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Kilmainhamwood Compost, Ballynalurgan, Kilmainhamwood, Kells, Co. Meath

## 1 Introduction

This report is the Annual Environmental Report for Kilmainhamwood Compost. It has been prepared in compliance with Condition 11.7 of the Waste Licence (Licence Reg. No. W0195-01) and includes emission details and reporting for the reporting period of 2008.

This licence was granted by the Environmental Protection Agency (EPA) to Padraig Thornton Waste Disposal Ltd (PTWDL) on the 30<sup>th</sup> January 2006. The contents of this report are as required by Schedule G of Waste Licence W0195-01.

### 1.1 Operator

The facility operator and licensee of licence number W0195-01 is Padraig Thornton Waste Disposal Ltd. This AER relates to Kilmainhamwood Compost, Ballynalurgan, Kilmainhamwood, Kells, Co. Meath.

The address and contact details for the company headquarters are;

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Unit S3B Park West Business Park  
Dublin 10.

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**Site Contact:** Tom McDonnell

**Mobile:** 086-8563431

### 1.2 Reporting Period

The reporting period for this Annual Environment Report (AER) is between the 01/01/2008 to the 31/12/2008.

## 2 Facility Activities

### 2.1 Waste Activities carried out at the Facility

Part 1 of the current Waste Licence W0195-01 lists those activities contained in the Third and the Fourth Schedule of the Waste Management Act 1996, which are licensed to be carried out at Kilmainhamwood Compost, Ballynalurgan, Kilmainhamwood, Kells, Co. Meath. These activities are as follows:

#### *Third Schedule*

<b>Class 6</b>	<b>Biological treatment not referred to elsewhere in this Schedule which results in final compounds or mixtures which are disposed of by means of any activity referred to in paragraphs 1 to 10 of this Schedule:</b>
<b>Class 13.</b>	<b>Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced.</b>

#### **Fourth Schedule**

<b>Class 2</b>	<b>Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).</b>
<b>Class 13.</b>	<b>Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced.</b>

#### **2.2 Operation Processes – Waste Activities at the facility**

The following section details the operational procedure for dealing with acceptable biodegradable waste that enters the Kilmainhamwood Compost Facility. (Appendix 1 details the Facility layout)

##### **Standard Operation procedures in the Composting Building**

On arrival the transportation vehicle bringing material to the facility is inspected and checked to ensure that it is clean and there are no residual materials on the truck body and that it is properly covered or netted. Passing inspection the vehicle is directed towards the weighbridge. After weighing the following information is recorded on our computerised system;

- a. Date
- b. The name of the carrier (including if appropriate, the waste carrier registration details),
- c. The vehicle registration number,
- d. The name of the producer(s)/collector(s) of the waste as appropriate,
- e. The name of the waste facility(if appropriate) from which the load originated including the waste licence or waste permit register number,
- f. A description of the waste including the associated EWC codes,
- g. The quantity of the waste, recorded in tonnes,
- h. The name of the person checking the load.

Once weighed the vehicle is directed to the reception hall, the door of the reception is opened and the vehicle is directed in, once inside the reception hall the door is closed. On clearance the driver is directed to tip load and the facility operator inspects the load whilst the load is tipping. The facility operator signs off the acceptance form and confirms if material is suitable for processing at the facility. Any material not suitable for processing or is in contravention of the licence is removed for temporary storage in a quarantine area. The quarantined material is removed off site ASAP by a licensed contractor for disposal as per waste acceptance procedure EP14 for Kilmainhamwood Compost.

Once tipping is complete the facility operator washes down the container with a steam power washer insuring no residual material remains. The door is opened and the driver is directed to leave the reception hall and to the weighbridge for weighing where he will be given a weighbridge docket. The vehicle then leaves the facility taking the exit route.

Inside the building the organic waste material suitable for composting is mixed and blended by weight with an amendment material. The typical blend is made up of 45% Seed Material, 10% sludge/grease trap waste and 45% Brown Bin/catering waste. This mixed material is conveyed by loading shovel to a collection area where a batch size of 120 tonnes is reached and then removed by a loading shovel and placed into an aerated bay. The material is given a unique sub-batch code which allows for full traceability of the ingredients of the batch and traceability of the batch through the facility. When the bay is full the operator places one temperature probe into the material. The aeration is switched on which is controlled by a plc that brings the temperature to the required level. The composting material stays in this bay for one week. After this period the material is taken out of the bay and placed over the wall into Zone 3 (Appendix 1). The material is then placed into another bay and moisture is amended to the required level. A temperature probe

is placed into the material and the aeration switched on. The composting material will stay in this zone for 2 weeks and will get one turn using a machine and a moisture amendment if required.

After this period the material is placed is taken into Zone 4 (Appendix 1) and screened through a 12mm screen. The oversize material is sent back to the start of the process as seed compost and any residual plastic from the process comes out the end of the screener and is sent to landfill when a full load is collected. The screened 12mm material is placed into an enclosed tunnel for pasteurisation. The tunnel can hold up to 25 sub-batches and when full the total material will be given a unique Batch Number for traceability. Once inside the enclosed tunnel the aeration is switched on and the temperature is brought to over 70°C for 60 consecutive minutes to satisfy the Animal By-Product Regulations (ABPR). After Pasteurisation the material is sampled in situ and the samples sent to an approved Laboratory for analysis. Once the material has passed the ABPR requirements and E.P.A. standards it can be classified as compost and taken out of the tunnel by a clean machine and loaded for transport off site to the appropriate end user.

Any material not meeting ABPR and EPA standards can be reworked in the facility to produce higher grade compost or transported to an appropriate landfill site as cover.

### **2.3 Weighbridge Calibration**

The weighbridge was calibrated and certified by the legal metrology service on the 24<sup>th</sup> July 2008. A copy of this certificate is contained within Appendix 2.

## **3 Quantity and Composition of Waste Received, Recovered and Disposed of During the Reporting Period**

### **3.1 Waste Handled in Kilmainhamwood Compost**

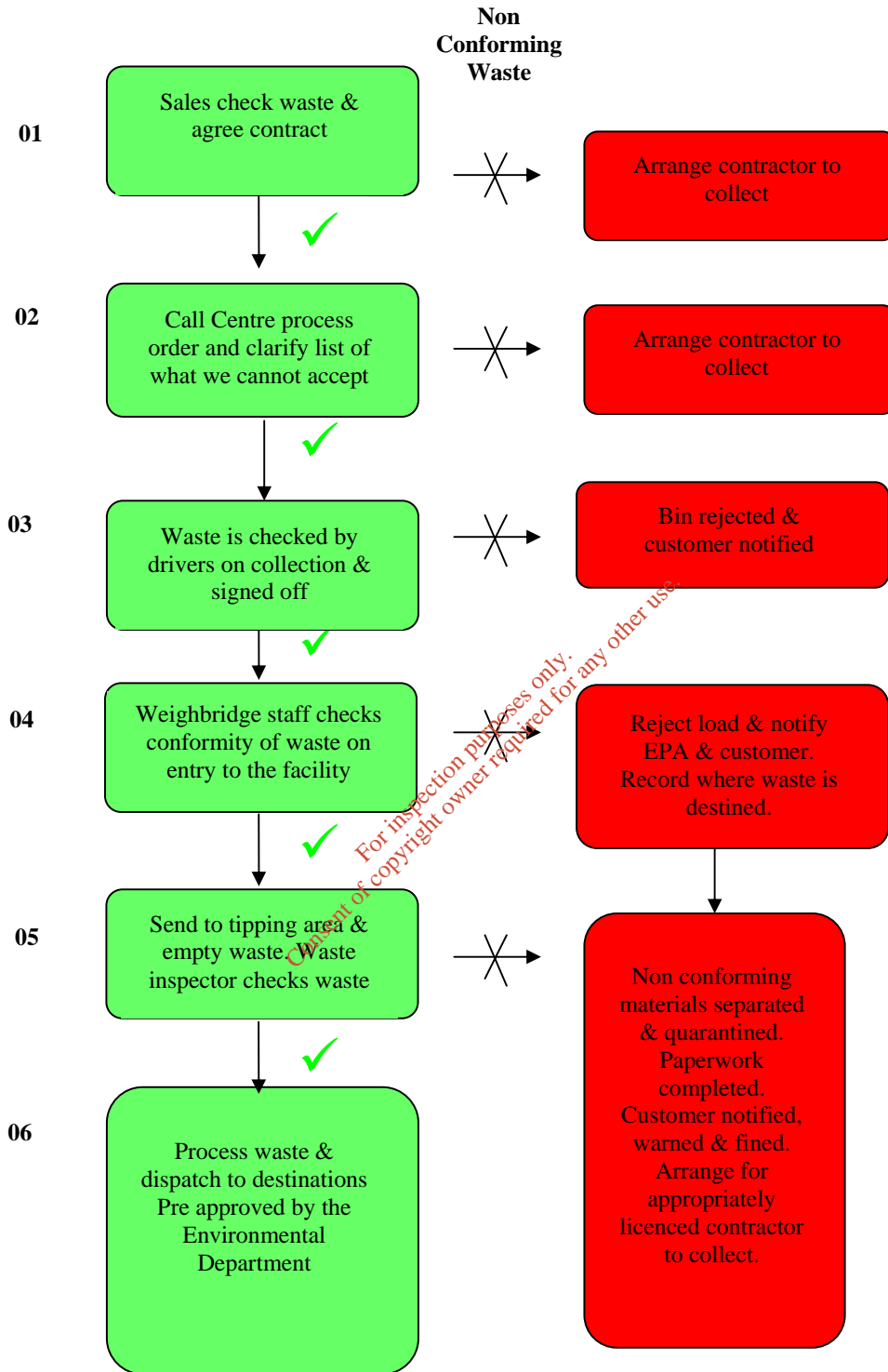
All waste is checked and documented at the weighbridge in accordance with our waste licence and our waste acceptance procedures. Waste is then inspected, processed and placed into our production system. The composting process takes up to 8 weeks to produce mature compost.

Mature compost started to leave the Facility on 14<sup>th</sup> April 2007 and was subjected to the quality analysis, as per Schedule E of the Licence W0195-01 and The Technical Amendment of the licence. Until the approval process for ABP from the Dept. of Agriculture was fully completed all compost produced went as inert landfill cover and for soil formation. Full approval under the ABP Regulations from the Dept. of Agriculture was received on 11<sup>th</sup> October 2007. A copy of the Approval Certificate is contained within Appendix 3.

Should any non-conforming waste come to the attention of our staff it is either rejected before collection or segregated and quarantined to be disposed of by a licensed contractor. Paperwork in relation to all non-conforming wastes is maintained on site.

### **3.2 Waste Acceptance**

The following is a simplified diagram explaining our waste acceptance procedures at Kilmainhamwood Compost.



All new staff employed by the company in 2008 received an Environmental Induction which includes licence training, waste acceptance procedures, good practice in composting, emergency procedures and environmental awareness. All staff employed at the facility are diligent in assisting in eliminating the occurrence of non-conforming waste and producing a good quality compost at the facility.

