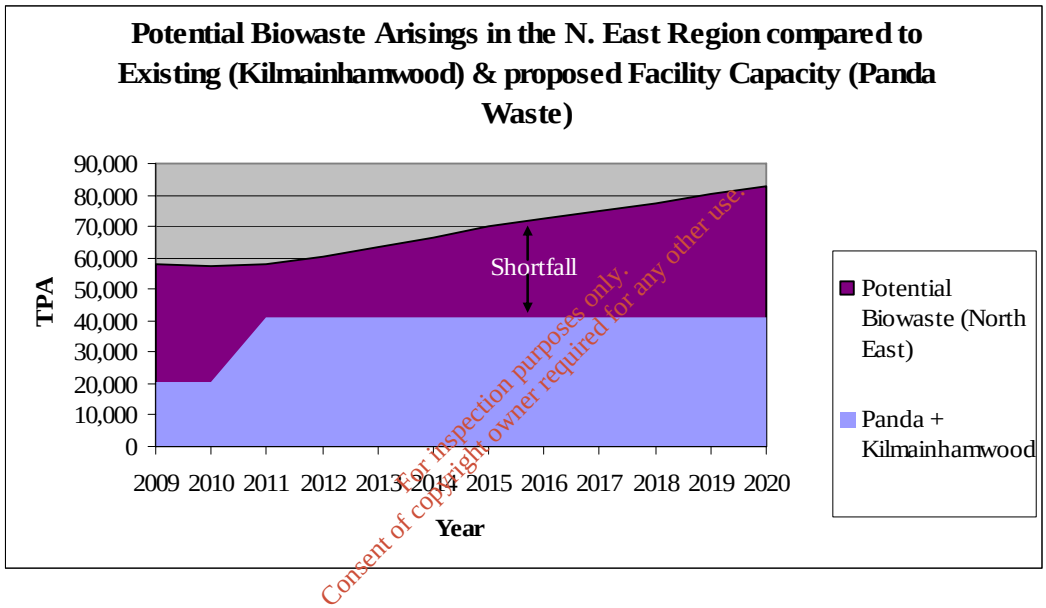
In addition to the above, there will also be a requirement for biological treatment of the organic fraction within residual waste or thermal treatment of residual waste within the North East Region in order for landfills in the region to meet the MSW pre-treatment conditions recently imposed by the EPA in waste licences. As Figure 4.1 above does not include tonnages of organic fraction within residual waste that may require biological treatment in the coming years in the North East region, the shortfall identified therein is likely to be further exacerbated in the future.

The scenarios presented below provide a representation of the shortfalls that will occur should certain facilities not be developed. Again the shortfalls identified are considered conservative, as organic fraction within residual waste that may require biological treatment is not included in the analysis.

Panda waste has recently been granted planning permission (October 2009) for a waste anaerobic digestion and composting system at its existing materials recovery facility in County Meath. It is proposed that this facility will treat 20,000 tonnes per annum of compostable waste. A waste licence review application is currently with the EPA. An Animal By-Product application is also with the Department of Agriculture Fisheries and Food.

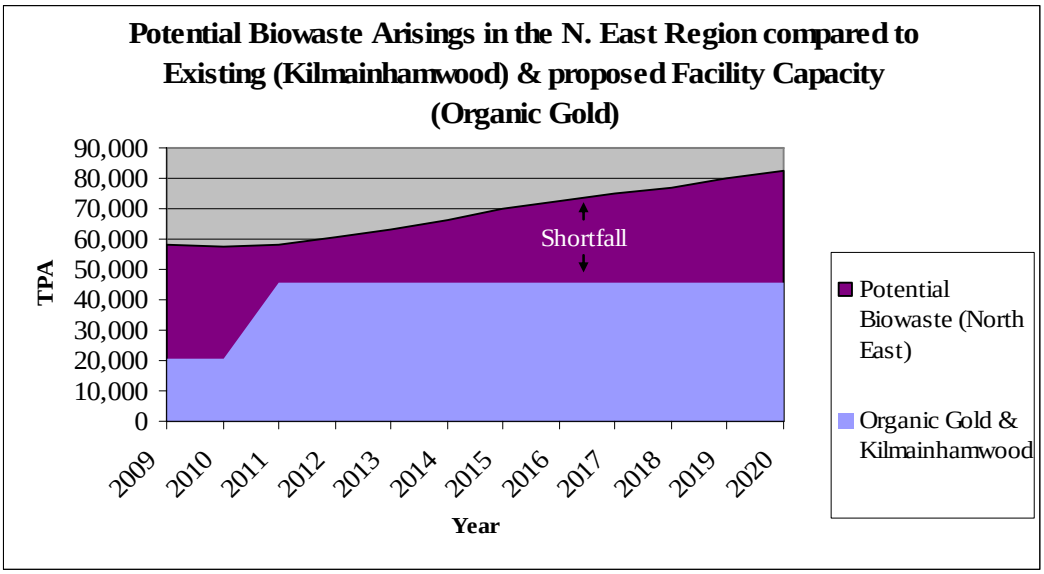
It is assumed that if Panda Waste secures the remaining necessary permissions, it will have capacity to biological treat 20,000 tonnes of biowaste. Assuming that 2011 is the first full year of permitted biowaste treatment at the facility, Figure 4.2 below illustrates the shortfall that will occur in biological treatment capacity in the North East region.

Figure 4.2 Potential Biowaste Arisings (NE Region) versus Potential Capacity (Panda Waste)



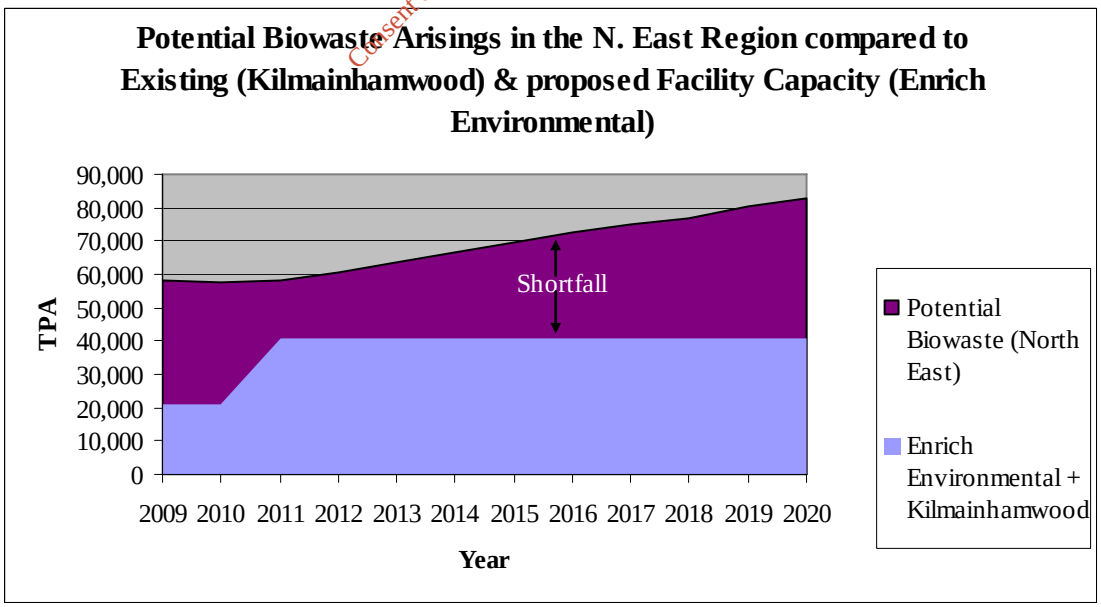
The Organic Gold facility, also located in County Meath was granted an EPA waste licence in April 2007. This waste licence allows for 25,000 TPA of organic waste (i.e. food waste, green waste, sludge, dewatered slurry and commercial organics) to be accepted at the facility. This facility has not yet been constructed and does not have approval to accept animal by-products. Assuming that 2011 is the first full year of permitted biowaste treatment at this facility, Figure 4.3 below illustrates the shortfall that will occur in biological treatment capacity in the North East region.

Figure 4.3 Potential Biowaste Arisings (NE Region) versus Potential Capacity (Organic Gold)



The Enrich Environmental facility, also located in County Meath has planning permission for the treatment of 20,000 tonnes of biowaste per annum. This facility has not yet been constructed and does not have approval to accept animal by-products. Assuming that 2011 is the first full year of permitted biowaste treatment at this facility, Figure 4.4 below illustrates the shortfall that will occur in biological treatment capacity in the North East region.

Figure 4.4 Potential Biowaste Arisings (NE Region) versus Potential Capacity (Enrich)



As stated previously, the Kilmainhamwood Compost facility is located within the Greater Dublin Area. There are other biological treatment facilities constructed, but with no Animal By-Products approval,

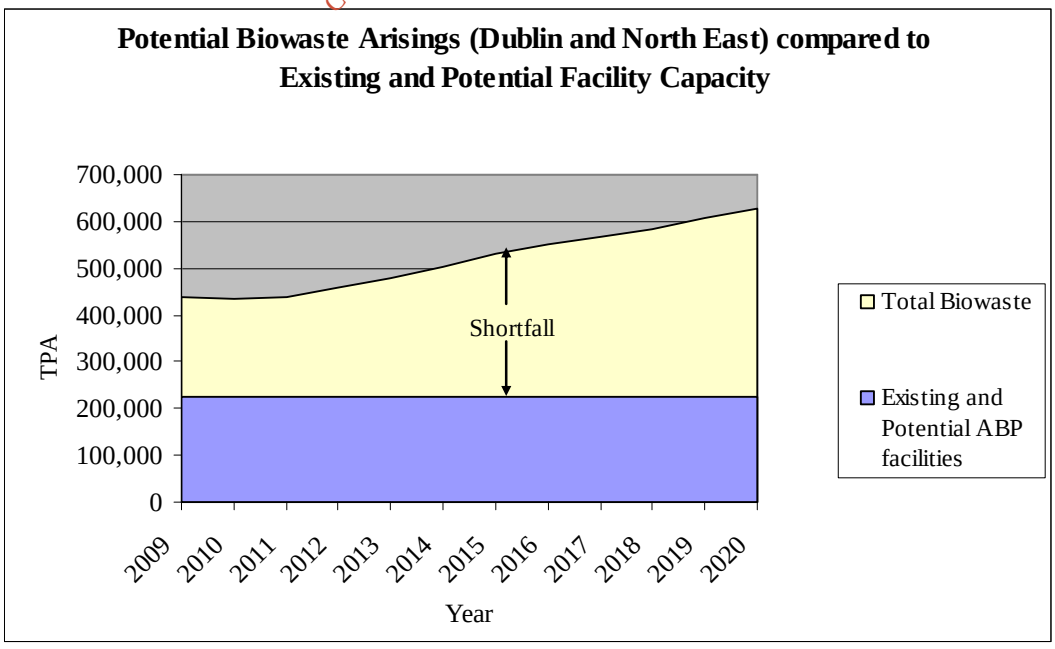
within the Greater Dublin Area. In addition, there are also sites with planning permission for biological treatment facilities in the Greater Dublin Area. If constructed and approved by the Department of Agriculture, Fisheries and Food, such facilities could accept and process biowaste. Existing facilities and facilities with planning permission include:

- Greenstar Millennium Park, Dublin (50,000 tpa);
- Nephin Trading Ltd, Co. Kildare (65,000 tpa);
- Drehid Waste Management Facility, Co. Kildare (25,000 tpa);
- Organic Gold in Co. Meath (25,000 tpa);
- Panda Waste in Co. Meath (20,000 tpa); and
- Enrich Environmental in Co. Meath (20,000 tpa);

It should be noted that the above facility details are based on the best data available at the time of writing. The proposed facilities at Kilshane Cross and the Ballyogan Recycling Park in County Dublin have not been included, as the relevant Dublin local authorities have stated that the current tender process for these facilities will not be progressed further. In addition, there is no certainty that all of the above facilities will be developed. It is likely that some of the facilities listed above (if developed) will be constructed as MBT (Mechanical and Biological Treatment) facilities for the stabilisation of the organic fraction within residual waste. Therefore the potential biological treatment capacity (for source separated biowaste) in the Greater Dublin Area will be further reduced by this likely scenario.

Figure 4.5 illustrates the potential biowaste arisings in the Dublin and North East Regions and the existing Animal By-Products approved facility (Kilmainhamwood Compost) and proposed facilities that could potentially have biological treatment capacity in the future.

Figure 4.5 Potential Biowaste Arisings (NE and Dublin Region) versus Potential Capacity



It is clear from these findings that there will be a significant deficit in the biological treatment capacity for biowaste in the North East and Dublin Regions should all the facilities listed above be constructed and approved to accept Animal By-Products. Obviously, this shortfall would increase further should any of the proposed facilities not be developed or granted approval by the Department of Agriculture, Fisheries and Food.

The proposed extension and intensification of the Kilmainhamwood Compost facility is therefore regarded as infrastructure that is required to provide urgently needed biological treatment capacity for the North East and Dublin Regions. This need is further reflected by the EPA which states that the priorities for improvements in biodegradable municipal waste management in Ireland for 2010, as set out in the EPA NWR 2008 include;

'Ensuring there is adequate infrastructure to treat the very large quantities of organic (particularly food) waste that must be collected separately and diverted from landfill' (Ref Section 4.3, EPA NWR 2008).

Inter Regional Movement of Waste

The existing Kilmainhamwood facility currently accepts waste from both the North East Region and the Dublin Region. Thorntons Recycling currently have approximately 7,860 household customers in County Meath and are in the process of rolling out source separated biowaste collections to all these customers (having already rolled out brown bins to approximately 1,000). In relation to the inter regional movement of waste, the North East Waste Management Plan 2005-2010 states that;

'Conditions attached to some planning permissions for waste infrastructure restrict facilities to handling only waste that arises in the geographic area covered by the Waste Management Plan, the rationale being the proximity principle. The Government's latest policy document 'Taking Stock and Moving Forward', recognises that the proximity principle has been interpreted too severely by some planning authorities and that some but not all planning authorities have been too literal in their interpretation of Waste Management Plans. The policy statement also states how each region has to take responsibility for its own waste.'

It also states that *'The Waste Plan recognises that there should be flexibility with respect to the movement of waste across regional boundaries. In broad terms the capacity of waste facilities in the Region should primarily satisfy the needs of the Region whilst not precluding inter regional movement of waste and allowing flexibility to cater for the development of required national infrastructure. This policy on inter regional movement of waste has been reinforced by the recent Policy Direction issued by the Minister under Section 60 of the Waste Management Acts, 1996-2003.'*

It is clear from the above extracts that the acceptance of waste, at the Kilmainhamwood facility, from outside the North East Region does not contravene waste policy and direction.

Suitability of the Proposed Development

The Kilmainhamwood composting facility is considered an appropriate and suitable location for the provision of additional and urgently needed biological treatment capacity for the North East and Dublin Regions with respect to the following criteria:

- Existing infrastructure and land bank;
- Existing Animal By-Products Approval;
- Proximity to waste arisings;
- Development Potential;
- Current access to the site;

Existing infrastructure

The existing facility includes infrastructure that will facilitate the proposed extension to the facility. This infrastructure includes site access, site road, weighbridge, compost screening area and odour abatement technology. The facility has precedence in the acceptance and treatment of biowaste. In addition, the facility has access to a substantial land bank (in excess of 1,500 hectares) for the beneficial application of the finished compost.

Due to the availability and suitability of existing facility infrastructure, the proposed extension to the Kilmainhamwood facility could be constructed in a relatively short timeframe (compared to the construction of a facility on a new site) thereby providing urgently needed biological treatment capacity.

Existing Animal By-Products Approval;

The Kilmainhamwood Compost facility is currently the only facility in the North East and Dublin Regions approved by the Department of Agriculture, Fisheries and Food to accept Animal By-Products. Indeed, there are currently only six Animal By-Product complaint facilities in Ireland with a processing capacity of the order of 85,000 tonnes per annum. Clearly, there is a significant deficit in approved biological treatment capacity on both a National level and Regional level. Source separated food waste from household and commercial premises is defined as Animal By-Products and therefore any intending biological treatment facility requires approval from the Department of Agriculture, Fisheries and Food.

Proximity to Waste Arisings

The existing composting facility is located approximately 6km northwest of Nobber, Co. Meath and 75km from Dublin. The R162 regional road runs to the south and southwest of the site. The location of the site in relation to its geographic surrounds is shown on Figure 1.1 of the previously submitted EIS. Waste currently accepted at the facility is primarily from the North East and Dublin Regions. Please refer to Figure 2.6, provided below, for location of the Kilmainhamwood facility with respect to the North East and Dublin Regions.

Thorntons Recycling currently have approximately 7,860 household customers in County Meath and are in the process of rolling out source separated biowaste collections to all these customers (having already rolled out brown bins to approximately 1,000). In addition, the existing Kilmainhamwood facility currently treats biowaste collected by service providers in County Monaghan, County Cavan and County Louth.

Development Potential

The current application proposes to extend the existing facility buildings in order to provide sufficient processing capacity for the additional tonnage. There is sufficient land adjacent to the existing compost facility to serve the needs of the proposed extension.

Current access to the site

As part of the development of the existing facility, a 5m wide site road of approximately 0.85km in length was constructed from the facility to the R162 regional road to facilitate the movement of delivery vehicles to the composting facility. The current access to the R162 and the existing site road will also be utilised for the proposed extension to the facility.

5 HUMAN BEINGS/SOCIO ECONOMIC

5.1 INTRODUCTION

Human Beings are a vital element to be considered as part of the EIA process. The purpose of this assessment is to examine the existing environment, the current and potential impacts of the extension of the existing composting facility, at Ballnalurgan, Kilmainhamwood, Kells, Co. Meath on human beings. As this facility is already in existence, this section will provide an assessment of socio-economic issues that may be affected by its continued use and expansion. This section will focus on population, employment, tourism and amenities, and material assets.

5.1.1 Methodology

A desk study was carried out in order to examine all relevant information pertaining to planning and socio economic activity in the study area. The relevant national, regional and local planning guidelines were examined along with the Meath County Development Plan 2007-2013.

Fáilte Ireland tourist literature for Meath was examined in relation to tourism amenity in conjunction with websites of relevant tourism sites and amenities for the area. In addition Ordnance Survey maps were used to identify land use and possible amenity and tourist sites that may be located in proximity to the existing composting facility.

5.2 EXISTING ENVIRONMENT

The site is located in a rural agricultural area approximately 4km south of Kingscourt, Co. Cavan in the townlands of Ballnalurgan and Newcastle.

The site lands are currently used as a composting facility and related infrastructure. The area immediately surrounding the site is predominantly farmland with residential dwellings and farm buildings located in the vicinity of the composting facility. A number of industries are located in proximity to the site. These include Gypsum Industries and College Proteins.

The nearest occupied dwelling is located 400m north of the existing facility and its proposed extension. A detailed drawing showing the location of dwellings within 1km of the site is provided in Drawing 5361-2407. This drawing is summarised in Table 5.1 below.

Table 5.1 Number of Buildings within 1km of the Composting Facility

Type of Building	Residential Dwelling	Derelict Building	Business Premises	Farm Buildings	Shed/ Stables
Number	69	7	2	22	12

The effects of noise, dust, traffic, air and water quality on the surrounding environment will be dealt with individually in those relevant sections of the EIS.

5.2.1 Population

To understand an area, its population must be examined. This section will look at the population change over the period 1996-2006. The existing facility is located within the townland of Ballnalurgen and subsequent District Electoral Division (DED) of Kilmainham which is located within Kells Rural Area. Table 5.2 illustrates the population change between 1996-2006 in the State, Leinster, Meath, Kells Rural Area and Kilmainham DED in which the existing composting facility is located.

Table 5.2 Population Change 1996-2006

	1996	2002	2006	% Change
State	3,626,087	3,917,203	4,239,848	17%
Leinster	1,924,702	2,105,579	2,295,123	19%
Meath	109,732	134,005	162,831	48%
Kells Rural Area	11,341	12,483	13,950	23%
Killmainham DED	565	676	741	31%

Source: CSO 2002 and 2006

Table 5.2 shows that the population of the Kells Rural Area (23%) increased at a rate similar to that of the Leinster (19%). In comparison the population of County Meath increased significantly by 48% in the period 1996-2006. Killmainham DED also experienced significant population increases with an increase of 31% in the period 1996-2006. 7% of the population of Leinster live in County Meath, while 0.5% of County Meath's population live in the DED of Kilmainham.

5.2.2 Employment

Employment is an important indicator of the economic standing of an area. This section examines unemployment levels, employment status and industrial groups within the area of the existing compost facility. Quarterly National Household Survey (QNHS) provides details of unemployment on a regional level. Ballynalurgen is located in the Mid-East Region therefore this Region will be used to illustrate unemployment in the area. The Mid-East Region consists of Counties Kildare, Wicklow and Meath.

Table 5.3 Quarterly National Household Survey (Q4 2009)

	Unemployment Rate	Participation Rate
State	12.4%	61.2%
Mid-East Region	11.4%	65.8%

Source: CSO, 2009

Table 5.3 illustrates the findings from the most recent QNHS quarter four (October to December 2009). The unemployment rate is the number of unemployed persons expressed as a percentage of the total labour force. The unemployment rate for the State was 12.4% while the unemployment rate for the Mid-

East Region, which contains the study area, was 11.4%. During this period the Mid-East Region has a lower unemployment rate than the State.

The participation rate is the number of persons in the labour force expressed as a percentage of the total population (over the age of 15 years). Currently the participation rate in the State is 61.2%. The Mid-East Region's participation rate is 65.8%, which are higher then that of the State.

The Central Statistics Office (CSO) publishes figures relating to the live register. These figures are not strictly a measure of unemployment as they include persons who are legitimately working part time and signing on part time. However they can be used to provide an overall trend within an area.

Table 5.4 Live Register 2009-2010

	March 2009	**March 2010**	**% Change**
State	369,203	435,121	18%
Mid-East	34,932	41,839	20%
Meath	9,464	11,549	22%
Kells	1,637	1,892	16%

Source: CSO 2010

The figures in Table 5.4 show that over the period March 2009-March 2010 the number of persons on the live register has significantly increased in all regions. No live register data is available for, Ballynalurgen therefore data available for Kells was used.

National and local trends indicate that they are significantly more persons unemployed in March 2010 than in March 2009.

The existing composting facility currently has 4 No. employees. Indirect employment is generated as a result of the composting facility, in terms of suppliers of products and services, such as fuel and oil suppliers, machinery suppliers, environmental monitoring, etc.

5.2.3 Socio-Economic Profile of the Locality

Statistics in relation to occupational group are not provided in the Census for Ballynalurgen. As Ballynalurgen is a rural townland the occupational group for County Meath is used as an indicator.

Table 5.5 Occupational Group, County Meath

Occupational Group	Percentage
Farming, fishing and forestry workers	4%
Manufacturing workers	13%
Building and Construction workers	10%
Clerical, managing and government workers	20%
Communication and transport workers	6%
Sales and commerce workers	13%
Professional, technical and health workers	15%
Service workers	10%
Other	9%

Source: CSO, 2008

Table 5.5 illustrates the occupational group of persons living in Meath. Clerical, managing and government workers represent the highest percentage of workers (20%), while farming, fishing and forestry workers represent the lowest percentage (4%).

Gypsum industries and College proteins are located in proximity to the current composting site. These industries provide employment in the region.

5.2.4 Land Use / Agriculture

The site currently contains a composting facility. The proposed extension area is comprised primarily of existing hardstand and also a small amount of planted woodland.

5.2.5 Tourism and Amenities

According to the Meath County Development Plan, 2007-2013, '*Meath has much to offer as a tourist destination – in particular its rich heritage, the quality of the rural landscape and its coastline'* (Ref Section 3.3.1).

Meath, according to Fáilte Ireland, is located in the East & Midlands Tourist Region. The East & Midlands Region consists of Counties Kildare, Laois, Longford, Louth, Meath, Wicklow, Offaly East and Westmeath. The latest available statistics from Fáilte Ireland are for the year ending December 2008. These statistics state that the number of overseas visitors to the East & Midlands Region was 839,000 in 2008. The total tourism revenue generated from these visits was €311.9 million.

Table 5.6 Overseas Tourism to Meath 2008

	Britain	M. Europe	N. America	Other	Total
Number of Visitors (000s)	66	41	27	6	140
Revenue Generated (€m)	20	16	7	1	45

Source: Fáilte Ireland 2008

Table 5.6 illustrates that Meath received over 140 thousand overseas visitors in 2008 generating revenue of €45 million for this year.

Landscape Character

Landscape Character Types (LCT's) and Landscape Character Areas (LCA's) are set out in Appendix VI of the Meath County Council Development Plan 2007-2013. LCT's are generic areas of distinctive character which may occur in several places across the County. LCTs are used to categorise the more geographically specific LCA's.

The existing compost facility and its proposed extension is located in an area which is has a LCT known as a *'Hills and Upland Areas*' and subsequently in LCA 2- *'North Meath Lakelands'.* This area has moderate landscape value and low landscape sensitivity. The land use in this area is primarily small-scale pastoral fields and small scale managed farmland. The settlement type has been identified as predominantly small villages with several medium to large villages.

Rathe house equestrian centre outside Kilmainhamwood has been identified as a tourist facility. This is located approximately 2km to the south of the existing facility.

Views and Prospects

It is an objective in the Meath County Development Plan 2007-2013,

'To provide adequate protection of views and vistas that contribute to the appreciation of landscape character' (Ref Policy HER POL 85).

To maintain scenic vistas and panoramic views from key vantage points and towards key landmarks and features within the landscape' (Ref Policy HER POL 86).

'To protect and enhance the visual qualities of rural areas through the sensitive design of necessary development' (Ref Policy HER POL 89).

There is one protected viewpoint as indicated in the Meath County Development Plan. This view from the R162 takes in the higher ground to the north east. The proposed extension to the composting facility would not be visible from this view.

Protected Trees

It is a policy of Meath County Council in the Meath County Development Plan to,

'Seek to maintain and enhance the natural heritage amenity of the county by promoting the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees' (Ref Policy HER POL 29).

'To discourage the felling of mature trees to facilitate development and to encourage tree surgery rather than felling where possible' (Ref Policy HER POL 31).

Map 06 of the Landscape Character Assessment which forms part of Appendix VI of the Meath County Development 2007-2013 identifies measures trees. Trees identified include those adjacent to Newcastle Lough. These are located approximately southwest of the existing composting facility.

Designated Areas

It is policy in the Meath County Development Plan to '*protect, conserve and enhance the County's biodiversity and natural heritage including wildlife (flora & fauna), habitats, landscape features of importance to wildlife or which play a key role in the conservation and management of natural resources such as water'* (Ref Policy HER POL1).

There are designated sites are present within 5km of the site. The nearest site designated for conservation is Ballyhoe Lough proposed Natural Heritage Area (pNHA) which is located 5.3km to the northeast.

Walking Routes

It is set out in the Meath County Development Plan *'that public rights of way which contribute generally to the amenities of the country and local areas will be protected and maintained'* (Ref Section 3.3.11).

There are no designated walking routes located in proximity to the existing composting facility.

5.2.6 Material Assets

Planning Permissions

There are no live planning applications within the townland of Ballynalurgan (with the exception of the proposed development), Newcastle, Mullaghboy, Raloagha and Lisnagrow as of the 27th April 2010. There are planning applications with Meath County Council for dwelling houses in the townlands of Ballynaclose and Carrickleck.

5.3 SIGNIFICANT IMPACTS

Effects on Population

The composting facility is not located in close proximity to any urban areas. The proposed extension of the facility will not negatively impact on any towns or villages. There are a number of dispersed dwellings in close proximity to the site. The composting facility will therefore operate under rigid guidelines to assure residential amenity is maintained.

Traffic

There are currently no cycle or pedestrian facilities in place on the R162. Due to the nature and rural location of the development, cycle lanes and pedestrian facilities are not considered to be necessary.

As discussed in Section 13 of this EIS, the existing local road network can accommodate the proposed development.

Noise and Vibration

Noise from the construction phase of the project has minimal potential to increase noise levels at the nearest noise sensitive properties during this stage of the development. The design of the site has been laid out so as to minimise noise impact on the surrounding environment. All major noise producing plant associated with the proposed facility is to be located within the site buildings and not in the open air. For further information refer to Section 10 of this EIS.

Dust and Odour

It is anticipated that with the implementation of the suggested mitigation measures dust emissions will be in compliance at all dust monitoring locations when measured using the TA Luft/VDI 2119/Bergerhoff Method. When the proposed upgrade to the facility design has been implemented no odour impact will be perceived by residential receptors in the vicinity of the facility. Further details are provided in Section 9 of this EIS.

Effects on Health and Safety

Potential Impacts regarding the public health and safety of the composting facility relate primarily to concerns about those either straying or trespassing into the site, as well as the health and safety of workers and visitors to the site. The day-to-day operation of the facility, including the workings associated with all machinery and on-site vehicles, and how visitors are to present and conduct themselves when undertaking visits to the site, will be in compliance with all health and safety laws and regulations pertaining to the location and the location's Safety Statement.

All staff employed by Kilmainhamwood Compost receives Environmental, Health and Safety Training and in house composting courses. The existing facility is certified to international standards for Environmental ISO14001, Health and Safety OHSAS 18001 and quality ISO9001 and operates an Integrated Management System (IMS).

Effects on Employment

The proposed extension to the existing composting facility will lead to the generation of 2 no. additional jobs. Employment will also be generated during the construction phase of the development. Spin off employment will also be provided and retained by this development.

Effect on Landuse/Agriculture

The extension of this currently existing composting facility will lead to minor changes in use of land within the activity boundary. Land which had previously been utilised as hardstand and minor amounts of woodland will now be utilised for the construction of a composting facility extension.

Effects on Amenities and Tourism

There are no designated walking routes located in proximity to the existing composting facility. The proposed extension to the composting facility would not be visible from the protected view as listed in the Meath County Development Plan 2007-2013. Rathe house equestrian centre is located approximately 2km to the south of the existing facility and will not be impacted upon by the proposed development.

5.4 MITIGATION MEASURES

Population

The operation of the facility will have limited effects on the local population, as the facility is currently an active site. The composting facility and its proposed extension will be managed in such a way as to limit the impact of its operation on the surrounding environment.

Traffic

Mitigation Measures for Traffic include that appropriate warning signs indicating the presence of the entrance for traffic approaching from Nobber or Kingscourt should be provided and maintained. Further mitigation measures are outlined in Section 13 of this EIS.

Noise and Vibration

It is envisaged that a variety of practicable noise control measures will be employed. This may include the selection of plant with low inherent potential for generation of noise and/or vibration. Further mitigation measures are proposed in Section 10 (Noise and Vibration) of this EIS.

Dust and Odour

Thorntons Recycling will endeavour to ensure that dust and odour emissions are kept to a minimum at all locations and shall take all reasonable steps as far as is practical to minimise dust and odour emissions. Further mitigation measures are proposed in Section 9 (Air) of this EIS.

Health and Safety

All future facility personnel will be appropriately trained and certified in the safe operation, handling of materials of this facility. All current personnel have been thoroughly trained on the properties of all materials and products being handled within the facility, and will be trained to react in the unlikely event of an unplanned incident.

Employment

The impact on employment is positive and therefore no mitigation measures are proposed.

Amenities and Tourism

A planting plan has being prepared indicating woodland edge planting around the new structures. This will reduce visual impact of the extension. Details of mitigation measures are provided in Section 11 (Landscape and Visual Impact) of this EIS.

5.5 CONCLUSION

In summary the continued operation and the proposed extension of the existing facility will have a positive impact in relation to the socio-economic standing of the surrounding area. This will take the form of retaining and providing direct and indirect jobs. All activities on site will be carried out with regard to strict environmental and safety guidelines. When all mitigation measures are complied with there should be no significant impacts arising from its continued use and proposed extension. It is anticipated that the development will not have a negative impact on the everyday activities and lifestyles of local people and the surrounding environs.

6 FLORA & FAUNA

6.1 INTRODUCTION

TOBIN Consulting Engineers have been requested to prepare an Ecological Report for lands at Kilmainhamwood by Thorntons Recycling.

This assessment was conducted broadly in accordance with EPA *Guidelines on the Information to be contained in Environmental Impact Statements* (EPA, 2002) and also in general accordance with the *Guidelines for Ecological Impact Assessment in the United Kingdom* (Colebourn, K. 2006).

A bibliography for this Ecological Assessment is presented in Appendix 6.1.

6.1.1 Methodology

This ecological assessment comprised both a desktop study and a field survey. The desk study comprised the following elements:

- Identification of all sites designated for nature conservation within 5km of the development site.
- Consultation with the National Parks & Wildlife Service (NPWS) and Eastern Regional Fisheries board.
- Review of existing databases with information on the distribution of rare or protected species
- Review of Ordnance Survey maps and aerial photography in order to determine broad habitats that occur within the existing site.

TOBIN Consulting Engineers undertook a site visit to carry out habitat and general mammal assessment on 17th February, 2009. This field survey assessed habitats within the facility activity area and adjacent areas, see Figure 6.2.

The habitat assessment was conducted in accordance with The Heritage Council's Draft methodology, *A Standard Methodology for Habitat Survey and Mapping in Ireland* (Natura Environmental Consultants, 2002) and habitats were classified according to The Heritage Council's *A Guide to Habitats in Ireland* (Fossitt, 2000). Plant identification and nomenclature principally follows Webb *et al.* (1996) and Rose (2006). The predominant plant species for each habitat type were recorded in order to accurately determine habitats present on the site. Habitats were rated according to the Site Evaluation Scheme contained in the National Roads Authority's *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (National Roads Authority, 2006). Refer to Appendix 6.2 for qualifying criteria.

The general mammal survey primarily involved searching the site for evidence/signs of mammals (e.g. tracks, scats, dwellings and occasionally direct sightings). An assessment of the habitats in terms of their importance for mammals was also undertaken.

Survey Constraints

A comprehensive faunal survey was not a practical proposition due to natural mammalian behaviour. Most mammals are small and shy of human presence. Therefore, it would take a more detailed study to confirm their presence. Also mammals often tend to be more active at night making their presence more difficult to detect.

The survey was conducted outside the main botanic growing season therefore it would not have been possible to identify all plant species on the site. This did not prevent identification of habitats which may potentially contain protected/ rare flora.

6.2 EXISTING ENVIRONMENT

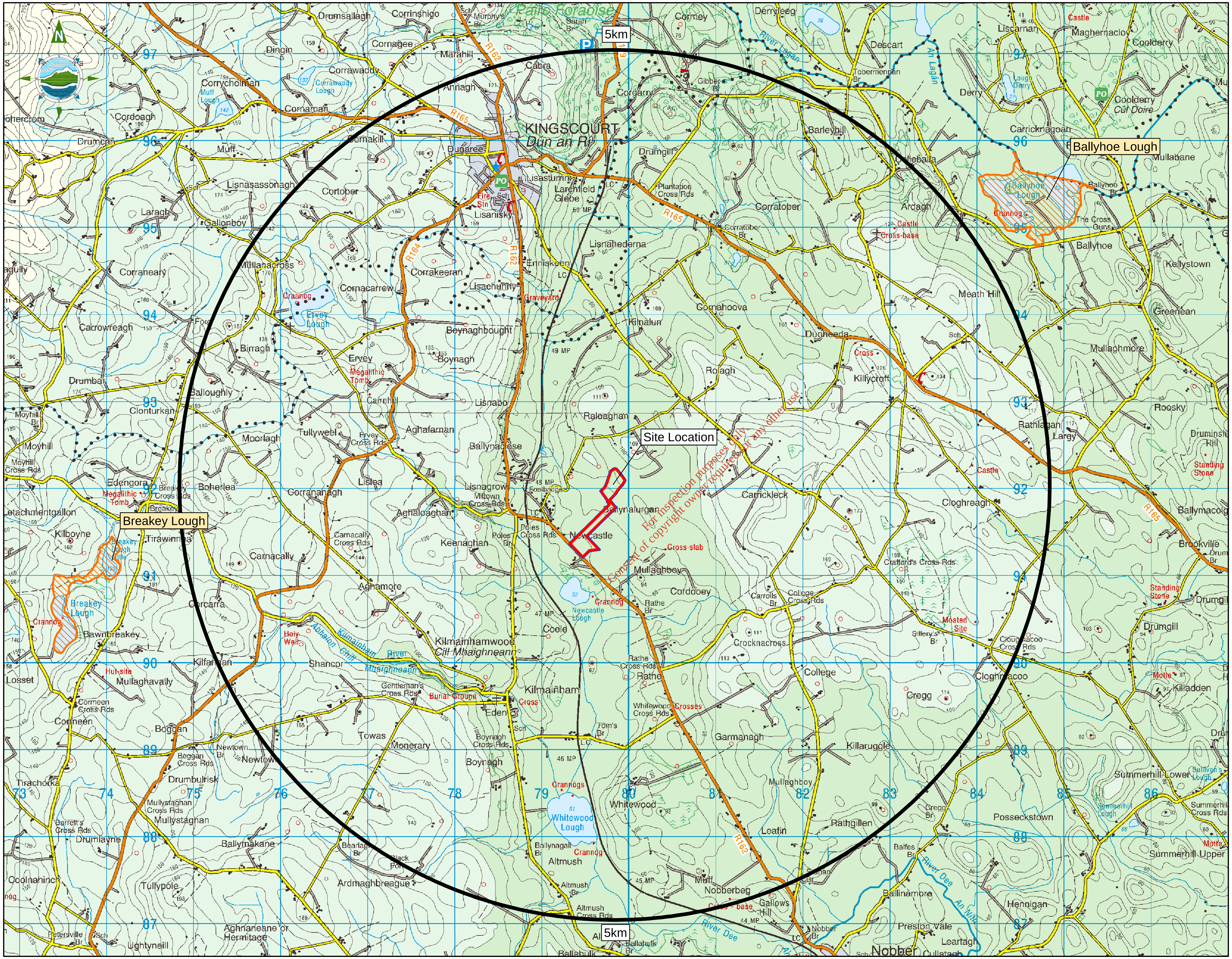
6.2.1 Consultation

Consultation letters were sent to the NPWS and the Eastern Regional Fisheries Board (ERFB). To date no response has been received from the NPWS. A response from the ERFB outlined the following issues:

- Surface water from the site drains towards the River Dee upstream of Newcastle Lough. The River Dee rises near Bailieborough, County Cavan and flows in a south easterly direction approximately 50km before entering the sea at Annagassan, County Louth.
- The River Dee holds good stocks of Brown Trout, Sea Trout and Salmon.
- The stretch of the river both upstream and downstream of Newcastle Lough contains valuable salmonid spawning and nursery areas.
- The most recent EPA Biological rating for the River Dee was carried out in 2006, which recorded a Q4 value (unpolluted).
- Salmon migrate through Newcastle Lake to reach spawning areas upstream and to the sea downstream.
- Newcastle Lake is a coarse fishery with Pike of specimen size present.
- ERFB would be anxious that all surface water from the site is managed in a sustainable manner to minimise any impacts on these valuable fisheries habitats.

