Prepared by:
Tom Mc Donnell – Facility Manager
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 2009.

This licence was granted by the Environmental Protection Agency (EPA) to Padraig Thornton Waste Disposal Ltd (PTWDL) on the 30th 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;

Thorntons Recycling Head Office
Unit S3B Henry Road
Park West Business Park
Dublin 10.

Telephone: 01- 623 5133
Fax: 01- 623 5131
Site Contact: Tom McDonnell
Mobile: 086-8563431

1.2 Reporting Period

The reporting period for this Annual Environment Report (AER) is between the 01/01/2009 to the 31/12/2009.

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

Class 6	**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:**
Class 13.	**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.**

Fourth Schedule

Class 2	**Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).**
Class 13.	**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.**

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 24th 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

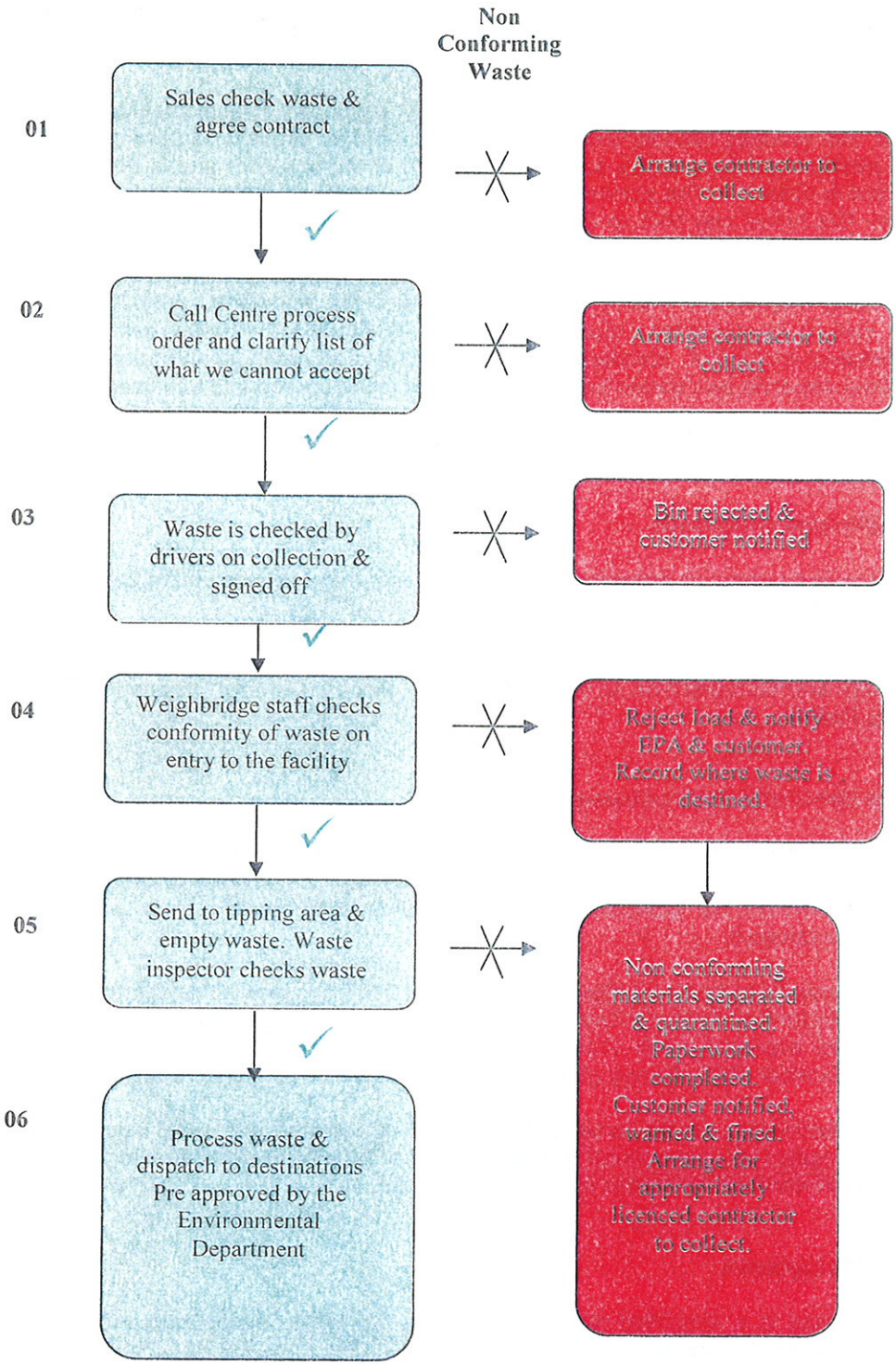
All waste is checked and documented at the weighbridge in accordance with our waste licence and our waste acceptance procedures as detailed in sectojn 2.2. Waste is then inspected, processed and placed into our production system. The composting process takes up to 8 weeks to produce mature compost.

Mature compost started to leave the Facility on 14th 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. Continued approval under the ABP Regulations from the Dept. of Agriculture was received on 05th October 2009. 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 Kilmainhamwood Compost have received an Environmental Health and Safety Induction which included 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 2009. The IMS system is available for inspection on the IMS drive at all company site offices.

3.3 Waste Received

A total of 20,748.84 tonnes of waste for composting was accepted at the facility in the reporting period from 1st January 2009 to 31st December 2009. As per E.P.A. licence W0195-01 Kilmainmhamwood compost can accept 20,800 tonnes of waste per annum.

Table 3.3.1 Quantity and Composition of Waste Received 2008-2009

EWC Code	Materials Received	2008	2009
19 08 05	Sludge Urban Waste Water	6,159	1139.70
02 02 04	Sludge Food Prep Animal Origin	845	1322.94
20 01 25	Grease Trap Waste	1,366	655.00
02 03 04	Unsuitable food waste	2,228	1954.87
20 01 08	Compostable Food Waste	7,766	15503.47
02 07 04	Unsuitable Alcohol/Liquid	31	9.02
02 06 01	Bakers Waste	36	27.42
19 12 07	Wood – Processed	183	40.36
20 02 01	Compostable/ Green Waste	54	-
02 07 05	Sludge Alcohol/non-Alcohol	172	67.72
19 09 01	Screening Waste Water	59	2.88
02 01 01	Sludge Agriculture Washing	-	-
02 01 06	Animal manure	545	-
20 03 01	Mixed Municipal Waste	9	-
10 01 03	Ash from Peat and Untreated Wood	-	25.46
02 05 02	Sludge Dairy Industry	1,198	-
	TOTAL TONNAGE	20, 651	20, 748.84

3.4 Waste Disposed

Of the total 20,748.84 tonnes accepted at the facility in 2009, 962.52 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 2008, an estimated 2,091,709 tonnes of biodegradable municipal waste was generated in Ireland in 2008 of which 57% was land filled. Ireland has made significant inroads into closing the gap between the EU targets and where we currently stand
Kilmainhamwood Compost, Ballynalurgan, Kilmainhamwood, Kells, Co. Meath have been successfully contributing towards National Targets and diverted approximately 18,709 tonnes in 2007, 20,651 tonnes in 2008 and 20,748.84 tonnes in 2009 of biodegradable waste from landfill for composting. This material would have historically gone for disposal to licensed landfills

Thornton's Recycling 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 commenced roll out of the domestic brown bin collection service in Meath and Kildare in 2008 and 2009 and have rolled out an additional brown bin collection service to a number of commercial customers such as hospitals, hotels, restaurants etc. 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). It is hoped that in 2010 the enforcement of the food regulations in Ireland will allow Kilmainhamwood Compost to increase quantities of biodegradable material for composting at the facility.

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 where carried out during the reporting period of 2009. The following section details results obtained and interpretations of results.

5.1 Total Dust Deposition 2009

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^2/day, recommended by the EPA as per conditions of W0195-01, reports have been submitted to the EPA.

Table 5.1 Average ambient Total dust deposition concentrations at three monitoring locations at the Kilmainhamwood Compost 2009.

Location	Unit	Mar-09	July-09	Sep-09	Dec-09
DA	mg/m2/day	44	98	128	66
DB	mg/m2/day	52	114	144	92
DC	mg/m2/day	36	128	167	111

5.2 Noise Monitoring 2009

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.

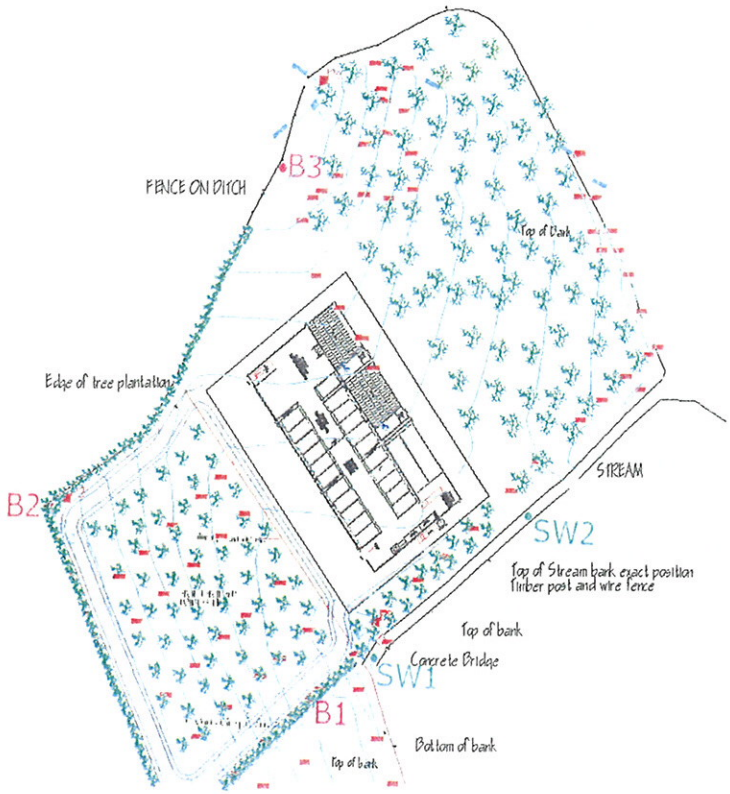
Table 5.2 Recorded Noise Levels dB(A) – Intervals 30 minutes 2009

Location	Time	unit	Feb-09	June-09	Sept-09	Dec-09
N1	Day	Leq	48	41	41	46.4
	Day	L10	39.9	47	42.9	47
	Day	L90	33.3	38	35.7	33
	Night	Leq	35.3	36.6	39	40.5
	Night	L10	42	44	41.3	40
	Night	L90	32.5	36	30.1	30

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.