Kilmainhamwood Compost successfully maintained its certification for its management systems in ISO14001 Environmental, ISO 9001 Quality, OHSAS 18001 Health and Safety in 2008. The IMS system is available for inspection on the IMS drive at all company site offices.

### 3.3 Waste Received

A total of 20,651 tonnes of waste was accepted at the facility in the reporting period from 1<sup>st</sup> January 2008 to 31<sup>st</sup> December 2008. As per E.P.A. licence W0195-01 Kilmainhamwood compost can accept 20,800 tonnes of waste per annum.

**Table 3.3.1 Quantity and Composition of Waste Received 2007-2008**

<b>EWC Code</b>	<b>Materials Received</b>	<b>2007</b>	<b>2008</b>
19 08 05	Sludge Urban Waste Water	7,985	6,159
02 02 04	Sludge Food Prep Animal Origin	195	845
20 01 25	Grease Trap Waste	981	1,366
02 03 04	Unsuitable food waste	1,662	2,228
20 01 08	Compostable Food Waste	4,335	7,766
02 07 04	Unsuitable Alcohol/Liquid	120	31
02 06 01	Bakers Waste	48	36
19 12 07	Wood – Processed	159	183
20 02 01	Compostable/ Green Waste	767	54
02 07 05	Sludge Alcohol/non-Alcohol	75	172
19 09 01	Screening Waste Water	104	59
02 01 01	Sludge Agriculture Washing	268	-
02 01 06	Animal manure	-	545
20 03 01	Mixed Municipal Waste	204	9
20 03 04	Septic Tank Sludge	8	-
02 05 02	Sludge Dairy Industry	1,798	1,198
	<b>TOTAL TONNAGE</b>	<b>18,709</b>	<b>20, 651</b>

### 3.4 Waste Disposed

Of the total 20,651 tonnes accepted at the facility in 2008, 839.92 tonnes of the material was not suitable for composting and was sent to landfill as a residual waste. The remaining material was suitable for composting and was sold as a product or returned into the operation to assist in the composting process and enable the production of compost.

## 4 Contribution to the achievement of recovery targets

### 4.1 Proposal for the contribution of the facility to the achievement of targets for the reduction of Biodegradable waste to landfill as specified in the landfill Directive

Progressive targets have been set out in the Landfill Directive (1999/31/EC) to reduce the proportion of biodegradable municipal waste landfilled. By 2006 Member States were restricted to land filling a maximum of 75% of the total weight of biodegradable municipal waste generated in 1995, the baseline year. This target is further reduced to 50% of the 1995 baseline by 2009 and 35% by 2016. According to the National Waste Report 2007 an estimated 2,318,091 tonnes of biodegradable municipal waste was generated in Ireland in 2007 of which 63.6% was landfilled and the remaining 36.4% recovered. The report states that recovery only marginally increased on 2006 showing that the country has a long way to go in reversing this trend and meeting the landfill directive targets.

Kilmainhamwood Compost, Ballynalurgan, Kilmainhamwood, Kells, Co. Meath have been successfully contributing towards National Targets and diverted approximately 18,709 tonnes in 2007 and 20,651 tonnes in 2008 of biodegradable waste from landfill for composting. This material would have historically gone for disposal to licensed landfills

Thorntons Recycling can now offer all their customers the opportunity to segregate all biodegradable waste at source and with the development of Kilmainhamwood Compost can offer a composting alternative to all its customers. The facility at Ballynalurgan, Kilmainhamwood, County Meath, (Waste Licence W0195-01) has proven to be very successful. The facility accepts non-hazardous biodegradable wastes (including sewage sludge, industrial sludge's, household and commercial waste for composting). Thorntons Recycling also commenced roll out of the domestic brown bin collection service in Meath and Kildare in 2008. Kilmainhamwood Compost will aim to continue to increase the quantity of biodegradable waste that can be diverted from landfill even further and assist Ireland in achieving Targets laid down by the landfill Directive (1999/31/EC).

### 4.2 The recovery of non hazardous biodegradable waste

All non hazardous biodegradable waste arrives at the facility and when accepted is tipped in the reception hall. After inspection the material is amended with other organic material such as wood chip or sawdust in order to create a blend with a Carbon: Nitrogen ratio of 30: 1, moisture content of 65% and with an open texture. This material will be placed into our composting bays and achieves temperatures in excess of 60°C. After 3 weeks the material is screened and the screened compost is placed into pasteurization in order to comply with the ABP Regulations, 70°C for 60mins with a 12mm particle size. After a total period of 8 weeks the composting material will have matured and using Schedule E of Licence W0195-01 can be classified in either a class I or class II compost. Any end product not meeting this standard can be reworked in the process or classified as a stabilized bio-waste and disposed of in an approved landfill site.



## 5.0 Summary Report and Interpretations on Environmental Monitoring and Emissions Data

In accordance with Schedule D of PTWDL waste licence W0195-01 monitoring of dust, noise, surface water, groundwater and air microbes were carried out during the reporting period. The following section details results obtained and interpretations of results.

### 5.1 Total Dust Deposition 2008

Three fixed monitoring locations (DA, DB and DC) were used to perform total dust deposition monitoring quarterly over the 30 day sampling period as per Waste licence W0195-01.

The monitoring locations are presented in Appendix 1. The results presented in *Table 5.1* illustrate that total depositional dust at all locations. All dust depositions levels were under the guideline limit, 350 mg/m<sup>2</sup>/day, recommended by the EPA as per conditions of W0195-01.

**Table 5.1 Average ambient Total dust deposition concentrations at three monitoring locations at the Kilmainhamwood Compost.**

Location	Unit	Mar-08	Jun-08	Sep-08	Dec-08
DA	mg/m <sup>2</sup> /day	68	114	62	53
DB	mg/m <sup>2</sup> /day	111	128	144	84
DC	mg/m <sup>2</sup> /day	48	96	48	36

### 5.2 Noise Monitoring

The noise survey was carried out at the location N1 referenced in the waste licence (see map attached Appendix 1). Monitoring was carried out on a quarterly basis as per Schedule D of waste licence W0195-01. The monitoring results are presented in *Table 5.2*. The results presented in *Table 5.2* illustrate that recorded noise levels at all locations. Reports have been submitted to the EPA, as per waste licence requirements, and all levels displayed in Table 5.2 are below the emission levels set down by the waste licence W0915-01.

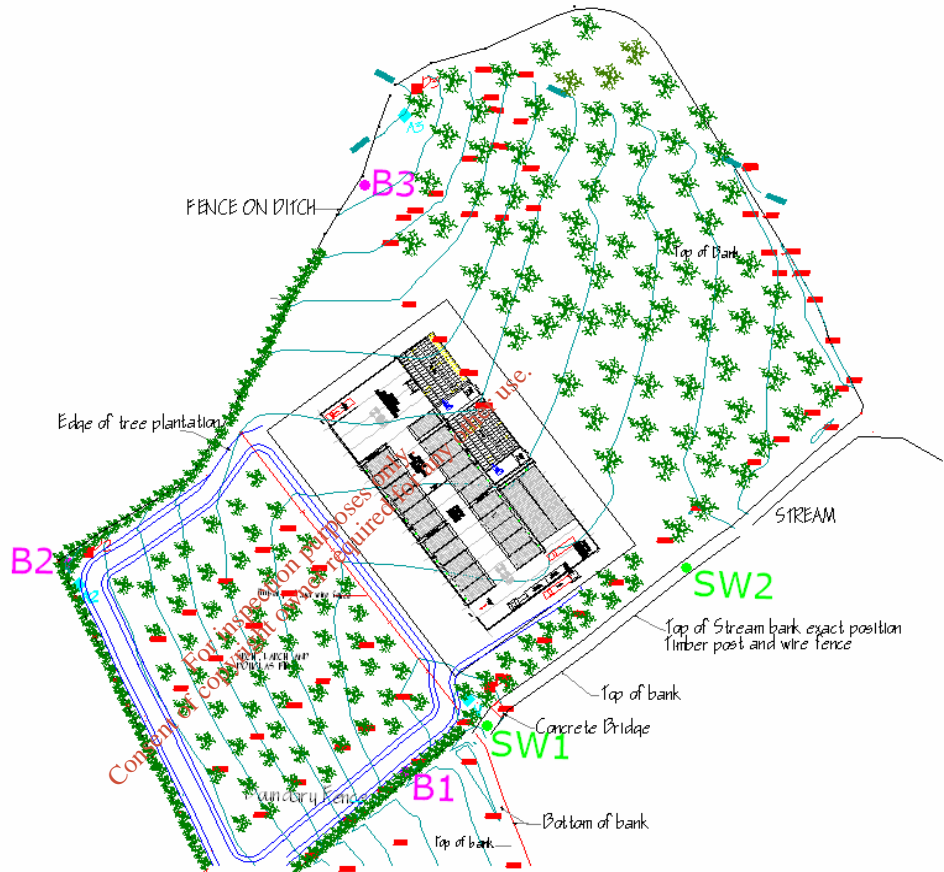
**Table 5.2 Recorded Noise Levels dB(A) – Intervals 30 minutes**

Location	Time	unit	Jan-08	April-08	Sept-08	Dec-08
N1	Day	Leq	48.1	47.9	61.4	48
	Day	L10	45.8	46.5	47	44.6
	Day	L90	39.3	35.6	39	37.3
	Night	Leq	41	43.6	37	39.5
	Night	L10	41.1	41.7	36.6	43.1
	Night	L90	32.5	30	30.1	33.5

**5.3 Groundwater and Surface Water**

As per Schedule D of waste licence W0195-01 Groundwater was monitored at B1, B2 and B3 bore wells and Surface Water was monitored quarterly at SW1 and SW2. Diagram 5.3.1 shows the locations of the monitoring points and the results are outlined in the tables below.

**Figure 5.3.1 Monitoring Locations of Surface Water and Groundwater**



**SW1** -----Down stream Monitoring Point.

**SW2**-----Up stream Monitoring Point.

**B1** -----Groundwater Well No.1 Monitoring Point.

**B2** -----Groundwater Well No.2 Monitoring Point.

**B3** -----Groundwater Well No.3 Monitoring Point.

The results of monitoring during the reporting period are recorded in the following tables.