6.2.2 Nature Designated Areas

The National Parks and Wildlife Services database of designated nature conservation areas was reviewed. The database was searched for designated sites within 5 km of the site. No designated sites are present within 5km of the site (Refer to Figure 6.1). The nearest site designated for conservation is Ballyhoe Lough proposed Natural Heritage Area (pNHA) which is located 5.3km to the northeast.



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LEGEND

- Site Activity Boundary
- Application Boundary
- Natural Heritage Areas
- Proposed Natural Heritage Areas
- Special Areas of Conservation
- Special Protection Areas

0 0.2 0.4 0.8 1.2 1.6
Kilometers

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

B	XX.04.10	ISSUED FOR WLA	A.G.	E.D.
D03	24.07.09	Boundary modified	A.G.	E.D.
D02	24.06.09	Boundary modified	A.G.	E.D.
D01	25.03.09	Draft	A.G.	A.A.
Issue	Date	Description	By	Chkd.

Client: Thorntons recycling

Project: KILMAINHAMWOOD FACILITY EXPANSION

Title: DESIGNATED CONSERVATION AREAS

Scale @ A3: 1:40,000

Prepared by: A.Gruschka | Checked: A.Austin | Date: March 2009

Project Director: D. Grehan

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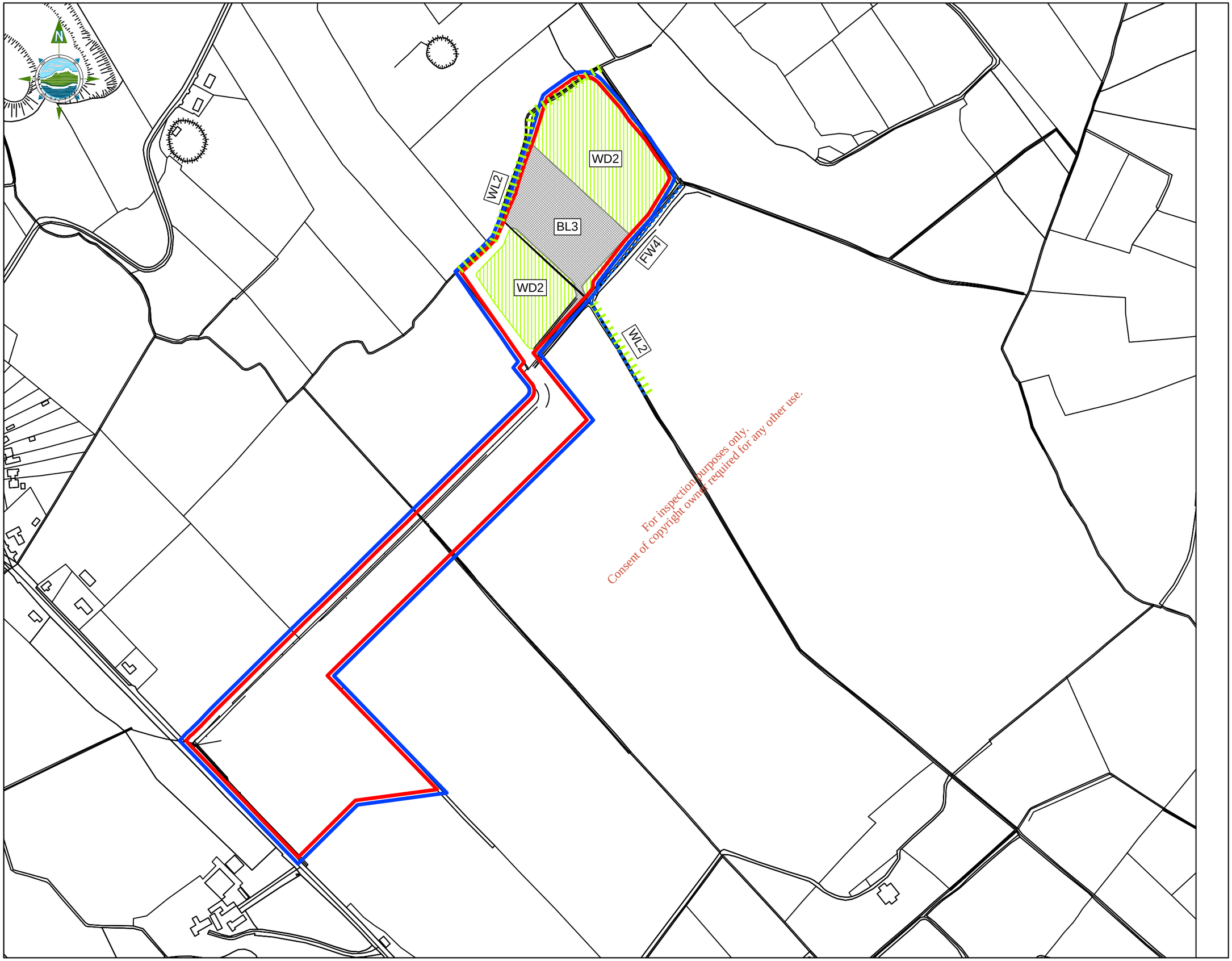
Drawing No.: Figure 6.1 | Issue: B



LEGEND

- Site Activity Boundary
- Application Boundary
- FW4 Drainage ditches
- WL2 Treelines
- BL3 Building and artifical surfaces
- WD2 Mixed broadleaved/ conifer woodland

0 15 30 60 90 120
Meters

NOTES

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4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
B	XX.04.10	ISSUED FOR WLA	A.G.	E.D.
D03	24.07.09	Modified Boundary	A.G.	E.D.
D02	29.06.09	Modified Boundary	A.G.	E.D.
D01	24.06.09	Draft	A.G.	E.D.

Client: Thorntons recycling

Project:
KILMAINHAMWOOD FACILITY EXPANSION

Title:
HABITAT MAP

Scale @ A3: 1:4,500

Prepared by:	Checked:	Date:
A.Gruschka	E.Delaney	June 2009

Project Director: D. Grehan

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Drawing No.: Figure 6.2

Issue: B

6.3 HABITAT ASSESSMENT

A composting facility is currently operational at this location. It is proposed to extend this facility immediately adjacent to the existing building. The existing facility building covers an area of 0.455ha while the proposed extension area covers an area of 0.196ha. The expansion area is predominantly made ground comprising of buildings and artificial surfaces habitat (concrete). It also extends into a small area of plantation woodland.

Figure 6.2 presents the habitats recorded.

Buildings and artificial surfaces (BL3)

Buildings and artificial surfaces is the dominant habitat classification on site and comprises the current yard area which surrounds the existing facility. Vegetation cover in this area is minimal, containing some Yorkshire fog (*Holcus lanatus*), spear thistle (*Cirsium vulgare*), creeping buttercup (*Ranunculus repens)*, creeping thistle (*Cirsium arvense*), ragwort (*Senecio jacobaea*), bramble *(Rubus sp.)*, dandelion *(Taraxacum agg.)* and common nettle (*Urtica dioica*).

This habitat type is disturbed with little or no associated vegetation, and is of low ecological value. This habitat will be the focus of the development.

Mixed broadleaved / conifer woodland (WD2)

Mixed broadleaved / conifer woodland is present to the immediate north, east and south of the existing facility area. This is young plantation woodland and comprises predominantly of ash *(Fraxinus excelsior)* and sitka spruce (*Picea sitchensis)* with some larch also occurring. Canopy height is approximately 12 -15m. The density of trees means the ground is heavily shaded with limited flora occurring. Creeping buttercup, bramble, ivy *(Hedera helix)*, dandelion, fescue sp. *(festuca sp)* and butterfly bush *(buddleja davidii)* occur along the woodland edge.

This habitat type is of low –moderate ecological value as it is a young plantation which is artificial in nature with low species diversity but has some local value for a range of common wildlife. Approximately 0.3 hectares (ha) of this habitat will be required for this development. However, the majority of this habitat will be retained as part of the development.

6.3.1 Adjacent Habitats to Composting Facility

Drainage ditches (FW4)

A drainage ditch runs along the eastern landownership boundary and flows in a south-easterly direction. This is located outside the proposed facility activity area. The drainage ditch comprises a channel approximately 2-4m wide and is slow moving. Water depth varies but is approximately 30cm with silt substrate with some gravel and larger stones in places. The banks of the drainage ditches are steep and vegetated. An ash and hawthorn *(Crataegus monogyna)* treeline is present on the outer bank to the east. The stream is generally not shaded but no aquatic vegetation is present. Marginal

vegetation is dominated by fools watercress *(Apium nodiflorum)*, starwort sp. *(Callitriche sp.)* and soft rush *(Juncus effusus)*. The water quality of this drainage ditch is monitored by the EPA. This habitat will be retained as part of the development.

Treelines (WL2)

Several treelines are present within the landownership area and form site boundaries. The treelines are chiefly made up of ash and hawthorn. They are generally >4m in height and are leggy structures with frequent gaps. The understorey consists chiefly of bramble. A treeline that marks the site entrance has occasional gorse *(Ulex europaeus)* and yew *(Taxus baccata)* present within the understorey.

A treeline forms the western landownership boundary immediately adjacent the proposed site activity area in the west. Dominant species within the treeline are ash and hawthorn with some gorse and bramble occurring in the understorey layer. This habitat will be retained as part of the development.

6.4 FAUNAL ASSESSMENT

Mammals

No mammal signs or trails were recorded within the proposed facility activity area. It is possible that common mammals such as fox *(Vulpes vulpes)*, rabbit *(Oryctolagus cuniculus)*, hedgehog *(Erinaceus europaeus)* and grey squirrel *(Sciurus carolinensis)* use the woodland and adjacent habitats to forage. The woodland edge on site also provides suitable conditions for the small rodents, pygmy shrew *(Sorex minutus)* and wood mouse *(Apodemus sylvaticus)*. Both species are common and widespread throughout Ireland (Hayden & Harrington, 2000).

It is also possible that this woodland is utilised by red squirrel *(Sciurus vulgaris)* although none were recorded during the site visit.

No protected mammal breeding sites namely otter (*Lutra lutra*) and badger (*Meles meles*) exist on the site.

The woodland onsite and adjacent treeline provide probable feeding areas for bats. No roost sites are likely within the works footprint. Treelines on the site boundary may possibly be utilised as temporary roosts.

Birds

No specific bird survey was undertaken however, birds identified during the site visit were recorded. Birds identified using the site and immediate surrounding area includes coal tit *(Periparus ater)*, robin *(Erithacus rubecula)*, wren *(Troglodytes troglodytes)*, blackbird *(Turdus merula)* and chaffinch *(Fringilla coelebs)*. It is likely that birds do nest within the plantation woodland area and existing treelines.

All birds and their nesting places are protected under the Irish Wildlife Act (1976) and under the Irish Wildlife Amendment Act, (2000) (except for excluded species). It is an offence to kill, trap or harm these

birds. It is also an offence to wilfully disturb these birds on or near a nest containing eggs or unfledged young.

6.4.1 Rare or Protected Flora

The development site is located in the Ordnance Survey National Grid 10 km square N79. A plant species list for this 10 km square was generated from the CD-Rom version of the *New Atlas of British and Irish Flora* (Preston *et al*., 2002). This list was then compared to the list of species protected under the Flora (Protection) Order, 1999 and that are included in the Irish Red Data Book (Curtis and McGough, 1988). Table 6.1 presents the protected or rare species with records occurring in this grid square.

Table 6.1 Rare or Protected Plant Species recorded in 10 km Square N79 as extracted from Preston et al. (2002)

Species	Status	Category
Water-violet	(NI)	Vulnerable
Small Cudweed	Protected	Data Deficient Species
Bog-rosemary	(NI)	Species not Considered Threatened in the Republic of Ireland but protected in NI

No rare or protected species were recorded during the site visit and none are likely to exist on the site. The habitats present on site are not suitable for the species listed in Table 6.1 above.

6.4.2 Overall Evaluation

The development site does not lie within or adjacent to any area that has been designated for nature conservation under Irish or European legislation. The nearest designated site is Ballyhoe Lough pNHA located 5.3km to the northeast.

Two habitats are present within the proposed facility activity area. Buildings and artificial surfaces habitat is of low ecological value as it is disturbed with little or no associated vegetation. Mixed broadleaved / conifer woodland which is of low- moderate ecological value as it a young plantation with low species diversity but locally important for wildlife.

No rare or protected species of plant or animal were recorded on site. The woodland on site provides potential forage habitat for bats. However conditions within the facility activity area are unsuitable for bat roosts. Boundary treelines may provide temporary roost sites and will be retained. All bats and their roosts are protected under the Irish Wildlife Acts.

6.5 POTENTIAL IMPACTS

6.5.1 Nature Designated Sites

The proposed development site does not lie within or adjacent to any area designated for nature conservation. There will be no direct or indirect impacts on any site designated for nature conservation.

6.5.2 Habitats

The assessment of impacts follows NRA guidance (NRA 2006).

A small section of the mixed broadleaved / conifer woodland (WD2) habitat (approximately 0.3 ha) will be permanently removed for the extensions at the immediate northeast and southwest of the existing facility leading to a minor negative impact. An office administration building is also to be located within this habitat to the south leading to a minor negative impact.

There will be no direct impact to adjacent habitats outside the proposed facility activity area. Indirect impacts may occur on the adjoining habitats particularly the remaining woodland and a treeline to the west of the site, through temporary deposition of spoil material or damage to root systems.

There is ongoing potential from indirect pollution / runoff impacts to occur in the drainage ditch habitat located just outside the eastern site boundary. This drainage ditch drains towards the River Dee upstream of Newcastle Lough. It is a condition of the current waste licence that surface water within this drainage ditch is monitored on a quarterly basis. It is proposed during the construction period to ensure that all potential run-off is diverted through appropriate settlement tanks/grit traps. The layout of the site has been designed for collection of surface water from roadways, paths and roofs within the development. Stormwater from hardstanding areas is treated through a silt trap and interceptor (Class 1) before being discharged to the water features around the site. Surface water attenuation infrastructure, in the form of storage in a low lying forested area as shown on Drawing No. 5361-2402, is also proposed to support the extension of the Kilmainhamwood Compost facility. Providing these measures are efficiently undertaken no indirect impacts on the drainage ditch habitat are predicted from current or future site activities.

6.5.3 Fauna

Removal of a small area of the mixed broadleaved/ conifer woodland (WD2) habitat will lead to a loss of foraging and potentially nesting habitat for birds. However adjacent woodland and treelines will continue to provide good habitat for birds and local populations will be unaffected by the proposed development. The direct impact on nesting birds is expected to be minor providing mitigation measures are implemented.

No protected species of mammals were recorded on site. The main impact on the mammalian fauna is likely to be a minor loss of forage habitat for bats, however, the nearby woodland and treelines will continue to provide good habitat for these animals and local populations will be unaffected by the proposed development.

6.5.4 Rare or Protected Flora

There are no rare or protected species of flora present on site and therefore, this development will not impact on any rare or protected flora.

6.6 MITIGATION MEASURES

If construction works are to take place within the bird nesting season (1st March - 31st August), the area of mixed broadleaved/conifer woodland (WD2) habitat to be removed should be surveyed for nesting birds prior to works by an experienced bird surveyor. If nesting birds are present then a licence must be obtained from the National Parks and Wildlife Service. If works are to take place outside the bird nesting season then no such licence will be required.

No materials or machinery should be stored within 5m of remaining mixed broadleaved/conifer woodland (WD2) and adjacent treeline and drainage ditch habitat close to the proposed facility activity area. Materials, especially soil and stones, can prevent air and water circulating to the roots of trees/shrubs. Damage to root systems can kill trees and no roots arising from the adjacent woodland to be retained should be damaged during site clearance and groundworks.

To minimise impacts on foraging bats; it is recommended that outdoor lighting be cowled to ensure that light does not spill out onto adjoining habitats and focuses on the works area only. Cowled lights will ensure that lighting is directed onto the proposed development site only. The height of poles should also be restricted to reduce the possibility of light pollution onto adjoining habitats.

Biological monitoring of water quality should continue as currently exists under current EPA licensing. This will allow appropriate actions to maintain existing water quality.

7 SOILS/GEOLOGY

7.1 INTRODUCTION

TOBIN Consulting Engineers were appointed by Thorntons Recycling to prepare an Environmental Impact Statement (EIS) to address the proposed extension to the existing composting facility based at Kilmainhamwood, Co. Meath.

This section addresses the soil and geology aspects of the environment and assesses the impacts of the extension on the existing soil, subsoil and bedrock environments.

7.2 STUDY METHODOLOGY

The assessment of soils and geology consisted of:

- A desk study of soils, subsoils and bedrock.
- Review of data from previous site investigation (McGill Environmental Ltd. and O'Neill Groundwater - 2003)
- Site visits by TOBIN Consulting Engineers
- Interpretation of all data and reporting.

Guidelines used in the preparation of the report included the Environmental Protection Agency (EPA) document 'Guidelines on Information to be contained in Environmental Impact Statements' (2002) and the Institute of Geologist of Ireland (IGI) publication 'Geology in Environmental Impact Statements – A Guide'.

Information held by the Geological Survey of Ireland (GSI) and Environmental Protection Agency (EPA) was accessed to provide the geological setting of the site. Datasets used to provide the setting of the site included GSI bedrock data sets and the EPA/Teagasc soil mapping information.

Further to the description of the existing environment, the site and activities were assessed in conjunction with the plans for the proposed extension to determine the scale of impacts on the existing soil, subsoil and bedrock environments.

Measures are proposed to mitigate potential impacts to ensure that the activities occurring within the site do not adversely impact upon the geological environment outside of the site boundary.

7.3 EXISTING ENVIRONMENT

Information presented in the original EIS baseline studies (as completed by McGill Environmental Systems (Ireland) Ltd.) for this facility states that previously the site consisted of commercial forestry and grassland.

The 2004 planning application was granted and a composting facility is currently operational at this location. This proposal is for an extension to the existing facility. The extension is divided into two areas -one extension area to the rear of the existing building and one extension area to the front of the existing building. The front extension will be constructed on an existing concrete hardstand area. An approximate area of 178m^2 of existing woodland will be cleared to facilitate access and construction of this extension.

An area of approximately 2,462 m^2 of existing woodland will be cleared for the construction of the rear extension to the facility building. This extension will be partially constructed on existing concrete hardstand. The proposed office administration building will also require removal of vegetation of approximately 576m^2.

As described in the original EIS, the underlying geology comprises the following:

7.3.1 Soil/Subsoil

The subsoils underlying the southern part of the site at Ballynalurgan, consist of gravels that have been derived from Lower Palaeozoic rocks. The gravels are glaciofluvial in origin, which means they were deposited by running water. They represent the retreat of the ice-sheets. They are usually stratified and composed of rounded, loosely packed pebbles. Deposits of till derived from lower Palaeozoic rocks lie within the proposed activity area where the extension will be located.

River alluvium has been deposited to the south of the site -near the entrance.

7.3.2 Bedrock Geology

Reference to the relevant geological information for this area, the 1:100,000 scale Sheet 13 – Bedrock Geological Map of Meath (*GSI* 1999) indicate that this is quite a varied area of bedrock geology and one of the few areas of Permo-Triassic rocks within Ireland.

A sequence of red sandstones and evaporate deposits of gypsum and anhydrite unconformably overlie a sequence of older Carboniferous rocks bounded to the west by the Kingscourt Fault. The strata dip gently (10°-30°) westwards towards the fault (except immediately adjacent to it) which produces a half-graben structure. This fault has a maximum downthrow to the east of approximately 2100m. The permo-Triassic rocks occur in a series of open northeast trending folds. North-south trending faults transect these folds in several places.

The Kingscourt Sandstone Formation (KS) consists of a lower siltstone unit which grades upwards to a thickly bedded, cross laminated red sandstone. This formation conformably overlies the Kingscourt Gypsum Formation (KG). This formation is composed of a basal impersistent conglomerate, followed by a mud dominated sequence of two major gypsum and anhydrite levels. The lower mudstone unit

comprises grey, laminated siltstones. This is succeeded by a red micaceous mudstone, including gypsum lenses, and coarse sandstone horizons towards the top.

7.3.3 Site Investigations

Three monitoring boreholes were drilled within the site in March 2003 by Southern Pumps Ltd. The type of subsoil and bedrock described in the driller's logs (included in Appendix 7.1) supports the above description of geology in the area. Clay with gravel layers was reported to overlie Chalk. Based on the appearance of Chalk, it is assumed that the bedrock encountered was Gypsum, which would be typical of the geology in this region of Ireland.

Trial pits were excavated at the site in October 2005. The associated trial pit logs are provided in Appendix 7.2.

7.3.4 Karst Features

According to the GSI, there are no karst features within 5km of the proposed facility activity area.

7.4 SIGNIFICANT IMPACTS

As the proposed changes to the facility do not involve any significant changes to the physical environment at the Thorntons Recycling composting site, there will be minimal impact on the geology of the underlying site.

The extension and proposed administration building area are currently comprised of made-ground, with the exception of an area of approximately 0.3ha of planted woodland and landscaping surrounding the perimeter.

Potential risks posed to the natural geological environment at the site include the storage of chemicals and fuels and the maintenance of vehicles, mobile and fixed plant equipment.

If unmanaged, leachate from the incoming waste and the composting activities could infiltrate to ground and contaminate the underlying bedrock aquifer.

The increase in waste to be stored and composted at the facility will not impact on the surrounding environment as this material will be processed as per current operational procedures in the existing and proposed extension buildings.

7.5 MITIGATION MEASURES

The facility is covered in made ground, with the exception of an area of landscaping along the perimeter of the site. Soil removed to facilitate construction will be retained within the site and used for landscaping purposes.

All potentially polluting run-off from the composting process will be contained within the composting facility. A diesel tank is located on site. This tank is a double skin bowser with a capacity for 2,500 litres. To minimise any impact on the underlying subsurface strata and the groundwater from material spillages all waste oils, used spill kits, etc. used during operations will continue to be stored on a bunded pallet.

All fuel loading will be carried within a bunded designated area within the facility building. Spill kits and pumping will be employed to deal with any spillages occurring within this bunded area.

Spill kits will be retained on site to ensure that all spillages or leakages are dealt with immediately & staff trained in their proper use. Any servicing of vehicles on site will be confined to designated and suitably protected areas. The sites management system for quality, health and safety and environmental is certified to international ISO standards. Suitable mitigation measures are detailed with the management systems.

7.6 CONCLUSION

As the site is currently covered in made ground, with the exception of an area of landscaping along the perimeter of the site, no impacts on the existing geological environment are predicted.

With the correct environmental management at the site, there should be no adverse risk to the geological environment.

8 WATER

8.1 INTRODUCTION

TOBIN Consulting Engineers were appointed by Thorntons Recycling to prepare an Environmental Impact Statement (EIS) to address the proposed extension to the composting facility based at Kilmainhamwood, Kells, Co. Meath.

TOBIN Consulting Engineers have prepared this section of the EIS, which assesses the impact of the proposed development on the water environment during the construction and operational phases of the proposed composting facility expansion and addresses and mitigates any possible sources of pollution from each phase.

8.2 STUDY METHODOLOGY

This report has been prepared using the recommendations set out in the Environmental Protection Agency (EPA) document 'Guidelines on Information to be contained in Environmental Impact Statements' (2002).

This section describes the hydrological and hydrogeological setting of the site and refers to the information available from a number of published sources.

The information contained in this section has been divided into sub-sections, so as to describe the various aspects pertaining to water environment. In the preparation of this section the following protocols were used in order to assess the hydrological and hydrogeological context and character of the site: -

- The site was assessed using published information and regional hydrological data;
- All available information was collected from the Environmental Protection Agency with respect to historical water quality in this region;
- All available information from the Geological Survey of Ireland was assessed and collated;
- On Site Monitoring boreholes;
- Site specific information with respect to the existing services; and,
- This Water Report (Surface Water and Groundwater) was prepared following the interrogation and collation of all available information.

The characterisation of the site is considered detailed and sufficient to adequately characterise the hydrological and hydrogeological setting of the site.

All projects and developments that require an EIS are of a scale or nature that they have the potential to have an impact on the environment. It is therefore crucial that the significance of the potential impact is determined. In this section the potential impact on the surface water and groundwater environments

resulting from the construction of the proposed extension at the existing composting facility is assessed and appropriate mitigation measures are submitted.

8.3 SURFACE WATER

The area proposed for the extension to the existing compost facility is located in the townland of Ballynalurgan, approximately 4km south of Kingscourt, Co. Cavan and 6km northwest of Nobber, Co. Meath. The R162 road runs to the south and southwest and access to the facility is provided by means of an entrance onto the R162.

The total existing facility area is approximately 1.3 hectares with an overall landholding of 13.2 hectares. The topographic elevation of the site ranges from approximately 60m AOD to approximately 88m AOD. The overall slope of the site is to the south and east.

The site is located in the upper catchment of the Dee river catchments [Hydrometric Area 06], within the Neagh-Bann River Basin District (NBRBD). The Dee River is the main watercourse in the vicinity of the site. The River Dee is located approximately 1km south of the Kilmainhamwood Compost facility. A surface water drainage ditch is located along the eastern boundary to the site and flows in a southeastern direction (See Figure 8.1).

8.3.1 Receiving Environment

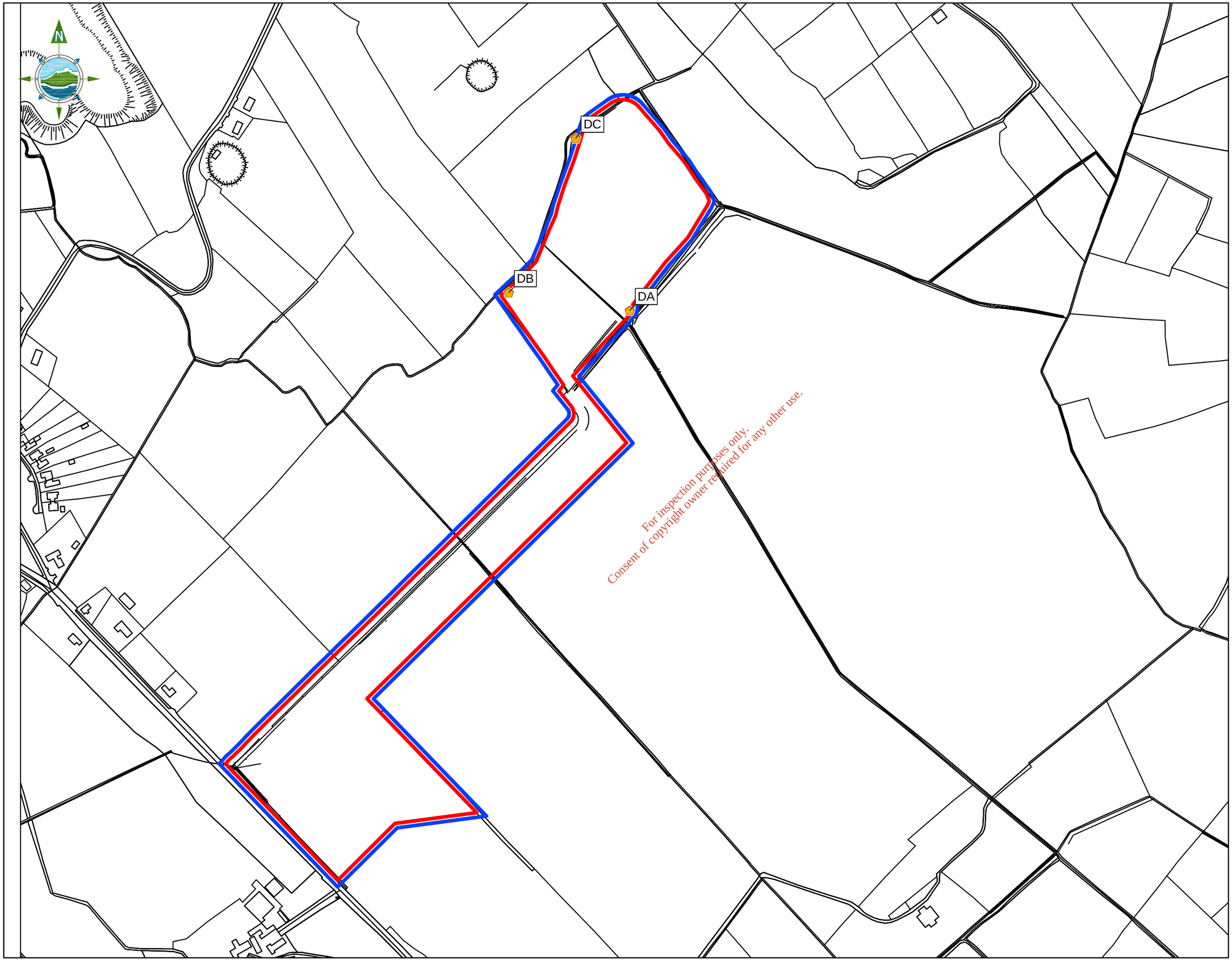
Surface Water Quality

Surface water samples have been taken at the Kilmainhamwood Facility as part of the EPA Waste License W0195-01 prior to commencement of waste acceptance in September 2006. Results are included in Appendix 8.2. Surface water samples were obtained from a stream along the eastern site boundary. SW2 sampling location is located upstream of the facility with SW1 sampling location is located downstream of the facility.

Surface water quality was similar at SW1 and SW2. Suspended solid concentrations were below the laboratory detection limit (<10mg/l) and below their respective parametric levels, in all samples.

The EPA monitors the quality of Ireland's surface waters and assesses the quality of watercourses in terms of 4 no. quality categories; 'unpolluted', 'slightly polluted', 'moderately polluted', and 'seriously polluted'. These water quality categories and the water quality monitoring programme are described in the EPA publication 'Water Quality in Ireland, 1998-2000'.

The water quality assessments are largely based on biological surveys. Biological Quality Ratings or Biotic Indices (Q values) ranging from Q1 to Q5 are defined as part of the biological river quality classification system. The relationship of these indices to the water quality classes defined above, are set out in Table 8.1.



LEGEND

- Site Activity Boundary
- Application Boundary
- Dust Monitoring Location

0 15 30 60 90 120
Meters

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
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Issue	Date	Description	By	Chkd.
B	XX.04.10	ISSUED FOR WLA	A.G.	E.D.
A	19-01-10	Issued	A.G.	E.D.

Client: Thorntons recycling

Project:
KILMAINHAMWOOD
FACILITY EXPANSION

Title:
DUST MONITORING
LOCATIONS

Scale @ A3: 1:4,500

Prepared by:	Checked:	Date:
A.Gruschka	E.Delaney	January 2010

Project Director: D. Grehan

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Drawing No.: Figure 9.1

Issue: B

Table 8.1 Relationship between Biotic Indices and Water Quality Classes

Biotic Index	Quality Status	Quality Class
Q5, 4-5, 4	Unpolluted	Class A
Q3-4	Slightly Polluted	Class B
Q3, 2-3	Moderately Polluted	Class C
Q2, 1-2, 1	Seriously Polluted	Class D

The relevant water quality monitoring station is located on the Dee River at 'Evrys Cross Roads' and 'Toms Bridge'. Biological Quality ratings and other details are given in the Table 8.2.

The Ervy Lough Monitoring location (0025) maintained its satisfactory (Q4) status. However, although a slight improvement was apparent in the upper reaches of this latter branch (0016) deterioration was recorded at Tom's Bridge (0035) in the lower reaches just upstream of Whitewood Lake. As indicated primarily by the luxuriant weed and algal growths observed and by the wide DO fluctuations recorded (e.g., 59% at 0035, 59% at 0200, 125% at 0450). Unrestricted cattle access caused localized bed and bank damage at several locations including (0035, 0200) where extensive bank erosion also occurred.

Table 8.2 EPA summary data for Dee River, copyright EPA

Site Location	Location Code HA06	1997	2000	2003
Evrys Cross Roads	0025	4	4	4
Toms Bridge	0035	3	3-4	3
Deegvee Br	0200	3	3-4	3-4

The EPA Water Quality Database indicates that the biotic water quality in the Dee River near the subject site at Toms Bridge has not improved between 1997 and 2003 -'moderately polluted'.

Under the Water Framework Directive, the Dee River is classed as '1a', i.e., at risk of failing to meet 'good status' by 2015 (See Appendix 8.1). The principle pressures on the River Dee are arable sources, diffuse pollution and channelisation/modification of the River Dee.

Hydrometric Data

Relatively recent flooding is reported and documented for the Kilmainham River at Kilmainhamwood on a tributary to the River Dee. This is due to development on the natural flood plains of the River Dee (www.floodmaps.ie;). No flooding was noted on the Dee River between Newcastle Lough and Whitewood Lough. The subject site is located approximately 3 km to the north of the site and is not located within the flood plain.

Surface Water Monitoring To Date

All suspended solids and hydrocarbon concentrations recorded to date, as per the surface water monitoring regime stipulated in the existing facility waste licence, comply with the relevant Regulations.

Surface water monitoring locations are shown on Figure 8.1. The downgradient surface water monitoring point is at the facility outfall to the drainage ditch. The upgradient surface water monitoring point is approximately 50m upstream of the facility outfall.

Results from existing surface water monitoring points, SW1 (upgradient) and SW2 (downgradient), are detailed below in Table 8.3 for suspended solids.

Table 8.3 Results from SW1 and SW2 for Suspended Solids

Date / Monitoring locations	12/2008	03/2009	03/2009	06/2009	09/2009	11/2009
SW 1	<10	<10	<10	3.5	2.5	6
SW2	<10	<10	<10	4	2.5	10

Note: All results in mg/l

Results from existing surface water monitoring points, SW1 (upgradient) and SW2 (downgradient), are detailed below in Table 8.4 for mineral oil.

Table 8.4 Results from SW1 and SW2 for Mineral Oil

Date / Monitoring locations	12/2008	03/2009	03/2009	06/2009	09/2009	11/2009
SW 1	<10	<10	<10	<10	<10	<10
SW2	<10	<10	<10	<10	<10	<10

Note: All results in ug/l

8.4 GROUNDWATER

Regional Details were identified from the following resources:

- The EPA (http://maps.epa.ie/internetmapviewer/mapviewer.aspx)
- The Geological Survey of Ireland (http://www.gsi.ie).

The main points are as follows:

1. The site is located in the Tallow Groundwater Body in the Neagh-Bann River Basin District (ERBD).
2. The aquifer is categorised as a Poor Aquifer – Bedrock that is generally unproductive except in local zones (***Pl***).
3. The Groundwater Vulnerability is categorised as '**Moderate'**.
4. There are no source protection zones delineated by the GSI in the vicinity of the subject site.

5. The draft groundwater WFD status is considered as 'At risk of not achieving good status'. This is possibly due to the naturally high sulphate concentration with the gypsum bedrock and the dewatering of the bedrock at the Gypsum mining facility.

Refer to Figure 8.2 and Figure 8.3 which illustrate bedrock and vulnerability of aquifer.

Aquifer Classification and Flow Type

The aquifer is categorised as a Poor Aquifer – Bedrock which is generally unproductive except in local zones (***Pl***) (DoEHLG/EPA/GSI, 1999).

Groundwater Vulnerability

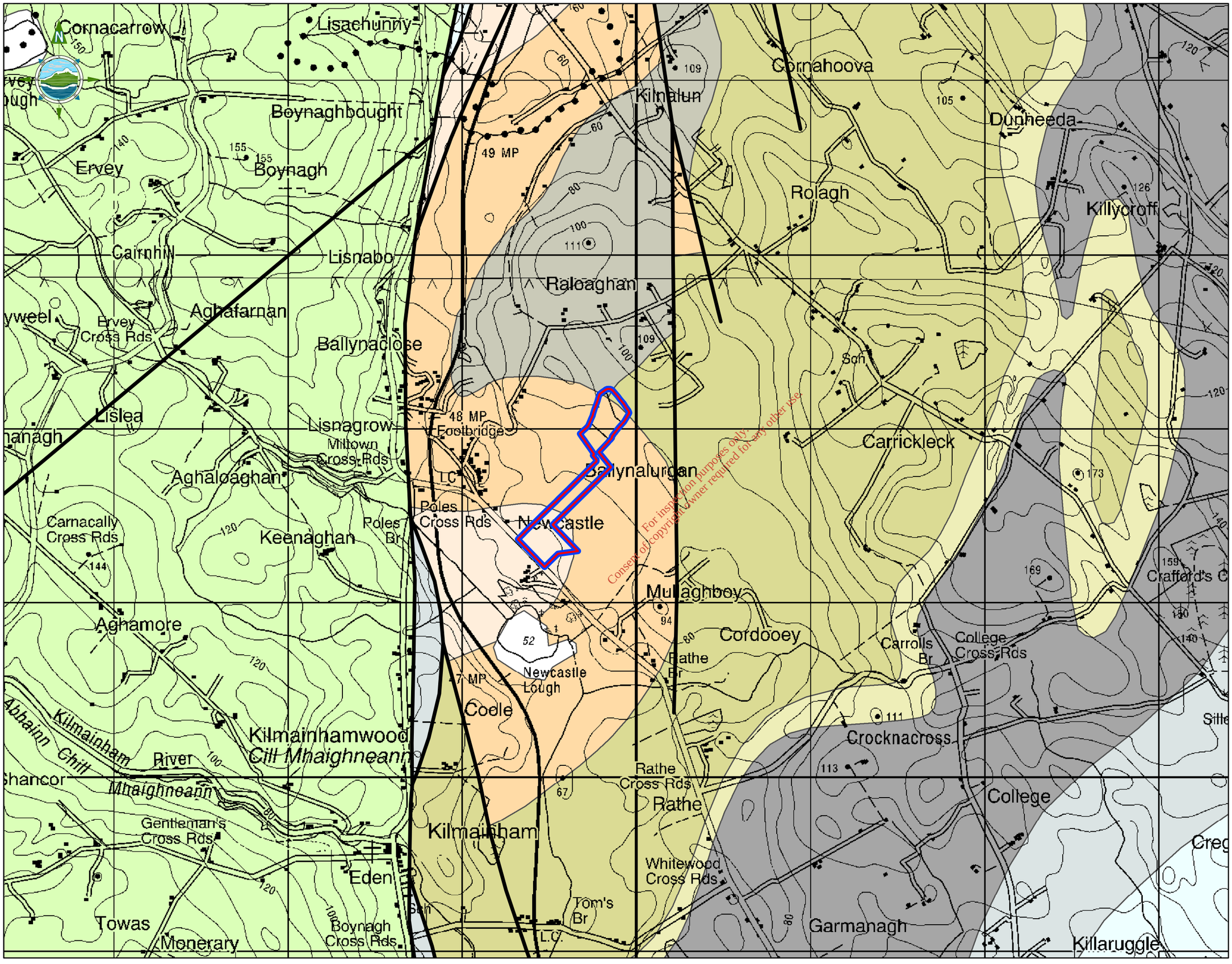
Groundwater Vulnerability guidelines are given in Table 8.5. Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. The vulnerability category is based on the relative ease with which infiltrating water and potential contaminants may reach groundwater in a vertical or sub-vertical direction. The permeability and thickness of the subsoil, which influence the attenuation capacity of a subsoil, are important aspects in determining the vulnerability of groundwater.