Table 5.3.2

MONITORING WELL B1: Chemical Analysis of Groundwater.						
PARAMETERS	UNIT	Limit	25/02/2008	18/09/2008	21/01/2009	15/09/2009
FIELD ANALYSIS						
General Water Quality Parameters	mAoD(malin)		80.81m	80.81m	80.81m	80.81m
Colour	-	No abnormal change	-	Clear	-	
Conductivity @ 25°C	uS/cm	1,000	1,106		-	
Odour	-		-	No Odour	-	
pH	pH Units	6.5-9.5	7.21	7.4	-	
Temperature	deg C	25	9	11.6	-	
Ground Water Level	M		-	16.7	35.5	16.35
LABORATORY ANALYSIS						
General Water Quality Parameters						
pH	pH Units	6.5-9.5	-	7.4	7.4	7.6
Inorganics						
Ammonia	NH_4 mg/l	<0.15	<0.2	<0.6	<0.06	0.055
Calcium	Ca mg/l	200	-	151.3	-	81.94
Chloride	Cl mg/l	30	24	25.59	23.78	20.41
Nitrate	$N0_3$ mg/l	25	-	0.1	-	<0.09
Phosphorous	P mg/l		-	0.005	-	0.042
Potassium	K mg/l	5	-	4.01	-	3.69
Ortho Phosphate	PO_4 mg/l	0.03	-	0.005	-	<0.005
Sodium	Na mg/l	150	-	25.86	-	20.53
Sulphate	SO_4 mg/l	200	447	277.3	281.22	202.43
Metals						
Boron	B mg/l	1	-	0.207	-	0.1031
Cadmium	Cd mg/l	0.005	-	<.00009	-	<0.00009
Chromium (Total)	Cr mg/l	0.03	-	0.0013	-	0.001
Copper	Cu mg/l	0.03	-	<0.002	-	<0.0002
Iron	Fe mg/l	0.2	-	0.1388	-	0.4828
Lead	Pb mg/l	0.01	-	<0.0043	-	0.0111
Magnesium	Mg mg/l	50	-	38.02	-	28.14
Manganese	Mn mg/l	0.05	-	0.0095	-	0.00112
Nickel	Ni mg/l	0.02	-	0.0006	-	0.004
Zinc	Zn mg/l	0.1	-	0.0749	-	0.1798
Bacteria						
Feacal Coliforms	cfu/100ml	0.00	-	6	-	2
Total Coliforms	cfu/100ml	0.00	-	112	-	10
List I/II						
Volatile Organic Compounds	mg/l		---	<0.001	---	<0.001
Semivolatiles	mg/l		--	<0.001	--	<0.0005
Pesticides	mg/l		-	**<0.001**	-	-

Table 5.3.3

MONITORING WELL B2: Chemical Analysis of Groundwater.						
PARAMETERS	UNIT	Limit	25/02/2008	18/09/2008	21/01/2009	11/09/2009
FIELD ANALYSIS						
mAoD(malin)			86.93	86.93	86.93	86.93m
General Water Quality Parameters						
Colour	-	No abnormal change	-	-	-	
Conductivity @ 25°C	uS/cm	1,000	1,112	_	-	
Odour	-		No Odour	No Odour	-	
pH	pH Units	6.5 9.5	7.18	7.3	-	
Temperature	deg C	25	8.8	12.3	-	
Ground Water Level	M		-	23	16	21.9
LABORATORY ANALYSIS						
General Water Quality Parameters						
pH	pH Units	6.5 9.5	-	7.3	7.4	7.5
Inorganics						
Ammonia	NH_4 mg/l	<0.15	<0.2	<0.06	0.43	0.018
Calcium	Ca mg/l	200	-	147	-	88.78
Chloride	Cl mg/l	30	13	14.88	14.73	14.05
Nitrate	NH_3 mg/l	25	-	<0.09	-	<0.09
Phosphorous	P mg/l		-	0.004	-	0.017
Potassium	K mg/l	5	-	2.01	-	1.89
Ortho Phosphate	PO_4 mg/l	0.03	-	0.004	-	<0.005
Sodium	Na mg/l	150	-	30.96	-	24.76
Sulphate	SO_4 mg/l	200	167	270.51	279.88	188.77
Metals						
Boron	B mg/l	1	-	<.0042	-	0.0625
Cadmium	Cd mg/l	0.005	-	<0.00009	-	<0.00009
Chromium (Total)	Cr mg/l	0.03	-	<0.00093	-	0.00093
Copper	Cu mg/l	0.03	-	<0.0002	-	0.185
Iron	Fe mg/l	0.2	-	0.213	-	0.0927
Lead	Pb mg/l	0.01	-	<0.0018	-	0.0118
Magnesium	Mg mg/l	50	-	33.23	-	25.34
Manganese	Mn mg/l	0.05	-	0.6462	-	0.0849
Nickel	Ni mg/l	0.02	-	0.0005	-	0.0011
Zinc	Zn mg/l	0.1	-	0.0114	-	0.1084
Bacteria			-	-	-	
Feacal Coliforms	cfu/100ml	0.00	-	5	-	1
Total Coliforms	cfu/100ml	0.00	-	58	-	7
List I/II			-	-	-	
Volatile Organic Compounds	mg/l		-	<0.001	-	<0.001
Semivolatiles	mg/l		-	<0.001	-	<0.0005
Pesticides	mg/l		-	<0.00001	-	-

Table 5.3.4

MONITORING WELL B3: Chemical Analysis of Groundwater.						
PARAMETERS	UNIT	Limit	25/02/2008	18/09/2008	21/01/2009	15/09/2009
FIELD ANALYSIS						
General Water Quality Parameters	mAoD(malin)					
Colour	-	No abnormal change	-	Clear	-	-
Conductivity @ 25°C	uS/cm	1,000	540	-	-	-
Odour	-		-	No Smell	-	-
pH	pH Units	6.5-9.5	7.23	7.36	-	-
Temperature	deg C	25	10	14.1	-	-
Ground Water Level	M		-	9	-	23.8
LABORATORY ANALYSIS						
General Water Quality Parameters						
pH	pH Units	6.5-9.5	-	8	7.4	7.7
Inorganics						
Ammonia	NH_4 mg/l	<0.15	<0.2	<0.06	<0.06	<0.01
Calcium	Ca mg/l	200	-	63.51	-	90.25
Chloride	Cl mg/l	30	14	13.62	13.68	14.79
Nitrate	NH_3 mg/l	25	-	0.48	-	0.46
Phosphorous	P mg/l		-	0.028	-	0.041
Potassium	K mg/l	5	-	2.2	-	2.44
Ortho Phosphate	PO_4 mg/l	0.03	-	0.028	-	0.02
Sodium	Na mg/l	150	-	10.6	-	15.16
Sulphate	SO_4 mg/l	200	88	95.77	86.89	94.47
Metals						
Boron	B mg/l	1	-	<0.0042	-	0.00409
Cadmium	Cd mg/l	0.005	-	<0.00009	-	<0.00009
Chromium (Total)	Cr mg/l	0.03	-	<0.00093	-	<0.00093
Copper	Cu mg/l	0.03	-	0.012	-	<0.0002
Iron	Fe mg/l	0.2	-	0.0211	-	<0.0037
Lead	Pb mg/l	0.01	-	0.0008	-	<0.00038
Magnesium	Mg mg/l	50	-	14.14	-	20.4
Manganese	Mn mg/l	0.05	-	0.0094	-	0.0208
Nickel	Ni mg/l	0.02	-	0.0006	-	<0.00047
Zinc	Zn mg/l	0.1	-	0.0394	-	0.0046
Bacteria						
Feacal Coliforms	cfu/100ml	0.00	-	0	-	0
Total Coliforms	cfu/100ml	0.00	-	23	-	0
List I/II Volatile Organic Compounds	mg/l		-	<0.001	-	<0.001
Semivolatiles	mg/l		-	<0.001	-	<0.0005
Pesticides	mg/l		-	<0.0001	-	-

5.3.1 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.

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 Kilmainhamwood Compost is located in 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 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.

3 no. 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 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.

Monitoring Location B1 indicated elevated levels of sulphate; this is consistent with baseline data and may be attributed to the underlying geology in the area as discussed above. Iron levels recorded were slightly elevated to 0.48mg/l in September 2009 when compared with the interim guideline value of 0.2mg/l as per table 3.1 of the EPA document "Towards Setting Guideline values for the protection of Groundwater in Ireland". It is important to note that this Borehole is not used for drinking water at the facility and potable water is bought in. Iron levels are still below 1.0mg/l which is the EQSs for surface waters.

Monitoring Location B2 shows elevated levels of copper 0.185mg/l in September 2009 where the interim value is set at 0.2mg/l. Copper can occur naturally, with the drinking water standard having a level of 2.0mg/l. There was also an elevation in Ammonia and Sulphate in January 2009, elevations in sulphate attributed to the underlying geology in the area and the elevation in ammoniacal nitrogen could possibly be linked to agricultural activity on the surrounding lands. The groundwater levels taken at B1 and B2 indicate that the water table is following from a west to east direction with the water table being higher at B2. As the facility is to the east of this borehole B2 then we can conclude that agricultural runoff may have attributed to the elevated ammoniacal nitrogen result.

Monitoring Location B3 recorded good quality groundwater with all parameters below the respective limits in the interim guideline value as per EPA report.

Boreholes are not used for potable water at the facility and are used only used for sanitary facilities and to top up the existing water tank on site in the event that it may be required. Nevertheless Thorntons Recycling will continue to monitor the groundwater and mitigate against any elevations, within their power to do so.