**MONITORING WELL B1: Chemical  
Analysis of Groundwater.**

Table 5.3.2

PARAMETERS	UNIT	13/09/2007	25/02/2008	18/09/2008
<b>FIELD ANALYSIS</b>				
<i>General Water Quality Parameters</i>	mAoD(malin)	80.81m	80.81m	80.81m
Colour	-	Clear	-	Clear
Conductivity @ 25°C	uS/cm	1,229	1,106	-
Odour	-	No Odour	-	No Odour
pH	pH Units	7.33	7.21	7.4
Temperature	deg C	10.9	9	11.6
Ground Water Level	M	16.7		16.7
<b>LABORATORY ANALYSIS</b>				
<i>General Water Quality Parameters</i>				
pH	pH Units	7.6	7.21	7.4
<i>Inorganics</i>				
Ammonia	NH <sub>4</sub> mg/l	<0.2	<0.2	<0.6
Calcium	Ca mg/l	168	-	151.3
Chloride	Cl mg/l	27	24	25.59
Nitrate	NH <sub>3</sub> mg/l	<0.3	-	<0.1
Phosphorous	P mg/l	<0.05	-	<0.005
Potassium	K mg/l	2.8	-	4.01
Ortho Phosphate	PO <sub>4</sub> mg/l	<0.04	-	<0.005
Sodium	Na mg/l	26.5	-	25.86
Sulphate	SO <sub>4</sub> mg/l	619	447	277.3
<i>Metals</i>				
Boron	B mg/l	0.42	-	0.207
Cadmium	Cd mg/l	<0.004	-	<0.00009
Chromium (Total)	Cr mg/l	<0.001	-	<0.0013
Copper	Cu mg/l	<0.004	-	<0.002
Iron	Fe mg/l	<0.002	-	0.1388
Lead	Pb mg/l	<0.001	-	<0.0043
Magnesium	Mg mg/l	58.39	-	38.02
Manganese	Mn mg/l	0.036	-	0.0095
Nickel	Ni mg/l	<0.008	-	<0.0006
Zinc	Zn mg/l	0.114	-	0.0749
<i>Bacteria</i>				
Feacal Coliforms	cfu/100ml	<1		6
Total Coliforms	cfu/100ml	800		112
<i>List I/II</i>				
Volatile Organic Compounds	mg/l	<0.001		<0.001
Semivolatiles	mg/l	<0.001		<0.001
Pesticides	mg/l	<0.00001		<0.001

**MONITORING WELL B2: Chemical  
Analysis of Groundwater. Table 5.3.3**

PARAMETERS	UNIT	13/09/2007	25/02/2008	18/09/2008
<i>General Water Quality Parameters</i>	<b>mAOD(malin)</b>	<b>86.93</b>	<b>86.93</b>	<b>86.93</b>
<b>FIELD ANALYSIS</b>				
<i>General Water Quality Parameters</i>				
Colour	-	-	-	-
Conductivity @ 25°C	uS/cm	1,116	1,112	-
Odour	-	No Odour	No Odour	No Odour
pH	pH Units	7.1	7.18	7.3
Temperature	deg C	11.9	8.8	12.3
Ground Water Level	M	22.2	-	23
<b>LABORATORY ANALYSIS</b>				
<i>General Water Quality Parameters</i>				
pH	pH Units	7.49	-	7.3
<i>Inorganics</i>				
Ammonia	NH <sub>4</sub> mg/l	<0.2	<0.2	<0.06
Calcium	Ca mg/l	175.1	-	147
Chloride	Cl mg/l	15	13	14.88
Nitrate	NH <sub>3</sub> mg/l	<0.3	-	<0.09
Phosphorous	P mg/l	0.06	-	0.004
Potassium	K mg/l	2.8	-	2.01
Ortho Phosphate	PO <sub>4</sub> mg/l	0.03	-	0.004
Sodium	Na mg/l	39	-	30.96
Sulphate	SO <sub>4</sub> mg/l	459	167	270.51
<i>Metals</i>				
Boron	B mg/l	0.056	-	0.0042
Cadmium	Cd mg/l	<0.004	-	<0.00009
Chromium (Total)	Cr mg/l	<0.001	-	<0.00093
Copper	Cu mg/l	<0.001	-	<0.0002
Iron	Fe mg/l	<0.002	-	<0.213
Lead	Pb mg/l	<0.001	-	<0.0018
Magnesium	Mg mg/l	44.47	-	33.23
Manganese	Mn mg/l	0.154	-	0.6462
Nickel	Ni mg/l	0.003	-	0.0005
Zinc	Zn mg/l	0.012	-	0.0114
<i>Bacteria</i>				
Feacal Coliforms	cfu/100ml	<1	-	5
Total Coliforms	cfu/100ml	3	-	58
List I/II				
Volatile Organic Compounds	mg/l	<0.001	-	<0.001
Semivolatiles	mg/l	<0.001	-	<0.001
Pesticides	mg/l	<0.00001	-	<0.00001

**MONITORING WELL B3: Chemical Analysis of Groundwater.** Table 5.3.4

PARAMETERS	UNIT	13/09/2007	25/02/2008	18/09/2008
<b>FIELD ANALYSIS</b>				
<i>General Water Quality Parameters</i>		mAoD(malin)		
Colour	-	Clear	-	Clear
Conductivity @ 25°C	uS/cm	601	540	-
Odour	-	No Odour	-	No Odour
pH	pH Units	7.36	7.36	7.36
Temperature	deg C	11.5	10	14.1
Ground Water Level	M	10	-	9
<b>LABORATORY ANALYSIS</b>				
<i>General Water Quality Parameters</i>				
pH	pH Units	7.82	-	8
<i>Inorganics</i>				
Ammonia	NH <sub>4</sub> mg/l	<0.2	<0.02	<0.06
Calcium	Ca mg/l	90.27	-	63.51
Chloride	Cl mg/l	13	14	13.62
Nitrate	NH <sub>3</sub> mg/l	1.6	-	0.48
Phosphorous	P mg/l	0.12	-	0.028
Potassium	K mg/l	2.2	-	2.2
Ortho Phosphate	PO <sub>4</sub> mg/l	0.08	-	0.028
Sodium	Na mg/l	12.5	-	10.6
Sulphate	SO <sub>4</sub> mg/l	90	88	95.77
<i>Metals</i>				
Boron	B mg/l	0.035	-	0.0042
Cadmium	Cd mg/l	<0.004	-	<0.00009
Chromium (Total)	Cr mg/l	<0.001	-	<0.00093
Copper	Cu mg/l	<0.001	-	<0.012
Iron	Fe mg/l	<0.002	-	<0.0211
Lead	Pb mg/l	<0.001	-	<0.0008
Magnesium	Mg mg/l	17.36	-	14.14
Manganese	Mn mg/l	0.003	-	0.0094
Nickel	Ni mg/l	0.003	-	0.0006
Zinc	Zn mg/l	0.009	-	0.0394
<b>Bacteria</b>				
Feacal Coliforms	cfu/100ml	<1	-	<b>0</b>
Total Coliforms	cfu/100ml	52	-	<b>23</b>
List I/II				
Volatile Organic Compounds	mg/l	<0.001	-	<0.001
Semivolatiles	mg/l	<0.001	-	<0.001
Pesticides	mg/l	<0.00001	-	<0.0001

Table 5.3.5: SW1 Results

		Feb-08	Apr-08	Sep-08	Dec-08
<b>LABORATORY ANALYSIS</b>					
<i>General Water Quality Parameters</i>					
Total Suspended Solids	mg/l	<10	<10	<10	<10
Mineral Oils	mg/l	<0.01	<0.01	<0.01	<0.01
pH	pH Units	7.6	7.2	7.26	7.55
<i>Inorganics</i>					
Total Ammonia	NH <sub>4</sub> mg/l	0.48	0.2	0.2	1.2
Chloride	Cl mg/l	13	13	17	15

Table 5.3.6: SW2 Results

		Feb-08	Apr-08	Sept-08	Dec-08
<b>LABORATORY ANALYSIS</b>					
<i>General Water Quality Parameters</i>					
Total Suspended Solids	mg/l	11	<10	<10	<10
Mineral Oils	mg/l	<0.01	<0.01	<0.01	<0.01
pH	pH Units	7.5	7.24	7.58	7.37
<i>Inorganics</i>					
Total Ammonia	NH <sub>4</sub> mg/l	<0.2	0.2	0.2	<0.2
Chloride	Cl mg/l	13	12	17	15

### 5.3.1 Interpretation of Surface Water Analysis

Results of the surface water were compared to the EQS standards from the EPA document "Environmental Quality Objectives and Environmental Quality Standards". The sample taken from SW2 represents the background water quality in the stream adjacent to the composting plant. The suspended solid level of 11 and <10 mg/l shows how clear the water is, EQS is <25 mg/l annual mean. The pH is normal for all samples, chloride and mineral oil levels are low. Ammonical Nitrogen was 0.2 mg/l on all days of sampling, slightly elevated above the recommended <0.02 mg/l for E.Q.S. Combining these results with the clarity of the water and the lack of odour on days of sampling, it is concluded that the stream on the days of water testing contained good quality water.

Samples taken from SW1 are downstream of the main activities at the site. Results from this monitoring point were also compared with the EQS standards from the EPA document "Environmental Quality Objectives and Environmental Quality Standards". A slightly elevated level of Ammoniacal nitrogen (0.48 and 1.2 mg/l) were recorded in February and December 2008 respectively. There is a slight improvement in water quality when compared with the previous monitoring rounds in 2007 where elevated levels of ammoniacal nitrogen of 2.4 mg/l in February and September 2007 were recorded. Results of analysis of the suspended solids content, mineral oil, pH and chloride indicated levels of these parameters well within the relevant water quality standards. On investigation it is possible that a discharge pipe from a farm which enters the local stream close to sampling location SW1 may have contributed to the elevated levels of

ammoniacal nitrogen recorded, this is beyond the control of Kilmainhamwood Compost. It must be noted that when examining surface water monitoring results carried out in 2008 that they are similar to baseline data recorded before commencement of site activities in September 2006 at Kilmainhamwood Compost.

### 5.3.2 Interpretation of Groundwater Analysis

Results from monitoring of groundwater locations were compared to the Interim Guideline Values from the EPA document "Towards Setting Guideline values for the Protection of Groundwater in Ireland.

*Monitoring Well B1.* - Slightly elevated levels of ammonia (<0.2 and <0.6 mg/l), total coliforms (112 cfu/100ml) and Faecal Coliforms (6 cfu/100ml) were recorded at Monitoring Location B1. Sulphate (447mg/l in February 08 and 277.3 mg/l in September 08) was elevated above the IGV limit of 200 mg/l. Elevated results could possibly be linked to the application of fertilisers on surrounding lands and run off entering the well.

*Monitoring Well B2* - Elevated levels of sulphate (270.51 mg/l), total coliforms (58 cfu/100ml) and faecal coliforms (5 cfu/100ml) were also recorded at Monitoring Location B2 in September 2008.

*Monitoring Well B3* - Elevated levels of total coliforms (23 cfu/100ml) only were recorded at this monitoring location, all other parameters lie below the guideline values for groundwater. No faecal coliforms were recorded at this monitoring location.

Groundwater samples were also analysed for VOC and SVOC as is required by the licence on an annual basis. All parameters analysed were recorded at levels below the laboratory detection limit.

Results of groundwater sampling at the Kilmainhamwood facility during 2008 indicated impacted water quality with elevated levels of a number of parameters at monitoring locations as detailed above. It must be noted that when examining groundwater monitoring results carried out in 2008 that they are similar to baseline data recorded before commencement of site activities in September 2006 at Kilmainhamwood Compost.