Table 8.5 Groundwater Vulnerability Guidelines (DoEHLG, EPA, GSI (1999))

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand/gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/gravel aquifers only)	(<30 m radius)
Extreme (E)	0 - 3.0m	0 - 3.0m	0 - 3.0m	0 - 3.0m	-
High (H)	>3.0m	3.0 - 10.0m	3.0 - 5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0 - 10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A

Notes: (1) N/A = not applicable.
(2) Precise permeability values cannot be given at present.
(3) Release point of contaminants is assumed to be 1-2 m below ground surface.

According to the available sources, the groundwater vulnerability is categorised as '**Moderate**'.



LEGEND

- Site Activity Boundary
- Application Boundary
- Faults
- Dinantian Pure Bedded Limestones
- Dinantian Upper Impure Limestones
- Namurian Sandstones
- Namurian Shales
- Namurian Undifferentiated
- Permo-Triassic Sandstones
- Permo-Triassic Mudstones and Gypsum
- Silurian Metasediments and Volcanics
- Westphalian Shales

0 65 130 260 390 520
Meters

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
B	XX.04.10	ISSUED FOR WLA	A.G.	E.D.
A	19.01.10	Issued	A.G.	E.D.

Client: Thorntons recycling

Project: KILMAINHAMWOOD FACILITY EXPANSION

Title: BEDROCK MAP

Scale @ A3: 1:20,000

Prepared by:	Checked:	Date:
A.Gruschka	E.Delaney	January 2010

Project Director: D. Grehan

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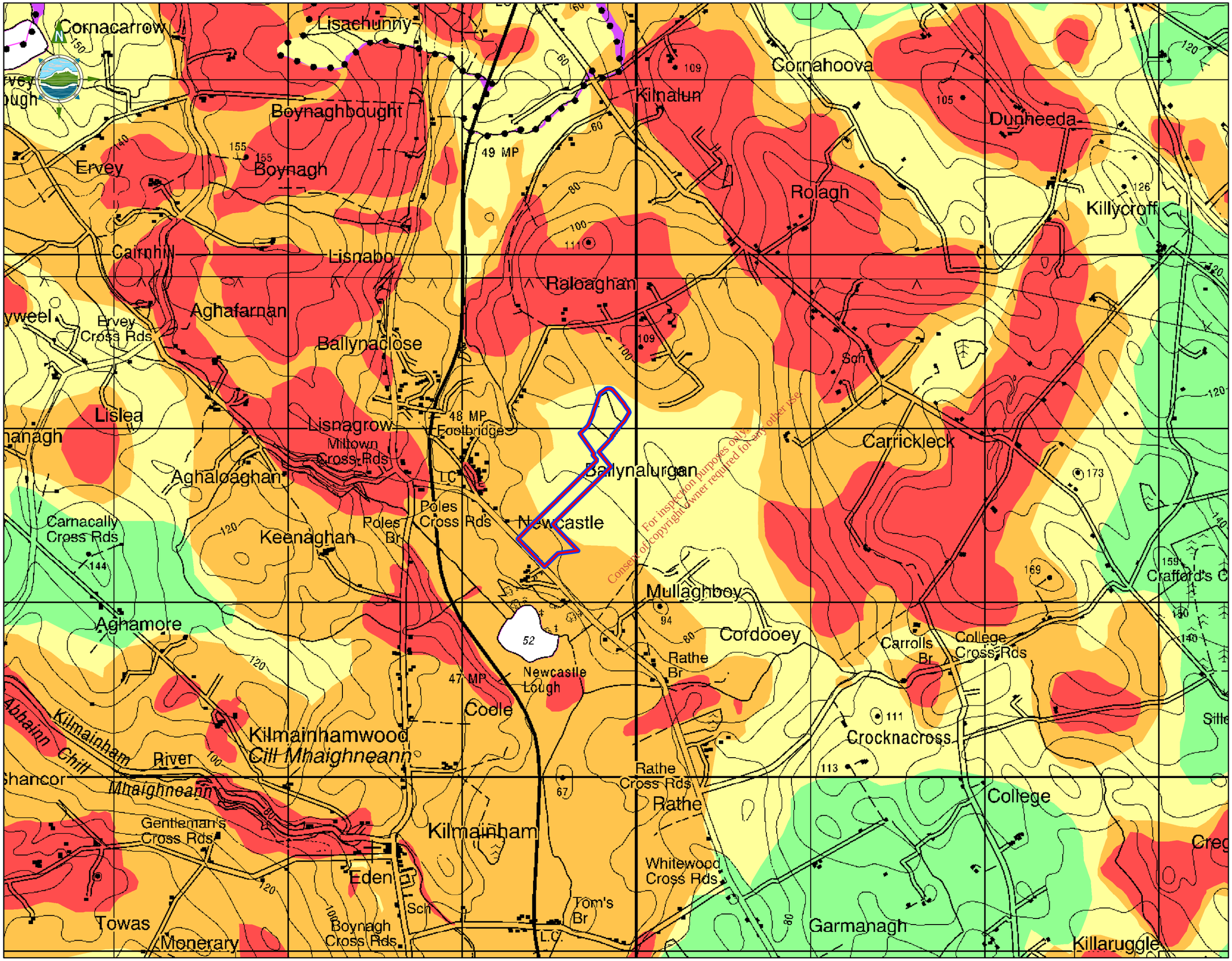
Drawing No.: Figure 8.2 | Issue: B



LEGEND

- Site Activity Boundary
- Application Boundary
- X (extreme - outcrop or rock close)
- E (extreme)
- H (high)
- M (moderate)
- L (low)
- HL (unmapped)
- Water

0 75 150 300 450 600
Meters

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
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Issue	Date	Description	By	Chkd.
B	XX.04.10	ISSUED FOR WLA	A.G.	E.D.
A	19.01.10	Issued	A.G.	E.D.

Client: Thorntons recycling

Project: KILMAINHAMWOOD FACILITY EXPANSION

Title: VULNERABILITY MAP

Scale @ A3: 1:20,000

Prepared by:	Checked:	Date:
A.Gruschka	E.Delaney	January 2010

Project Director: D. Grehan

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Drawing No.: Figure 8.3 | Issue: B

Assessment of site specific borehole information indicates that the depth to bedrock is between 10.7m and 16.5m. Some gravels horizons were encountered within the overburden.

Therefore, the groundwater vulnerability is ***'moderate'***.

Resource Protection Zones

From the Groundwater Protection Schemes (DoEHLG, EPA and GSI, 1999), a combination of aquifer classification and vulnerability rating give rise to the resource protection zones (RPZ). The purpose of these zones is to place a control on the activities practised within a zone and thus provide protection to any underlying groundwater resources. Therefore the RPZ for the subject site is Pl/M (Poor aquifer with moderate vulnerability). There is no source protection zone delineated in the vicinity of the site.

Groundwater Quality

The groundwater quality was determined from three boreholes on site predevelopment of the facility and post development (see Figure 8.1).

The monitoring of groundwater at three monitoring points (BH1, BH2 & BH3) at the facility is a requirement of the existing facility waste licence (W0195-01). Monitoring Locations are shown on Figure 8.1. Any elevations in parameters analysed are reported to the EPA in the form of detailed reports.

Groundwater Monitoring To Date

Groundwater monitoring results included in Annual Environmental Reports (AERs), prepared since the facility commenced operation in September 2006, were examined. Annual Environmental Reports (2007, 2008 and 2009) are provided in Appendix 2.4. The main change in groundwater quality appears to be a decline in sulphate concentrations in BH1 over the last 3 years. Sulphate concentrations within BH1 appear to have declined consistently from 800 mg/l in to 202 mg/l. This is possibly due to the higher than average rainfall during the intervening 3 years. While this trend appear to be consistently downwards, it is likely that following an extended dry period and/or a dryer than average year, sulphate concentrations will increase. The groundwater concentration in BH1-BH3 reflects the natural groundwater quality within the Kingscourt Gypsum Groundwater Body (Calcium Sulphate chemical signature).

Groundwater within the Kingscourt Gypsum Groundwater Body reflects the presence of Gypsum (calcium sulphate) type rock as would be expected within the groundwater. While these minerals are rarely found in Irish geological strata, they are present at Kingscourt. This can be seen in the mining of Gypsum at Kingscourt. This is clearly reflected within the similar discharge quality from the Kingscourt Gypsum Mine.

Carbon dioxide in the atmosphere is dissolved by rainfall to form a weak solution of carbonic acid (rainfall pH reaches approximately pH 5.6). In soils and subsoils containing carbonate minerals this percolating acidic water rapidly reaches equilibrium (~ph 7) with the carbonates and dissolves the minerals. This releases calcium and magnesium into solution along with any impurities in the minerals

(e.g. magnesium). Evaporite minerals (e.g. halite, gypsum and anhydrite) dissolve readily into solution irrespective of the pH. Halite dissolution contributes sodium and chloride to the groundwater; gypsum and anhydrite contribute calcium and sulphate. This can also be clearly seen in the Sodium and Chloride concentrations. Although they are within their respective limit values, concentrations are more typical of gypsum/halite bedrock than limestone bedrock.

One exceedance for Ammonical Nitrogen was recorded in January 2009. The low concentrations of nitrate and one exceedance for Ammonical nitrogen are likely to reflect reducing conditions within the groundwater. One exceedance of iron was noted in 2009. Iron is commonly above the drinking water standards in Ireland. All other metals concentrations are within the Drinking water standards S.I. 278 of 2007.

Groundwater samples were also analysed for Volatile Organic Compounds (VOC's) and Semi Volatile Organic Compounds (SVOC) as is required by the licence on an annual basis. All parameters analysed were recorded at levels below the laboratory detection limit.

Groundwater monitoring results from the Annual Groundwater Monitoring Report 2009 prepared by Irish Gypsum Industries are compared to groundwater monitoring results from existing monitoring wells at Kilmainhamwood Compost below in Table 8.6. The Irish Gypsum Industries site is located approximately 0.7km to the east of the Kilmainhamwood Compost facility.

Table 8.6 Groundwater quality within the Kingscourt Groundwater Body

Parameter	Irish Gypsum Industries (2009)	Kilmainhamwood Compost Facility (June 2006 to September 2009)
Calcium	48 -627 mg/l	64-206 mg/l
Chloride	10 -1530 mg/l	12-47 mg/l
Magnesium	-	14 -75 mg/l
Manganese	1 – 10,500 ug/l	1 – 850 ug/l
Sulphate	14 - 2090 mg/l	64-860 mg/l

Groundwater Flow Direction

The groundwater flow direction is based on an assessment of the drainage patterns, the aquifer flow type and the assumption that the water table is generally a subdued reflection of the topographic surface. Groundwater levels measured in 2009 indicated that groundwater levels were greater than 16 metres below ground level. The groundwater flow direction is expected to be in a south-westerly direction, towards the Dee River and Newcastle Lough. Groundwater at the site is unconfined by depth of overburden underlying the site.

GSI Well and Karst Data

A GSI well search was conducted within 1 km radius of the site. A number of wells were drilled within the Kingscourt Gypsum. 4 No. dug wells were identified within the townland of Ballynalurgan. 2 No. dug

wells were recorded to the north within the townland of Ballynaclose. Bedrock was not encountered within the dug wells.

No known karst feature is recorded in the GSI karst databases within a 2km radius search of the site. Gypsum (hydrated calcium sulphate) is similar to limestone in so far as it undergoes karstification. Gypsum shows little evidence of karst features in Ireland. The site and surrounding areas are overlain by substantial deposits of clay rich till material, thereby limiting the potential development of karst features.

Site Investigation data

Site-specific intrusive investigations were undertaken within the site. Records of all ground conditions were maintained during this exercise. Site investigations comprising three boreholes were undertaken by Southern Pumps Limited on behalf of McGill Environmental Ltd at the subject site in March 2003. See Appendix 7.1

Rotary drilling of boreholes (BH 1, BH2 and BH3) were completed in bedrock. The overburden encountered in BH1 – BH3 was greater than 10 metres deep, underlain by gypsum/anhydrite. Groundwater levels measured in 2009 indicated groundwater levels within the bedrock were >16 mbgl. The depth to bedrock in the surrounding areas is greater than 10m.

8.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development consists of an extension of an existing composting facility. The current application proposes to extend the existing facility buildings in order to provide sufficient processing capacity. It is proposed to construct a 38m x 25m extension on the southwest side of the existing facility and an extension 39m x 30m on the northeast side of the existing facility.

The proposed volume of discharge from the proposed surface water system to the existing drainage ditch will be restricted to 13.54 l/s (the calculated 1 year green field runoff rate). This will be achieved by the provision of surface water attenuation infrastructure on site. It should be noted that the provision of surface water attenuation for the entire facility (surface water from the existing facility is currently not attenuated) will reduce and control the discharge rate to the drainage ditch during storm events.

Water Supply

Water for the facility is provided by a combination of a pumped borehole (BH3) and a rainwater storage tank. The water usage at the site is considered low. Kilmainhamwood Compost Facility is not connected to the local water mains supply. Water usage at the composting facility is only required for the washing of trailers, equipment and floors.

Water for washing will be utilised from the rainwater storage tank, the composting process will not place any demand on the onsite borehole. No water is used in the composting process as the incoming material contains excess moisture.

An onsite water treatment plant is proposed at the point of entry to the facility administration building to treat the borehole (BH3) supply to drinking water standards. It is proposed to provide a package plant in the Tea Station.

8.6 POTENTIAL IMPACTS OF THE DEVELOPMENT

Construction Phase

The development of the site will change the setting of the site, by increasing the hardstanding area and roof area at the Kilmainhamwood Compost facility. During the construction period, a potential exists for discharge of sediment laden water from the site. This sediment laden water will be generated due to exposure of soil surfaces.

Operational Phase

The construction of the hardstanding will alter the natural hydrological setting of the site, whereby hardstanding surface run-off will be increased (from 5,918m^2 to 6,073 m^2) and natural run-off flowpaths disrupted by the construction. The generation of increased runoff, as a result of increased hardstanding area, is a direct and long-term impact of the development. Without mitigation measures the magnitude of this impact is considered low to moderate. Appropriate mitigation measures, including surface water attenuation, are proposed to ensure that discharges from the site are managed and regulated, so as to reduce the magnitude of the potential impact.

Surface water run-off from hardstand areas has the potential to absorb potential contaminants from surfaces, i.e. spillages or leakages from vehicles, machinery, etc. The run-off could also be heavily sediment laden. Discharge of such run-off to the receiving watercourse has the potential to adversely impact water quality. This is a direct potential impact of the development, however the potential magnitude is considered moderate. Appropriate mitigation measures are proposed to ensure that surface water is protected against accidental discharges to the drainage network. An existing silt trap and oil interceptor will be utilised as part of the proposed extension. Part of the proposed extension will be constructed on an existing concrete plinth, hence minimises the potential for additional run-off.

The operational facility at present does not discharge any effluent from the site. The proposed extension will not discharge any effluent from the site. Process water is reused within the facility to provide optimum moisture content for the composting process.

Flooding

The proposed development site is not located in an area naturally prone to flooding. It is not envisaged that the proposed development will have any adverse impact on the flows of the Dee River as most of the effective rainfall is surface water runoff both pre and post development and that groundwater is primarily expected to discharge to the Dee river. Following construction of the proposed extension the risk of flooding within the development is considered low.

Surface water attenuation infrastructure is proposed for the Kilmainhamwood Compost facility. A low lying forested area adjacent and south east of the existing facility building will be used to provide storage volume to cater for a 1 in 100 year storm event. The greenfield runoff rate to the existing drainage ditch will be controlled by a hydrobrake. An overflow, downstream of the oil interceptor, will discharge into the storage area. When the storage area fills, some water will infiltrate to ground and the remainder will discharge back to the existing drainage ditch over time. The water level in the storage area, for a 1 in 100 storm event, will be a minimum of 500mm below the finished floor levels of the facility buildings. The proposed surface water attenuation infrastructure is illustrated on Drawing No. 5361-2402.

Groundwater

Given the presence of low permeability, deep subsoil (>10m), the presence of hardstanding throughout the site and the bunded facility building, the potential connection between the facility and the groundwater body is negligible. If there is a negligible connection between the facility and the groundwater body, the potential impact on the groundwater is therefore negligible. This applies to both existing and potential impacts.

The source-pathway-receptor (SPR) concept is frequently used to analyse contamination risks to groundwater. Within this concept, if one of the three components of the SPR is missing, there is no contamination linkage and therefore the risk posed is negligible. In this case the fully bunded facility buildings coupled with the presence of greater than 10m of low permeability subsoil means that there is no pathway and therefore no contamination linkage to groundwater. Furthermore good site management, good waste handling procedures and monitoring (as per requirements of the EPA waste licence) further limits the potential risk of contamination to groundwater.

There are a small number of wells recorded within 1km of the site. It is not envisaged that the implementation of the proposed development will have an adverse impact on groundwater resources. The groundwater chemistry in the existing on site boreholes (BH1-BH3) reflects the natural groundwater quality within the Kingscourt Gypsum Groundwater Body. The water requirements at the site are low.

The proposed development would have a potential to cause groundwater contamination from leakages from the wastewater collection and disposal systems and from vehicular fuel spillages and leakages on roads and car parking areas. The depth of overburden at the site affords a moderate vulnerability to potential contamination sources. Furthermore, the existing water and wastewater disposal systems will prevent the occurrence of contamination leakage.

In summary the potential impact on the surface water and groundwater environment is assessed as low.

Do Nothing Scenario

The Do-Nothing Scenario would be to leave the site as a predominantly hardstanding area with some forestry. If the proposed expansion does not go ahead, there would be no potential indirect impacts arising from the construction or operation of the site.

8.7 REMEDIAL OR MITIGATION MEASURES

Construction Phase

All site works will be conducted in an environmentally responsible manner so as to minimise any adverse impacts on the soils and water that may occur as a result of works associated with the construction phase.

With regard to on-site storage facilities and activities, any raw materials, fuels and chemicals, will be stored within structurally sound warehousing buildings and/or bunded areas if appropriate to guard against potential accidental spills or leakages. All equipment and machinery will have regular checking for leakages and quality of performance.

Appropriate measures are required during the construction period to ensure that all potential run-off is diverted through appropriate settlement tanks/grit traps.

Operational Phase

The design of the proposed development has taken into account the potential impacts associated with the construction and operation of the development on the water environment.

All incoming waste is and will be stored within the facility building. All composting operations take place and will continue to take place within the facility building. The finished product is and will be transported directly from the facility building off site. No compost is stored outside of the facility building. The facility building is fully bunded and therefore all waters from washing activities are contained and incorporated back into the composting process.

Given that the yard area as a result of the proposed development will only increase by 155 m^2 (from 5918 m^2 to 6073 m^2), an increase of approximately 2.5%, the final characteristics of the proposed surface water discharge will be similar to the existing discharge to the drainage ditch.

The suspended solids and hydrocarbon concentrations within the adjacent stream will comply with the surface water regulations and the EPA waste license. The increased loading on the grit and oil interceptor is minimal and will only change by 2.5%.

A small increase in hardstanding runoff (2.5%) is a consequence of the proposed extension to the facility. The proposed extension is designed to minimise hardstanding areas that generate surface water run off. Mitigation measures include the recycling, where possible, of surface water run-off from the site at the proposed development. The layout of the site has been designed for collection of surface

water from roadways, paths and roofs within the development. Surface water runoff from roofs etc. will be reused where possible within the facility.

Surface water runoff from the facility to the drainage ditch will be limited to 1 year return greenfield rates. Calculations are submitted for attenuating and storing the 100 year storm subject to a flow restriction equal to the calculated 1 year green field runoff rate Qbar of 13.54l/s. Details of the surface water attenuation infrastructure are shown on Drawing No. 5361-2402 The calculations are included in Appendix 8.3. In terms of surface water run off, in order to prevent potential contamination of soil/surface water/ groundwater media with water that may be contaminated with oil/ solids, an existing grit trap and oil interceptor will process surface water from hardstanding areas prior to discharge to the proposed surface water attenuation area or the drainage ditch. The existing grit trap and oil interceptor shall be utilised for the proposed extension of the facility. Please refer to Appendix 2.2 for further details.

Groundwater

The groundwater potential and quality beneath the site was proven by exploratory drilling. There are no predicted impacts on the groundwater as a result of the proposed development. Groundwater levels and groundwater quality is currently and will be monitored as part of the EPA waste license.

8.8 MONITORING

During the works undertaken for the construction of the facility extension, strict monitoring of all potential polluting materials used will be maintained. The surface water attenuation infrastructure, outflow control devices, grit trap and oil interceptor will require periodic maintenance. These systems will be monitored in accordance with the latest EPA waste licence requirements.

8.9 REINSTATEMENT

Subject to the development of the site in line with the proposed plans, there is no scope for reinstatement. The site will be permanently altered as a result of the development.

The proposed development will have no impact on the surrounding water environment; therefore there will be no short to long-term impacts outside the site boundary.

9 AIR QUALITY AND CLIMATE

9.1 DUST

9.1.1 Introduction

Data generated from dust monitoring undertaken by competent Consultants appointed by Thorntons Recycling as a condition of licensing (EPA Waste Licence W0195-01) was used as the baseline assessment for dust for the purpose of this Environmental Impact Assessment.

All developments have the potential to adversely affect air quality within the surrounding area. Currently in Ireland there are no statutory limits for dust deposition from developments. In recent years the TA Luft/VDI 2119/Bergerhoff Method of dust emission monitoring has become the most commonly used method. This method involves using a direct collection pot to standardised dimensions of either glass or plastic. The system benefits from being a direct collection method (i.e. less transferring of material and consequent reduction in sampling errors). This method is defined as an internationally recognised standard and has been adopted by the Environmental Protection Agency (EPA) as the method of choice for licensed facilities.

The current waste licence (W0195-01) for the composting facility was issued by the EPA in July 2005. Schedule C.2 of the licence sets out the dust deposition limit for the facility. This dust limit is set at 350/mg/m^2/day over a 30 day period.

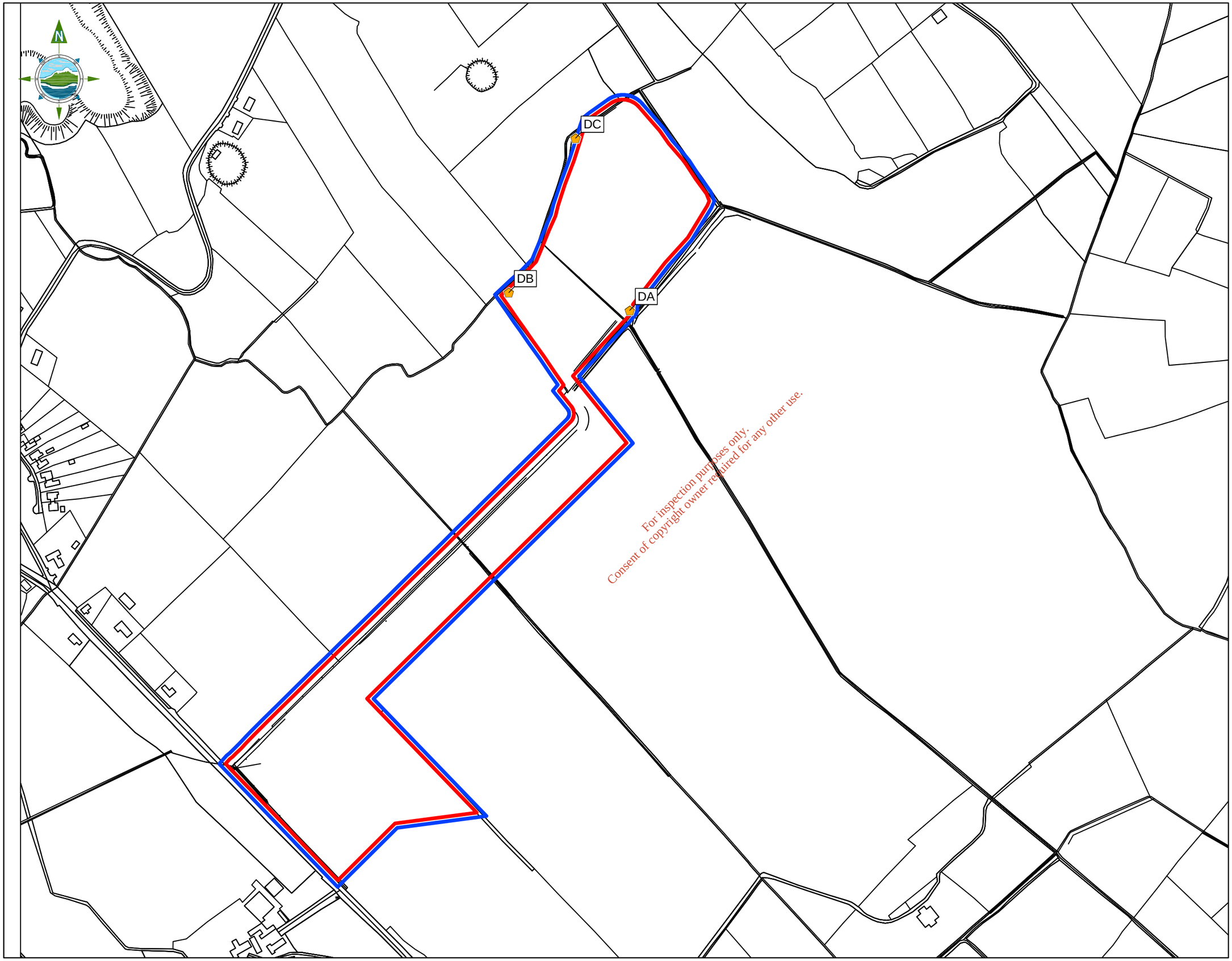
9.1.2 Existing Environment

As part of scheduled monitoring required by the facility waste licence, dust monitoring is carried out at 3 No. locations as described in Table 9.1 and presented in Figure 9.1. These locations were chosen to represent all directions of the site.

Table 9.1 Dust Monitoring Locations

Monitoring Location	Description
DA	At south east perimeter of site
DB	At western corner of site
DC	At north west perimeter of site

Total dust deposition was measured using the Bergerhoff gauges specified in the German Engineering Institute VDI 2119 document entitled "Measurement of Dustfall using the Bergerhoff Instrument (Standard Method)."



LEGEND

- Site Activity Boundary
- Application Boundary
- Dust Monitoring Location

0 15 30 60 90 120
Meters

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
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Issue	Date	Description	By	Chkd.
B	XX.04.10	ISSUED FOR WLA	A.G.	E.D.
A	19-01-10	Issued	A.G.	E.D.

Client: Thorntons recycling

Project:
KILMAINHAMWOOD
FACILITY EXPANSION

Title:
DUST MONITORING
LOCATIONS

Scale @ A3: 1:4,500

Prepared by:	Checked:	Date:
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Project Director: D. Grehan

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Drawing No.: Figure 9.1

Issue: B

Dust gauges were set up approximately 2m above the ground surface and the jars were left open for one month, then collected and the results analysed. Results for each of the monitoring periods are shown below in Table 9.2

Table 9.2 Results of Total Dust Deposition

Period	DA ($mg/m^2/day$)	DB ($mg/m^2/day$)	DC ($mg/m^2/day$)
February 2007	143	163	7460*
June 2007	142	80	224
September 2007	78	92	Damaged
December 2007	58	44	62
March 2008	68	111	48
June 2008	114	128	96
September 2008	62	144	48
December 2008	53	84	36
March 2009	44	52	36
July 2009	98	114	128
September 2009	128	144	167
December 2009	66	92	111

***** High result due to contamination with leaves. DC was subsequently relocated

It can be seen from Table 9.2 that all dust-monitoring locations are below the compliance threshold limit of 350mg/m^2/day (EPA Waste Licence W0195-01), when measured using the TA Luft Bergerhoff Method during this monitoring period.

9.1.3 Potential Significant Impacts

9.1.3.1 Potential Construction Impacts

There is the potential for dust emissions during the construction of the proposed extensions. Wind blown dust emissions may arise during the construction phase of the proposed development, which may impact upon the surrounding environment. The deposition of dust and mud on the local roads is both unsightly and dangerous. Dust may be a particular problem during periods of dry windy weather.

Potential sources of dust include the following:

- Vehicles carrying dust on their wheels;
- Un-vegetated stockpiles of construction materials; and
- The handling of construction materials for the construction phase of the development.

However since the construction involves minimal earthworks and the construction period is not lengthy, there will not be a significant impact from dust emissions once mitigation measures are applied.

9.1.3.2 Potential Operational Impacts

Previous dust monitoring on site (results provided in Table 9.2) clearly illustrates that dust is currently not a nuisance issue on site. All current waste processing takes place indoors within enclosed buildings which is maintained under negative pressure thereby reducing dust emissions arising at the facility. Similarly, all future waste processing will take place indoors within enclosed buildings, therefore dust emissions from the facility are not expected to be a nuisance issue for the proposed development.

A potential source of dust is from the site road. This road will be wetted down during dry weather conditions to prevent the generation of dust.

9.1.4 Mitigation Measures

Thorntons Recycling will endeavour to ensure that dust emissions are kept to a minimum at all locations and shall take all reasonable steps to minimise dust emissions. Currently a road sweeper is available, when required, to further reduce dust emissions from the yard and site road.

In summary the following mitigation measures are proposed:

- All composting and materials handling activities will continue to be carried out indoors;
- A road sweeper will continue to be used on site when required;
- Access routes will be regularly inspected and cleaned when necessary;
- The site road and all hardstanding areas will be sprayed with water in periods of dry weather to help suppress dust emissions;

It is anticipated that with the implementation of the above mitigation measures, dust emissions will continue to be in compliance at all dust monitoring locations when measured using the TA Luft/VDI 2119/Bergerhoff Method.

9.2 ODOUR

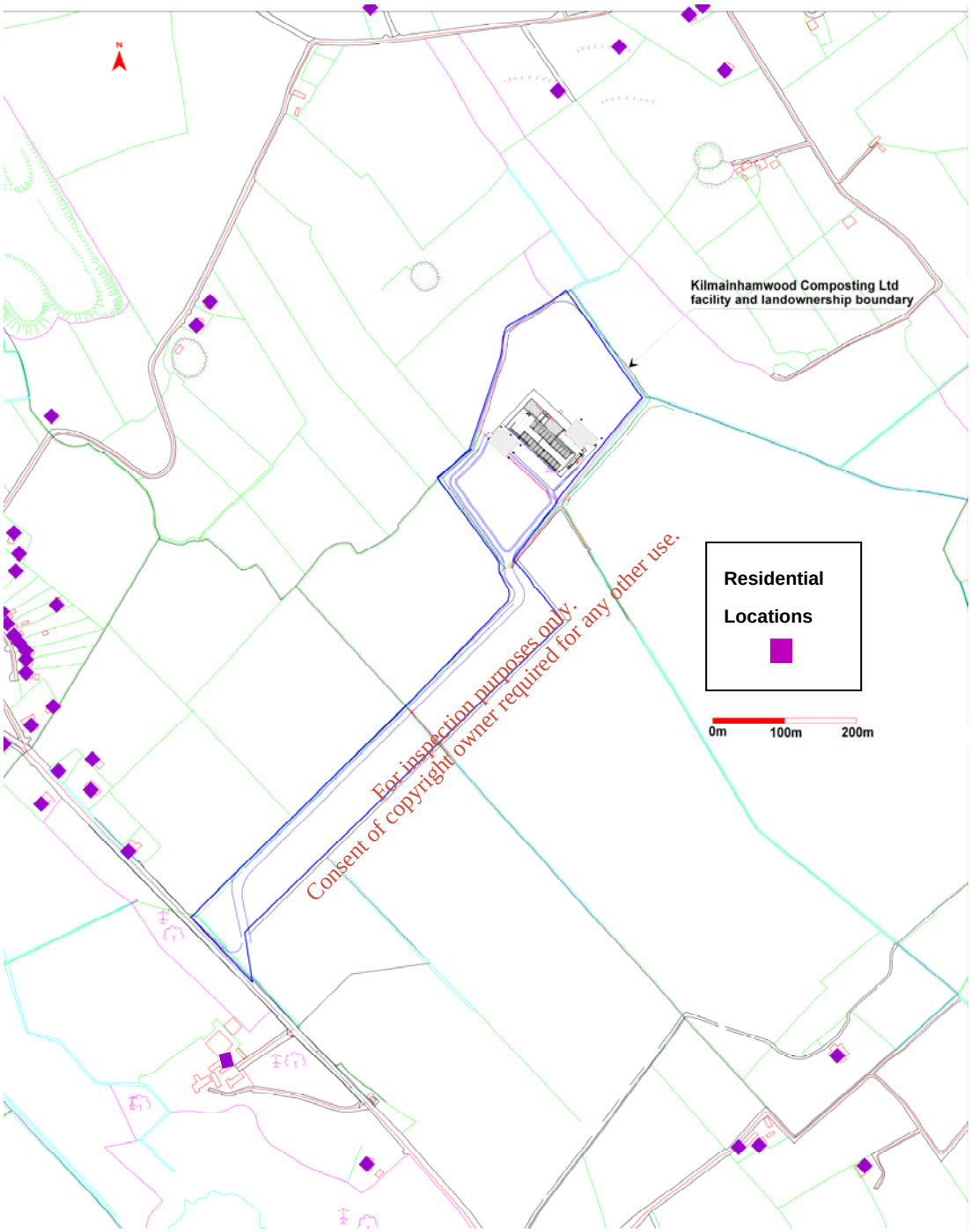
9.2.1 Introduction

Odour Monitoring Ireland were commissioned to perform an odour assessment and dispersion modelling impact assessment of the existing facility design and the proposed facility design (existing facility and proposed extension including upgrading of odour abatement system) located in Kilmainhamwood, Nobber, Co. Meath (Figure 9.2). An odour impact assessment of the existing and proposed composting facility design was performed in order to determine the potential risks of odour on the surrounding air quality. The existing composting facility is fully enclosed and the only scheduled emission(s) occur from the odour control system exhaust points. Odour sampling and measurement in accordance with the EN13725:2003 was performed on the exhaust of each biofilter system 1 and 2.

For the existing facility impact, the gathered odour emission data including source characteristics was utilised in conjunction with dispersion-modelling techniques (i.e. AERMOD Prime 07026) to assess any odour impact on the surrounding area in accordance with established odour impact criterion. For the proposed upgrade facility design, the improved odour treatment design was utilised in conjunction with guaranteed odour emission data to ascertain the potential level of odour impact on the surrounding population in the vicinity of the facility. All odour dispersion modelling was performed in accordance with the recommendations contained within the Irish and UK EPA guidance documents “Odour impacts and odour emission control measures for intensive agriculture”, EPA, 2001 and H Horizontal Guidance notes Parts 1 and 2, UK Environment Agency. AERMOD Prime was used to perform dispersion modelling assessment due to the significant probability of on site building wake effects (i.e. large buildings and low emission points). AERMOD Prime is the model mechanism preferred by the Environmental Agency and USEPA. Five years of consecutive meteorological data (Clones 2002 to Clones 2006 inclusive) was used within the dispersion modelling assessment to provide statistically significant prediction over 5 years.

This report will describe the methodologies used to ascertain the existing levels of odours at the facility and provide information on the proposed odour treatment design for the new facility.

Figure 9.2 Aerial Diagram of Kilmainhamwood Compost Facility



Landownership Boundary (——)

Scope of the Works

The main aims of this odour assessment include:

- Perform an odour assessment on the exhaust of biofiltration system 1 and 2 (existing facility) in accordance with EN13725:2003.
- Perform predictive odour impact assessment of the existing facility operations in accordance with recognised assessment methodology in order to determine the potential of odour impact in the vicinity of the existing facility.
- Perform predictive odour impact assessment of the proposed facility design operations in accordance with recognised assessment methodology in order to determine the potential of odour impact in the vicinity of the proposed facility design.
- Provide a list of key criteria for odour minimisation and management at the facility.

9.2.1.1 Key Decision-Making Processes in Operation of the Odour Management System

The following key design elements must be implemented into the odour control and management system for the existing and proposed composting facility design. These include:

1. The prevention of generation and release of odours from the process is key to ensure no odour impact in the vicinity of the facility. These include the implementation of odour management procedures, which will take account of daily operations to reduce the overall generation of odours from the facility. These include:
    - Responsible operation and handling of material.
    - Closed-door management strategy.
    - Facility management and cleaning procedures for all surfaces in contact with material.
    - Material acceptance procedures to include enforcement of acceptance of enclosed material loads, type of material accepted into the facility and the procedures for handling materials within the facility.
    - Other elements include the implementation of an odour management plan and operation and maintenance management plans for the odour control system.
2. Containment of odours within the composting facility building is essential to effective capture and treatment. The current containment measures are used within this Odour Management system design and include:
    - The composting building is covered with an inner impermeable membrane to prevent odour leakage from the building fabric. All building fabric surfaces are regularly audited for leakage and repaired where necessary.
    - The current composting operations are open bay where positively displaced odour emissions are vented to the headspace of the building. This unnecessarily increases air handling capacity for the building and increases difficulty in capture and containment of odour emissions for treatment. This requires optimisation for ammonia scrubbing of the composting tunnel emissions.

- The facility access doors are fitted with normal roller doors to prevent the release of odours through the access doors of the facility. These are operated in closed mode.
- The makeup air for composting will be drawn from within the building to ensure no positive pressure effects as a result on outside air been ventilated through the composting piles. This is performed at present.
- Treatment of odours using end of pipe technologies is essential to ensure compliance with the specified ground level odour concentrations to prevent odour impact. Two separate cell biofilters are in operation within the existing facility design. The existing biofiltration systems will be further optimised to improve sprinkling, air distribution and treatment capacity.

9.2.2 General Overview of Formation and Odour Emissions at Composting Facilities

Unlike a mechanical process, the breakdown of organic materials is very difficult to stop. When the necessary components for a particular biological process are not present in adequate amounts, a microbial population will develop capable of capitalizing on the existing conditions. For example, when adequate oxygen is available, aerobic micro organisms will dominate the population. However a lack of oxygen will cause organisms that do not require oxygen (anaerobic micro organisms) to take over as the dominant group. These different micro organism types use alternative processes to degrade organic material. This diversity of options is very healthy for our planet as it ensures that most nutrients will be recycled through some biological pathway.

From a facility operation point of view, some of the microbial degradation processes are definitely preferable to others particularly because of the associated odours generated. Microbes utilizing odour-producing processes commonly take over when conditions are:

Anaerobic: processes occurring without adequate oxygen often release strong-smelling gases that many people find objectionable. Many of these odourous compounds are pervasive and likely to be noticed off-site.

Low Carbon/Nitrogen Ratio (C:N): a composting mixture that has a low C:N ratio will often release ammonia as part of the degradation process. Ammonia is not a pervasive odour and disperses easily, and so is more likely to be noticed on-site than by neighbours. It is, however, a signal that nitrogen is being lost from the composting mixture, which will lower the nutritive value of the final composted product.

There are two main stages at which material in a composting facility may be exposed to these odour-producing conditions: before entering the facility, and/or when in the active composting phase.