Surface Water Monitoring Location SW1: Chemical Analysis

PARAMETERS	UNIT	Limit	18/03/09	18/06/09	11/09/09	25/11/09
FIELD ANALYSIS						
General Water Quality Parameters						
Colour	-		-	Clear	Clear	Clear
Conductivity @ 25°C	uS/cm		-	-	-	-
Odour	-		No Odour	No Odour	No Odour	No Odour
pH	pH Units	6 to 9	-	-	-	-
Temperature	deg C	<21.5	-	13.2	10.3	8.1
LABORATORY ANALYSIS						
General Water Quality Parameters						
Total Suspended Solids	mg/l	<25	<10	3.5	2.5	6
Mineral Oils	mg/l	<5	<0.01	<0.01	<0.01	<0.01
pH	pH Units	6 to 9	7.61	7.45	8.37	8.22
Inorganics						
Ammoniacal Nitrogen	NH_4 mg/l	<1	<0.2	<0.2	<0.2	<0.2
Chloride	Cl mg/l		14	13.2	12.8	13

LEGEND
- = No data reported or no analyses conducted
< = Less Than
NDP = No Determination Possible

Limit - Salmonid Water Quality Standards - S.I. No 293 of 1988

Table 5.3.5: SW1 Results

Surface Water Monitoring Location SW2: Chemical Analysis.

PARAMETERS	UNIT	Limit	18/03/09	18/06/09	11/09/09	25/11/09
FIELD ANALYSIS						
General Water Quality Parameters						
Colour	-		-	Clear	Clear	Clear
Conductivity @ 25°C	uS/cm		-	-	-	-
Odour	-		No Odour	No Odour	No Odour	No 0dour
pH	pH Units	6 to 9	-	-	-	-
Temperature	deg C	<21.5	-	13.1	10.6	8.4
LABORATORY ANALYSIS						
General Water Quality Parameters						
Total Suspended Solids	mg/l	<25	<10	4.0	2.5	10
Mineral Oils	mg/l	<5	<0.01	<0.01	<0.01	<0.01
pH	pH Units	6 to 9	7.61	7.37	7.43	8.23
Inorganics						
Ammoniacal Nitrogen	NH_4 mg/l	<1	<0.2	<0.2	<0.2	<0.2
Chloride	Cl mg/l		14	13.5	14.1	13

LEGEND
- = No data reported or no analyses conducted
< = Less Than
NDP = No Determination Possible

Limit - Salmonid Water Quality Standards - S.I. No 293 of1988

Table 5.3.6: SW2 Results

5.3. Interpretation of Surface Water Analysis

Results of the surface water were compared to the Salmonid Water Quality Standards - S.I. No 293 of 1988

The samples taken from SW2 represent the background water quality in the stream adjacent to the composting plant. All parameters tested lie below the limits contained within the standard. . 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 Salmonid Water Quality Standards - S.I. No 293 of 1988

Combining these results from SW1 and SW2 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.

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

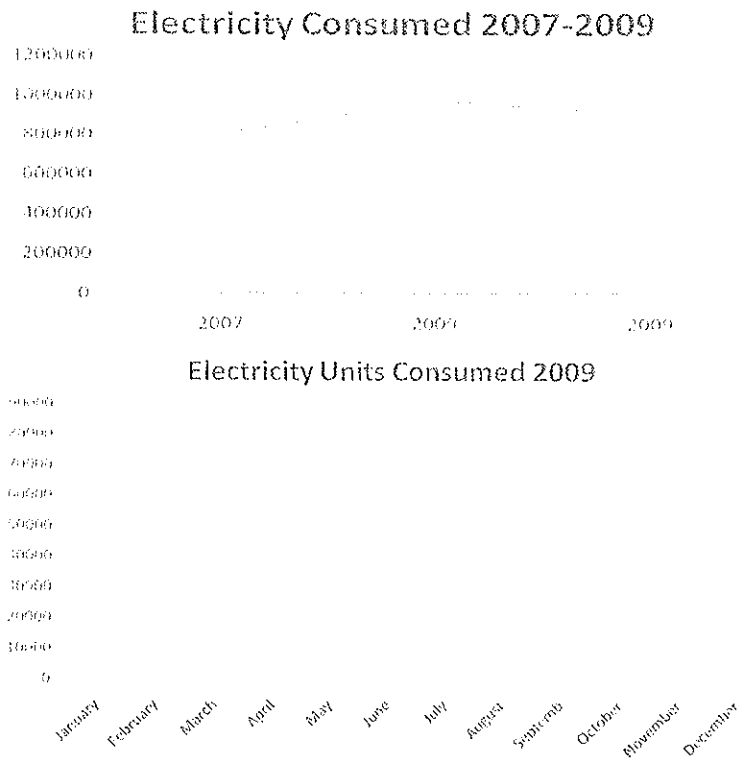
6.0 Resources and Energy Usage

The following section discusses resources such as Electricity, Fuel and Water used at Kilmainhamwood Compost in 2009. 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 decreased in 2009 with a conscious effort to reduce energy consumption at the facility. In 2007 a total of 799,842 Kwh was consumed, 2008 962,551 Kwh and in 2009 897,035 Kwh was consumed at the facility.
Figures 6.1 displays a comparison in previous year's energy consumption at Kilmainhamwood Compost.

Figure 6.1 Energy Consumption 2009



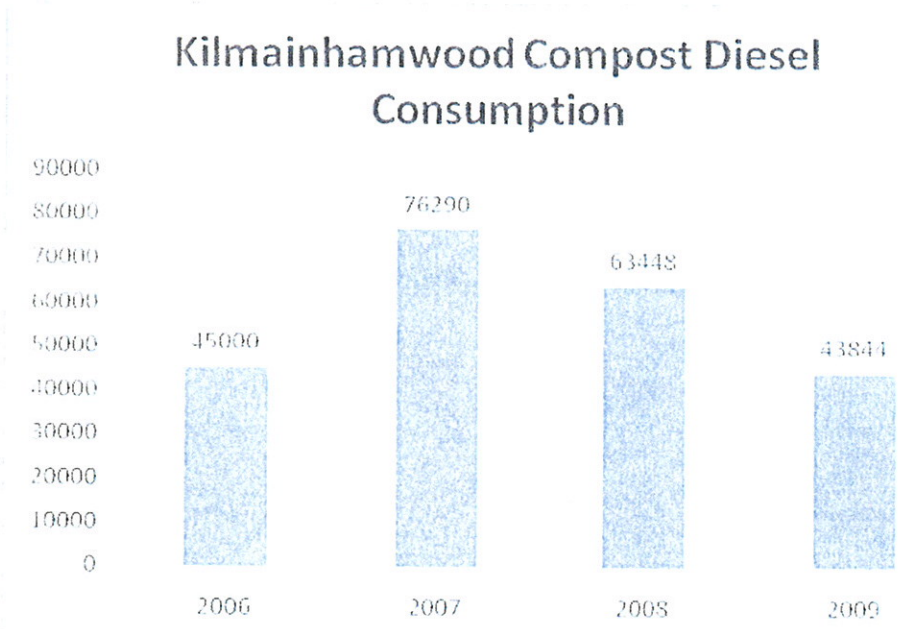
6.2 Water

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 if required.

6.3 Diesel

The main consumption of diesel in 2009 was the Loading shovels and Shredding machines. A total of 43,844 litres of diesel were consumed during 2009. All machines are serviced regularly in order to achieve optimum fuel efficiency. Diesel consumption reduced due to the fact that most of the incoming feedstock is already shred and does not require on site shredding. The process is continuously monitored in order to access possible methods of making changes that would make fuel saving.

Figure 6.3 Diesel Consumption 2006 – 2009



7.0 Development/Infrastructural Works

7.1 Site Developments 2009

During 2009 the facility accepted and processed 20,748.84 Tonnes of waste. The following developments were carried out in 2009;

- **Training -** 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 2009.
- **Odour abatement upgrade -** During 2009 Kilmaimhamwood Compost commenced the first stage of its odour abatement upgrade. Phase 1 was completed in 2009 which resulted in existing composting bays being enclosed. This allows the processed air to be captured and with future advances in additional infrastructure processed air can be treated to remove the ammonia before it is sent to the biofiltration system, thus increasing efficiency and effectiveness of the biofilters which are currently on site.

7.2 Proposed Developments 2010

A number of developments are proposed for the forthcoming year of 2010. 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 complete the upgrade of our odour abatement system. We intend to reduce the amount of air requiring treatment by extracting the process air from our enclosed composting bays within the building and passing this process air through an acid scrubber before the air is sent to out biofiltration system. This will increase the efficiencies and the effectiveness of the biofilters. Details of which have been forwarded to the EPA.
- It is proposed that a 15 acre willow plantation is developed at the facility. This will enhance the environment by its consumption of CO2 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 2009.
- 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.
- With a deficit of composting infrastructure in Ireland needed to divert and treat biodegradable waste from going to landfill we intend to complete the planning process for the construction of infrastructure that would allow the facility to accept and process 40,000 tonnes of biodegradable waste. Once planning permission is completed it is the intention of Thorntons Recycing to apply for a licence review with the EPA of Kilmainhamwood Compost.

7.3 Plant Capacity 2009

The Facility is licensed to process 20,800 tonnes of waste per year. During 2009 20,748.84 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 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 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 is well within their working Capacity. Kilmainhamwood Compost is part of the Thornton's 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 if required.

8.0 Schedule of Environmental Objectives and Targets for 2010

The contents of the Integrated Management System (IMS) are too large to contain within the main body of this report, however the Agency can access the system 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 2010 for Kilmainhamwood Compost is contained within Appendix 6 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 2009 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 2008 and 2009 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
Polices – 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 Kilmanhaimwood
- 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 2009 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 2012.

10.1 Pipeline Tests

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

11 Summary of Incidents and Complaints

11.1 Incidents

There were no incidents recorded in 2009.

11.2 Complaints

There were twenty three complaints made to the Facility during 2009, most of these were in relation to odour and made during March/April and September. All complaints were investigated in full and responded to. During 2009 the decision was made by the Board of Directors to upgrade the odour abatement technology which would include the installation of an acid scrubber to improve the effectiveness of the biofilter systems. This project started in May 2009 and is expected to be completed in the 2nd Quarter 2010.
Full details of the complaints 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 2009. A survey of the biofilter system was carried out during 2008 and it is proposed to install an acid scrubber in 2010 which will enhance the efficiency of the existing 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,etc in 2009. The Environmental team also met if requested with 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.

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. Thornton's 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, PM08 Complaints Procedure 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.

Management Structure

Kilmainhamwood Compost is part of the Thornton's Recycling Group and as such has access to the Management Facilities of Thornton's 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;

Carmel Thornton	Paul Thornton	Shane Thornton	Anna Marie Thornton
Director	Director	Director	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 2009

The total amount of compost produced in Kilmainhamwood compost in 2009 was 4534.23 Tonnes.

