

2013 Annual Environmental Report

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

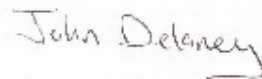
Waste Licence Number: W0218-01

Annual Environmental Report 2013

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



Prepared By: Geoenvironmental Consultants



Report Compilation & Writing:

John Delaney (MSc; BSc)
Environmental Consultant
On behalf of Greenking Compost Ltd

Date:

28/3/2014

Table of Contents

1.0	INTRODUCTION.....	2
2.0	SITE DESCRIPTION.....	3
2.1	Facility Location and Layout.....	3
2.2	Waste Types and Volume.....	3
3.0	MANAGEMENT OF THE FACILITY.....	4
3.1	Site Management Structure.....	4
3.2	Environmental Management System.....	4
3.3	Environmental Management Programme.....	7
3.4	Staff Awareness and Training.....	7
3.5	Public Communications Programme.....	7
4.0	EMISSIONS MONITORING.....	8
4.1	Noise Monitoring.....	8
4.2	Dust Monitoring.....	8
4.3	Surface Water Monitoring.....	9
4.4	Groundwater Monitoring.....	10
4.5	Bioaerosol Monitoring.....	11
4.6	Odour Monitoring.....	12
4.7	Compost Analysis.....	13
4.7	Pollutant Release and Transfer Register.....	13
5.0	Site Visits and Inspections.....	13
6.0	NUISANCE CONTROL.....	14
6.1	Mud, Dust, Litter.....	14
7.0	Site Developments Works.....	14
7.1	Engineering Works.....	14
7.2	Tanks and Pipeline Testing and Inspection Report.....	14
8.0	RESOURCE USE AND ENERGY EFFICIENCY.....	14
8.1	Energy Efficiency Audit.....	14
8.2	Resource Consumption Summary.....	15
9.0	WASTE RECEIVED AND CONSIGNED FROM FACILITY.....	15
9.1	Waste Management Records.....	15
9.2	Waste Recovery Report.....	16
10.0	ENVIRONMENTAL INCIDENTS AND COMPLAINTS.....	16
10.1	Incidents Summary.....	16
10.2	Register of complaints.....	17
11.0	OTHER REPORTS.....	17
11.1	Statement of Measures in Relation to the Prevention of Environmental Damage and Remedial Actions.....	17
12.0	FIGURE 1 –SITE LOCATION MAP.....	18
13.0	APPENDICES.....	21

1.0 INTRODUCTION

Geoenvironmental was commissioned by Greenking Composting Ltd to collate and compile the company's 2013 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 2013 to December 2013.

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 2013 and proposed schedule of targets for 2014 are outlined below.

Table 0:2: Schedule of Objectives and Targets for 2013

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 2013
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 2014	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 2014	
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 2013 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 2013.

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

No noise monitoring was carried out in 2013. Noise monitoring frequency at the Coolbeg Composting facility was reduced to biennial (once every two years). The last noise survey was carried out in 2012.

4.2 Dust Monitoring

Dust deposition monitoring was carried out quarterly at three on site locations in 2013. 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 ALS an INAB accredited laboratory located at Carraigeen Business Park, Clonmel, Co. Tipperary 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 A

Table 4.1: Summary of Dust Monitoring Results

Quarter	Period		Deposition (mg/m ² /day)			Dust Deposition Limits
	From	To	D1	D2	D3	mg/m ² /day
Q1	1/4/13	30/4/13	28.9	14.8	11.2	350
Q2	1/6/13	1/7/13	191.5	109.4	120	350
Q3	1/7/13	1/8/2013	70.8	47.2	265.2	350
Q4	18/10/13	18/11/13	80.6	31.6	62.5	350

The dust monitoring results are well below the dust emission limits of 350 milligrams per square metre per day (averaged over 30 days) specified by its Waste Licence (Ref. No. W0218-01), therefore the site was compliant with the Waste Licence 2011 with regard to dust emissions.

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 2013 as it was not possible to retrieve a sample from the manhole sump due to the sustained period of dry weather experienced between June–December. A sustained period of wet weather is needed to provide an adequate volume of water to enable a sample to be taken. This was communicated to the inspector in December 2013. A sample was taken in early 2014 which shows compliance with all the chemical limits. The E-Coli results was also compliant but the Total Coliform count was slightly elevated at 12 MPN per 100 ml. This is most likely as a

result of naturally occurring bacteria entering the surface water sump. A copy of the certificate of analysis is set out in Appendix B.

The route of the new stretch of M11 motorway under construction between Rathnew – Arklow is located very close to the soakaway sump. There exists a risk of cross-contamination of the water within the sump from motorway construction activities and when the road opens from vehicles.

