McGILL

Annual Environmental Report

Name:	McGill Environmental Systems (Ireland) Limited
Address:	Coom, Glenville, Co Cork
Waste licence:	W0180-01
Reporting Period:	January 1st 2011 – December 31st 2011

Signed: _____

Environmental Manager

Summary:

McGill Environmental Systems (Ireland) Limited operate a composting facility at Coom, Glenville, Co Cork, Waste licence W0180-01.

McGill Environmental Systems (Ireland) Ltd. (McGill) was founded by Jim McGill in Ireland in 1996. McGill specializes in the composting of non-hazardous industrial and sewage sludges, and other non-hazardous biodegradable materials. McGill will compost any biodegradable material provided it meets stringent regulatory requirements as well as McGill's own waste acceptance criteria. McGill won the IBEC 2001 National Environmental Excellence Award (Focusing on Waste Management).

The company operates three indoor composting facilities in Castletownroche and Glenville, Co. Cork, and Cappoquin, Co. Waterford.

McGill specialises in the recovery of biodegradable materials through the process of industrial composting. McGill operate the industrial composting facilities using a controlled static pile, forced aeration system. The process takes place completely indoors. The incoming wastes are mixed with dry finished compost and other dry amendments. The McGill method is based on a scientific enhancement of the natural composting process that creates and maintains an environment conducive to the proliferation of specific microbial populations. These microbes are responsible for biodegradation and, when provided with the right balance of moisture, temperature, and oxygen are able to affect the rapid decay of organic material.

McGill received Animal By Products approval in March 2011 following a six month validation period with the Department of Agriculture, Fisheries and Food. McGill's feedstocks moved significantly towards Animal By Products material during 2011 as a lot of Local Authorities and Industries have reverted to landspreading of their sludges which would have accounted for a significant portion of McGill's incoming waste to date.

McGill have implemented an Environmental Policy in the company which covers all three of composting facilities.

The attached Environmental Report covers the period 1st January 2011 to 31st December 2011.

1.0 Waste activities carried out at the facility and quantity/composition of waste received, disposed of and recovered during the reporting period:

Attached are summary sheets with details of:
All wastes accepted during the year – details of Animal By Products Material Accepted on site is kept separate to other waste.
All amendments accepted during the year
All material moved of site during the reporting period
A weighbridge log is available with details of all loads

See Attachment 1

2.0 Emissions and results of environmental monitoring

A monitoring plan is attached.

- Compost Analysis summary reports for metals and pathogens are attached
- Sludge Analysis Report is attached. All sludges were analysed on a quarterly basis
- McGill conducted dust monitoring on site for three different 28 day periods during 2011. The dust monitors collapsed during the third monitoring period as a result of expansion of the metal grids with ice. McGill will conduct for rounds of monitoring in 2012. All of these results were below the limits specified in the licence
- Odour Monitoring Ireland were on site on 20th June 2011 and again on 6th December 2011 to conduct PM10 and Bioaerosol monitoring. The results of both these visits showed that there are no significant bioaerosol impacts in the vicinity of the facility and the ambient air concentration levels of PM10 were below the statutory 24-hour average ambient air concentration level of 50ug m3.
- Biofilter sampling was conducted as per the licence requirement and a summary sheet and full methodology is attached. There were no environmental concerns with the results.
- Groundwater sampling was conducted as per the licence requirement and a summary sheet is attached. There were no environmental concerns with the results.
- Surfacewater sampling was conducted as per the licence requirement and a summary sheet is attached. There were no environmental concerns with the results.
- ORS Environmental Consultants conducted Noise Monitoring on site as per the licence requirements. All noise levels were within licence requirements.

See Attachment 2

3.0 Resource and energy consumption summary

Water usage: 460m^3 for the reporting period. This is a reduction on the amount used in 2010 as McGill are using water from the biofilter void to wash the inside of containers prior to steam washing.

Diesel Usage: 42687 litres of diesel was used during the reporting period to operate equipment in the facility.

Electricity Usage: McGill have used 735848 KwH of electricity at the facility during the reporting year

4.0 Report on development works undertaken during the reporting period, and a timescale for any proposed for the coming year.

There were no development works on site during 2011 and there are no proposed developments for 2012.

5.0 Environmental Management Programme

The Environmental Management Programme is attached. This programme was updated in January 2011 as part of the annual EMS update

See Attachment 3

6.0 Reported Incidents and Complaints summaries

McGill received eleven complaints during the reporting period. One of these complaints was anonymously reported to the EPA while the other ten were made by neighbours who contacted Niall Carroll or Fiona O'Sullivan of McGill. Each of these complaints was followed up and responded to immediately.

There were no reportable incidents during the reporting period.

7.0 Financial provisions made under this licence

McGill have put financial provisions of €91875 in place to cover any Environmental Risk or Clsoure costs associated with the site. This was looked at during the year and it was determined that there was no additional risks. As per the decommissioning and aftercare plan McGill have a provision of €50,625 and as per the Environmental Liability Risk Assessment McGill have a provision of €41,250. These provisions are in the form of a guarantee from McGill Compost, USA, parent company of McGill Environmental Systems (Ireland) Limited

8.0 Management Structure

The Management and Staffing Structure for the facility are attached

See Attachment 4

9.0 Information Programme

The Programme for Public information is attached

See Attachment 5

10.0 Foul Water Movement

McGill transported 13.54 tonnes of discoloured water to Fermoy WWTP during the reporting year.

Attachment 1

Waste Licence W0180-01

Reporting Period 1st January 2011 - 31st December 2011

Incoming Waste Material (Non Animal By Products)

EWC Code	Description	Tonnage
020204	SLUDGES FROM ON SITE EFFLUNT TREATMENT	484.82
020304	MATERIALS UNSUITABLE FOR CONSUMPTION OR PROCESSING	60.44
020501	MATERIALS UNSUITABLE FOR CONSUMPTION OR PROCESSING	3.62
020502	DAIRY INDUSTRY	1560.98
020704	DRINKS INDUSTRY	13.32
020705	DRINKS INDUSTRY	927.84
030305	PAPER INDUSTRY	17.52
070599	SPENT LEAVES	878.98
070599	WASTE NETTLES	1.14
070599	WASTE LEAVES	52.86
070599	WASTES NOT OTHERWSIE SPECIFIED	369.54
070199	ORGANIC CHEMICAL	179.46
070512	SLUDGES FROM ON SITE EFFLUNT TREATMENT	268.7
070699	COSMETICS INDUSTRY	79.34
190805	WASTE WATER TTREATMENT PLANT	177.98
190812	SLUDGES FROM BIO TREATMENT OF IND WASTE WATER	22.7
190902	SLUDGES FROM WATER CLARIFICATION	50.18
200125	EDIBLE OILS AND FATS	284.84
200304	MUNICIPAL WASTE	30.6
		5464.86

Incoming Waste Material (Animal By Products)

EWC Code	Description	Tonnage
191212	ORGANIC FINES	7970.02
		7970.02

Waste Licence W0180-01

Reporting Period 1st January 2011 - 31st December 2011

Incoming Amendment

Amendment	Quantity
FLAKE	17.8
SAWDUST	649.52
SHAVINGS	20.74
STRAW	4.58
WOODCHIP	969.64
Total	1662.28

Waste Licence W0180-01

Reporting Period 1st January 2011 - 31st December 2011

Material Removed from Site

Product	Use	Quantity
Compost	Horticulture	287.54
Stabilised Biowaste	Landfill Cover	1951.34
Oversize Inorganic Material	Landfill Void	3533.54
	Total	**5772.42**

Attachment 2

Dust Analysis

McGill Reference	*Lab Reference*	*Units*	*Result*
GLV DM1 (July 2011)	0360/259/01	mg/m2/day	91.74
GLV DM2 (July 2011)	0360/259/02	mg/m2/day	41.94
GLV DM3 (July 2011)	0360/259/03	mg/m2/day	247.44
GLV DM1 2011 (2)	0360/269/01	mg/m2/day	58.71
GLV DM2 2011 (2)	0360/269/02	mg/m2/day	55.04
GLV DM3 2011 (2)	0360/269/03	mg/m2/day	52.95

All results are below the limits specified in Waste Licence W0180-01

All analysis was conducted by Euro Environmental Services, Drogheda

Biofilter Water Monitoring

		McGill Reference	GLV - Biofilter Water
		Lab Reference	0360/206/01
		Units	
BOD	Electrometry	mg/L	26
pH	Electrometry	ph Units	8.3
Solids (Total Suspended)	Filtration / Drying @104c	mg/L	414

All analysis was conducted by Euro Environmental Services, Drogheda

Biofilter Monitoring

Colormetric Indicator Tube Testing

Results of Monitoring June 2011

Sample	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
Ammonia NH3 (ppm)	<5	<5	Not detected	Not detected	<5	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected
Hydrogen Sulfide H_2S (ppm)	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected
Total Mercaptans R•SH	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected	Not detected

Full Monitoring Report is attached

Compost & Stabilised Biowaste Results

McGill Reference	*Lab Reference*	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Mercury mg/kg	Nickel mg/kg	Zinc mg/kg	PCB'S mg/kg	PAH'S mg/kg
G9 09/02/2011 ABP4&A	0360/228/01	0.168	4.597	62.38	74.313	0.186	19.17	0.516	<0.005	<0.05
G11 23/06/2011	0360/250/03	0.19	2.835	27.425	53.17	0.056	12.743	117.63	<0.005	<0.05
GLV Aug 2011	0360/262/02	0.252	6.065	170	312	0.384	22.12	257	<0.005	<0.05
GLV Oct 2011	0360/267/09	0.489	7.21	84.12	86.746	0.115	25.494	263.604	<0.005	<0.05

All compost was tested by Euro Environmental Services, Drogheda

	Parameter	AT4
	Unit	mg O2 g
	Method Ref:	Oxitop
	Upper Limit	
Lab Sample No.	**McGill Reference**	
0360/219/01S	G11 05-01-2011	9.63
0360/245/02S	ABP Batch 7 & 8	8.72
9602E04	Sample 4 15th Aug 2011	8.8
GW120105	Batch ABP25 Sample 1	3.43

Air Monitoring at Biofilter

Date: 23rd June 2011

Materials:

GASTEC GV-100 pump
GASTEC Detector Tube no. 70L Total Mercaptans R•SH
Drager Accuro Gas Detection Pump
Drager Ammonia tubes
Drager Hydrogen Sulfide tubes

Application of the tubes

Use of these tubes for the detection of substances in air and industrial areas.

Measurement Procedure for Total Mercaptans

1. The tips were broken off a fresh detector tube in the tube breaker of the pump.
2. The tube was inserted into the pump inlet with arrow G> on the tube pointing towards pump.
3. Guide marks on pump and handle were aligned.
4. Handle was pulled out until it locked into full position.
5. After three minutes, a reading was taken.

Measurement Procedure for Ammonia and Hydrogen Sulfide

1. The tips were broken off a fresh detector tube in the tube breaker of the pump.
2. The tube was inserted into the pump inlet with arrow pointing towards pump.
3. The air was pumped for ten strokes
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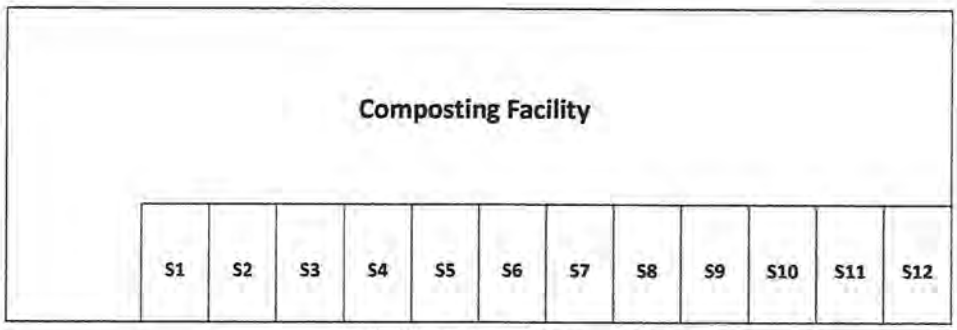
Results

Sample	Ammonia NH3 (ppm)	Hydrogen Sulfide H_2S (ppm)	Total Mercaptans R•SH
S1	<5	Not detected	Not detected
S2	<5	Not detected	Not detected
S3	Not detected	Not detected	Not detected
S4	Not detected	Not detected	Not detected
S5	<5	Not detected	Not detected
S6	Not detected	Not detected	Not detected
S7	Not detected	Not detected	Not detected
S8	Not detected	Not detected	Not detected
S9	Not detected	Not detected	Not detected
S10	Not detected	Not detected	Not detected
S11	Not detected	Not detected	Not detected
S12	Not detected	Not detected	Not detected

Table 1. Results from air sampling

Discussion

Nuisance problems such as odours are mainly caused by Ammonia, Hydrogen Sulfide and other sulfur containing compounds (mercaptans). The biofilter is responsible for cleaning air which has been extracted from the building through the extraction fans. The air was sampled directly above the surface of the biofilter areas through a cone. There was no detection of any compounds at either of the sampling points on the biofilter.



Biofilter Sampling Locations

Signed: _____

Fiona O'Sullivan
Environmental Manager

Date: 23rd June 2011

Air Monitoring at Biofilter

Date: 19th September 2011

Materials:

GASTEC GV-100 pump
GASTEC Detector Tube no. 70L Total Mercaptans R•SH
Drager Accuro Gas Detection Pump
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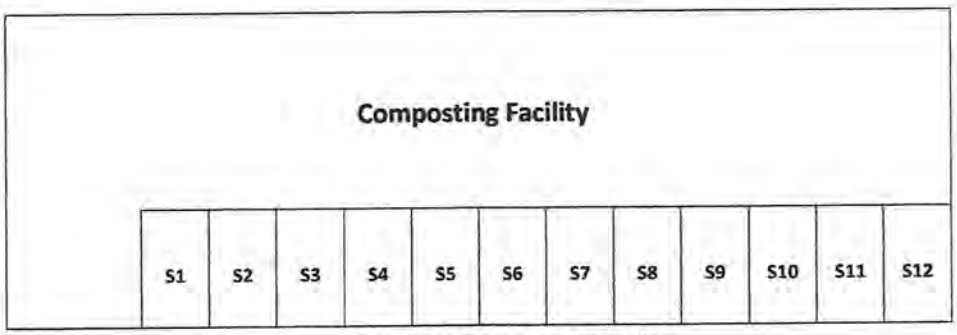
Results

Sample	Ammonia NH3 (ppm)	Hydrogen Sulfide H_2S (ppm)	Total Mercaptans R•SH
S1	Not detected	Not detected	Not detected
S2	Not detected	Not detected	Not detected
S3	<5	Not detected	Not detected
S4	<5	Not detected	Not detected
S5	<5	Not detected	Not detected
S6	Not detected	Not detected	Not detected
S7	Not detected	Not detected	Not detected
S8	Not detected	Not detected	Not detected
S9	Not detected	Not detected	Not detected
S10	Not detected	Not detected	Not detected
S11	Not detected	Not detected	Not detected
S12	Not detected	Not detected	Not detected

Table 1. Results from air sampling

Discussion

Nuisance problems such as odours are mainly caused by Ammonia, Hydrogen Sulfide and other sulfur containing compounds (mercaptans). The biofilter is responsible for cleaning air which has been extracted from the building through the extraction fans. The air was sampled directly above the surface of the biofilter areas through a cone.



