

2014 Annual Environmental Report

**On behalf of Greenking Composting Ltd,
Coolbeg,
Co. Wicklow**

Waste Licence Number: W0218-01

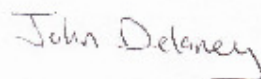
Annual Environmental Report 2014

On behalf of Greenking Composting Ltd,
Coolbeg,
Co. Wicklow



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Date:

21/3/2015

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1.0 INTRODUCTION

Geoenvironmental was commissioned by Greenking Composting Ltd to collate and compile the company's 2014 Annual Environmental Report (AER). The (AER) is prepared for the Coolbeg Composting Facility operated by King Tree Services Ltd., trading as Greenking Composting Ltd. The content of this Annual Environmental Report is based on Schedule G of Waste Licence W0218-01 and follows guidelines set out in the document '*Guidance Note for Annual Environmental Report*' published by the Agency. This AER covers the period from January 2014 to December 2014.

The composting facility at Coolbeg, Co, Wicklow has with the capacity to accept and process 40,000 tonnes of green waste per annum. King Tree Services Ltd was issued with a Waste License from the Environmental Protection Agency (EPA) on the 25th October 2005. (Ref. No. W0218-01). The facility started its operation on the 6th June 2006.

The license permits the recycling or reclamation of organic substances which are not used as solvents (including composting and other biological processes) and the 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 prescribed under Class 2 and Class 13 of the *fourth Schedule of the Waste Management Acts, 1996 to 2003*.

2.0 SITE DESCRIPTION

2.1 Facility Location and Layout

The waste recovery facility is located in the townland of Coolbeg, approximately 4 km south west of Wicklow Town. The site is accessed via a local road running from the N11 Regional Road at The Beehive towards Glenealy; refer to Figure 1 (Site Location Map). The land adjoining the western site boundary is occupied by non-hazardous residual waste landfill. The new M11 motorway when completed will be located close to the eastern boundary of facility.

The existing site layout includes the following facilities:

- a reception office
- a workshop located behind the reception building
- a weighbridge
- parking areas
- the waste reception area
- windrows area
- maturation area
- finished product storage area
- leachate storage lagoon.

The site office and welfare facilities are located at the reception; refer to Figure 2 (Site Layout Plan).

2.2 Waste Types and Volume

Waste Licence W0218-01 regulates the operation of the composting facility at Coolbeg, County Wicklow. The green waste accepted at the facility comprises wood wastes generated by the King Tree Services tree surgery business, garden and park waste produced during improvement and maintenance works by landscape gardeners, grass and shrub trimmings produced by individual householders and timber and wood waste

recovered during construction and demolition works. The facility is licensed to accept 40,000 tonnes of green waste annually. GreenKing offers a green drop off facility and collection service.

The composting operations involve pre treatment of green waste, shredding and mixing, composting in open windrows, maturation and post treatment and impurities removal. All operations are carried out externally. The finished product is suitable for a range of further activities which include a range of landscaping, horticultural and agricultural use.

3.0 MANAGEMENT OF THE FACILITY

3.1 Site Management Structure

King Tree Services Ltd. currently employs full time a total of two people at their Coolbeg Facility. The organisation and management structure in Coolbeg Composting Facility is provided below. Mr. Ian Browne, the facility manager is responsible for the day to day operation of the facility.

Table 0.1: Organisation Structure

Staff Name	Role	Experience
Ian Browne	Facility Manager	Completed FAS Waste Management Course.
Ann Keogh	Facility Administration	Completed FAS Waste Management Course.

3.2 Environmental Management System

In accordance with Condition 2.2.1, King Tree Services Ltd. has prepared and documented a basic Environmental Management System for its Composting Facility at Coolbeg. In March 2010 the emergency response procedures were updated. The schedule of Objectives and Targets for 2014 and proposed schedule of targets for 2015 are outlined below.

Table 0:2: Schedule of Objectives and Targets for 2014

No	Objective	Target	Progress
1	Reduce the energy /fuel usage at the facility.	Monitor diesel and electricity usage at least annually.	Diesel Usage was reduced
3	Control litter, dust, odour, and noise nuisances.	Continue daily Facility Inspection Form to ensure any nuisances are identified and managed on a daily basis.	Ongoing
4	Maintain Environmental Management System	Maintain documentation for EMS and implement on site.	Ongoing
		Review the EMP in accordance with the Licence.	Reviewed in March 2014
7	Maintain Regular Schedule of Environmental Training	Carry out training on Environmental Awareness, Emergency Response, Waste Licence W0218-01 for all staff.	Ongoing
8	Identify measures to improve efficiency and minimise waste.	Continue to identify measures to reduce waste and use of water	Ongoing

Table 0.3: Schedule of Objectives and Targets for 2014

No	Objective	Target	Timescale	Responsibility
1	Reduce the energy /fuel usage at the facility.	Monitor diesel and electricity usage at least annually.	Q4 2015	Facility Manager
3	Control litter, dust, odour, and noise nuisances.	Continue daily Facility Inspection Form to ensure any nuisances are identified and managed on a daily basis.	Ongoing	Facility Manager
4	Maintain Environmental Management System	Maintain documentation for EMS and implement on site.	Ongoing	Facility Manager
		Review the EMP in accordance with the Licence	Q1 2015	
7	Maintain Regular Schedule of Environmental Training	Carry out training on Environmental Awareness, Emergency Response, Waste Licence W0218-01 for all staff.	Ongoing	Facility Manager
8	Identify measures to improve efficiency and minimise waste.	Continue to identify measures to reduce waste and use of water	Ongoing	Facility Manager

3.3 Environmental Management Programme

A comprehensive Environmental Management Programme for 2014 was implemented at Coolbeg Composting Facility. The environmental monitoring works undertaken included monitoring of dust emissions, surface water and groundwater quality monitoring, bioaerosol monitoring, odour monitoring. Results of the monitoring are provided in Section 4 of this report under Emissions Monitoring.

3.4 Staff Awareness and Training

No staff training was carried out in 2014.

3.5 Public Communications Programme

Records available for public inspection at the site office include:

- Copy of Waste Licence W0218-01
- Licence Application and Review documentation
- Monitoring records
- Complaints file
- Incidents file
- EPA Correspondence file

Visits to the Coolbeg Composting Facility can be arranged in advance by calling the Facility Manager at 0404-62422.

4.0 EMISSIONS MONITORING

An Environmental Monitoring Programme is required at the facility to assess the significance of emissions from site activities. Schedule C of Waste Licence W0218-01 specifies the required level of monitoring at the Coolbeg Composting Facility. All of the monitoring locations are shown on Figure 1 (Site Layout Plan) of this AER.

4.1 Noise Monitoring

Noise monitoring was carried out in 2014. Three noise monitoring points have been established. Two of the monitoring points are located on site (N1 & N2 and a third NSL1 is located at the nearest dwelling located 200m east of the facility.

The average LAeq (30mins) recorded on site at Kings Tree Services compost facility were close to the day-time limit value of 55 dB. The result of N1 is below the limit value at 54.2 dB and the result at N2 is marginally above the limit value at 55.2 dB. Both locations are impacted by traffic related noise from the N11 and from intermittent noise generated from works on the new M11 motorway. The motorway service depot is located 10m east of the licensed facility. The impact from noise generated from on-site operations is well within the limit value if the L₉₀ or 90th percentile value is considered. The L₉₀ excludes peak values and is therefore more indicative of non-traffic related noise impacts.

The nearest noise sensitive location (NSL1) ie cottage located along N11 roadside are highly impacted almost continuous day-time traffic related noise emissions. The levels measured at this location are not indicative of noise generated at the licensed facility. Any noise generated from the licensed facility was not audible at the location during monitoring. The Noise Monitoring Report is set out in Appendix A.

4.2 Dust Monitoring

Dust deposition monitoring was carried out quarterly at three on site locations in 2014. The objective of the dust stations is to monitor the level of wind blown dust and other small particles which may be generated from on-site activities. The Bergerhoff dust method was used as the dust monitoring medium to obtain dust levels at the site. The Bergerhoff method measures airborne dustfall in milligrams per square metre. The sample is collected in an open plastic jar mounted on a stand.

The dust collecting jars were left in-situ for a period of 30 days. After this period the samples were collected and delivered to ALT Ltd an INAB accredited laboratory located at Unit 4, Newbridge Industrial Estate, Co. Kildare for analysis using a gravimetric in-house method. The result obtained from the Lab with the amount of days the dust jar has been on site once calculated, will give the dustfall per mg/m^2 per day. The dust deposition results are set out in Appendix B.

Table 4.1: Summary of Dust Monitoring Results

Quarter	Period		Deposition ($\text{mg}/\text{m}^2/\text{day}$)			Dust Deposition Limits
	From	To	D1	D2	D3	$\text{mg}/\text{m}^2/\text{day}$
Q1	16/3/14	16/4/14	61	78	61	350
Q2	19/4/14	19/5/14	446	201	93	350
Q3	6/9/14	7/10/2014	689	148	403	350
Q4	19/10/14	19/11/14	64	62	76	350

The dust monitoring results show that during the 2nd and 3rd quarters there were a number of exceedances of the 350 milligrams dust deposition limit value. The principal reason for the exceedances was due to the close proximity of the M11 motorway depot to the facility and in particular to the dust monitoring locations. The dust locations were adversely impacted from off-site dust emissions generated from vehicles exiting and entering the adjacent depot.

4.3 Surface Water Monitoring

Surface water run-off from the composting process areas is diverted to the leachate storage lagoon located and is kept isolated from the surface water drainage system. Run-off from non-process paved areas and roof area of the building is collected and passes through to a Class 1 oil interceptor and then soak away located along the access road. The surface water sample was collected at the soakaway sump.

No surface water monitoring was conducted in 2014 as the surface water manhole is located adjacent to the new M11 motorway depot and it was not feasible to gain access to the sampling location. The depot is no longer in place which will allow Greenking Compost to re-commence sampling from the monitoring location again in 2015.

4.4 Groundwater Monitoring

A groundwater sample was taken from one monitoring location (PW1), as shown on Figure 2 (Site Layout Plan), on the 22nd August 2014 by John Delaney of Geoenvironmental. Samples were analysed by City Analysts an INAB accredited laboratory located at Pigeon House Road, Ringsend, Dublin 4. The certificate of analysis is provided in Appendix C. Groundwater was analysed for chemical and biological parameters specified in Schedule C of the waste licence W0218-01. The results of the analysis are summarised in Table 4.3.

Table 0.1: 2014 Groundwater Monitoring Results

Parameter	Unit	PW1 6/12/13	MAC*
Electrical Conductivity	<i>mS/cm @ 20 deg C</i>	269.8	
pH	<i>pH Units</i>	7.554	-
Chloride	<i>mg/l</i>	22.71	187.5
Ammonia as Nitrogen	<i>mg/l</i>	<0.01	0.175
Faecal Coliforms	<i>cfu/100m</i>	<1	-
Total Coliforms	<i>cfu/100m</i>	<1	-
Arsenic	<i>µg/l</i>	<0.37	7.5
Boron	<i>µg/l</i>	<50	750
Cadmium	<i>µg/l</i>	0.2	3.75
Copper	<i>µg/l</i>	24.5	1500
Lead	<i>µg/l</i>	<0.8	18.75
Nickel	<i>µg/l</i>	<0.25	15

MAC Maximum Admissible Concentration

* European Communities Environmental Objectives (Groundwater Regulations, 2010 (S.I. No.9 of 2010) – Overall Threshold Value Range

The results of the groundwater analysis shows that tested parameters are compliant with the overall threshold values for chemical status of groundwater. All chemical and microbiological parameters are below their respective threshold limit values.

4.5 Bioaerosol Monitoring

Bioaerosol monitoring was carried out by Odour Monitoring Ireland on the 2nd December 2014, as specified in Schedule C of the waste Licence W0218-01. The results of bioaerosol monitoring are summarised in Table 4.4. The full report is included in Appendix D. Bioaerosol monitoring locations are shown on Figure 2.1 of the Bioaerosol, Odour and Hydrogen Sulphide Impact Assessment Report.