### 5.4 Air Monitoring – Bacteria and Aspergillus Fumigatus

As per schedule D of the licence, bacteria and Aspergillus fumigates monitoring was carried out by independent consultants odour monitoring Ireland, a copy of this report is contained within Appendix 4 of this report

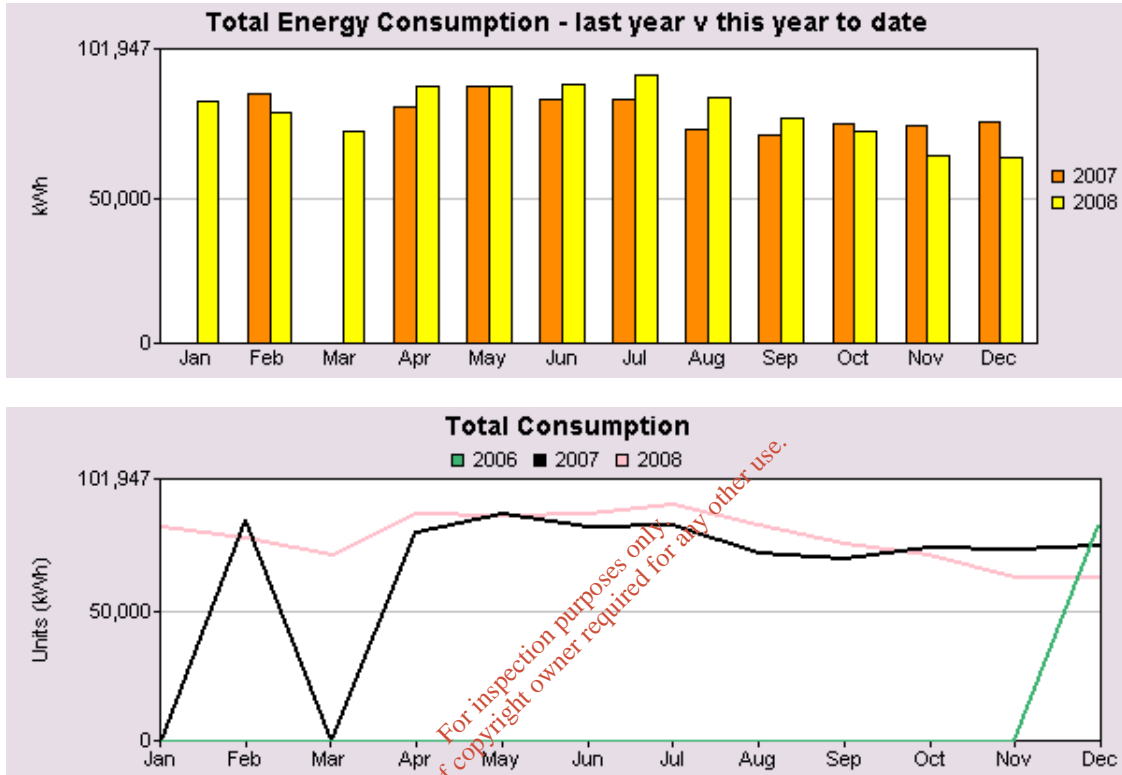
## 6.0 Resources and Energy Usage

The following section discusses resources such as Electricity, Fuel and Water used at Kilmainhamwood Compost in 2008. As per condition 5.7 of the licence a copy of the energy efficiency audit carried out at the facility is contained within Appendix 5 of this report.

### 6.1 Electricity

Electricity consumption at the facility increased slightly in 2008, this would have a correlation to a direct increase in tonnage handled at the facility and the installation of the new screener in March 2008 which is powered by electricity. In 2007 a total of 799,842 Kwh was consumed and in 2008 962,551 Kwh was consumed. Figures 6.1 display a comparison in previous year's energy consumption at Kilmainhamwood Compost.

Figure 6.1 Energy Consumption 2008



**6.2 Water**

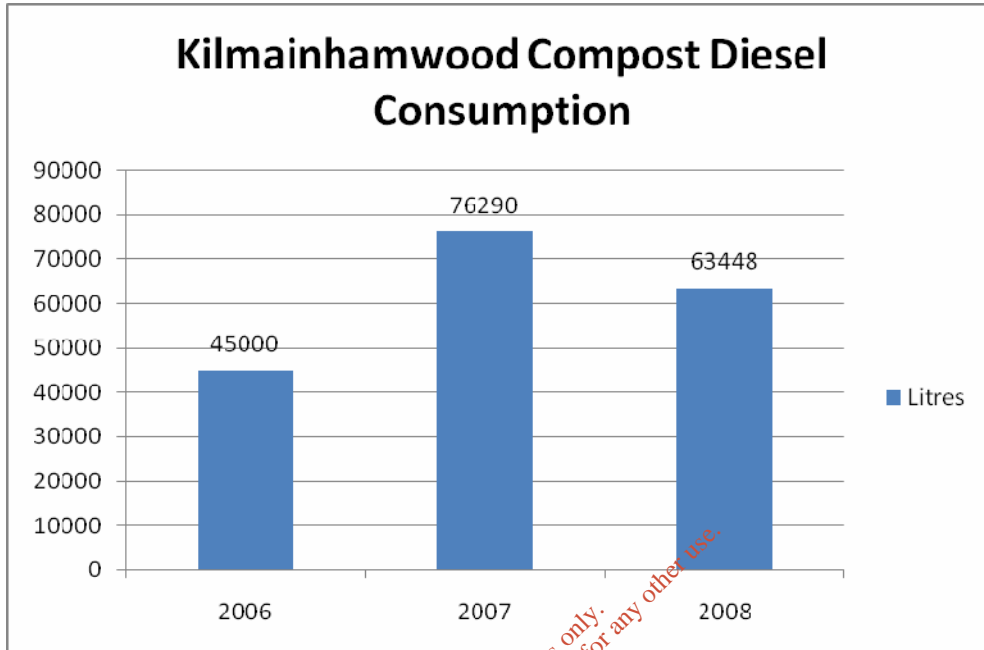
Kilmainhamwood compost is not connected to the local water mains and uses its rain collection tank as a source of water for the facility. This water is used for washing trailers, equipment and floors. No water is used in the process as the incoming material contains excess moisture. Drinking water is supplied by a contract water supplier. For emergency purposes there is an over ground collection tank that holds 90,000 litres and is supplied by Bore well 3.

**6.3 Diesel**

The main consumption of diesel in 2008 was the Loading shovels and Shredding machines. A total of 63,448 litres of diesel was consumed during 2008. All machines are serviced regularly in order to achieve optimum fuel efficiency. Diesel consumption reduced due to the fact that the new screening machine installed in March 2008 is powered by electric motors. The process is continuously monitored in order to access possible methods of making changes that would make fuel savings.



Figure 6.3 Diesel Consumption 2006 – 2008



## 7.0 Development/Infrastructural Works

### 7.1 Site Developments 2008

During 2008 the facility accepted and processed 20,651 Tonnes of waste. The following developments were carried out in 2008;

#### Training

- Staff training – weekly health and safety inductions for new staff
- Staff training - weekly environmental/waste licence inductions for new staff
- Staff training - Machinery operation and driver certification

#### ISO

- Kilmainhamwood Compost maintained certification in standards for ISO 14001 Environmental, ISO 9001 Quality and OHSAS 18001 in 2008.

Kilmainhamwood Compost received the prestigious Cre award for the Best Composting Facility in Ireland 2008 (Appendix 8)

### 7.2 Proposed Developments 2009

A number of developments are proposed for the forthcoming year of 2009. All developments are carried out with the intention of reducing environmental impacts of the facility and increasing waste processing efficiency at Kilmainhamwood Compost. Developments proposed include;

- It is proposed to upgrade our odour abatement system. We intend to reduce the amount of air requiring treatment by enclosing all composting bays within the

building. We will be upgrading on air handling system to possibly include the installation of an acid scrubber on the system before the odourous air from the composting process reaches the biofilter. This will increase the efficiencies and the effectiveness of the biofilter.

- It is proposed that a 15 acre willow plantation is developed at the facility. This will enhance the environment by its consumption of CO<sub>2</sub> and its timber can be used as a renewable source of Biofuel. This land is currently not in use and was to be planted in 2008.
- Continuous development of facility procedures in line with ISO certification and Animal By Products Regulations, it is proposed to introduce a one way flow system at the facility.

### 7.3 Plant Capacity 2008

The Facility is licensed to process 20,800 tonnes of waste per year. During 2008 20,651 tonnes of waste was processed. The facility contains the following plant which processes the waste;

List of equipment on site;

- Two L90E Volvo Loading Shovels
- One Doppstadt Drum Screening Machine SM 620 Profi
- One Doppstadt Shredder AK 430 Profi
- One McDonald 50ft Screener

The L90E Volvo Loading Shovels can move over 100 tonne of material per hour so they are well within their working capacity.

The Doppstadt Screening machine can screen 40 tonne per hour and the Doppstadt Shredder can shred 30 Tonne per hour.

The McDonald Screener has a capacity of 120 tonne per hour.

The average waste intake is 400 tonnes per week and all of the above plant are well within their working Capacity. Kilmainhamwood Compost is part of the Thorntons Recycling Group so if there were any emergency breakdowns or additional plant machinery required then they can be brought from another facility for use on site. Thorntons Recycling have a maintenance garage which is fully equipped with mechanics, fitters etc which are available for use by Kilmainhamwood Compost,

### 8.0 Schedule of Environmental Objectives and Targets for 2009

The content the Integrated Management System (IMS) is too large to contain within the main body of this report, however the Agency can access this for inspection on a specially designated Drive (X Drive or IMS Drive) at any of the companies' site offices.

A new schedule of objectives and targets for the forthcoming year of 2009 for Kilmainhamwood Compost is contained within appendix 4 of this report.

### 9.0 Report on the progress towards achievement of the Environmental Objectives and Targets contained in the previous year's report

An update on the Environmental Objectives and Targets for Kilmainhamwood Compost, waste licence W0195-01, as detailed in the Management Programme for the company for 2008 is contained in Appendix 6 of this report. Kilmainhamwood Compost established an Environmental Management System on commencement of activities in 2006. This was further expanded in 2007 and 2008 to cover a number of additional procedures specific to composting and the Animal By Products Regulations. The following is a summary of what is currently on the IMS and which relates to Kilmainhamwood Compost;

Top Level Manual  
 Legal Register  
 Emergency Response Plans  
 Policies – EHS and Quality  
 Key Performance Indicators  
 Training File – Skills Matrix  
 Third Party Contractors Files  
 Management Programme – Objectives and Targets  
 Staff Handbook

#### **Environmental Procedures**

- Communications Programme
- Waste Outlet Audit
- Environmental Monitoring and Analysis
- Odour Control
- Oil – Chemical Spill
- House Keeping
- Biofilters Monitoring Procedure Kilmainhamwood
- Waste Acceptance Kilmainhamwood
- Vehicle Emergency Response WCP Procedure
- Residual Waste Management Kilmainhamwood
- Tanker Emergency Response WCP Procedure
- Screen Sampling Procedure for Kilmainhamwood
- Housekeeping Procedure Kilmainhamwood
- Sampling Procedure Kilmainhamwood
- Filling Pasteurisation Tunnel Procedure
- Pasteurisation procedure
- Emptying Compost from Pasteurisation Tunnel Procedure

#### **Health and Safety**

- A detailed Safety Statement with risk assessments is also contained within the EMS
- An emergency site specific plan is available for Kilmainhamwood Compost.