9.2.2.1 Characterisation of Odour

The sense of smell plays an important role in human comfort. The sensation of smell is unique to each human, varies with the physical condition of the person, the odour emission conditions and the individual's odourous education or memory. The smell reaction is the result of a stimulus created by the olfactory bulb located in the upper nasal passage. When the nasal passage comes in contact with odourous molecules, signals are sent via the nerve fibres in the olfactory bulb in the brain where the odour impressions are created and compared subjectively with stored memories which help form an individual's perceptions and social values. Since the smell is subjective some people will be hypersensitive and some will be less sensitive (anosmia). Therefore, the sense of smell is the most useful detection technique available as it specialises in synthesising complex gas mixtures sensation to the human nose rather than analysing the individual chemical compound (Sheridan, 2000).

9.2.2.2 Odour Qualities

An odour sensation, which may lead to a complaint, consists of a number of inter-linked factors. These include:

- Odour threshold/concentration.
- Odour intensity.
- Hedonic tone.
- Quality/Characteristics.
- Component characteristics.

The odour threshold concentration dictates the concentration of the odour in OuE m-3. The odour intensity dictates the strength of the odour. The Hedonic quality refers to the determination of pleasantness/unpleasantness. Odour quality/characteristics indicates similarity of the odour to a known smell (such as turnip, like dead fish, flowers, etc.). Individual chemical component identity determines the individual chemical components that constitute the odour (i.e. hydrogen sulphide, methyl mercaptan, carbon disulphide, etc.). Once odour qualities are determined, the overall odour impact can be assessed. Odour impact assessment can then be used to determine if an odour minimisation strategy is to be required and if so, the most suitable technology. Furthermore, by suitably characterising the odour through complaint logs, the most likely source of the odour can be determined, enabling the implementation of immediate odour mitigation techniques to prevent such emission in the future.

9.2.2.3 Perception of Emitted Odours

Complaints are the primary indicators that odours are a problem in the vicinity of any facility. Perceptions of odours vary from person to person, with several conditions governing a person's perception of odour:

Control: A person is better able to cope with an odour if they feel it can be controlled.

Understanding: A person can better tolerate an odour impact if they understand its source.
Context: A person reacts to the context of an odour much as they do to the odour itself (i.e. waste odour source).

Exposure: When a person is constantly exposed to an odour: They may lose their ability to detect that odour. For example, a plant operator who works in the facility may grow immune to the odour or their tolerance to the odour reduces and they complain more frequently.

Based on these criteria, we can predict that odour complaints are more likely to occur when:

- A new facility is located in areas where people are unfamiliar with facility's purposes;
- The establishment of new processes within a facility (i.e. composting plant, etc.);
- Or when an urban population encroaches on an existing facility.

The ability to characterise odours emitted from a facility will help to develop a better understanding of the impact of the odour on the surrounding vicinity. It will also help to implement and develop better techniques to minimise/abate odours using available technologies and engineering design.

9.2.2.4 Characteristics of Composting Odours

Odours from composting arise mainly from the following sources:

- The uncontrolled anaerobic biodegradation of proteins and carbohydrates to produce unstable intermediates in the waste inlet stream,
- Directly from the accepted materials and bad material handling/management practices,
- Incorrect processing of waste and composting material,
- Positive wind pressure on buildings, open doors and temperature increases will increase positive pressure within waste transfer stations and biological treatment facilities and may cause the fugitive release of odour from such facilities. Incorporating efficient air extraction systems maintaining negative ventilation and appropriate treatment of extracted air within an odour control system will reduce/eliminate odour impact.

Odours are generated by a number of different components, the most significant being the sulphur containing compounds (thiols, Mercaptans, hydrogen sulphide), volatile fatty acids (butyric acid, valeric acid), amines (methylamine, Dimethylamine), phenols (4-methylphenol), chlorinated hydrocarbons (trichloroethylene, etc), etc. (Dawson et al. 1997). Most of these compounds have very low odour threshold concentrations as illustrated in Table 9.3.

Most of these compounds have hedonically offensive characters as illustrated in Table 9.3. Different concentrations and mixtures of these compounds can intensify or reduce odour threshold concentration, determined as synergism and antagonism respectively. Hobbs et al., (2002) performed studies on various odours commonly found in pig odour. This study concluded that 4-methyl phenol had a negative effective (reduced the overall odour threshold concentration) on perceived odour concentration when mixed with other odourants.

Table 9.3 Commonly Encountered Odour Precursors in Air Stream

Chemical component	Odour character
Ammonia	Pungent, sharp, irritating
Methylamine	Fishy, Putrid Fishy
Trimethylamine	Fishy, Pungent fishy
Dimethylamine	Putrid fishy
Ethylamine	Ammonia like
Triethylamine	Fishy
Pyridine	Sour, putrid fishy
Indole	Faecal, nauseating
Skatole	Faecal, nauseating
Hydrogen Sulphide	Rotten eggs
Methyl mercaptan	Rotten cabbage
Ethyl mercaptan	Decaying cabbage/flesh
Propyl mercaptan	Intense rotten vegetables, Unpleasant
Allyl mercaptan	Garlic, coffee
Benzyl mercaptan	Skunk, unpleasant
Thiocresol	Skunk
Dimethyl disulphide	Rotten vegetables
Carbon disulphide	Rubber, intense sulphide
Acetic acid	Vinegar
Butyric acid	Rancid
Valeric acid	Sweaty, rancid
Propionic acid	Rancid, pungent
Hexanoic acid	sharp, sour, rancid odour, goat-like odour
Formaldehyde	Pungent, medicinal
Acetone	Pungent, fruity, sweet
Butanone	Sweet, solventy
Acetophenone	Sweet pungent odour of orange blossom or jasmine
Limonene	Intense orange/lemons
Alpha Pinene	Intense pine, fresh
THN Tetrahydronaphthalene	Meat

O'Neill & Phillips et al. (1992) and Suffet at al., 2004

9.2.2.5 Odourous Compound Formation in Composting Plants

Material coming onto a site may already have developed a strong odour due to the nature of the material itself or to the way it has been stored. For example:

Material Stored under Anaerobic Conditions: fresh organic material stored in plastic bags or insufficiently ventilated containers. The potential for odour increases if the organic material has high moisture content, has been kept in an anaerobic state for a number of days, and/or has been subjected to high temperature and direct sunlight. (e.g. grass clippings, fresh plant material, wet leaves, food waste, etc).

Material that has a Low C:N Ratio: this can be a particular problem if the material also has a high moisture content. (e.g. sewage sludge or other high nitrogen sludge's, fish processing or slaughterhouse residuals, food waste, etc).

MANAGEMENT STRATEGIES:

Feedstock with a low C:N ratio is often invaluable because of the nitrogen and moisture they provide to the composting recipe. Proactive management strategies can help to capitalize on the benefits moist low C:N ratio material offer while minimising the potential for offensive odour release, the following strategy will be considered at minimum:

- Knowledge of delivery schedule or pattern. Knowing when a potentially odorous load is likely to arrive facilitates readiness to deal with the material immediately, minimising the likelihood for potential odours to escape off-site.
- An implementable plan in place for dealing with materials likely to be offensive. Such a plan will include the following:
    - Incorporate the material quickly. Have a stock of porous, high-carbon material on hand, which can be mixed immediately with the incoming material. Examples, currently being used with success, include wood chips, wood shavings, or sawdust, dry leaves and straw. This helps to balance the C:N ratio, absorb the moisture in wet materials and add porosity so that the mixture can remain aerobic.
    - Handle loads of potentially offensive feedstock inside an enclosed work area ventilated by an odour control system.
    - If the material must be stored before blending/handling, add a blanket of saw dust or overs to cover the material to minimise potential odourous emissions.
    - Ensure the facility can process the organic material as soon as, or within a short time frame (24 hrs), it enters the facility.

OPTIMISING THE PROCESS:

The following basic elements:

1. Check carbon to nitrogen ratio (C:N) when preparing the composting mix: Recipes with a C:N ratio of less than 25 are likely to lose nitrogen in the form of ammonia. A ratio of 25-40 is better, with 30 being considered ideal for most materials.
2. Check the moisture content of the composting recipe: While too little moisture will slow the composting process, too much moisture will cause anaerobic conditions—as all of the small spaces in the material will be filled with water and not enough space is available for the air required by aerobic micro organisms. Moisture content between 40 and 60% is considered a good air/moisture balance to support aerobic processes.
3. Above neutral pH recipe. Basic mixtures above pH 8.5 will release nitrogen as ammonia.
4. Porosity is important in formulating the composting mix: A mixture consisting of nothing but fine textured materials will likely become compacted as the composting process develops, preventing air from penetrating the pile. To maintain porosity when composting, include some coarser material (such as wood shavings or chips) so that air can continue to move freely through the material as it breaks down. This is particularly important in systems where the material will not be turned during active composting.
5. Ensure that material is aerated to maintain aerobic conditions. The continuous monitoring of interstitial oxygen within the composting mix will help ensure maintenance of appropriate oxygen levels within the material.
6. Appropriate pile size, which is not too deep: Air will not be able to infiltrate the compost pile homogenously. If the pile is too deep, this results in various maturation rates for the composting process.

9.2.3 Materials and Methods

This section describes the materials and methods use for the odour measurement and dispersion modelling assessment of the existing and proposed facility operations. This section will also include the backbone odour management methodology to be used at Kilmainhamwood Composting Facility to ensure no odour impact.

9.2.3.1 Airflow Rate and Temperature Measurement

Using a calibrated pitot manometer and L type pitot tube, and PT100 temperature probe, the volumetric airflow rate and temperature of the emission air stream that passes through the emission source was determined in accordance with EN13284-1:2002. This allowed for the determination of physical operational parameters such as temperature, airflow velocity and volumetric airflow rate. Ten measurements were carried out in a straight section of ducting for airflow rate. Temperature readings were logged continuously to a Testo 400 handheld data logger and downloaded using Com soft

software where average readings were computed using Microsoft Excel. The pitot airflow rate measurements were performed on the inlet to the biofiltration system.

9.2.3.2 Odour Sampling and Measurement

Odour Sampling

In order to obtain air samples for odour assessment, a static sampling method was used where air samples were collected in 40 to 60 litre pre-conditioned NalophanNA bags using a vacuum sampling device over a 5 to 10 minute period. The sampler operates on the 'lung principle', whereby the air is removed from a rigid container around the bag by a battery powered SKC vacuum pump at a rate of 5 to 9 l min-1. This caused the bag to fill through a stainless steel and PTFE tube whose inlet is placed in ambient air, with the volume of sample equal to the volume of air evacuated from the rigid container. All odour-sampling bags were pre-conditioned and flushed with odourous air to remove any interference from the sample material.

Since the exhausts of the biofiltration systems are open beds, a hood technique was used to allow for capture of the odourous air stream to facilitate sampling. The hood was constructed from 304L SS and has a surface area of 1 m2 which is coned down to a circular duct of 0.075 m diameter. This also facilitates the measurement of total volumetric airflow rate per m2 of biofilter surface.

In term of the sampling regime, a total of between 6 and 8 individual sample locations were chosen randomly for each odour sample bag. The hood fixed to the surface of the biofilter bed and the presence of positively displaced air was verified through the use of a 73mm vane anemometer. A total of 5 minutes was allowed between sample acquisition to ensure in excess of 12 AC/hr within the hood before sampling commenced.

Olfactometry

Olfactometry using the human sense of smell is the most valid means of measuring odour (Dravniek et al, 1986) and at present is the most commonly used method to measure the concentration of odour in air (Hobbs et al, 1996). Olfactometry is carried out using an instrument called an olfactometer. Three different types of dynamic dilution olfactometers exist:

- Yes/No Olfactometer
- Forced Choice Olfactometer
- Triangular Forced Choice Olfactometer

In the dynamic dilution olfactometer, the odour is first diluted and is then presented to a panel of screened panellists of no less than four (CEN, 2003) Panellists are previously screened to ensure that they have a normal sense of smell (Casey et al., 2003). According to the CEN standard this screening must be performed using a certified reference gas n-butanol. This screening is applied to eliminate anosmia (low sensitivity) and super-noses (high sensitivity). The odour analysis has to be undertaken in

a low odour environment such as an air-conditioned odour free laboratory. Analysis should be performed preferably within 8 to 12 hours of sampling.

Odour Measurement in Accordance with the EN13725:2003

An ECOMA TO8 dynamic yes/no olfactometer was used throughout the measurement period to determine the odour threshold concentration of the sample air. The odour threshold concentration is defined as the dilution factor at which 50% of the panel can just detect the odour. Only those panel members who pass screening tests with n-butanol (certified reference gas, CAS 72-36-3) and who adhered to the code of behaviour were selected as panellists for olfactometry measurements (CEN, 2003). Odour measurement was carried out in an odour free laboratory in accordance with EN13725:2003. The analyses were carried out in the laboratory of Odour Monitoring Ireland in Trim Co. Meath.

What is an Odour Unit?

The odour concentration of a gaseous sample of odourant is determined by presenting a panel of selected screened human panellists with a sample of odourous air and varying the concentration by diluting with odourless gas, in order to determine the dilution factor at the 50% detection threshold. The Z50 value (threshold concentration) is expressed in odour units (OuE m-3).

The European odour unit is that amount of odourant(s) that, when evaporated into one cubic metre of neutral gas (nitrogen), at standard conditions elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one European Reference Odour Mass (EROM) evaporated in one cubic meter of neutral gas at standard conditions. One EROM is that mass of a substance (n-butanol) that will elicit the Z50 physiological response assessed by an odour panel in accordance with this standard. n-Butanol is one such reference standard and is equivalent to 123µg of n-butanol evaporated in one cubic meter of neutral gas at standard conditions (CEN, 2003).

9.2.3.3 Odour Emission Rate Calculation

The measurement of the strength of a sample of odourous air is, however, only part of the problem of quantifying odour. Just as pollution from a stack is best quantified by a mass emission rate, the rate of production of an odour is best quantified by the odour emission rate. For a chimney or ventilation stack, this is equal to the odour threshold concentration (OuE m-3) of the discharge air multiplied by its flow-rate (m3 s-1). It is equal to the volume of air contaminated every second (OuE s-1). The odour emission rate can be used in conjunction with dispersion modelling in order to estimate the approximate radius of impact or complaint (Hobson et al, 1995).

9.2.3.4 Dispersion Modelling

Atmospheric Dispersion Modelling of Odours: 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 odours for many years, originally using Gaussian form ISCST 3 and more recently utilising advanced boundary-layer physics models such as ADMS and AERMOD (Keddie et al. 1992). Once the odour emission rate from the source is known, (OuE 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 odours and to correlate with complaints; secondly, in a "reverse" mode, to estimate the maximum odour emissions which can be permitted from a site in order to prevent odour complaints occurring; and thirdly, to determine which process is contributing greatest to the odour 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, odour control systems and intensive agricultural processes (Sheridan et al., 2002).

9.2.3.5 AERMOD Prime

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 modelling 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 modelling 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).

9.2.3.6 Establishment of Odour Impact Criterion for Composting Facility Odours

Odours from Composting operations arise mainly from the volatilisation of odourous gases from:

- The uncontrolled anaerobic biodegradation of proteins and carbohydrates to produce unstable intermediates in the waste inlet stream,
- Directly from the accepted materials and bad material handling/management practices, Incorrect processing of waste and composting material,
- Positive wind pressure on buildings, open doors and temperature increases will increase positive pressure within waste transfer stations and biological treatment facilities and may cause the fugitive release of odour from such facilities. Incorporating efficient air extraction systems maintaining negative ventilation and appropriate treatment of extracted air within an odour control system will reduce/eliminate odour impact.
- Inefficient odour control/abatement equipment operation and design including loose fitting covers, inefficient extraction and odour control unit failure.

Some of the compounds emitted are characterised by their high odour intensity and low odour detection threshold (see Section 9.2.2.4). A sample of a report carried out in the Netherlands, United Kingdom and USA ranking generic and environmental odours according to the like or dislike by a group of people professionally involved in odour management is illustrated in Table 9.4 (EPA, 2001, Environment Agency, 2002). Although not scientifically based, it is interesting to observe the results of such studies.

Table 9.4 Ranking of Environmental Odours According to Like and Dislike (i.e. Similar Odour Hedonic Tone)

Generic odours	Hedonic score[1] Dravnieks, 1994	Ranking[2]	Ranking[2]	Ranking[2]	Environmental odours	Ranking[2]	Ranking[2]	Ranking[2]
Descriptor	**USA**	**UK median**	**UK mean**	**NL mean**	**Descriptor**	**NL mean**	**UK mean**	**UK Median**
Roses	3.08	4	4.4	3.4	Bread Factory	**1.7**	**2.5**	**1**
Coffee	2.33	3	4.5	4.6	Coffee Roaster	4.6	3.9	2
Cinnamon	2.54	4	4.9	6	Chocolate Factory	5.1	4.6	3
Mowed lawn	2.14	4	4.9	6.4	Beer Brewery	8.1	7.7	6
Orange	2.86	4	5.2	5.8	Fragrance & Flavour Factory	9.8	8.5	8
Hay	1.31	7	6.9	7.5	Charcoal Production	9.4	9.2	8
Soap	0.96	8	7.8	7.3	**Green Fraction composting**	**14**	**10.3**	**9**
Brandy		9	8.8	7.8	Fish smoking	9.8	10.5	9
Raisins	1.56	8	8.8	7.9	Frozen Chips production	9.6	11	10
Beer	0.14	9	9.5	9.3	Sugar Factory	9.8	11.3	11
Cork	0.19	10	10	10.5	Car Paint Shop	9.8	11.7	12
Peanut Butter	1.99	10	10.4	11.1	**Livestock odours**	**12.8**	**12.6**	**12**
Vinegar	-1.26	14	13.3	11.8	Asphalt	11.2	12.7	13
Wet Wool	-2.28	14	14	14.1	**Livestock Feed Factory**	**13.2**	**14.2**	**15**
Paint	-0.75	15	14	14.4	**Oil Refinery**	**13.2**	**14.3**	**14**
Sauerkraut	**-0.6**	**15**	**14.6**	**12.8**	Car Park Bldg	8.3	14.4	15
Cleaning Agent	**-1.69**	**15**	**14.7**	**12.1**	**Wastewater Treatment**	**12.9**	**16.1**	**17**
Sweat	-2.53	18	16.6	17.2	Fat & Grease Processing	15.7	17.3	18
Sour Milk	-2.91	19	18	17.5	Creamery/milk products		17.7	10
Cat's Pee	-3.64	19	18.8	19.4	Pet Food Manufacture		17.7	19
Sewer odour	**-3.68**	-	-	-	Brickworks (burning rubber)		17.8	18
-	-	-	-	-	**Slaughter House**	**17**	**18.3**	**19**
-	-	-	-	-	**Landfill**	**14.1**	**18.5**	**20**

Notes: *Source: Draft Odour H4-Part 1, Integrated Pollution Prevention and Control (IPPC). (2004). Environment Agency, Bristol, UK.*

[1] denotes the higher the positive "value", the more pleasant the odour descriptor and similarly below, the greater the negative value, the more unpleasant the odour descriptor

[2] denotes ranking in order of dislike ability.

As can be observed from Table 9.4, and using the Dutch based ranking system, Green waste composting has a mean raking of 14.0 in terms of dislike. Other odours with similar mean dislike ranking include Landfill, Oil Refinery, Livestock Feed Factory, Livestock odour (i.e. intensive pig/poultry production). Green fraction composting and landfill odours are similar in their dislike ability and therefore it is rational to suggest that a similar odour impact criterion may be used based on these facts. Selection of odour impact criterion can be illustrated through the mean ranking system (i.e. 1.50 Ou_E m^{-3} for Abattoir/slaughterhouse odours with a mean ranking of 17 (very dislikeable) to 1.50 to 3.0 Ou_E m^{-3} for green fraction composting and landfill odour with a mean ranking of 14 (more likeable).

9.2.3.7 Commonly used Odour Annoyance Criteria utilised in Dispersion Models

An odour impact criterion defines the odour threshold concentration limit value above baseline in ambient air, which will result in an odour stimulus capable of causing an odour complaint. There are a number of interlinked factors, which causes a nearby receptor (i.e. resident) to complain. These include:

- Odour threshold concentration, odour intensity and hedonic tone-defined measurable parameters at odour source,
- Frequency of odour-how frequently the odour is present at the receptor location,
- Duration of odour-how long the odour persists at the receptor location,
- Physiological-previous experiences encountered by receptor, etc.

By assessing these combined interlinked factors, the ability for a facility to cause odour complaint can be determined. As odour is not measurable in ambient air due to issues in sampling techniques, limit of detections for olfactometers and the inability to monitor continuously, therefore dispersion models become useful tools in odour impact assessments and odour risk analysis. Dispersion modelling also allows for the assessment of proposed changes in processes within the composting facility without actually having to wait for the processes to be changed (i.e. predictive analysis).

When utilising dispersion models for impact assessment, specific impact criterion (odour concentrations) need to be established at receptors. For odour assessment in general terms, this is called an odour impact criterion, which defines the maximum allowable ground level concentration (GLC) of odour at a receptor location for a particular exposure period (i.e. ≤ 1.50 OuE m-3 at the 98th percentile of hourly averages). Commonly used odour annoyance criteria in Ireland, UK, Netherlands and other world wide countries are illustrated in Table 9.5. The odour concentration, % odour exposure at this odour concentration, the dislike ability, the dispersion model and industry it applies are presented (see Table 9.5).

Table 9.5 Odour Annoyance Criterion used for Environmental Odours.

Country	Odour conc. limit (Ou_E m^3)	Percentile value (%)	Average time (minutes)	Industry type	Dispersion model	Type area it applies	Dislike ability (*see Table 9.4*)	Application of criterion
Ireland	≤6.0[1]	98th	60	Intensive pig production	Complex 1	Limit value for existing pig production units	12.80	For all pig production units in Ireland
Ireland	≤3.0[1]	98th	60	Intensive pig production	Complex 1	Limit value for existing pig production units	12.80	For all pig production units in Ireland
Ireland	≤1.50[2]	98th	60	Slaughter house	Complex 1/ISC ST3	Limit value for new slaughter house facilities	17.0	Limit value for new slaughter house facilities
Ireland	≤1.50[3]	98th	60	Balbriggan WWTP	ISC Prime/ISC ST3	Limit value at sensitive receptor locations	12.90	Limit value for existing facility at sensitive receptor locations.
UK	≤1.50[4]	98th	60	WWTP	ADMS/ AERMOD	Indicative odour exposure criterion for licensing	12.90	IPPC H4 Guidance Notes Part 1-Regulation and Permitting, Environment Agency
Ireland	≤3.0[3]	98th	60	Enniscorthy WWTP	ISC Prime/ISC ST3	Limit value at sensitive receptor locations	12.90	Limit value for existing facility at sensitive receptor locations.
UK	≤5.0[4]	98th	60	WWTP-Newbiggin by the Sea Planning	ADMS	Used as a limit value prevent odour impact associated with WWTP	12.90	Planning application-Newbiggin by the Sea
UK	≤1.50[4]	98th	60	Livestock feed factory	ADMS/ AERMOD	Indicative odour exposure criterion for licensing	13.20	IPPC H4 Guidance Notes Part 1-Regulation and Permitting, Environment Agency
UK	≤1.50[4]	98th	60	Oil refinery	ADMS/ AERMOD	Indicative odour exposure criterion for licensing	13.20	IPPC H4 Guidance Notes Part 1-Regulation and Permitting, Environment Agency
UK	≤3.0[5]	98th	60	Landfill activities	Complex 1	Odour exposure criterion developed through laboratory based odour intensity studies and complaint correlation	14.10	Longhurst et al 1998 for Landfill planning application
NL	≤3.50[6]	98th	60	WWTP	Complex 1	Limit value to prevent odour nuisance existing plant	12.90	Industry sector specific air quality criterion for odours in Netherlands
NL	≤1.50[6]	98th	60	WWTP	Complex 1	Limit value to prevent odour nuisance new plant	12.90	Industry sector specific air quality criterion for odours in Netherlands

Notes: [1] denotes reference BAT Note development for intensive agriculture sector.

[2] denotes EPA, (2004). BAT Notes for the Slaughterhouse sector, EPA, Johnston Castle, Wexford.

[3] denotes Odour limit values used during EIA application for WWTP's.

[4] denotes Environment Agency, (2002). Technical Guidance Notes IPPC H4-IPPC, Horizontal Guidance for Odour, Part 1-Regulation and Permitting. Environment Agency, Bristol, UK.

[5] denotes Magette, W., Curran, T., Provolo, G., Dodd, V., Grace, P., and Sheridan, B., (2002). BAT Note for the Pig and Poultry Sector. EPA, Johnston Castle, Wexford.

[6] denotes EPA, 2001. Odour Impacts and Odour emissions control for Intensive Agriculture. R&D Report Series no. 14. EPA, Johnston Castle, Wexford

Table 9.5 illustrates the range of odour impact criterion used in Ireland, UK, Netherlands, and other worldwide communities. The impact criterion accepted in Ireland and UK are based on research performed in Netherlands over the mid 80's and early 90's. In the late 90's the UK Environment Agency performed some research on validating those standards developed in Netherlands through studies performed in the UK. The main aims of these studies were for the developing of guidance notes on odour for licensing procedures under the EPA Act 1992. Over the last decade, these impact criterions have been providing protection to the community at large in the vicinity of such facilities. There is a general trend in odour impact criterion and dislike ability presented in Table 9.5. As can be observed in Table 9.4 and 9.5, the more offensive the odour is perceived, the lower the acceptable ambient odour concentration above baseline. Odours such as bakery odours are considered less offensive than pig production facilities and this is observed through the relative dislike ability and also the odour impact criterion established to limit nuisance. Green fraction composting odours have similar dislike ability to Waste water treatment and Landfill odour and therefore it would be rational to suggest a similar odour impact criterion. Other factors that require consideration include the location of the facility, the surrounding sensitive receptors, and amount of odour mitigation to be implemented into the overall design. For example in Ireland, pig production facilities are generally located in rural environments, whereby sensitive receptors in the vicinity of the facility are working in similar livestock operations and therefore do not consider the perceived odour as offensive as say a person not familiar with the odour. This composting facility on the other hand is located close to the sensitive receptors. This results in the installation of odour management and mitigation technologies to control and abate the odour emission. By abating the sources of offensive odours within the Composting facility, the facility has a markedly lower potential risk of causing complaint. Taking into account these factors for the existing and proposed Composting facility, it is proposed that:

- All sensitive locations will be located outside the 1.50 Ou_E m^{-3} at the 98th percentile of hourly averages over a meteorological year.
- All sensitive locations will be located outside the 3.0 Ou_E m^{-3} at the 99.5th percentile of hourly averages over a meteorological year.

These proposed odour impact criterion is sufficiently conservative to provide protection to the community at large taking into account latest suggested odour impact criterion by environmental agencies in Ireland, UK and Netherlands. In the case of the Kilmainhamwood Compost facility, all odour sources capable of generating offensive odours will be enclosed inside the main building, sealed and negatively ventilated to an odour control system. The 99.5th percentile of hourly averages is used to complement the 98th percentile of hourly averages to take account of predicted downwind odour concentrations during short time worst-case meteorological conditions thereby providing added protection to the public at large.

9.2.3.8 Meteorological Data

Clones meteorological station Year 2002 to 2006 inclusive was used for the operation of Aermod Prime. This allowed for the determination of the worst-case meteorological year for the determination of overall

odour impact from the existing and proposed Kilmainhamwood Compost Facility on the surrounding population.

The wind rose plot and statistical aspects of the meteorological file are contained in Appendix 9.1.

9.2.3.9 Terrain Data

Topography affects in the vicinity of the site were accounted for in the model as the topography in this area was considered complex. Topographical data was collected from Ordnance Survey Ireland and processed through the Aermap processing facility in AERMOD Prime. All building wake effects are accounted for in the modelling scenarios (i.e. building effects on point sources) as this can have a major effect on the odour plume dispersion at short distances (which is important in this instance).

9.2.4 Odour Management Plan and Systems

The Odour Management Plan (OMP) is a core document detailing operational and control measures appropriate to management and control of odour at a site. The format of the OMP provides sufficient detail to allow operators and maintenance staff to clearly understand the odour management operational procedures for both normal and abnormal conditions.

The OMP is designed to include sufficient feedback data to enable site management (and regulatory inspectors) to audit site operations on odour management. An example of some of the issues to be considered are summarised as follows.

- A summary of the site, odour sources and the location of receptors,
- Details of site management responsibilities and procedures for reporting faults, identifying maintenance needs, replenishing consumables and complaints procedure,
- Odour management equipment operation procedures (e.g. correct use of equipment, process, materials, checks on equipment performance, maintenance and inspection,
- Operative training,
- Housekeeping,
- Maintenance and inspection of plant (both routine and emergency response),
- Spillage/contaminated surface management procedures,
- Record keeping – format, responsibility for completion and location,
- Emergency breakdown and incident response planning including responsibilities and mechanisms for liaison with the regulatory bodies.
- Public relations.

The Odour Management Plan will be regularly reviewed and upgraded. It will form the basis of a document Environmental and Odour Management system for the operating site. The Odour Management System documentation defines the roles of the Plant Operator and staff and sets out templates in relation to the operating of the facility and reporting procedures to be employed. Requirements for the Odour management plan will be implemented thought-out the site with a branched management system implemented in order to share responsibility around the site. The site

manager will ensure all works are performed in accordance with the OMP. The OMP will be integrated in the overall Environmental Management/Performance System for the site.

9.2.5 Results of Odour Emission Rates and Dispersion Modelling for Existing and Proposed Facility Operations

9.2.5.1 Odour Emission Data for Existing and Proposed Facility Design

Two data sets for odour emission rates were calculated to determine the potential odour impact of the existing and proposed Kilmainhamwood Compost Facility operation and design utilising measured and library individual source odour emission data. These scenarios included:

Ref Scenario 1: Predicted overall odour emission rates from existing composting facility (*see* Table 9.6).

Ref Scenario 2: Predicted overall odour emission rates from proposed composting facility design (see Table 9.7).

Odour Emission Rates from Existing Kilmainhamwood Composting Facility Operations for Atmospheric Dispersion Modelling Scenario 1

Table 9.6 illustrates the overall odour emission rate from the existing operational Kilmainhamwood Composting Facility.

As can be observed in Table 9.6, the overall odour emission rate from the existing operational Kilmainhamwood Composting Facility design is predicted to be at or less than 50,159 OuE/s. This odour emission rate is based on measured emissions from the facility biofiltration system on the day of monitoring.

Table 9.6 Measured Overall Odour Emission Rate from Existing Kilmainhamwood Composting Facility Design (Ref Scenario 1).

Emission source	Volumetric airflow rate (m^3/hr)	Volumetric airflow rate (m^3/s)	Odour threshold concentration (Ou_E/m^3)	Odour emission rate (Ou_E/s)
BF 1	38,000	10.56	1,514	15,981
BF2-1	34,000	9.44		
BF2-2	29,000	8.06		
Subtotal BF2	***63,000***	***17.50***	***1,953***	***34,178***
Total[1]	**101,000**	**28.05**	**-**	**50,159**

Notes:

[1] denotes that all composting operations are carried out indoors. This includes the delivery and tipping of waste material, shredding, addition of amendment and mixing of feedstocks, loading of material into first stage and second stage composting bays, screening of compost and loading of compost into Animal By-Product treatment tunnels. The containment principle applies here to ensure no emissions of odours escape to atmosphere. Odours collected from the headspace of the building are directed to the biofiltration system.

Odour Emission Rates from Proposed Kilmainhamwood Composting Facility Operations for Atmospheric Dispersion Modelling Scenario 2

Table 9.7 illustrates the overall odour emission rate from the proposed Kilmainhamwood Composting Facility design.

As can be observed in Table 9.7, the overall odour emission rate from the proposed Kilmainhamwood Composting Facility design is predicted to be at or less than 17,776 Ou_E/s. This odour emission rate is based on guaranteed odour performance emissions from the upgraded facility odour treatment system. The upgraded odour treatment system will involve the separate capture of odours from the headspace of the composting tunnels and treatment in an acid scrubber for the removal of ammonia. This air will then be directed to the biofiltration system where improvements in air distribution will be implemented in order to achieve the exhaust odour threshold concentration of less than 800 Ou_E/m^3 continuously. This represents a 64% reduction from existing odour emission levels by way of significant improvements in the treatment technology.

Table 9.7 Predicted Overall Odour Emission Rate from Proposed Kilmainhamwood Composting Facility Design (Ref Scenario 2).

Emission source	Volumetric airflow rate (m^3/hr)	Volumetric airflow rate (m^3/s)	Odour threshold concentration (Ou_E/m^3)	Odour emission rate (Ou_E/s)
BF 1	30,000	8.33	800	6,664
BF2-1	25,000	6.94		
BF2-2	25,000	6.94		
Subtotal BF2	***50,000[2]***	***13.89***	***800***	***11,112***
Total[1]	**80,000[3]**	**22.23**	**800**	**17,776**

Notes:

[1] denotes that all waste handling and composting operations are carried out indoors. This includes waste reception, shredding, addition of amendment and mixing of feedstocks, loading of material into first stage and second stage enclosed composting bays, screening of compost and loading of compost into Animal By-Product treatment tunnels. The containment principle applies here to ensure no emissions of odours escape to atmosphere.

[2] denotes that process air will be collected directly from the enclosed composting bays and directed to an acid scrubber for ammonia removal and then be ducted directly to the optimised biofiltration system for treatment.

[3] denotes that in order to ensure negative pressure within the building a total volumetric airflow rate of 30,000 m^3/hr of air will be ventilated from the composting building headspace. Makeup aeration air for the composting tunnels will be taken from the building while additional building ventilation air will be extracted to ensure effective negative ventilation.

Odour Dispersion Modelling Results for Scenarios 1 and 2

AERMOD Prime (USEPA ver. 07026) was used to determine the overall odour impact of the existing and proposed Kilmainhamwood Composting Facility design. Impacts from emission points are assessed in accordance with the impact criterion contained in Section 9.2.3.6 and 9.2.3.7. Two distinct scenarios were assessed:

The output data was analysed to calculate the following:

Ref Scenario 1:

- Predicted odour emission contribution of overall existing composting facility design operation to surrounding population (see Table 9.6), to odour plume dispersal at the 98th percentile for a ground level concentration of less than or equal to 1.50 Ou_E m^{-3} (see Figure 9.3).
- Predicted odour emission contribution of overall existing composting facility design operation to surrounding population (see Table 9.6), to odour plume dispersal at the 99.5th percentile for a ground level concentration of less than or equal to 6.0 Ou_E m^{-3} (see Figure 9.4).

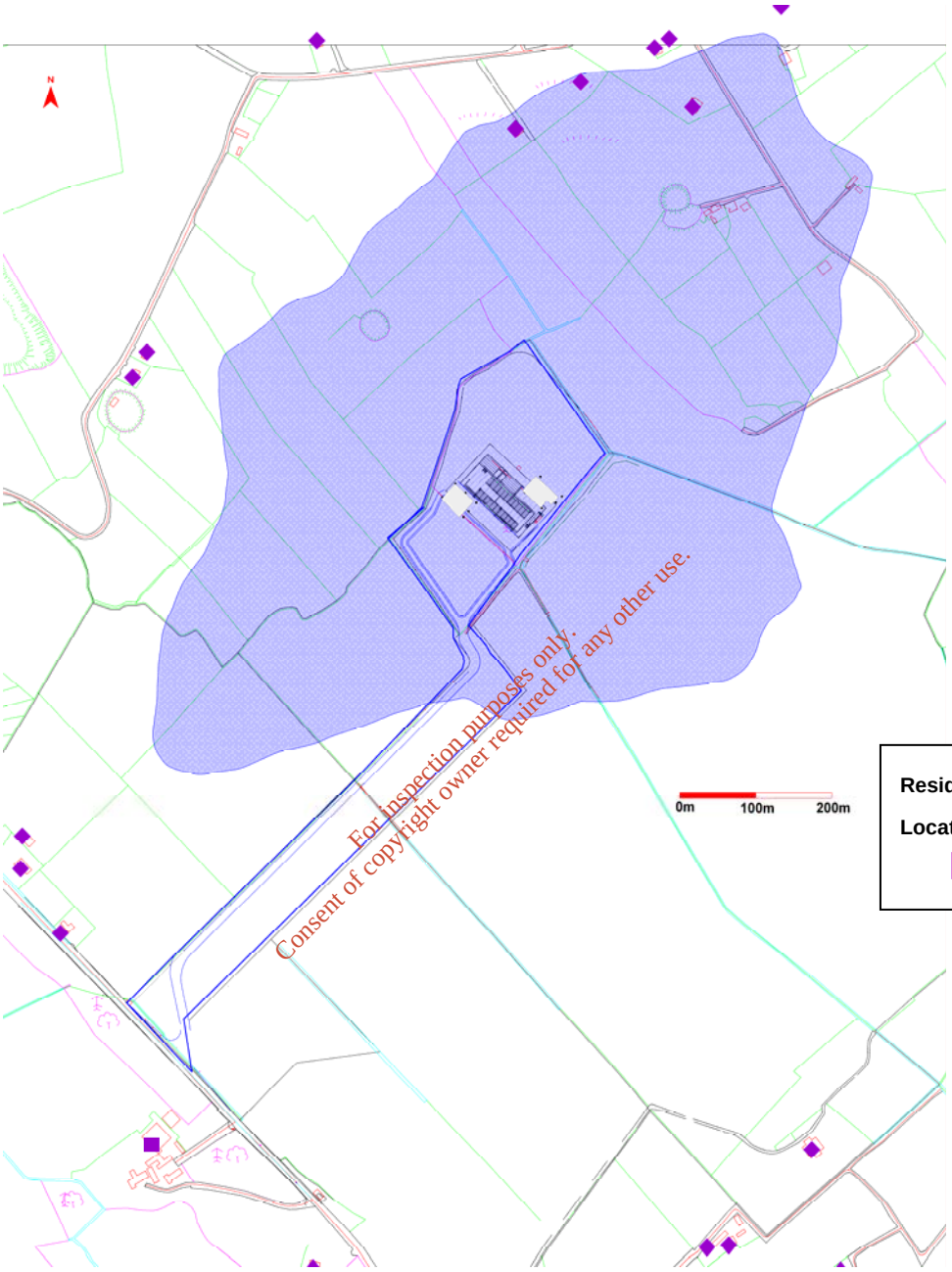
Ref: Scenario 2:

- Predicted odour emission contribution of overall proposed composting facility design operation to surrounding population (see Table 9.7), to odour plume dispersal at the 98th percentile for a ground level concentration of less than or equal to 1.50 OuE m-3 (see Figure 9.5).
- Predicted odour emission contribution of overall proposed composting facility design operation to surrounding population (see Table 9.7), to odour plume dispersal at the 99.5th percentile for a ground level concentration of less than or equal to 3.0 OuE m-3 (see Figure 9.6).
- Comparison between predicted odour impact for existing and proposed facility design for the 98th percentile of hourly averages (see Figure 9.7).
- Comparison between predicted odour impact for existing and proposed facility design for the 99.5th percentile of hourly averages (see Figure 9.8).

These computations give the odour concentration at each Cartesian grid receptor location that is predicted to be exceeded for 0.5% (44 hours) and 2% (175 hours) of five years of hourly sequential meteorological data.