Table 0.2 – 2014 Bioaerosols concentration levels

Location ID	Average <i>Aspergillus fumigatus</i> Concentration (CUF m ⁻³) ¹	Average <i>Mesophillic Bacteria</i> Concentration (CUF m ⁻³) ¹	Sampling Count ²
Loc 1	10	<3	3
Loc 2	13	38	3
Loc 3	15	31	3

¹ denotes a total of 6 blanks (3 plate and 3 impactor blanks for the monitored bioaerosol) were incorporated into a sampling exercise. All blanks were negative CFU m⁻³.

² denotes total number of sample counts for each parameter monitored at each location.

The bioaerosol concentration levels were determined at each sampling location in triplicate. Three sampling locations were chosen including Loc 1, 2, 3. The monitoring locations are shown on the schematic plant within the main report. Currently there are no significant bioaerosol impacts in the vicinity of Coolbeg site with all reported bioaerosol ambient air concentrations within the range of the proposed assessment criterion.

4.6 Odour Monitoring

Odour monitoring was carried out by Odour Monitoring Ireland on the 2nd December 2014 as specified in Schedule C of the waste Licence W0218-01. The results of odour monitoring are summarised in Table 4.5. The full report is included in Appendix D. The odour monitoring locations are shown on Figure 2.1 of the Bioaerosol, Odour and Hydrogen Sulphide Impact Assessment Report.

Table 0.5: 2014 Odour Threshold Concentration and Hydrogen Sulphide Results

Date	Sample Location	Odour threshold concentration (Ou _E m ⁻³)	H ₂ S (ppb)	Comment
17/11/11	Loc 1	57	<3	No Distinct Odour
17/11/11	Loc 2	53	<3	No Distinct Odour
17/11/11	Loc 3	49	<3	No Distinct Odour
17/11/11	Loc 4	36	<3	No Distinct Odour
17/11/11	Loc 5	--	<3	No Distinct Odour
17/11/11	Loc 6	33	<3	No Distinct Odour
17/11/11	Loc 7	--	<3	No Distinct Odour
17/11/11	Loc 8	62	<3	No Distinct Odour

All odour sampling and analyses were performed in accordance with EN13725:2003. All ambient odour threshold concentrations were less than or equal to 53 Ou_E/m³, therefore there is no indication of any significant odour impact. No elevated concentrations of odour or hydrogen sulphide were detected during the survey. All Hydrogen sulphide concentrations recorded at each monitoring location were less than 3 ppb in ambient air.

4.7 Compost Analysis

A sample of final compost from Greenking Composting was consigned to the ANUA testing laboratory of 10th December 2014. The sample was tested for a range of Standards for Compost Quality as set out in Schedule F Waste Licence W0218-01. The result of the analysis complies with the standard for trace elements, pathogens, bacteria and heavy metals and other contaminants as set out in the License. A copy of the analysis report is set out in Appendix E of this report.

4.7 Pollutant Release and Transfer Register

Under the European Pollution and Transfer Register Regulation King Tree Services Ltd. are required to submit information on emissions and waste annually to the EPA. A copy of the PRTR Emission Reporting Workbook for 2014 submitted to the Agency via the web-based data reporting system is set out in the Appendix F.

5.0 Site Visits and Inspections

There were no EPA site visits to the licensed facility in 2014.

6.0 NUISANCE CONTROL

6.1 *Mud, Dust, Litter*

Nuisance controls at the facility include inspections of the facility and amenities immediate to the facility boundary for mud, dust and litter. These are documented in the daily facility inspection form to ensure any nuisances are identified and managed on a daily basis.

7.0 Site Developments Works

7.1 *Engineering Works*

No engineering works were carried out in 2014 and it is not envisaged that any works will be carried out in 2015. The Agency will be notified of future engineering works as per Condition 3.2 of the licence.

7.2 *Tanks and Pipeline Testing and Inspection Report*

Condition 3.17.5 of the waste licence requires that the integrity and water tightness of all bunded structures be tested by the licensee at least once in three years. All foul and surface water drains on site were cleaned and surveyed in July 2013 by Kelly Environmental Services using high pressure water jetting and IPEC CCTV equipment. All drains were found to be in good condition. The oil storage tanks were assessed by Blanchfield Oil Storage services on the 16th July 2013 and were found to be in good condition and suitable for the storage of of gas oil and kerosene. The pipelines will be surveyed and oil storage tanks assessed within the next 2 years.

8.0 RESOURCE USE AND ENERGY EFFICIENCY

8.1 *Energy Efficiency Audit*

An Energy efficiency report was submitted as part of the 2006 AER. One of the main recommendations of the report was to install thermostat in the office building. This recommendation has been implemented and currently each radiator is fitted with a thermostatic control valve. There are only two staff members' at the facility full time

and the use of energy is very low. The main users of electricity are the office equipment. There is no electricity consumed in the compost production process on site.

8.2 Resource Consumption Summary

Table 8.1 presents an estimate of resources used on-site from January to December 2014. The water supply for the facility comes from an on-site groundwater well and it is not metered, water is used for sanitary and kitchen purposes.

Table 0.1: Resource Consumption Summary

Energy Stream	Annual Quantity	Units	Period
Electricity	10428	kWh	2014
Diesel	9000	Litres	2014
Heating Oil	880	Litres	2014
Hydraulic and Engine Oil	200	Litres	2014

9.0 WASTE RECEIVED AND CONSIGNED FROM FACILITY

9.1 Waste Management Records

Table 9-1 shows the total quantities of waste received at the waste facility in 2014. A breakdown of the waste types is provided in accordance with the European Waste Catalogue and Hazardous Waste List. The total of green waste accepted at the facility between January 2014 and December 2014 was 1,044 tonnes.

Table 0.1: Waste Received in 2014

EWC	Description	Waste in (tonnes)
20 02 01	Green Waste	1044
	Total Received	1044

Table 9.2 shows the quantities of waste received in previous years.

Table 0.2: Waste Received during 2008 to 2012

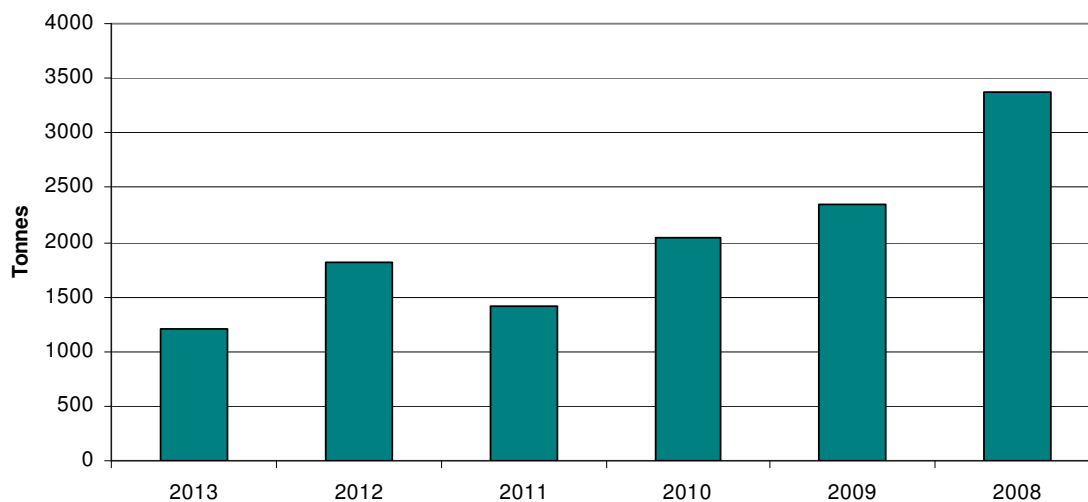
EWC	Description	2013	2012	2011	2010	2009	2008
20 01 01	Green Waste	1210	1,814	1,413	2,034	2,351	3,377

	Total Received		1,814	1,413	2,034	2,351	3,377
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Table 0.3: Compost Quantities Consigned in 2014

EWC	Description	Waste (tonnes)
20 02 01	Compost	700
	Total	700

Figure 9.1: Green Waste Quantities Received 2008 - 2014



9.2 Waste Recovery Report

All waste received at the facility was used to produce compost, therefore the facility had a 100% recovery rate in 2014.

10.0 ENVIRONMENTAL INCIDENTS AND COMPLAINTS

10.1 Incidents Summary

King Tree Services Ltd. maintains register of incidents. There were no environmental incidents during the reporting period of 2014.

10.2 Register of complaints

King Tree Services Ltd. maintains register of complaints. No complaints were received during the reporting period.

11.0 OTHER REPORTS

11.1 *Statement of Measures in Relation to the Prevention of Environmental Damage and Remedial Actions*

Green waste composting is a relatively low impact waste management activity. The potential sources of environmental damage and the measures employed to prevent pollution are listed below:

Kerosene and Diesel tanks outside the Maintenance Shed – These are self-bunded tanks and are protected from impact by a strong steel fence.

Hydraulic and other oils in the Maintenance Shed – These are stored on bunded pallets.

Waste materials – These are stored and processed on paved surfaces with run-off directed to the leachate lagoon.

Leachate Lagoon – This is contained by a lining system, monitored regularly and serviced as required.

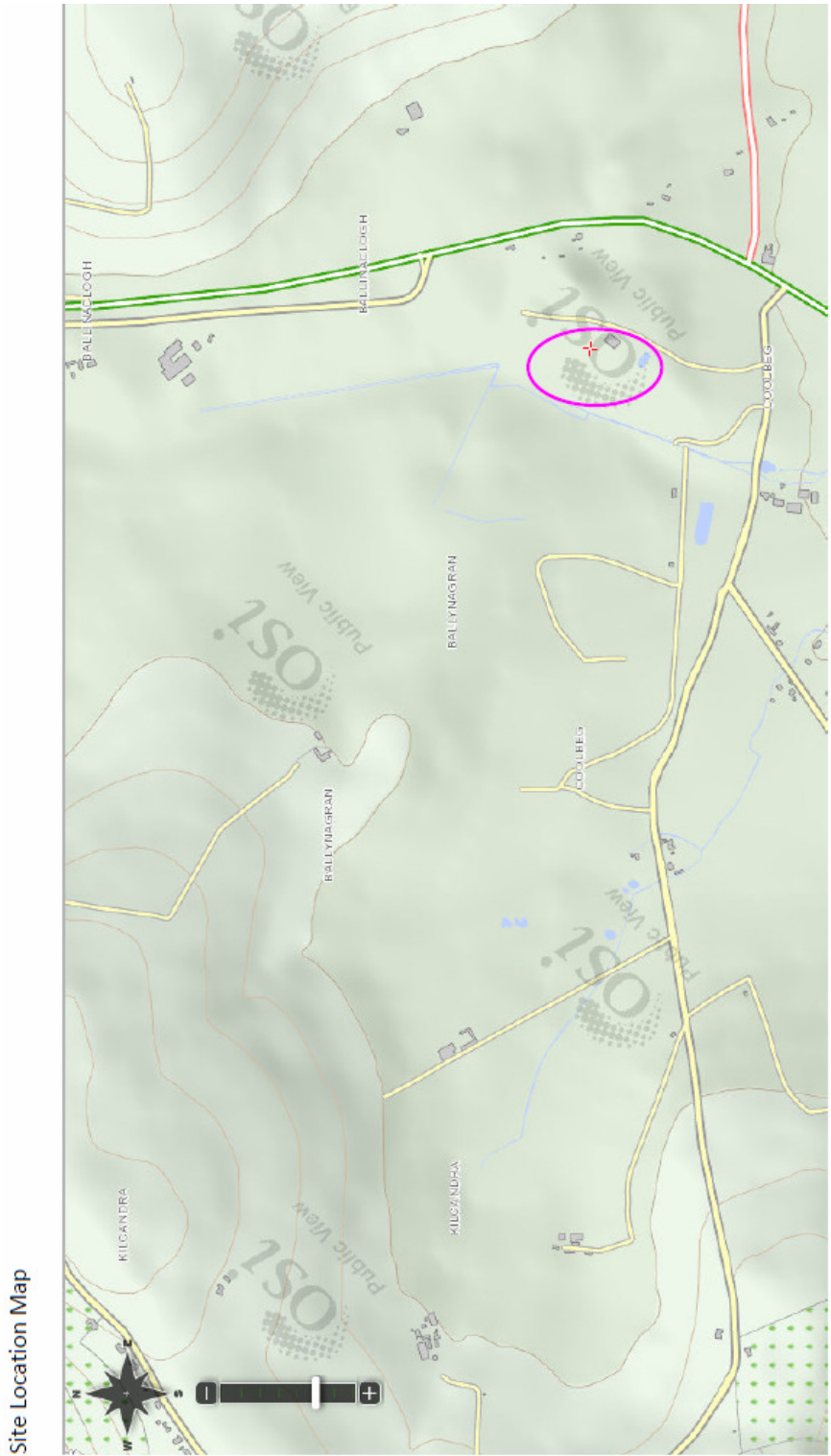
Sewage from the office – Municipal wastewater generated on site is treated by an on-site biocycle wastewater treatment unit that is serviced regularly. The system was serviced in September 2013.