4.4 Groundwater Monitoring

A groundwater sample was taken from one monitoring location (PW1), as shown on Figure 2 (Site Layout Plan), on the 11th November 2013 by John Delaney of Geoenvironmental. Samples were analysed by ALS laboratories, Carrigeen Business Park, Clonmel, Co. Tipperary.. 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: Groundwater Monitoring Results

Parameter	Unit	PW1 6/12/13	MAC*
Electrical Conductivity	<i>mS/cm @ 20 deg C</i>	237	
pH	<i>pH Units</i>	7.75	-
Chloride	<i>mg/l</i>	22.3	187.5
Ammoniacal Nitrogen	<i>mg/l</i>	<1	0.175
Faecal Coliforms	<i>cfu/100m</i>	0	-
Total Coliforms	<i>cfu/100m</i>	0	-
Arsenic	<i>µg/l</i>	<5	7.5
Boron	<i>µg/l</i>	13	750

Cadmium	$\mu\text{g/l}$	<0.4	3.75
Chromium	$\mu\text{g/l}$	<1	37.5
Copper	$\mu\text{g/l}$	24.5	1500
Lead	$\mu\text{g/l}$	<5	18.75
Nickel	$\mu\text{g/l}$	<2	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 17th November 2013, 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 - 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	<4	<8	3
Loc 2	44	128	3
Loc 3	24	84	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 17th November 2013 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: Odour Threshold Concentration and Hydrogen Sulphide Results

Date	Sample Location	Odour threshold concentration (O _{uE} m ⁻³)	H ₂ S (ppb)	Comment
17/11/11	Loc 1	45	<3	No Distinct Odour
17/11/11	Loc 2	48	<3	No Distinct Odour
17/11/11	Loc 3	41	<3	No Distinct Odour
17/11/11	Loc 4	38	<3	No Distinct Odour
17/11/11	Loc 5	--	<3	No Distinct Odour
17/11/11	Loc 6	52	<3	No Distinct Odour
17/11/11	Loc 7	--	<3	No Distinct Odour
17/11/11	Loc 8	45	<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 O_{uE}/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 2nd December 2013. 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 2013 submitted to the Agency via the web-based data reporting system is set out in the Appendix F.

5.0 Site Visits and Inspections

The Agency carried out a site inspection on the 28th March 2013. A site inspection report was issued by the Agency Inspector Damian Masterson on 29th April 2013. No non-compliances or negative observations were highlighted in the report. The Agency Inspector found that the environmental management practices at the site were well organised.

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 2013 and it is not envisaged that any works will be carried out in 2014. 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. A Copy of the Oil tanks and Pipeline Testing Inspection Reports are provided in Appendix G.

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 2013. 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	11182	kWh	2013
Diesel	10000	Litres	2013
Heating Oil	650	Litres	2013
Hydraulic and Engine Oil	200	Litres	2013

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 2013. 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 2013 and December 2013 was 1,210 tonnes.

Table 0.1: Waste Received in 2013

EWC	Description	Waste in (tonnes)
20 02 01	Green Waste	1210
	Total Received	1210

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

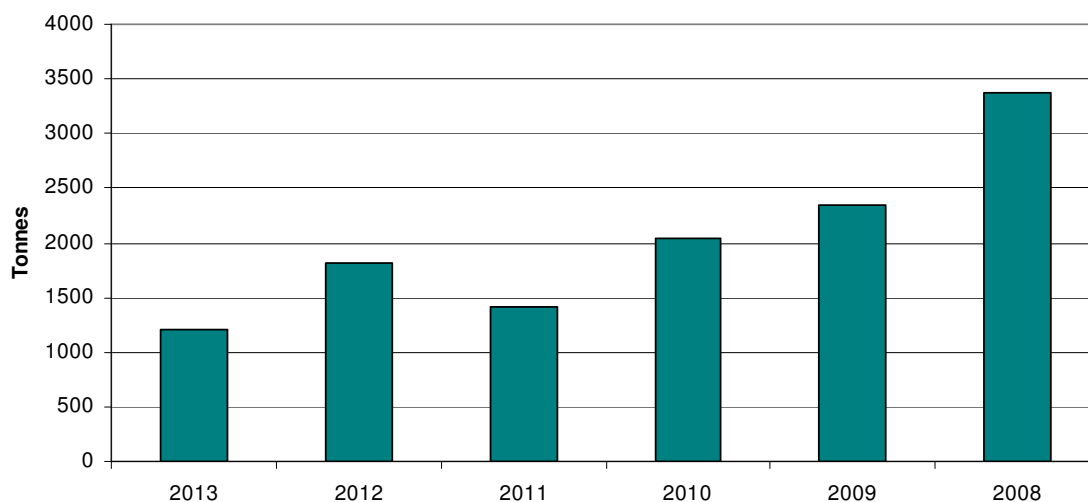
Table 0.2: Waste Received during 2008 to 2012

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

Table 0.3: Compost Quantities Consigned in 2013

EWC	Description	Waste (tonnes)
20 02 01	Compost	1228
	Total	1228

Figure 9.1: Green Waste Quantities Received 2008 - 2013



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 2013.

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 2013.

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 on-site biocycle wastewater treatment unit that is serviced regularly. The system was serviced in September 2013. A copy of the service report is set out in Appendix H.