#### **Quality**

- Staff Appraisal
- Purchasing
- Weekly Operating Report Procedure
- Call Centre Instruction Manual
- Customer Focus
- Third Party Contractors

#### **Generic Procedures**

##### **Aspects**

- Legal Identification and Evaluation
- Management Programmes
- Communications
- Training
- Emergency Response
- Monitoring and measurement
- Complaints
- Non-conformance and preventative actions
- Document control
- Internal auditing
- Management Review
- Records Management

- Risk Assessment
- Contractor Control
- Operational Control

## **10 Tank, drum, pipeline and bund testing.**

At Kilmainhamwood Compost there is only one tank in use. This tank collects the leachate from the biofilters and from the wash bay. There are no fuel tanks on site and diesel is filled via a boozer. Kilmainhamwood Compost commissioned White Young Green, environmental consultants to carry out an integrity test on the leachate process tank in December 2006 to BS8007 standards. The tank at the facility passed the integrity tests. A copy of the report is attached in Appendix 7. This tank will be tested every three years as per Condition 3.10.5 of waste licence; therefore further tests are not due to be completed until the end of 2009.

### **10.1 Pipeline Tests**

All pipe lines are running free and clear and will be serviced on a regular basis by Thorntons Tanker Services.

## **11 Summary of Incidents and Complaints**

### **11.1 Incidents**

There were no incidents recorded in 2008.

### **11.2 Complaints**

There were twenty nine complaints made to the Facility during 2008, most of these were in relation to odour and made during May. Following an investigation by the facility manager it was not clear as to the source of the odour and it was decided that a survey on the effectiveness of the odour abatement system would be carried out. It was recommended from this survey that installation of an acid scrubber would improve the effectiveness of the biofilter systems. It is planned that this would be installed during 2009.

Full details of the complaint have been maintained on site at the facility as per our complaints procedure PM08 – Complaints

## **12 Review of Nuisance Controls**

Potential nuisances at composting facilities include dust, noise, odour, litter, birds, vermin and mud. Kilmainhamwood Compost do their utmost to control any nuisance which may occur at the facility, checks on nuisances are carried out daily and corrective actions are carried out as required.

### **12.1 Dust**

Kilmainhamwood Compost is required to carry out dust monitoring quarterly (please refer to section 5.1 of this report). As all waste processes takes place indoors there are no dust emissions from the process. The main source of dust is from the roadways which will be wetted down during dry weather conditions.

In an effort to further reduce dust emissions from the yard and roadways Kilmainhamwood compost use Thornton's road sweeper on a regular basis at the facility.

### **12.2 Noise**

Noise monitoring surveys were conducted at the facility; see section 5.3 of this report. As all activities takes place inside the building noise levels are well within the permitted range.

### 12.3 Odour

All waste activities take place inside the fully enclosed building which is under negative pressure. All exhausted air from the building must pass through the biofilter system before entering the atmosphere. This biofilter system is designed to breakdown any foul odours before it leaves the system. Daily monitoring of this system takes place and the biofilters were continuously assessed during 2008. A survey of the biofilter system was carried out during 2008 and it is proposed to install an acid scrubber in 2009 which will enhance the odour abatement system.

### 12.4 Litter

Daily checks are carried out on litter within and around the site boundary any litter which may escape is cleared up immediately. All waste transportation vehicles are either enclosed or have a net which covers waste, preventing littering while waste is in transit. All staff sweep and tidy picking areas constantly throughout the day and daily housekeeping checks are carried out by supervisors in all areas with random checks carried out by the site manager to ensure that these are completed. All housekeeping checks are maintained on file in the site office.

### 12.5 Birds

Kilmainhamwood Compost has no problems with birds at the facility. Doors at the facility are kept closed.

### 12.6 Vermin

Complete Pest Control are contracted to carry out pest control for the facility. This includes rodents and flies. They conduct regular checks of all bait points around the facility which effectively controls rodents at the facility, all documentation for site visits and reports are maintained on site.

Flies have not been a problem at the facility. However to ensure a fly problem never develops at the facility, Complete Pest Control carry out mitigation measures of spraying of areas where flies would most likely occur at regular intervals e.g. in the corridors.

### 12.6 Mud

All surfaces are hard standing and as such mud is not an issue at the facility. We also have a regular visit from Thornton's road sweeper that keeps these hard standings clean

## 13 Management Structure, Programme for Public Information

### *Programme of Public Information*

Kilmainhamwood Compost operates an open door policy at the facility and has carried out tours with local representative groups, county councillors etc in 2008. The Environmental team also met with Councillors and Local representatives of the area to discuss operation of the facility and to ensure that clear channels of communication are kept open between the facility and the public for the future.

Kilmainhamwood Compost has become actively involved in financing a number of local projects. These included;

- Sponsored local soccer team "Electro Celtic" a set of football Kit.
- Main Sponsor with the Kilmainhamwood GAA project to develop an all weather pitch which was opened in November 2007

New and existing clients are brought through our waste acceptance procedures and are supplied with information by sales representatives or call centre agents in relation to what waste types we can accept at the facility. Thorntons Recycling has also upgraded its

website so customers can access information such as waste collection permit numbers and waste licences etc.

All information relating to activities carried out at Kilmainhamwood Compost is maintained on site. Public information is accessible at the site at all times at the site office or at the Office of Environmental Enforcement. Detailed Communications Procedures (PM04-Communications and EP01 – Communications Programme) has been implemented in our IMS and are used throughout the company (Appendix 8). A company newsletter was produced and circulated to interested parties in 2008 as part of our communications procedure (Appendix 8).

### **Management Structure**

Kilmainhamwood Compost is part of the Thorntons Recycling Group and as such has access to the Management Facilities of Thorntons Recycling. These facilities include an Environmental Department which includes Mercedes Feely, David Duff and Tommy Rogers. Below is a brief outline of the management structure of the site;

<b>Carmel Thornton</b> Director	<b>Paul Thornton</b> Director	<b>Shane Thornton</b> Director	<b>Anna Marie Thornton</b> Director
------------------------------------	----------------------------------	-----------------------------------	--

**Gary Brady**  
Managing Director

**Tom McDonnell**  
Facility Manager

**Dermot Ward**  
Production Supervisor

**General Operatives**  
(2)

The Facility Manager of Kilmainhamwood Compost is Tom Mc Donnell. The Production Supervisor is Dermot Ward and is deputy manager when Tom Mc Donnell is not on site. There are two Loader Shovel Drivers, Fran Dowd and Marius Lanaskuas.

### **14 Quantity of Compost Produced 2008**

The total amount of compost produced in Kilmainhamwood compost in 2008 was 4274.9 Tonnes.

## **AER 2008 List of Appendices**

**Appendix 1** – Facility Layout complete with Monitoring Locations

**Appendix 2** – Weighbridge Certificate 2008

**Appendix 3** – ABP Approval Certificate

**Appendix 4** – Bioaerosol Impact Assessment

**Appendix 5** – Energy Efficiency Audit

**Appendix 6** –Progress on Objectives and Targets for 2008 and New Objectives and Targets for 2009

**Appendix 7** – Leachate Tank Integrity Certificate

**Appendix 8** – Communications Programme and Company Newsletter

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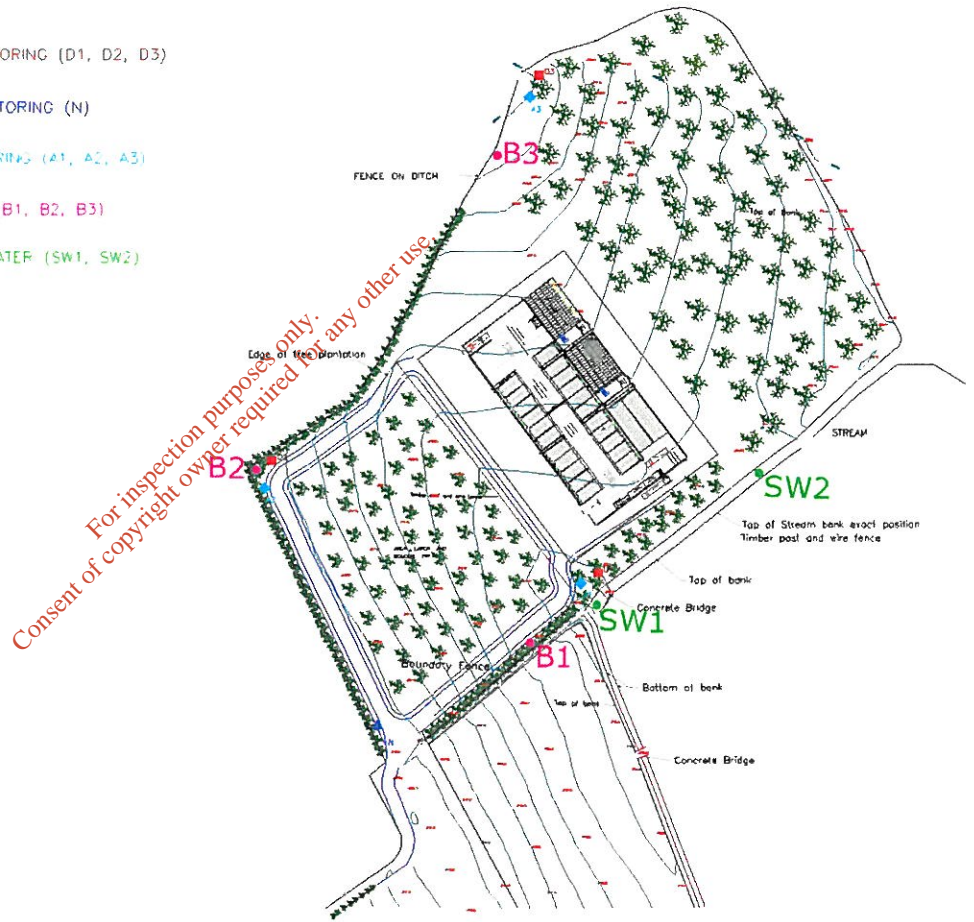
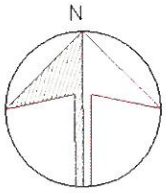
# APPENDIX 1

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LEGEND

- DUST MONITORING (D1, D2, D3)
- ▲ NOISE MONITORING (N)
- ◆ AIR MONITORING (A1, A2, A3)
- BOREHOLE (B1, B2, B3)
- SURFACE WATER (SW1, SW2)



12000

7000

53250

ZONE 4  
(SCREEN)

43780

PASTEURIZATION TUNNEL 2

PATHOGEN-KILL AREA

PASTEURIZATION TUNNEL 1

28935

11575

10000

11575

5700

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ZONE 3

ZONE 2

23775

7728

23775

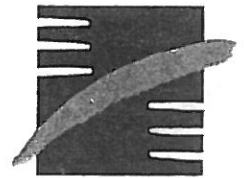
ZONE 1  
PREPARATION  
(TIPING & MIXING)

30

# APPENDIX 2

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# Legal Metrology Service

## Metrology Acts, 1980-1998 Certificate of Conformity

Dundalk Regional Centre

IDA Small Business Park,  
Coe's Road,  
Dundalk,  
Co. Louth

Tel: 042 933 2758  
Fax: 042 933 2791

Certificate No: DK 08 - 30

File No:                      Job No:                      Order No:                     

CLIENT NAME: THORNTON RECYCLING

ADDRESS: Millmainwood Co Meath

This is to certify that the metrological instrument described hereunder was/were examined and tested by me on 24/7/08 and was/were found to be in conformity with the requirements of the Metrology Acts 1980-1998 and that the Standards used to perform the tests are traceable to National Standards.