Biofilter Sampling Locations

Signed: _____
Fiona O'Sullivan
Environmental Manager

Date: 19th September 2011

Sludge Analysis

Lab Reference	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Mercury mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium	Zinc mg/kg
0360/241/01	0.0639	1.605	22.265	1.121	0.085	0.521	1.697	0.382	53.779
0360/241/02	0.0595	0.379	2.685	35.755	0.099	0.315	0.539	0.323	20.317
0360/241/03	0.025	0.269	4.316	0.096	0.001	<0.005	0.328	0.542	3.278
0360/241/04	0.055	0.681	4.828	0.328	0.004	0.44	1.093	0.729	15.980
0360/241/05	0.054	0.328	8.94	0.249	0.016	<0.005	0.337	0.781	13.635
0360/241/06	0.049	0.724	2.407	0.251	0.006	<0.005	0.598	0.402	10.627
0360/241/07	0.047	0.672	2.26	0.318	0.379	<0.005	0.512	0.427	4.508
0360/241/08	0.073	1.146	6.442	5.658	0.005	0.392	6.419	1.071	22.554
0360/241/09	<0.01	0.845	2.503	0.403	0.0015	<0.005	3.541	4.327	16.839
0360/241/10	0.0007	0.049	0.743	0.177	0.001	<0.005	0.125	0.0047	2.510
0360/253/01	<0.01	0.03	0.226	0.059	<0.002	0.099	0.048	<0.01	3.037
0360/253/02	<0.01	0.019	15.17	0.0629	<0.002	0.147	0.021	<0.01	6.564
0360/253/03	<0.01	0.08	0.283	0.047	0.014	0.023	0.097	0.037	0.770
0360/253/04	<0.01	0.805	5.409	54.315	0.003	0.257	2.075	<0.01	74.499
0360/253/05	0.039	1.67	26.969	1.448	0.01	0.1	2.37	<0.01	54.113
0360/253/06	0.0177	0.766	4.053	0.307	<0.002	0.489	0.975	<0.01	25.951
0360/256/01	0.023	0.267	4.945	2.163	0.0037	0.355	3.983	0.05	144.600
036/0257/01	<0.01	1.102	2.017	<0.01	0.0019	0.701	0.826	<0.01	5.805
036/0257/02	<0.01	1.03	16.543	0.124	0.0026	0.243	0.214	0.313	10.228
036/0257/03	<0.01	0.41	2.368	0.178	0.005	0.235	0.166	0.211	5.724
036/0257/04	<0.01	0.596	1.817	<0.01	0.0023	0.187	0.413	<0.01	10.224
036/0257/05	<0.01	0.49	15.675	0.322	0.0067	0.302	0.32	<0.01	26.256
036/0257/06	<0.01	0.177	19.918	1.032	0.0047	0.107	0.133	<0.01	70.536
0257/07	<0.01	0.523	3.941	1.184	0.0047	0.105	0.312	0.672	34.708
0360/264/01	0.141	0.566	3.736	0.339	<0.0002	0.678	0.794	0.315	17.574
0360/246/02	0.133	0.218	1.21	1.654	<0.0002	0.198	0.216	0.235	4.854
0360/264/03	0.123	0.3	2.99	0.202	<0.0002	0.189	0.202	0.398	8.963
0360/264/04	0.164	0.882	11.578	5.166	0.013	0.402	1.787	<0.01	28.640
0360/264/05	0.121	0.159	4.64	0.241	0.000477	2.273	0.426	0.374	3.138
0360/266/01	0.189	1.076	2.001	0.518	0.013	0.698	0.515	0.415	5.685
0360/266/02	0.205	1.676	6.917	2.999	0.005	1.149	2.164	<.01	55.741
0360/270/01	0.0005	0.0075	0.0470	0.0110	0.0005	<.005	0.0012	0.0410	0.824
0360/270/02	<0.01	1.7650	8.3630	31.1340	0.0060	1.0870	6.1970	0.6810	32.278
0360/270/03	<0.01	0.5240	2.9860	0.3500	0.0100	0.3750	0.3630	<.010	5.374
0360/270/04	<0.01	0.7810	2.3590	0.2870	0.0090	0.4660	0.6290	<0.01	25.310
0360/270/05	<0.01	0.0936	4.8840	0.1930	0.0002	0.1430	0.3110	<0.01	4.600
0360/270/06	0.0730	2.5360	27.7210	5.0240	0.0240	0.7340	3.4330	1.2930	108.160
0360/270/07	<0.01	0.4240	3.6890	0.4200	0.0010	0.8870	0.6460	<0.01	17.882
0360/270/08	<0.01	1.1200	28.0630	2.3340	0.0110	0.4850	1.4460	0.3420	97.000
0360/270/09	0.0410	3.0390	34.9000	5.0430	0.0170	0.5770	2.2330	<.01	205.268
0360/270/12	<0.01	0.9380	3.7090	0.4440	<0.0002	0.5980	1.2140	<0.01	22.141

Lab Reference	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Mercury mg/kg	Molybdenum mg/kg	Nickel mg/kg	Selenium	Zinc mg/kg
0360/270/13	<0.01	0.9030	3.2930	0.3820	0.0340	0.5970	1.3400	<0.01	18.144
0360/270/14	<0.01	0.8260	3.2590	0.4910	0.0100	0.4940	1.3250	0.4670	17.762
0360/270/16	0.0010	0.0075	4.7020	0.1610	0.0002	0.0070	1.7140	0.0020	5.711
0360/270/17	<0.01	0.2380	3.5190	0.0708	0.0007	0.5590	0.1000	<0.01	143.891
0360/279/20	<0.01	0.8610	14.8420	0.7400	0.0570	0.2230	0.8270	0.4190	33.362

All sludge samples was tested by Euro Environmental Services, Drogheda

Groundwater Monitoring

2011		*McGill Reference*	GLV-MW1-11	*GLV-MW2-11*	*GLV-MW3-11*	*GLV-MW4-11*	*Indicator Parametric Value*
		Lab Reference					
Parameter	**Analytical Techni**	**Units**					
Depth			**3.51m**	**2.48m**	**1.8m**	**Tap**	
Ammonical N	Colorimetry	mg/L as N	<0.01	<0.01	<0.01	<0.01	0.3 mg/l
Chloride			14.62	13.96	14.24	12.32	250 mg/l
ElectricalConductivity	Electrometry	pH units	295	280	257	173.9	2500 uS cm-1
pH	Filtration/Drying (	mg/L	6.6	7	6.4	6.2	
Coliforms (Faecal)	Filtration/Incubat	no/100ml	<1	<1	<1	<1	0
Coliforms (Total)	Electrometry	uscm-1@25C	64	122	23	<1	0

Groundwater samples were taken on 18th July 2011 by Fiona O'Sullivan, McGill Environmental Systems. Samples were extracted using a Waterra Inertial Pump.
Each monitoring well has its own baler to prevent cross-contamination. Wells were purged prior to collecting the sample.

There were no faecal coliforms in any wells but there was a count of total coliforms , this will be rechecked in the first half of 2012 to ensure that there is no increase in this level.
All other parameters are in line with the Indicator Parametric Values.

All analysis was conducted by Euro Environmental Services, Drogheda

Surfacewater Monitoring

		McGill Reference	GLV-SW1-11
		Lab Reference	0360/242/01
Parameter	**Analytical Technique**	**Units**	
Ammonia	Colorimetry	mg/L as N	0.034
BOD	Electrometry	mg/L	<2
Coliforms (Faecal)	Filtration/Incubation @ 44c/24H	no/100ml	0
Coliforms (Total)	Filtration/Incubation @ 37c/24H	no/100ml	0
Conductivity	Electrometry	uscm-1@25C	99.6
pH	Electrometry	pH units	7.2
Solids (Total Suspended)	Filtration/Drying @104C	mg/L	71

Surfacewater sample was taken on 25th March 2011 by Fiona O'Sullivan, McGill Environmental Systems.

The surface water was clean and there was a lot of water in the stream at the time of sampling.

All analysis was conducted by Euro Environmental Services, Drogheda

Compost Pathogen Results

McGill Ref:	Lab Ref:	Result Salmonella per 25g	Result Ecoli CFU/g
Batch ABP7 Sample 1	531196		<10
Batch ABP7 Sample 2	531196		<10
Batch ABP7 Sample 3	531196		<10
Batch ABP7 Sample 4	531196		<10
Batch ABP7 Sample 5	531196		<10
Batch ABP8 Sample 1	531196		<10
Batch ABP8 Sample 2	531196		<10
Batch ABP8 Sample 3	531196		<10
Batch ABP8 Sample 4	531196		<10
Batch ABP8 Sample 5	531196		<10
N Batch 6 Sample 1	532953	Not Detected	
N Batch 6 Sample 2	532953	Not Detected	
N Batch 6 Sample 3	532953	Not Detected	
N Batch 6 Sample 4	532953	Not Detected	
N Batch 6 Sample 5	532953	Not Detected	
Batch 2 Sample 1	532954	Not Detected	
Batch 2 Sample 2	532954	Not Detected	
Batch 2 Sample 3	532954	Not Detected	
Batch 2 Sample 4	532954	Not Detected	
Batch 2 Sample 5	532954	Not Detected	
Batch 3 Sample 1	532954	Not Detected	
Batch 3 Sample 2	532954	Not Detected	
Batch 3 Sample 3	532954	Not Detected	
Batch 3 Sample 4	532954	Not Detected	
Batch 3 Sample 5	532954	Not Detected	
Batch 9 Sample 1	46/91309		<10
Batch 9 Sample 2	46/91310		<10
Batch 9 Sample 3	46/91311		<10
Batch 9 Sample 4	46/91312		<10
Batch 9 Sample 5	46/91313		<10
Batch 3 & 5 Sample 1	46/91261	Not Detected	
Batch 3 & 5 Sample 2	46/91262	Not Detected	
Batch 4 & 6 Sample 1	46/91263	Not Detected	
Batch 4 & 6 Sample 2	46/91264	Not Detected	
Batch 7 & 8 Sample 1	46/91265	Not Detected	
Batch 7 & 8 Sample 2	46/91266	Not Detected	
Batch 4 & 6 Sample 1 21/03/2011	47/8394	Not Detected	
Batch 4 & 6 Sample 2 21/03/2011	47/8395	Not Detected	
Batch 4 & 6 Sample 3 21/03/2011	47/8396	Not Detected	
Batch 7 & 8 Sample 1 21/03/2011	47/8397	Not Detected	
Batch 7 & 8 Sample 2 21/03/2011	47/8398	Not Detected	
Batch 7 & 8 Sample 3 21/03/2011	47/8399	Not Detected	
Batch 7 & 8 Sample 4 21/03/2011	47/8400	Not Detected	

Compost Pathogen Results

McGill Ref:	Lab Ref:	Result Salmonella per 25g	Result Ecoli CFU/g
Batch 7 & 8 Sample 5 21/03/2011	47/8401	Not Detected	
Batch 9 Sample 1	46/91309		<10
Batch 9 Sample 2	46/91310		<10
Batch 9 Sample 3	46/91311		<10
Batch 9 Sample 4	46/91312		<10
Batch 9 Sample 5	46/91313		<10
Batch ABP10 - Sample 1	47/49569		<10
Batch ABP10 - Sample 2	47/49570		<10
Batch ABP10 - Sample 3	47/49571		<10
Batch ABP10 - Sample 4	47/49572		<10
Batch ABP10 - Sample 5	47/49573		<10
Batch ABP10 - Sample 6	47/49574		<10
Batch ABP11 - Sample 1	47/91726		<10
Batch ABP11 - Sample 2	47/91727		<10
Batch ABP11 - Sample 3	47/91728		<10
Batch ABP11 - Sample 4	47/91729		<10
Batch ABP11 - Sample 5	47/91730		<10
Batch ABP12 Sample 1	48/13845		<10
Batch ABP12 Sample 2	48/13846		<10
Batch ABP12 Sample 3	48/13847		<10
Batch ABP12 Sample 4	48/13848		<10
Batch ABP12 Sample 5	48/13849		<10
Batch ABP13 Sample 1	48/52402		<10
Batch ABP13 Sample 2	48/52403		<10
Batch ABP13 Sample 3	48/52404		<10
Batch ABP13 Sample 4	48/52405		<10
Batch ABP13 Sample 5	48/52406		<10
Batch ABP11 - Sample 1	48/52407	Not Detected	
Batch ABP11 - Sample 2	48/52408	Not Detected	
Batch ABP11 - Sample 3	48/52409	Not Detected	
Batch ABP11 - Sample 4	48/52410	Not Detected	
Batch ABP11 - Sample 5	48/52411	Not Detected	
Batch ABP14 - Sample 1	48/80407		<10
Batch ABP14 - Sample 2	48/80408		<10
Batch ABP14 - Sample 3	48/80409		<10
Batch ABP14 - Sample 4	48/80410		<10
Batch ABP14 - Sample 5	48/80411		<10
Batch ABP12 - Sample 1	48/80412	Not Detected	
Batch ABP12 - Sample 2	48/80413	Not Detected	
Batch ABP12 - Sample 3	48/80414	Not Detected	
Batch ABP12 - Sample 4	48/80415	Not Detected	
Batch ABP12 - Sample 5	48/80416	Not Detected	
Batch ABP15 - Sample 1	49/30225		<10
Batch ABP15 - Sample 2	49/30226		<10
Batch ABP15 - Sample 3	49/30227		<10
Batch ABP15 - Sample 4	49/30228		<10
Batch ABP15 - Sample 5	49/30229		<10

Compost Pathogen Results

McGill Ref:	Lab Ref:	Result Salmonella per 25g	Result Ecoli CFU/g
Batch ABP13 - Sample 1	49/30230	Not Detected	
Batch ABP13 - Sample 2	49/30231	Not Detected	
Batch ABP13 - Sample 3	49/30232	Not Detected	
Batch ABP13 - Sample 4	49/30233	Not Detected	
Batch ABP13 - Sample 5	49/30234	Not Detected	
Batch ABP16 - Sample 1	50/4501		<10
Batch ABP16 - Sample 2	50/4502		<10
Batch ABP16 - Sample 3	50/4503		<10
Batch ABP16 - Sample 4	50/4504		<10
Batch ABP16 - Sample 5	50/4505		<10
Batch ABP14 - Sample 1	50/4506	Not Detected	
Batch ABP14 - Sample 2	50/4507	Not Detected	
Batch ABP14 - Sample 3	50/4508	Not Detected	
Batch ABP14 - Sample 4	50/4509	Not Detected	
Batch ABP14 - Sample 5	50/4510	Not Detected	
Batch ABP15 - Sample 1	50/4511	Not Detected	
Batch ABP15 - Sample 2	50/4512	Not Detected	
Batch ABP15 - Sample 3	50/4513	Not Detected	
Batch ABP15 - Sample 4	50/4514	Not Detected	
Batch ABP15 - Sample 5	50/4515	Not Detected	
Batch ABP17 - Sample 1	50/37041		<10
Batch ABP17 - Sample 2	50/37042		<10
Batch ABP17 - Sample 3	50/37043		<10
Batch ABP17 - Sample 4	50/37044		<10
Batch ABP17 - Sample 5	50/37045		<10
Batch ABP16 - Sample 1	50/37050	Not Detected	
Batch ABP16 - Sample 2	50/37051	Not Detected	
Batch ABP16 - Sample 3	50/37052	Not Detected	
Batch ABP16 - Sample 4	50/37053	Not Detected	
Batch ABP16 - Sample 5	50/37054	Not Detected	
Batch ABP17 - Sample 1	50/71329	Not Detected	
Batch ABP17 - Sample 2	50/71330	Not Detected	
Batch ABP17 - Sample 3	50/71331	Not Detected	
Batch ABP17 - Sample 4	50/71332	Not Detected	
Batch ABP17 - Sample 5	50/71333	Not Detected	
Batch ABP18 - Sample 1	50/71324		<10
Batch ABP18 - Sample 2	50/71325		<10
Batch ABP18 - Sample 3	50/71326		<10
Batch ABP18 - Sample 4	50/71327		<10
Batch ABP18 - Sample 5	50/71328		<10
Batch ABP19 - Sample 1	51/17804		<10
Batch ABP19 - Sample 2	51/17805		<10
Batch ABP19 - Sample 3	51/17806		<10
Batch ABP19 - Sample 4	51/17807		<10
Batch ABP19 - Sample 5	51/17808		<10
Batch ABP18 - Sample 1	51/17809	Not Detected	
Batch ABP18 - Sample 2	51/17810	Not Detected	