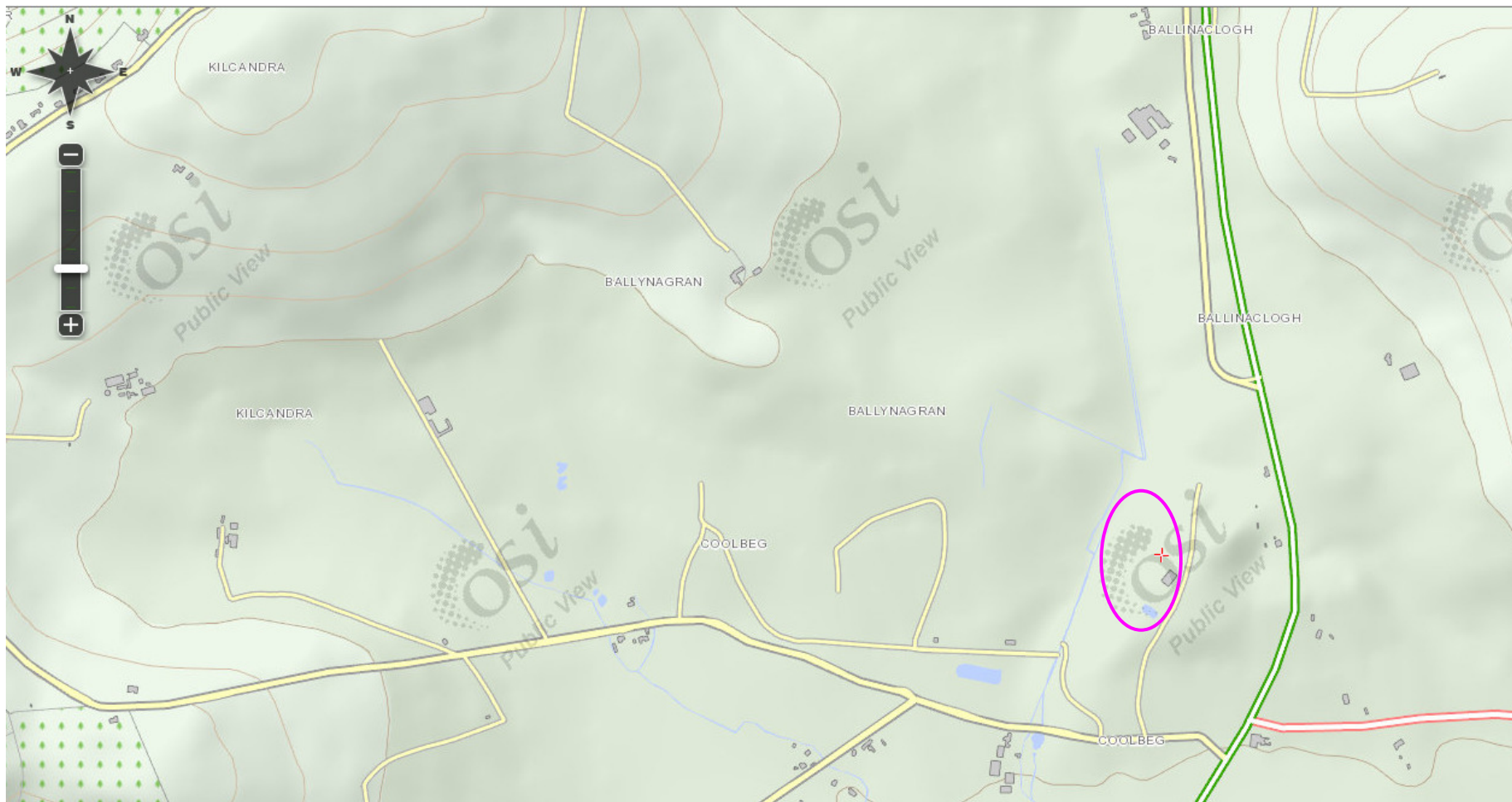
Dust and other air emissions – The composting piles are regularly sprayed with water, particularly during dry periods and this prevents excessive wind-blown dust and other material such as spores.







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.

12.0 FIGURE 1 –SITE LOCATION MAP

Site Location Map



LEGEND	
	DUST MONITORING LOCATION
	NOISE MONITORING LOCATION
	NOISE SENSITIVE LOCATION
	GROUNDWATER MONITORING WELL (PW)
	SURFACE WATER MONITORING LOCATION (SW)
	BASELINE BIOAEROSOL MONITORING



13.0 APPENDICES

Appendix A

Dust Deposition Results



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Report No: GeEn-054310513
Document No: EF0011

CERTIFICATE OF ANALYSIS

Client	Geoenvironmental	Date Received	31/05/2013
	Knocklas	Date Reported	10/06/2013
	Coolcotts	Order Number	N/A
	Co.Wexford		

For the Attention of: John Delaney
Sample Reception 1 sample(s) received in good condition.
Comments N/A

Note: A # next to the result indicates that there was insufficient sample to carry out testing as per SOP.