(NOTE: This Certificate only indicates that the instrument concerned conforms to the requirements of the Metrology Acts 1980 - 1998 and does not imply compliance with any other applicable regulations enforced by other Statutory Bodies.)

### DESCRIPTION

Instrument Type: WEIGHBRIDGE

Manufacturer	Model	Serial no.	Capacity	Scale Interval	Type Approval No.	Accuracy Class (where Applicable)
T.S. 300	LD5204	100427616	50t	20kg	DK 0199-27	111

Date: 28/7/08

Kevin Liley  
Legal Metrology Inspector



# APPENDIX 3

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Ref no: RNP 6-1 (Comp 6)

11 October 2007

Padraig Thornton Waste Disposal Ltd  
T/a Thorntons Recycling Ltd  
Unit S3B  
Parkwest Business Park  
Dublin 12

RE: **European Communities (Transmissible Spongiform Encephalopathies and Animal By-Products) Regulations of 2006 – SI No 612 of 2006, and Regulation (EC) No. 1774/2002**

I am directed by the Minister of Agriculture, Fisheries & Food to inform you that Kilmainhamwood Compost located at Ballynalrgan, Kilmainhamwood, Kells, Co Meath has been approved to operate as a composting plant from **8<sup>th</sup> October 2007 to 7<sup>th</sup> October 2009**, in accordance with Regulation 10(6) of the European Communities (Transmissible Spongiform Encephalopathies and Animal By-Products) Regulations of 2006 – SI No 612 of 2006.

The official **approval number** allocated to your composting plant is **COMP - 6**.

Your approval is subject to the following conditions:

1. The plant must meet the requirements of Regulation (EC) No 1774/2002.
2. The plant may accept catering waste as detailed in **Article 6(1)(l)** of Regulation (EC) No 1774/2002 and defined in **Annex 1** of this Regulation.
3. The plant may accept former foodstuff waste as detailed in **Article 6(1)(f)** of Regulation (EC) No 1774/2002 and fish waste as detailed in **Article 6(1)(i)** of this Regulation.
4. The plant may accept manure, digestive tract content separated from the digestive tract, as detailed in **Article 5(2)(e)** of Regulation (EC) No 1774/2002.
5. The plant must not accept any other Animal By-Products, as defined in **Article 2(1)(a)** of Regulation (EC) No 1774/2002.
6. The plant must process approved Category 2 and 3 material using EU processing standards of:
  - (a) Maximum particle size before entering the composting reactor: 12mm
  - (b) Minimum temperature in all material in the reactor: 70°C
  - (c) Minimum time in the reactor at 70°C (all material): 60 minutes



7. The plant must adopt all measures necessary to comply with the requirements of Regulation (EC) No 1774/2002 and carry out its own checks as provided for under **Article 25** of this Regulation.
8. The plant will be subjected to regular inspection by the Competent Authority in accordance with **Article 26** of Regulation (EC) No 1774/2002
9. The plant, must ensure that wastewater from the plant is treated in accordance with other relevant Community legislation.
10. The plant must take representative samples from every batch of compost for microbiological analysis at a Department of Agriculture, Fisheries and Food approved laboratory. This Department must be notified immediately of all sample failures. Following a sample failure no material should be moved off site without the Department's approval.
11. Plant management must ensure that all necessary conditions as outlined in the Department of Agriculture, Fisheries and Food's document are adhered to "*Conditions for approval and operation of composting and biogas plants treating animal by-products in Ireland*" (Attached)
12. The landspread of organic fertilisers and soil improvers must be in accordance with S.I. 612 No of 2006 and S.I. No. 615 of 2006.

**Please note that failure to comply with these conditions may result in enforcement proceedings or the withdrawal of your approval.**

For the Minister of Agriculture, Fisheries and Food

Geraldine Lanigan  
Higher Executive Officer

An Officer authorised in that behalf by the said Minister.

# APPENDIX 4

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[www.odourireland.com](http://www.odourireland.com)

**BIOAEROSOL IMPACT ASSESSMENT AT KILMAINHAMWOOD COMPOST, NOBBER, CO. MEATH**

PERFORMED BY ODOUR MONITORING IRELAND ON BEHALF OF KILMAINHAMWOOD COMPOSTING LTD

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<b>PREPARED BY:</b>	Dr. Brian Sheridan
<b>ATTENTION:</b>	Mr. Tom McDonnell
<b>DATE:</b>	26 <sup>th</sup> March 2009
<b>REPORT NUMBER:</b>	2009.A147 (1)
<b>DOCUMENT VERSION:</b>	Version 1
<b>REVIEWERS:</b>	

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**Document Amendment Record**

**Client:** Kilmainhamwood Compost Ltd

**Title:** Bioaerosol Impact Assessment at Kilmainhamwood Compost Ltd, Nobber, Co. Meath

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<b>Project Number:</b> 2009.A147(1)			<b>Document Reference:</b> Bioaerosol Impact Assessment at Kilmainhamwood Compost Ltd, Nobber, Co. Meath		
2009.A147(1)	Document for review	B.A.S.	JMC	B.A.S	26/03/2008
<b>Revision</b>	<b>Purpose/Description</b>	<b>Originated</b>	<b>Checked</b>	<b>Authorised</b>	<b>Date</b>
					

## 1. Introduction

Odour Monitoring Ireland was commissioned to perform a bioaerosol assessment in the vicinity of Kilmainhamwood Compost, Nobber, Co. Meath. The bioaerosol assessment was carried out in accordance with the guidance document established by the UK Composting Association "Standardised protocol for the testing and enumeration of micro organisms". Total Mesophilic bacteria and *Aspergillus fumigatus* sampling was performed using equivalent Andersen single stage impactors. Triplicate sampling and plates / impactor blanks were performed at each of the three identified sampling locations within the vicinity of Kilmainhamwood Compost facility located at Nobber, Co. Meath.

The bioaerosol concentration levels were determined at each sampling location in triplicate. Three sampling locations were chosen - Loc 1, Loc 2, Loc 3. Currently, there are no significant bioaerosol impacts in the vicinity of Kilmainhamwood Composting facility located at Nobber, Co. Meath with all reported bioaerosol ambient air concentrations within the range of the proposed assessment criterion.

### 1.1 Scope of the study

The main aims of the study were:

- To enumerate the ambient air concentration of two bioaerosols groups namely: *Aspergillus fumigatus* and Total Mesophilic bacteria during operation of the composting facility at Nobber, Co. Meath. These are the two most frequently requested bioaerosols to be monitored for composting plants.

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## 2. Materials and methods

This section describes in detail the materials and methods used throughout the study period. Monitoring was carried out on the 04<sup>th</sup> March 2009.

### 2.1 Sampling locations

Figure 5.1 and Table 2.1 illustrates the sample location in the vicinity of the site. Sample locations were predominately chosen on the basis of meteorological conditions on the day of the survey whereby one upwind location and two downwind locations were chosen to determine the bioaerosol concentration levels in the vicinity of the facility.

**Table 2.1.** Monitoring locations and parameters monitored.

Location ID	Parameter monitored	Location details
Loc 1	Total Mesophilic bacteria and Aspergillus fumigatus	Upwind of site at boundary
Loc 2	Total Mesophilic bacteria and Aspergillus fumigatus	Downwind of site on boundary
Loc 3	Total Mesophilic bacteria and Aspergillus fumigatus	Downwind of site on boundary

### 2.2 Meteorological data

Table 2.2 illustrates the average wind direction, during over the monitoring period. Average wind speed was low breeze to breezy. Cloud cover was high with an octave rating of 5 to 6 (i.e. on a 8 point scale). Barometric pressure was approximately 1013 mbar. Relative humidity was high with a range of readings from 70 to 90% while temperature was low from 6 to 10 degrees Celsius. This would be typical for this time period of the year in Eastern Ireland.

**Table 2.2** Meteorological conditions during the two-day monitoring period

Parameter	Day 1- 04/03/2009
Wind direction (From)	180 to 230
Wind speed (m s <sup>-1</sup> )	4.0 to 5.0
Cloud cover (Octaves)	5 to 6
Barometric pressure	1013
Temperature (°C)	6 to 10
Relative humidity (%)	70 to 90

### 2.3 Bioaerosols monitoring

Monitoring of bioaerosols was performed in strict accordance with available information and advice including the sources:

1. Standardised Protocol for the Sampling and Enumeration of Airborne Micro-organisms at Composting Facilities. (1999). The UK Composting Association.
2. Macher, J. (1999). Bioaerosol assessment and control. American Conference of Government Industrial Hygienists, Kemper Woods Centre, 1330 Kemper Meadow Drive, Cincinnati, OH.
3. Direct Laboratories, (formerly ADAS), Woodthorne, Wergs Road, Wolverhampton, WV6 8QT.
4. SKC Inc, 863 Valley View Road, Eighty-four, PA, 15330.



Impactor plate sampling was carried out in accordance with the document "Sampling Protocol for the Sampling and Enumeration of Airborne Micro-organisms at Composting facilities, The Composting Association, UK.

One sampling technique was employed namely:

- Biostage single stage 400 hole impactor (SKC Inc, PA)- This is directly equivalent to the Andersen N6 single stage impactor and meets the requirements of NIOSH 0800 and NIOSH 0801 biological sampling standards (i.e. this impactor is a direct copy of the Andersen N6 impactor with added benefits including the Surelok system which prevents any air leakages. This was an inherent problem of the Andersen N6 single stage impactor).

Generally, sampling times of 10 to 15 minutes were used to assess ambient background levels using the impactor plates as longer sampling times can lead to desiccation of the plate and impacted microbes. Sampling times of 10 minutes were used for the duration of this study.

The Biostage (i.e. Andersen N 6 equivalent impactor) was calibrated using a Bios Primary flow calibrator to a volumetric flow rate of 28.3 *litres min*<sup>-1</sup> and Hi Flow 30 battery operated automatically timed pumps were used for suction airflow.

The Biostage impactors were fixed to tripods ensuring an adjustable sampling height of between 1.0 to 1.90 metres. The sampling height was fixed at 1.50 metres. Two Biostage impactors were used throughout the study period. The use of correctly designed sampling equipment ensured correct operation at all times throughout the study period.

The Irish Equine Centre (ISO 17025 accredited) tested two medias including Malt Extract Agar media (MEA) for *Aspergillus fumigatus*, and standard plate count agar (TVC) for total Mesophilic bacteria. MEA media facilitates the sporulation of *Aspergillus fumigatus*, which is used to identify the species. Sterile fresh 90mm plates were supplied by Cruinn Diagnostics accredited laboratory services and placed in sealed coolers. Fresh plates were used to eliminate the formation of a skin upon the plate upper surface (i.e. develops with age). It was thought that this may cause problems while using an impaction method (i.e. particle bounce off).