AER 2009 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

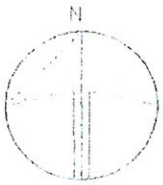
Appendix 6 –Progress on Objectives and Targets for 2009 and New Objectives and Targets for 2010

Appendix 7 – Leachate Tank Integrity Certificate

Appendix 8 – Communications Programme and Associated Procedures

APPENDIX 1

LEGEND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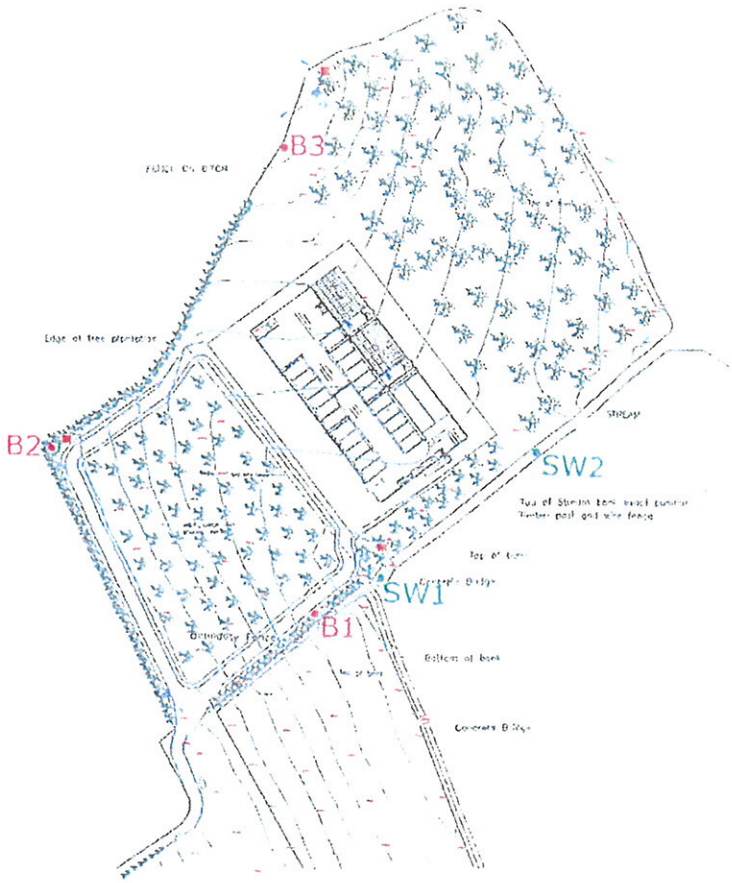
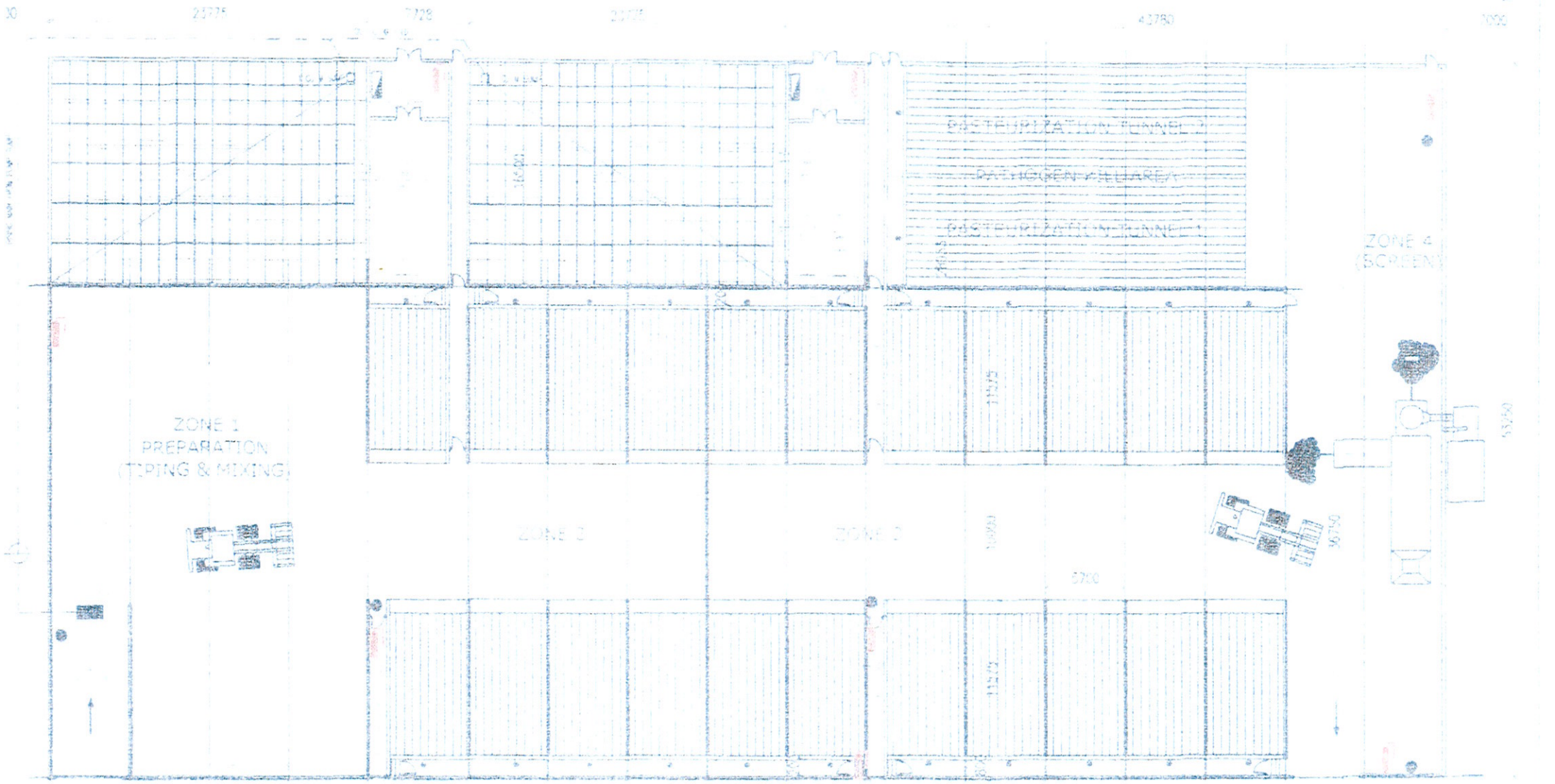

B3
B2
B1
SW2
SW1
Edge of tree plantation
Boundary Fence
Bottom of bank


ZONE 1
PREPARATION
(TEPING & MIXING)
ZONE 2
ZONE 3
ZONE 4
(SCREEN)

APPENDIX 2

Legal
Metrology
Service

Dundalk Regional Centre

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

Tel: 042 933 2758
Fax. 042 933 2791

Metrology Acts, 1980-1998
Certificate of Conformity

Certificate No: DK 08 [illegible]

File No: — Job No: — Order No: —

CLIENT NAME: Thornton Recycling

ADDRESS: [illegible] Co. Meath

This is to certify that the metrological instrument described hereunder was/were examined and tested by me on ..28/7/08.......... 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	(I) S 7014	16042[illegible]	50 t	20 kg	DK 0199.2[illegible]	III

Date: 28/7/08

[signature]
Legal Metrology Inspector

nsai

A division of the
National Standards
Authority of Ireland

APPENDIX 3

Department of
Agriculture,
Fisheries and Food
An Roinn
Talmhaíochta,
Iascaigh agus Bia

Ref no: RNP 6-1 (Comp-6)

5 October 2009

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 2008 (S.I. No. 252 of 2008 as amended by S.I. No. 291 of 2009 and S.I. No. 345 of 2009) and Regulation (EC) No. 1774/2002

I am directed by the Minister for Agriculture, Fisheries & Food to inform you that you have been approved to operate Kilmainhamwood Compost located at Ballynalurgan, Kilmainhamwood, Kells, Co. Meath as a Composting Plant from **8th October 2009 to 7th October 2011,** in accordance with Part 4 of the European Communities (Transmissible Spongiform Encephalopathies and Animal By-Products) Regulations of 2008 (S.I. No. 252 of 2008 as amended).

The official **approval number** allocated to your composting plant is **COMP - 6** and your approval is subject to the following conditions:

SPECIFIC PLANT CONDITIONS:

1. The plant may accept Category 2 manure and digestive tract content separated from the digestive tract, as detailed in **Article 5(1)(a)**, milk and colostrum as detailed in **Article 5(1)(c)** of Regulation (EC) No 1774/2002.

2. The plant may accept the following Category 3 material:
   - Feathers as detailed in **Article 6(1)(c)**
   - Former foodstuff waste as detailed in **Article 6(1)(f)**
   - Raw milk as detailed in **Article 6(1)(g)**
   - Fish waste as detailed in **Article 6(1)(h)** and **Article 6(1)(i)**
   - Shells, hatchery by-products and cracked eggs as detailed in **Article 6(1)(j)**
   - 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 must not accept any other Animal By-Products, as defined in **Article 2(1)(a)** of Regulation (EC) No 1774/2002.

4. The plant must process the above mentioned approved Category 2 and 3 material using EU processing standards:
   (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

4. The plant's HACCP must be implemented and must be updated and modified as required.

5. Unless otherwise directed by the Department of Agriculture, Fisheries and Food (DAFF), every batch of material, immediately after processing must be sampled for E-coli. Every batch of end product must be sampled for Salmonella. Batches for Salmonella testing may comprise of up to one months production of compost. Microbiological analysis must be carried out at a DAFF approved laboratory. In the event of a sample failure, DAFF must be notified immediately.

GENERAL CONDITIONS

1. The plant must meet the requirements of Regulation (EC) No 1774/2002, S.I. No. 252 of 2008 as amended, S.I. No. 253 of 2008, and all other relevant legislation.

2. Plant management must ensure that all necessary conditions as outlined in the attached document: *"Conditions for approval and operation of composting plants treating animal by-products in Ireland"* are complied with. These conditions may be subject to change.

3. Sale or supply of fertiliser or soil improvers must be in accordance with S.I. No. 253 of 2008, Regulation (EC) No 181 of 2006 and the Conditions for approval and operation of composting plants treating animal by-products in Ireland.

4. DAFF must be notified immediately of any changes in the registered company name or in plant management.

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

For the Minister for Agriculture, Fisheries and Food

Geraldine Lanigan
Higher Executive Officer

An Officer authorised in that behalf by the said Minister.