Report Authorised by:

Denis Kent
Technical Manager

Conditions:

1. Results in this report relate only to the items tested
2. Reports may not be reproduced except in full without the approval of Advanced Micro Services & Environmental Laboratories Ltd
3. All queries regarding this report should be addressed to the Technical Manager at the above address
4. A * next to a method reference signifies that Advanced Micro Services & Environmental Laboratories Ltd are NOT INAB accredited for this method
5. Results reported as CFU/cm² are calculated based on information supplied by customer regarding area swabbed
6. CFU indicates Colony Forming Units, MPN indicates Most Probable Number
7. SUBCON* indicates analysis subcontracted to approved subcontractors who do not hold accreditation for this test
8. SUBCON^ indicates analysis subcontracted to approved subcontractors who hold accreditation for this test



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Report No: GeEn-054310513

Document No: EF0011

CERTIFICATE OF ANALYSIS

Date Received 31/05/2013
Date Reported 10/06/2013
Order Number N/A

Sample Type Dust
Client ID D1 - Bergerhoff Dust Deposition Measurement at Greenking Composting, Coolbeg, Co. Wicklow. Sample in-situ from 01/04/13-30/04/13.
Date Tested 05/06/2013
ALS ID 1319096

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	28.9	mg/m ² /day	P524*

Report Authorised by:

Denis Kent
Technical Manager



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 Knocklas
 Coolcotts
 Co.Wexford

Date Received 31/05/2013

Date Reported 10/06/2013

Order Number N/A

For the Attention of: John Delaney

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Comments N/A

Note: A # next to the result indicates that there was insufficient sample to carry out testing as per SOP.

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Denis Kent
Technical Manager

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Report No: GeEn-057310513

Document No: EF0011

CERTIFICATE OF ANALYSIS

Date Received 31/05/2013

Date Reported 10/06/2013

Order Number N/A

Sample Type Dust
Client ID D2 - Bergerhoff Dust Deposition Measurement at Greenking Composting, Coolbeg, Co. Wicklow. Sample in-situ from 01/04/13-30/04/13.
Date Tested 05/06/2013
ALS ID 1319097

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	14.8	mg/m ² /day	P524*

Report Authorised by:

Denis Kent
Technical Manager



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Report No: GeEn-061310513

Document No: EF0011

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Report No: GeEn-061310513

Document No: EF0011

CERTIFICATE OF ANALYSIS

Date Received 31/05/2013

Date Reported 10/06/2013

Order Number N/A

Sample Type Dust
Client ID D3 - Bergerhoff Dust Deposition Measurement at Greenking Composting, Coolbeg, Co. Wicklow. Sample in-situ from 01/04/13-30/04/13.
Date Tested 05/06/2013
ALS ID 1319116

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	11.2	mg/m ² /day	P524*

Report Authorised by:

Denis Kent
Technical Manager



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Report No: GeEn-079040713

Document No: EF0011

CERTIFICATE OF ANALYSIS

Client	Geoenvironmental	Date Received	04/07/2013
	Knocklas	Date Reported	17/07/2013
	Coolcotts	Order Number	N/A
	Co.Wexford		

For the Attention of: John Delaney

Sample Reception 3 sample(s) received in good condition.

Comments N/A

Note: A # next to the result indicates that there was insufficient sample to carry out testing as per SOP.

Report Authorised by:

Emma Haughton
Deputy Chemistry Manager

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Report No: GeEn-079040713

Document No: EF0011

CERTIFICATE OF ANALYSIS

Date Received 04/07/2013

Date Reported 17/07/2013

Order Number N/A

Sample Type Water
Client ID D1 3* Dust Bergerhoff Dust SAmping at Green King Composting, Coolbeg, Co. Wicklow
Date Tested 16/07/2013
ALS ID 1362127

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	191.5	mg/m2/day	P524*

Sample Type Water
Client ID D2 3* Dust Bergerhoff Dust SAmping at Green King Composting, Coolbeg, Co. Wicklow
Date Tested 16/07/2013
ALS ID 1362128

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	109.4	mg/m2/day	P524*

Sample Type Water
Client ID D3 3* Dust Bergerhoff Dust SAmping at Green King Composting, Coolbeg, Co. Wicklow
Date Tested 16/07/2013
ALS ID 1362129

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	120	mg/m2/day	P524*

Report Authorised by:

Emma Haughton
Deputy Chemistry Manager



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Report No: GeEn-039080813

Document No: EF0011

CERTIFICATE OF ANALYSIS

Client **Geoenvironmental**
 Knocklas
 Coolcotts
 Co.Wexford

Date Received 08/08/2013

Date Reported 20/08/2013

Order Number N/A

For the Attention of: John Delaney

Sample Reception 3 sample(s) received in good condition.

Comments N/A

Note: A # next to the result indicates that there was insufficient sample to carry out testing as per SOP.

Report Authorised by:

Emma Haughton
Deputy Chemistry Manager

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Report No: GeEn-039080813

Document No: EF0011

CERTIFICATE OF ANALYSIS

Date Received 08/08/2013

Date Reported 20/08/2013

Order Number N/A

Sample Type Dust
Client ID 30 Day dust samples from 1.7.13 - 01.08.13 D1 Bergoerhoff Dust Monitoring samples From Greenking Composting, Coolbeg Co Wicklow
Date Tested 19/08/2013
ALS ID 1405762

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	70.8	mg/m ² /day	P524*

Sample Type Dust
Client ID 30 Day dust samples from 1.7.13 - 01.08.13 D2 Bergoerhoff Dust Monitoring samples From Greenking Composting, Coolbeg Co Wicklow
Date Tested 19/08/2013
ALS ID 1405763