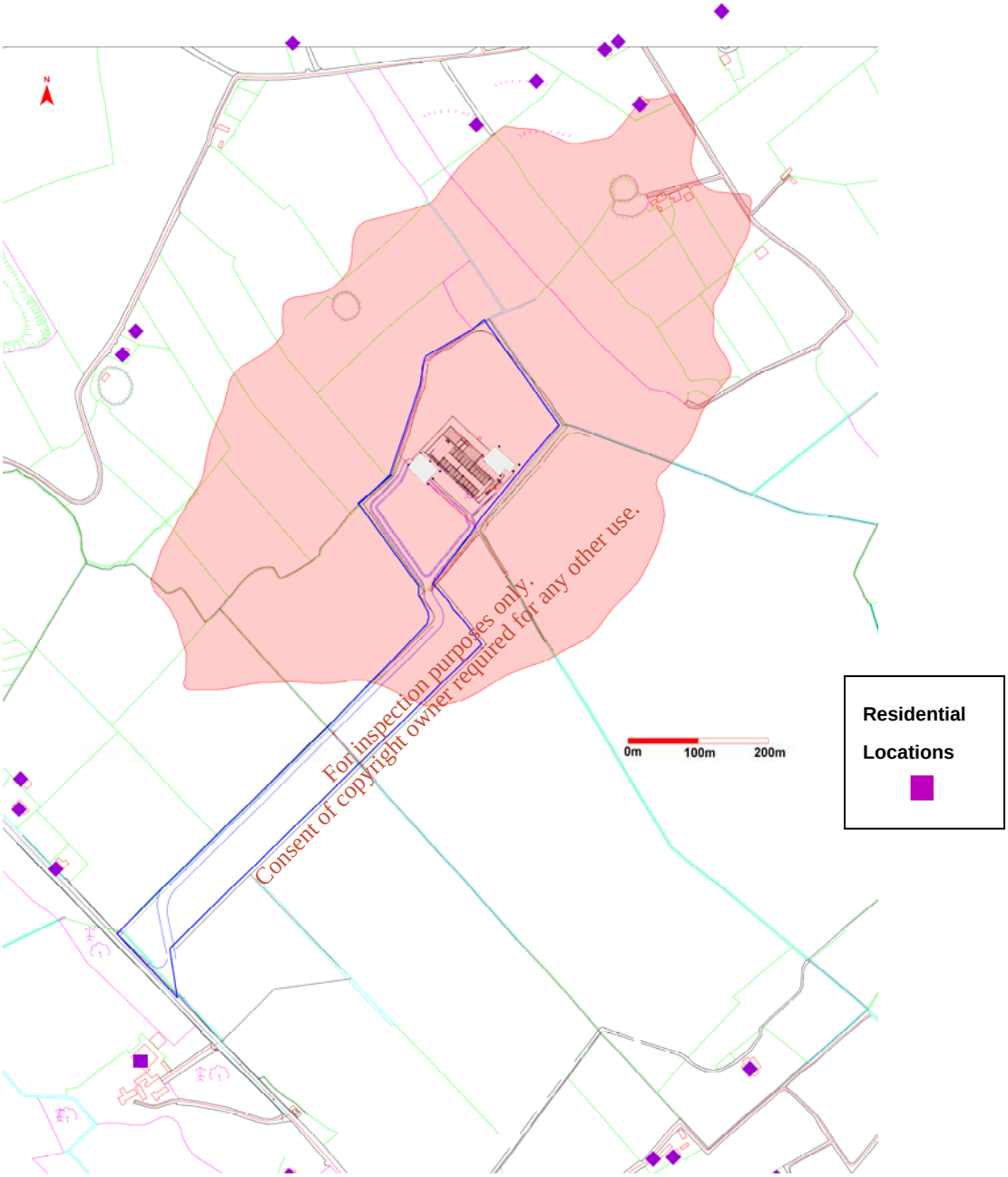
This will allow for the predictive analysis of any potential impact on the neighbouring sensitive locations while the composting facility is in operation. It will also allow the operators of the facility to assess the effectiveness of their odour abatement/minimisation strategies. The intensity of the odour from the two or more sources of the facility operation within the composting facility will depend on the strength of the initial odour threshold concentration from the sources and the distance downwind at which the prediction and/or measurement is being made. Where the odour emission plumes from a number of sources combine downwind, then the predicted odour concentrations may be higher than that resulting from an individual emission source. It is important to note that various odour sources have different odour characters. This is important when assessing those odour sources to minimise and/or abate. Although an odour source may have a high odour emission rate, the corresponding odour intensity (strength) may be low and therefore is easily diluted.

Figure 9.3 Predicted Existing Kilmainhamwood Composting Facility Odour Dispersion Modelling Assessment Contour Plots for Scenario 1 (98th Percentile for an Odour Concentration of ≤ 1.5 OuE m-3)



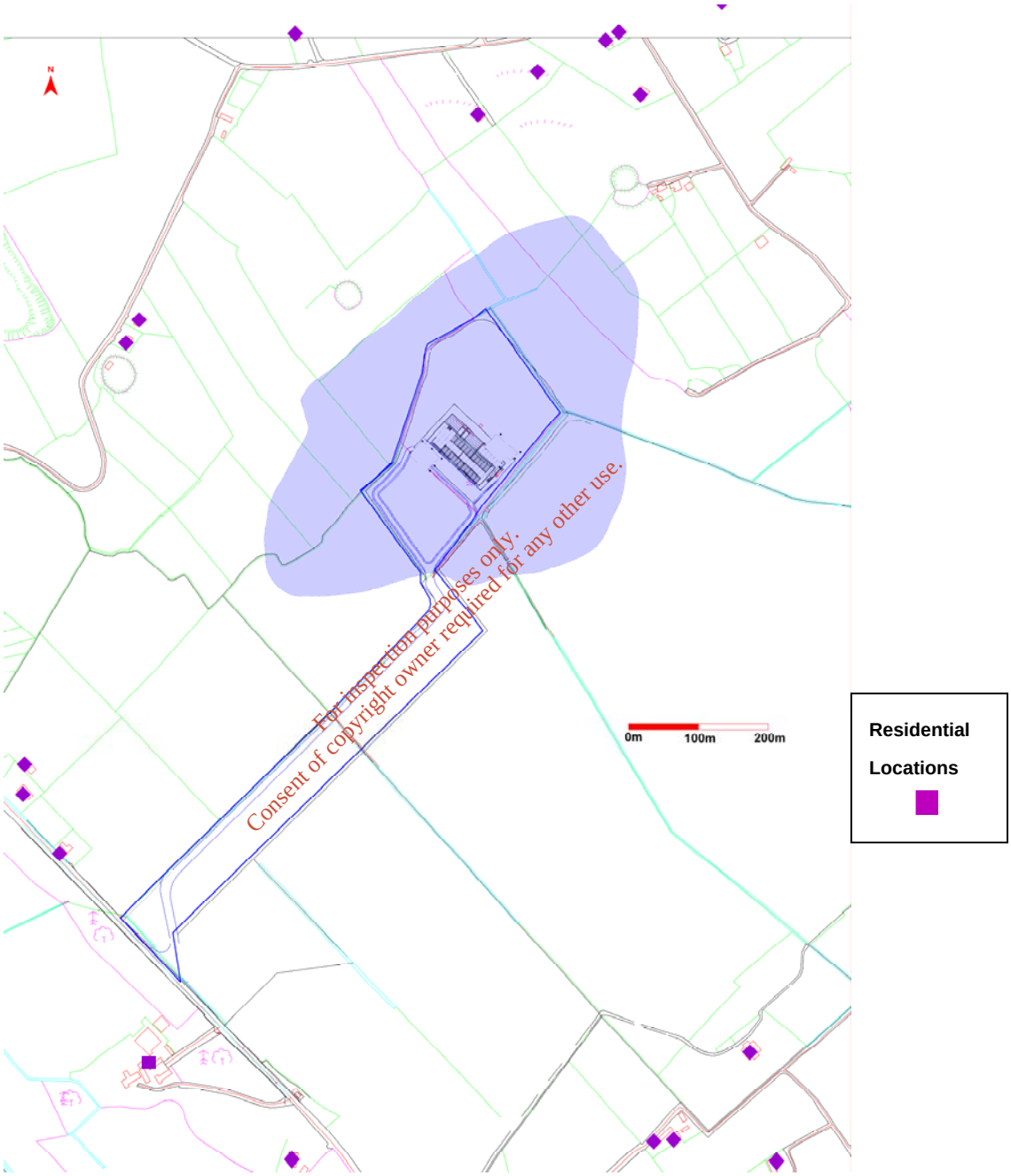
Predicted odour emission contribution of existing overall Kilmainhamwood Composting Facility operation to odour plume dispersal for the 98th percentile for an odour concentration of ≤ 1.5 Ou_E m^{-3} (▬) for 5 years of hourly sequential meteorological data from Clones (2002 to 2006 inclusive).

Figure 9.4 Predicted Existing Kilmainhamwood Composting Facility Odour Dispersion Modelling Assessment Contour Plots for Scenario 1 (99.5th Percentile for an Odour Concentration of ≤ 6 OuE m-3)



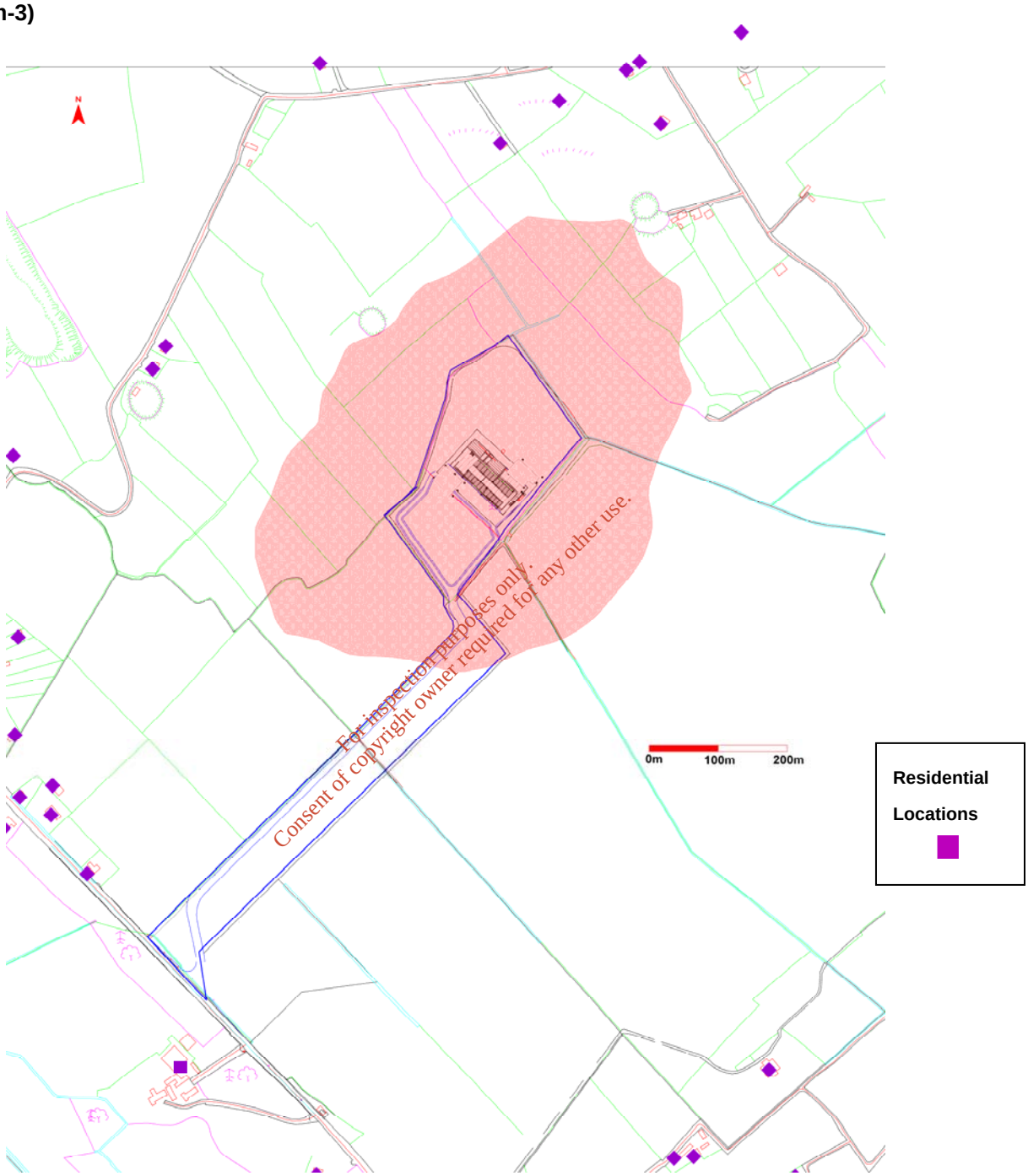
Predicted odour emission contribution of existing overall Kilmainhamwood Composting Facility operation to odour plume dispersal for the 99.5th percentile for an odour concentration of ≤ 6.0 Ou_E m^{-3} (▬) for 5 years of hourly sequential meteorological data from Clones (2002 to 2006 inclusive).

Figure 9.5 Predicted Proposed Kilmainhamwood Composting Facility Odour Dispersion Modelling Assessment Contour Plots for Scenario 2 (98th Percentile for an Odour Concentration of ≤1.50 OuE m-3)



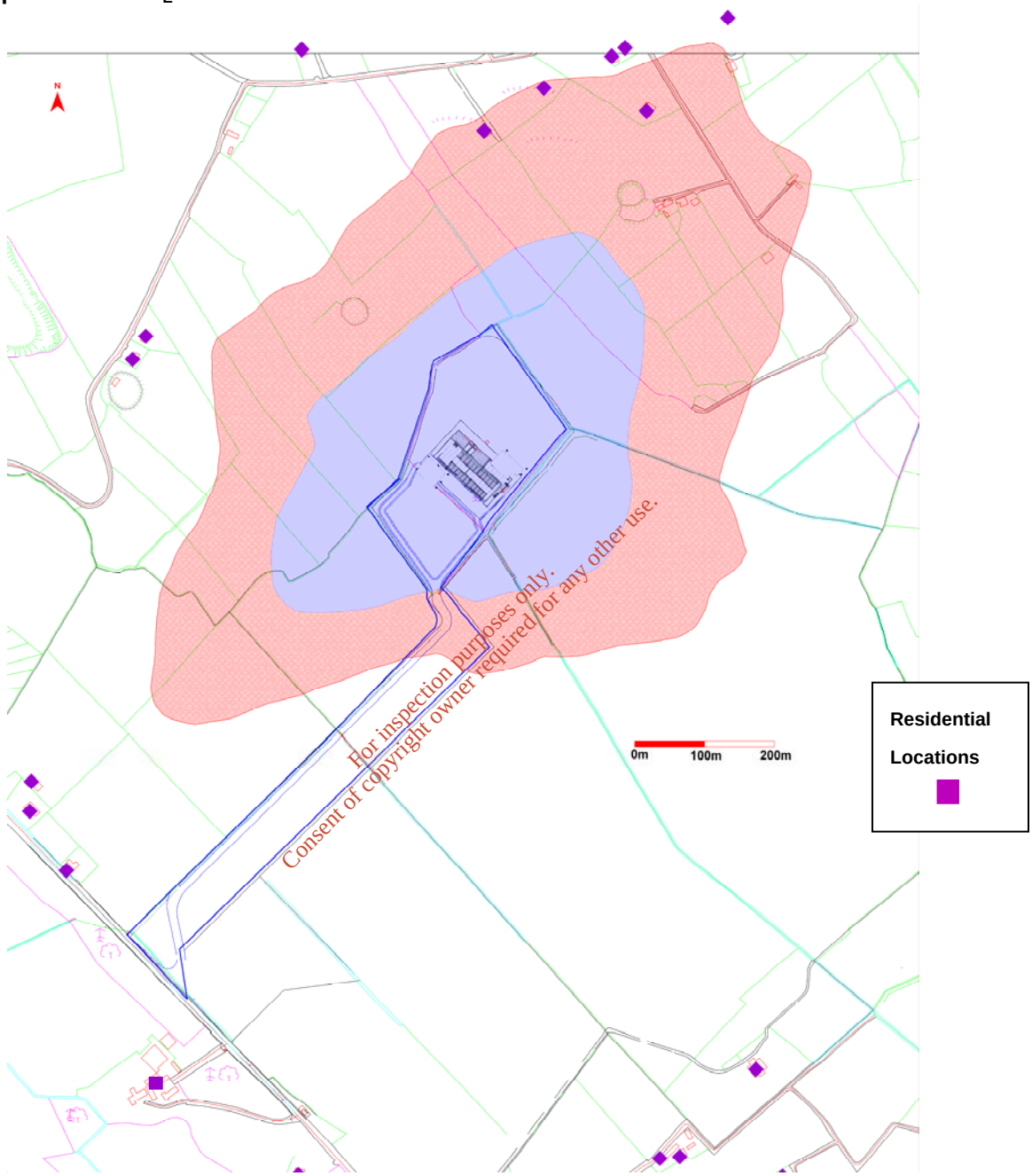
Predicted odour emission contribution of proposed overall Kilmainhamwood Composting Facility operation to odour plume dispersal for the 98th percentile for an odour concentration of ≤1.50 Ou_E m^{-3} (▬) for 5 years of hourly sequential meteorological data from Clones (2002 to 2006 inclusive)

Figure 9.6 Predicted Proposed Kilmainhamwood Composting Facility Odour Dispersion Modelling Assessment Contour Plots for Scenario 2 (99.5th Percentile for an Odour Concentration of ≤3 OuE m-3)



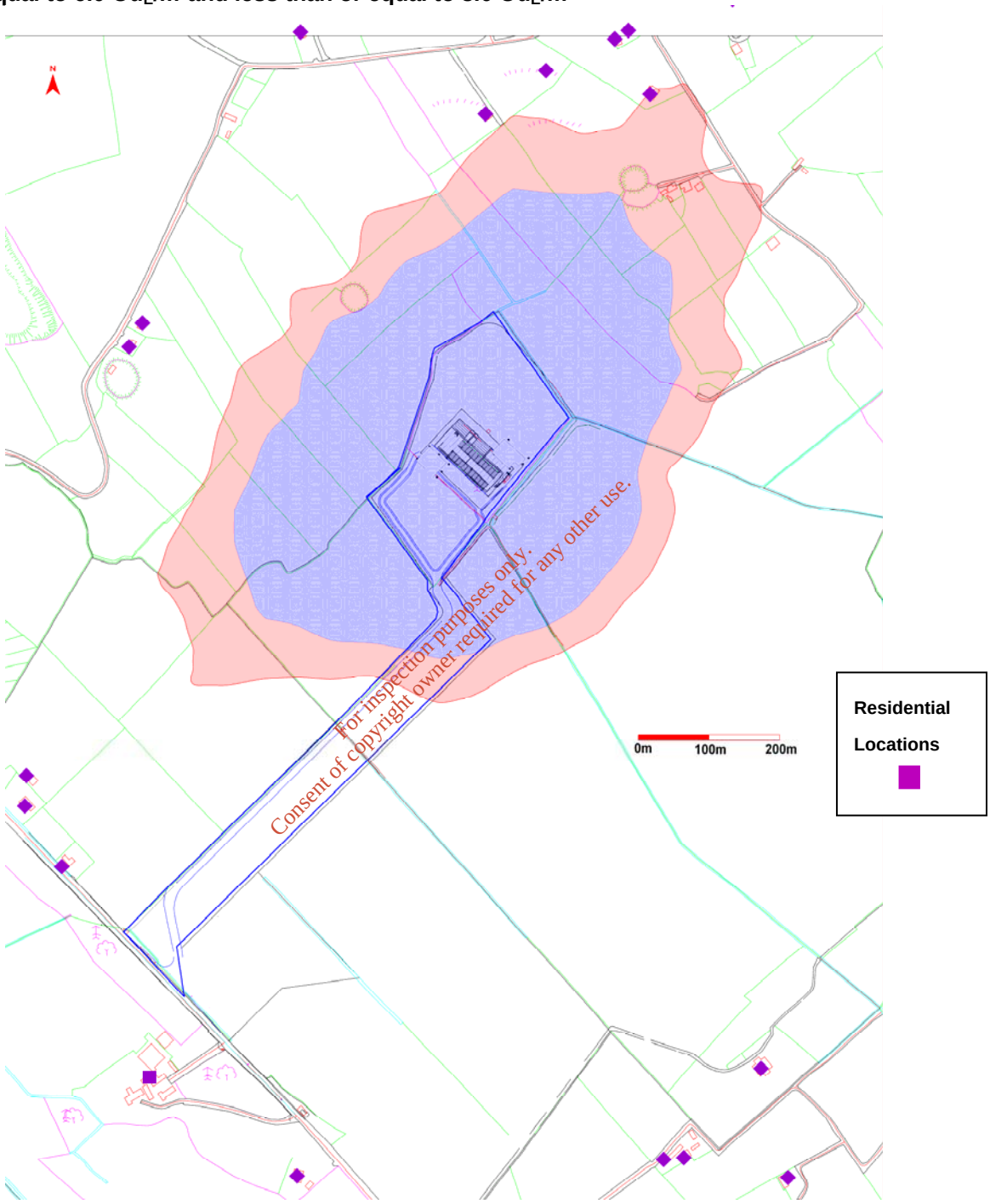
Predicted odour emission contribution of proposed overall Kilmainhamwood Composting Facility operation to odour plume dispersal for the 99.5th percentile for an odour concentration of ≤ 3.0 Ou_E m^{-3} (——) for 5 years of hourly sequential meteorological data from Clones (2002 to 2006 inclusive).

Figure 9.7 Comparison between Predicted Odour Emissions from Existing Compost Facility and from Proposed Compost Facility Design at the 98th Percentile for an Odour Concentration of less than or equal to 1.50 Ou_E/m^3.



Comparison between predicted odour emissions from existing compost facility ( ) and from proposed compost facility design ( ) at the 98th percentile of hourly averages for 5 years of hourly sequential meteorological data for an odour concentration of less than or equal to 1.50 Ou_E/m^3.

Figure 9.8 Comparison between Predicted Odour Emissions from Existing Compost Facility and from Proposed Compost Facility Design at the 99.5th Percentile for an Odour Concentration of less than or equal to 6.0 $Ou_E/m^3$and less than or equal to 3.0 Ou_E/m^3



Comparison between predicted odour emissions from existing compost facility ( ) and from proposed compost facility design ( ) at the 99.5th percentile of hourly averages for 5 years of hourly sequential meteorological data for an odour concentration of less than or equal to 6.0 Ou_E/m^3 ( ) and less than or equal to 3.0 Ou_E/m^3 ( )

9.2.6 Discussion of Results Dispersion Modelling Study

This section provides discussion on the results obtained from the dispersion modelling assessment.

9.2.6.1 Predicted Odour Impact Assessment of Existing Kilmainhamwood Compost Facility (Ref: Scenario 1)

The plotted odour concentrations of ≤ 1.50 OuE m-3 for the 98th and ≤ 6.0 OuE m-3 for the 99.5th percentile for the existing Kilmainhamwood Composting Facility operation is illustrated in Figure 9.3 and Figure 9.4, respectively. The odour contour of less than 6.0 OuE/m3 at the 99.5th percentile was chosen only for representation purposes. Odour levels above 3.0 OuE/m3 at the 99.5th percentile can result in odour impact at the receptor location.

As can be observed in Figure 9.3 (98th percentile for an odour concentration of ≤ 1.5 OuE m-3), it is predicted that the odour plume has a north east/south west spread of approximately 600 to 800 metres from the boundary of the facility. Similarly, as observed in Figure 9.4 (99.5th percentile for an odour concentration of ≤ 6 OuE m-3) it is predicted that the odour plume has a north east / south west spread of approximately 500 to 600 metres from the boundary of the facility. Greater odour plume spread is experienced in the north east/south west directions due to the fact that low dispersion estimates are associated with meteorological conditions with this wind direction and due to the fact that the local topographical features result in the receptors been at a higher elevation.

9.2.6.2 Predicted Odour Impact Assessment of Proposed Kilmainhamwood Compost Facility (Ref: Scenario 2)

The plotted odour concentrations of ≤ 1.50 OuE m-3 for the 98th and ≤ 3.0 OuE m-3 for the 99.5th percentile for the proposed Kilmainhamwood Composting Facility operation is illustrated in Figure 9.5 and Figure 9.6, respectively.

As can be observed in Figure 9.5, it is predicted that odour plume spread is in a north east / south west spread of approximately 150 to 200 metres from the boundary of the facility. All resident locations in the vicinity of the proposed facility operations will perceive an odour concentration less than 1.50 OuE/m3 at the 98th percentile of hourly averages for 5 years of hourly sequential meteorological data. In accordance with odour impact criterion in Section 9.2.3.7 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 composting facility.

Figure 9.6 illustrates that residential receptors located to the north east of the facility will experience an odour threshold concentration of less than 3.0 OuE/m3 at the 99.5th percentile of hourly averages. In accordance with odour impact criterion in Section 9.2.3.7, and in keeping with currently recommended odour impact criterion in this country, no short-term odour impacts will be generated by receptors in the vicinity of the composting facility.

Figures 9.7 and 9.8 illustrate the comparison between the existing and proposed impacts from the facility operations. As can be observed there is a significant reduction in the odour plume spread with all

residential locations perceiving an odour concentration less than 1.10 OuE/m3 and 2.60 OuE/m3 for the 98th and 99.5th percentile of hourly averages for 5 years of hourly sequential meteorological data. Therefore it is concluded that no short or long term odour impacts will be generated by the proposed extension to the composting facility and intensification of waste acceptance as a result of the upgrading of the odour abatement system.

9.2.7 General Conclusions

The following general conclusions were drawn from the study:

1. This document provides the structure and methodologies for the development of an overall odour management, minimisation and mitigation procedure for the relevant operating entities at the operating composting facility.

2. The overall existing building structure at the facility is effective in terms of containment since the inner building fabric has been coated with a layer of expanded foam. This minimises potential leakage from the facility building when the wind is blowing on the building.

3. Following an odour audit of the existing facility, the measured odour threshold concentration on biofiltration system 1 ranged from 1218 Ou_E/m^3 to 1,878 Ou_E/m^3 with an average odour threshold concentration of 1,514 Ou_E/m^3. The measured odour threshold concentration on biofiltration system 2 ranged from 1579 Ou_E/m^3 to 2,233 Ou_E/m^3 with an average odour threshold concentration of 1,953 Ou_E/m^3. The odour threshold concentration from biofiltration system 2 was approximately 29% higher than biofiltration system 1. The average odour emission rate from biofiltration system 1 and 2 was 15,981 Ou_E/s and 34,178 Ou_E/s, respectively. This equated to a total maximum odour emission rate of 50,159 Ou_E/s for a total volumetric airflow treatment capacity of 101,000 m^3/hr. Due to the larger volume of air passing through biofiltration system 2, the odour emission rate from this system was on average 2.14 times higher than biofiltration system 1.

4. The dispersion modelling exercise was performed utilising AERMOD Prime dispersion model and the gathered olfactometry data and source characteristics on each biofiltration system for the existing facility design. The overall odour emission rate from the biofiltration system on the day of monitoring will lead to an odour plume spread from 500 to 800 metres from the facility boundary. Greater odour plume spread is experienced in the north east/south west directions due to the fact that low dispersion estimates are associated with meteorological conditions with this wind direction and due to the fact that the local topographical features result in the receptors been at a higher elevation.

5. In terms of the proposed upgrade, improvements in double containment and scrubbing of the composting air itself will lead to increased odour removal efficiencies on each biofiltration system. The efficient capture and zoned treatment of the odourous air will ensure sustained

performance of the odour control system. Improvements in the biofiltration system design will ensure efficient air distribution within the biofilter bed. The implementation of acid scrubbing on the composting air itself will minimise the carryover of ammonia to the biofiltration bed and thereby minimise acidification of the media.

6. From proposed upgrade facility design, a maximum allowable odour threshold concentration of 800Ou_E/m^3 was determined for biofiltration system 1 and 2. This equates to a total maximum odour emission rate of 17,778 Ou_E/s for a total volumetric airflow treatment capacity of 80,000 m^3/hr. When compared to the existing odour emission rate this is approximately 64% lower and is significantly lower than existing conditions. Following dispersion modelling utilising AERMOD Prime, no odour impact will be perceived by residential receptors in the vicinity of the facility. All residential locations will perceive an odour concentration less than 1.10 Ou_E/m^3 at the 98^{th} percentile of hourly averages for 5 years of hourly sequential meteorological data. In addition, all residential locations will perceive an odour concentration less than 2.60 Ou_E/m^3 for the 99.5^{th} percentile of hourly averages for 5 years of hourly sequential meteorological data. This is approximately 13% and 27% lower than the accepted odour impact criterion for such facilities.

7. This overall document provides a strategy and design notes for the optimisation of odour minimisation, mitigation and control of odour emissions from the composting facility and provides the backbone development of an odour management and preventative maintenance plan for the processes. In moving forward, the guaranteed emission rates of odours will provide compliance with the odour impact criterion contained in Section 9.2.3.7.

9.2.8 General Recommendations

The following recommendations were developed during the study and will be implemented at the Kilmainhamwood Compost facility for the proposed facility extension and upgrade of the odour abatement system:

1. Odour management, minimisation and mitigation procedures as discussed within this document will be implemented at the composting facility in order to prevent any odour impact in the surrounding vicinity.
2. The maximum allowable odour emission rate from the overall composting facility biofilters will not be greater than 17,776 $Ou_E\ s^{-1}$ (see Table 9.7).
3. Maintain good housekeeping practices (i.e. keep yard area clean, etc.), closed-door management strategy (i.e. to eliminate puff odour emissions) at current high levels. All odourous processes will be carried out indoors within the proposed facility as currently occurs.
4. The odour management plan will include a process description, management strategies for the prevention of emissions and a strict maintenance and management program for ensuring all odour mitigation techniques remain operation at optimal capacity throughout all operational scenarios.

5. Operate the composting facility within specifications to eliminate overloading and under loading, which may increase emissions from the processes.
6. Within the proposed upgrade and increased capacity design, the following will be implemented:
    a. The recently enclosed tunnel composting process (completed in January 2010) will be negatively ventilated to an acid scrubbing system before treatment within the upgraded odour control system.
    b. Appropriate moisture application will be installed upon the biofilter beds so as to ensure optimal operation.
    c. The air distribution system within each biofilter cell will be optimised so as to optimise equal air distribution within each biofilter bed and ensure efficient treatment of odours.
    d. Optimise and implement a SCADA system, or a similar monitoring system for the control and monitoring of the process in terms of air handling.
    e. Optimised long life inorganic bed medium will be installed within biofilter cell 2.

9.3 AEROSOLS

9.3.1 Potential Impacts

The production of bioaerosols, such as actinomycetes, bacteria, fungi, antropods, and protozoa, from biowaste composting facilities has generated some concern. Several studies have been carried out both in Europe and the United States investigating the generation and effect of bioaerosols on workers and the neighbouring population at a range of composting facilities.

One such study was undertaken by a group of international experts on bioaerosols, risk assessment and composting who investigated the impact of bioaerosols on workers at composting facilities. The study found that although some types of bioaerosols (mainly *Aspergilus fumigatus*) are present in the air at composting facilities, available epidemiological evidence does not support the suggestions of allergic, asthmatic, or acute or chronic respiratory diseases in the general public at or around the several open air and one enclosed composting facility.

Their overall conclusion that 'composting facilities do not pose any unique endangerment to the health and welfare of the general public' is based on the fact that on-site workers at composting facilities were regarded as the most exposed part of the community, and where workers health was studied, for periods of up to 10 years on a composting site, no significant adverse health effects were found. A separate study showed that microbial and endotoxin emissions from an enclosed composting facility fitted with a biofilter are generally low and similar to background concentrations found in ambient air.

Most bioaerosols generated during the composting process occur during the mechanical treatment of biowaste and the first stage of composting. These processes will be fully enclosed. All process steps in the facility will be equipped with air extraction and biofilter treatment of process air. It is therefore envisaged that no significant emissions of bioaerosols will occur from the Kilmainhamwood Compost facility and that no impacts are expected.

9.3.2 Mitigation Measures

Since it is envisaged that aerosol emissions are not significant and no potential impacts are expected, no specific mitigation measures have been identified. During the mechanical treatment of the compost, workers will wear respiratory protective equipment, i.e. facemasks. All mechanical equipment such as front-end loader will be fitted with air filters and the machine cabins will have a positive pressure environment.

9.4 CLIMATE

9.4.1 Introduction

In this section a general overview of the climate in the Meath region and more specific meteorological data for the existing composting site at Ballynalurgan, Co. Meath are outlined. Information on rainfall and potential evapotranspiration for the area is provided. This is based on information obtained from the Meteorological Service. Wind speed and orientation is also detailed.

9.4.1.1 Study Methodology

All meteorological data contained in this report has been received from Met Éireann. This information is adjusted when necessary to take into account the site's location and elevation. All calculations detailed in the report are advised methods as described by Met Éireann personnel.

9.4.2 Existing Environment

9.4.2.1 General

Over the summer months the influence of anti-cyclonic weather conditions on the Western and North Western region results in dry continental air interspersed by the passage of Atlantic frontal systems. During much of the winter period the climate is characterised by the passage of Atlantic low-pressure weather systems and associated frontal rain belts from the west. Occasionally the establishment of a high-pressure area or anticyclone over Ireland results in calm conditions and during the winter months these are characterised by clear skies and the formation of low-level temperature inversions with light wind conditions at night time. If anticyclonic conditions become established for a few days or more during the summer months, high temperatures during the day might be recorded, especially at inland locations. Long spells of dry weather are relatively rare but should continental air masses or anticyclones persist over Ireland a period of drought conditions may occur which could last up to two or three weeks.

9.4.2.2 Weather Observing Stations

Rainfall Stations

There is a number of rainfall measuring stations throughout the country. These stations measure the daily rainfall in millimetres (mm). A number of these also measure additional parameters such as soil moisture, temperature, humidity, etc.

Synoptic Stations

Synoptic stations are those, which observe and record all the surface meteorological data. These observations include rainfall, temperature, wind speed and direction, relative humidity, solar radiation, clouds, atmospheric pressure, sunshine hours, evaporation and visibility. They report a mixture of snapshot hourly observations of the weather known as synoptic observations, and daily summaries of the weather known as climate observations. There are 15 synoptic stations located throughout Ireland.

9.4.2.3 Rainfall

There is no meteorological data specific to the existing site. In order to give reliable climatic data on a particular area a weather station should be within 10km of the site and in operation for at least 30 years. A climate station is located at Kingscourt Gypsum, approximately 1km west of the existing facility. This climate station is in operation since 1981. The nearest synoptic station is at Clones Synoptic Station and this is located approximately 50km northwest of the development site. Specifics of these measuring stations relative to the development site are outlined in Table 9.8.

Table 9.8 Designated Meteorological Stations for the Kilmainhamwood Composting Facility

Location	Grid Reference	Elevation (m O.D. MH)	Height Difference (m)
Kilmainhamwood Compost Facility	N789922	74	-
Kingscourt Gypsum	N788922	67	7
Clones Synoptic Station	H500263	89	1

The elevation of the rainfall gauge at Kingscourt Gypsum measuring station is 67m O.D. The elevation of the development site is approximately 74m O.D. The average monthly and annual precipitation recorded at Kingscourt Gypsum measuring station is detailed in Table 9.4 below. According to Met Eireann, annual precipitation levels increase by 200 - 300mm per 100m elevations. The height difference between the rainfall gauging station and the development site is approximately 7m. Therefore, the annual precipitation due to the elevation of the development site shall be adjusted by 18mm (See Table 9.9).

Table 9.9 Average Monthly and Annual Precipitation (mm)

Location	Kingscourt Gypsum	Kilmainhamwood Composting Facility
Ht. m O.D.	67	74
January	106	108
February	73	74
March	77	78
April	64	65
May	69	70
June	66	67
July	63	64
August	84	86
September	87	89
October	97	99
November	88	90
December	100	102
Annual mm	973	992

At the composting facility area, approximately 56% of the total annual rainfall is recorded during the winter period (October – March). This amount of precipitation (including snow) will normally be associated with more prolonged Atlantic frontal weather depressions passing over the region compared to the summer.

9.4.2.4 Evapotranspiration and Effective Rainfall

The nearest meteorological station with evapotranspiration measuring equipment is located at the Clones Synoptic Station. Evapotranspiration is the return of water vapour to the atmosphere by evaporation from land and by the transpiration of plants, generally measured from a short-grass covered surface (such as a permanent pasture) adequately supplied with water. Evaporation is the return of water vapour to the atmosphere by evaporation from a free water surface such as a pan of water, known as a “Class A Pan”, fitted with a depth measuring gauge. The evapotranspiration figures for the Clones Synoptic Station are detailed in Table 9.10.

It can be noted that evapotranspiration is very low during winter months, when plant growth is minimal. The vast majority of evapotranspiration during winter months is attributable to direct evaporation from ground surfaces. During summer months the rate of evapotranspiration increases and often exceeds the monthly rainfall. This is due to increased free evaporation from the surface and from transpiration from leaves and plants.

Using the rainfall data calculated for the site in Table 9.9 and the potential evapotranspiration data for the nearest synoptic station, i.e. Clones Synoptic Station, the effective rainfall for the subject site can be calculated. Table 9.10 also shows the effective rainfall to the site. Any rain falling on the site will infiltrate to the ground, evaporate from the surface or become surface water runoff.

Table 9.10 Hydrological Data for the Development Site

Month	Rainfall (mm)	Potential Evapo-transpiration (mm)	Actual Evapo-transpiration (mm) (PE x 0.92)	Effective Rainfall (mm)
January	108	2.4	2.2	105.8
February	74	14.6	13.4	60.9
March	78	29.9	27.5	50.9
April	65	51.7	47.6	17.6
May	70	72.1	66.3	3.9
June	67	79.8	73.4	-6.2
July	64	74.1	68.2	-4.0
August	86	58.5	53.8	31.7
September	89	35.9	33.0	55.6
October	99	16.8	15.5	83.3
November	90	3	2.8	86.9
December	102	-0.5	-0.5	102.3
Total	1032	438.3	403.2	588.8

The surface water runoff drainage system is discussed in more detail in Section 8.3 of the water section of this report.

9.4.2.5 Wind

The closest synoptic weather station with the capability of measuring wind and that has been in operation for at least 30 years is the Clones Synoptic Station, which is approximately 50km northwest of the existing development site.

The wind rose for the Clones Synoptic Station shows that the prevailing winds are from the southwest (See Appendix 9.2). The mean wind speed at Clones Synoptic Station is 7.9 knots. This value is also applied to the existing composting facility site.

9.4.3 Potential Impacts

On a local scale, the climate will not be altered by the proposed development of an extension to the existing composting facility.

Composting is a degradation process that would occur naturally and therefore the production of carbon dioxide from this process is not considered to contribute to global greenhouse gas levels. Also the composting of these materials will ensure that these materials are not sent to landfill thereby reducing methane generation due to anaerobic decomposition.

9.4.4 Mitigation Measures

As there will be no significant impact on the local or global climate, there are no mitigation measures proposed other than the operation of the facility to BAT guidelines.