APPENDIX 4

ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath

Tel: +353 46 9437922
Mobile: +353 86 8550401
E-mail info@odourireland.com
www.odourireland.com

BIOAERosol IMPACT ASSESSMENT AT KILMAINHAMWOOD COMPOST, NOBBER, CO. MEATH

PERFORMED BY ODOUR MONITORING IRELAND ON BAHALF OF KILMAINHAMWOOD COMPOSTING LTD

PREPARED BY:	Dr. Brian Sheridan
ATTENTION:	Mr. Tom McDonnell
DATE:	13th January 2010
REPORT NUMBER:	2010A34(1)
DOCUMENT VERSION:	Version 1
REVIEWERS:	

TABLE OF CONTENTS

Document Amendment Record

Client: ***Kilmainhamwood Compost Ltd***

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

Project Number: 2010A34(1)			Document Reference: Bioaerosol Impact Assessment at Kilmainhamwood Compost Ltd, Nobber, Co. Meath		
2010A34(1)	Document for review	B.A.S.	JMC	B.A.S	13/01/2010
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

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 Mesophillic 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 Mesophillic 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.

2. Materials and methods

This section describes in detail the materials and methods used throughout the study period. Monitoring was carried out on the 16th December 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 Mesophillic bacteria and Aspergillus fumigatus	Upwind of site at boundary
Loc 2	Total Mesophillic bacteria and Aspergillus fumigatus	Downwind of site on boundary
Loc 3	Total Mesophillic 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 1003 mbar. Relative humidity was high with an average reading of 86.90% while temperature was low with a value of 6.50 degrees Celsius recorded. This would be typical for this time period of the year in Eastern Ireland.

Table 2.2 Meteorological conditions during the monitoring period.

Parameter	Day 1-16/122009
Wind direction (From)	WNW
Wind speed (m s^{-1})	3 to 5
Cloud cover (Octaves)	5 to 6
Barometric pressure	1003
Temperature (^{0}C)	6.50
Relative humidity (%)	86.90
Rainfall (mm)	0

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^{-1} 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 Mesophillic 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 $5^{0}C$) 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-proponal. 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 $30^{0}C$ for Total viable counts (i.e. Mesophillic bacteria) and $37^{0}C$ for Aspergillus *fumigatus* by the laboratory technician. Results were received within 10 to 15 working 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 Aspergillus *fumigatus*)[1]	1000 to 5,000 CFU m^{-3}	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[1]	5,000 to 10,000 CFU m^{-3}	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: [1] denotes the values of CFU m^{-3} 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 Mesophillic bacteria were assessed on the day of sampling namely 16th December 2009.

Table 3.1. Bioaerosols concentration levels in the vicinity of the Kilmainhamwood facility on 16th December 2009.

Location ID	Average Aspergillus *fumigatus* concentration (CFU m^{-3})[1]	Average Mesophillic bacteria concentration (CFU m^{-3})[1]	Sample count[2]
Loc 1	<7	11	3
Loc 2	42	78	3
Loc 3	35	145	3

Notes: [1] 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^{-3}.
[2] 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 downwind of the facility and next to the biofilter. Total Mesophillic 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^{-3} for Aspergillus *fumigatus*, 0 to 15,673 CFU m^{-3} for Total fungi and 79 to 3204 CFU m^{-3} 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 of decrease ambient bioaerosol concentrations.

In accordance with the assessment criteria reported in *Table 2.3*, bioaerosol concentrations within lower range for Aspergillus fumigatus and Total Mesophillic 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.
2. 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.

5. *Appendix I*- Monitoring locations

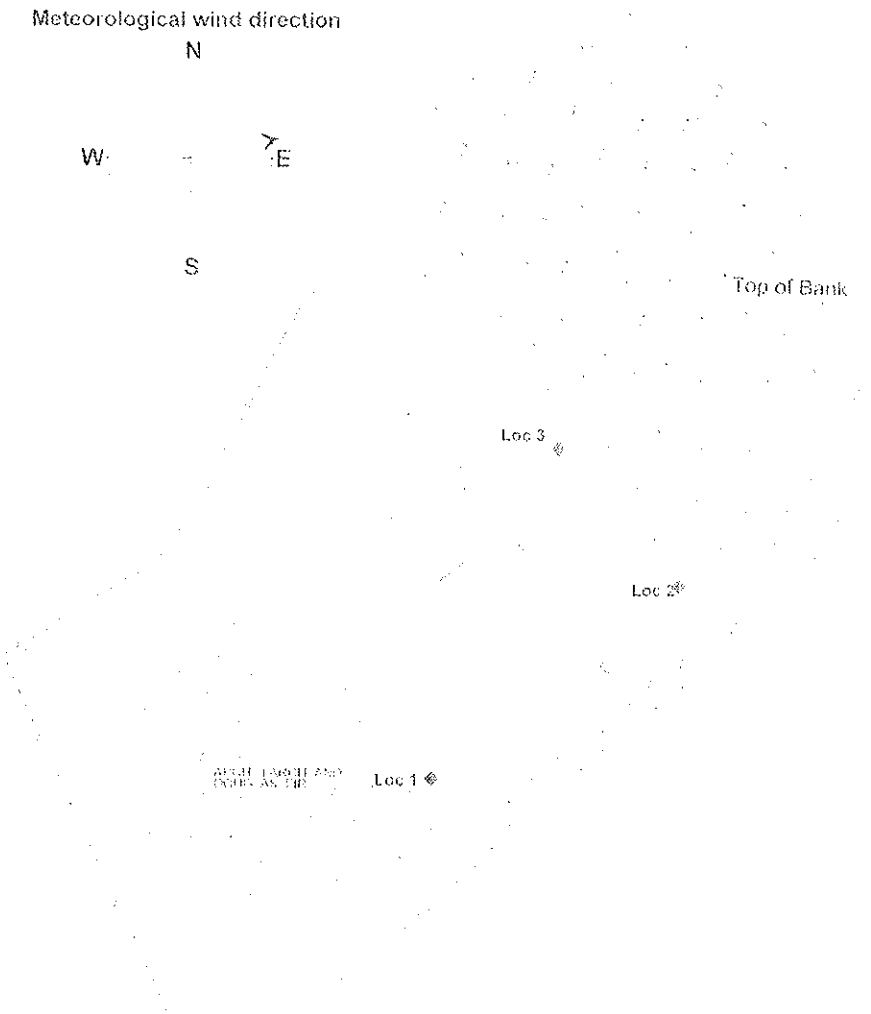


Figure 5.1. Schematic overview of Bioaerosol monitoring locations and wind direction on the day of monitoring.

APPENDIX 5

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 20th August 2008 and the Agency agreed to the submitted programme in later correspondence (EPA Reference W0195-01/AK06KF, dated the 11th 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 29th 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 Ballynalurgan, 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 liitres 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
Screener	Electricity	140Kw/h	14 hours per week	
3 x Fans 37.5 KW	Electricity	112 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

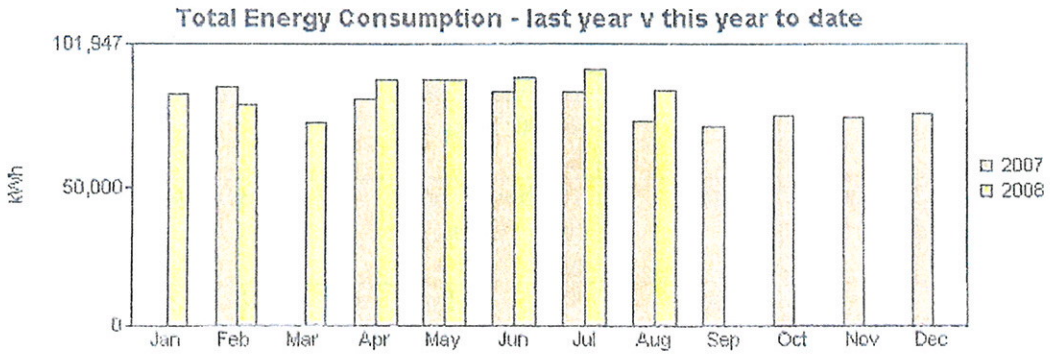
There are two main energy sources used at Kilmainhamwood Compost i.e. Electricity from the Electricity Supply board and fuel in the form of diesel purchased from a third party supplier

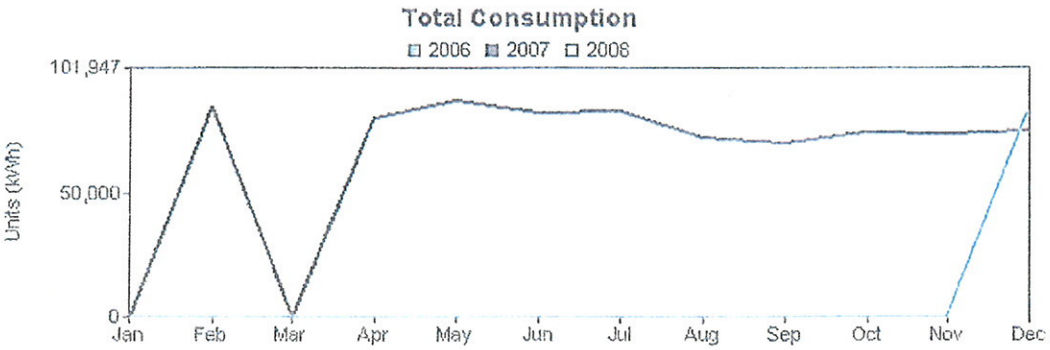
3.1 Electricity

Electricity is supplied to Kilmaimhamwood 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



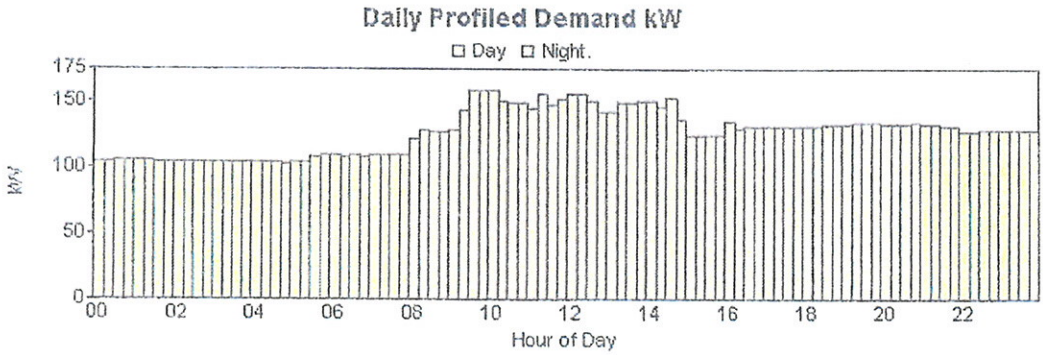


The area which currently uses the largest consumption of electricity is the extraction system for odour abatement.