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	47.2	mg/m ² /day	P524*

Sample Type Dust
Client ID 30 Day dust samples from 1.7.13 - 01.08.13 D3 Bergoerhoff Dust Monitoring samples From Greenking Composting, Coolbeg Co Wicklow
Date Tested 19/08/2013
ALS ID 1405764

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	265.2	mg/m ² /day	P524*

Report Authorised by:

Emma Haughton
Deputy Chemistry Manager



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Report No: GeEn-342191113

Document No: EF0011

CERTIFICATE OF ANALYSIS

Client	Geoenvironmental	Date Received	19/11/2013
	Knocklas	Date Reported	29/11/2013
	Coolcotts	Order Number	N/A
	Co.Wexford		

For the Attention of: John Delaney

Sample Reception 3 sample(s) received in good condition.

Comments N/A

Note: A # next to the result indicates that there was insufficient sample to carry out testing as per SOP.

Report Authorised by:

Emma Haughton
Environmental Chemistry Manager

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Report No: GeEn-342191113

Document No: EF0011

CERTIFICATE OF ANALYSIS

Date Received 19/11/2013

Date Reported 29/11/2013

Order Number N/A

Sample Type Dust
Client ID D1 30 day bergerhoff dust sample from Greenking Compost Ltd Coolbeg
Date Tested 28/11/2013
ALS ID 1534906

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	80.6	mg/m ² /day	P524*

Sample Type Dust
Client ID D2 30 day bergerhoff dust sample from Greenking Compost Ltd Coolbeg
Date Tested 28/11/2013
ALS ID 1534907

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	31.6	mg/m ² /day	P524*

Sample Type Dust
Client ID D3 30 day bergerhoff dust sample from Greenking Compost Ltd Coolbeg
Date Tested 28/11/2013
ALS ID 1534908

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Dust Deposition	62.5	mg/m ² /day	P524*

Report Authorised by:

Emma Haughton
Environmental Chemistry Manager

Appendix B

Surface Water Certificate of Analysis



Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

Michael O'Sullivan
Public Analyst
H.S.E. Dublin Mid-Leinster
Public Analyst's Laboratory
Sir Patrick Dun's Hospital
Lower Grand Canal Street
Dublin 2
Tel. (01) 661 2022
Fax. (01) 662 8532
www.publicanalystdublin.ie

Date of this Report: 24/02/14

This is an amended report replacing the previous test report of 01/01/14

Report of the Public Analyst's Laboratory

Sample of: Environmental water.
Marked: Ian Browne, Greenking Composting, Coolbeg,
Wicklow, Co. Wicklow.

Date Sampled: 05/02/2014
Lab. Ref. No.: 00583/14/26 WP
Order No.:
Your Ref.: SW.
Analysis: Priv C & B - XCP
Supply Name: Surface Water.

Received on: 05/02/14

Report to: Ian Browne,

Greenking Composting,
Coolbeg,
Wicklow,
Co. Wicklow.

This report is issued subject to the conditions at the end of the report.

Report No.: 00583/14/26 WP /1

Microbiological Examination

Date Work Commenced: 05/02/14

SOP	Parameter	Result	Units
PALM0108	Coliforms	12 MPN per 100ml	
PALM0108	Escherichia coli	0 MPN per 100ml	

Authorised By:

Rachel Hewitt

Rachel Hewitt
Executive Analytical Chemist (Microbiology)

Chemical Analysis

Date Work Commenced: 05/02/14

SOP	Parameter	Result	Parametric Value	Units
PALCW0022	Hydrogen Ion (pH)	7.8	6.5 - 9.5	pH Units
PALCW0022	# pH measured at	17.9	-	°C
PALCW0011	# Biochemical Oxygen Demand	0.15	-	mg/L O2
PALCW0016	# Suspended Solids	<1.0	-	mg/l
PALCW0019	Conductivity @ 20°C	211	2500.0	µS/cm

"<" indicates "less than" the Limit of Quantitation for that parameter.

Authorised By:

Ken McCartney

Ken McCartney
Executive Analytical Chemist



Appendix C

Ground Water Certificates of Analysis



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Report No: GeEn-406061113

Document No: EF0011

CERTIFICATE OF ANALYSIS

Client	Geoenvironmental	Date Received	06/11/2013
	Knocklas	Date Reported	22/11/2013
	Coolcotts	Order Number	N/A
	Co.Wexford		

For the Attention of: John Delaney

Sample Reception 1 sample(s) received in good condition.

Comments N/A

Note: A # next to the result indicates that there was insufficient sample to carry out testing as per SOP.