Compost Pathogen Results

McGill Ref:	Lab Ref:	Result Salmonella per 25g	Result Ecoli CFU/g
Batch ABP18 - Sample 3	51/17811	Not Detected	
Batch ABP18 - Sample 4	51/17812	Not Detected	
Batch ABP18 - Sample 5	51/17813	Not Detected	
Batch ABP20 - Sample 1	51/51009		<10
Batch ABP20 - Sample 2	51/51010		<10
Batch ABP20 - Sample 3	51/51011		<10
Batch ABP20 - Sample 4	51/51012		<10
Batch ABP20 - Sample 5	51/51013		<10
Batch ABP19 - Sample 1	51/51014	Not Detected	
Batch ABP19 - Sample 2	51/51015	Not Detected	
Batch ABP19 - Sample 3	51/51016	Not Detected	
Batch ABP19 - Sample 4	51/51017	Not Detected	
Batch ABP19 - Sample 5	51/51018	Not Detected	
Batch ABP21 - Sample 1	51/84319		<10
Batch ABP21 - Sample 2	51/84320		<10
Batch ABP21 - Sample 3	51/84321		<10
Batch ABP21 - Sample 4	51/84322		<10
Batch ABP21 - Sample 5	51/84323		<10
Batch ABP20 - Sample 1	51/84324	Not Detected	
Batch ABP20 - Sample 2	51/84325	Not Detected	
Batch ABP20 - Sample 3	51/84326	Not Detected	
Batch ABP20 - Sample 4	51/84327	Not Detected	
Batch ABP20 - Sample 5	51/84328	Not Detected	
Batch ABP22 - Sample 1	52/13695		<10
Batch ABP22 - Sample 2	52/13696		<10
Batch ABP22 - Sample 3	52/13697		<10
Batch ABP22 - Sample 4	52/13698		<10
Batch ABP22 - Sample 5	52/13699		<10
Batch ABP23 - Sample 1	52/56394		<10
Batch ABP23 - Sample 2	52/56395		<10
Batch ABP23 - Sample 3	52/56396		<10
Batch ABP23 - Sample 4	52/56397		<10
Batch ABP23 - Sample 5	52/56398		<10
Batch ABP Nov 11 - Sample 1	52/56399	Not Detected	
Batch ABP Nov 11 - Sample 2	52/56400	Not Detected	
Batch ABP Nov 11 - Sample 3	52/56401	Not Detected	
Batch ABP Nov 11 - Sample 4	52/56402	Not Detected	
Batch ABP Nov 11 - Sample 5	52/56403	Not Detected	
Batch ABP27 Sample 1	54/22072		<10
Batch ABP27 Sample 2	54/22073		<10
Batch ABP27 Sample 3	54/22074		<10
Batch ABP27 Sample 4	54/22075		<10
Batch ABP27 Sample 5	54/22076		<10
Batch ABP Dec 11 Sample 1	53/40329	Not Detected	
Batch ABP Dec 11 Sample 2	53/40330	Not Detected	
Batch ABP Dec 11 Sample 3	53/40331	Not Detected	
Batch ABP Dec 11 Sample 4	53/40332	Not Detected	

Compost Pathogen Results

McGill Ref:	Lab Ref:	Result Salmonella per 25g	Result Ecoli CFU/g
Batch ABP Dec 11 Sample 5	53/40333	Not Detected	

All compost was tested by Euro Environmental Services, Drogheda and Exova Laboratories Cork

All compost produced on site met the Pathogen requirements of Waste Licence W0180-01
and Animal By Products Regulations where required

McGill Environmental Ltd.

Coom, Glenville, Co. Cork

Environmental Noise Survey

Report Date:
2nd November 2011

KD Environmental

17 Eastham Court, Bettystown, Co. Meath

Report No 2011/43/01

1.0 Introduction

KD Environmental were commissioned by Fiona O'Sullivan of McGill Environmental Ltd. to carry out a day and night time noise survey at three pre-determined noise monitoring locations at their compost facility at Coom, Glenville, Co. Cork, to comply with Waste license W0180-01. The day and night noise survey was carried out on 27th October 2011 by David Kelly of KD Environmental.

The McGill Environmental composting facility is situated in a rural location approximately 3km outside the village of Glenville, Co. Cork. The exact site location is N 52°02.985', W 008°28.602'. The site is elevated at 218m above sea level.

Schedule E.4 of EPA Waste license W0180-01 states that that activities on site shall not give rise to noise levels at noise sensitive locations that exceed sound pressure limits (Leq30mins) of 55 db(A) for daytime hours and 45 dB(A) for night time hours.

Condition 6.6 of EPA Waste license W0180-01 states that there shall be no clearly audible tonal or impulsive noise components from activities on site.

The EPA have recently agreed that for the purposes of noise monitoring, day time hours shall be between 8am and 6pm. Night time hours shall be between 6pm and 8am.

2.0 Duration and Measurements of Survey

The day time noise survey was carried out between 13:24 and 17:24 on 27th October 2011. The night time noise survey was carried out between 18:00 and 21:14 on 27th October 2011. The following measurements were carried out at each noise location:

- Daytime Broadband measurements $L(A)_{eq}$, $L(A)_{10}$ and $L(A)_{90}$ over a 30 minute period.
- Night time Broadband measurements $L(A)_{eq}$, $L(A)_{10}$ and $L(A)_{90}$ over a 30 minute period.
- 1:3 Octave band measurements for day time and night time noise.

3.0 Weather Conditions

Weather conditions were cold, dry and clear during day and night time monitoring. There was little or no wind with wind speeds of less than 5 m/sec. Temperatures during the day were 9 to 11 °C and at night were 8 to 5 °C. Weather conditions were considered to be neutral for noise monitoring.

4.0 Location of Monitoring Points

A map illustrating the 3 noise monitoring locations is included As Appendix 1 of this report. It should be noted that the site is situated in a rural location with no immediate neighbouring dwellings. The nearest Noise Sensitive Location (NSL) is a private dwelling approx. 250m from the facility.

N1
This monitoring point is located at the front entrance to the site beside the main gate. A local road runs adjacent to the site at this point. Access to the site is through the main gates and via a gravel driveway of approx. 250m.

N2
This monitoring point is located at the rear of the site, beside a forested area and the main SW drains. It is approx. 50m from main site activities.

N3
N3 is also located beside at the rear of the facility, beside a forested area and approx. 170m from main site activities. This is the location closest to the nearest NSL (Noise Sensitive Location) – a private residence approx. 130m from this location.

5.0 Methodology

The noise survey was carried out in accordance with ISO 1996/1/2/3 – Acoustics – Description and Measurement of Environmental Noise and The Environmental Noise Survey Guidance Document issued by the EPA.

Reference was also made to the guidance note issued by the Environmental Protection Agency for the assessment of noise from licensed facilities.

Broadband measurements were analysed for 30-minute intervals. The measurement range was set at 30-100 dB during daytime and night time readings.

1:3 octave measurements were also made during daytime and night time hours to monitor for tonal or impulsive noise.

6.0 Equipment

The meter used was a Cirrus 831C serial No. 176101 integrating sound pressure meter, with selective 1:1 or 1:3 octave band measurements. Calibrator was a Cirrus 53298, serial No. 176102.

The meter was fixed to a tripod 1.3 meters above ground level and the microphone was protected using a windshield.

7.0 Calibration

Calibration was carried out on site using an acoustic calibrator at 94dBA. The meter was calibrated before and after the day and night monitoring round with all calibration readings acceptable.
The calibrator and meter were calibrated externally by Cirrus on 30/04/2011.

8.0 Sound Level Results

Monitoring Point	Date/ Time	Sampling Interval minutes	L(A)eq	$L(A)_{10}$	$L(A)_{90}$	Audible Noise Sources
N1	27/10/2011					
	13:25	30	49.3	52.6	44.3	No Daytime on site noise audible. Low level noise from light traffic on a local road approx 8m away.
	20:12	30	29.1	30.4	27.2	No night time noise from site activities audible at this location.
N2	27/10/2011					
	15:54	30	39.4	43.2	38.2	Sources of low audible day time noise from ventilation from the main compost plant, mobile plant operating on site and the odour abatement unit at approx. 40m away
	19:06	30	38.9	40.0	38.4	Sources of low audible day time noise from ventilation from the main compost plant and the odour abatement unit at approx. 40m away
N3	27/10/2011					
	14:49	30	38.7	43.6	35.7	Sources of low audible day time noise from ventilation from the main compost plant, mobile plant operating on site and the odour abatement unit at approx. 90m away
	18:01	30	40.7	41.8	36.4	Sources of low audible day time noise from ventilation from the main compost plant and the odour abatement unit at approx. 90m away

9.0 Tonal or Impulsive Noise

Monitoring Point	Time	Tonal or Impulsive Noise from Site Activity	Comments and Interferences
N1 27/10/2011	Day 13:56 Night 20:42	 No No	No tonal or impulsive noise from site activity. No tonal or impulsive noise from site activity.
N2 27/10/2011	Day 16:54 Night 19:36	 No No	No tonal or impulsive noise from site activity. Recorded at 50 Hz due to birdsong near meter. No tonal or impulsive noise from site activity. Occurred once at 50 Hz due to off site activity.
N3 27/10/2011	Day 15:20 Night 18:32	 No No	No tonal or impulsive noise from site activity. Recorded at 50 Hz due to off site activity. No tonal or impulsive noise from site activity. Recorded at 50 Hz due to off site activity.

10.0 Interferences

Noise levels at location N1 are prone to road and farm traffic on the local road that runs adjacent to the site entrance. Birdsong is also a source of interference noise during daytime readings at all three locations.

There may have been some interference caused by the technician negotiating rough terrain in the vicinity of the meter at N3. Farm traffic and activity may also be a source of noise interference at locations N2 and N3 with brief low level tonal/impulsive noise from off site activities.

11.0 Conclusions

Daytime noise levels were within the permitted day time noise level of 55 dB (A) at all three noise measurement locations – N1, N2 and N3.

Night time noise levels were within the permitted night time noise level of 45 dB (A) at all three noise measurement locations – N1, N2 and N3.

There was no significant tonal or impulsive noise from site activities during daytime and night noise monitoring.

In conclusion, activities at the Glenville compost facility did not result in a breach of permitted noise levels during daytime or night time hours.

David Kelly
Technical Manager

Marie Dolan
Operations Manager

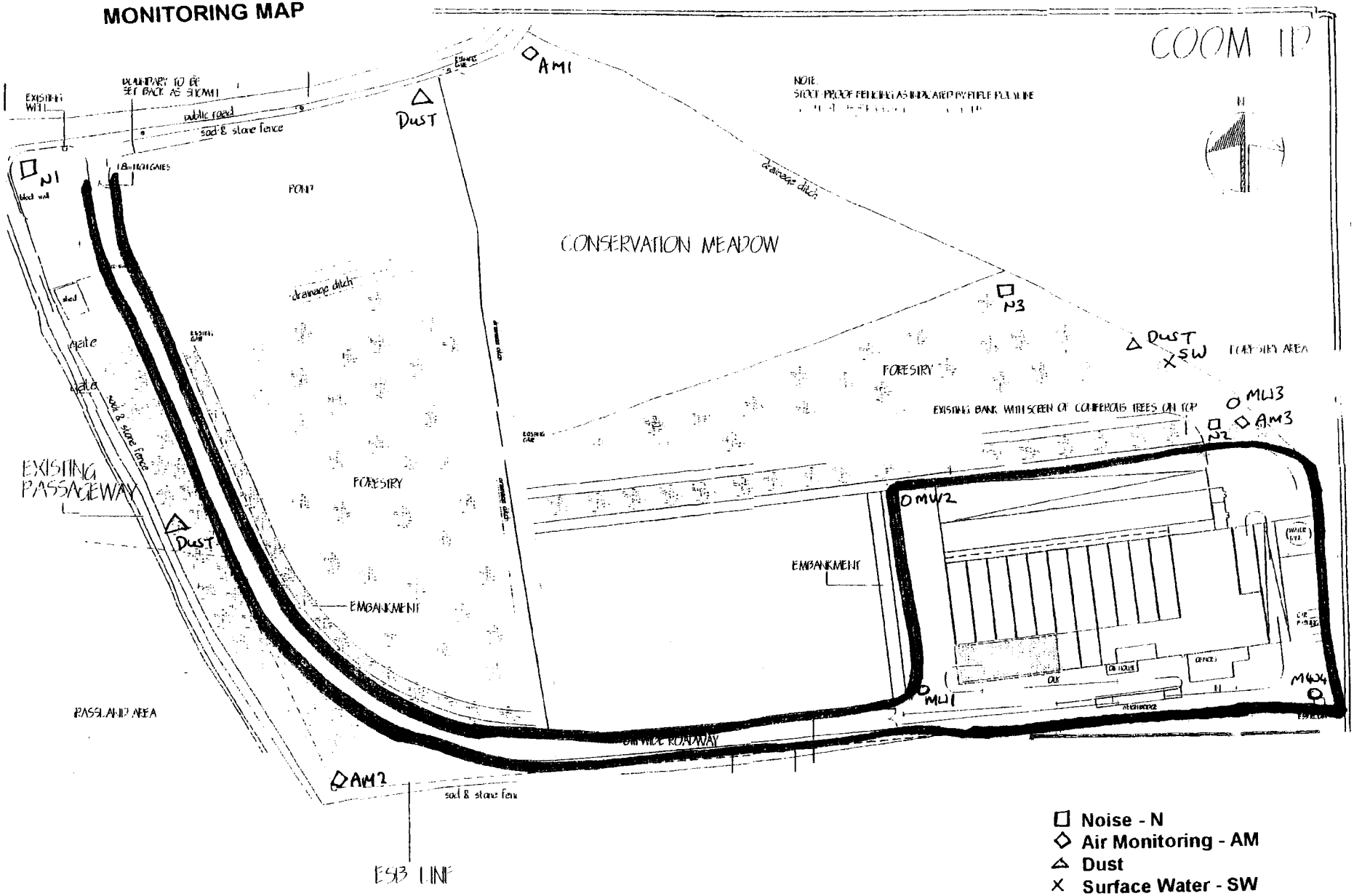
2nd November 2011

Appendix 1

Maps of Noise Monitoring Locations

GLENVILLE SITE

MONITORING MAP



- Noise - N
- Air Monitoring - AM
- Dust
- Surface Water - SW
- Groundwater - MW

Appendix 2

Noise Monitoring Readings

Measurement Report

Measurement Details

Date and Time:	27/10/2011 13:24
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012

Location:	Mc Gill Compost Glenville

Notes:

Daytime Initial Calibration

Calibrated to:	93.7 dB dB
Calibration Offset:	0.3 dB dB

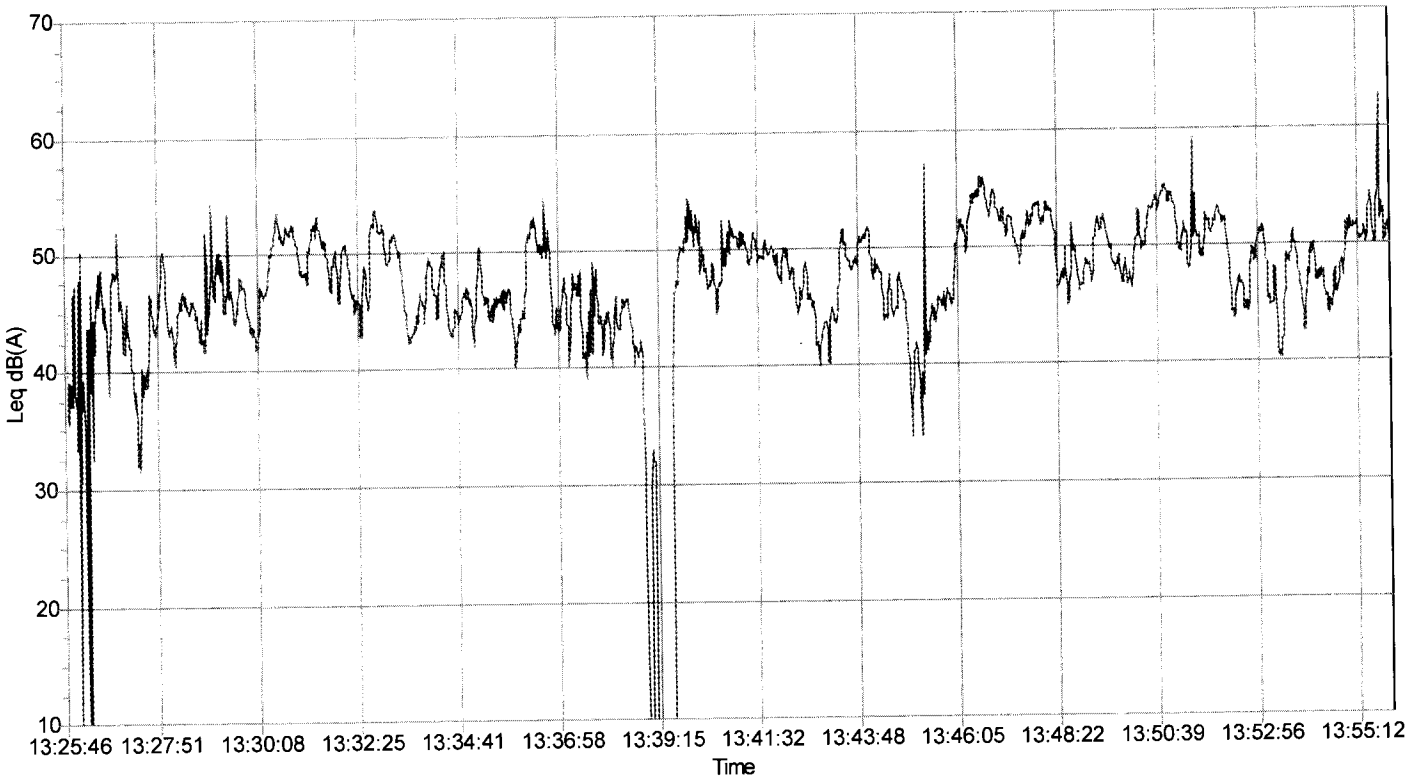
Measurement Report

Measurement Details

Date and Time:	27/10/2011 13:25
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:00 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	McGill Compost Glenville N1
Notes:	
Daytime Broadband	

Data

Leq	49.3 dBA	L1.0	55.1 dBA
Lepd	37.2 dBA	L5.0	53.7 dBA
LAE	81.6 dBA	L10.0	52.6 dBA
LAFmax	70.8 dBA	L50.0	48.4 dBA
Peak	97.1 dBC	L90.0	44.3 dBA
		Lmin	37.8 dBA



Measurement Report

Measurement Details

Date and Time:	27/10/2011 13:56
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:25 hh:mm:ss
Range:	30-100 dB
Location:	McGill Compost Glenville N1

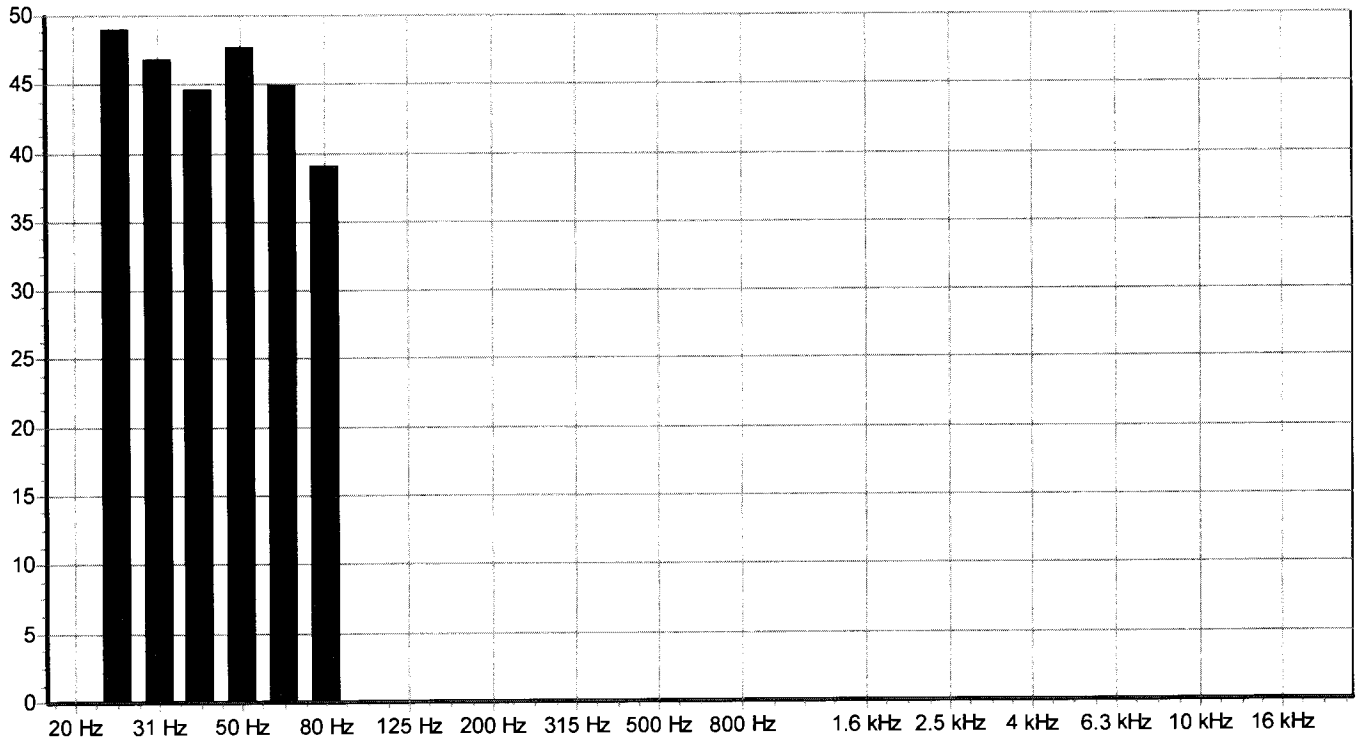
Notes:

Daytime 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	0.0 dB	55		3.15 kHz	0.0 dB	56	
25 Hz	49.0 dB	55		315 Hz	0.0 dB	55		4 kHz	0.0 dB	56	
31 Hz	46.8 dB	55		400 Hz	0.0 dB	55		5 kHz	0.0 dB	55	
40 Hz	44.6 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	56	
50 Hz	47.7 dB	55		630 Hz	0.0 dB	55		8 kHz	0.0 dB	55	
63 Hz	44.9 dB	55		800 Hz	0.0 dB	55		10 kHz	0.0 dB	55	
80 Hz	39.1 dB	56		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	0.0 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	0.0 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	0.0 dB	55		2 kHz	0.0 dB	55					
200 Hz	0.0 dB	56		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	50.4 dBA	55	
LCeq	62.5 dBC	55	
LZeq	70.1 dBZ	55	



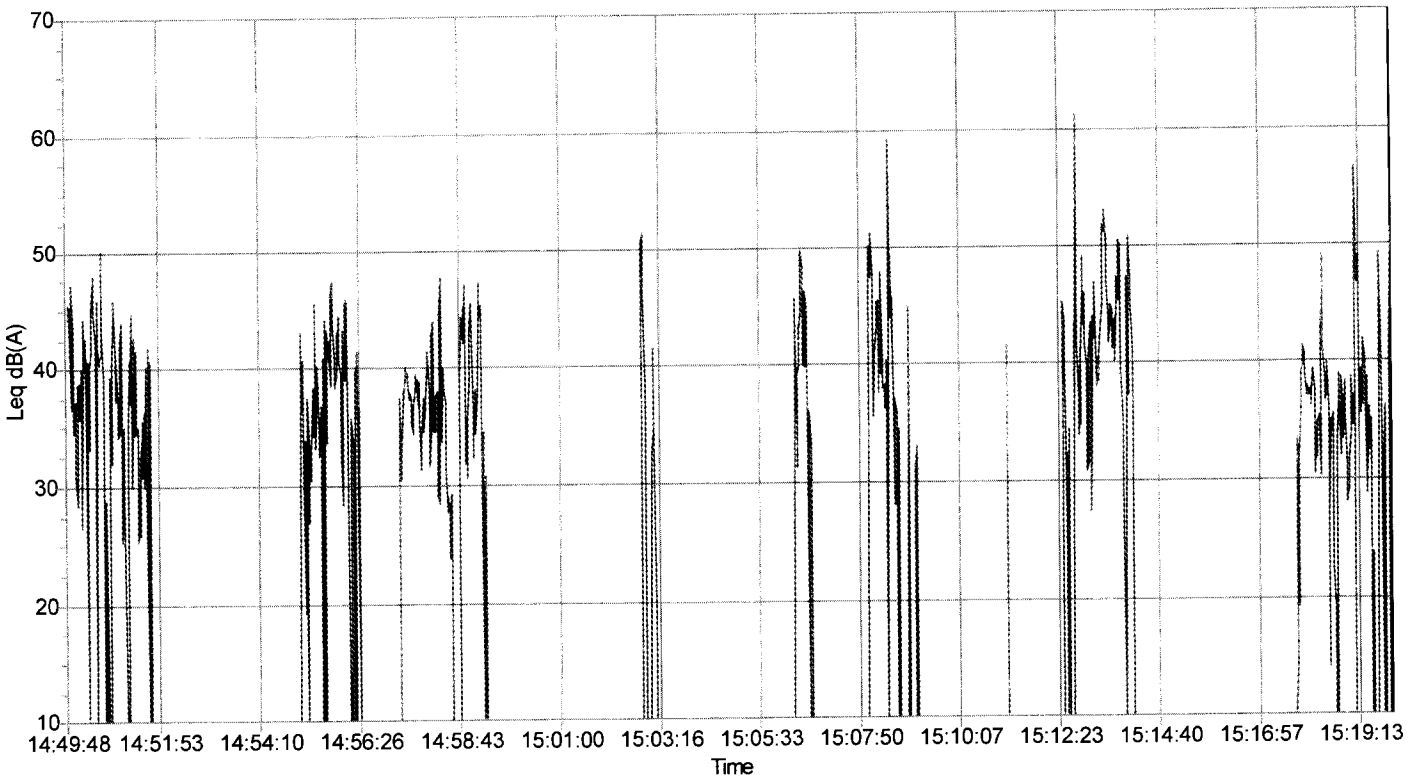
Measurement Report

Measurement Details

Date and Time:	27/10/2011 14:49
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:00 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	McGill Compost Glenville N3
Notes:	
Daytime Broadband	

Data

Leq	38.7 dBA	L1.0	50.1 dBA
Lepd	26.6 dBA	L5.0	45.8 dBA
LAE	71.0 dBA	L10.0	43.6 dBA
LAFmax	65.2 dBA	L50.0	38.3 dBA
Peak	95.3 dBC	L90.0	35.7 dBA
		Lmin	33.0 dBA



Measurement Report

Measurement Details

Date and Time:	27/10/2011 15:20
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:22 hh:mm:ss
Range:	30-100 dB
Location:	McGill Compost Glenville N3

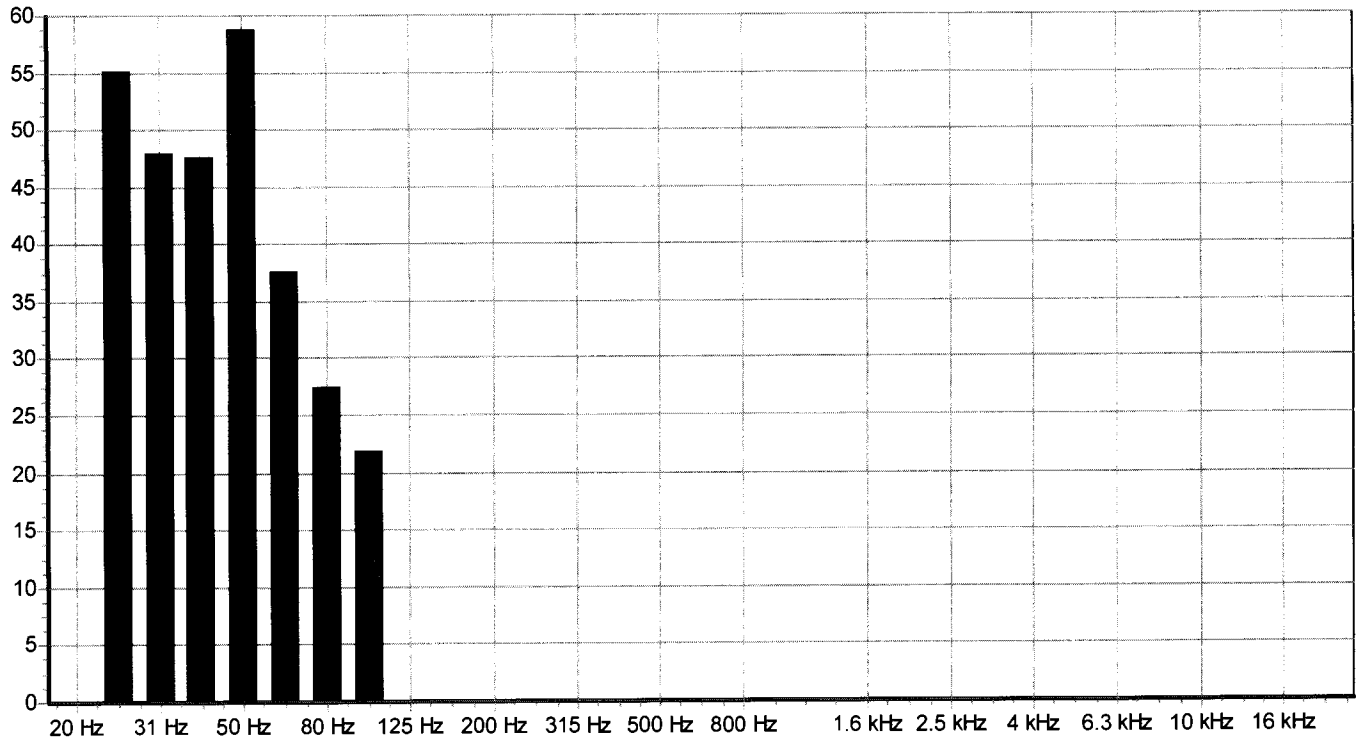
Notes:

Daytime 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	0.0 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	55.1 dB	55		315 Hz	0.0 dB	55		4 kHz	0.0 dB	55	
31 Hz	48.0 dB	56		400 Hz	0.0 dB	55		5 kHz	0.0 dB	55	
40 Hz	47.6 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	55	
50 Hz	58.7 dB	56		630 Hz	0.0 dB	55		8 kHz	0.0 dB	55	
63 Hz	37.7 dB	55		800 Hz	0.0 dB	55		10 kHz	0.0 dB	55	
80 Hz	27.5 dB	55		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	21.9 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	0.0 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	0.0 dB	55		2 kHz	0.0 dB	55					
200 Hz	0.0 dB	55		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	22.0 dBA	55	
LCeq	63.4 dBC	55	
LZeq	71.7 dBZ	55	