Dust and other air emissions – The composting piles are regularly sprayed with water, particularly during dry periods and this prevents excessive wind-blown dust and other material such as spores.

Noise – Noise at the facility is primarily caused by shredding of green waste. This is periodic and is mitigated by the relatively long distance between site operations and the nearest sensitive receptors. There are no noise sensitive receptors within 150m of site boundary.

The site monitoring in 2013 has shown that the prevention measures employed at the site are currently operating effectively.

11.0 FIGURE 1: SITE LOCATION AND ENVIRONMENTAL MONITORING LOCATIONS





12.0 APPENDICES

Appendix A: 2014 Noise Monitoring Report

Environmental Noise Monitoring Report 2014

On behalf of

**Kings Tree Services Ltd
Coolbeg,
Co. Wicklow**

Waste License No: 218-01



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Environmental Noise Monitoring Report 2014

On behalf of

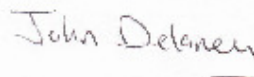
Kings Tree Services Ltd

Coolbeg,

Co. Wicklow

Prepared By: Geoenvironmental

Noise Monitoring & Report Writing:



John Delaney (MSc; BSc; MIEI)

Date:

1st December 2014

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1 INTRODUCTION

Geoenvironmental was instructed by Kings Tree Services Ltd to conduct a noise survey at their waste licensed facility located in Coolbeg, Co. Wicklow. The purpose of the survey was to fulfill the monitoring and reported requirements and site out in Schedule B2 of the License which sets out day-time and night-time noise limit values. The facility does not operate at night and therefore only day-time measurements were carried out. Noise monitoring is carried out one every two years at the facility

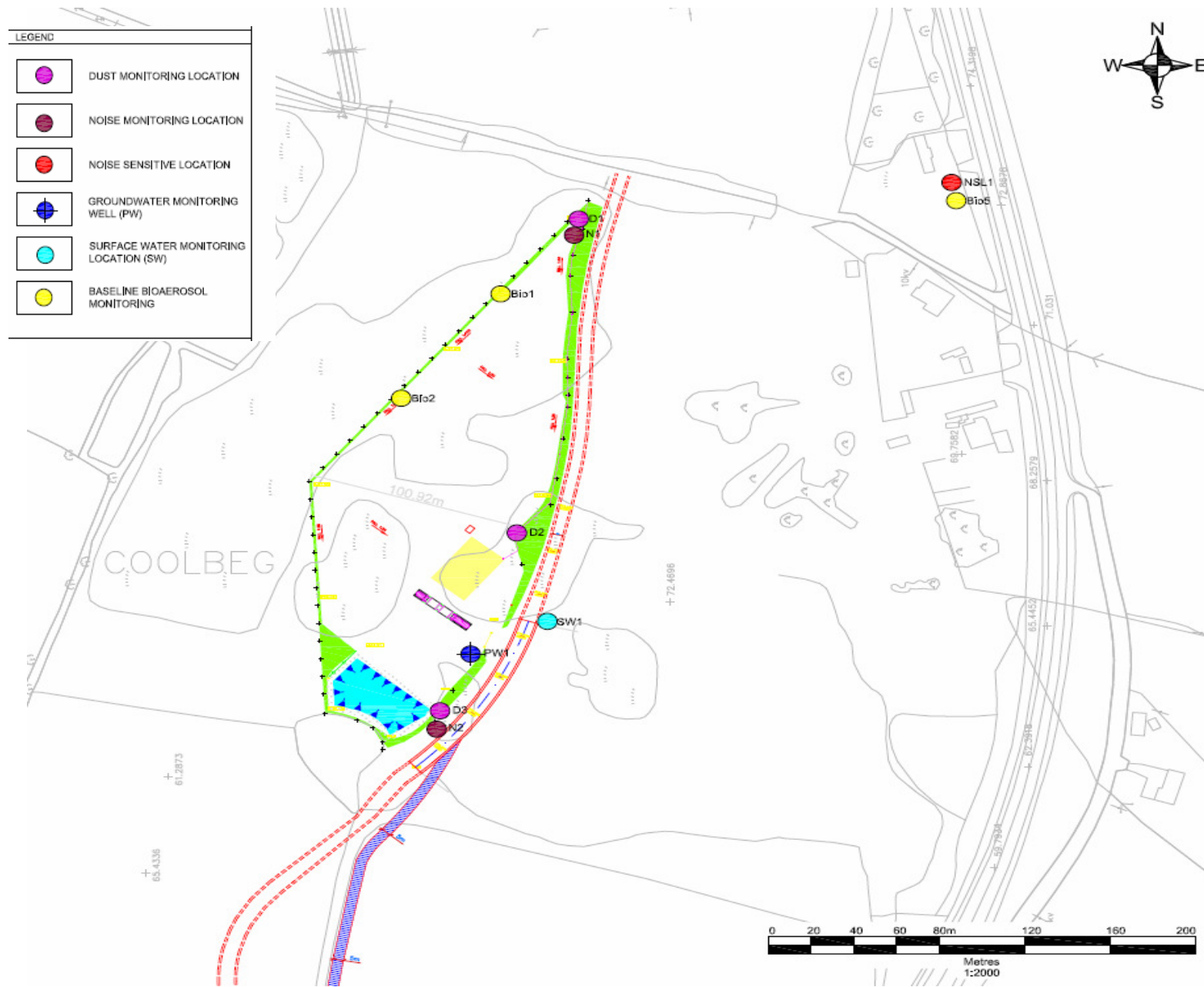
2 SITE DESCRIPTION

The composting facility at Coolbeg, Co, Wicklow has with the capacity to accept and process 40,000 tonnes of green waste per annum. King Tree Services Ltd was issued with a Waste License from the Environmental Protection Agency (EPA) on the 25th October 2005. (Ref. No W0218-01). The facility commenced operations on the 6th June 2006.

The license permits the recycling or reclamation of organic substances which are not used as solvents to include composting and other biological processes. The licensee is required to ensure that noise emissions at the facility do not exceed 55 dB during daytime hours (8 am to 10 pm) and LAeq (30 minutes) of 45 dB during night-time hours (10 pm to 8 am). The facility does not operate at night so only day time measurements were conducted.

Three noise monitoring points have been established. Two of the monitoring points are located on site (N1 & N2 and a third NSL1 is located at the nearest dwelling located 200m east of the facility. The monitoring points are illustrated on the facility map

Figure 1: Site Layout Showing Environmental Monitoring Locations



3. SURVEY EQUIPMENT

The noise survey was carried out using a precision grade, integrating, data-logging, sound level meter, with the capability to perform simultaneous real-time frequency analyses and calculate statistical parameters. The specification of the instrument meets the requirements of Type 1 for sound level meters (according to International Standards IEC 651, IEC 804, & IEC 61672-1) and Type 1 for 1/1 & 1/3 octave analysis (International Standard IEC 1260). The SLM was used with a ½” pre-polarised condenser microphone, mounted on a tripod stand at 1.5m above ground level.

The system was calibrated on site using a Type 1 acoustic calibrator (International Standard IEC 60942).. The manufacturer, model numbers, serial numbers of the instrumentation are summarised in Table 1 below.

Table 1: Details of noise survey equipment

Instrument	Manufacturer	Model Number	Serial Number	Last verification date
Class 1 Sound Level Meter	Quest Technologies	SoundPro SP DL 1-1/3	BL1060009	April 2014
Microphone	Bruel & Kjaer	4936	2663498	April 2014
Acoustic Calibrator	Quest Technologies	QC-10/QC-20	Q11070062	April 2014

4. METHODOLOGY

The noise survey was conducted on the 18th November during day-time hours. A field calibration of the sound level meter was carried out before and after the noise measurements at each location using the acoustic calibrator. The noise monitoring at all three locations (N1, N2, NSL₁) was conducted over a 30min period as set out in Schedule B.2 of the Waste License W0218-01. The sound level meter was attached to a tri-pod stand and located. The wind speed and temperature were measured at the start, middle and end of the survey.

The basic noise parameter measured was the sound pressure level (SPL), with the A & C weighted frequency response and fast-weighted time response. The data logger rate was set to 1min. Other noise parameters were calculated from the instantaneous SPL, including the following:

L_{Aeq}

L_{min}

L_{max}

L_{A10}

L_{A90}

Frequency analysis (1/3 octave band analysis)

5. MONITORING LOCATIONS & OBSERVATIONS

N1 – Northern Boundary of Facility (N52, 57.437; W006 05.864)

The monitoring point is located close to the northern boundary of the facility and approximately 180m north of the main building on site. The monitoring point is approximately 200m from the current N11 public road and approximately 100m from the route of the new M11 Motorway. This monitoring location is impacted by noise generated by traffic on the N11 and to a lesser extent by internal traffic & operations. The on-site compost operations had a negligible impact on noise levels at this location.

N2 – Southern Boundary of Facility 30m from entrance (N52 57.315; W006 05.911)

The monitoring point is located close to the southern boundary of the facility and approximately 50m north of the main buildings on site. The monitoring point is approximately 180m from the current N11 public road and approximately 100m from the route of the new M11 Motorway. The monitoring point is located closer to the facility entrance and compost storage area and is therefore more representative of the noise levels generated from on-site activities. The monitoring point is also located 20m west of a vehicle storage depot serving the new M11 motorway and is also impacted by vehicle movements in and from the depot.

NSL1 – Cottages located 180m east of facility (52 57.497; W006 05.670)

The off-site monitoring point is located 180m east of the facility and adjacent to the current N11. The location is highly impacted from traffic related noise emissions. The on-site compost operations had a no audible impact on noise levels at this location.

Met conditions

Weather conditions during monitoring were considered appropriate for surveying purposes and therefore did not affect the readings i.e. conditions were dry and wind speed was less than 5 m/s (the normal upper limit for taking measurements). The Sound Level Meter was also fitted with a windshield to minimise interference from potential meteorological conditions, in keeping with good practice. The meteorological conditions during the survey periods are shown below.

Table 2: Weather Conditions

Survey Phase	Date & Time	Av Wind Speed m/sec	Temp °C	Prevailing Weather Conditions
Beginning	18/11/2014 14:05	0.5	11	Dry, mostly cloudy and cool
Middle	18/11/2014 15:00	1.1	9	Dry, mostly cloudy and cool
End	18/11/2014 16:58	1.6	8	Dry, mostly cloudy and cool

6. NOISE SURVEY RESULTS

The measurement parameters $L_{Aeq,T}$, are tabulated below in the tables for each monitoring location. Where relevant (ie at locations where traffic noise is prevalent) the L_{AF90} is also listed in the table. Associated particulars such as a description of the on-site noise and off-site noise noticed at each location are also provided in Section of the report.

Where traffic or other off site intermittent noise sources are significant, the parameter LA_{90} may be a better descriptor of site noise.

Table 3: Summary Data Analysis

Period	LAeq(30 mins)	LA90 (30 mins)	On-Site Tonal	Compliant
N1	54.2	52.1	No	Yes
N2	55.2	52.9	No	No
NSL1	75.2	61.5	No	No

The L_{AF90} is more representative of the on-site noise levels at N1 & N2 as the traffic related noise emissions are eliminated from the data

NSL1 is located within 5m of N11 and is therefore highly impacted by traffic

Results and Observations at N1

The 30 min $LA(eQ)$ result of 54.2dB at N1 is compliant with the daytime limit of 55 dB.