Report Authorised by:

Emma Haughton
Deputy Chemistry Manager

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Report No: GeEn-406061113

Document No: EF0011

CERTIFICATE OF ANALYSIS

Date Received 06/11/2013
Date Reported 22/11/2013
Order Number N/A

Sample Type Water
Client ID Groundwater Sample (PW1) from Greenking, Coolbeg, Co. Wicklow
Date Tested 07/11/2013
ALS ID 1520439

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Ammonical nitrogen	<1.0	mg/l NH3-N	P218*
pH	8.0	Units	P233
Chloride	22.3	mg/l CL	P281
Conductivity @ 20°C	237	µs/cm	P284
Total Arsenic	<0.0050	mg / l	SUBCON^
Total Boron	0.013	mg / l	SUBCON^
Total Cadmium	<0.00040	mg / l	SUBCON^
Total Chromium	<0.0010	mg / l	SUBCON^
Total Copper	0.0245	mg / l	SUBCON^
Total Lead	<0.0050	mg / l	SUBCON^
Total Nickel	<0.0020	mg / l	SUBCON^

Report Authorised by:

Emma Haughton
Deputy Chemistry Manager



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Report No: GeEn-408061113

Document No: EF0011

CERTIFICATE OF ANALYSIS

Client **Geoenvironmental**
Knocklas
Coolcotts
Co. Wexford

Date Received 06/11/2013

Date Reported 09/11/2013

Order Number N/A

For the Attention of: John Delaney

Sample Reception 1 sample(s) received in good condition.

Comments N/A

Note: A # next to the result indicates that there was insufficient sample to carry out testing as per SOP.

Report Authorised by:

Eliza Moriarty
Shift Supervisor

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Report No: GeEn-408061113

Document No: EF0011

CERTIFICATE OF ANALYSIS

Date Received 06/11/2013

Date Reported 09/11/2013

Order Number N/A

Sample Type Water
Client ID Groundwater Sample (PW1) from Greenking, Coolbeg, Co. Wicklow
Date Tested 06/11/2013
ALS ID 1520440

<u>Test</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>
Faecal coliform bacteria	0	MPN/100ml	SP 047 Based on ISO 9308-2 (1990)*
Faecal coliform bacteria	<1	MPN/100ml	SP 047 Based on ISO 9308-2 (1990)*
Coliform bacteria	0	CFU/100ml	SP 140 MODW Part 4,B 2009
Coliform bacteria	<10	CFU/100ml	SP 140 MODW Part 4,B 2009
Coliform bacteria	<100	CFU/100ml	SP 140 MODW Part 4,B 2009

Report Authorised by:

Eliza Moriarty
Shift Supervisor

Appendix D

Bioaerosols, Odour & Hydrogen Sulphide Monitoring Report



ODOUR & ENVIRONMENTAL CONSULTANTS

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www.odourireland.com

**YEAR 2013 - 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:	16 th Jan. 2014
REPORT NUMBER:	2014011(1)
DOCUMENT VERSION:	Version 1
REVIEWERS:	


TABLE OF CONTENTS

Section	Page number
TABLE OF CONTENTS	i
DOCUMENT AMENDMENT RECORD	ii
1. Introduction	1
1.1 Aims of the study	1
2. Materials and methods	1
2.1 Sampling locations and residential locations	1
2.2 Meteorological data	3
2.3 Bioaerosols monitoring	3
2.4. Transport of bioaerosol samples	4
2.5. Odour sampling	4
2.6. Olfactometry	4
2.7. Odour measurement in accordance with EN13725:2003	5
2.7.1 What is an odour unit?	5
2.8. H ₂ S measurement	5
2.9 Bioaerosol assessment criteria	6
2.10 Ambient Bioaerosol air quality	7
2.11. Odour and H ₂ S results	8
3. Conclusions	8

Document Amendment Record

Client: *Kings Trees Limited*

Title: Year 2013 - Bioaerosol, Odour and H₂S Impact Assessment at Green King Composting Ltd, Coolbeg, Co. Wicklow

Project Number: 2014011(1)			Document Reference: Year 2013 - Bioaerosol, Odour and H ₂ S Impact Assessment at Green King Composting Ltd, Coolbeg, Co. Wicklow		
2014011(1)	Document for review	B.A.S.	JMC	B.A.S	07/01/2014
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 52 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