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 30th 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 29th 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

Conditions	KW	KVA	Power Factor
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.

- Odour Control System - This plant operates on full flow but has the ability to work on half flow during night time hours. The demand on the system is not as high during winter time as material is not as hot and odourous as in the summer time months. I propose the system is switched to half power during the cold months of December and January.
- Operation of all Machinery – A large part of the plant on site is turned off during break times. A consultation should be carried out with the manufacturers of all the machinery to ensure that this is the correct thing to do; often the largest part of electricity is during the power up process of machinery.
- Compressor – A compressor can have a significant contribution to energy consumption, a compressor was used at the facility for odour control but this has ceased since July 2008
- Administration of Electricity Usage – Going forward I propose that all electricity usage day (kWh), night (kWh) and cost should be entered in on receiving the invoice into a simple spreadsheet. This will allow us to track improvements and trends in the electricity consumption at the site.
- Hot water – There is always a supply of hot water from taps at the facility which may be fuelled by an electric switch. These should be all checked to ensure efficiency and if indeed the hot water is necessary in areas.

3.2 Water

Water consumption at the facility is extremely hard to define as it is not metered or connected to the local mains and water consumption is directly from the well on site. No water is used for processing as incoming material normally contains excess moisture from the natural degrading process. For emergency purposes there is an over ground tank that holds 90,000 litres if water and is supplied by Bore well number 3.

Some Water Uses at Kilmainhamwood Compost;

- Wash down of vehicles, processing machinery etc
- Fire Hoses/Hydrants
- Showers
- Canteen
- Toilets

Recommendations

- Recycle the washbay water
- Roof drainage could be diverted into a holding tank and used to top up the water reserves for the fire system.
- All dripping taps, hoses and hydrants to be repaired immediately and checked on a monthly basis
- Toilets to be adapted to only allowed a certain amount of water in per flush

3.3 Diesel

The main types of fuel used at Kilmainhamwood Compost includes plant diesel (Gas Oil). 76, 290 litres of diesel was consumed at the facility in 2007.

Table 3.3a below estimates the proposed quantity of diesel which will be consumed at the facility in 2008 totally 78290 litres. This is of a similar quantity of which was consumed in 2007.

Table 3.3a

Machine	Source of Energy	Consumption Year
Shredder Doppstadt AK 430	Diesel	20,800 litres diesel
Cat 318 C Used to load Shredder	Diesel	7,800 liitres of diesel
Volvo Loading Shovel L90E X 2	Diesel	47,320 Litres of diesel
Forklift	Diesel	520 litres
Food Tractor	Diesel	2080 litres

Recommendations Diesel Consumption

- Carry out an investigation on compatibility of machinery on site to use of Bio Fuels (50% VRT refund available)
- Ensure fleet serviced regularly
- Drivers leave engines running whilst on site, turning off engines must be enforced at the facility

4.0 Long Term Capital Projects/ Renewable energy sources

Dry Anaerobic Digestion

We are currently investigating incorporating a dry anaerobic digester. Using this technology we can extract Methane gas from our feedstock and run a CHP plant which would supply enough electricity to run our composting facility and export excess electricity into the national grid.
The technology of "dry fermentation" can generate energy from municipal and agricultural organic matter and waste.

Until now, biogas technology mainly concentrated on "wet fermentation" of agricultural and municipal organic waste, while the recently patented BEKON dry fermentation process allows methane production from organic matter with a high content of dry matter. This kind of energy production is ecologically friendly and financially interesting, while also creating and securing jobs.
A great potential for energy generation from organic matter is found in agricultural by-products and waste, municipal organic waste and cuttings from coppicing and other countryside and forest maintenance work.
The dry fermentation process produces biogas with high energy content that can be converted into electricity, on the one hand, and into heat in block-type thermal power stations, on the other hand.
Instead of disposing organic matter from agriculture or municipal waste otherwise, dry fermentation offers a means of turning the waste into a valuable resource and extracting the highest possible benefit from it (in the form of biogas, electricity, heat, compost and fertilizer). The high quality compost resulting from the process of dry fermentation can be used as a valuable fertilizer for agricultural and horticultural purposes.

Combined Heat and Power (CHP) Deployment Programme

At present the Programme includes feasibility studies, to assist investigation into the application of CHP across all size ranges and technologies and investment grant support for small-scale fossil fired CHP with a capacity $\geq$ 50kWe and $<$ 1MWe. The Programme will ultimately include biomass (anaerobic digestion (AD) and wood residue) CHP, and micro CHP, and these remaining technologies will be launched through specific calls.

5.0 Energy as part of the Environmental Management System

Kilmainhamwood Compost is certified to international standards for Quality ISO 9001, Health and Safety OHSAS 18001 and Environmental ISO 14001. As part of its Environmental Management Programme for its integrated management system (IMS)

alternative energy resources research has been defined as a clear objective and target for the facilities manager to investigate by the end of 2008. Simple procedures incorporating some of the recommendations detailed in this report can be adopted for the management of energy consumption at Kilmainhamwood Compost through its IMS.
Thorntons Recycling will strive to achieve an Irish Energy Management Standard i.e. IS 393 Energy Management System, which will drive energy efficiency and reduce costs. This is a national standard to ensure that energy management becomes integrated into the organisational business structure.

6.0 Summary

Energy Costs for Kilmainhamwood Compost are very high. Fuel spent in 2007 was €45,773 and electricity costs were approximately €99,796.

Energy consumption and costs are currently playing a large role in the financial operation of the Kilmainhamwood compost. No other sites owned by Thorntons Recycling were used as a benchmark as no other site incorporates the same processing and handles the same materials as Kilmainhamwood Compost so it was felt that another site would not be representative to draw comparisons. All recommendations listed above for reduction in consumption should be taken into account and a detailed summary should be produced for 2008 in order to identify trends.

APPENDIX 6

PM03- F01 Management Programme 2009

COMPLETED | DELAYED CARRY FORWARD TO 2010 | ON HOLD

Ref Number	Date	Type	Objective and Target	Location	Responsibility	Method	Time Frame	Status
ENVIRONMENTAL								
EP 01	Jan '09	Environmental	Site Expansion to 40,000 tonnes	Kilmainham	TMCD/MF	1 Meeting with EPA 2 Metting with MCC re planning 3 Appoint consultants 4 Lodge with EPA and MCC	Planning - 01/07/2009 Licence - TBC after RFI MCC	Started - Work in Progress Planning lodged on the 1st July 2009 RFI Requested and lodged December 2009 Licence to be lodged after completion of RFI 09
EP 02	Jan-09	Environmental	Landscape Plan to be completed at Kilmainhamwood Compost re conditions of the licence	Kilmainham	TMCD	1. Kilmainhamwood landscape plan to be completed as part of the new expansion	Dec-09	Not Started - Plans previously drawn up from inital planning, awaiting new planning conditions from Meath CC before commence the landscape plan
EP 03	Jan '09	Environmental	Upgrade of odour system - Investigate possibility of scrubber etc	Kilmainham	TMCD	1. Quotes for consultants and assess same 2 Appoint Consultant 3 Tender out the installation of technology 4 Assess options available 5 Installation	Dec-09	Started - Work in Progress Tender submitted to five consultants and agreed contract with preferred supplier, work to commence in 2010
EP 09	Feb'09	Environmental	Repak Revenue - waste chacterisation on MDR	Company	MF/DD	1. Contact repak to confirm details for characterisation survey 2. Obtain 3 quotes from consultants. 3. Carry out survey's. 4. Finalise reports and distribute	Jun-09	Completed - Reports submitted to Repak and new claim figures being used
EP 12	Jul'09	Environmental	RDF - Waste Characterisation Study so can claim repak subsidy	Company	MF	1. Quote from Consultants 2. Discuss with Repak how best to do as study involves 96 tonnes of material to be sampled and processed 3. Organise dates and get certificates of Lagan to enable us to claim subsidy	Sep-09	Completed claim with Repak Commenced September 2009
EP 23	Jul'09	Environmental	Lighting in Kilmainhamwood / Head Office	Kilmainham/ Head Office	TMCD/MF/TR	1. Kilmainhamwood clean all lights internally and any bulbs to be replaced 2. Head Office - Remove sensors re around the atrium and adjust lighting switches	Dec '09	Kilmainhamowood completed - Head Office in progess Completed before ISO audit in Nov
EP 26	May '09	Environmental	Shredding - Monitor Resource Efficency on sites	All Sites	DD	1. Get Bills and log monthly resource concumption 2. Identify trends and plot graphs 3. Ensure we are covered in the aspects register for shredding facility 4. Track fuel usage on all site and compare with tonnages	Nov-09	Completed DD compiled and statistics are located within the KPI folder in the IMS. Resource informaiton tracked against Tomnage where possible
HEALTH AND SAFETY								
H&S 01	Dec-08	H&S	Ongoing site training for all Thorntons Recycling Personnel (Induction Training,Manual Handling. etc)	All Sites	H&S Manager	1. Draft list & agree training dates for all sites 2. Schedule dates for same 3. Update and review quarterly	Dec'09	WIP Management updated
H&S 02	Apr-08	H&S	Additional / refresher training for first aiders in Thorntons Recycling Sites	All Sites	H&S Manager	1. Identify how many require training 2. Liasion with H & S on training 3. Log training with certificates on personnel files	Jul-09	Completed - Nine employees trained

H&S 03	Jan-09	H&S	Update all documents in the H & S system to OHSAS 2007 standard	All Sites	H&S Manager	1. Identify the clases to be amended 2. implement same	Apr-09	Completed - All done before audit in May and then a compliance audit completed on General applications in June 2009 i.e. Legal Register
H&S 04	Jan'09	H&S	Annual H & S Review submit report to management	All Sites	H&S Manager	1. Report to be completed summarising all aspects of H & S system for 2008	Mar'09	Complete Circulated to management
H&S 05	April'09	H&S	Occupational Noise Monitoring All sites	All Sites	H&S Manager	1. Determine Sites to be carried out 2. Carried out TR 3. Results forwarded to Directors at managment meeting	Dec'09	All sites
H&S 06	April'09	H&S	Occupational Dust Monitoring All sites	All Sites	H&S Manager	1. Determine Sites to be carried out 2. Carried out TR 3. Results forwarded to Directors at managment meeting	Oct'09	All sites
H&S 08	May '09	H&S	Legal Register - Health and Safety	All Sites	EHS Managers	1.Compliance evaluation audit	June '09	Completed and forwarded to CE
H&S 09	May '09	H&S	Accident and Incident reporting forms to be reviewed and redesigned due to tooo much information which may not be necessary for TR application statistis	All Sites	H&S Manager	1. Template to be designed. 2. Quote off stationary for printing	Dec '09	All sites
H&S 11	Oct'09	H&S	Investigate the possibility of Thermal Imaging / electrical testing on all possible heat sources	All Sites	H&S Manager	Liase with Maintenance Manager 1. Identify & List all items. 2. Record & log all factual information	Dec-09	Consultants quotation finalised in November 09 and approval by Maintenance Manager.