10 NOISE AND VIBRATION

10.1 INTRODUCTION

This chapter of the EIS shall explore the potential Noise and Vibration impacts associated with the proposed extension to the existing compost facility at Kilmainhamwood, Kells, County Meath.

The current application proposes to extend the existing facility buildings in order to provide sufficient processing capacity for the additional tonnage. It is proposed to construct a 38m x 25m extension on the southwest side of the existing facility and an extension 39m x 30m on the northeast side of the existing facility. The proposed extensions to the facility buildings are shown on Drawing No. 5361–2402 and Drawing No. 5361-2403. The extensions to the buildings will a steel portal frame design featuring 3.0m high mass concrete walls and green cladding (to match character of the existing buildings). The height of the proposed extensions will not be any higher than the existing buildings.

10.2 EXISTING ENVIRONMENT

The existing environment is already a composting facility which this proposed development seeks to expand. Noise levels for the area are presented below and are taken from the Annual Environmental Reports for the existing facility.

Two principal environmental noise parameters were measured which are defined below.

L_{Aeq} is the A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value.

L_{A90} is the A-weighted sound level that is exceeded for 90% of the measurement period and is used to quantify background noise level.

A-weighting is the process by which noise levels are corrected to account for the non-linearity of human hearing. All noise levels quoted are relative to a sound pressure of $2x10^{-5}$ Pa.

Typical ranges of noise levels are presented in Table 10.1 below to compare against the baseline noise levels measured:

Table 10.1 Typical Noise Levels in Our Environment

Sound levels in decibels dB (A)	Description of Activity
0	Absolute silence
25	Very Quiet room
35	Rural night time setting with no wind
55	Day time, busy roadway 0.5km away
70	Busy Restaurant
85	Very busy pub, voice has to be raised to be heard
100	Disco or rock concert
120	Uncomfortably loud, conversation impossible
140	Noise causes pain in ears

Source: Guidance Note for Noise in relation to Scheduled activities, 2nd Edition, EPA 2006.

A description of the noise monitoring locations is presented in Table 10.2 below.

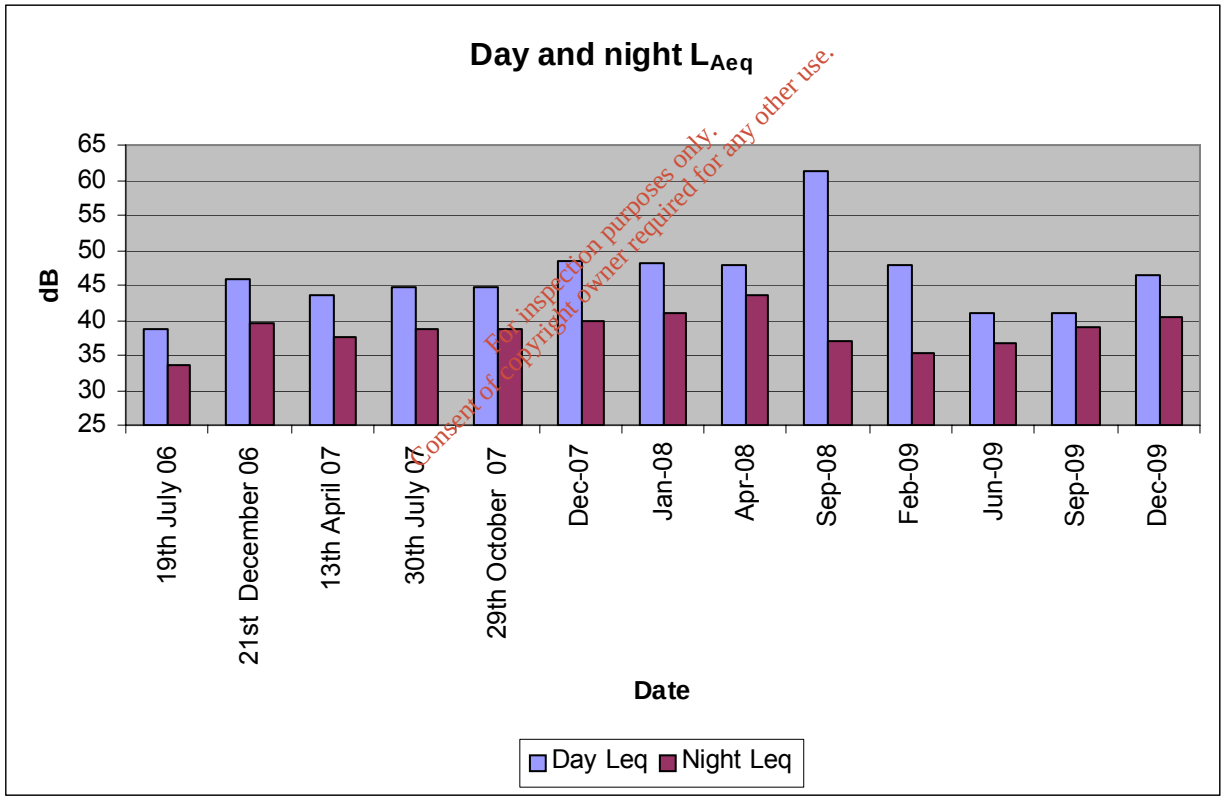
Table 10.2 Noise Monitoring Locations

Position No.	Description
N1	At entrance road to existing facility as per Schedule D of waste licence W0195-01 and illustrated on Drawing No. 5361-2406

10.2.1 Survey Results

The Annual Environmental Report noise measurement location was chosen (as per Schedule D of waste licence W0195-01) to represent, as best as practicable, typical noise levels in the surroundings of the facility. A description of these locations and the noise levels measured are detailed below in Figures 10.1 and 10.2.

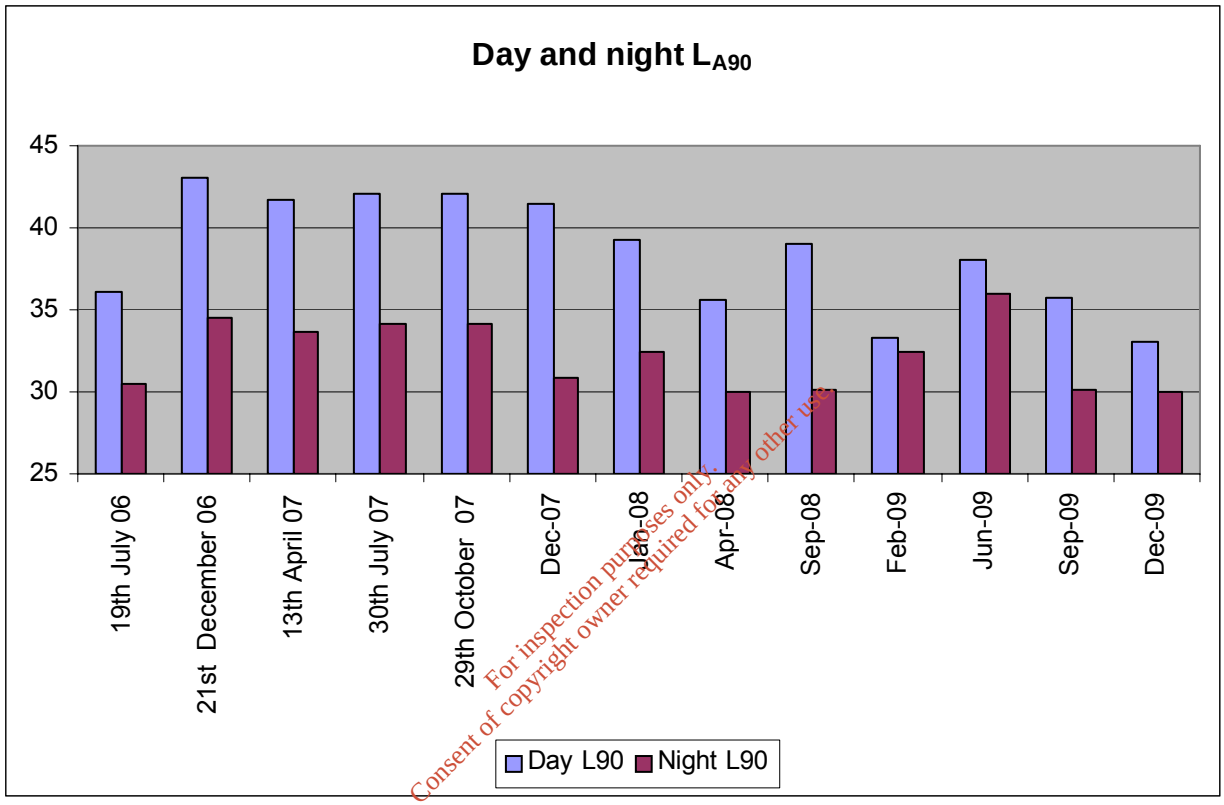
Figure 10.1 Day and night time L_{Aeq} values from 2008 and 2009 Annual Environmental Reports



The relatively steady state noise levels as shown above from July 2006 through to April 2008, and from February 2009 through to December 2009 would be deemed to be typical of the noise emissions from the site. The elevated reading during the day time in September 2008 was derived from off-site noise sources, including sheep in the adjacent field and a helicopter which was hovering overhead in the area at the time of the survey. This is evident as the work practices were unchanged in this period from those preceding it and following it. This was reported to the EPA as part of the annual environmental report (Appendix 2.4).

Similarly the operation of the facility runs on a 24hr basis and there is no corresponding elevation in the night time noise for the same period. As such it can be considered that the once off, elevated noise levels measured in September 2008 are derived from off-site sources, and would not constitute a depiction of the noise emissions from the site.

Figure 10.2 Day and night time L_{A90} values from 2008 and 2009 Annual Environmental Reports



10.3 PREDICTED IMPACTS

The potential noise and vibration impacts associated with the proposed extension to the Kilmainhamwood Compost facility are divided between the construction and operational phases of the development.

10.3.1 Construction Phase

The construction phase of the development has potential to increase noise levels at noise sensitive locations surrounding the development site. The nearest noise sensitive locations are situated at distances of a minimum of 400m from the existing facility and proposed extensions.

Impact from the construction phase will depend on the number and type of equipment used during the construction of the facility extensions. Construction noise sources will result in a temporary impact on

the noise climate in the area. The construction phase should not give rise to excessive noise levels. During the construction phase, there will be minimal noise impact from trucks (involved in construction activities) entering and exiting the site as the increase in road haulage numbers due to the proposed construction activities will be limited. Construction noise levels are outlined in Table 10.3.

Table 10.3 Construction Phase Noise Levels

BS5228 Calculations	Estimated Construction noise levels at varying distances LAeq 1 hour			
Plant	**Receptor 1**	**Receptor 2**	**Receptor 3**	**Receptor 4**
	388m	**403m**	**412m**	**730m**
Dozer	20	20	20	13
Dumper truck	10	10	10	3
Cement Lorry	11	11	11	4
Telescopic handler	13	13	13	6
Tracked Excavator	47	47	47	40
Tracked mobile crane	29	29	29	22
Combined Level LAeq 1hour	**47dB**	**47dB**	**47dB**	**40dB**

Predicted noise levels have been estimated using the methodology described in *BS: 5228: Noise and control on construction and open sites, 1997*. Predictions are based on typical equipment used during various constructive stages of the development. Predictions are based on a L_{Aeq}1hour value with all machinery listed in Table 10.3 operating for a continual period of 1 hour. This may be considered a worst-case scenario as machinery may operate for shorter periods and may not work simultaneously. Additionally, calculations are based on minimum distances between site activities and the nearest noise sensitive locations.

In Ireland, there are no statutory guidelines relating to noise limits for construction activities. These are generally controlled by local authorities and commonly refer to limiting working hours to prevent a noise nuisance. The National Roads Authority (NRA) report entitled '*Guidelines for the treatment of noise and vibration in national road schemes'* 2004, has outlined recommended noise levels for construction noise during road works. Although these refer to road projects, they have been developed in line with typical construction noise limits on general construction projects used previously in Ireland.

The limits outlined represent a reasonable compromise between the practical limitations during a construction project and the need to ensure an acceptable ambient noise level for local residents. As a result, these limits have become the most acceptable standard for construction noise limits for EIS assessments to date. The authority does note however that where pre-existing noise levels are particularly low, more stringent levels may be more appropriate. Table 10.4 below details these recommended limits.

Table 10.4 Typical maximum permissible noise levels at the façade of dwellings during construction activities (NRA Draft guidelines for the treatment of noise and vibration in national road schemes 2004)

Day & Times	L_{Aeq} (1hr) dB	L_{Amax} dB
Monday – Friday (07:00 to 19:00 hrs)	70	80
Monday – Friday (19:00 to 22:00 hrs)	60[1]	65[1]
Saturday (08:00 to 16:30 hrs)	65	75
Sundays and Bank Holidays (08:00 to 16:30 hrs)	60[1]	65[1]

[1] Construction activities at these times, other than that required in respect of emergency works, will normally require the explicit permission of the relevant local authority.

The predicted construction noise levels in Table 10.3 are in full compliance with the recommended noise levels for construction projects, and are significantly below the applicable threshold. As the predicted values are a worst-case assessment the impact is likely to be slight to moderate on noise sensitive locations, when the ambient noise levels are taken into account. The temporary nature of the construction period and the variety of machinery used should ensure that no construction activity is operational for long periods. This phase will therefore result in short term impacts, and will in all probability not be as loud as the worst-case predictions in Table 10.3.

10.3.2 Operational Phase

The proposed extension to the currently operating composting facility is intended to operate on a 08:00 to 18:00 basis Monday to Friday and 08:00 to 13:00 on Saturday and as such shall be operated in a manner so as to ensure adherence to the EPA *Guidance Note For Noise In Relation To Scheduled Activities* which outlines a limit of a free-field LAr,T value of 55dB by daytime (08:00 – 22:00), at any noise sensitive location. During night-time (22:00 – 08:00), the noise attributable to on-site activities should not exceed a free-field LAeq, T value of 45 dB. Rigorous efforts shall be made to avoid clearly audible tones and impulsive noise at all sensitive locations. Additional air handling fans proposed for the facility extension are of similar design to the existing fans and are therefore not expected to produce a tonal component.

The existing ambient noise levels in the area which is inclusive of the existing facility are significantly below the daytime 55dB L_{Aeq} value, and are also significantly below the 45dB L_{Aeq} nightime value. It is considered highly unlikely that the proposed extension would reach these levels, even in a worst-case scenario, as this proposal consists of similar activity to that currently in place.

All of the major noise producing plant associated with the proposed development will be situated within the purpose built buildings associated with the development. The noise sources associated with the proposed development in the operational phase will consist of:

- Noise generated by site operations including 2 new loading shovels and 9 no. extraction fans; and

- Noise generated by road traffic to and from the site.

With regard to noise generated from on site activity this will be composed of typical Composting Facility machinery as currently used on the site as it operates at present.

Additional roof fans will be employed in the design of the extended portion of the operations will not cause significant impact to the nearest sensitive receptors, as they will be similar in character and emission to those currently in operation without significant impact.

All 9 of the new fans will be placed inside the site buildings, seven new fans will be in the existing reception hall and two fans will be in the new building at the end of the process. This comprises a total of 9 new centrifugal fans, each with a noise level of 85 dB(A).

An assessment of the propagation of noise from the addition of these fans and of the loading shovels to the nearest sensitive receptors and noise monitoring location has been under taken. A conservative 30dB has been used in the calculations for attenuation provided by the structure of the building itself.

Predicted noise levels have been estimated using the methodology described in BS: 5228: Noise and control on construction and open sites, 1997. Predictions are based on noise levels obtained from the supplier of the fans, intended to be used in the process. Predictions are based on a LAeq1hour value with fans operating for a continual period of 1 hour.

Results from noise monitoring carried out on site by Thorntons Recycling on 5th June 2009 have been used to characterise the existing noise climate at the site. All measurements were carried out during day time and night time as specified in waste licence No W0195-01. Environmental noise analysers had data logging facilities set on real-time, the logged data was later downloaded via a personal computer using software. One-third octave frequency analyses were taken at the one location using the Bruel & Kjaer 2238 Integrating Sound Level Analyser/Data logger with real-time frequency analyser facility.

The measurement location was away from reflecting surfaces and at 1.5m height above local ground. All plant fixed and mobile was in normal operation.

All acoustic instrumentation was calibrated before and after the survey period and no drift of calibration was observed (calibration level 94dB).

The results of the noise survey are given in Table 10.5.

Table 10.5 Recorded Noise Levels dB(A) – Intervals Approximate 30 minutes

Location	Date	Time	Leq	L10	L90	Comments
N1	5th June '09 **Day time**	15.23	41.0	47.0	38.0	Daytime activity from works slightly audible. Leq at less than 41 dBA.
	5th June '09 **Night time**	20.14	36.6	47.0	36.0	Hum from road traffic noise

The noise impact of the additional fans and loading shovels proposed for the day time and night time periods have been predicted and are presented in Tables 10.6 and 10.7 below respectively. The cumulative impact of the predicted noise emission from the new fans/loading shovels on the existing noise climate is presented.

Table 10.6 Predicted Day Time Noise Impact

BS5228 Calculations	Estimated Daytime noise levels at varying distances LAeq 1 hour				
Plant	Receptor N1	Receptor N2	Receptor N3	Receptor N4	EPA Monitoring location
	388m	403m	412m	730m	157m
9 new fans	27	26	26	20	37
2 loading shovels	11	11	11	4	21
Existing noise climate Leq	41	41	41	41	41
Combined Level LAeq 1hour	**41.2**	**41.2**	**41.1**	**41.0**	**42.4**
Applicable Limit Value	**55**	**55**	**55**	**55**	**55**

Table 10.7 Predicted Night Time Noise Impact

BS5228 Calculations	Estimated Night time noise levels at varying distances LAeq 1 hour				
Plant	Receptor N1	Receptor N2	Receptor N3	Receptor N4	EPA Monitoring location
	388m	403m	412m	730m	157m
9 new fans	27	26	26	20	37
2 loading shovels	11	11	11	4	21
Existing noise climate Leq	37	37	37	37	37
Combined Level LAeq 1hour	**37.0**	**37.0**	**37.0**	**36.7**	**39.7**
Applicable Limit Value	**45**	**45**	**45**	**45**	**45**

As can be seen from the predicted noise levels in Tables 10.6 and 10.7, the predicted noise levels for both the day and night time periods are comfortably within the limits outlined in the EPA Guidance Note For Noise In Relation To Scheduled Activities at a free-field LAr,T value of 55dB by daytime (08:00 – 22:00), at any noise sensitive location. During night-time (22:00 – 08:00), the noise attributable to on-site activities should not exceed a free-field LAeq, T value of 45 dB.

10.3.2.1 Traffic Noise

Thorntons Recycling provided the input data for the traffic noise assessment for the proposed facility extension. HGV traffic is predicted to increase by 5.8 movements per day, and car traffic is predicted to increase by 4 movements per day.

This equates to 0.64 additional HGV movements per hour and 0.44 additional car movements per hour (on the basis of a 9 hour day). These numbers are not predicted to have any significant effect on the surrounding noise climate.

10.4 MITIGATION MEASURES

10.4.1 Construction Phase

Noise from the construction phase of the project has minimal potential to increase noise levels at the nearest noise sensitive properties during this stage of the development. This phase of the development will not require proprietary noise mitigation.

As a matter of Best Practice it is proposed that various practices be adopted during construction, including:

- Appointing a site representative responsible for matters relating to noise;

- Establishing channels of communication between the Contractor/Developer, Local Authority and local Residents;

Furthermore, it is envisaged that a variety of practicable noise control measures will be employed. These may include:

- Selection of plant with low inherent potential for generation of noise and/or vibration;
- Erection of temporary barriers around items such as generators or high duty compressors. For maximum effectiveness, a barrier should be positioned as close as possible to either the noise source or receiver. The barrier should be constructed of material with a mass of > 7kg/m2 and should have no gaps or joints in the barrier material. As a rough guide, the length of a barrier should be 5 times greater than its height. A shorter barrier should be bent around the noise source, to ensure no part of the noise source is visible from the receiving location.
- Siting of noisy plant as far away from sensitive properties as permitted by site constraints.

10.4.2 Operational Phase

The design of the site has been laid out so as to minimise noise impact on the surrounding environment. All major noise producing plant associated with the proposed facility is to be located within the site buildings and not in the open air.

This design in itself provides significant noise mitigation advantages in that the noise reaching sensitive receptors and indeed the site boundaries is much curtailed due to horizontal distance separation. Worst case operational noise levels are predicted to comfortably comply within the EPA *Guidance Note For Noise In Relation To Scheduled Activities* which outlines a limit of a free-field LAr, T value of 55dB by daytime (08:00 – 22:00), at any noise sensitive location and one of 45dB for night operations. As such, no further mitigation is required for the operational phase of the development.

As per EPA guidance (see Note 1 below), if a tonal component is detected during noise monitoring following the construction phase, a +5dB(A) penalty is added to the measured equivalent continuous A-weighted sound pressure level (LAeq) so as to determine the potential receptor response to the measured noise.

To date, noise monitoring has been undertaken in accordance with EPA guidance and as per the requirements of the existing EPA waste licence. Results from noise monitoring undertaken to date (since the existing facility commenced operations in September 2006) have been in compliance with the EPA waste licence limits.

Should a tone be observed during noise monitoring post installation of the proposed additional fans, this would incur the 5dB penalty (as outlined above), and would result in an exceedance of the 55dB LAeq limit during daytime hours. As such if a tone were to be detected during noise monitoring, it would have to be engineered out to meet day time limits. However it is not expected that this will arise, as there is

no existing character in the form of tonality from the existing fans, which operate as per the proposed fans.

Note No.1

The EPA Guidance Document - **Guidance Note for Noise in Relation to Scheduled Activities (2nd Edition)** - states:

"The character of the noise is of considerable importance particularly during night-time. This can normally be assessed subjectively for tonal content or impulsive qualities. These characteristics attract a penalty of +5dB(A) added to the measured level. The presence of clearly audible tones can be objectively assessed by 1/3 octave band analysis".

10.5 RESIDUAL IMPACT

On completion of all construction/installation works, and full commissioning of the proposed extension, it is anticipated that there will be a slight, permanent noise impact to the local noise climate as a result of the proposed facility.

The operational noise output from the facility will not be significant, and shall be in full accord with all relevant criteria, and will be similar in both character and impact to that currently in place. Road traffic noise associated with the operational phase of the proposed facility is not expected to be significant in terms of a minimal predicted increase in overall existing heavy road traffic volumes on the surrounding road network. The total residual noise impact is predicted to be slight and permanent.

11 LANDSCAPE AND VISUAL IMPACT

11.1 INTRODUCTION

This report examines the visual impact of a proposed extension to a composting facility at Ballynalurgan, Kilmainhamwood, Co Meath. The assessment includes a map to indicate the location of potential views of the proposal, as well as photosheets to illustrate these views. Key measures to ameliorate the identified visual impacts and aid the integration of the building into the existing environment are proposed.

11.1.1 Definition of Visual Impacts

Terminology used in the assessment of impacts is defined as follows:

The quality of the Impact may be described as:

- **Neutral** – A neutral impact will neither enhance nor detract from the landscape character or viewpoint.
- **Positive** – A positive impact will improve or enhance the landscape character or viewpoint.
- **Negative** – A negative impact will reduce or have an adverse effect on the existing landscape character or viewpoint.

The Duration of Impacts is defined as follows:

- **Temporary** Impacts lasting one year or less
- **Short Term** Impacts lasting one to seven years
- **Medium Term** Impacts lasting seven to fifteen years
- **Long Term** Impacts lasting fifteen to sixty years
- **Permanent** Impacts lasting over sixty years

The Significance of Impacts may be described as follows:

- **None** – There will be no change to an existing view. Arises where existing landform, vegetation or the built environment adequately screens the proposal.
- **Imperceptible** – An impact capable of measurement but without noticeable consequences.
- **Slight** – An impact which causes noticeable changes in the character of the environment without affecting its sensitivities.
- **Moderate** – An impact that alters the character of the environment in a manner that is consistent with existing and emerging trends.
- **Significant** – An impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
- **Profound** – An impact which obliterates sensitive characteristics.

11.2 LANDSCAPE CONTEXT AND LANDSCAPE CHARACTER

The application site is located in the townland of Ballynalurgan and lies approximately 2.4km to the northeast of the village of Kilmainhamwood, approximately 6km to the northwest of Nobber and approximately 9km west of Ardee Town.

The site lands are situated at an elevation of between 60m and 88m AoD. To the east and west of the application site, the land rises gently from low hills reaching high points of 173m AoD at Carrickleck to the east and 155m AoD at Boynagh to the west.

The landscape in the immediate vicinity is generally open with a gently rolling topography, with some visual enclosure formed by field hedgerows. The amount of screening provided by the existing hedgerows depends on the height of vegetation in any particular location. There is a well-developed pattern of medium sized fields throughout the study area as seen in photoplate 10. In some areas, particularly in the flatter areas, the fields are larger resulting in open views across the landscape, see photoplates 3, 4, 5, 7. The nature of the topography results in some visual enclosure even where there is no screening vegetation, as seen in photoplate 3. There are open panoramic views of the landscape at higher levels, see photoplates 9-11.

Settlement in the immediate area consists of scattered private homes along the minor roads, with more concentrated settlement in the townlands of Lisnagrow and Ballynaclose and in the village of Kilmainhamwood.

There is a large area of coniferous forestry immediately to the southwest and northeast of the existing composting facility which prevents views into the site from views in this area, see photoplate 1.

11.3 DESIGNATED LANDSCAPES/PROTECTED VIEWS/RELEVANT POLICY

The current County Meath Development Plan 2007-2013 is the statutory plan detailing the development objectives of the Authority.

Landscape Character, Value and Capacity

The area is located in the landscape character area, “Teervurcher Uplands”. Landscape Value is described as Moderate, Landscape Sensitivity is described as Low and Landscape Importance is Regional. The Development plan recommends the following for this landscape character area:

- Develop incentives to encourage landowners to maintain the integrity of historic field patterns and manage field boundaries and woodland.

- Maintain the visual quality of the landscape by avoiding development that would alter the drumlin landform or that would adversely affect short range views within valleys or long range views from the tops of drumlins.

- This LCA predominately features small scale farms so large agricultural buildings would be a change of character. However, the complex topography and low sensitivity means the potential capacity to accommodate overall is medium.

Protected Viewpoints

Figure 11-1 indicates the location of a protected viewpoint as indicated in the Development Plan. This view from the R162 takes in the higher ground to the north east. The proposed extension to the composting facility would not be visible in these views due to existing vegetation and the nature of the surrounding topography

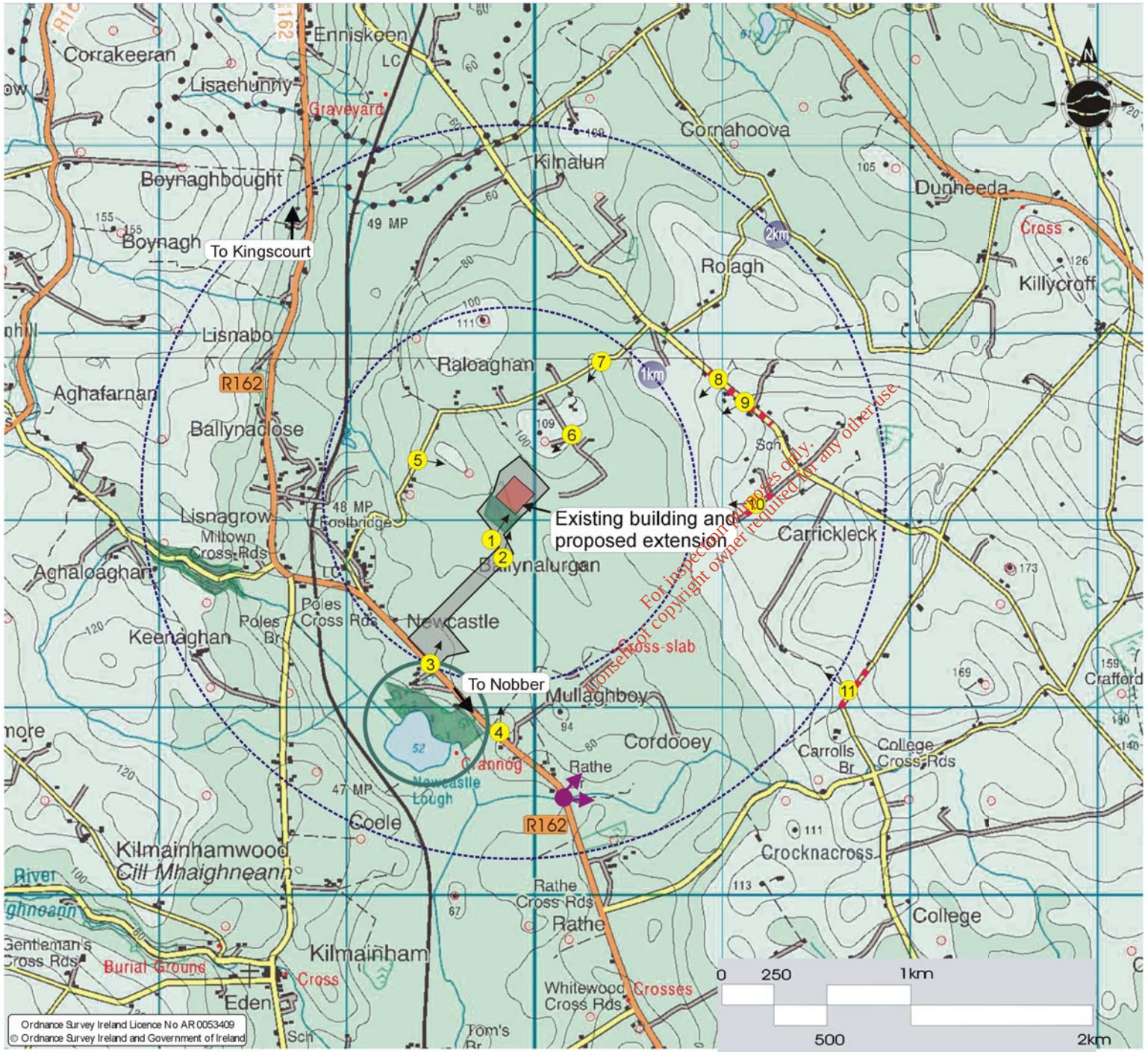
Protected Trees

As noted in Figure 11-1, a wooded area around Newcastle Lough is protected. These trees will not be affected by the proposals.

ED POL 19

This policy directly relates to the potential impact of extensions to industrial enterprises in the countryside and states it is policy *"to normally permit development proposals for the expansion of existing industrial or business enterprises in the countryside where the resultant development is of a size and scale which remains appropriate and which does not negatively impact on the character and amenity of the surrounding area; and the proposal demonstrates that it has taken into account traffic, public health, environmental and amenity considerations……in all instances it should be demonstrated that the proposal would not generate traffic of a type and amount inappropriate for the character of the access roads or would require improvements that would affect the character of these roads.*"

The report describes, in Section 11.4 below, the potential impact on the visual character of the surrounding landscape resulting from the proposed development. The proposed extension would be slightly visible from a number of identified viewpoints to the northeast as indicated in Figure 11-1 (Plate Locations 8,9,10 & 11). Impact on landscape character is closely related to visibility and therefore the extension would not have a significant impact on the character and amenity of the surrounding area, considering the restricted visibility of the proposals and the designation of this area in the Development Plan as being of low sensitivity to development, and having medium capacity for absorbing a development such as that proposed.



KEY

- Site of Existing Compost Facility
- Location of existing building and proposed extension to facility
- Potential intermittent views of site from roads
- Kilometres distance from centre of application site
- Plate location
- Existing vegetation
- Measured trees as indicated in Meath County Development Plan 2007 -2013
- Protected views as indicated in Meath County Development Plan 2007 - 2013. Views from R162 to higher ground directly to the north east.

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Facility Expansion
Kilmainham
Co. Meath

VISUAL IMPACT ASSESSMENT
(PHOTO PLATE LOCATIONS)

FIGURE 11-1 April 2009
S106262
Rev A Drawn: CD Checked: DB

Plate 1: View north from access road at entrance to composting plant existing trees screen the building completely

Plate 2: View north from access road towards the composting plant. The buildings are screened by an existing berm and intervening vegetation.

Plate 3: View north from access road entrance off the R162. The buildings are screened by intervening topography

Plate 4: View north towards the site from the R162. Site screened by intervening topography.

Plate 5: View south east from elevated site at Raloagan. Site screened by intervening topography.

Photosheet 1: Plates 1- 5 *MARCH* 2009 S106336	PROPOSED KILMAINHAMWOOD COMPOST PLANT EXTENSION KILMAINHAMWOOD CO MEATH

Plate 6: View south from laneway at Raloaghan

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Plate 7: View south from Rathlogan towards the site

Plate 8: View southwest from residential dwelling at Rolagh.

Plate 9: View southwest from gap in the vegetation near the school at Rolegh towards the site

Plate 10: View west from Carrickleck through gateway overlooking the site.

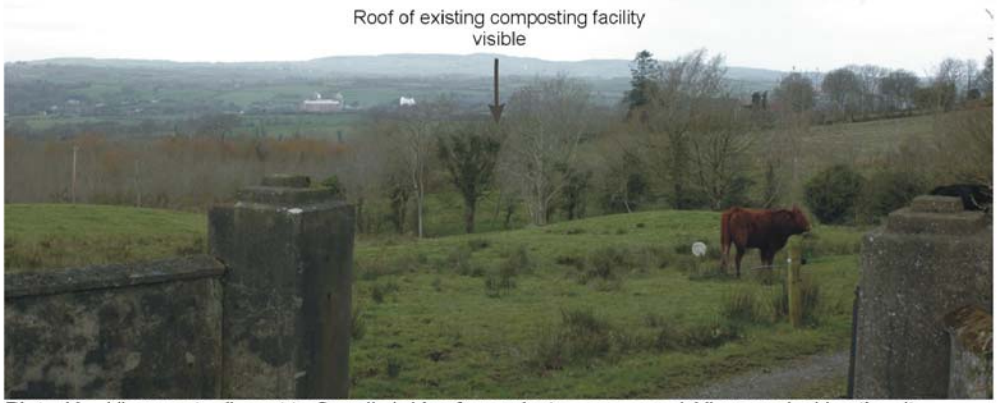


Plate 11: View west adjacent to Carrolls bridge from private access road. View overlooking the site.

11.4 PHOTOSHEETS AND DESCRIPTION OF VISUAL IMPACT

Figure 11-1 shows the location of the existing composting facility and the proposed facility extension and indicates the areas along roads in the vicinity of the site from which the existing facility is intermittently visible. Please note that due to topography, garden or other vegetation, the site is not visible from all residences and locations along these parts of the roads.

The seasonal effects of hedgerows and trees in winter, the effects of distance and weather conditions will also affect the visibility of the proposed extension.

The greatest visual impacts are likely to occur on a small number of identified views *(Plate 8,9,10 & 11 on Photo sheet 2)* from roads on elevated ground to the northeast and east of the site as indicated on Figure 11-1.

Impacts on Identified Views

Photoplates 1, 2 and 3

There would be some slightly negative and temporary impact on views in this area during the construction period due to increased traffic around the entrance. However, the coniferous plantation and the rolling nature of the topography completely screen the location of the proposed extension from views to the south west of the site and around the site entrance, and therefore there will be no long term visual impact resulting from the extension on these views.

Predicted visual impact
Quality of impact: neutral
Duration of impact: long term
Significance of impact: none

Photoplate 4

There are no views of the site of the proposed extension from the R162 to the south west of the site due to the nature of the topography and intervening vegetation.

Predicted visual impact
Quality of impact: neutral
Duration of impact: long term
Significance of impact: none

Photoplates 5, 6, 7

There are no views of the site from roads to the north west of the site due to the nature of the topography and intervening vegetation.

Predicted visual impact
Quality of impact: neutral
Duration of impact: long term
Significance of impact: none

Photoplates 8, 9, 10

These photos represent the areas with most visibility of the existing composting facility. The only part of the building visible is the roof, due to the screening abilities of intervening vegetation. The red dotted line on Figure 11-1 shows the parts of the road where this view is possible, roadside vegetation prevents views from other parts of the road. The construction of the extension would slightly increase the amount of roof visible in these viewpoints. The proposed planting plan in combination with the planting plan previously submitted to Meath County Council will significantly increase the tree cover around the facility, such that the building roof is only partially visible from this viewpoint in the long term.

Predicted visual impact
Quality of impact: negative
Duration of impact: long term
Significance of impact: moderate

Photoplate 11

This view is similar to those described above, although less of the building roof is visible. The construction of the extension would slightly increase the amount of roof visible in this viewpoint. The planting plan in combination with the planting plan previously submitted to Meath County Council will significantly increase the tree cover in this view and further reduce the visibility of the building roof.

Predicted visual impact
Quality of impact: negative
Duration of impact: long term
Significance of impact: slight

11.4.1 Summary of Impacts

In conclusion, the proposed extension to the composting facility will be only visible from a small number of areas to the northeast and east of the site but is generally not visible from surrounding viewpoints. The composting facility is not visible from the protected viewpoint along the R162 due to intervening

existing vegetation and local topography. The Meath County Council Landscape Character Assessment describes this area as being of low sensitivity to development. The planting plan in combination with the planting plan previously submitted to Meath County Council will significantly increase the tree cover in this view and assist in the integration of the composting facility into the environment.

11.5 MITIGATION MEASURES INCLUDING REINSTATEMENT

11.5.1 General

The following section describes the mitigation measures proposed to reduce visual impact of the extension.

A planting plan has being prepared indicating woodland edge planting around the new structures (Drawing No. 5361-2409). The edge planting proposed will provide a good structural character to the surrounding woodland and increase biodiversity. The planting plan includes information on species type and planting size. A maintenance plan will be prepared for at least two years to ensure good establishment of the new planting.

12 CULTURAL HERITAGE & ARCHAEOLOGY

12.1 INTRODUCTION

This cultural and archaeological heritage desktop assessment was completed by TOBIN Consulting Engineers on behalf of Thorntons Recycling in relation to lands at Ballynalurgan, County Meath. The purpose of this assessment is to identify and classify the extent and potential impacts on any archaeological features or deposits, which may be adjacent to or within the proposed extension area of the existing compost facility.

12.1.1 Methodology

The assessment of the archaeological and cultural heritage was based on a desktop study of published and unpublished documentary completed by TOBIN Consulting Engineers in February 2009.

The following sources were consulted during the desktop study.

Record of Monuments and Places

The RMP is a database recording all archaeological sites in Ireland known to the National Monuments Service established under Section 12 of the 1994 National Monuments (Amendment) Act. It is based on Ordnance Survey 6" sheets, which indicate the location of each monument or place of archaeological interest. For each, a file contains further documentary and photographic data or information relating to an archaeological event such as a site visit, survey or excavation. These are housed in the National Monuments Services in Dublin. The record is constantly updated and focuses on monuments that pre-date 1700.

The National Museum of Ireland Topographical Files

The discovery of artefacts can be an important indicator of past levels of activity in an area and therefore a useful guide to the archaeological potential of a site. The National Museum in Dublin houses a national archive of antiquities cataloguing artefacts that were found and reported between 1928 and recent years. These artefacts are catalogued by year and accession number.