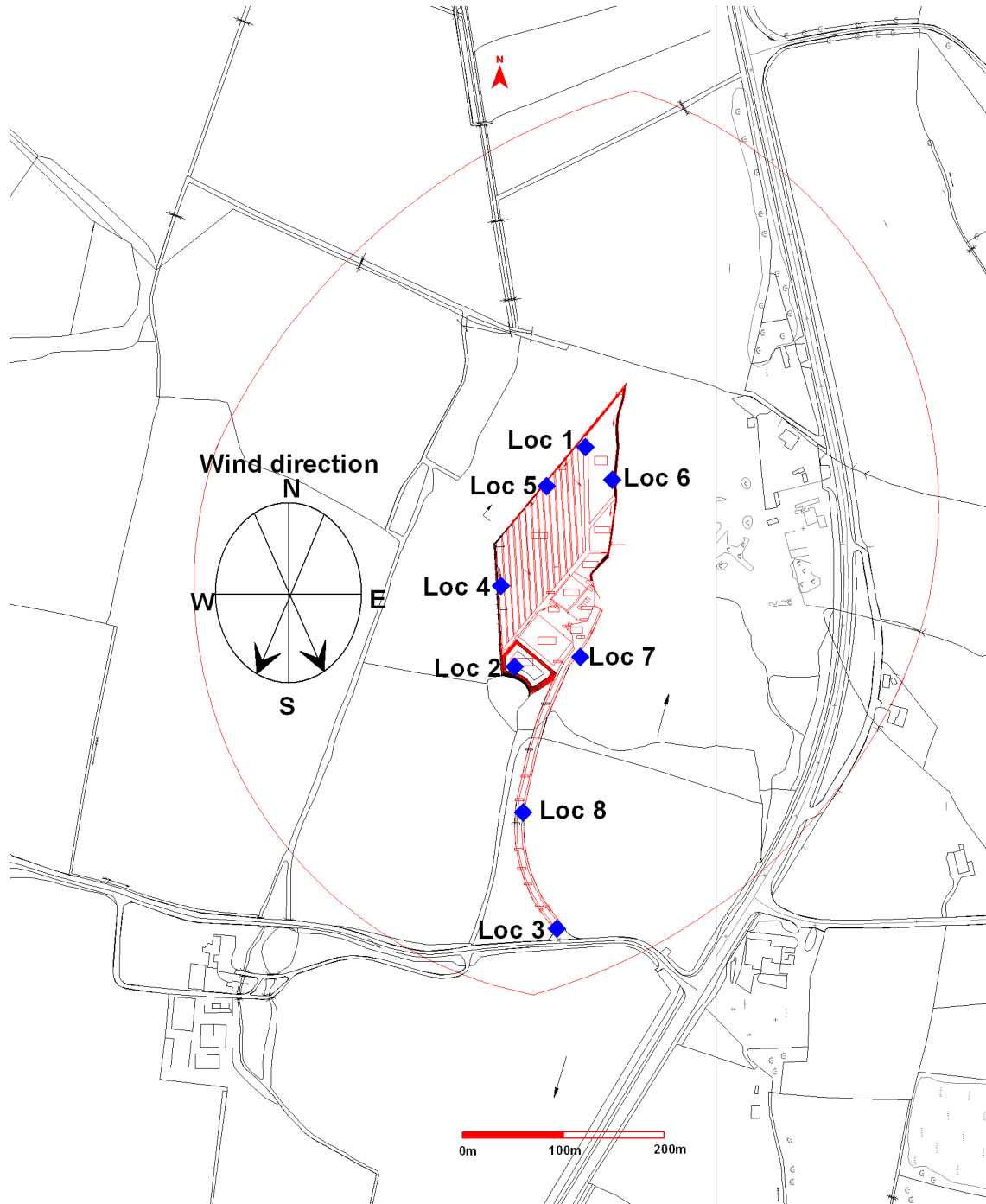


Figure 2.1. Schematic overview of Bioaerosol, Odour and H₂S monitoring locations.

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. Cloud cover was low with an octave rating of 2 to 3 (i.e. on an 8 point scale). Barometric pressure was approximately 1014 mbar. Relative humidity was 65% while temperature was low from 11 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 07/11/2013
Wind direction (From)	50 to 280
Wind speed (m s ⁻¹)	1
Barometric pressure	1014
Temperature (°C)	11
Relative humidity (%)	65

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 07th November 2013.

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	8	<3	3
Loc 2	15	35	3
Loc 3	12	28	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
07/11/2013	Loc 1	45	<3	No distinct odour
07/11/2013	Loc 2	48	<3	No distinct odour
07/11/2013	Loc 3	41	<3	No distinct odour
07/11/2013	Loc 4	38	<3	No distinct odour
07/11/2013	Loc 5	--	<3	No distinct odour
07/11/2013	Loc 6	52	<3	No distinct odour
07/11/2013	Loc 7	-	<3	No distinct odour
07/11/2013	Loc 8	45	<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 52 OuE/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

ANUA Compost Analysis Report



*ANALYSIS OF COMPOSTED GREEN
MATERIAL FROM GREENKING
COMPOSTING*

RECEIVED 02ND DECEMBER 2013

REPORT NO: 43603

ATTENTION: Iam Browne
GREENKING COMPOSTING
COOLBEG
WICKLOW
Co. WICKLOW

PREPARED BY: Aoife Doyle
Team Leader
ANUA

DATE: 28 January 2014

1 Introduction

One sample was received from Greenking Recycling on the 02nd of December 2013. No details of this sample are known; it was received in good condition and labelled as follows:

ANUA lab code	Client code
373938	Not known

The sample was analysed as requested by the client.

2 Results of Analysis

Compost Testing and Analysis Service

Report ref: 13-38006

Sample reference: 373938

Sample matrix: not known

Maturity Tests

Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results (mmolO ₂ /kg OS/h)
373938	PrEN 16087-1	4.8

Self Heating

Sample no	Maximum Temperature reached (ambient 20 ^o C)
373938	19

Plant Nutrient

Sample no	pH	EC μS.cm ⁻¹
373938	8.4	954
Test Method	I.S. EN13037	I.S. EN13038

CAT Soluble Nutrients

Sample no	NH ₄ -N mg.L ⁻¹	NO ₃ -N mg.L ⁻¹	PO ₄ -P mg.L ⁻¹	K mg.L ⁻¹
373938	687	7	54	3770
Test Method	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652