#### 2.4. Transport of bioaerosol samples

All sampling plates during monitoring were allowed to equilibrate to ambient temperature before sampling. This allowed for the development of less harsh conditions upon impacted bioaerosols. It was also noticed that cooled plates (approximately 5°C) formed an outer "skin" which could facilitate particle bounce. Following equilibration, it was apparent from observation, better "knitting" of impactor plates occurred. Before each sampling event, the Biostage impactors were sterilised using cotton wool and 70% iso-propanol. The impactors were autoclaved for complete sterilisation before sampling. Once sampled, all agar plates were inverted, sealed with parafilm, placed within a flexible plastic container, and neatly stacked within a mobile cooler for delivery to Irish Equine Centre laboratory located in Kill, Co. Kildare. Once received, they were incubated at the appropriate temperatures of 30°C for Total viable counts (i.e. Mesophilic bacteria) and 37°C for *Aspergillus fumigatus* by the laboratory technician. Results were received within 10 to 15 days following sampling.

## 2.5 Bioaerosol assessment criteria

Table 2.3 illustrates the assessment criteria to be used for comparison of results during operations to ascertain ambient air quality in the vicinity of the Kilmainhamwood Composting facility located at Nobber, Co. Meath.

**Table 2.3.** Assessment criteria for the ambient bioaerosol air quality in the vicinity of Kilmainhamwood Composting facility.

Assessment criteria	Reference concentration range	Notes	Reference
Total fungi (includes <i>Aspergillus fumigatus</i> ) <sup>1</sup>	1000 to 5,000 CFU m <sup>-3</sup>	Environment Agency proposed concentration level, Reported concentration range in Swan, 2003 & Sheridan et al., 2004	McNeel et al., 1999 Wheeler et al., 2001, Swan et al., 2003 Sheridan et al., 2004
Mesophillic bacteria <sup>1</sup>	5,000 to 10,000 CFU m <sup>-3</sup>	Environment Agency proposed concentration level, Reported concentration range in Swan, 2003 and Sheridan et al., 2004	Gorny and Dutkiewicz (2002) Wheeler et al., 2001 Swan et al., 2003 Dutch Occupational Health Association NWA 1989. Sheridan et al., 2004

**Notes:** <sup>1</sup> denotes the values of CFU m<sup>-3</sup> refers to Colony Forming Unit per cubic metre of air sampled.

### 3. Results

#### 3.1 Ambient Bioaerosol air quality

Table 3.1 illustrates the results from bioaerosol air quality monitoring. Both *Aspergillus fumigatus* and Total Mesophilic bacteria were assessed on the day of sampling namely 04<sup>th</sup> March 2009.

**Table 3.1.** Bioaerosols concentration levels in the vicinity of the Kilmainhamwood facility on 04<sup>th</sup> March 2009.

Location ID	Average <i>Aspergillus fumigatus</i> concentration (CFU m <sup>-3</sup> ) <sup>1</sup>	Average Mesophilic bacteria concentration (CFU m <sup>-3</sup> ) <sup>1</sup>	Sample count <sup>2</sup>
Loc 1	<4	8	3
Loc 2	11	107	3
Loc 3	12	445	3

**Note:** <sup>1</sup> denotes a total of 6 blanks (3 plate and 3 impactor blanks for the monitored bioaerosol) were incorporated into the sampling exercise. All blanks were negative CFU m<sup>-3</sup>.

<sup>2</sup> denote total number of sample counts for each parameter monitored at each location. The total number of sample plates was 24 plates.

Table 3.1 illustrates the ambient bioaerosol air quality within and in the vicinity of the Kilmainhamwood composting facility. As can be observed, *Aspergillus fumigatus* concentrations are low but increased slightly downwind of the facility and next to the biofilter. Total Mesophilic bacteria concentration levels at monitored location Loc 2 and Loc 3 were elevated in comparison to monitoring location 1. International literature suggests that bioaerosol concentrations greatly dissipate with distance from the source (i.e. within 80 to 200 metres).

Following a review of literature, it is reported that concentration levels of bioaerosols in ambient environment range from 0 to 400 CFU m<sup>-3</sup> for *Aspergillus fumigatus*, 0 to 15,673 CFU m<sup>-3</sup> for Total fungi and 79 to 3204 CFU m<sup>-3</sup> for Total bacteria. The data set measured is within the lower end of this range. Background monitoring of bioaerosols is important due to the complexities in monitoring once a facility is in operation. The main reasons for background monitoring include:

- Microbes are ubiquitous in the environment and air or surface samples will always contain some bacteria or fungi.
- Microbes grow and are released at irregular intervals and depend on some sort of air turbulence to be transported from their original source.
- Bioaerosols vary greatly in size and therefore some remain in ambient air for longer periods of time in comparison to larger, heavier particles that fall quickly to the ground. This is explained with Stokes law.
- Meteorological factors such as relative humidity, temperature and wind speed greatly effect ambient air concentrations.
- Due to the variety of size and sensitivity, the sampling methodology will greatly affect the measured concentration.
- Seasonal effects can increase or decrease ambient bioaerosol concentrations.

In accordance with the assessment criteria reported in Table 2.3, bioaerosol concentrations within lower range for *Aspergillus fumigatus* and in the mid range for total Mesophilic bacteria.



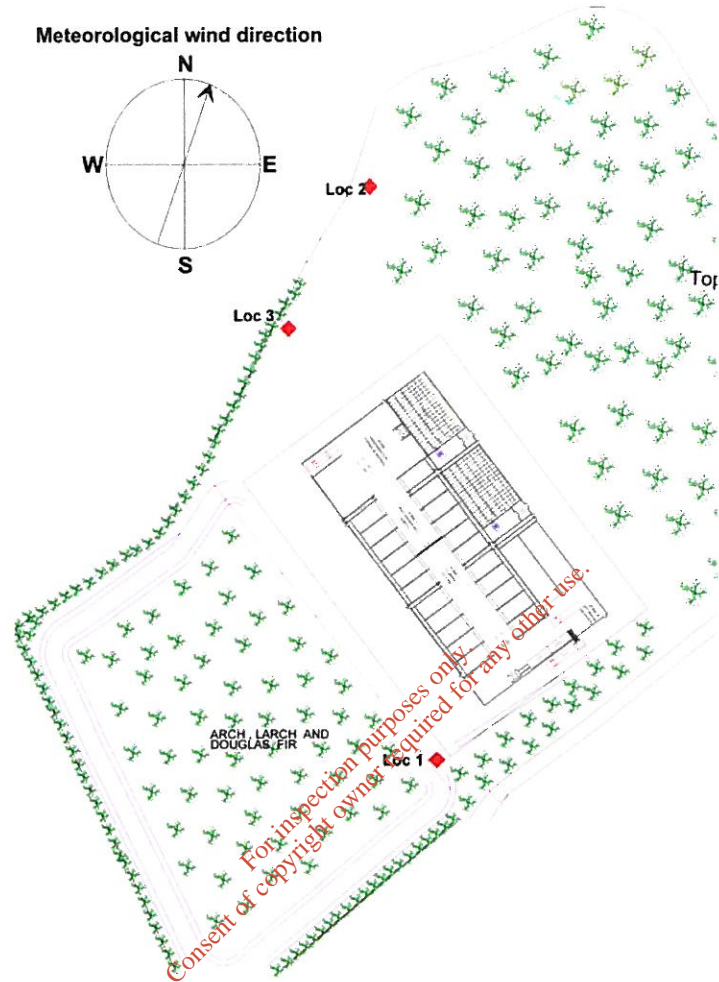
#### 4. Conclusions

The following conclusions may be drawn from the study;

1. The bioaerosol concentration levels were determined at each sampling location in triplicate. Three sampling locations were chosen including Loc 1, Loc 2 and Loc 3. Currently, there are no significant bioaerosol impacts in the vicinity of Kilmainhamwood Composting facility located at Nobber, Co. Meath with all reported bioaerosol ambient air concentrations within the range of the proposed assessment criterion.

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### 5. Appendix I- Monitoring locations



**Figure 5.1.** Schematic overview of Bioaerosol monitoring locations and wind direction on the day of monitoring.

# APPENDIX 5

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## KILMAINHAMWOOD COMPOST ENERGY REPORT

### 1.0 Introduction

Padraig Thornton Waste Disposal Ltd (PTWDL), T/A Thorntons Recycling own and operate Kilmainhamwood Compost, Ballynalurgan, Kilmainhamwood, Kells, Co Meath, Waste Licence W0195-01. In compliance with its waste licence as per condition 5.7.1 Kilmainhamwood Compost is required to carry out an "audit of the energy efficiency of the site". An audit programme was submitted to the Agency in relation to same on the 20<sup>th</sup> August 2008 and the Agency agreed to the submitted programme in later correspondence (EPA Reference W0195-01/AK06KF, dated the 11<sup>th</sup> September 2008).

In summary the programme agreed to the following;

#### Outcome of the Study

The outcome of this study will provide;

- A description of the company, the site, site operations and how energy is used at the site.
- An analysis of most significant contributions to energy consumption levels.
- Recommendations on measures the company can take to reduce their energy consumption
- Recommendations on how energy efficiency can be implemented into the company's environmental management system
- Longer term capital projects which will substantially help to decrease energy consumption.
- Targets and benchmarks the company may wish to introduce to control energy use.

#### Work Programme

- *Audit* – we will carry out a one day energy audit at Kilmainhamwood Compost, Nobber, Co Meath to identify measures that may reduce the energy consumption. We will interview a variety of staff, observe current behaviours and review management practices. Whilst undertaking the energy audits, we will also review cultural attitudes to energy on site.
- *Data Analysis/Evaluation* - We will evaluate all the data from the audit and all other supplied data to help compile an opportunities list on how energy can be used more effectively. The focus will be on practical and economic measures.



- *Renewable Energy* – We will briefly consider any potential opportunities from using renewable energy on site.
- *Report Writing and Presentation* – we will write a report summarising the findings from this study. A final report will be submitted to the EPA. The report will identify where existing controls/practices meet best practice as defined within the EPA guidance note.

This report will constitute all of the above as agreed with the Agency. Kilmainhamwood Compost is committed to a reduction in energy consumption; this study will be concerned with identifying resources used and costs associated with these namely Electricity and Fuel. All costs and figures will be based on information obtained through the Annual Environmental Report (AER) for 2007, invoices in 2007 and information collated for 2008 for Kilmainhamwood Compost and suggestions for improvement on energy efficiency will be recommended. A one day audit took place at Kilmainhamwood Compost on the 29<sup>th</sup> September 2008 by the Project Co-ordinator Mercedes Feely and the auditor Tom McDonnell. Information collated during this auditor will also be used within the body of this report.

## **2.0 Site Description and Activities**

Kilmainhamwood Compost is located in Ballynahunan, Kells, Co Meath. The facility has been in operation since September 2006, it received from the Environmental Protection Agency (EPA) its first waste licence and a later amendment in July 2005 (WL0195-01). The waste intake is limited to 20,800 tonnes per annum of biodegradable waste for composting. All wastes are processed within the main compost buildings. The site is licensed to operate 6 days a week, Monday to Friday 08.00-18.00 and Monday to Saturday 08.00-13.00. In order to assess energy usage and how recommendations can be made to improve consumption on site it is necessary to examine the process in detail, the following section details a summary on site activities at Kilmainhamwood Compost.