PM03- F01 Management Programme 2010

COMPLETED | CARRY FORWARD FROM 2009 | ON HOLD

Ref Number	Date	Type	Objective and Target	Location	Responsibility	Method	Time Frame	Status
ENVIRONMENTAL								
EP 01	Jan '09	Environmental	Site Expansion to 40,000 tonnes	Kilmainham	TMCD/MF	1. Meeting with EPA 2. Metting with MCC re planning 3. Appoint consultants 4. Lodge with EPA and MCC	Planning - 01/07/2009 Licence - Lodge after planning	Started - Work in Progress. Planning lodged on the 1st July 2009 RFI Requested and lodged December 2009. Licence to be lodged after completion of RFI 09
EP 02	Jan-09	Environmental	Landscape Plan to be completed at Kilmainhamwood Compost re conditions of the planning	Kilmainham	TMCD	1. Kilmainhamwood landscape plan to be completed as part of the new expansion	Dec-10	Not Started - Plans previously drawn up from inital planning, awaiting new planning conditions from Meath CC before commence the landscape plan
EP 03	Jan '09	Environmental	Upgrade of odour system - Investigate possibility of scrubber etc	Kilmainham	TMCD	1. Quotes for consultants and assess same 2. Appoint Consultant 3. Tender out the installation of technology 4. Assess options available 5. Installation	Apr-10	Work in Progress awaiting approval from EPA re preferred tenderer
EP 06	Jan '10	Environmental	Anaerobic Digestion Study	Kimainhamwood	MK/TMCD	1. Obtain Quotes 2. Carry out Feasibilility Study	Dec'10	Started - Team developed internally and tasks delegated. TMCD Project Manager
EP 07	Jan '10	Environmental	Energy Systems	All Sites	MK/DD	1. Energy study to see if we can reduce resource consumption on all sites	Dec'10	Commenced. Energy Team set up internally DD Project Manager
EP 10	Jan '10	Environmental	Waste Acceptance Procedures - Training Refresher for office staff	All Sites	MK/DD Killeen Road	1. Organise groups for tours of Killeen Road 2. Training to incorporate the importance of attention to detail, show staff how errors affect business and end up as credit notes on software system	Dec'10	Started
EP 12	March '10	Environmental	Fleet audit	All Sites	DD/MK	1. Ensure new multi regioanl collection permit is rolled out to all fleet and conditions are applied to re paperwork	Dec'10	Awaiting multi regional colelction permit
EP 13	March '10	Environmental	Environmental Drawings - Update all required	All Sites	Team	1 Update all drawings for all sites	Dec'10	Hire in Draughtsman - Started
EP 14	March '10	Environmental	EHS Newsletter	All Sites	Team	1 Communications Programme new newsletter to be developed for circulation to interested parties and customers	Dec'10	Not Started
HEALTH AND SAFETY								
H&S 01	Dec-09	H&S	Ongoing site training for all Thorntons Recycling Personnel (Induction Training,Manual Handling, etc)	All Sites	H&S Manager	1. Draft list & agree training dates for all sites 2. Schedule dates for same 3. Update and review quarterly	Dec'10	WIP
H&S 02	Jan'09	H&S	Annual H & S Review submit report to management	All Sites	H&S Manager	1. Report to be completed summarising all aspects of H & S system for 2008	Mar'10	Started
H&S 03	April'09	H&S	Occupational Noise Monitoring All sites	All Sites	H&S Manager	1. Determine Sites to be carried out 2. Carried out TR 3. Results forwarded to Directors at managment meeting	Dec'10	All sites
H&S 04	April'09	H&S	Occupational Dust Monitoring All sites	All Sites	H&S Manager	1. Determine Sites to be carried out 2. Carried out TR 3. Results forwarded to Directors at managment meeting	Dec'10	All sites
H&S 05	May '09	H&S	Accident and Incident reporting forms to be reviewed and redesigned due to tooo much information which may not be necessary for TR application statistis	All Sites	H&S Manager	1. Template to be designed. 2. Quote off stationary for printing	Dec'10	All sites

APPENDIX 7

WYG Ireland

Ref. CE08014/DMcD/DM

Mr Tom McDonnell,
Kilmainhamwood Compost,
Kilmainhamwood,
Kells,
Co Meath

22nd January 2010

RE: Integrity Test on Underground Leachate tank

Dear Tom,

In December 2009, Padraig Thornton Waste Disposal Limited, (PTWDL) requested WYG Environmental and Planning (Ireland) Ltd (WYG) to undertake integrity testing on the Underground Leachate Tank at its composting facility at Kilmainhamwood, Kells, Co Meath.

The test involved filling the tank with a known volume of water and monitoring any losses over a defined monitoring period. Where applicable the British Standard "BS 8007 – The British Standard Code of Practice for the Design of concrete structures for retaining aqueous liquids" was used as closely as possible in carrying out the test. However some amendments to the test were made to allow for operational constraints imposed by site processes.

1.0 Context of the Test

It is recommended by BS 8007 that integrity testing take place over a standard seven day period with a soakage period of the same order. However due to plant operational constraints, the test could only occur over a three day period. The tank was filled on the morning of the test for a period in the order of six hours prior to testing allowing any soakage effects from the concrete to be minimised. Under the British Standard it is also recommended that a visual inspection of the structure be undertaken for any defects prior to testing. For safety reasons, given the confined space risks involved, it was decided that the tank should only be visually inspected if the integrity test failed.

As the tank is located underground and all inputs and outputs were sealed for the duration of the test, climatic conditions i.e. rainfall, evaporation are unlikely to have had any significant effect on the water levels recorded and as such were not monitored.

2.0 Tank Capacity

The Leachate Processing Tank as shown on Figure 1 is constructed of precast concrete and has an internal diameter of 2.710m (2.996m externally) and a depth of 3.035m indicating a total capacity of 15.9m^3 or 3500 gallons. For the test the tank was filled to an arbitrary level close to the top of the tank and 0.722m below the manhole cover. Therefore approximately 2.313m or 13.33m3 of water were pumped into the tank (or just over 83.8% of the tank capacity). It is reported by PTWDL that in normal operating conditions the tank is filled to a level of no greater than 75% of the capacity of the tank.

3.0 Results

Figure 1 shows the construction of the Leachate Processing tank. Test water was pumped into the tank on the morning of the 16th of December 2009 under PTWDL supervision. The test commenced at 15.30 on the 16th of December 2009.

The tank was monitored over a three day test period by a combination of WYG and PTWDL staff on a daily basis measuring from the top of the manhole to the water level at a fixed location. Table 1 below presents the levels recorded in the tank over this period.

Table 1 Integrity Test Results

Date	Time	Monitored level
16/12/09	15:30	0.722
16/12/09	15:45	0.722
16/12/09	16:00	0.722
16/12/09	16:15	0.722
17/12/09	09:00	0.722
17/12/09	11:00	0.722
17/12/09	13:00	0.722
17/12/09	15:30	0.722
18/12/09	09:05	0.722
18/12/09	13:20	0.722
18/12/09	15:40	0.722
19/12/09	12:35	0.722
19/12/09	13:15	0.722
19/12/09	15:30	0.722

As can be seen on the table a steady water level of 0.722m below the measuring point was recorded over the three day period. This confirms there were no losses from the tank and it is concluded that the tank has passed the integrity test.

4.0 Summary and Recommendations

The Leachate Process Tank is deemed to have passed the integrity test. All tanks require testing every 3 years.

Yours Sincerely,

David McDermott
Principal Environmental Scientist
For and on behalf of WYG

Donal Marron
Regional Director
For and on behalf of WYG

APPENDIX 8

Environmental Procedures Manual		Reference EP01
Title: Environmental Communications Programme	Thorntons recycling	Date issued 05-01-09 Revision 06

Relevant to:-	Killeen Road	Kilmainhamwood	Shredding	Dunboyne	PDM	ELV	HQ	Tankering
	√	√		√				

PURPOSE AND SCOPE

The purpose of this communications programme will ensure that effective and responsive communication measures are in place at Thorntons Recycling to allow any local community groups, key interest groups, local residents, customers and members of the public to obtain information concerning the environmental performance of the facility, as required under the conditions of each sites waste Licence.
Procedure only relates to licensed facilities by the Environmental Protection Agency (EPA).

RESPONSIBILITY

The Environmental Manager for each site is responsible for ensuring that all requests from members of the public or customers on environmental information relating to the facility are dealt with in a quick and professional manner.

Associated Documentation

EP01-F01 request for Environmental Information
Environmental Guidance

COMMUNICATION TEAM AND OBJECTIVES

The Public Relations Department will be the main channel of information between Thorntons Recycling Centre and local residents, businesses and interest groups/organizations.

The Environmental Department will perform the following objectives;

- Manage consultation with local residents, businesses and local interest/representative groups
- Investigate complaints in relation to the Thorntons Recycling (and provide report to PR team to deal with)
- Encourage liaison between Thorntons Recycling and local residents
- Ensure the general public is aware of how to contact the facility
- Make available Environmental Performance data relating to waste transfer and recycling information available to members of the public and customers at all reasonable times

Relevant to:-	Killeen Road	Kilmainhamwood	Shredding	Dunboyne	PDM	ELV	HQ	Tankering
	√	√		√				

PROGRAMME IMPLEMENTATION

The communication programme will consist of the following elements:

(a) Site Notice Board

A site notice board has been erected at the entrance of all Thorntons Recycling Licensed sites. This clearly displays:

1. Name and telephone number of the facility
2. The normal hours of opening
3. Name of licence holder
4. An emergency out of hours contact telephone number
5. The licence reference number
6. Location of environmental information relating to the facility.