The principal noise sources at **N1** were as follows:

- Almost continuous traffic related noise from nearby N11
- Drill/cutting device in operation intermittently from works on nearby new M11 motorway
- Occasional internal traffic movements on-site
- Occasional vehicles entering and exiting the facility

Results and Observations at N2

The 30 min LA(eQ) result of 55.2 dB at N2 is marginally higher with the daytime limit of 55 dB. The LA90 may be a better indicator of site related emissions at this monitoring location as the traffic peaks are removed.

- Almost continuous traffic related noise from nearby N11
- Tractor in operation in M11 depot approximately 30m east of monitoring location
- Occasional internal traffic movements on-site
- Occasional noise from customer vehicles exiting and entering the facility

Results and Observations at NSL1

The 30 min LA(eq) result of 75.2 dB at NSL1 is significantly higher with the daytime limit of 55 dB. The noise emissions are not indicative of noise levels generated at the licensed facility as this monitoring location is very close to the N11 and heavily impacted by traffic related noise emissions. The LA90 at 61.5 has removed the peak levels caused by HGV's.

- Almost continuous traffic related noise from nearby N11
- Tractor in operation in M11 depot approximately 30m east of monitoring location
- No audible detection from on-site operations at the compost facility

7. CONCLUSIONS

The average LAeq (30mins) recorded on site at Kings Tree Services compost facility were close to the day-time limit value of 55 dB. The result of N1 is below the limit value at 54.2 dB and the result at N2 is marginally above the limit value at 55.2 dB. Both locations are impacted by traffic related noise from the N11 and from intermittent noise generated from current works on the nearby new M11 motorway as a motorway service depot is located 10m east of the compost facility. The impact from noise generated from on-site operations is well within the limit value if the L90 or 90th percentile value is considered. The L90 excludes peak values and is therefore more indicative of non-traffic related noise impacts.

The nearest noise sensitive location ie cottages located along N11 roadside are highly impacted almost continuous day-time traffic related noise emissions. The levels measured at this location are not indicative of noise generated at the licensed facility. Any noise generated from the licensed facility was not audible at the location during monitoring.

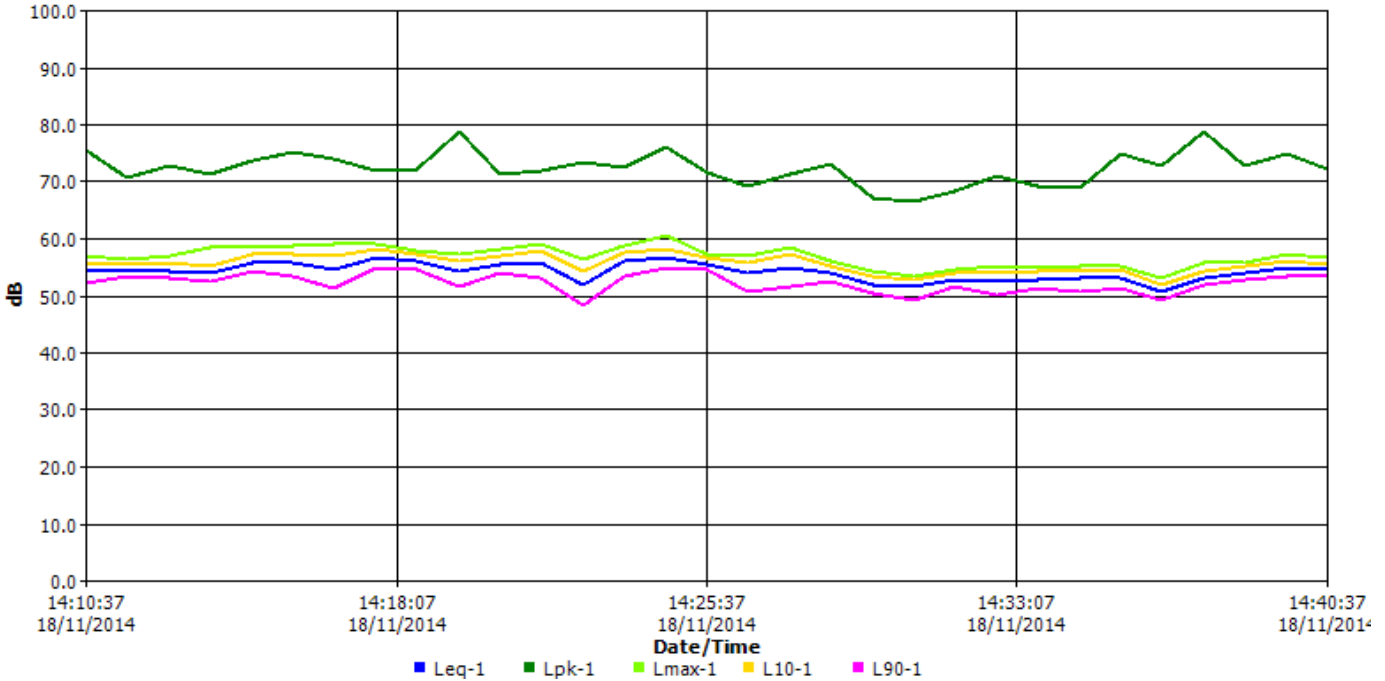
APPENDIX A: NOISE SURVEY DATA AND GRAPHS

N1_Greenking Compost

General Data Panel

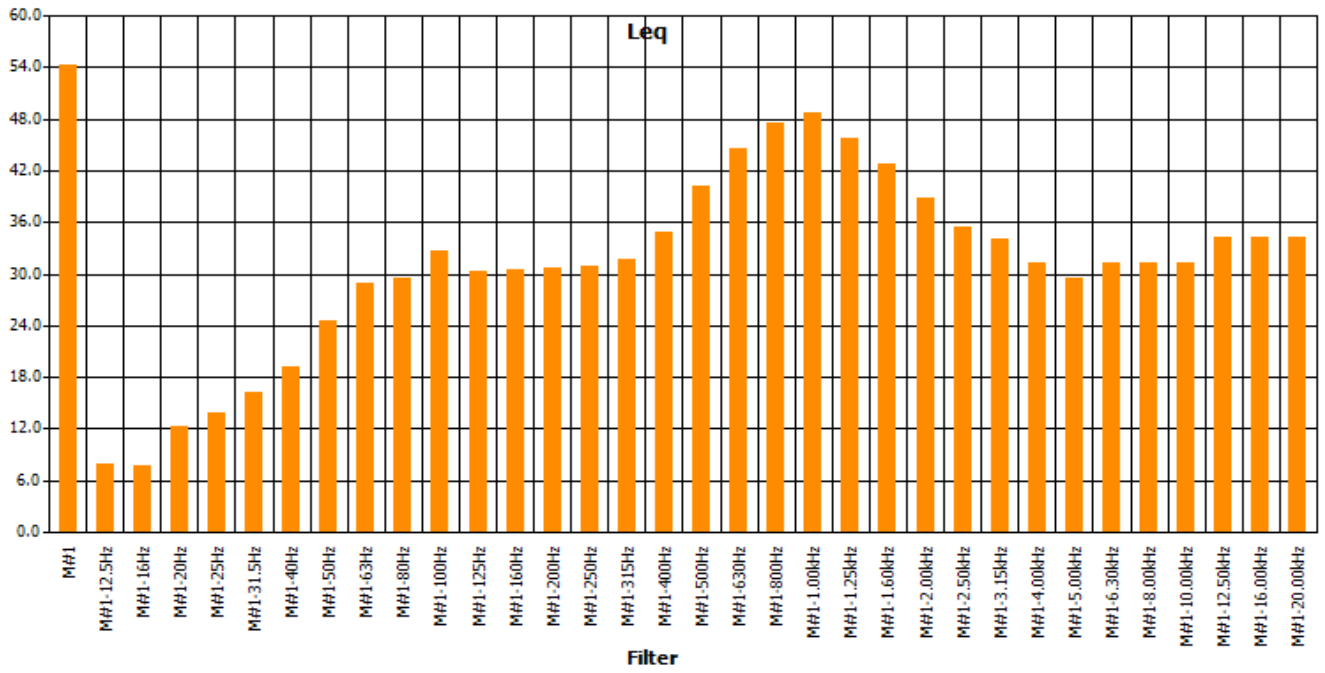
Description	Meter	Value	Description	Meter	Value
Leq	1	54.2 dB	Lmax	1	60.4 dB
Lmin	1	47 dB	Weighting	1	A
Response	1	SLOW	Bandwidth	1	1/3
Exchange Rate	1	3 dB	Int Threshold	1	80 dB
Log Rate	1	60 s	Exchange Rate	2	5 dB
Int Threshold	2	80 dB	Weighting	2	C
Response	2	FAST			

Logged Data Chart



Timestamp	Leq-1	Lmax-1	L10-1	L90-1
18/11/2014 14:10:37	54.1	57.0	55.6	52.1
18/11/2014 14:11:37	54.2	56.2	55.4	53.2
18/11/2014 14:12:37	54.3	56.9	55.8	52.9
18/11/2014 14:13:37	53.9	58.3	55.1	52.3
18/11/2014 14:14:37	55.6	58.5	57.2	54.1
18/11/2014 14:15:37	55.7	58.7	57.3	53.3
18/11/2014 14:16:37	54.4	59.1	57.0	51.2
18/11/2014 14:17:37	56.6	59.0	58.1	54.9
18/11/2014 14:18:37	56.0	57.9	57.1	54.5
18/11/2014 14:19:37	54.1	57.1	56.0	51.5
18/11/2014 14:20:37	55.4	58.1	57.0	53.8
18/11/2014 14:21:37	55.8	59.0	57.8	53.1
18/11/2014 14:22:37	51.8	56.2	54.1	48.2
18/11/2014 14:23:37	55.9	58.8	57.4	53.3
18/11/2014 14:24:37	56.5	60.4	58.1	54.9
18/11/2014 14:25:37	55.5	57.2	56.6	54.5
18/11/2014 14:26:37	53.9	56.9	55.7	50.6
18/11/2014 14:27:37	54.9	58.4	57.1	51.6
18/11/2014 14:28:37	53.9	55.9	55.1	52.5
18/11/2014 14:29:37	51.9	54.1	53.2	50.3
18/11/2014 14:30:37	51.4	53.3	52.8	49.1
18/11/2014 14:31:37	52.6	54.6	53.8	51.4
18/11/2014 14:32:37	52.3	55.0	53.9	50.1
18/11/2014 14:33:37	52.6	54.7	54.1	51.1
18/11/2014 14:34:37	52.9	55.2	54.2	50.6
18/11/2014 14:35:37	53.1	55.2	54.6	51.1
18/11/2014 14:36:37	50.5	52.9	51.9	49.1
18/11/2014 14:37:37	53.1	55.7	54.1	51.7
18/11/2014 14:38:37	53.9	55.6	55.0	52.8
18/11/2014 14:39:37	54.7	57.2	55.9	53.3
18/11/2014 14:40:37	54.6	56.6	55.5	53.5