Measurement Report

Measurement Details

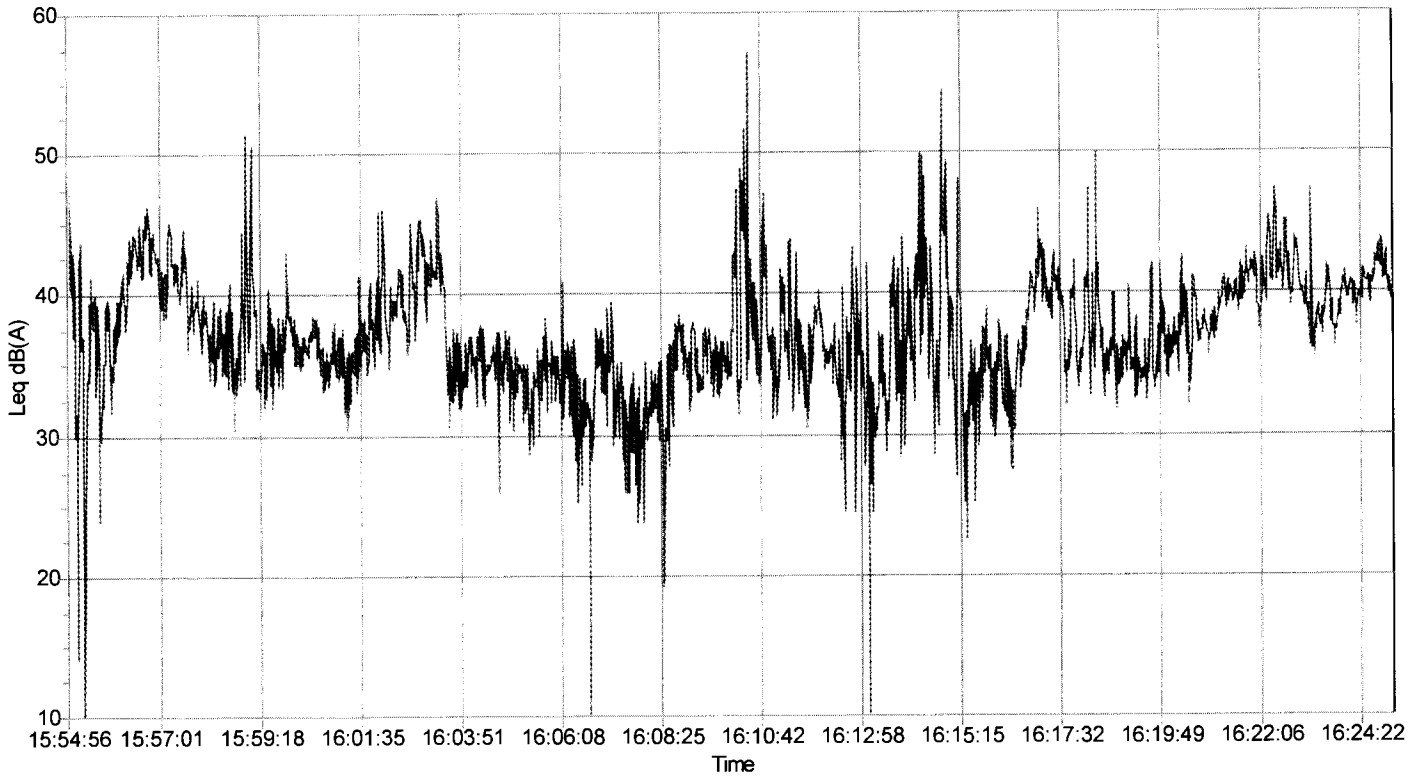
Date and Time:	27/10/2011 15:54
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:02 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	McGill Compost Glenville N2

Notes:

Daytime Broadband

Data

Leq	39.4 dBA	L1.0	47.2 dBA
Lepd	27.3 dBA	L5.0	44.4 dBA
LAE	71.7 dBA	L10.0	43.2 dBA
LAFmax	65.5 dBA	L50.0	39.9 dBA
Peak	87.0 dBC	L90.0	38.2 dBA
		Lmin	36.3 dBA



Measurement Report

Measurement Details

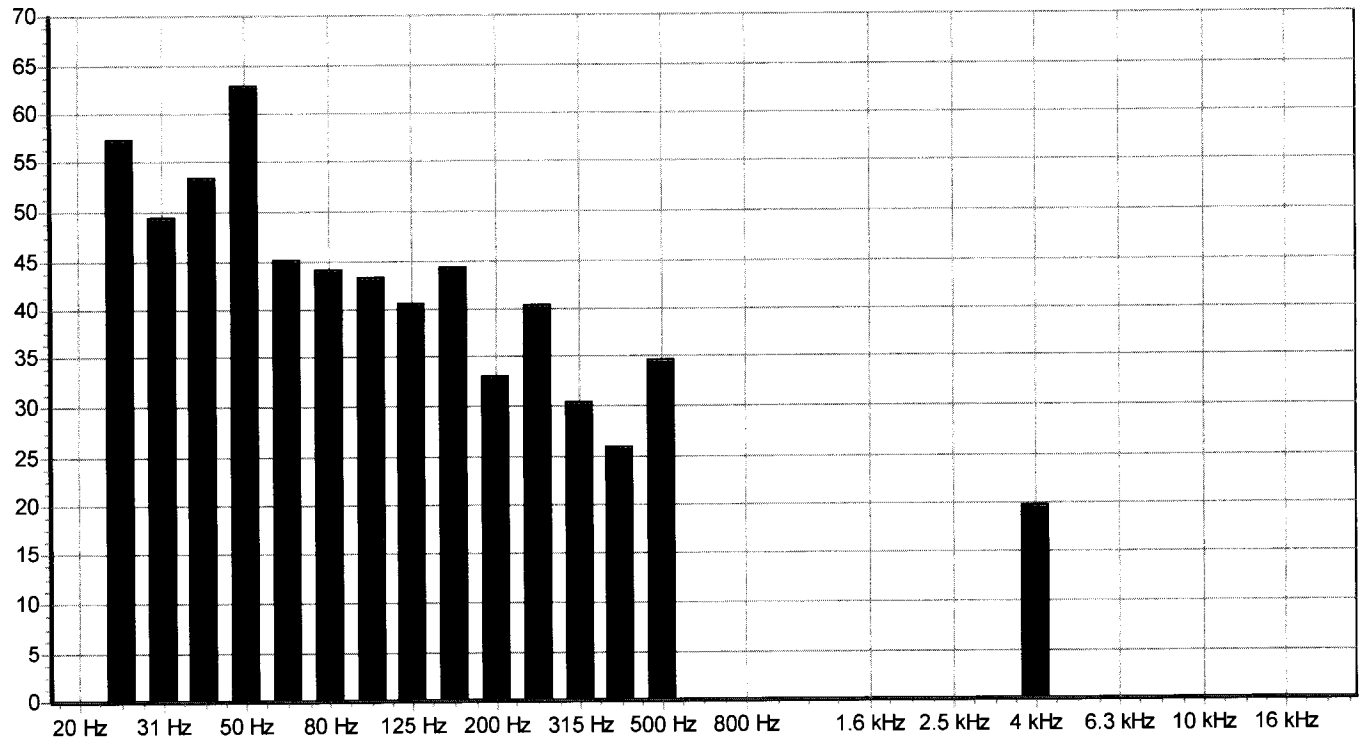
Date and Time:	27/10/2011 16:54
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:20 hh:mm:ss
Range:	30-100 dB
Location:	McGill Compost Glenville N2
Notes:	

Daytime 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	40.4 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	57.4 dB	55		315 Hz	30.5 dB	55		4 kHz	19.8 dB	55	
31 Hz	49.5 dB	55		400 Hz	25.9 dB	55		5 kHz	0.0 dB	55	
40 Hz	53.5 dB	55		500 Hz	34.7 dB	55		6.3 kHz	0.0 dB	55	
50 Hz	62.8 dB	55		630 Hz	0.0 dB	55		8 kHz	0.0 dB	55	
63 Hz	45.2 dB	55		800 Hz	0.0 dB	55		10 kHz	0.0 dB	55	
80 Hz	44.2 dB	55		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	43.2 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	40.6 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	44.2 dB	55		2 kHz	0.0 dB	55					
200 Hz	33.1 dB	55		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	42.8 dBA	55	
LCeq	65.1 dBC	55	
LZeq	66.8 dBZ	55	



Measurement Report

Measurement Details

Date and Time:	27/10/2011 17:24
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012

Location:	McGill Compost Glenville

Notes:

Daytime Final Calibration

Calibrated to:	93.7 dB dB
Calibration Offset:	0.4 dB dB

Measurement Report

Measurement Details

Date and Time:	27/10/2011 18:00
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012

Location:	McGill Compost Glenville

Notes:

Night time Final Calibration

Calibrated to:	93.7 dB dB
Calibration Offset:	-0.4 dB dB

Measurement Report

Measurement Details

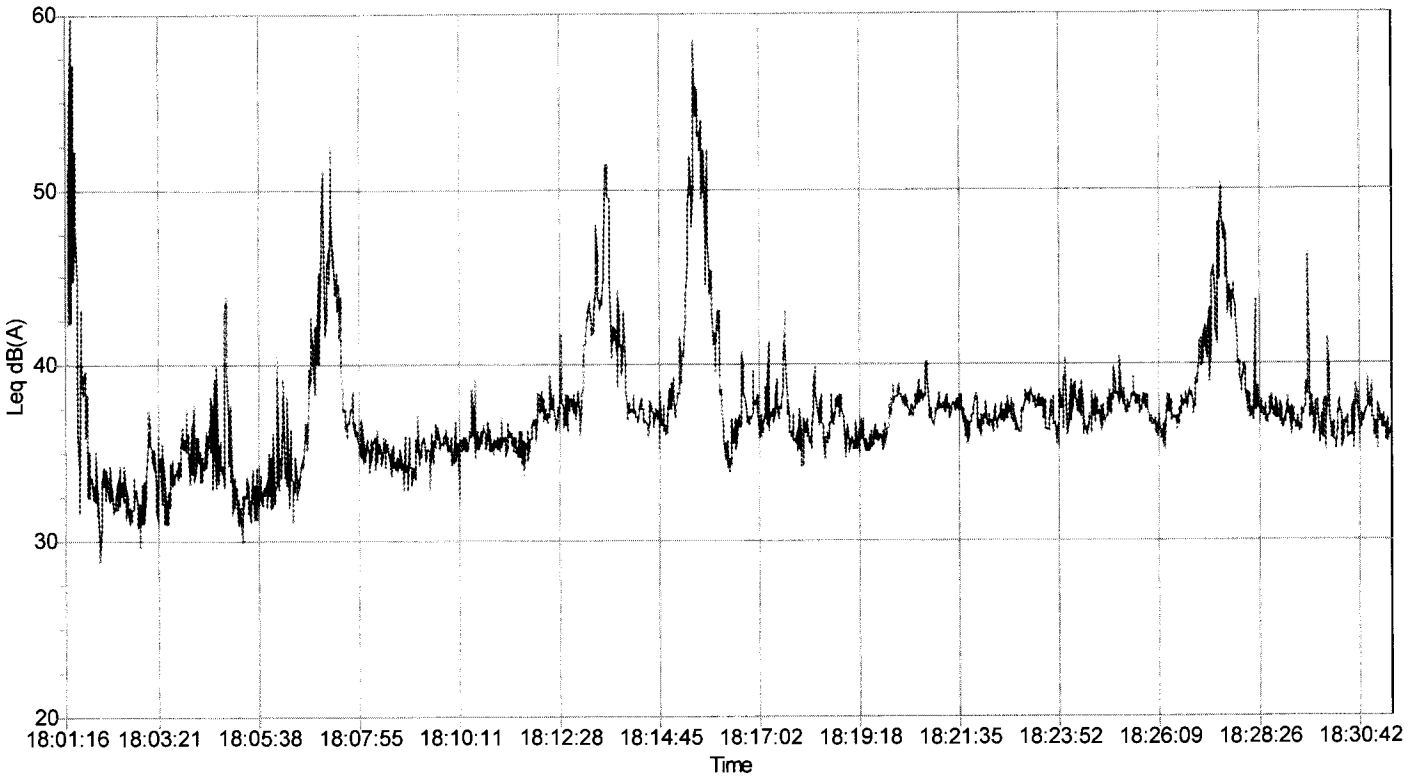
Date and Time:	27/10/2011 18:01
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:00 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	McGill Compost Glenville N3

Notes:

Night time Broadband

Data

Leq	40.7 dBA	L1.0	51.3 dBA
Lepd	28.6 dBA	L5.0	44.6 dBA
LAE	73.0 dBA	L10.0	41.8 dBA
LAFmax	67.9 dBA	L50.0	37.9 dBA
Peak	91.6 dBC	L90.0	36.4 dBA
		Lmin	34.2 dBA



Measurement Report

Measurement Details

Date and Time:	27/10/2011 18:32
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:24 hh:mm:ss
Range:	30-100 dB
Location:	McGill Compost Glenville N3

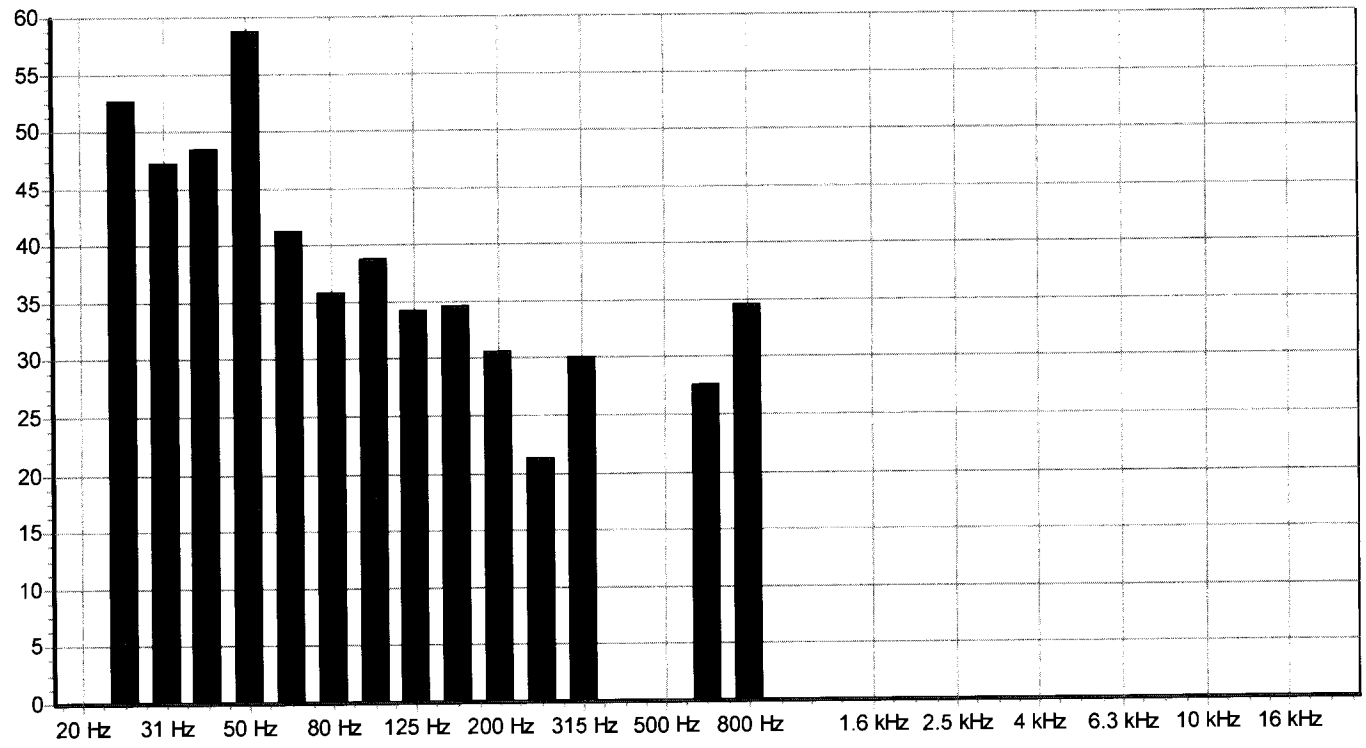
Notes:

Night time 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	21.4 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	52.7 dB	55		315 Hz	30.1 dB	55		4 kHz	0.0 dB	55	
31 Hz	47.2 dB	55		400 Hz	0.0 dB	55		5 kHz	0.0 dB	55	
40 Hz	48.4 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	55	
50 Hz	58.8 dB	55		630 Hz	27.7 dB	55		8 kHz	0.0 dB	55	
63 Hz	41.4 dB	55		800 Hz	34.7 dB	55		10 kHz	0.0 dB	55	
80 Hz	35.9 dB	56		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	38.9 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	34.3 dB	55		1.6 kHz	0.0 dB	56		20 kHz	dB		
160 Hz	34.6 dB	55		2 kHz	0.0 dB	57					
200 Hz	30.6 dB	55		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	40.0 dBA	55	
LCeq	62.4 dBC	55	
LZeq	64.3 dBZ	55	



Measurement Report

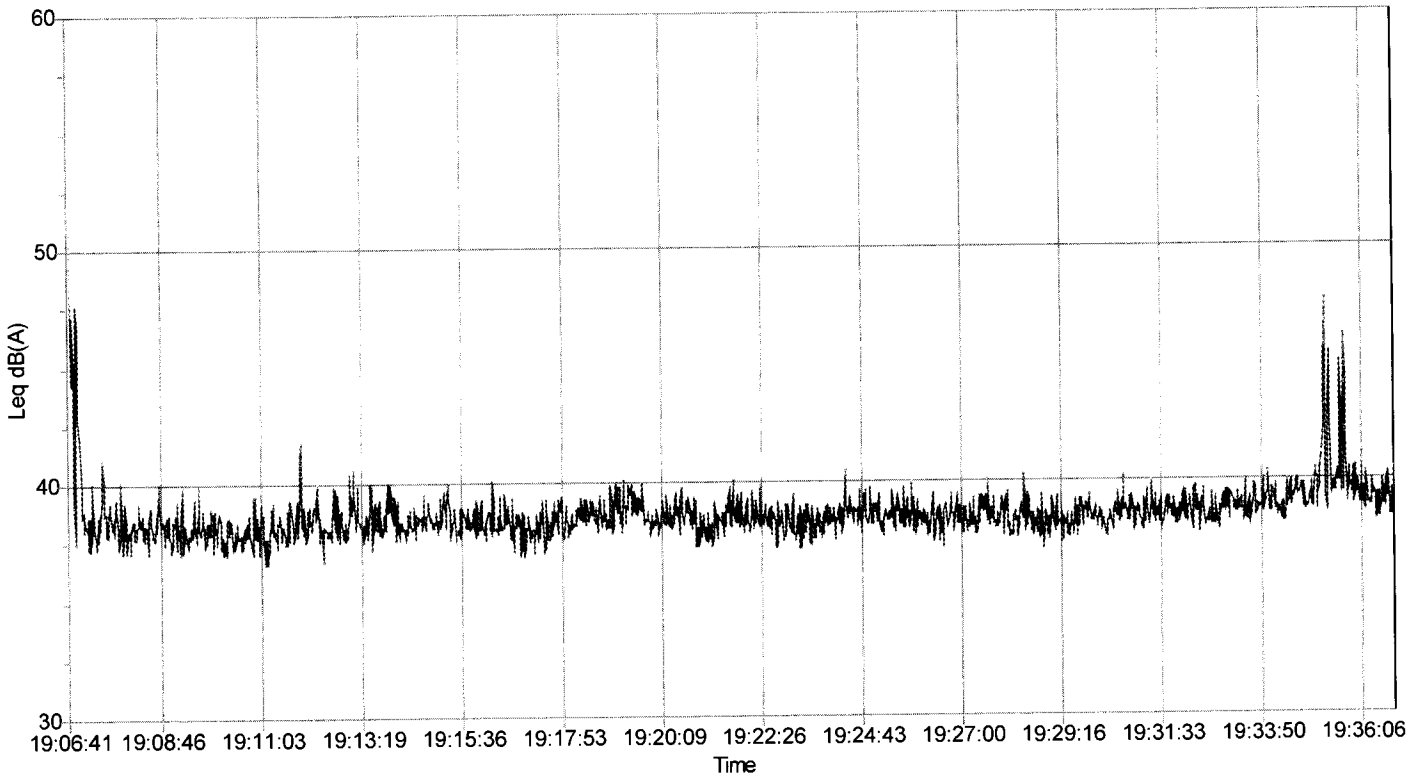
Measurement Details

Date and Time:	27/10/2011 19:06
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:30:02 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	McGill Compost Glenville N2
Notes:	

Night time Broadband

Data

Leq	38.9 dBA	L1.0	42.7 dBA
Lepd	26.8 dBA	L5.0	40.4 dBA
LAE	71.2 dBA	L10.0	40.0 dBA
LAFmax	57.9 dBA	L50.0	39.1 dBA
Peak	81.3 dBC	L90.0	38.4 dBA
		Lmin	36.9 dBA



Measurement Report

Measurement Details

Date and Time:	27/10/2011 19:36
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:21 hh:mm:ss
Range:	30-100 dB
Location:	McGill Compost Glenville N2

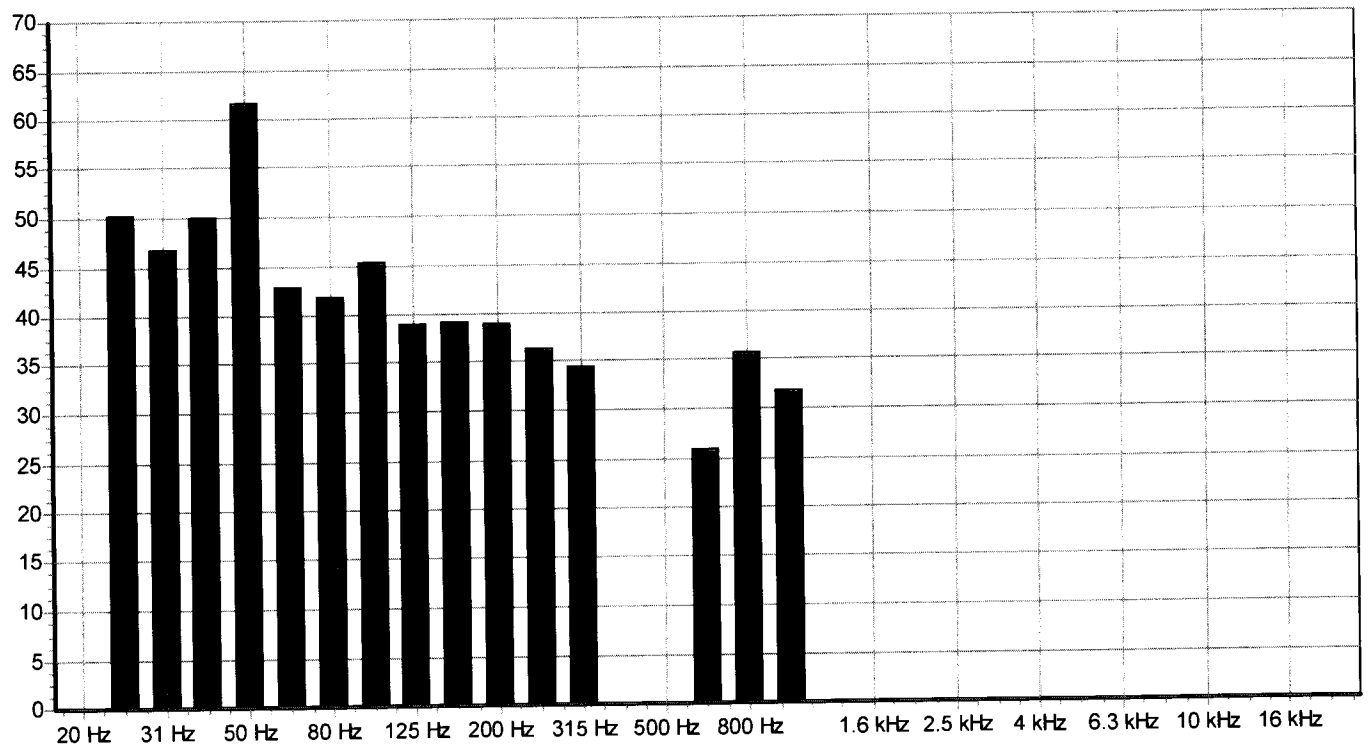
Notes:

Night time 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	36.2 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	50.2 dB	55		315 Hz	34.6 dB	55		4 kHz	0.0 dB	55	
31 Hz	46.8 dB	55		400 Hz	0.0 dB	56		5 kHz	0.0 dB	55	
40 Hz	50.0 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	55	
50 Hz	61.6 dB	55		630 Hz	25.9 dB	55		8 kHz	0.0 dB	55	
63 Hz	42.9 dB	55		800 Hz	35.7 dB	55		10 kHz	0.0 dB	55	
80 Hz	41.9 dB	55		1 kHz	31.8 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	45.3 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	38.9 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	39.1 dB	55		2 kHz	0.0 dB	55					
200 Hz	39.0 dB	55		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	38.4 dBA	55	
LCeq	63.3 dBC	55	
LZeq	66.5 dBZ	55	



Measurement Report

Measurement Details

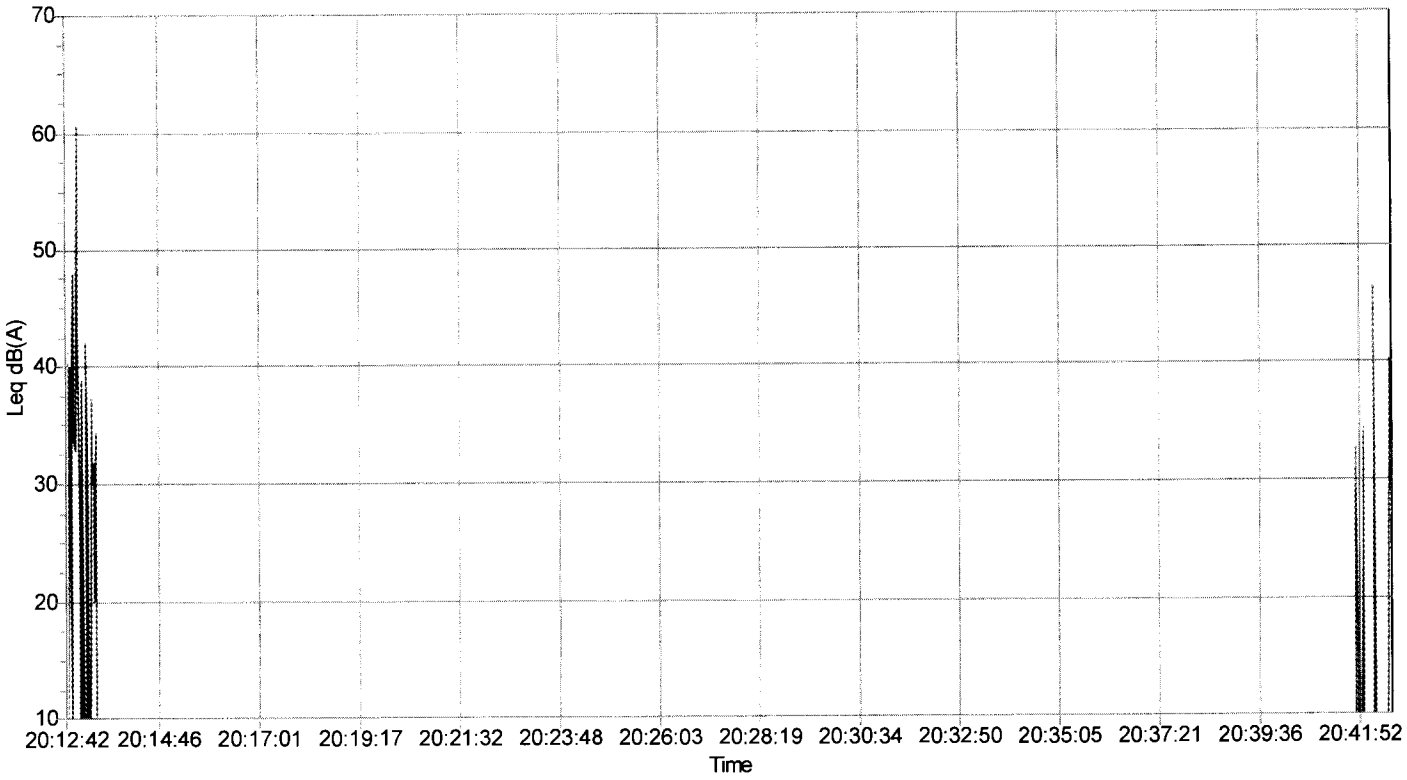
Date and Time:	27/10/2011 20:12
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:59 hh:mm:ss
Range:	30-100 dB
Overload:	no
Location:	McGill Compost Glenville N1

Notes:

Night time Broadband

Data

Leq	29.1 dBA	L1.0	39.8 dBA
Lepd	17.1 dBA	L5.0	32.3 dBA
LAE	61.9 dBA	L10.0	30.4 dBA
LAFmax	68.2 dBA	L50.0	28.9 dBA
Peak	95.9 dBC	L90.0	27.2 dBA
		Lmin	25.6 dBA



Measurement Report

Measurement Details

Date and Time:	27/10/2011 20:42
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012
Run Duration:	00:29:21 hh:mm:ss
Range:	30-100 dB
Location:	McGill Compost Glenville N1

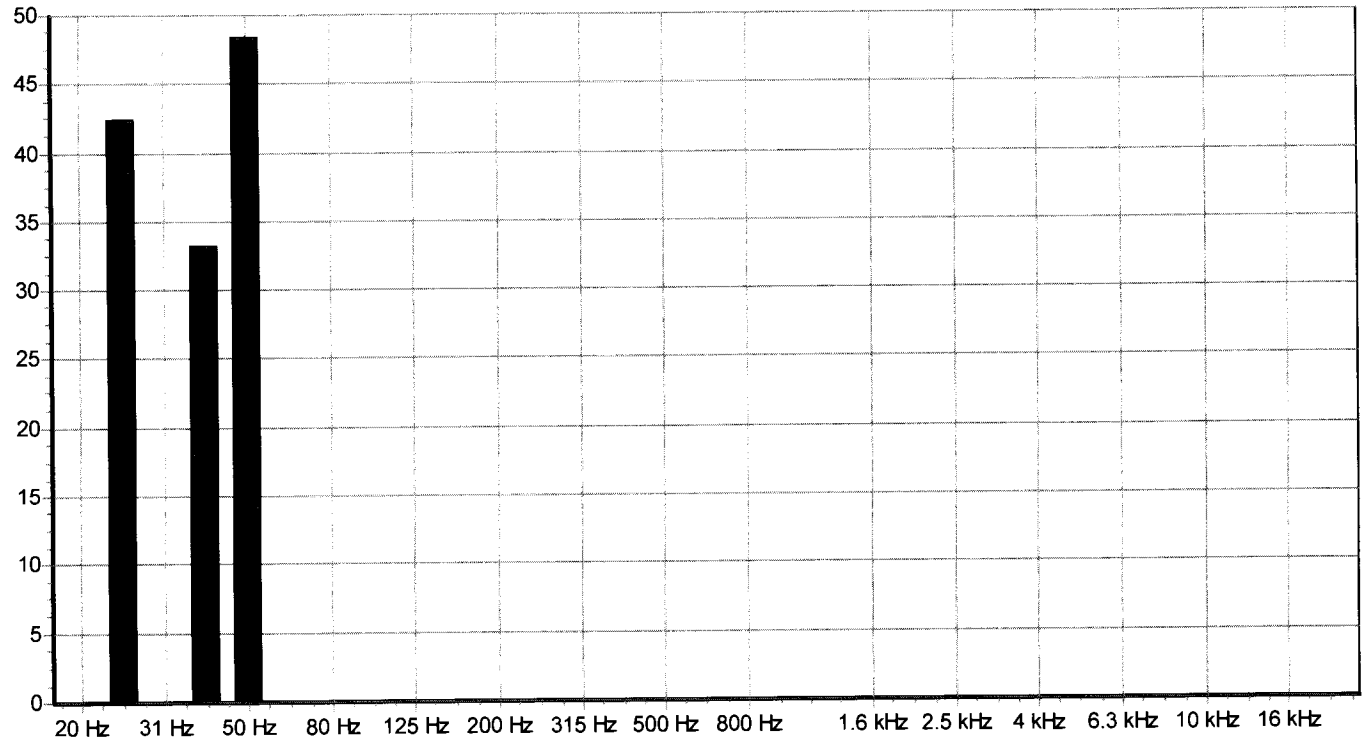
Notes:

Night time 1:3 Octave

Data

Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload	Band	LZeq,t	Time s	Overload
20 Hz	dB			250 Hz	0.0 dB	55		3.15 kHz	0.0 dB	55	
25 Hz	42.4 dB	55		315 Hz	0.0 dB	55		4 kHz	0.0 dB	55	
31 Hz	0.0 dB	55		400 Hz	0.0 dB	55		5 kHz	0.0 dB	55	
40 Hz	33.2 dB	55		500 Hz	0.0 dB	55		6.3 kHz	0.0 dB	56	
50 Hz	48.5 dB	55		630 Hz	0.0 dB	55		8 kHz	0.0 dB	55	
63 Hz	0.0 dB	55		800 Hz	0.0 dB	55		10 kHz	0.0 dB	55	
80 Hz	0.0 dB	55		1 kHz	0.0 dB	55		12.5 kHz	0.0 dB	55	
100 Hz	0.0 dB	55		1.25 kHz	0.0 dB	55		16 kHz	0.0 dB	55	
125 Hz	0.0 dB	55		1.6 kHz	0.0 dB	55		20 kHz	dB		
160 Hz	0.0 dB	55		2 kHz	0.0 dB	55					
200 Hz	0.0 dB	55		2.5 kHz	0.0 dB	55					

Band	Leq,t	Time s	Overload
LAeq	0.0 dBA	55	
LCeq	59.8 dBC	55	
LZeq	62.1 dBZ	55	



Measurement Report

Measurement Details

Date and Time:	27/10/2011 21:14
Sound Level Meter:	Cirrus Research plc
Recalibration Due:	30/04/2012

Location:	McGill Compost Glenville

Notes:

Night time Final Calibration

Calibrated to:	93.7 dB dB
Calibration Offset:	-0.7 dB dB

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BIOAEROSOL AND PARTICULATE MATTER IMPACT ASSESSMENT AT MCGILL ENVIRONMENTAL SYSTEMS, COOM, GLENVILLE, CO. CORK

PREPARED BY:	Dr. John Casey
ATTENTION:	Ms. Fiona O'Sullivan
DATE:	02nd March 2012
REPORT NUMBER:	2012122(1)
DOCUMENT VERSION:	Document version 1
REVIEWERS:	

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Document Amendment Record

Client: ***McGill Environmental Systems***

TITLE: Bioaerosol and Particulate matter impact assessment at McGill Environmental Systems, Coom, Glenville, Co. Cork

Project Number: 2012122(1)			**Document Reference:** Bioaerosol and PM_{10} impact assessment at McGill Environmental Systems, Coom, Glenville, Co. Cork		
2012122(1)	Document for review	B.A.S.	JMC	B.A.S	02/03/2012
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

1. Introduction and scope

1.1 Introduction

Odour Monitoring Ireland was commissioned to perform a bioaerosol and particulate matter (PM_{10}) assessment in the vicinity of the operating composting facility located in Coom, Glenville, Co. Cork on behalf of McGill Environmental Systems. The bioaerosol impact 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". The PM_{10} assessment was carried out in accordance EN1234-1:2002. Total Mesophillic bacteria and Aspergillus *fumigatus* sampling was performed using equivalent Andersen single stage impactors. Triplicate sampling was performed at each of the three identified sampling locations within and in the vicinity of the Composting facility located at Coom, Glenville, Co. Cork. Bioaerosol ambient air concentrations are within the lower range of the proposed Environment Agency assessment criterion downwind of the facility (*see Table 2.4*). Ambient air concentration levels of PM_{10} were below the statutory 24-hour average ambient air concentration level of 50 µg m^{-3} at the selected monitoring location (*see Table 2.5*).

1.2 Scope of the study

The main aim of the study was:

- To enumerate the ambient air concentration of two bioaerosols groups namely: Aspergillus *fumigatus* and Total Mesophillic bacteria during operation of the composting facility at McGill Environmental Systems, composting facility, Coom, Glenville, Co. Cork.
- To ascertain ambient air concentration levels of PM_{10} in the vicinity of McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork.

2. Materials and methods

This section describes in detail the materials and methods used throughout the study period.

2.1 Sampling and residential locations

Table 2.1 illustrates the location of the proposed site in relation to local residents. Monitoring locations were (*see Table 2.1*):

- Upwind 50m in the vicinity of the overall waste management facility,
- Downwind 50m in the vicinity of the overall waste management facility,
- At process and boundary locations around the composting facility operation.
- Centre of main facility boundary.

This allowed for the development of bioaerosol data for the operations at McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork.

Table 2.1. Monitoring locations and parameters monitored.

Location ID	Parameter monitored	Location description
Glen 1	Total Mesophillic bacteria and Aspergillus fumigatus	Upwind of site (approx 50m)
Glen 2	Total Mesophillic bacteria and Aspergillus fumigatus	Downwind of site (approx 50m)
Glen 3	Total Mesophillic bacteria and Aspergillus fumigatus	Within site downwind (approx 1 m from biofilter wall)
Glen 4	PM_{10}	Centre of main facility boundary

2.2 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 a direct 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 minutes were used to assess ambient levels using the impactor plates as longer sampling times can lead to desiccation of the plate and impacted microbes.

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 0.40 to 1.9 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).

2.3. 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 5^0C) 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 30^0C 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.

2.4 Particulate matter monitoring

Major sources of particulates include industrial/residential combustion and processing, energy generation, vehicular emissions and construction projects. The particulate matter created by these processes is responsible for many adverse environmental conditions including reduced visibility, contamination and soiling, but also recognised as a contributory factor to many respiratory medical conditions such as asthma, bronchitis and lung cancer. PM_{10} (Particulate Matter 10) refers to particulate matter with an aerodynamically diameter of 10 µm. Generally, such particulate matter remains in the air due to low deposition rates. It is the main particulate matter of concern in Europe and has existing air quality limits. In order to obtain ambient air PM_{10} concentration levels for the Molaisin Composting Ltd site, a battery operated gravimetric Particulate sampler (Partisol) was used. One fixed monitoring location (i.e. Glen 4) was used to perform gravimetric monitoring over the sampling period. The monitoring locations and results are presented in *Table 2.4.*

PM_{10} monitoring in Ireland is limited to continuous monitoring stations operated by the Local Authorities and the Irish EPA, mainly in large urban centres. The dominant source of PM_{10} in the area appears to be HGV emissions, boilers (i.e. Home heating and Industrial heating), traffic, wind blown dust and construction activities.

2.5 Assessment criteria bioaerosols and PM_{10}

Table 2.2 and 2.3 illustrates the assessment criteria is used for comparison of monitoring results during operation to ascertain ambient bioaerosol and PM_{10} air quality in the vicinity of the McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork. Bioaerosol impact criteria are derived from those limits proposed by the UK Environmental Agency.

Table 2.2. Assessment criteria for the ambient bioaerosol air quality in the vicinity of McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork.

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.

For PM_{10} the EU has introduced several measures to address the issue of air quality management. In 1996, Environmental Ministers agreed a Framework Directive on ambient air quality assessment and management (Council Directive 96/62/EC). As part of the measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, 1999/30/EC, has set limit values which replaced existing limit values under Directives 80/779/EEC, 82/884/EEC and 85/203/EEC in April 2001. The new directive, as relating to limit values for PM_{10}, is detailed in *Table 2.3.*

The National Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) transpose those parts of the "Framework" Directive 92/30/EC on ambient air quality assessment and management not transposed by Environment Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 2002 Regulations also transpose, in full, the 1st two "Daughter" Directives 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air and 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air.

Table 2.3. PM_{10} Irish and EU Ambient Air Standard SI 180 of 2011 and 1999/30/EC.

Pollutant	Regulation	Limit Type	Value
Particulate Matter as PM_{10}	2008/50/EC and SI180 of 2011	24-hour limit for protection of human health – not to be exceeded more than 35 times/year- 24 hour average	50 $\mu g/m^3$ PM_{10}
		Annual limit for protection of human health- Annual	40 $\mu g/m^3$ PM_{10}
Particulate matter as $PM_{2.5}$	2008/50/EC and SI180 of 2011	Annual limit for protection of human health- Annual	25 $\mu g/m^3$ $PM_{2.5}$

3. Results

This section presents the results obtained during the study period.

3.1 Ambient Bioaerosol air quality

Table 2.4 illustrates the results from bioaerosol air quality monitoring. Both Aspergillus *fumigatus* and Total Mesophillic bacteria were assessed on the day of sampling namely 05th December 2011.

Table 2.4. Bioaerosols concentration levels within and in the vicinity of the recycling facility on 05th December 2011.

Location ID	Average Aspergillus *fumigatus* concentration (CFU m^{-3})[1]	Average Mesophillic bacteria concentration (CFU m^{-3})[1]	Sample count[2]
Glen 1	<10	28	6
Glen 2	<15	46	6
Glen 3	<18	89	6

Note: [1] denote a total of 3 blanks (2 plate and 1 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.

Table 2.4 illustrates the ambient bioaerosol air quality within and in the vicinity of the composting facility. As can be observed, Aspergillus *fumigatus* concentrations are low in close proximity and downwind of the facility. Total Mesophillic bacteria ambient air concentration levels were elevated close to the facility biofilter while downwind concentrations decreased rapidly at 50 metres of the facility boundary (see *Table 2.2*).

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. Monitoring of bioaerosols is important due to the complexities in monitoring once a facility is in operation. The main reasons for 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 2.2*, bioaerosol concentrations levels are within the lower end of the range for Aspergillus *fumigatus* and *Total mesophillic bacteria.*

3.2 Particulate matter air quality

Table 2.5 illustrates the results from PM_{10} air quality monitoring.

Table 2.5. Average ambient PM_{10} concentrations for one fixed monitoring location at the McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork, Ireland on the 05th December 2011

Monitoring locations	Sample number	Average concentration value ($\mu g/m^3$)
Glen 4	084715	12

PM_{10} monitoring in Ireland is limited to continuous monitoring stations operated by the Local Authorities and the Irish EPA, mainly in large urban centres. The dominant source of PM_{10} in this area would appear to be HGV emissions, boilers (i.e. Home heating and Industrial heating), traffic, wind blown dust, composting and construction activities. The average ambient PM_{10} concentrations are in the range of those monitored in other rural locations. The results presented herein demonstrate that PM_{10} air quality is good at monitoring location Glen 4 (i.e. Air Quality Index rating, www.epa.ie).

4. Conclusions

The following conclusions were drawn during the study:

1. The bioaerosol concentration levels were determined at each sampling location in triplicate. Three sampling locations were chosen to include upwind, downwind and within the facility boundary.
2. Currently, there are no significant bioaerosol impacts in the vicinity of McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork with all reported bioaerosol ambient air concentrations within the range of the proposed bioaerosol assessment criterion.
3. Ambient air concentration levels of PM_{10} were below the statutory 24-hour average ambient air concentration level of 50 $\mu g\ m^{-3}$.

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BIOAEROSOL AND PARTICULATE MATTER IMPACT ASSESSMENT AT MCGILL ENVIRONMENTAL SYSTEMS, COOM, GLENVILLE, CO. CORK

PREPARED BY:	Dr. John Casey
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DATE:	06th July 2011
REPORT NUMBER:	2011A192(1)
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Project Number: 2011A192(1)			**Document Reference:** Bioaerosol and PM_{10} impact assessment at McGill Environmental Systems, Coom, Glenville, Co. Cork		
2011A192(1)	Document for review	B.A.S.	JMC	B.A.S	06/07/2011
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1. Introduction and scope

1.1 Introduction

Odour Monitoring Ireland was commissioned to perform a bioaerosol and particulate matter (PM_{10}) assessment in the vicinity of the operating composting facility located in Coom, Glenville, Co. Cork on behalf of McGill Environmental Systems. The bioaerosol impact 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". The PM_{10} assessment was carried out in accordance EN1234-1:2002. Total Mesophillic bacteria and Aspergillus *fumigatus* sampling was performed using equivalent Andersen single stage impactors. Triplicate sampling was performed at each of the three identified sampling locations within and in the vicinity of the Composting facility located at Coom, Glenville, Co. Cork. Bioaerosol ambient air concentrations are within the lower range of the proposed Environment Agency assessment criterion downwind of the facility (*see Table 2.4*). Ambient air concentration levels of PM_{10} were below the statutory 24-hour average ambient air concentration level of 50 $\mu g\ m^{-3}$ at the selected monitoring location (*see Table 2.5*).

1.2 Scope of the study

The main aim of the study was:

- To enumerate the ambient air concentration of two bioaerosols groups namely: Aspergillus *fumigatus* and Total Mesophillic bacteria during operation of the composting facility at McGill Environmental Systems, composting facility, Coom, Glenville, Co. Cork.
- To ascertain ambient air concentration levels of PM_{10} in the vicinity of McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork.

2. Materials and methods

This section describes in detail the materials and methods used throughout the study period.

2.1 Sampling and residential locations

Table 2.1 illustrates the location of the proposed site in relation to local residents. Monitoring locations were (*see Table 2.1*):

- Upwind 50m in the vicinity of the overall waste management facility,
- Downwind 50m in the vicinity of the overall waste management facility,
- At process and boundary locations around the composting facility operation.
- Centre of main facility boundary.

This allowed for the development of bioaerosol data for the operations at McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork.

Table 2.1. Monitoring locations and parameters monitored.

Location ID	Parameter monitored	Location description
Glen 1	Total Mesophillic bacteria and Aspergillus fumigatus	Upwind of site (approx 50m)
Glen 2	Total Mesophillic bacteria and Aspergillus fumigatus	Downwind of site (approx 50m)
Glen 3	Total Mesophillic bacteria and Aspergillus fumigatus	Within site downwind (approx 1 m from biofilter wall)
Glen 4	PM_{10}	Centre of main facility boundary

2.2 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 a direct 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 minutes were used to assess ambient levels using the impactor plates as longer sampling times can lead to desiccation of the plate and impacted microbes.

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 0.40 to 1.9 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).

2.3. 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 5^0C) 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 30^0C 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.

2.4 Particulate matter monitoring

Major sources of particulates include industrial/residential combustion and processing, energy generation, vehicular emissions and construction projects. The particulate matter created by these processes is responsible for many adverse environmental conditions including reduced visibility, contamination and soiling, but also recognised as a contributory factor to many respiratory medical conditions such as asthma, bronchitis and lung cancer. PM_{10} (Particulate Matter 10) refers to particulate matter with an aerodynamically diameter of 10 µm. Generally, such particulate matter remains in the air due to low deposition rates. It is the main particulate matter of concern in Europe and has existing air quality limits. In order to obtain ambient air PM_{10} concentration levels for the Molaisin Composting Ltd site, a battery operated gravimetric Particulate sampler (Partisol) was used. One fixed monitoring location (i.e. Glen 4) was used to perform gravimetric monitoring over the sampling period. The monitoring locations and results are presented in *Table 2.4.*

PM_{10} monitoring in Ireland is limited to continuous monitoring stations operated by the Local Authorities and the Irish EPA, mainly in large urban centres. The dominant source of PM_{10} in the area appears to be HGV emissions, boilers (i.e. Home heating and Industrial heating), traffic, wind blown dust and construction activities.