Microbiological Analysis

Sample no	E. coli (cfu/g)	Salmonella (spp/25g)
373938	<10	Not detected
Test Method	ISO 11866-2	I.S. EN ISO 6579

Physical Analysis

Sample no	H ₂ O %	Dry Matter %	Organic Matter %
373938	27	73	40
Test Method	I.S. EN 13041	I.S. EN 13041	I.S. EN 13039

Cress Germination Test

Sample no	Sample Diluted with 25% peat, to bring to correct EC	% Germination compared to control*	Root Index Compared to control (%)	MLVI compared to control (%)
373938	EC	100	93	92

* <80% = fail (method based on pr EN 16086-2)

Particle Size Analysis (Dry Wt. Basis)

<1mm %	1-2mm %	2-4mm %	4-8mm %	8-16.5mm %	16.5-31.5mm %	>31.5mm %
38	21	12	10	12	7.0	<0.01

Contaminants (Dry Wt. Basis)

Sieve size	Stones %	Metals %	Plastic %	Glass %	Other %
<1mm	n/d	n/d	n/d	n/d	n/d
1-2mm	n/d	n/d	n/d	n/d	n/d
2-4mm	2.4	<0.01	<0.01	<0.01	<0.01
4-8mm	2.1	<0.01	<0.01	<0.01	<0.01
8-16mm	<0.01	<0.01	<0.01	<0.01	<0.01
16-31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01
>31.5mm	<0.01	<0.01	<0.01	<0.01	<0.01

Heavy Metals (Dry Wt. Basis)

Sample no	Cd mg.kg ⁻¹	Cr mg.kg ⁻¹	Cu mg.kg ⁻¹	Hg mg.kg ⁻¹
373938	1.12	16.7	51.4	0.10
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650	ISO 16772

Sample no	Ni mg.kg ⁻¹	Pb mg.kg ⁻¹	Zn mg.kg ⁻¹
373938	18.2	79.9	203
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650

Total Plant Nutrients (Dry Wt. Basis)

Sample no	N %	P %	K %	C %	C:N %
373938	1.70	0.30	0.64	22	13
Test Method	I.S.EN 13554-1	I.S. EN 13650	I.S. EN 13650	I.S. EN 13039	

Bulk Density:

Sample no	Bulk Density (g/L)	Dry Bulk Density (g/L)
373938	540	397

Appendix F

PRTR Summary Report



[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 : Address of Next Destination Facility	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)
						Haz Waste : Name and Licence/Permit No of Recoverer/Disposer	Non Haz Waste: Address of Recoverer/Disposer						
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](#)

Appendix G

Copy of the Oil Tank Assessment and Pipeline Testing Inspection Letters

KELLY ENVIRONMENTAL SERVICES

◆ FOR ALL YOUR DRAINAGE NEEDS ◆

◆ CCTV DRAIN INSPECTIONS ◆ DRAIN UNBLOCKING ◆ GREASE TRAP MAINTENANCE ◆

Head Office: Rathdown Villa, Rathdown Rd, Greystones, Co Wicklow



Greenking recycling centre.

All foul and surface water drains were cleaned and surveyed in July 2013 using high pressure water jetting and ipec CCTV equipment, all drains were found to be in good condition as per CCTV survey report and attached DVD's.

Regards,

Stephen Smart,

Business development manager.

M Blanchfield Oil Services

Ballyramon Common
Kilmacanogue
Bray
Co. Wicklow
0872567500
Fax/Phone 012819814

blanchtanks@gmail.com

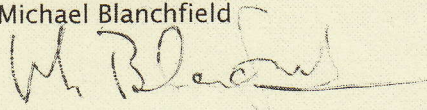
16 July 2013

Green King Composting
The Beehive
Wicklow
Co. Wicklow

To whom It May Concern

I have inspected the oil storage tanks at the above premises
And found them to be in good condition and suitable for the storage of gas oil
and kerosene

Michael Blanchfield



Appendix H

Biocycle Wastewater Treatment System Maintenance Report

Invoice

Enviropak

Septic Tank & Pump Services

John Buckley - 25 Patrick St, Enniscorthy - Mobile

M. Greenking Compost Ltd No

Co Wicklow

Due	Description
Sept 2013	Annual Service on Biofilter treatment tank
	Power supply on timer at tank
	Recirculating Water pump working well
	lifted + cleared down

V.A.T No IE 5033772 K

Sub - Total

V.A.T @ 3.5%

Signed: John Buckley

Total

Enviropak

Septic Tank & Pump Services No 0112

John Buckley

25 Patrick St, Enniscorthy Mobile: 086 -8375545

Annual Service Report

Check Air Pump.....	<input type="checkbox"/>
Check Air Filter.....	<input type="checkbox"/>
Check Water Pump..... <u>Working fine</u>	<input checked="" type="checkbox"/>
Check Float Switch.....	<input type="checkbox"/>
Check Control Panel.....	<input checked="" type="checkbox"/>
Check Alarm.....	<input type="checkbox"/>

YES

NO

Tank needs to be emptied.....

Comments:

Customer: Greenking Compost Ltd Date: Sept 2013

Address: Co Wicklow

PRICE: €147 — Signed: John Buckley

Donegan Print 053 9233166