Filter Summary Chart

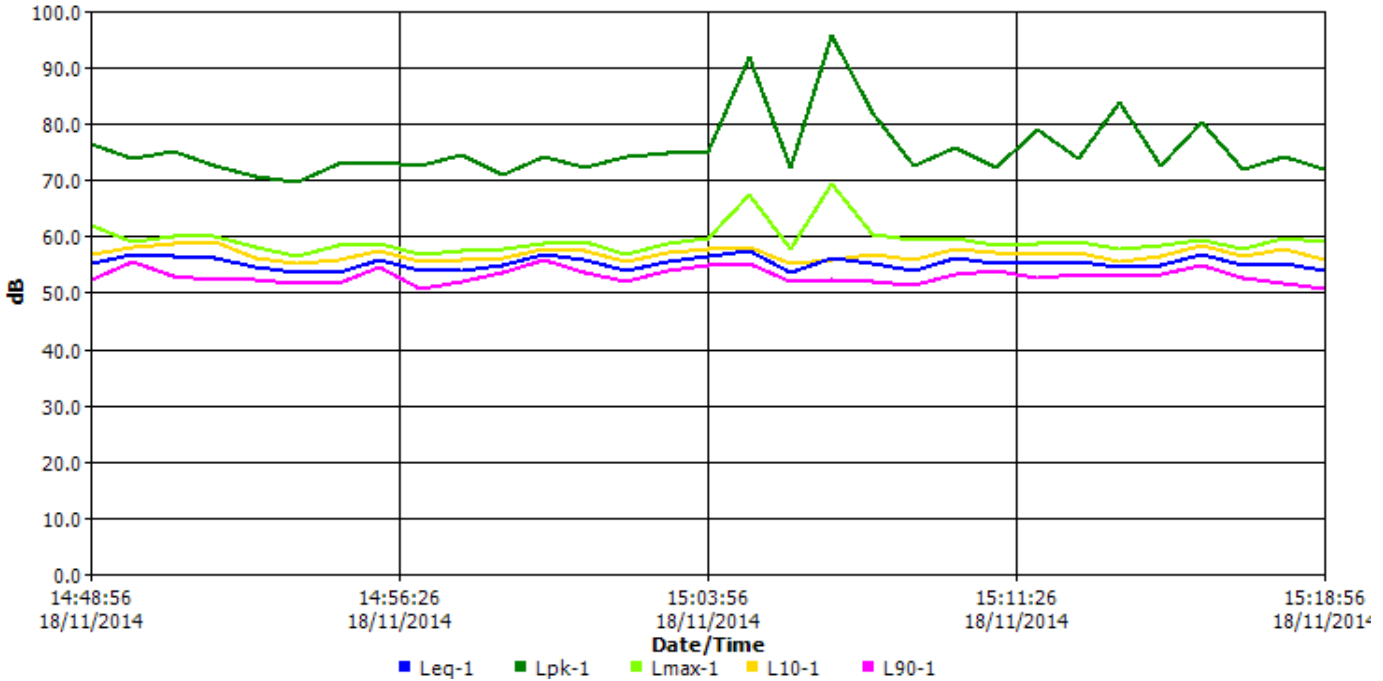


N2_Greenking Compost

General Data Panel

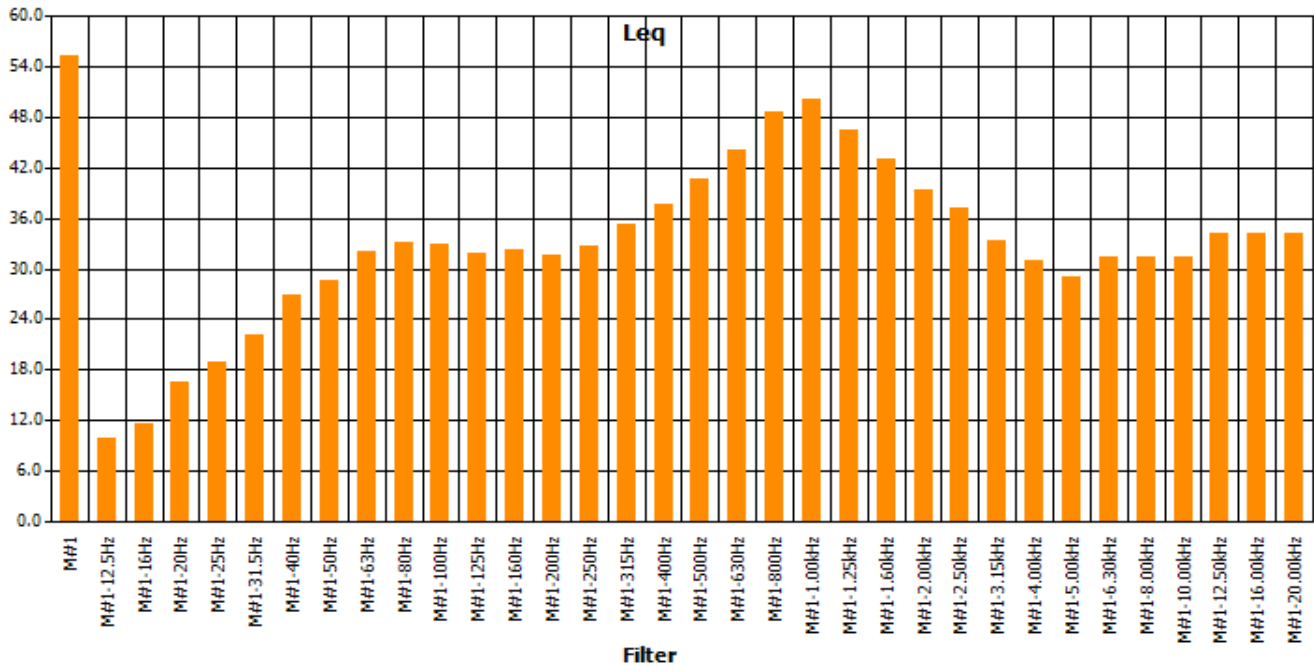
Description	Meter	Value	Description	Meter	Value
Leq	1	55.2 dB	Lmax	1	69.4 dB
Lmin	1	49.5 dB	Weighting	1	A
Response	1	SLOW	Bandwidth	1	1/3
Exchange Rate	1	3 dB	Int Threshold	1	80 dB
Log Rate	1	60 s	Exchange Rate	2	5 dB
Int Threshold	2	80 dB	Weighting	2	C
Response	2	FAST			

Logged Data Chart



Timestamp	Leq-1	Lmax-1	L10-1	L90-1
18/11/2014 14:48:56	55.0	61.8	56.8	52.2
18/11/2014 14:49:56	56.9	59.0	57.9	55.5
18/11/2014 14:50:56	56.5	60.0	58.7	53.0
18/11/2014 14:51:56	56.1	60.0	58.9	52.1
18/11/2014 14:52:56	54.4	58.0	56.2	52.1
18/11/2014 14:53:56	53.4	56.3	55.0	51.5
18/11/2014 14:54:56	53.6	58.2	55.9	51.5
18/11/2014 14:55:56	55.9	58.7	57.5	54.5
18/11/2014 14:56:56	53.7	56.6	55.6	50.7
18/11/2014 14:57:56	53.9	57.3	55.7	52.0
18/11/2014 14:58:56	54.8	57.6	56.0	53.5
18/11/2014 14:59:56	56.8	58.6	57.8	55.8
18/11/2014 15:00:56	55.8	58.9	57.4	53.6
18/11/2014 15:01:56	54.0	56.8	55.6	51.8
18/11/2014 15:02:56	55.6	58.8	57.2	53.9
18/11/2014 15:03:56	56.4	59.8	57.7	54.8
18/11/2014 15:04:56	57.3	67.5	57.9	55.1
18/11/2014 15:05:56	53.4	57.8	55.0	51.9
18/11/2014 15:06:56	56.1	69.4	55.9	52.2
18/11/2014 15:07:56	55.0	60.2	56.8	51.9
18/11/2014 15:08:56	53.9	59.2	55.8	51.4
18/11/2014 15:09:56	56.0	59.5	57.7	53.3
18/11/2014 15:10:56	55.3	58.4	57.0	53.7
18/11/2014 15:11:56	55.0	58.8	56.7	52.7
18/11/2014 15:12:56	55.6	59.0	57.0	53.3
18/11/2014 15:13:56	54.4	57.8	55.5	53.0
18/11/2014 15:14:56	54.9	58.3	56.5	53.3
18/11/2014 15:15:56	56.7	59.2	58.4	54.8
18/11/2014 15:16:56	54.7	57.8	56.5	52.6
18/11/2014 15:17:56	55.3	59.7	57.8	51.5
18/11/2014 15:18:56	53.9	58.9	55.7	50.7

Filter Summary Chart

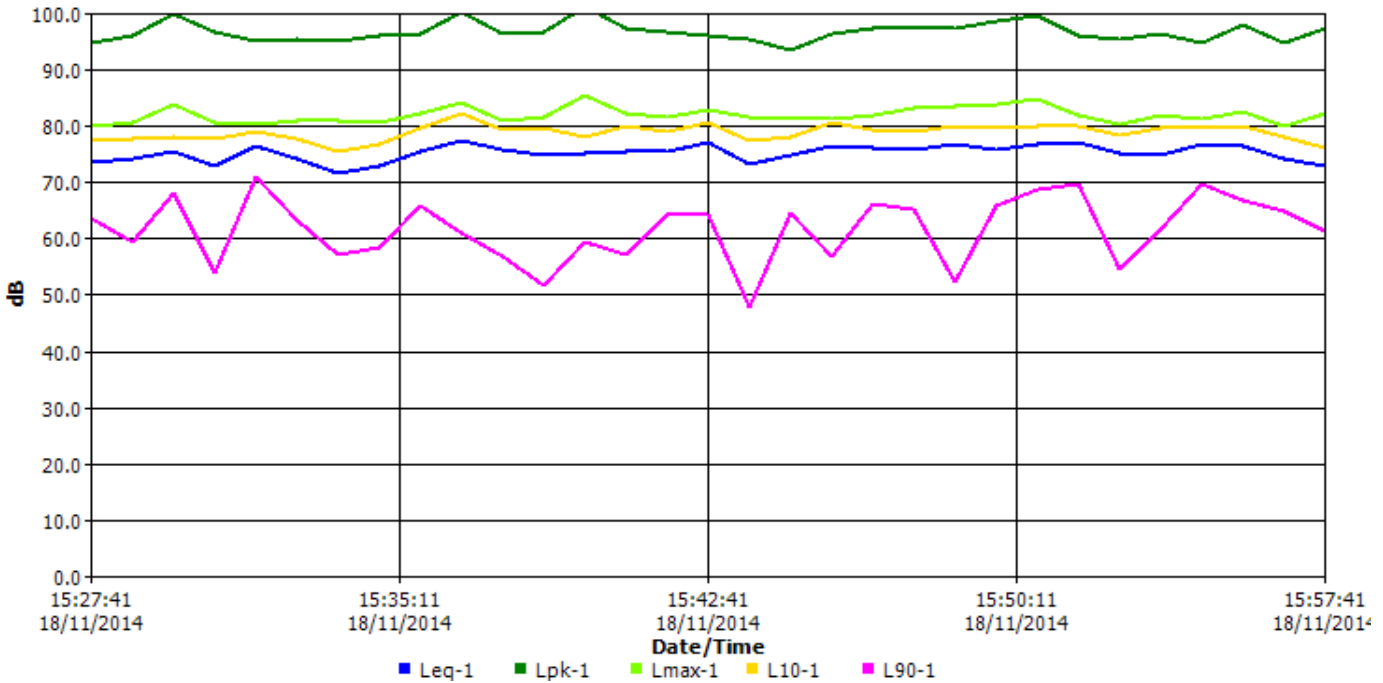


NSL1_Greenking Compost

General Data Panel

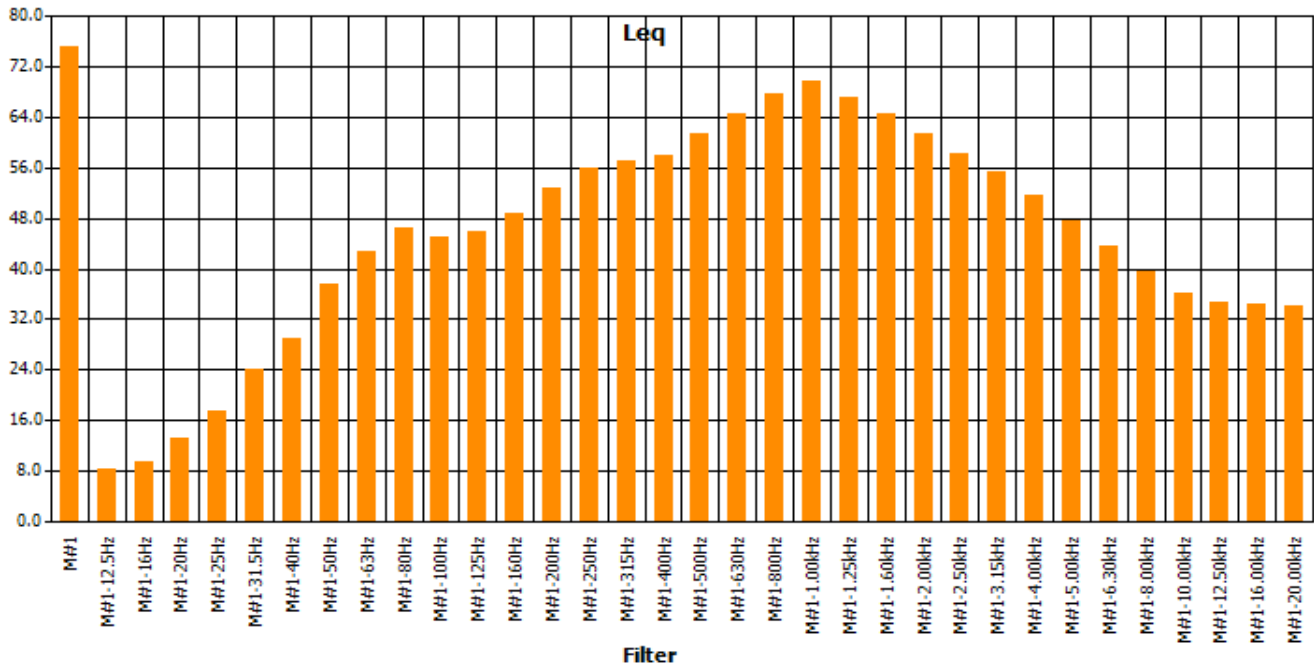
Description	Meter	Value	Description	Meter	Value
Leq	1	75.2 dB	Lmax	1	85.5 dB
Lmin	1	46.4 dB	Weighting	1	A
Response	1	SLOW	Bandwidth	1	1/3
Exchange Rate	1	3 dB	Int Threshold	1	80 dB
Log Rate	1	60 s	Exchange Rate	2	5 dB
Int Threshold	2	80 dB	Weighting	2	C
Response	2	FAST			