### **2.1 Standard Operation procedures in the Composting Building**

On arrival the transportation vehicle bringing material to the facility is inspected and directed towards the weighbridge. During which information particular to the customer is recorded on the computerised system.

Once weighed the vehicle is directed to the reception hall where it tips and the facility operator confirms if the material is suitable for processing at the facility. Inside the building the organic waste material suitable for composting is loaded into a batch mixer and is blended by weight with an amendment material. This mixer has capacity for a 12 tonne blend and delivers the blended material via a conveyor to a collection area where when a batch size of 120 tonnes is reached the materials are removed by a loading shovel





and placed into an aerated bay (controlled by fans). When the bay is full the operator places one temperature probe into the material. The aeration is switched on which is controlled by a plc that brings the temperature to the required level. The composting material stays in this bay for two weeks. After this period the material is taken out of the bay and placed over the wall into Zone 3 (Appendix 1). The material is then placed into another bay and moisture is amended to the required level. A temperature probe is placed into the material and the aeration switched on. The composting material will stay in this zone for 4 weeks and will get one turn using a machine and a moisture amendment if required.

After this period the material is placed is taken into Zone 4 (Appendix 1) and screened through a 12mm screen. The oversize material is sent back to the start of the process as seed compost and the screened material is placed into an enclosed tunnel for pasteurisation. The tunnel can hold up to 25 sub-batches and when full the total material will be given a unique Batch Number for traceability. Once inside the enclosed tunnel the aeration is switched on and the temperature is brought to over 70°C for 60 consecutive minutes to satisfy the Animal By-Product Regulations (ABPR). After Pasteurisation the material is sampled in situ and the samples sent to an approved Laboratory for analysis. Once the material has passed the ABPR requirements and E.P.A. standards it can be classified as compost and taken out of the tunnel by a clean machine and loaded for transport off site to the appropriate end user.

Any material not meeting ABPR and EPA standards can be reworked in the facility to produce higher grade compost or transported to an appropriate landfill site as cover.

There are currently 5 staff working on the site and the facility is manned from 08.00 to 18.00 Monday to Friday and 08.00 to 13.00 on a Saturday. In order to complete the composting process discussed there is a range of machinery used on site. Table 2.1a illustrates the main machinery used and the source of energy for the machine;



Table 2.1a – Types of machinery and source of energy

Machine	Source of Energy	Total Usage	Consumption Per Week	Consumption Year
Shredder Doppstadt AK 430	Diesel	10 hours p/wk @ 40 litres per hour	400 Litre of Diesel	20,800 litres diesel
Cat 318 C Used to load Shredder	Diesel	10 hours p/wk @15 litres per hour	150 litre of diesel	7,800 litres of diesel
Volvo Loading Shovel L90E X 2	Diesel	35 hours p/wk @ 13 litres per hour X 2	455 x 2 litres of diesel = 910	47,320 Litres of diesel
Forklift	Diesel	2 hours p/wk @ 5 litres per hour	10 litres	520 litres
Food Tractor	Diesel	5 hours p/wk @ 8 litres per hour	40 litres	2080 litres
Screeener	Electricity	140Kw/h	14 hours per week	
3 x Fans 37.5 KW	Electricity	12 Kw/h	168 hours per week	
24 x Fans 3 KW	Electricity	72 Kw/h	100 hours per week	
44 x Lighting 400w	Electricity	17.60 Kw/h	44 hours per week	
Office – Lighting, computer	Electricity	3kw per hour	40 hours per week	

### 3.0 Site Energy Analysis

There are two main energy sources used at Kilmainhamwood Compost i.e. Electricity from the Electricity Supply board and fuel in the form of diesel purchased from a third party supplier

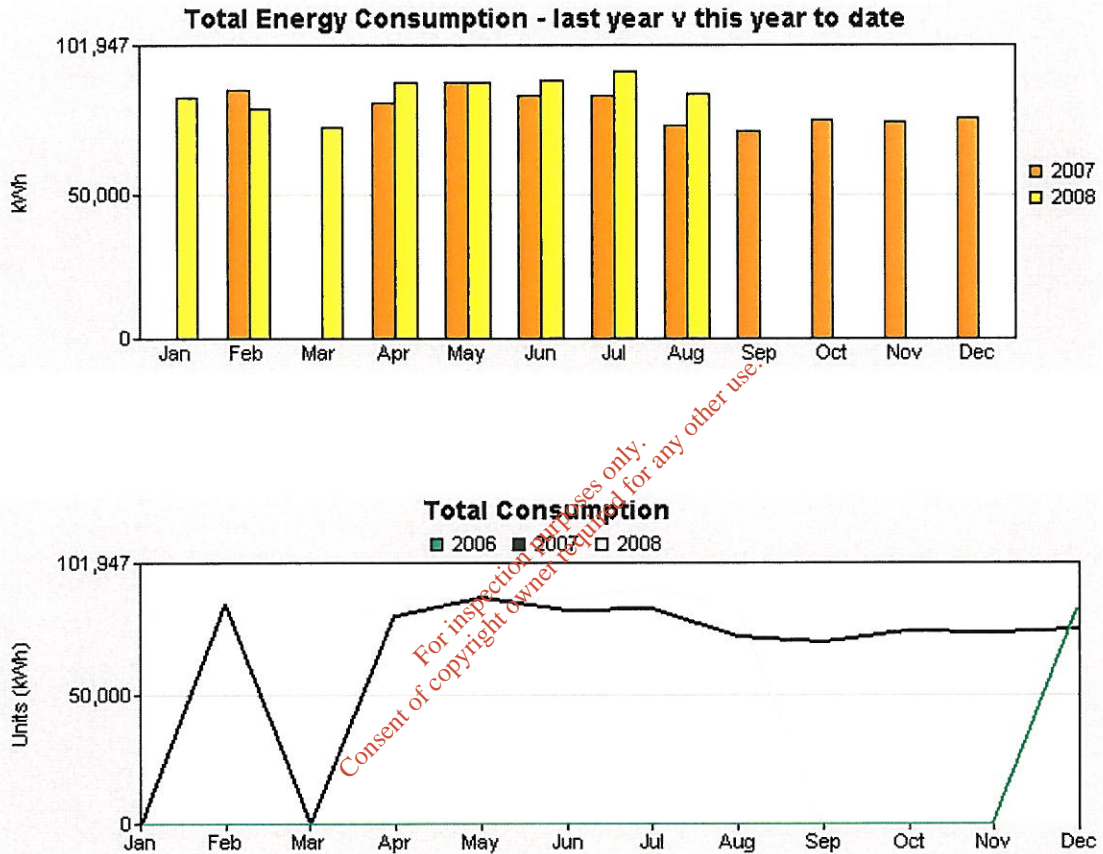
#### 3.1 Electricity

Electricity is supplied to Kilmainhamwood Compost via the Electricity Supply Board (ESB), total consumption in 2007 at the facility was 792,943 (kWh) (Source ESB client account on line). In order to identify trends consumption figures for January – August 2007 were compared with consumption figures for January- August 2008. Electricity



consumption for 2008 did increase due to the necessary installation of a screener which is used approximately 10 hours per week. This screener improves the quality of the compost by removing any fine particles of residual such as plastics which may be present in the compost product.

Figure 3.1a – Total Electricity Consumption 2007 versus 2008



The area which currently uses the largest consumption of electricity is the extraction system for odour abatement.

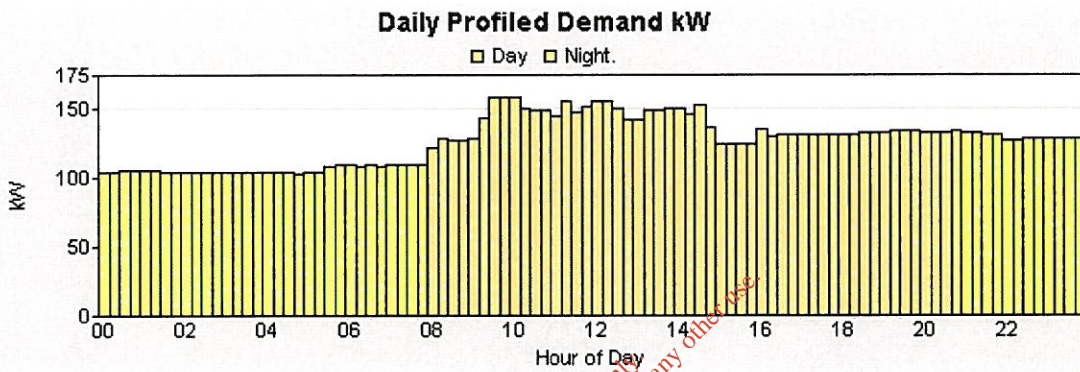
Figure 3.1b displays a typical day's demand on electricity for the facility. As may be noted from the figure there is a constant demand of up to 100KW per hour no matter





what time of the day. This is largely due to the fact that the facility has to operate fans to assist in the composting process i.e. aeration fans.

Figure 3.1b – Daily Demand on Electricity for the 30<sup>th</sup> July 2008



Peak electricity consumption at the facility is between the hours of 09.00 and 10.00 as may be noted from a typical days demand above. This may be attributed to opening hours and a ramping up on machinery and lighting etc

A one day energy audit was carried out at Kilmainhamwood on the 29<sup>th</sup> September 2008 to identify measures that may reduce the energy consumption. The facility manager Tom McDonnell and supervisor Dermot Ward were interviewed and current behaviours and management practices were reviewed. A study was carried out on site to ascertain areas in which a significant savings on electricity could be obtained; we did this by examining key areas where electricity was consumed. We set a control where lights were off, bay fans off, screener off and extraction fans speed to 80%, we then turned the electricity on/off in areas to see how it affected power consumption, the following was observed;

**Table 3.1c**

<b>Conditions</b>	<b>KW</b>	<b>KVA</b>	<b>Power Factor</b>
Control - Lights off, bay fans off, screener off and extraction fans at 80% speed	62.4	68.84	0.89
Reception lights on and above conditions maintained	68	86	0.9
All lights on above conditions maintained	77	86	0.9
All lights on above conditions maintained and Extraction fans set at 98%	124	134	0.925
All lights on, bay fans on, screener off and extraction still at 98%	127	137	0.925
All lights on, bay fans on, screener on and extraction still at 98%	146	177	0.82

It may be noted from the above table that the screener would have the biggest affect on electricity consumption at the facility

**Recommendations.**

- Lighting at the facility is on only in areas of operation during the day time, there is only a necessity for security lighting in areas which are not in operation. The lighting in all the processing buildings consists of high bay fitting with luminaries estimated to be rated at 400W each. During Night time all lights are turned off. If we installed a centralised panel and all lighting at the facility could automatically default to night time position when machinery is not in operation or by pressing a switch. An alternative would be to appoint of members of staff i.e. supervisors for turning off and checking all lights at the facility during night time hours. All staff should make an effort to switch off lights in the areas that they are required. The possibility of placing in clear cladding in roof areas should be researched to maximise natural light and reduce electricity consumption and change lighting in administration building to CFL's.