Irish Excavations Database

This online database (www.excavations.ie) contains summary accounts of all excavations carried out in Ireland – North and South – from 1970 to 2004. The database has been compiled from the published Excavations Bulletins from those years. The database was consulted to check if any excavations were carried out within the assessment area or its immediate environs.

Reference sources consulted for this cultural and archaeological heritage assessment are presented in Appendix 12.1.

12.2 EXISTING ENVIRONMENT

12.2.1 Location Details

Townland	Ballynalurgan
Barony	Morgallion
Parish	Enniskeen
OS 6" Sheet No.	Meath 002 & 005

The assessment area is located approximately 6km northwest of the early medieval and Anglo Norman settlement of Nobber.

12.2.2 General History of County Meath

County Meath is traditionally known as the 'Royal County' because it contained the seat of the ancient High Kings of Ireland at the Hill of Tara. Meath is said to derive from the name Midhe. He was the son of Bratha and the principal druid of the mythological clan Neimhidh. The territory is now much smaller than its extent in ancient times when it would have included parts of Westmeath, Longford and southeast Cavan but within its present boundaries are some of the most important sites in the mythology, archaeology and history of Ireland.

Prehistory

The earliest recorded phase of human occupation in Ireland is the Mesolithic period (7500–4500 BC) when groups of hunter-gatherers were living at subsistence level close to rivers and lakes and along the coastline, surviving on the limited flora and fauna available in the post-glacial period. They were a mobile society relying on wild resources for food, which was hunted and gathered using stone tools as well as boats, nets and traps. Settlement was in temporary and semi permanent groups of huts constructed of wood slung with hide, which may have operated as seasonal or hunting camps. Late Mesolithic material is known from County Meath at Moynagh Lough (O'Sullivan 1998, 52–53), the crannóg comprised an oval mound and was revealed as a multi-period site with activity continuing until late in the 8th century.

Farming was first adopted in the Middle East but spread gradually across Europe in succeeding centuries, arriving in Ireland about 4000BC. This transition in Ireland changed an economy based principally on hunting and foraging to one primarily of cereal cultivation and livestock rearing. Tending of crops and animals required a more sedentary lifestyle and larger permanent settlements were built. The megalithic (from the Greek mega – large and lith – stone) monuments of the Neolithic people built as communal tombs or for ceremonial purposes, are relatively common in the landscape. New methods were adopted for shaping stone tools and the first long distance trade networks were established. As a consequence, within Meath and elsewhere, large tracts of forest cover were cleared, permanent settlements were established, pottery was first used, and elaborate burial rites were developed which centred on large communal ritual monuments.

As stone tools were replaced by the use of copper, later combined with tin to make bronze, the structure of society also changed over centuries. Henges were constructed in Ireland in a broad period beginning around 2000BC, and were sometimes constructed around or beside previous Neolithic megaliths. Thirteen examples have been identified in County Meath in the vicinity of passage tombs, by far the highest concentration is in the Boyne Valley of County Meath, already home to the great passage tombs of Knowth and Newgrange. The monuments take the form of flat-topped banks encompassing circular or oval spaces with entrances facing either east or west and can measure 100 to 200 metres (330 to 660 feet) across. They are frequently located on slopes or, in a small number of cases, on the bottoms of river valleys; their builders contrived to give them a prominent siting within their immediate settings. Within these henges, archaeologists have found the systematically cremated remains of animals as well as evidence of wooden and stone posts. This indicates that henges were centres for a religious cult, which had its heyday in the first half of the Bronze Age.

While some communal megalithic monuments, particularly wedge tombs continued to be used, the Bronze Age is characterised by a movement towards single burial and the production of prestige items and weapons, suggesting that society was increasingly stratified and warlike. In late Bronze Age Ireland the use of metal reached a high point with the production of high quality decorated weapons, ornament and instruments, often discovered from hoards or ritual deposits. It is likely that the developed communities of the Boyne Valley were among the first to incorporate metal technology and their settlements have been excavated at a number of locations across Meath, including Monknewtown and Knowth (Waddell 1998, 117), and more recently at a number of sites along the route of the M1 Drogheda Bypass. The Bronze Age period is best known perhaps for the delicate gold artefacts and elaborate pottery styles, many of which have been identified in Meath. While we have little evidence for Bronze Age settlement in County Meath after 1800BC, settlement flourished in the east of the county where recent excavations have uncovered numerous sites, both enclosed and unenclosed from the period 1500 BC onwards.

The Iron Age/Early Historic Period

The Iron Age however is known as a ‘dark age’ in Irish prehistory. Iron objects are found rarely, but there is no evidence for the warrior culture of the rest of Europe, although the distinctive La Tené style of art with animal motifs and spirals was adopted. Life in Iron Age Ireland seems to have been much as it was in the early historic period – mixed farmers living in or around small defended settlements known as ringforts or stone cashels. In the first centuries AD, there began an expansion of population from west of the Shannon of groups who claimed common ancestry to Niall Níogiallach, Niall of the Nine Hostages, and who came to be known as the Uí Neill, the principal dynasty of the northern half of the country in the medieval period. The Uí Neill were split between northern and southern septs, with the Southern Uí Neill consisting of Síl Áedo Sláine (The Seed of Áed of Slane) and Clann Cholmáin Máir (The Children of Colmán the Great) who held sway over the ancient kingdoms of Brega and Míde.

Lewis Topographical Dictionary records the following description, “The ‘Eblani,’ whose territory also extended over Dublin and Kildare, are mentioned by Ptolemy as being settled in County Meath. According to the native divisions, Meath formed part of one of the five kingdoms into which Ireland was

partitioned and was known by the name of ‘Mithe Methe, Media or Midia,’ perhaps from its central situation. Other writers, however, derive its name from the Irish ‘Maith’ or ‘Magh,’ a "plain," or "level" country, a derivation indicative of its natural character. It was afterwards divided into two parts, ‘Oireamhoin,’ or “the eastern country," which comprehended the portion now known by the name of Meath; and ‘Eireamhoin,’ or “the western country," comprehending the present counties of Westmeath and Longford, with parts of Cavan, Kildare, and the Kings County (Offaly).

County Meath increased in importance in the centuries following. The fertile land, and the large numbers of cattle supported by it, ensured the wealth of the people of the area. The Irish Annals include references to Viking raids on monasteries throughout the country. The monks at Iona, Scotland, were driven from their island retreat by Viking raids and endeavoured to complete their illuminated manuscript at Kells, to the north of the county, in 807AD. Kells was subsequently plundered and burnt along with other ecclesiastical foundations. A Viking style burial of possible native Irish was discovered in a railway cutting at Navan, to the north-east of Trim, in 1845. Meath suffered as a result of its prominence and wealth throughout the period. There were bloody clashes throughout the eight to eleventh centuries as various groups tried to achieve or consolidate power.

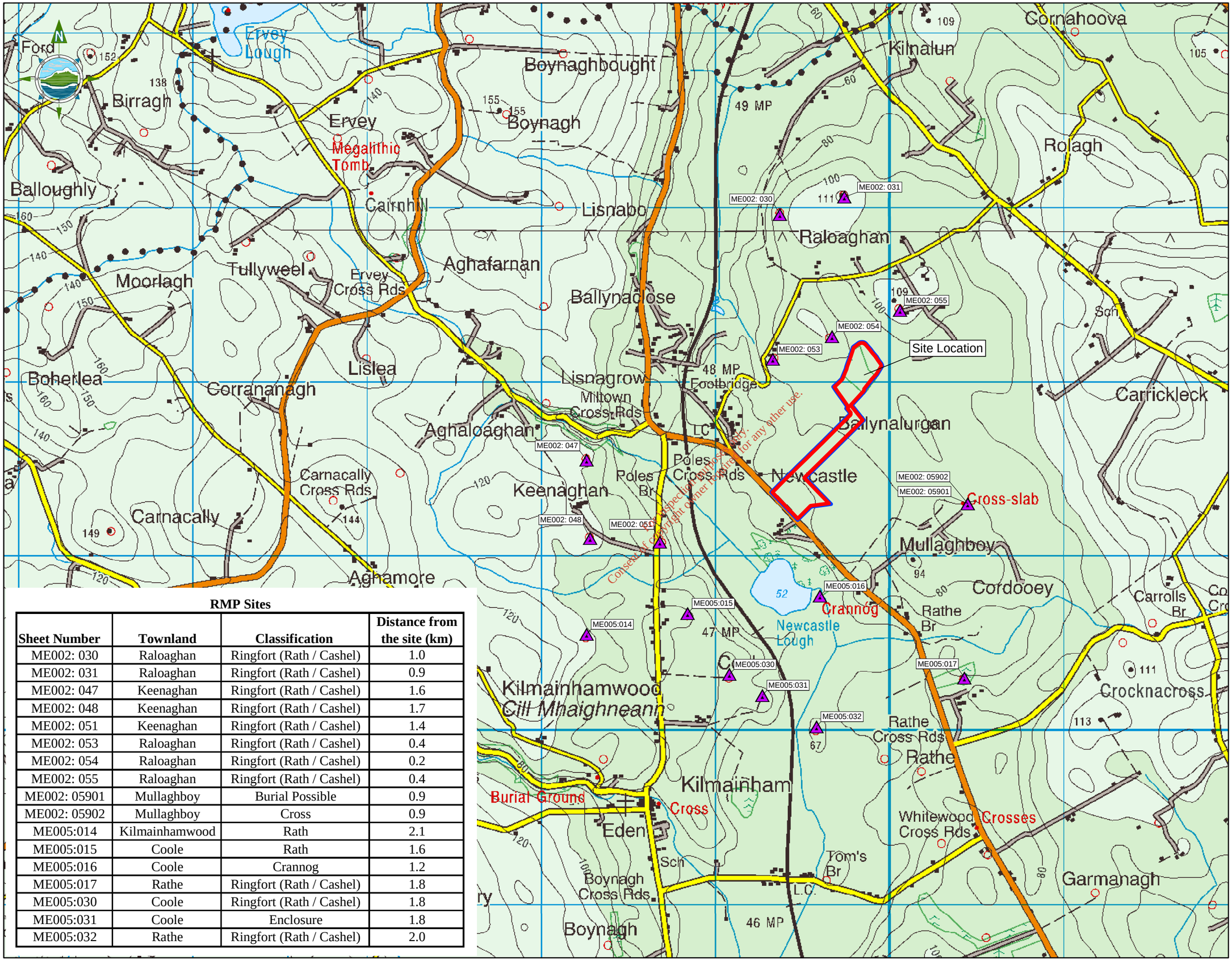
Later Historic Period

In 1172, Meath was given to Hugh de Lacy, who immediately began organising its colonisation and settlement (Graham 1974, 40), involving the sub-infeudation of the county into areas roughly corresponding to modern barony divisions. These baronies were divided up into smaller units known as manors. There was an overwhelming growth in settlements in this period; many of these remain at the heart of modern towns and villages, for example, Navan, Ratoath, Athboy, Trim, Dunboyne, and Dunshaughlin (Bradley 1988, 34–46). The primary form of settlement in medieval Meath was based on the manorial centre. Generally, this comprised a fortification (usually a motte or later a tower house), a manorial church and a number of dwellings, which could be nucleated or scattered around the manor. An example of one of the most important Norman military castles in the general area is Trim castle, built on the site of a Motte. A total of ninety-eight villages from this period have been identified in Meath (Graham 1974, 48), with many abandoned from the seventeenth century onwards.

12.2.3 General Archaeological Background

There are no known archaeological monuments within the proposed extension area of the existing compost facility. The following archaeological monuments in the townlands surrounding the assessment area are included to highlight the type of sites, which survive in the general area.

Sheet No. ME002 and ME005 for County Meath revealed a number of Record of Monuments and Places (RMP) sites within 1km of the facility boundaries. Refer to Table 12.1 and Figure 12.1 overleaf for details of archaeological monuments in close proximity to the facility boundaries. Appendix 12.2 presents further details on these monuments.



RMP Sites

Sheet Number	Townland	Classification	Distance from the site (km)
ME002: 030	Raloaghan	Ringfort (Rath / Cashel)	1.0
ME002: 031	Raloaghan	Ringfort (Rath / Cashel)	0.9
ME002: 047	Keenaghan	Ringfort (Rath / Cashel)	1.6
ME002: 048	Keenaghan	Ringfort (Rath / Cashel)	1.7
ME002: 051	Keenaghan	Ringfort (Rath / Cashel)	1.4
ME002: 053	Raloaghan	Ringfort (Rath / Cashel)	0.4
ME002: 054	Raloaghan	Ringfort (Rath / Cashel)	0.2
ME002: 055	Raloaghan	Ringfort (Rath / Cashel)	0.4
ME002: 05901	Mullaghboy	Burial Possible	0.9
ME002: 05902	Mullaghboy	Cross	0.9
ME005:014	Kilmainhamwood	Rath	2.1
ME005:015	Coole	Rath	1.6
ME005:016	Coole	Crannog	1.2
ME005:017	Rathe	Ringfort (Rath / Cashel)	1.8
ME005:030	Coole	Ringfort (Rath / Cashel)	1.8
ME005:031	Coole	Enclosure	1.8
ME005:032	Rathe	Ringfort (Rath / Cashel)	2.0

LEGEND

- Site Activity Boundary
- Application Boundary
- RMP Sites

0 0.1 0.2 0.4 0.6 0.8
Kilometers

NOTES

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER TO BE INFORMED OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. ALL LEVELS RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Issue	Date	Description	By	Chkd.
B	XX.04.10	ISSUED FOR WLA	A.G.	E.D.
D03	24.07.09	Boundary modified	A.G.	E.D.
D02	24.06.09	Boundary modified	A.G.	E.D.
D01	25.03.09	Draft	A.G.	A.A.

Client: Thorntons recycling

Project: KILMAINHAMWOOD FACILITY EXPANSION

Title: RMP SITES

Scale @ A3: 1:20,000

Prepared by: A.Gruschka | Checked: A.Austin | Date: March 2009

Project Director: D. Grehan

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Drawing No.: Figure 12.1 | Issue: B

Table 12.1 Archaeological Monuments in the Surrounding Townlands

Sheet Number	Townland	Classification	Distance from the site (km)
ME002: 030	Raloaghan	Ringfort (Rath / Cashel)	1.0
ME002: 031	Raloaghan	Ringfort (Rath / Cashel)	0.9
ME002: 047	Keenaghan	Ringfort (Rath / Cashel)	1.6
ME002: 048	Keenaghan	Ringfort (Rath / Cashel)	1.7
ME002: 051	Keenaghan	Ringfort (Rath / Cashel)	1.4
ME002: 053	Raloaghan	Ringfort (Rath / Cashel)	0.4
ME002: 054	Raloaghan	Ringfort (Rath / Cashel)	0.2
ME002: 055	Raloaghan	Ringfort (Rath / Cashel)	0.4
ME002: 05901	Mullaghboy	Burial Possible	0.9
ME002: 05902	Mullaghboy	Cross	0.9
ME005:014	Kilmainhamwood	Rath	2.1
ME005:015	Coole	Rath	1.6
ME005:016	Coole	Crannog	1.2
ME005:017	Rathe	Ringfort (Rath / Cashel)	1.8
ME005:030	Coole	Ringfort (Rath / Cashel)	1.8
ME005:031	Coole	Enclosure	1.8
ME005:032	Rathe	Ringfort (Rath / Cashel)	2.0

The term **Enclosure** refers to a monument in which an area, often circular or oval, is surrounded or enclosed by a physical barrier such as a bank, ditch, wall or combination of these, usually constructed for defensive purposes. Enclosures can date from any period from Neolithic to post Medieval and may represent a simple defended paddock but may equally be the remains of a ringfort; an enclosed farmstead of any period between the early Iron Age (300 BC-AD400) to as late as the seventeenth century. There is one enclosure surrounding the assessment area within the townland of Coole (ME005:031).

Crannógs were Celtic vernacular buildings which formed the ordinary living house for a family unit and also, in some instances, livestock. Irish examples are more commonly referred to as “defended homesteads” The name “crannóg” comes from the Irish "crann" meaning "tree". Archaeological excavations have shown that crannóg buildings were constructed as early as the Neolithic period (4000-2000 B.C.) and continued into the 17th century in remoter parts of Ireland and Scotland. The size of the crannóg was an indication of the status of the person living there. There is one crannóg adjacent the assessment area located in the townland of Coole (ME005: 016).

Ringforts are the most widespread type of archaeological monument in the country with approximately 40,000 in total. They are the classical Early Christian settlement type. They consist of circular areas, defined by banks and external ditches, and usually contain dwelling houses and outbuildings for extended families. It is quiet likely that many more were levelled by subsequent farmers but many of the sites may still remain undisturbed below the ground. There are thirteen sites which fall under this classification suggesting this area was well populated during the early Christian period. These sites are located within the townlands surrounding the assessment area including Raloaghan (ME002:030, ME002:031, ME002:053, ME002:054, ME002:055), Keenaghan (ME002:047, ME002:048, ME002:051), Kilmainhamwood (ME005:014), Coole (ME005:015, ME005:030), Rathe (ME005:017, ME005:032).

Holy Crosses varied in height up to seven metres (over 20 feet). Their chief purpose would have been for the inspiration and instruction of the faithful - picture-books, for a usually illiterate congregation - but they were often positioned as boundary markers. The best known have a ring circumscribing the intersection of the arms and stem of the cross, a pattern that has come to be known as the Celtic Cross. While each High Cross is different and totally individual, they mostly follow a similar pattern. They are carved in panels, representing subjects of the Old and New Testaments. In addition, there are intricately incised interlace and other patterns on any bit of spare space, whether immediately visible or not. Much of the ornament echoes that of the manuscripts. There are about a hundred High Crosses still surviving, in varying states of weathering and damage. A number of Stone Crosses are found on ecclesiastical sites in Britain, but none of them are as elaborate as the Irish Crosses. A Cross is present within the townland of Mullaghboy (ME002: 05902). The stone flag is in two fragments with the middle portion missing. The decoration is lightly incised and difficult to see.

12.2.4 Record of Monuments and Places

The nearest recorded monument to the proposed compost facility extension works is a Ringfort (Rath / Cashel) at ME002:054 located in the townland of Raloaghan (Refer to Figure 12.1). This is located at a distance of approximately 200m from the facility boundary.

12.2.5 Recorded Artefacts In The Vicinity Of the Development

The following archaeological artefacts are included to highlight the type of archaeological activity in the area and the importance of archaeological monitoring as stray finds are frequently found in the course of monitoring of groundworks. The discovery of artifacts can be an important indicator of past levels of activity in an area and therefore a useful guide to the archaeological potential of a site. The National Museum in Dublin houses a national archive of antiquities cataloguing artifacts, which were found and reported between 1920 and recent years.

A number of topographical finds have been discovered in the townlands surrounding the assessment area.

- Several topographical finds were discovered after drainage works by the OPW at a lake in the townland of Whitewood including a perforated stone bead, a medieval jar fragment, a fragment

of pottery, hollowed stone, timbers and paddles, fragments of quern stone and two dug out canoes.

- In the townland of Newcastle a stone head feature was discovered within a stable wall.

See Appendix 12.3 for a detailed list and description of stray finds uncovered in townlands surrounding the existing compost facility.

12.2.6 Irish Excavations Database

A search of the excavations database of Irish excavations was undertaken for the townlands immediately adjacent to the assessment area including the townlands of Ballynalurgan, Ballynaclose, Carrickleck, Cordooey, Keenaghan, Kilmainhamwood, Lisnagrow, Mullaghboy and Newcastle.

There are no records of excavations occurring within these townlands.

12.3 POTENTIAL IMPACTS

There will be no impact on any known archaeological sites or monuments from the proposed extension works at the existing compost facility.

There is the potential to reveal unknown archaeological finds/features during the proposed extension works. If any archaeological features are identified during the site works, all work in that area will have to cease and the area fenced off. All archaeological issues will have to be resolved to the satisfaction of the Department of Environment, Heritage and Local Government and the National Museum of Ireland.

12.4 RECOMMENDATIONS

In order to prevent any loss to potential archaeological remains a series of mitigation strategies have been recommended.

If any archaeology is identified during ground works, development will be halted until an appropriate level of excavation and recording can be undertaken.

This must be undertaken by a suitably qualified archaeologist to record any sub-surface archaeological deposits and to recover any artefacts that are discovered.

A copy of this Monitoring Report should be submitted to the Department of Environment, Heritage and Local Government for comment.

Please Note: Any recommendations made in this report are subject to ratification by the Department of the Environment, Heritage and Local Government.

13 TRAFFIC & ROAD ASSESSMENT

13.1 INTRODUCTION

13.1.1 Introduction

TOBIN Consulting Engineers has been appointed by the Thorntons Recycling to carry out a Traffic Impact Assessment which will form part of an application for the extension of the Kilmainhamwood Compost facility at Ballynalurgan, Kilmainhamwood, Co. Meath.

In preparing this report, TOBIN Consulting Engineers has made reference to

- The NRA 'Traffic and Transport Assessment Guidelines';
- The NRA 'Future Traffic Forecasts 2002 to 2040';
- Geometric Design Guidelines RT180 (Classification, Alignment, Cross Section);
- Meath County Development Plan 2007-2013;
- NRA TD 9/07;
- NRA TD 42/95;

13.1.2 Objectives

The objective of this section of the EIS is to assess the impact that the proposed Kilmainhamwood Compost facility extension will have with respect to traffic considerations. This section will calculate the expected volume of traffic that will be generated by the extension of the composting facility and assess the impact that this traffic will have on the operational capacity of the road network in the vicinity of the development. In this case the existing entrance to the facility is assessed. Road safety conditions are also considered as part of this section.

13.2 PROPOSED DEVELOPMENT

13.2.1 Site Location

The Kilmainhamwood Compost facility is in the townland of Ballynalurgan, Co. Meath. The nearest town to the site is Kingscourt and the facility is located approximately 4km south of the town. Access to the facility is provided by means of a priority entrance onto the R162. Figure 13.1 below shows the location of the composting facility.

Figure 13.1 Site Location

13.2.2 Description of Existing and Proposed Development

The Kilmainhamwood Compost facility has been in operation since September 2006. The facility is situated on a land holding of approximately 13.2 hectares in Ballynalurgen, Kilmainhamwood, Co. Meath. Currently the facility processes 20,800 tonnes of biodegradable material, including kitchen and garden waste, per annum. The scope of the proposed extension of this facility is to increase the amount of biodegradable material processed to 40,000 tonnes per annum.

Following a planning search, no large committed development in the area surrounding the facility was identified. Applications are mainly limited to one off housing, extensions to existing dwellings and farm buildings. The traffic, on the local road network, generated by such applications is negligible and is accounted for in yearly growth factors.

13.3 EXISTING AND PROPOSED TRAFFIC CONDITIONS

13.3.1 Traffic Survey

In order to determine the magnitude of the existing traffic flows, TOBIN used the results of a Manual Classified Traffic Survey that was carried out by Abacus Transportation Surveys Ltd. on the 3rd March 2009 at the existing entrance to the facility. This survey was carried out between the hours of 07.00 and 19.00 and distinguished between cars, buses, light good vehicles and heavy good vehicles. Details of the results of this survey are provided in Appendix 13.1 of this report.

The results of this survey indicated that the peak traffic levels experienced at this entrance occurred between the hours of 09:00 and 10:00 in the morning and 17:00 and 18:00 in the evening. There was a HGV content of 14.05% at the junction.

13.3.2 Existing Road Network

The entrance to the composting facility connects to the R162 within an 80km/hr speed zone. Sight line requirements for entrances within an 80km/hr speed zone are 3m x 160m and this requirement is currently satisfied at the existing entrance.

The R162 is a regional road linking Kingscourt to Navan. This road is a single carriageway road with a carriageway width of approximately 6.0m. The speed limit along this stretch of road is 80km/hr and the road is suitable to cater for these speeds.

13.3.3 Proposed Network Improvements

There are no significant road network improvements proposed within the vicinity of the development.

13.4 TRIP DISTRIBUTION AND GENERATION

13.4.1 Trip Generation

The volume of traffic related to existing operations at the compost facility (traffic generated by existing facility) has been derived from data gathered for the operation of the site during 2008. This data is detailed in Table 13.1 below. This table details the number of vehicle trips that are currently being generated by activities at the compost facility – based on 2008 data. Table 13.2 gives an estimate for the number of vehicle trips that will be generated as a result of the proposed extension of the composting facility.

Based on existing delivery data, the average load per vehicle arriving at the site has been calculated at 13.7 tonnes per truck. It should be noted that the delivery capacity of a typical delivery truck is approximately 24 tonnes per load and as such the estimated number of vehicles delivering raw waste to the site may actually be less than those indicated in Table 13.2.

Table 13.1 Existing One Way Trip Generation for Composting Facility

EXISTING ONE WAY TRIP GENERATIONS FOR COMPOSTING FACILITY				
Task	**Assumptions**	**Trucks Per Annum**	**Trucks Per Day**	**Trucks Per Hour**
Delivery of Raw Waste	20,651 tonnes/annum at approx. 13.7 tonnes/Truck	1,511	5.3	0.59
Delivery of Finished Product	4,274 tonnes/annum at approx. 21.3 tonnes/Truck	201	0.7	0.08
Disposal of Residual Waste	839 tonnes/annum at approx. 17.8 tonnes/Truck	47	0.2	0.02
Total (One Way Truck Movements)		**1,759**	**6.2**	**1***

** Rounded up to nearest whole number*

Notes:

52 operational weeks assumed

5.5 days per week assumed

9 hour day assumed

Table 13.2 Proposed One Way Trip Generation for Composting Facility

PROPOSED ONE WAY TRIP GENERATIONS FOR COMPOSTING FACILITY				
Task	**Assumptions**	**Trucks Per Annum**	**Trucks Per Day**	**Trucks Per Hour**
Delivery of Raw Waste	40,000 tonnes/annum at 13.7 tonnes/Truck	2927	10.2	1.1
Delivery of Finished Product	8,280 tonnes/annum at 21.3 tonnes/Truck	389	1.4	0.15
Disposal of Residual Waste	1,625 tonnes/annum at 17.8 tonnes/Truck	91	0.3	0.04
Total (one way truck movements)		**3,426**	**12**	**2***

** Rounded up to nearest whole number*

Notes:

52 operational weeks assumed

5.5 days per week assumed

9 hour day assumed

The above tables identify the number of delivery vehicles that will be entering or leaving the site loaded with materials. An equal number of empty delivery vehicles will be performing the journey in the opposite direction. It is assumed these will be at a similar frequency to those leaving. On the day the

traffic count was carried out (3rd March 2009), 7 HGVs entered and departed from the facility. This figure corresponds closely with the figures estimated in Table 13.1 above and as such the assumptions appear to be satisfactory.

In addition to traffic related to the delivery of materials to or from the composting facility, the facility also employs 4 full time staff. The proposed extension of the facility is expected to increase numbers to 6 full time staff. It is assumed that staff will arrive during the morning peak and leave during the evening peak. The total number of additional trips that the facility will generate during the AM and PM peak is shown in Table 13.3 below.

Table 13.3 Additional Peak Hour Trips Generated by the Composting Facility Extension

	AM Peak Hour		PM Peak Hour	
	Arriving	Departing	Arriving	Departing
Delivery Vehicles	1	1	1	1
Employee Vehicles	2	0	0	2

13.4.2 Trip Distribution

Based on information provided by Thorntons Recycling, the vast majority of biowaste being delivered to the site arrives from the south and through Nobber. Similarly, the vast majority of finished compost being exported from the site departs to the south and through Nobber. Hence it is assumed that all additional vehicles (generated by proposed facility extension) will be travelling to and from Nobber. This assumption corresponds with the data produced by the traffic count (3rd March 2009). From the traffic survey (conducted at site entrance) it can be seen that this is similarly the case for cars and light vehicles. Figures 13.2 and 13.3 below show the expected distribution of traffic arriving to and departing from the development during the AM and PM peaks.

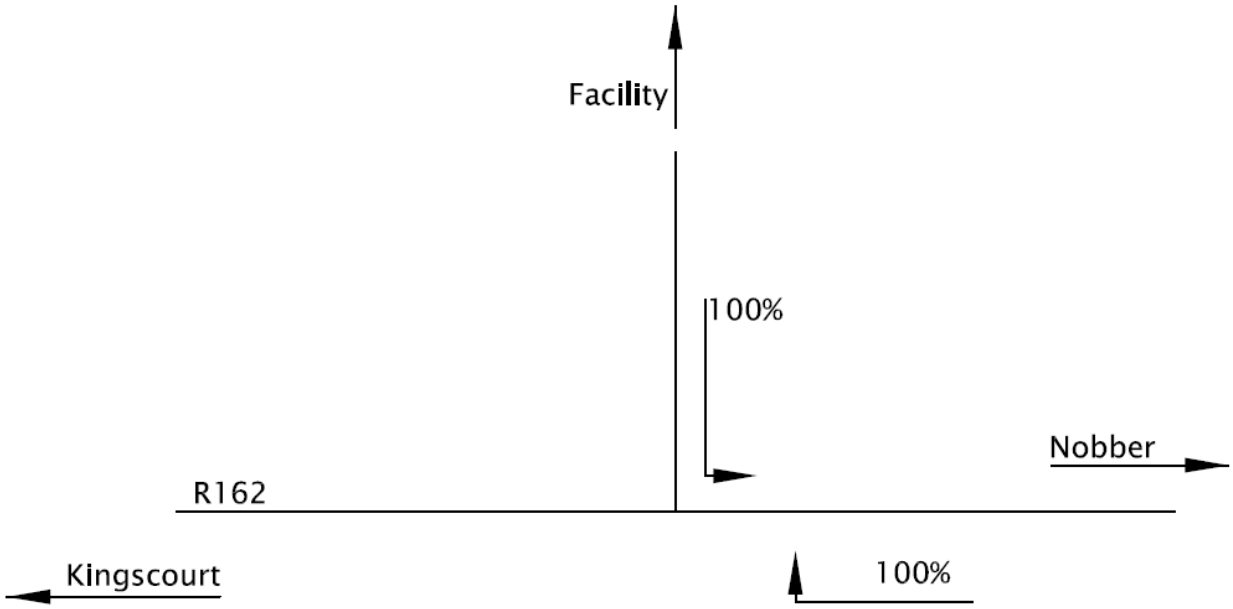

Figure 13.2 Distribution of Generated Traffic AM Peak

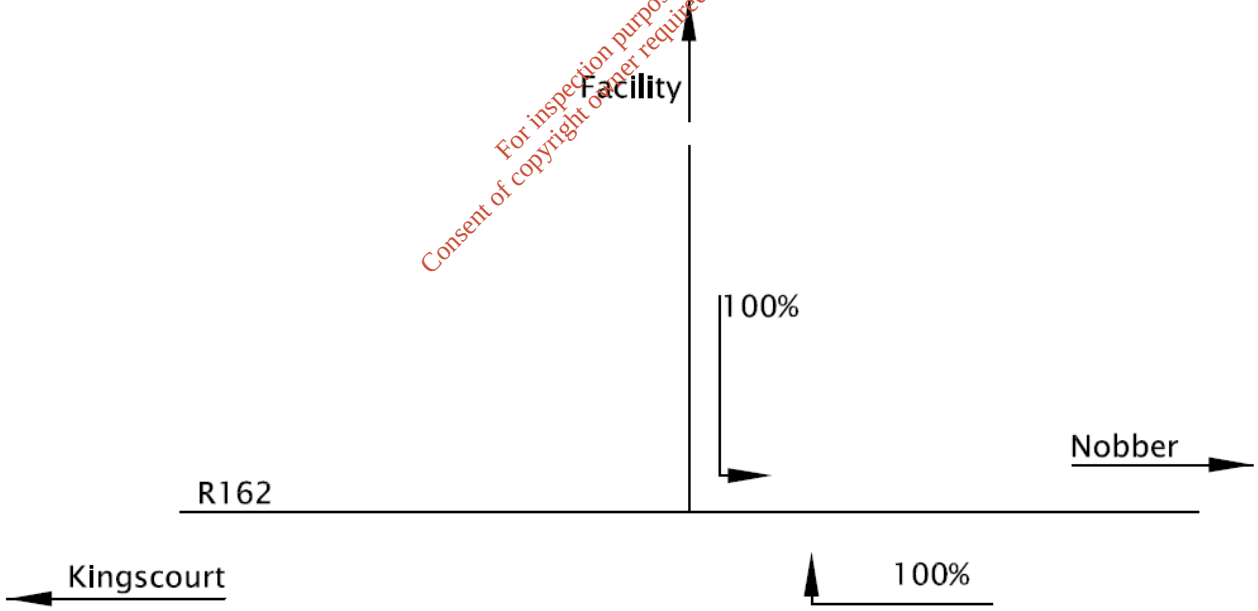

Figure 13.3 Distribution of Generated Traffic PM Peak

The application of the above distribution to the traffic associated with the composting facility for the AM and PM peaks is shown below in Figures 13.4 and Figure13.5. HGV traffic is shown in black while employee traffic is shown in red.

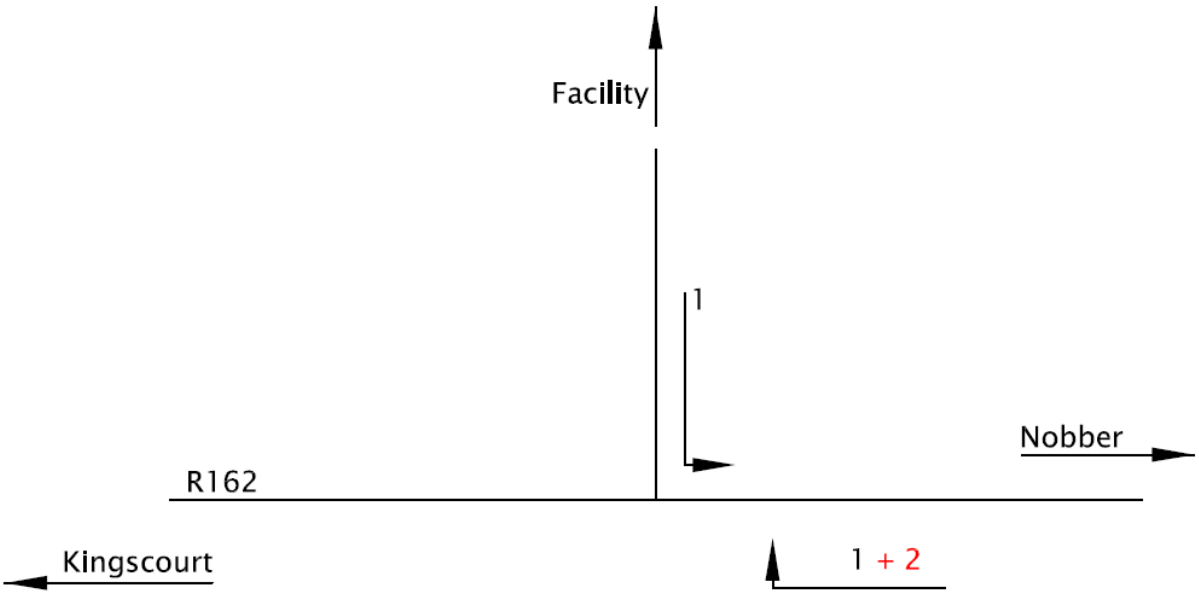

Figure 13.4 Generated Traffic AM Peak

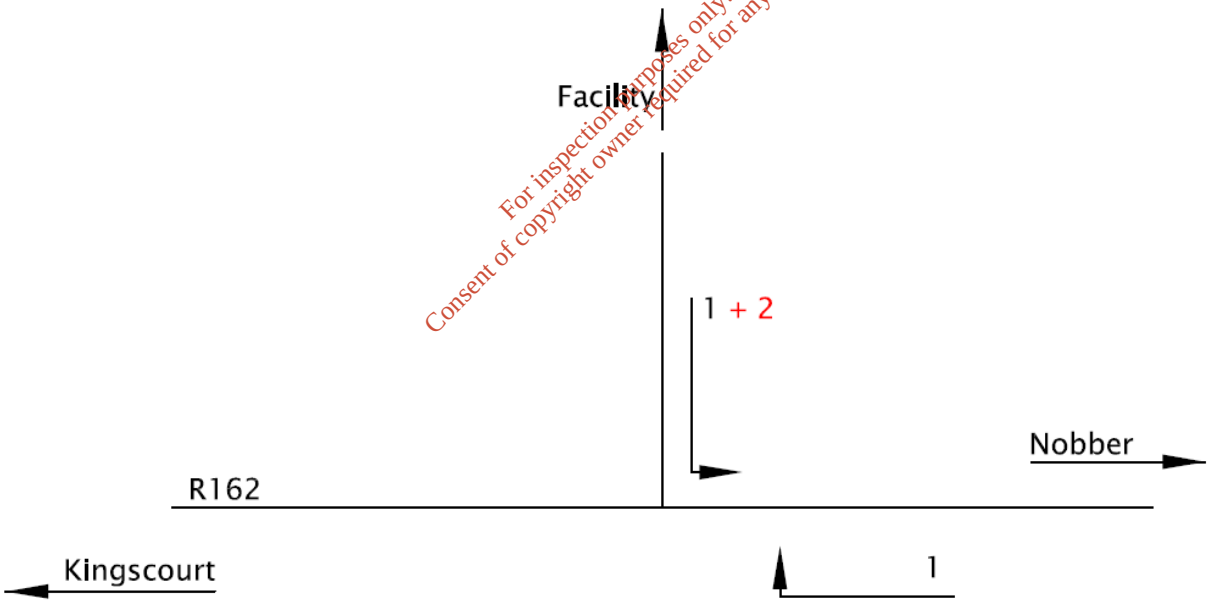

Figure 13.5 Generated Traffic PM Peak

13.4.3 Seasonal Adjustment

In order to undertake an analysis of the traffic flows, it is necessary to apply a correction factor to convert the surveyed traffic flows into seasonally adjusted traffic flows to take account of the seasonal variation that is experienced with traffic surveys. These seasonally adjusted conversion factors were calculated from data taken from a fixed automatic traffic counter located on the N3 just south of Kells during 2006. It was found that traffic volumes during the AM and PM peak were higher during March

than the average peak flows over the course of a year and as such no correction factor has been applied to the data compiled from the traffic count conducted on March 3rd 2009. The seasonally adjusted traffic flows for the AM and PM Peaks are depicted in Figures 13.6 and Figure 13.7 respectively. The percentage of HGVs is shown in parentheses.