Logged Data Chart



Timestamp	Leq-1	Lmax-1	L10-1	L90-1
18/11/2014 15:27:41	73.4	80.0	77.3	63.4
18/11/2014 15:28:41	74.2	80.7	77.8	59.2
18/11/2014 15:29:41	75.5	83.7	78.1	67.9
18/11/2014 15:30:41	72.9	80.5	77.6	53.8
18/11/2014 15:31:41	76.5	80.3	78.9	71.0
18/11/2014 15:32:41	74.1	81.0	77.6	63.2
18/11/2014 15:33:41	71.7	81.0	75.3	57.2
18/11/2014 15:34:41	72.9	80.6	76.6	58.2
18/11/2014 15:35:41	75.3	82.3	79.7	65.7
18/11/2014 15:36:41	77.3	84.0	82.0	61.0
18/11/2014 15:37:41	75.8	80.9	79.3	56.6
18/11/2014 15:38:41	74.7	81.5	79.6	51.6
18/11/2014 15:39:41	75.2	85.5	78.1	59.2
18/11/2014 15:40:41	75.4	82.2	79.8	57.0
18/11/2014 15:41:41	75.5	81.5	79.0	64.1
18/11/2014 15:42:41	77.0	82.7	80.6	64.0
18/11/2014 15:43:41	73.0	81.4	77.3	47.9
18/11/2014 15:44:41	74.6	81.1	78.0	64.5
18/11/2014 15:45:41	76.5	81.2	80.4	56.7
18/11/2014 15:46:41	76.1	81.7	79.4	66.2
18/11/2014 15:47:41	75.7	83.1	78.9	65.1
18/11/2014 15:48:41	76.6	83.3	79.8	52.1
18/11/2014 15:49:41	75.7	83.7	79.7	65.7
18/11/2014 15:50:41	76.6	84.8	79.9	68.8
18/11/2014 15:51:41	76.9	81.8	79.9	69.5
18/11/2014 15:52:41	75.0	80.3	78.4	54.5
18/11/2014 15:53:41	74.9	81.9	79.6	61.5
18/11/2014 15:54:41	76.6	81.2	79.5	69.5
18/11/2014 15:55:41	76.4	82.6	79.9	66.7
18/11/2014 15:56:41	74.2	80.0	78.1	64.7
18/11/2014 15:57:41	72.9	82.1	76.0	61.2

Filter Summary Chart



Appendix B: 2014 Quarterly Dust Monitoring Results



Advanced Laboratory Testing Ltd
 Unit 4, Newbridge Industrial Estate,
 Newbridge, Co. Kildare, Ireland
 Tel: 045-434355 Web: www.altesting.ie

TEST CERTIFICATE

Document Reference: **QMF021** Revision 1

Replacement Report

Project: **1-140416-02579**

Report Number: **Preview**

This report replaces Report Number: **19715**

Date Issued: 12-May-2014

Page 1 of 3

Attention:
 Client: **Geoenvironmental**
 Address: Knocklas
 Coolcotts
 Co.Wexford

Order Number:

Conditions

Results in this report relate only to the items tested.
 Reports may not be reproduced in full without the approval of **Advanced Laboratory Testing**.
 All queries regarding this report should be addressed to the Technical Manager at the address above.
 Non Accredited in the comments section signifies that **Advanced Laboratory Testing** are NOT INAB accredited for this method.
 Sample type refers to INAB P9 classification system for testing and calibration.
 Results reported as cfu/cm2 are calculated based on information supplied by the relevant customer regarding the specific area

ALT ID: 56963 Sample Type: Others
 Date Received: 16/04/2014 Date Tested: 06/05/2014
 Client ID: Sample 1 D1 GreenKing Compost Coolbeg, Co.Wicklow 30 Day Sample

Test	Result	Unit(s)	Method	Comments
Dust deposition	61	mg/m2/day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Chemistry Manager



Client:

Geoenvironmental

TEST CERTIFICATE

Document Reference: QMF021 Revision 1

Replacement Report

Project: **1-140416-02579**

Report Number: **Preview**

Date Issued: **12-May-2014**

Page 2 of 3

Order Number:

ALT ID: 56964 **Sample Type:** Others
Date Received: 16/04/2014 **Date Tested:** 06/05/2014
Client ID: Sample 2 D2 Greenking Compost, Coolbeg, Co. Wicklow. 30 Day Sample

Test	Result	Unit(s)	Method	Comments
Dust deposition	78	mg/m2/day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Chemistry Manager



Client:

Geoenvironmental

TEST CERTIFICATE

Document Reference: QMF021 Revision 1

Replacement Report

Project: **1-140416-02579**

Report Number: **Preview**

Date Issued: **12-May-2014**

Page 3 of 3

Order Number:

ALT ID: 56965 **Sample Type:** Others
Date Received: 16/04/2014 **Date Tested:** 06/05/2014
Client ID: Sample 3 D3 Greenking Compost, Coolbeeb, Co. Wicklow. 30 Day SaMPLE

Test	Result	Unit(s)	Method	Comments
Dust deposition	61	mg/m2/day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Chemistry Manager



Advanced Laboratory Testing Ltd
Unit 4, Newbridge Industrial Estate,
Newbridge, Co. Kildare, Ireland
Tel: 045-434355 Web: www.altesting.ie

TEST CERTIFICATE

Document Reference: **QMF021** Revision 1

Final Report

Project: 1-140519-02992

Report Number: 22244

Date Issued: 21-May-2014

Page 1 of 3

Attention:

Order Number:

Client: **Geoenvironmental**

Address: Knocklas
Coolcotts
Co.Wexford

Conditions

Results in this report relate only to the items tested.

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Non Accredited in the comments section signifies that **Advanced Laboratory Testing** are NOT INAB accredited for this method.

Sample type refers to INAB P9 classification system for testing and calibration.

Results reported as cfu/cm² are calculated based on information supplied by the relevant customer regarding the specific area

ALT ID: 73513 Sample Type: Others
Date Received: 19/05/2014 Date Tested: 21/05/2014
Client ID: D1 Greenking Compost

Test	Result	Unit(s)	Method	Comments
Dust deposition	446	mg/m ² /day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Chemistry Manager



Client:

Geoenvironmental

TEST CERTIFICATE

Document Reference: QMF021 Revision 1

Final Report

Project: 1-140519-02992

Report Number: 22244

Date Issued: 21-May-2014

Page 2 of 3

Order Number:

ALT ID: 73514 **Sample Type:** Others
Date Received: 19/05/2014 **Date Tested:** 21/05/2014
Client ID: D2 Greenking Compost

Test	Result	Unit(s)	Method	Comments
Dust deposition	201	mg/m2/day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Chemistry Manager



Client:

Geoenvironmental

TEST CERTIFICATE

Document Reference: QMF021 Revision 1

Final Report

Project: 1-140519-02992

Report Number: 22244

Date Issued: 21-May-2014

Page 3 of 3

Order Number:

ALT ID: 73515 **Sample Type:** Others
Date Received: 19/05/2014 **Date Tested:** 21/05/2014
Client ID: D3 Greenking Compost

Test	Result	Unit(s)	Method	Comments
Dust deposition	93	mg/m2/day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Chemistry Manager



Advanced Laboratory Testing Ltd
Unit 4, Newbridge Industrial Estate,
Newbridge, Co. Kildare, Ireland
Tel: 045-434355 Web: www.altesting.ie

TEST CERTIFICATE

Document Reference: **QMF021** Revision 1

Final Report

Project: 1-141007-01402

Report Number: 51524

Date Issued: 13-Oct-2014

Page 1 of 3

Attention:

Client: **Geoenvironmental**

Address: Knocklas
Coolcotts
Co.Wexford

Order Number:

Conditions

Results in this report relate only to the items tested.

Reports may not be reproduced in full without the approval of **Advanced Laboratory Testing**.

All queries regarding this report should be addressed to the Technical Manager at the address above.

Non Accredited in the comments section signifies that **Advanced Laboratory Testing** are NOT INAB accredited for this method.

Sample type refers to INAB P9 classification system for testing and calibration.

Results reported as cfu/cm² are calculated based on information supplied by the relevant customer regarding the specific area

ALT ID: 149517 **Sample Type:** Others
Date Received: 07/10/2014 **Date Tested:** 09/10/2014
Client ID: D1 - 30 Day Dust Sample from Grenking Compost Ltd, Coolbeg, Co. Wicklow.

Test	Result	Unit(s)	Method	Comments
Dust deposition	689	mg/m ² /day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Laboratory Manager - Chemistry



Client:

Geoenvironmental

TEST CERTIFICATE

Document Reference: QMF021 Revision 1

Final Report

Project: 1-141007-01402

Report Number: 51524

Date Issued: 13-Oct-2014

Page 2 of 3

Order Number:

ALT ID: 149518 **Sample Type:** Others
Date Received: 07/10/2014 **Date Tested:** 09/10/2014
Client ID: D2 - 30 Day Dust Sample from Grenking Compost Ltd, Coolbeg, Co. Wicklow.

Test	Result	Unit(s)	Method	Comments
Dust deposition	148	mg/m2/day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Laboratory Manager - Chemistry



Client:

Geoenvironmental

TEST CERTIFICATE

Document Reference: QMF021 Revision 1

Final Report

Project: 1-141007-01402

Report Number: 51524

Date Issued: 13-Oct-2014

Page 3 of 3

Order Number:

ALT ID: 149519 **Sample Type:** Others
Date Received: 07/10/2014 **Date Tested:** 09/10/2014
Client ID: D3 - 30 Day Dust Sample from Grenking Compost Ltd, Coolbeg, Co. Wicklow.

Test	Result	Unit(s)	Method	Comments
Dust deposition	403	mg/m ² /day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Laboratory Manager - Chemistry



Advanced Laboratory Testing Ltd
Unit 4, Newbridge Industrial Estate,
Newbridge, Co. Kildare, Ireland
Tel: 045-434355 Web: www.altesting.ie

TEST CERTIFICATE

Document Reference: **QMF021** Revision 1

Final Report

Project: 1-141120-03713

Report Number: 60111

Date Issued: 25-Nov-2014

Page 1 of 3

Attention:

Order Number:

Client: **Geoenvironmental**

Address: Knocklas
Coolcotts
Co.Wexford

Conditions

Results in this report relate only to the items tested.

Reports may not be reproduced in full without the approval of **Advanced Laboratory Testing**.

All queries regarding this report should be addressed to the Technical Manager at the address above.

Non Accredited in the comments section signifies that **Advanced Laboratory Testing** are NOT INAB accredited for this method.

Sample type refers to INAB P9 classification system for testing and calibration.