2.5 Assessment criteria bioaerosols and PM_{10}

Table 2.2 and 2.3 illustrates the assessment criteria is used for comparison of monitoring results during operation to ascertain ambient bioaerosol and PM_{10} air quality in the vicinity of the McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork. Bioaerosol impact criteria are derived from those limits proposed by the UK Environmental Agency.

Table 2.2. Assessment criteria for the ambient bioaerosol air quality in the vicinity of McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork.

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.

For PM_{10} the EU has introduced several measures to address the issue of air quality management. In 1996, Environmental Ministers agreed a Framework Directive on ambient air quality assessment and management (Council Directive 96/62/EC). As part of the measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, 1999/30/EC, has set limit values which replaced existing limit values under Directives 80/779/EEC, 82/884/EEC and 85/203/EEC in April 2001. The new directive, as relating to limit values for PM_{10}, is detailed in *Table 2.3.*

The National Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) transpose those parts of the "Framework" Directive 92/30/EC on ambient air quality assessment and management not transposed by Environment Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 2002 Regulations also transpose, in full, the 1st two "Daughter" Directives 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air and 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air.

Table 2.3. PM_{10} Irish and EU Ambient Air Standard SI 271 of 2002 and 1999/30/EC.

Particulate Matter Stage 1	1999/30/EC SI 271 of 2002	24-hour limit for protection of human health - not to be exceeded more than 35 times/year-24 hour average	50% until 2001 reducing linearly to 0% by 2005 for 1999/30/EC 30% from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by 1 January 2005 for SI 271 of 2002	50 µg/m^3 PM_{10}
		Annual limit for protection of human health-Annual	20% until 2001 reducing linearly to 0% by 2005 for 1999/30/EC 12% from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 moths thereafter by equal annual percentages to reach 0% by 1 January 2005	40 µg/m^3 PM_{10}
Particulate Matter Stage 2	1999/30/EC SI 271 of 2002	24-hour limit for protection of human health - not to be exceeded more than 7 times/year-24 hour average	To be derived from data and to be equivalent to Stage 1 limit value for 1999/30/EC Not to be exceeded more than 28 times by 1 January 2006, 21 times by 1 January 2007, 14 times by 1 January 2008, 7 times by 1 January 2009 and zero times by 1 January 2010 for SI 271 of 2002	50 µg/m^3 PM_{10}
		Annual limit for protection of human health-Annual	50% until 2005 reducing linearly to 0% by 2010 for 1999/30/EC and SI 271 of 2002	20 µg/m^3 PM_{10}

3. Results

This section presents the results obtained during the study period.

3.1 Ambient Bioaerosol air quality

Table 2.4 illustrates the results from bioaerosol air quality monitoring. Both Aspergillus *fumigatus* and Total Mesophillic bacteria were assessed on the day of sampling namely 21st June 2011.

Table 2.4. Bioaerosols concentration levels within and in the vicinity of the recycling facility on 21st June 2011.

Location ID	Average Aspergillus *fumigatus* concentration (CFU m^{-3})[1]	Average Mesophillic bacteria concentration (CFU m^{-3})[1]	Sample count[2]
Glen 1	<15	32	6
Glen 2	<21	41	6
Glen 3	<23	58	6

Note: [1] denote a total of 3 blanks (2 plate and 1 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.

Table 2.4 illustrates the ambient bioaerosol air quality within and in the vicinity of the composting facility. As can be observed, Aspergillus *fumigatus* concentrations are low in

close proximity and downwind of the facility. Total Mesophillic bacteria ambient air concentration levels were elevated close to the facility biofilter while downwind concentrations decreased rapidly at 50 metres of the facility boundary (see *Table 2.2*).

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. Monitoring of bioaerosols is important due to the complexities in monitoring once a facility is in operation. The main reasons for 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 2.2*, bioaerosol concentrations levels are within the lower end of the range for Aspergillus *fumigatus* and *Total mesophillic bacteria.*

3.2 Particulate matter air quality

Table 2.5 illustrates the results from PM_{10} air quality monitoring.

Table 2.5. Average ambient PM_{10} concentrations for one fixed monitoring location at the McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork, Ireland on the 20th June 2011

Monitoring locations	Sample number	Average concentration value ($\mu g/m^3$)
Glen 4	093254	18

PM_{10} monitoring in Ireland is limited to continuous monitoring stations operated by the Local Authorities and the Irish EPA, mainly in large urban centres. The dominant source of PM_{10} in this area would appear to be HGV emissions, boilers (i.e. Home heating and Industrial heating), traffic, wind blown dust, composting and construction activities. The average ambient PM_{10} concentrations are in the range of those monitored in other rural locations. The results presented herein demonstrate that PM_{10} air quality is good at monitoring location Glen 4 (i.e. Air Quality Index rating, www.epa.ie).

4. Conclusions

The following conclusions were drawn during the study:

1. The bioaerosol concentration levels were determined at each sampling location in triplicate. Three sampling locations were chosen to include upwind, downwind and within the facility boundary.
2. Currently, there are no significant bioaerosol impacts in the vicinity of McGill Environmental Systems composting facility, Coom, Glenville, Co. Cork with all reported bioaerosol ambient air concentrations within the range of the proposed bioaerosol assessment criterion.
3. Ambient air concentration levels of PM_{10} were below the statutory 24-hour average ambient air concentration level of 50 $\mu g\ m^{-3}$.

Attachment 3

W0180-01/8 Environmental Mangement Programme

The responsibility of implementing the Environmental Management System lies with the appointed Environmental Team:

Fiona O'Sullivan	Environmental Manager
Lucinda Blyth	Administration Manager
Noel Lyons	General Manager
Niall Carroll	Factory Manager

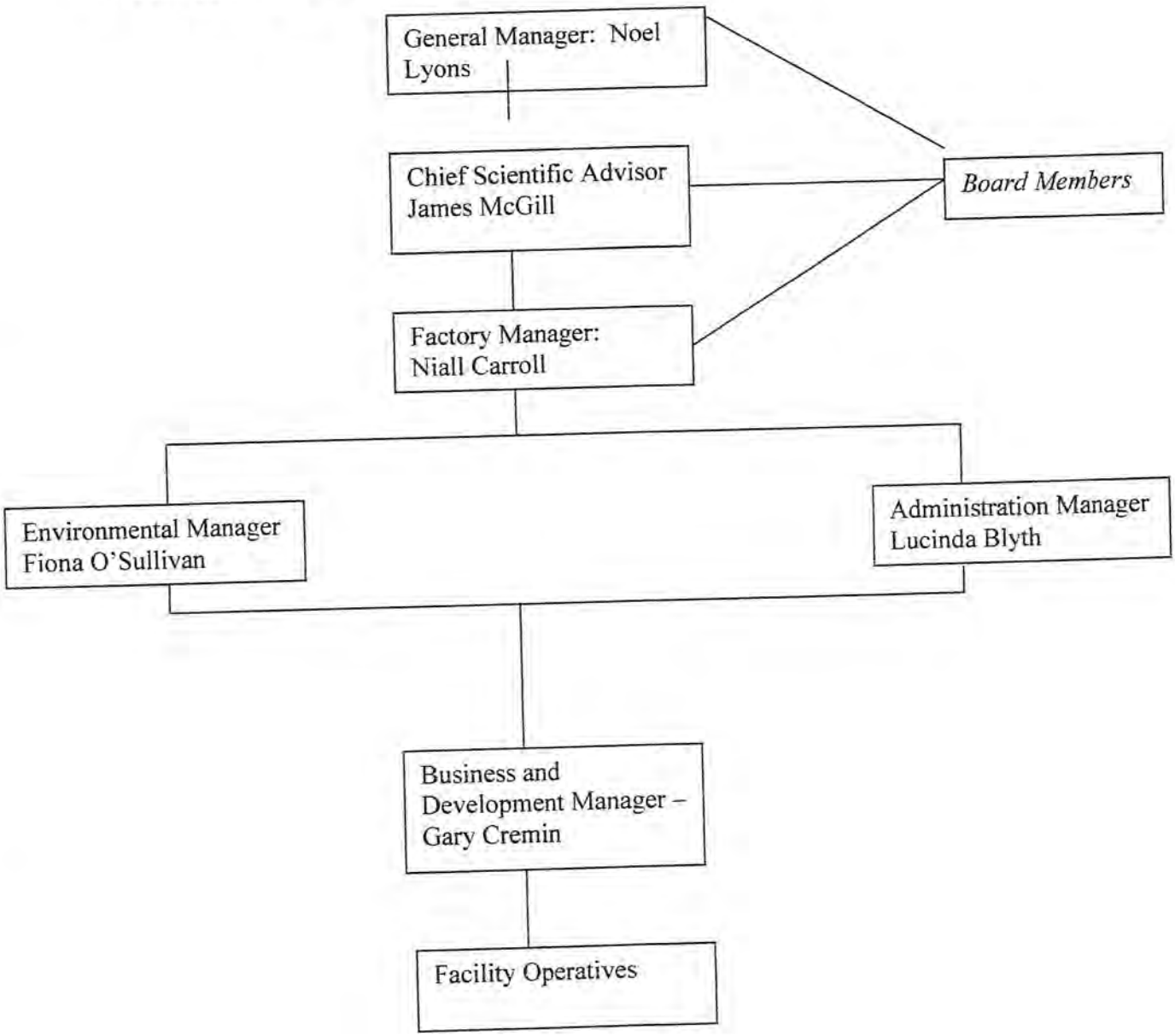
The Environmental Management Programme (EMP) for McGill Environmental Systems (Irl.) Ltd. will be updated on an annual basis.

The EMP for McGill Environmental Systems (Irl.) Ltd. is as follows:

Environmental Management Plan	Responsibility	Target Date
Implement conditions of Waste Licence	F O'Sullivan	Ongoing
Inhouse training of Staff	N Carroll	Ongoing
Continuous Training of Operators in EWC Codes and Acceptance of Same	F O'Sullivan	Ongoing
Health & Safety training	F O'Sullivan	July 2011
Energy Awareness	F O'Sullivan	July 2011
Update EMP and EMS	F O'Sullivan	Ongoing

Attachment 4

W0180-01/5 Structure & Responsibility



McGill Environmental Systems (Irl.) Ltd. – Facility Organisational Chart

Roles and Qualifications

James H. McGill, Chief Scientific Advisor. Mr. McGill is an environmental engineer with over 30 years in the field. He qualified with a primary arts degree from Trinity College, Dublin, and went on to study science at Rutgers University, where he earned a masters degree in environmental science. He taught same and undertook environmental research at Rutgers. Mr. McGill was a founder of the McGill group of companies and has worked on major waste management and bioremediation projects in the U.S., Europe, and Asia. Jim has 25 years international experience in Environmental Engineering. He has worked on major environmental projects in the US and for the US Government overseas. He has designed industrial composting plants in North Carolina, The Philippines and Thailand. He has also worked on Bioremediation projects in Sweden. Jim is a director of McGill Environmental Systems (Irl.) Ltd.

M. Noel Lyons, General Manager. Mr. Lyons is also a founder of the McGill group and president of McGill (U.S.), with 19 years in the field of waste management. He is a graduate of the Waterford Institute of Technology and holds a certificate of supervisory management (with distinction) from the Irish Management Institute, and a certificate of technical competency in composting from the University of Maine. Noel is responsible for overall guidance and management of the company. Noel has a unique combination of technical and sales knowledge in feedstocks, composting and transportation. He has accomplished significant business results in challenging enterprise environments over the past 15 years. Noel has pioneered product marketing of compost as a revenue-producing service in North Carolina. Noel is currently splitting his time between America and Ireland. Noel is a director of McGill Environmental Systems (Irl.) Ltd.

Fiona O'Sullivan, Environmental Manager. Fiona graduated from University College Dublin with a primary Degree in Agricultural Science and a Masters Degree in Environmental Science from Sligo Institute of Technology. Fiona has extensive knowledge of waste management and planning regulations and plays a key role in the company's planning and waste permit/license applications. Fiona is responsible for ensuring environmental compliance with all regulations and permits, and monitoring incoming sludges, outgoing compost and all other site associated monitoring. Fiona looks after all Health and Safety requirements for the company, signage, PPE and reporting.

Duties:

- All environmental monitoring as per Planning Permissions and Waste Permit or Waste Licence
- Ensuring pre acceptance criteria are met for incoming waste
- Sampling
- Process control monitoring
- Product quality assurance
- Implementation of environmental management system
- Research and development
- Waste management
- Industrial and environmental compliance
- Planning Permission Applications
- Waste Permit Applications
- Health and Safety

Niall Carroll, Factory Manager. Mr. Carroll has been with McGill (Ireland) since its start-up, managing daily operations and serving as a technical specialist serving for Ireland and U.S. plants. His expertise is in factory management with particular knowledge in machine maintenance. Niall spent three months at the McGill Composting

factory in North Carolina in early 2000 where he was trained in compost plant management. He has completed courses in the United States to qualify him for position of factory manager, and to enable him to train in others for this position, including qualifying as Compost Facility Operator and Process Engineer at the University of Winthrop in Charlotte, South Carolina. This course would be of equal level to recommended Fás course. He has also completed an intensive course in Composting in North Carolina. Niall has been facilities manager of McGill Environmental Systems (Ireland) Ltd. overseeing the operation of all the McGill facilities and has taken on the role of Factory Manager of the Glenville facility.

Lucinda Blyth, Administration Manager. Lucinda has been with McGill since 2002. Among her responsibilities are office administration, human resources and record keeping. Lucinda's previous experience includes six years as Assistant to the Chairman of a Private Bank in London, several years as Administration Manager at a Strategy Consultancy based in London, Paris and Rome. Lucinda has also spent time working for a middle-eastern royal family organizing the logistics and staffing of several large palaces and houses throughout the world and a fleet of aeroplanes worldwide. Lucinda is secretary for the company.

Gary Cremin, Sales & Business Development Manager. A native of Cork, Gary has held a number of senior commercial roles in the environmental services sector, including eight years with one of the world's largest waste management and recycling companies, Veolia Environmental Services. Gary is a graduate of University College Cork and Cork Institute of Technology, holding a Masters Degree in Business and a Diploma in Environmental Science and Social Policy. Gary has completed the Fas waste management course as recommended by the EPA.

Contact Details:

Full contact details of appropriate personnel for normal working hours and for outside working hours will be given on a notice board at the facility entrance. The main contacts will be Niall Carroll 087 2538337 or Fiona O'Sullivan 087 7462049. In the event that Niall or Fiona will be unavailable for calls their phones will be diverted to other relevant personnel.

Attachment 5

W0180-01/10 Communications Procedure

1. The purpose of this procedure is to describe the methods of communication at McGill Environmental Systems (Irl.) Ltd.

2. The procedure applies to all communications, internal and external.

3. The procedure refers to:
Waste Licence W0180-01
Planning Permission S/02/2853

4. Internal Communication

- Management Review of EMS
- Notice Board

The organization regards verbal communication to be an important aspect due to its size.

5 External Communication

- As per Licence Notification: In the event of any incident which may result in water, soil or air pollution, the Environmental Manager shall immediately report the incident to the Licensing Authority by phone or fax and shall confirm the communication in writing within 24 hours.
- Records of external communication are kept by the Administration Manager and the Environmental Manager. These records consist of letters, faxes and telephone conversations.

6 Complaints

- Complaints are handled by the Environmental Manager. Details of the complaint are recorded. Responses to complaints can be by phone or written.

7 Enquiries

- As per Waste Licence. Members of the public are welcome on site and can obtain information concerning the environmental performance of the licence holder at all reasonable times.

8 Emergency Response

- Local Fire Stations and Guards will be made aware of where the facility is situated
- Employees are made aware of emergency exits and location of emergency equipment

- In the event of an employee sustaining a work related injury and is absent for more than three working days, a report is to be sent to the Safety Authority detailing the incident.