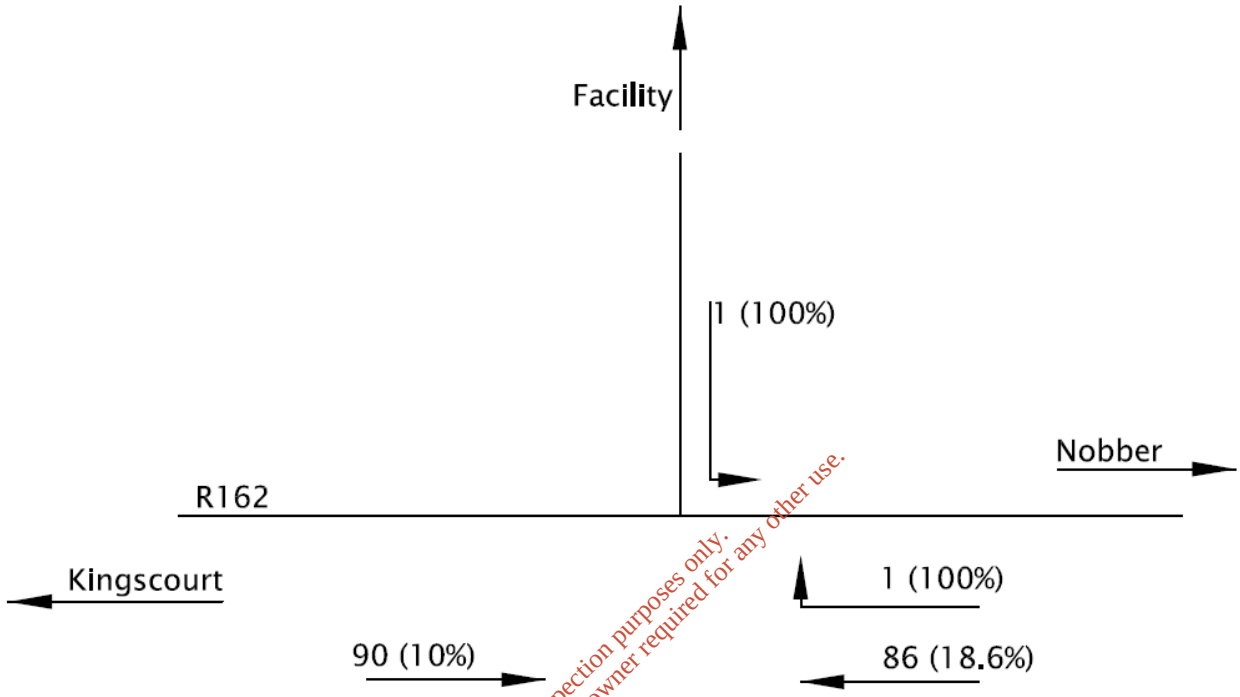

Figure 13.6 2009 Seasonally Adjusted AM Peak Traffic Flows

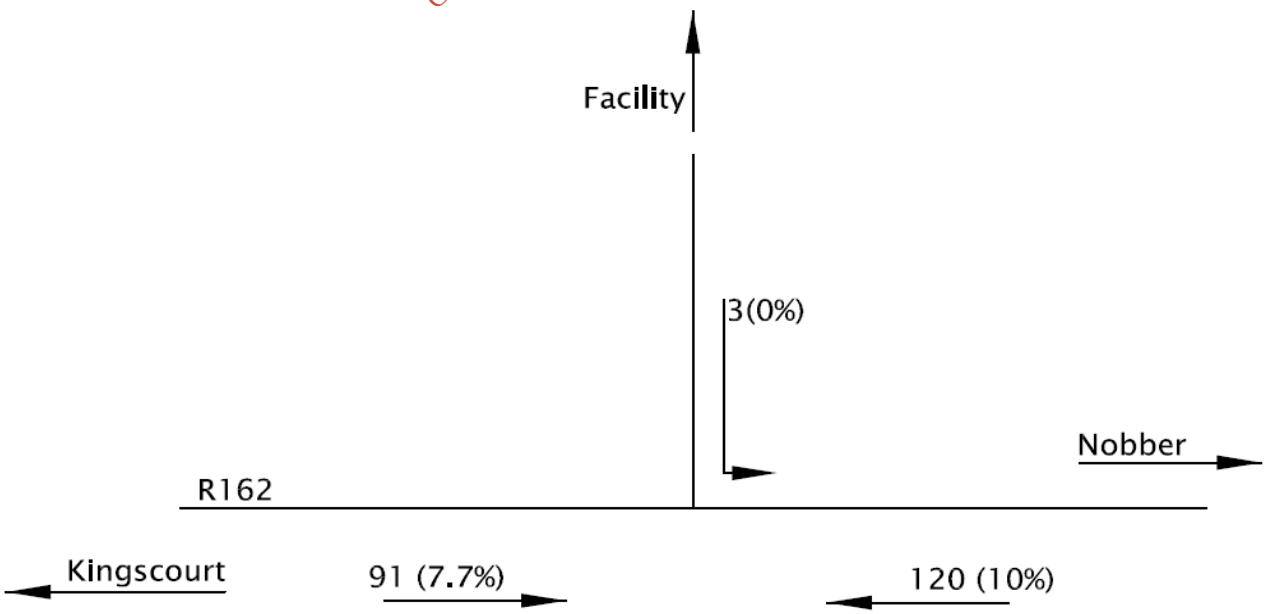

Figure 13.7 2009 Seasonally Adjusted PM Peak Traffic Flows

13.4.4 Traffic Growth

The background traffic growth factors used in the analysis in this report are those provided by the NRA for the non-national road network (Published August 2003 for years 2002 – 2040). These are:

- Cars 1.017 growth factor from 2009 to 2010
  1.174 growth factor from 2009 to 2025
- HGV 1.018 growth factor from 2009 to 2010
  1.196 growth factor from 2009 to 2025

The traffic for the AM and PM peaks is shown below in Figures 13.8 to 13.11 below, for both the opening year of 2010 and the design year of 2025 (defined in Section 13.5.1.2). The percentage of HGVs is shown in parentheses.

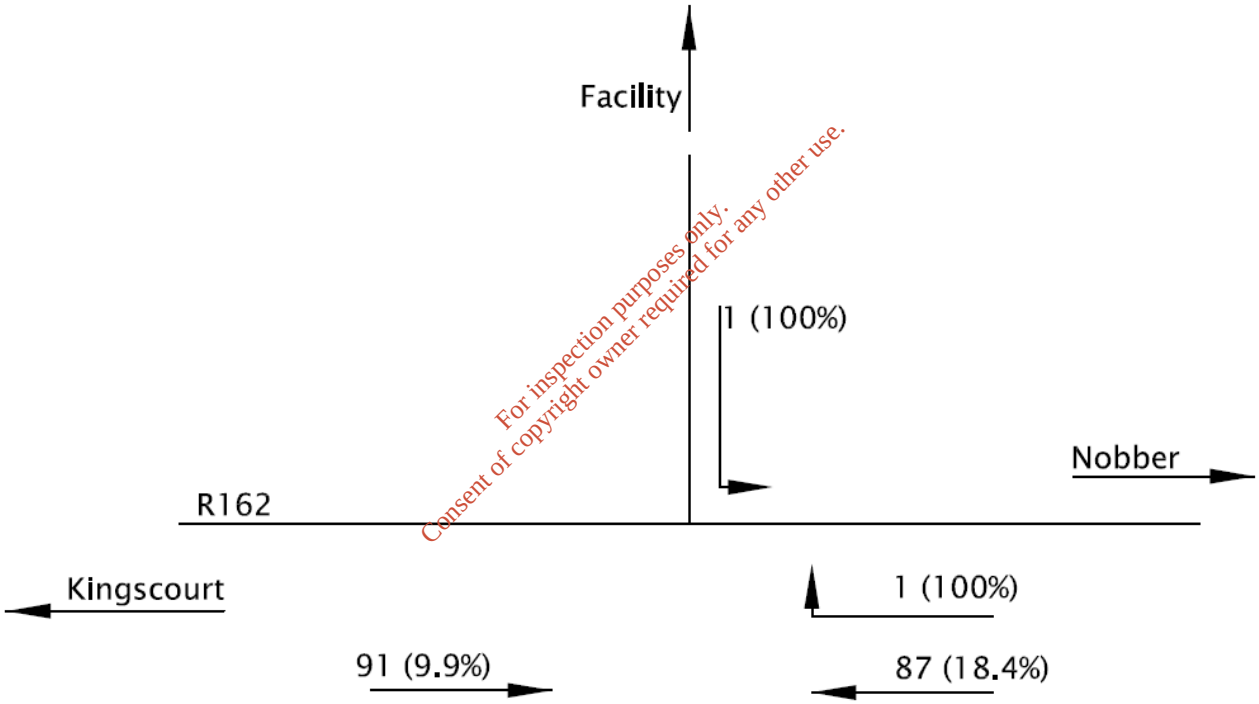

Figure 13.8 2010 AM Peak Baseflow Traffic Flows

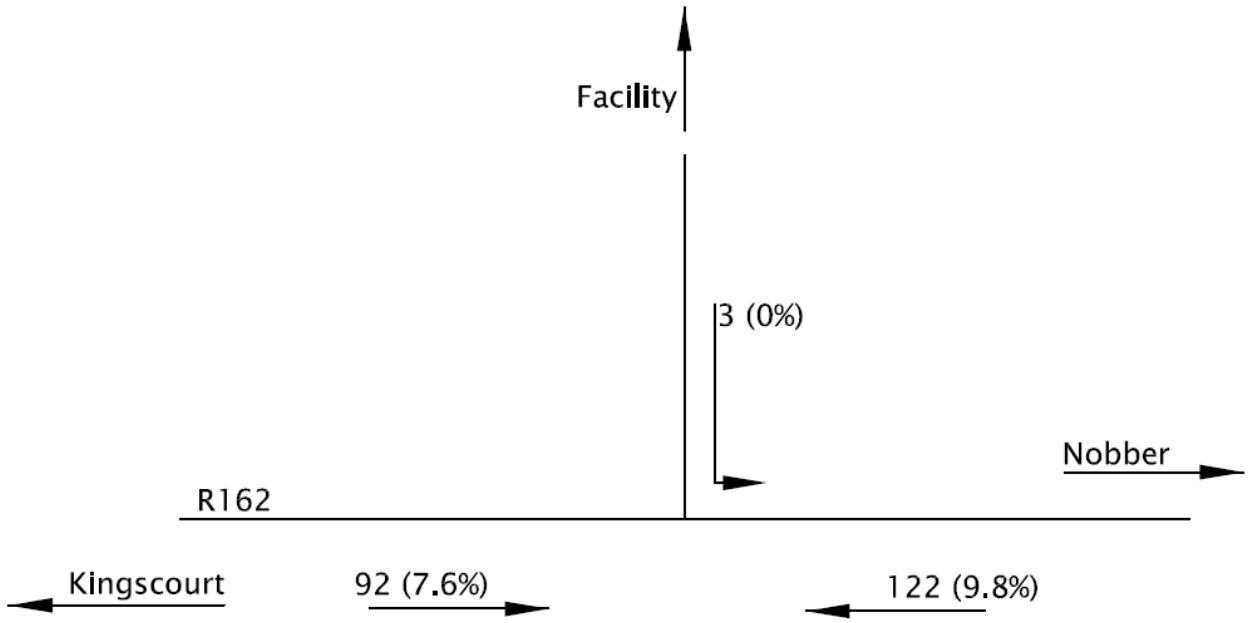

Figure 13.9 2010 PM Peak Baseflow Traffic Flows

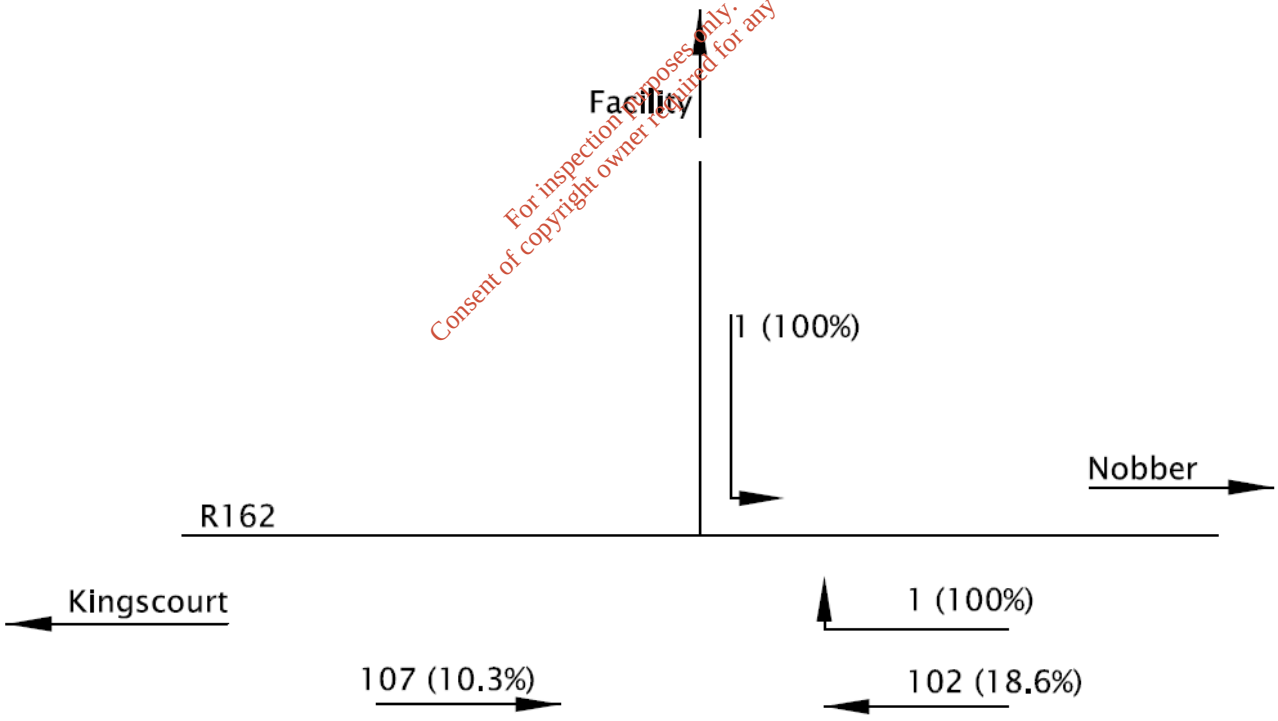

Figure 13.10 2025 AM Peak Baseflow Traffic Flows

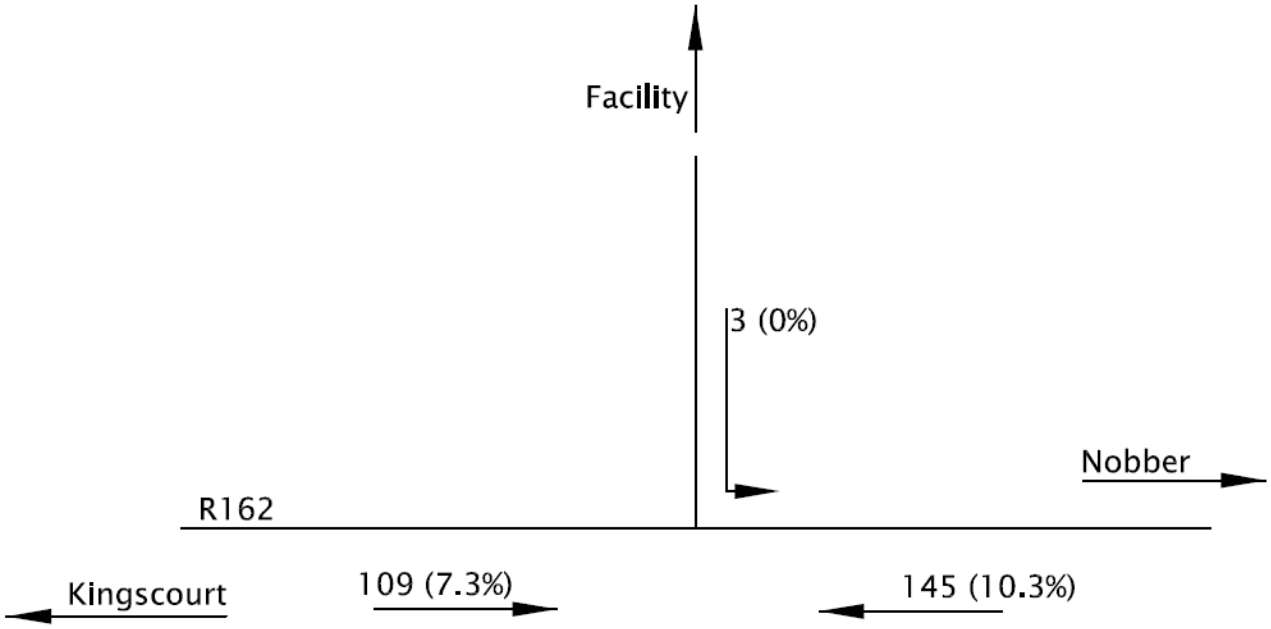

Figure 13.11 2025 PM Peak Baseflow Traffic Flows

The baseflow traffic with the additional generated traffic for the AM and PM peaks is shown below in Figures 13.12 to 13.15 below, for both the opening year of 2010 and the design year of 2025. The percentage of HGVs is shown in parentheses.

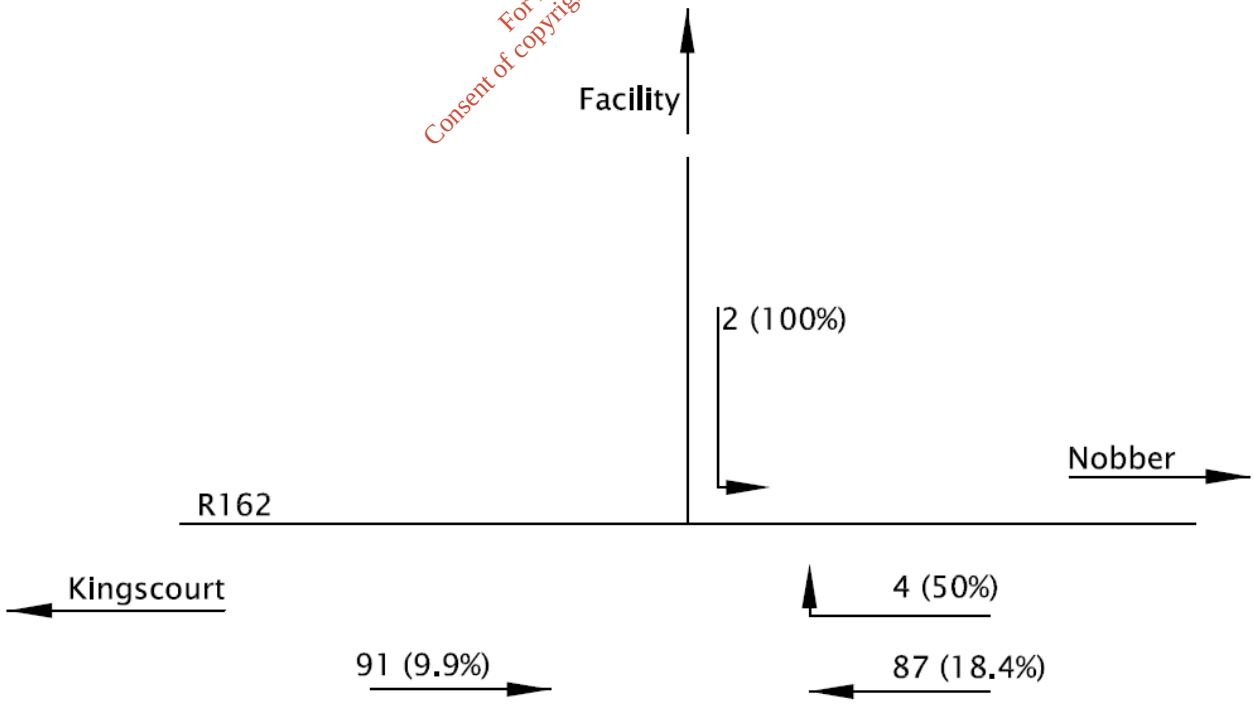

Figure 13.12 2010 AM Peak Baseflow + Generated Traffic Flows

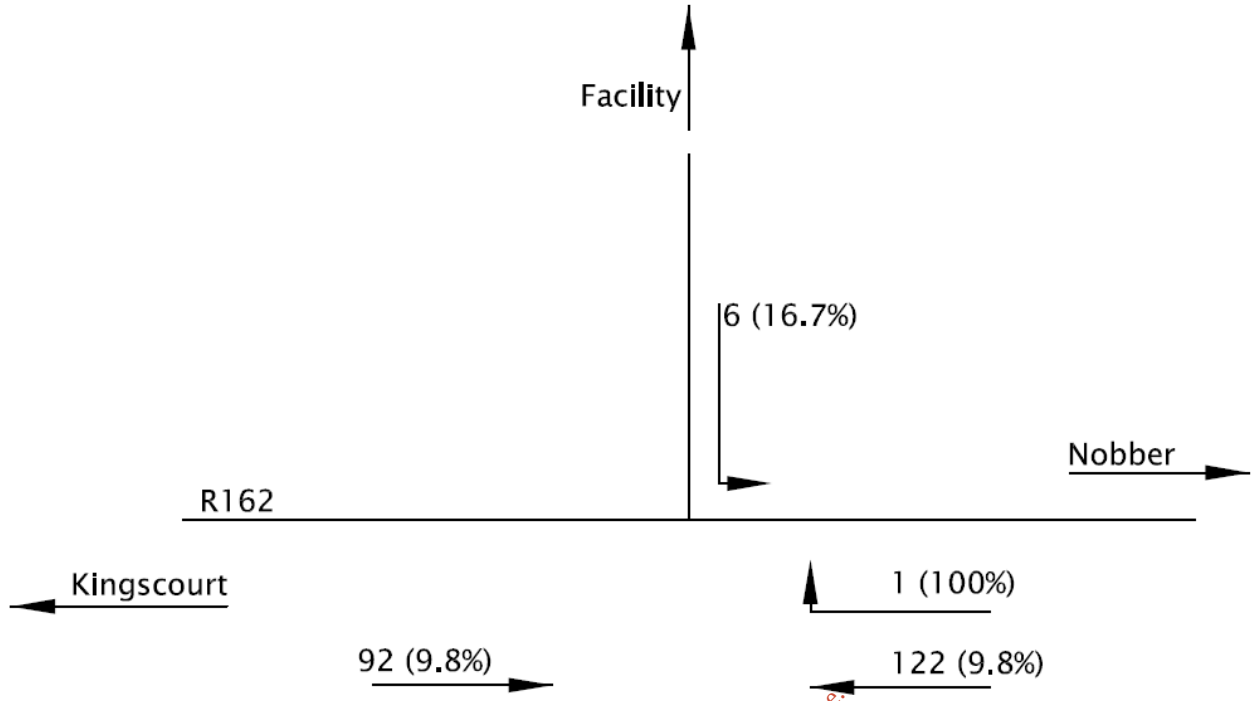

Figure 13.13 2010 PM Peak Baseflow + Generated Traffic Flows

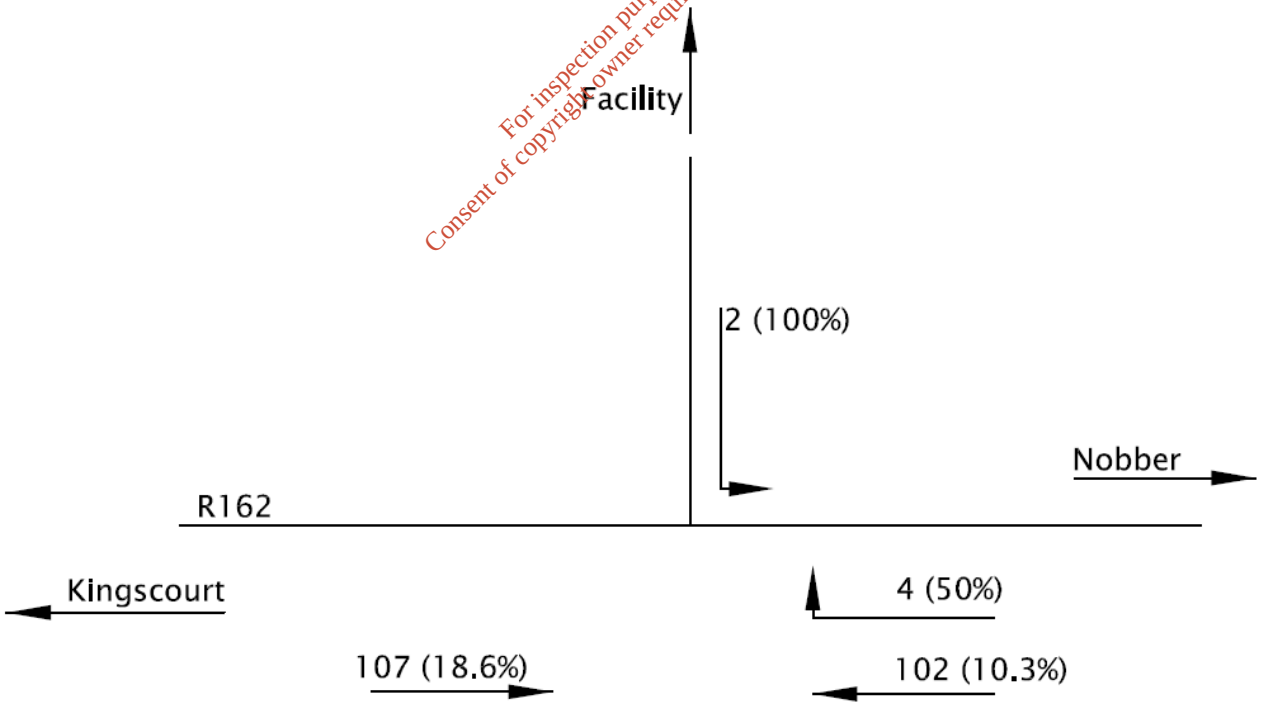

Figure 14.14 2025 AM Peak Baseflow + Generated Traffic Flows

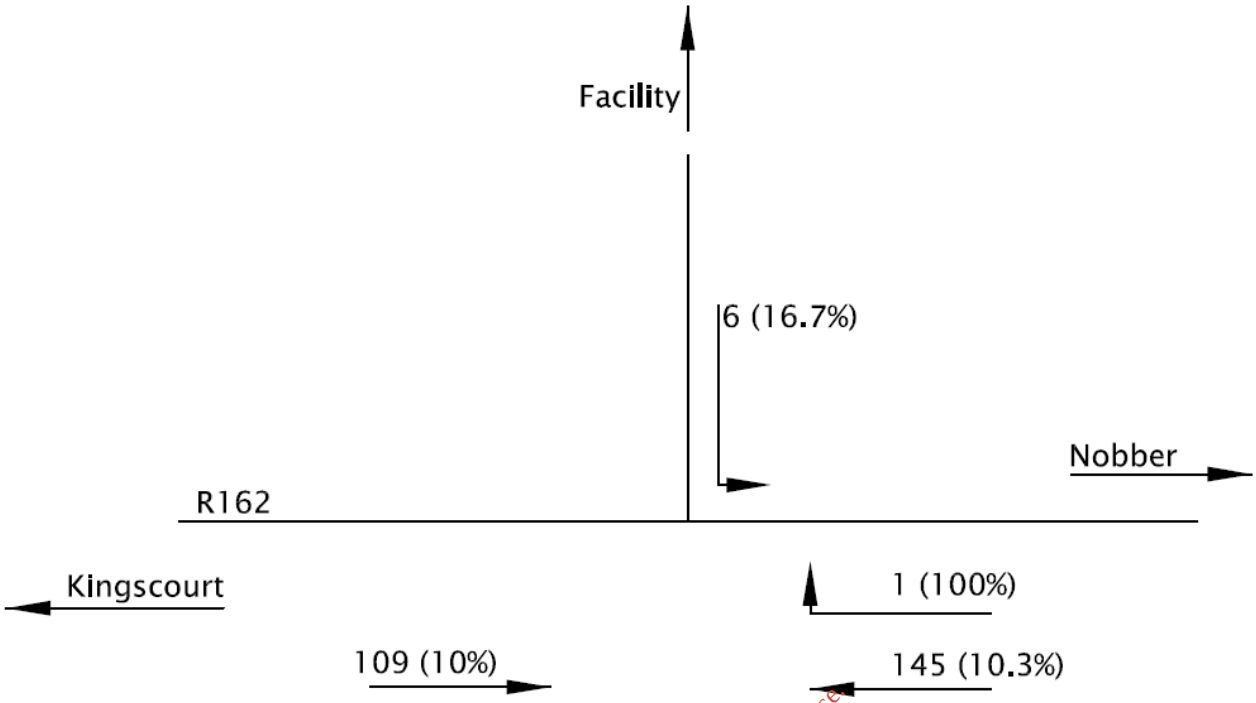

Figure 13.15 2025 PM Peak Baseflow + Generated Traffic Flows

13.5 ROAD IMPACT

13.5.1 Junction Analysis

13.5.1.1 Introduction and Methodology

The junction analysed is the existing Kilmainhamwood Compost facility entrance onto the R162. This junction is a priority junction and has been analysed using the Transport Research Laboratory (TRL) computer program PICADY, a widely accepted tool used for the analysis of priority junctions.

The key parameters examined in the results of the analysis are the Ratio of Flow to Capacity Value (RFC value – desirable value should be no greater than 0.85 for PICADY, values over 1.00 indicate the approach arm is at over capacity), the maximum queue length on any approach to the junction and the average delay for each vehicle passing through the junction during the modelled period.

PICADY requires the following input data:

- Basic modelling parameters (usually peak hour traffic counts synthesised over a 90 minute model period)
- Geometric parameters (including lane numbers & widths, visibility, storage provision etc)
- Traffic demand data (usually peak hour origin/destination table with composition of heavy goods vehicles input).

The results of the PICADY analysis are presented in Section 13.5.1.3. The origin/destination traffic demand tables for all the different scenarios tested for the analysed junction are provided in Appendix 13.2 of this Report.

13.5.1.2 Assessment Years

The performance of the junctions has been analysed for the critical AM and PM peak hours (09:00-10:00 and 17:00-18:00 respectively) for 2009, 2010 (expected year of expanded operations commencing), and the design year of 2025 (15 years beyond the operational date in accordance with the NRA Traffic and Transport Assessment Guidelines).

13.5.1.3 Analysis Results

The analysis results for the entrance into the facility for both the AM and PM peak hours are provided below in Table 13.4 Full PICADY outputs are provided in Appendix 13.3.

Table 13.4 PICADY Results: Facility Entrance AM and PM Peak Hours

Run Information	Arm A – R162 North		Arm B – Compost Facility Entrance		Arm C – R162 South		Average Delay (Min/ Vehicle)
	RFC Value	Max Queue Length	RFC Value	Max Queue Length	RFC Value	Max Queue Length	
2009 AM	-	-	0.003	0.00	0.003	0.00	0.00
2009 PM	-	-	0.004	0.00	0.000	0.00	0.00
2010 AM	-	-	0.003	0.00	0.003	0.00	0.00
2010 PM	-	-	0.004	0.00	0.000	0.00	0.00
2010 AM + Generated Traffic	-	-	0.006	0.01	0.010	0.01	0.00
2010 PM + Generated Traffic	-	-	0.010	0.01	0.003	0.00	0.00
2025 AM	-	-	0.003	0.00	0.003	0.00	0.00
2025 PM	-	-	0.004	0.00	0.000	0.00	0.00
2025 AM + Generated Traffic	-	-	0.006	0.01	0.010	0.01	0.00
2025 PM + Generated Traffic	-	-	0.010	0.01	0.003	0.00	0.00

The above results indicate that the compost facility entrance will operate below its capacity up to and including 2025 and is capable of handling the traffic that will be generated by the proposed extension of the facility.

13.5.2 Link Capacity

A link capacity assessment has been carried out for the R162 with reference to the Geometric Design Guidelines RT180. The R162 is approximately 6.0m wide with 60% visibility greater than 460m and a lateral clearance of 1m from the carriageway edge on both sides. Due to the rural nature of the area, it is assumed that level of service C is to be provided, meaning the two way capacity of the road is 765 vehicles per hour. The maximum two way flow that is expected to occur is during the PM peak in 2025 with a flow volume 257 PCUs. This is below the capacity of the road meaning that the local road will operate within capacity up to and including 2025 where there will be approximately 66% spare capacity.

13.6 ROAD SAFETY, PARKING, PEDESTRIAN FACILITIES AND CYCLISTS

13.6.1 Road Safety

Existing warning signage, warning motorists of a facility entrance, is located at both sides of the facility entrance. It is recommended that additional warning signage is installed and maintained at 200m from either side of the existing compost facility entrance to warn traffic to the presence of slow moving vehicles.

13.6.2 Parking

The Meath County Development Plan 2007-2013 does not outline any specific parking standards for developments such as composting facilities. However, it is noted that adequate parking is provided at the facility to accommodate the expected number of employees and visitors. Adequate space is also provided to facilitate parking for all delivery vehicles.

13.6.3 Pedestrian Facilities

There are no pedestrian facilities in place on the R162 in the vicinity of the development. As it is not expected that there will be any pedestrian activity to and from or within the proposed development, no pedestrian facilities are considered to be required for this development.

13.6.4 Cyclists

There are currently no cycle facilities in place on the R162. Due to the nature and rural location of the development, cycle lanes are not considered to be necessary.

13.7 CONCLUSIONS AND RECOMMENDATIONS

13.7.1 Conclusions

The conclusions to this report are as follows:

- The entrance to the composting facility will operate below its capacity up to and including the design year;
- The R162 will operate below its capacity up to and including the design year;
- Traffic generated by the facility constitutes less than 5% of the traffic flow on the R162 and will have a negligible impact on the capacity of the road network;

13.7.2 Recommendations

The recommendations of this report are as follows:

- Adequate parking for both cars and HGVs should be provided within the proposed development;
- Appropriate warning signs indicating the presence of the entrance for traffic approaching from Nobber or Kingscourt should be provided and maintained;
- Vegetation at the entrance be maintained such that the appropriate visibility requirements are achievable.

14 INTERACTION OF THE FOREGOING

The potential environmental impacts of the continuation of operations and the proposed extension of this composting facility, including the measures proposed to mitigate these impacts have been outlined in this Report. This section discusses the potential for interaction between impacts of the different environmental aspects.

The result of these interactions may either exacerbate the magnitude of the impact or may in fact ameliorate it. As part of the requirements of an Environmental Impact Statement the interaction of the impacts on the surrounding environment, need to be addressed.

There is the potential for interaction between the impacts of the previously permitted composting facility and its proposed extension as follows:

- The facility and site road are inspected on a daily basis for evidence of excessive generation of airborne dust. Thorntons Recycling personnel carry out this inspection. Any remedial actions, such as road cleansing or sweeping, are then implemented. These measures will reduce the impact on human beings and material assets in the community.

- Travel patterns will not be disrupted by the proposed facility extension, however vehicle numbers will increase. Social and travel patterns, pedestrian or otherwise, will not be disrupted by the continuing use of the facility and its proposed extension as no roads or pedestrian ways will be altered significantly.

- There will be minimal loss of wildlife habitat as a result of the proposed facility extension. The majority of landuse within the extension footprint is composed of existing hardstand with only minor removal of existing planting required.

- The proposed redesign of the odour abatement system, to include the use of an acid scrubber, combined with changes (already undertaken) to optimise volumes of process air requiring treatment at the Kilmainhamwood Compost Facility are in line with Best Available Techniques (BAT) in the industry and will significantly minimise nuisances caused by odour.

- The existing composting facility is currently operated in compliance with EPA waste license (W0195-01) and the extended facility will be operated in compliance with a revised waste licence following a waste licence review by the EPA. The conditions of the waste licence include measures to minimise or prevent nuisance to the public occurring as a result of the operation of the facility. A complaints register detailing any complaint received from the general public in respect of the operation of the facility is maintained at the site. The existing facility is certified to International Standards for Environmental (ISO14001), Health and Safety (OHSAS 18001) and quality (ISO9001) and operates an Integrated Management System (IMS). The proposed extension will be included within the scope of these management systems.

- Strict control procedures have been put in place at the Kilmainhamwood Compost facility in order to control the population of vermin. These measures will reduce impacts on human beings and material assets.

- Compliance monitoring is currently undertaken, as per regulatory conditions and annual environmental reports have been compiled to detail the performance of the existing facility. These reports are made available to all interested parties, which will allay public concerns as to the operation of the site and will result in a positive interaction with respect to human beings.

While there is potential for the above impacts to interact and result in a cumulative impact, it is unlikely that any of these cumulative impacts will result in significant environmental degradation.

It should be noted that throughout the Environmental Impact Statement potential interaction between various environmental criteria are discussed. The baseline assessment for this project was completed prior to the design of the facility extension, which allowed for the optimisation of the site layout design. Avoidance of impacts was used throughout the design of the proposed facility. The impact and mitigation measures proposed are designed to further ameliorate the impact of the existing facility and the proposed extension of the facility on the wider environment.

15 EXPLANATION OF TECHNICAL TERMS

ABP: Animal By-Products

AER: Annual Environmental Report

A-Weighting: is the process by which noise levels are corrected to account for the non-linearity of human hearing

BAT: Best Available Techniques

BMW: Biodegradable Municipal Waste. Is municipal waste that is capable of undergoing anaerobic or aerobic decomposition, such as food and garden waste, and paper and paperboard

C&D: Construction and Demolition

Compost: Is the stable, sanitised and humus-like material, rich in organic matter and free from offensive odours, resulting from the composting process of separately collected biowaste

C:N Ratio: Carbon to Nitrogen Ration. The C:N ratio is used by the composting industry as a measure of a proper nitrogen balance

CSO: Central Statistics Office

DAFF: Department of Agriculture, Fisheries and Food

DED: District Electoral Division

DOEHLG: Department of Environment Heritage and Local Government

EIA: Environmental Impact Assessment

EIS: Environmental Impact Statement

ELV: End of Life Vehicles

EPA: Environmental Protection Agency

EQS: Environmental Quality Standards

ERFB: Eastern Regional Fisheries Board

EWC Code: European Waste Catalogue

GDA: Great Dublin Area

Green Waste (Garden and Landscape Material): Green waste is vegetation waste from gardens and parks, including tree cuttings, branches, grass, leaves, prunings, old plants and flowers

GSI: Geological Survey Ireland

HACCP: Hazard Analysis and Critical Control Points

HGV: Heavy Goods Vehicle

IGI: Institute of Geologist of Ireland

LA90: is the A-weighted sound level that is exceeded for 90% of the measurement period and is used to quantify background noise level

LAEQ: is the A-weighted equivalent continuous steady sound level during the measurement period and effectively represents an average ambient noise value

LCA: Landscape Character Areas

LCT: Landscape Character Types

MBT: Mechanical Biological Treatment

MM; Millimetres

Municipal Waste: Is waste from households, as well as commercial and other waste, which, because of its nature or composition, is similar to household waste

NPWS: National Parks & Wildlife Service

NRA: National Roads Authority

NSS: National Spatial Strategy

OD: Ordnance Datum is a vertical datum used by an ordnance survey as the basis for deriving altitudes on maps

OPW: Office of Public Works

pNHA; Proposed Natural Heritage Area

QNHS: Quarterly National Household Survey

RMP; Record of Monuments and Places

RPZ: Resource protection zones

SI: Statutory Instrument

SUDS: Sustainable Urban Design Schemes

SVOC: Semi Volatile Organic Compounds

TRL: Transport Research Laboratory

VOC: Volatile Organic Compounds

WFD: Water Framework Directive

WIMS: Waste Information Management System

WMP: Waste Management Plan