Results reported as cfu/cm² are calculated based on information supplied by the relevant customer regarding the specific area

ALT ID: 174059 Sample Type: Others
Date Received: 20/11/2014 Date Tested: 21/11/2014
Client ID: D1 30 Day Bergerhoff Dust Sample @ Greenking Compost, Coobeg, Co. Wicklow

Test	Result	Unit(s)	Method	Comments
Dust deposition	64	mg/m ² /day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Laboratory Manager - Chemistry



Client:

Geoenvironmental

TEST CERTIFICATE

Document Reference: QMF021 Revision 1

Final Report

Project: 1-141120-03713

Report Number: 60111

Date Issued: 25-Nov-2014

Page 2 of 3

Order Number:

ALT ID: 174060 **Sample Type:** Others
Date Received: 20/11/2014 **Date Tested:** 21/11/2014
Client ID: D2 30 Day Bergerhoff Dust Sample @ Greenking Compost, Coobeg, Co. Wicklow

Test	Result	Unit(s)	Method	Comments
Dust deposition	62	mg/m2/day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Laboratory Manager - Chemistry



Client:

Geoenvironmental

TEST CERTIFICATE

Document Reference: QMF021 Revision 1

Final Report

Project: 1-141120-03713

Report Number: 60111

Date Issued: 25-Nov-2014

Page 3 of 3

Order Number:

ALT ID: 174061 **Sample Type:** Others
Date Received: 20/11/2014 **Date Tested:** 21/11/2014
Client ID: D3 30 Day Bergerhoff Dust Sample @ Greenking Compost, Coobeg, Co. Wicklow

Test	Result	Unit(s)	Method	Comments
Dust deposition	76	mg/m2/day	ECTM014	

The results in this report were authorised by:

Name	Title
Denis Kent	Laboratory Manager - Chemistry

Appendix C: 2014 Groundwater Certificate of Analysis

Certificate of Analysis

Customer Contact: John Delaney
Customer: GeoEnvironmental
Customer Address: Knocklas
Coolcots
Wexford Town

Report Reference: 14-04351-CA
Report Version: 3



Page 3 of 3

Sample Description: Groundwater sample PW-1 from Greenking compost
Sample Type: Ground Water
Date Sampled: 22/08/2014
Lab Reference Number: 185785

Site/Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value	Accreditation Status
D/3001	26/08/2014	Nickel, Total	<0.25	ug/l	-	INAB
SUB C		Arsenic, Total as As	<0.37	ug/l	-	UKAS
D/3000	26/08/2014	Ammonia as N	<0.01	mg/l	-	INAB
D/1041	22/08/2014	pH	7.554	pH Units	-	INAB
D/3001	25/08/2014	Boron, Total	<50	ug/l	-	INAB
D/3001	26/08/2014	Cadmium, Total	0.2	ug/l	-	INAB
D/3000	26/08/2014	Chloride	22.71	mg/l	-	INAB
D/1201	22/08/2014	Coliforms	<1	MPN/100ml	-	INAB
D/3011	22/08/2014	Conductivity	269.8	µs/cm at 20°C	-	INAB
D/3001	25/08/2014	Copper, Total	18	ug/l	-	INAB
D/3221	22/08/2014	Faecal Coliforms	<1	cfu/100ml	-	INAB
D/3001	26/08/2014	Lead, Total	<0.8	ug/l	-	INAB

Note:

NAC & ATC - No abnormal change and acceptable to customers.

TVC - Total Viable Count

PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014, and relates only to drinking water samples.

Site D = Analysed at City Analysts Dublin. Site L = Analysed at City Analysts Shannon. Site SUBC= Analysed at a subcontracted lab

Appendix D: 2014 Bioaerosols and Odour Monitoring Report



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**YEAR 2014 - BIOAEROSOL, ODOUR AND HYDROGEN SULPHIDE IMPACT ASSESSMENT AT
GREEN KING COMPOSTING LTD, COOLBEG, CO. WICKLOW**

PREPARED BY:	Dr. Brian Sheridan
ATTENTION:	Mr. John Delaney
DATE:	17 th Dec. 2014
REPORT NUMBER:	2014613(1)
DOCUMENT VERSION:	Version 1
REVIEWERS:	


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Document Amendment Record

Client: *Kings Trees Limited*

Title: Year 2014 - Bioaerosol, Odour and H₂S Impact Assessment at Green King Composting Ltd, Coolbeg, Co. Wicklow

Project Number: 2014613(1)			Document Reference: Year 2014 - Bioaerosol, Odour and H ₂ S Impact Assessment at Green King Composting Ltd, Coolbeg, Co. Wicklow		
2014613(1)	Document for review	B.A.S.	JMC	B.A.S	17/12/2014
Revision	Purpose/Description	Originated	Checked	Authorised	Date
					

1. Introduction

Odour Monitoring Ireland was commissioned to perform a bioaerosol, odour and hydrogen sulphide (H₂S) assessment in the vicinity of Green King Composting Ltd, Coolbeg, Co. Wicklow. The bioaerosol assessment was carried out in accordance with the guidance document established by the UK Composting Association “Standardised protocol for the testing and enumeration of micro organisms”. Total Mesophilic bacteria and *Aspergillus fumigatus* sampling was performed using equivalent Andersen single stage impactors. Triplicate sampling was performed at each of the three identified sampling locations within and in the vicinity of Green King Composting facility located at Coolbeg, Co. Wicklow.

The odour assessment was carried out in accordance with EN 13725:2003. Hydrogen sulphide (H₂S) sampling and analysis was carried out using a Gold leaf Jerome ppb analyser.

The bioaerosol concentration levels were determined at each sampling location in triplicate. Three sampling locations were chosen including Green 1, 2 and 3. Currently, there are no significant bioaerosol impacts in the vicinity of Green King Composting facility located at Coolbeg, Co. Wicklow with all reported bioaerosol ambient air concentrations within the range of the assessment criterion. All odour sampling and analysis was performed in accordance with EN13725:2003. All ambient odour threshold concentrations were less than 62 Ou_E/m³. Hydrogen sulphide concentrations recorded at each monitoring location were less than the lower level of detection of 3 ppb in ambient air.

1.1 Aims of the study

The main aims of the study were:

- To enumerate the ambient air concentration of two bioaerosols groups namely: *Aspergillus fumigatus* and Total Mesophilic bacteria during operation of the composting facility at Coolbeg, Co. Wicklow. These are the two most frequently requested bioaerosols to be monitored for composting plants.
- To ascertain ambient odour and H₂S concentrations levels in the vicinity of the composting facility.

2. Materials and methods

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

2.1 Sampling locations and residential locations

Figure 2.1 and Table 2.1 illustrates the location of the facility in relation to local residents.

Table 2.1. Monitoring locations and parameters monitored.

Location ID	Parameter monitored	Location details
Loc 1	Total Mesophilic bacteria and <i>Aspergillus fumigatus</i> , Odour ¹ , H ₂ S	Upwind of site
Loc 2	Total Mesophilic bacteria and <i>Aspergillus fumigatus</i> , Odour ¹ , H ₂ S	Beside green waste, downwind of site
Loc 3	Total Mesophilic bacteria and <i>Aspergillus fumigatus</i> , Odour ¹ , H ₂ S	Downwind of site at entrance
Loc 4	H ₂ S, Odour ¹	Western boundary
Loc 5	H ₂ S	Upwind of site
Loc 6	H ₂ S, Odour ¹	Upwind of site
Loc 7	H ₂ S	Downwind of site
Loc 8	H ₂ S Odour ¹	Downwind on entrance road

Notes: ¹ denotes duplicate odour samples taken

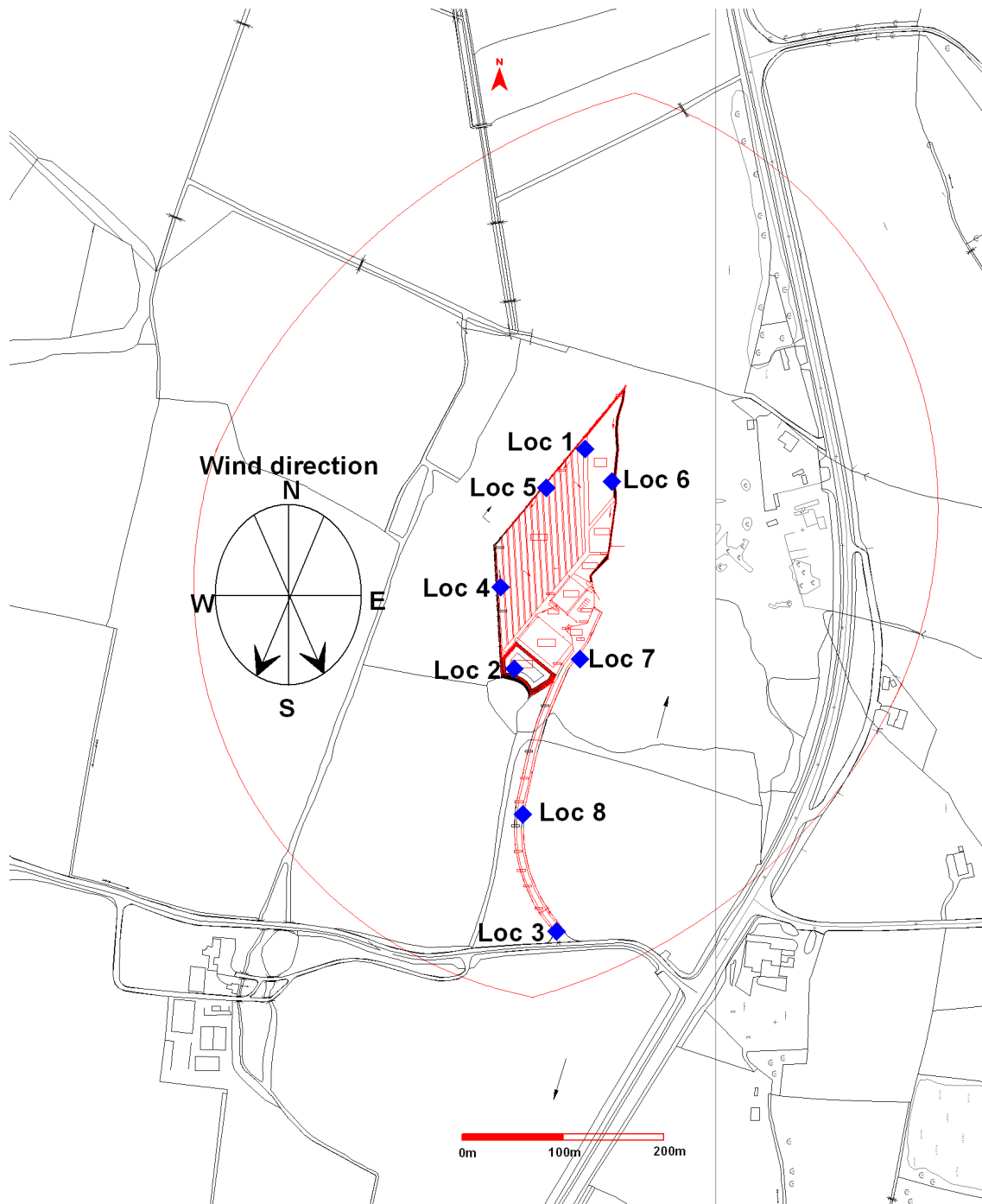


Figure 2.1. Schematic overview of Bioaerosol, Odour and H₂S monitoring locations.

2.2 Meteorological data

Table 2.2 illustrates the average wind direction during the one-day monitoring period. Average wind speed was low during the monitoring. Barometric pressure was approximately 1027 mbar. Relative humidity was 80% while temperature was low from 7 degrees Celsius. This would be typical for this time period of the year in Southern Ireland.

Table 2.2 Meteorological conditions during the one-day monitoring period.

Parameter	Monitoring event 02/12/2014
Wind direction (From)	NNW
Wind speed (mph)	9.5
Barometric pressure	1027
Temperature (°C)	7
Relative humidity (%)	80

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

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

2.4. Transport of bioaerosol samples

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

2.5. Odour sampling

In order to obtain air samples for odour assessment, a static sampling method was used where air samples were collected in 60 litre pre-conditioned Nalophan^{NA} bags using a vacuum sampling device over a ten to twenty minute period. The sampler operates on the 'lung principle', whereby the air is removed from a rigid container around the bag by a battery powered SKC vacuum pump at a rate of 3 to 5 l min⁻¹. This caused the bag to fill through a stainless steel and PTFE tube whose inlet is placed in ambient air, with the volume of sample equal to the volume of air evacuated from the rigid container. All odour-sampling bags were pre-conditioned and flushed with odourless lab air to remove any interference from the sample material.