(b) Queries or Requests for Environmental Information

Environmental information including annual environmental reports, quarterly reports, environmental policy and waste licence, in relation to Thorntons Recycling can be viewed at;

- The Main Reception of Thorntons Recycling facility offices at Killeen Road, Dunboyne and Kilmainhamwood, between the hours of 09:00 and 17:00 only. All visitors must sign a visitor's book at reception at site offices.
- Office of Environmental Enforcement, EPA, McCuminskey House, Richview, Clonskeagh, Dublin 14 on request between the hours of 09:00 and 17:00 only.

(c) Main Contacts

Local resident groups and businesses can contact the PR Manager or Environmental Manager or Deputy Manager of the facility. If issues arise local residents may contact the PR manager to ensure that issues are dealt with effectively and efficiently by Thorntons Recycling.

(d) Site Visits

Thorntons Recycling maintain an "open door" policy to neighbors' and customers that may wish visit the facility at reasonable times. Site visits and tours can be arranged by writing to the Environmental Department of the site which you wish to visit. The written request must detail the date and time of the proposed visit, number of visitors and the purpose of such a visit.

(e) Complaints Register

1. All complaints concerning the performance of the facility will be logged in the environmental complaints recording form completed for record tracking purposes.
2. The Environmental Department will have regard to the corrective action procedure and liaise with the complainant to ensure that impacts have been alleviated.
3. The environmental department will respond to all written complaints within ten days.

(f) Meetings with Interested parties/organisations

Relevant to:-	Killeen Road	Kilmainhamwood	Shredding	Dunboyne	PDM	ELV	HQ	Tankering
	√	√		√				

Interested parties/organizations can submit a written request for a member of Thorntons Recycling management to attend meetings. The written request must detail the date and time of the proposed meeting and the purpose of the meeting. Thorntons Recycling management will do their best to honour such requests.

(g) Newsletters
Thorntons Recycling Centre will continue to submit newsletters to local residents and interested parties.

(h) Thorntons Recycling Website
Information in relation to the company including the companies' EHS policy is available to download from Thorntons Recycling Website at http://www.thorntons-recycling.ie/

(i) Internal Communications
Information in relation to common environmental queries can be obtained for internal use at the following link.Environmental Guidance. Should you require more detailed information please contact the environmental department.

COMMUNICATION POLICY

"Thorntons Recycling is committed to maintaining open and clear channels of communication with local residents and other interested parties with regards to the environmental performance of all of Thorntons Recycling facilities. It is intended that the communication programme will help address any concerns and certainly help avoid any misunderstandings about the operation of Thorntons Recycling".

All original completed records of request for information or any complaints received in relation to Thorntons Recycling will be filed in the communications file or the complaints file in the Environmental department, of each Thorntons Recycling site and will be available for inspection by the EPA at all reasonable times.

Procedures Manual		Reference PM04 Date issued 01/01/2009 Revision 01
Title: Communications	Thorntons recycling	

Relevant to:-	Killeen Road	Kilmainhamwood	Shredding	Dunboyne	PDM	ELV	HQ	Tankering
	√	√	√	√	√	√	√	√

Purpose and Scope
The purpose of this procedure is to ensure effective and timely communication of information related to Environment, Health & Safety and Quality affairs. This procedure describes processes for internal communications and reporting to relevant regulatory bodies, interested parties and safety representatives.

The communications procedure also applies to contractors.

Environmental aspects will not be reported to any third party.

When to use this procedure
1. Communicating non-compliances to regulatory bodies
2. Communicating accident reports to regulatory bodies
3. Communicating new legislation
4. Communicating on performance

Responsibility
It is the responsibility of all employees who are engaging in regulatory reporting.

It is the responsibility of the employees who are communicating information relating to changes or new activities.

Associated Documents
EP01 Communications Programme
PM08, Complaints

Procedure
1. The Management Representatives are responsible for communicating the organisation's environment, health & safety and quality policies and procedures to all employees.

2. Department Managers are responsible for communicating procedures (and any changes to the procedures), results of accident and "near miss" investigations in their areas, and other significant information related to environment, health and safety and quality issues.

3. The selection of the most appropriate mechanism(s) used for internal communication is left to the discretion of the Department Manager. Mechanisms that are used for various types of communications include, but are not limited to:

- All employee meetings, Daily Weekly and monthly.
- Area environment, health and safety meetings,
- Bulletin boards and posters,
- Memoranda and employee letters.
- Email, company Intranet

4. All employees are responsible for reporting environment, health and safety incidents or emergencies (including spills and fires), and quality issues immediately upon discovery. Such incidents are reported to the Department manager or any of the Management Representatives.

5. Environmental or Health & Safety issues, such as incidents should also be reported to the appropriate emergency contacts as identified in the site specific emergency response plans.

6. Consultation with employees is carried out on an ongoing basis. Employees are informed on changes to the management system, polices and procedures via their Department Manager.

External Communications

Health and Safety

7. External communications of a Health and Safety nature must be sent to:

Health and Safety Authority,
10 Hogan Place,
Dublin 2.

8. Reporting accidents and dangerous occurrences is the responsibility of the Health and Safety Manager.
    a. Accidents are reported to the HSA online at www.hsa.ie. All previous accidents and incidents are recorded online.

Environmental Regulatory reporting

9. Sites that operate and maintain a waste licence or waste permit are subject to reporting procedures detailed in the particular licence or permit.

10. Each site Environmental Manager must be aware of the reporting protocol.

Third Party Environmental Communications

11. This refers to Environmental communications between Thorntons Recycling and local community groups, key interest groups, local residents and members of the public. The means for communication is detailed in EP01, Communications Programme.

Procedures Manual		Reference PM08 Date issued 05/01/2009 Revision 03
Title: Complaints	Thorntons recycling	

Relevant to:-	Killeen Road	Kilmainhamwood	Shredding	Dunboyne	PDM	ELV	HQ	Tankering
	√	√	√	√	√	√	√	√

Purpose and Scope

The purpose of this procedure is to ensure that all complaints are recorded and actions initiated. The important function of this procedure is to justify the complaint. This will ensure that only legitimate and justifiable complaints are dealt with and corrected.

Complaints refer to third parties raising issues of environmental, health and Safety or customer services.

Environmental complaints are recorded separately by the environmental team.

Responsibility

It is the responsibility of all persons that receive a complaint to document it and forward it to the appropriate Department Manager and the relevant Mrep that the complaints refer to. The department manager must ensure that the complaint is solved and logged in the relevant folders on the IMS Drive. All complaints must be acted on.

Environmental Complaints are the responsibility of each Site Environmental Manager. The Managing Director, or his nominated representative, is ultimately responsible for ensuring appropriate actions are taken to investigate all environmental complaints documented in accordance with this procedure, and that where necessary, communications are held with the relevant interested parties (in compliance with the appropriate procedure).

The Environmental Manager is responsible for ensuring that environmental complaints are documented and resolutions forwarded to the complainant as soon as practicably possible and within 5 working days.

All employees are responsible for contributing to the planned resolution of complaints, in so far as they relate to matters within their control.

Associated Documentation

PM08- F01, General Complaints Form
PM08- F02, Environmental Complaints Form
PM09, Non conformance, corrective and Preventive action procedure
PM08-F03 Environmental Complaint Recording Form.doc

Procedure

General complaints

1. Complaints can be received by fax, email, letter and verbal (telephone, meeting). All faxed, email, letter and minutes of meetings must be sent to the department manager. Verbal complaints must be recorded and emailed to the Department Manager.

2. If a complaint is received by phone the following must be recorded in the email to the Department Manager;
    a. Contact details
    b. Description of complaint
    c. Date of complaint

3. The information above must be sent to the department manager with the word 'Complaint' in the subject bar of the email.

4. Each Department Manager is responsible for recording the complaint in the complaints spreadsheet PM08-F01. All the required information must be placed into the spreadsheet.

5. Complaints must be justified. It is the responsibility of the Department Manager to determine the relevance of a complaint.

6. When entering complaints into the Spreadsheet the following information must be included;

    a. **Date** - date complaint received
    b. **Dept/Area** - the complaint relates to
    c. **Category** - (see explanation below)
    d. **Description** - all details of the complaint, (If the complaint is received by post of fax, it is not necessary to enter all details into the spreadsheet. However there must be a reference to the letter/ fax and it must easily retrievable)
    e. **Corrective action required (Y/N)** - if the problem is deemed significant and it requires time, money or persons to solve or it is a reoccurrence then documented corrective action is required this is carried out using PM09, Corrective action procedure. All complaints may require some form of corrective actions, minor complaints that have 'quick fixes' do not have to be formally documented in the corrective action procedure.

f. **Comments,** if the person filling in the spread sheet wants to add additional notes they can enter into the comments section.

7. The categorisation of complaints is carried out to determine if there are any trends developing and to help in the justification of the complaint. the following categories are used;
    i. Financial(inc pricing/inv error, a/c's on stop etc)
    ii. Delivery / Collection Service
    iii. Property Damage
    iv. Personnel
    v. Data Input Error
    vi. Other

8. All complaints will be discussed once a month at the Interdepartmental meeting and also included in the Management Review.

Environmental Complaints

9. All environmental complaints are recorded in the Environmental Complaints Spreadsheet PM08-F02.

10. Complaints can be received by fax, email, letter and verbal (telephone, meeting). All faxes, emails, letters and minutes of meetings must be sent to the Environmental Manager. Verbal complaints must be recorded and emailed to the Environmental Manager.

11. If a complaint is received by phone the following must be recorded in the email to the Environmental Manager;
    a. Contact details
    b. Description of complaint
    c. Date of complaint
12. The information above must be sent to the Environmental Manager with the word 'Complaint' in the subject of the email.

13. Each Environmental Manager is responsible for recording the complaint in the complaints spreadsheet PM08-F02. All the required information must be placed into the spreadsheet.

14. The Environmental Complaints Spreadsheet PM08-F02 is self explanatory. All the headings in the spreadsheet must be completed.

15. **Corrective action. If** the problem is deemed significant and it requires time, money or persons to solve or it is a reoccurrence then documented corrective

action is required. This is carried out using PM09, Corrective action procedure. All complaints may require some form of corrective actions, minor complaints that have 'quick fixes' do not have to be formally documented in the corrective action procedure.