2.6. Olfactometry

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

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

In the dynamic dilution olfactometer, the odour is first diluted and is then presented to a panel of screened panellists of no less than four (CEN, 2003) Panellists are previously screened to ensure that they have a normal sense of smell (Casey et al., 2003). According to the CEN standard this screening must be performed using a certified reference gas *n*-butanol. This screening is applied to eliminate anosmia (low sensitivity) and super-noses (high sensitivity). The odour analysis has to be undertaken in a low odour environment such as an air-conditioned odour free laboratory. Analysis should be performed preferably within 8 to 12 hours of sampling.

2.7. Odour measurement in accordance with EN13725:2003

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

2.7.1 What is an odour unit?

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

The European odour unit is that amount of odourant(s) that, when evaporated into one cubic metre of neutral gas (nitrogen), at standard conditions elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one European Reference Odour Mass (EROM) evaporated in one cubic meter of neutral gas at standard conditions. One EROM is that mass of a substance (n-butanol) that will elicit the Z_{50} physiological response assessed by an odour panel in accordance with this standard. *n*-Butanol is one such reference standard and is equivalent to 123 μ g of n-butanol evaporated in one cubic meter of neutral gas at standard conditions (CEN, 2003).

2.8. H₂S measurement

A Jerome real time data-logging H₂S gold leaf analyser (measurement range 3 ppb to 50ppm) was also used for the measurement of ambient hydrogen sulphide levels in order to ascertain any elevations in ambient H₂S concentrations. This was used, as H₂S is commonly associated with composting operations and is a good indicator gas for the assessment of significant odour nuisance in the vicinity of compost facilities.

2.9 Bioaerosol assessment criteria

Table 2.2 illustrates the assessment criterion which is used for comparison of results during operation to ascertain ambient bioaerosol air quality in the vicinity of the Green King Composting facility located at Coolbeg, Co. Wicklow.

Table 2.2. Assessment criteria for the ambient bioaerosol air quality in the vicinity of Green King Composting facility Coolbeg, Co. Wicklow.

Assessment criteria	Reference concentration range	Notes	Reference
Total fungi (includes <i>Aspergillus fumigatus</i>) ¹	500 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.

2.10 Ambient Bioaerosol air quality

Table 2.3 illustrates the results from bioaerosol air quality monitoring. Both *Aspergillus fumigatus* and Total Mesophilic bacteria were assessed on the day of sampling 02nd December 2014.

Table 2.3. Bioaerosols concentration levels within and in the vicinity of the recycling facility

Location ID	Average <i>Aspergillus fumigatus</i> concentration (CFU m ⁻³) ¹	Average Mesophilic bacteria concentration (CFU m ⁻³) ¹	Sample count ²
Loc 1	10	<3	3
Loc 2	13	38	3
Loc 3	15	31	3

Note: 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.

Table 2.3 illustrates the ambient bioaerosol air quality within and in the vicinity of the Green waste composting facility. As can be observed, *Aspergillus fumigatus* concentrations are low and at expected ambient concentration levels. Total mesophilic bacteria concentration levels at monitored location Loc 2 were elevated but dissipated rapidly with distance to monitoring location Loc 3 (approx. 50 to 90m downwind). The dissipation in concentrations of total mesophilic bacteria from Loc 2 to Loc 3 would be indicative of results obtained from international literature where 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.

In accordance with the assessment criteria reported in Table 2.2, bioaerosol concentrations within lower range for *Aspergillus fumigatus* and in the mid range for total Mesophilic bacteria.

2.11. Odour and H₂S results

Table 2.4 and 2.5 illustrates the odour threshold concentration and hydrogen sulphide results obtained during the monitoring period. All sampling and analysis for odour was performed in accordance with EN13725:2003. No elevated concentrations of odour or hydrogen sulphide were detected during the survey.

Table 2.4. Odour threshold concentration and Hydrogen sulphide results following monitoring of Green King Composting Ltd, Coolbeg, Co. Wicklow.

Date	Sample Location	Odour threshold conc. (OuE m ⁻³)	H ₂ S (ppb)	Comment
02/12/2014	Loc 1	57	<3	No distinct odour
02/12/2014	Loc 2	53	<3	No distinct odour
02/12/2014	Loc 3	49	<3	No distinct odour
02/12/2014	Loc 4	36	<3	No distinct odour
02/12/2014	Loc 5	--	<3	No distinct odour
02/12/2014	Loc 6	33	<3	No distinct odour
02/12/2014	Loc 7	-	<3	No distinct odour
02/12/2014	Loc 8	62	<3	No distinct odour

3. 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, 2, 3. Currently, there are no significant bioaerosol impacts in the vicinity of Green King Composting facility located at Coolbeg, Co. Wicklow with all reported bioaerosol ambient air concentrations within the range of the proposed assessment criterion.
2. All odour sampling and analysis was performed in accordance with EN13725:2003.
3. All ambient odour threshold concentrations were less than 62 Ou_E/m³, therefore there is no indication of any significant odour impact.
4. All Hydrogen sulphide concentrations recorded at each monitoring location were less than 3ppb in ambient air.

Appendix E: 2014 Compost Certificate of Analysis Report

Project Code : 14-42958
 Report Date : 05-Mar-2015

Report Unique ID: 49155
 Commen. Date: 10/12/2014

Customer: IAN BROWNE

Contact Details:

COOLBEG
 WICKLOW
 CO WICKLOW

Approved by : Roisin Kavanagh
 Team Leader

Sample Number : 404812

Client ID: Composting greenwaste 09/12/14

Sample Type: Solid

Received: 10/12/2014 15:49

Condition: Good

Analysis	Component	Specification	Result	Units
e.Coli**	e.Coli **	-	180	cfu/g
	Salmonella**	-	None Detected	
	Particle size >31.5mm (%)	-	0	%
	Particle size >16mm (%)	-	0.1	%
	Particle size >8mm (%)	-	0.4	%
	Particle size >4mm(%)	-	12.8	%
	Particle size >2mm (%)	-	30.6	%
	Particle size >1mm (%)	-	34.2	%
	Particle size <1mm (%)	-	22.03	%
	Total contaminants in sample analysed	-	1.99	%
	Total Glass in Sample	-	0.05	%
	Total Metal in Sample	-	0	%
	Total Plastic in Sample	-	0	%
	Total Stone and Other Inorganics	-	1.93	%
Cress Test	Cress germination compared to control	-	95.83	%
	Root Index compared to control	-	112	%
	MLVI compared to control	-	109	%
	% Sample diluted with peat	-	0	%
C:N Ratio	C:N Ratio	-	14	%
Density	Density	-	570.4	g/l

Project Code : 14-42958

Report Unique ID: 49155

Sample Number : 404812

Client ID: Composting greenwaste 09/12/14

Sample Type: Solid

Received: 10/12/2014 15:49

Condition: Good

<i>Analysis</i>	<i>Component</i>	<i>Specification</i>	<i>Result</i>	<i>Units</i>
Heavy Metals**	Cd (Dry Wt Basis)**	-	1.21	mg/kg
	Cr (Dry Wt Basis)**	-	18.8	mg/kg
	Cu (Dry Wt Basis)**	-	66.0	mg/kg
	Ni (Dry Wt Basis)**	-	19.4	mg/kg
	Pb (Dry Wt Basis)**	-	87.3	mg/kg
	Zn (Dry Wt Basis)**	-	211	mg/kg
	Hg (Dry Wt Basis)**	-	0.17	mg/kg
Organic Matter	Organic Matter	-	37.6	%
Oxygen Uptake Rate	Oxygen Uptake Rate (OUR)	-	4.6	mmolO ₂ /kg OS/h
% NPK **	Total Nitrogen (N) **	-	1.45	% wt/wt
pH	pH reading	-	8.28	
	pH	-	8.3	
	Temperature	-	18.2	
Self Heating	Self Heating Test	-	17.8	°C
	Control	-	18.8	°C
% SOL NUTRIENTS **	NH ₄ - N **	-	<10	mg/kg
	NO ₃ - N **	-	159	mg/kg
	PO ₄ - P **	-	86.5	mg/kg
	K **	-	995	mg/kg

Project Code : 14-42958

Report Unique ID: 49155

Methods of Analysis

<u>Analysis Name:</u>	<u>Method:</u>
% NPK **	%N: I.S EN 13554-1 %P: I.S EN 13650 %K: I.S EN 13650
C:N Ratio	Inhouse Calculation based on % C & % N
Heavy Metals**	I.S EN 13650 & Hg -ISO 16772
Cress Test	FprEn 16086-2
Self Heating	FprEN 16087-2
Fraction Analysis	PAS 100:2005 Annex E
pH	based on I.S.EN13037
% SOL NUTRIENTS **	I.S EN 13652
e.Coli**	G/72 MPN based on IDEXX defined substrate method
Oxygen Uptake Rate	based on PrEN 16087-1
Density	Gravimetric analysis
Organic Matter	based on I.S. EN 13039

Notes

* = INAB accredited test

** = subcontracted test

*** = outside accredited range

Conditions

1. Reports shall not be reproduced except in full, without the expressed approval of Bord Na Mona Technical Services Analytical Laboratory
2. Results contained in this report relate only to the items tested.
3. All Comments concerning this report or its contents should be forwarded to the Laboratory Manager

Appendix F: 2014 PRTR Submission



[Guidance to completing the PRTR workbook](#)

AER Returns Workbook

Version 1.1.17

REFERENCE YEAR	2013
-----------------------	------

1. FACILITY IDENTIFICATION

Parent Company Name	Kings Tree Services Limited
Facility Name	Kings Trees Services Composting Facility
PRTR Identification Number	W0218
Licence Number	W0218-01

Waste or IPPC Classes of Activity

No.	class name
4.2	Recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes).
4.13	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.

Address 1	Coolbeg
Address 2	Co Wicklow
Address 3	
Address 4	
Country	Wicklow
Country	Ireland
Coordinates of Location	-6.09863 52.9559
River Basin District	IEEA
NACE Code	3832
Main Economic Activity	Recovery of sorted materials
AER Returns Contact Name	Ian Browne
AER Returns Contact Email Address	ian@greenking.ie
AER Returns Contact Position	Facility Manager
AER Returns Contact Telephone Number	0404 62433
AER Returns Contact Mobile Phone Number	0868382004
AER Returns Contact Fax Number	040468846
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	2
User Feedback/Comments	
Web Address	

2. PRTR CLASS ACTIVITIES

Activity Number	Activity Name
50.1	General
50.1	General

3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)

Is it applicable?	
Have you been granted an exemption?	
If applicable which activity class applies (as per Schedule 2 of the regulations)?	
Is the reduction scheme compliance route being used?	

4. WASTE IMPORTED/ACCEPTED ONTO SITE

[Guidance on waste imported/accepted onto site](#)

Do you import/accept waste onto your site for on-site treatment (either recovery or disposal activities)?	
---	--

This question is only applicable if you are an IPPC or Quarry site

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

[PRTR# : W0218 | Facility Name : Kings Trees Services Composting Facility | Filename : W0218_2013.xls | Return Year : 2013]

28/03/2014 15:24

Please enter all quantities on this sheet in Tonnes

5

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonnes per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	Haz Waste : Name and Licence/Permit No of Next Destination Facility Non-Haz Waste : Name and Licence/Permit No of Recover/Disposer	Haz Waste : Address of Next Destination Facility Non-Haz Waste : Address of Recover/Disposer	Name and License / Permit No. and Address of Final Recoverer / Disposer (HAZARDOUS WASTE ONLY)	Actual Address of Final Destination i.e. Final Recovery / Disposal Site (HAZARDOUS WASTE ONLY)	
						M/C/E	Method Used						
Within the Country	20 02 01	No	1100 0.0	biodegradable waste	R3	M	Weighed	Onsite of generic,W0218-01	King Tree Services Ltd.	Coolbeg,Coolbeg,Wicklow,Co Wicklow,Ireland			
			0										

* Select a row by double-clicking the Description of Waste then click the delete button

- [Link to previous years waste data](#)
- [Link to previous years waste summary data & percentage change](#)
- [Link to Waste Guidance](#)