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Composting Facility, Coolbeg, Co. Wicklow
Kings Tree Services Ltd., (Greenking Composting Ltd.)

Annual Environmental Report 2012

Waste Licence Ref. No. W0218-01

March 2013
SLR Ref: 130311_501.00221.00002. Rev0

SLR Consulting Ireland, 7 Dundrum Business Park, Windy Arbour, Dublin 14, Ireland
T : +353 1 296 4667 F : +353 1 296 4676 www.slrconsulting.com

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1.0 INTRODUCTION

This Annual Environmental Report (AER) is prepared for the Coolbeg Composting Facility operated by King Tree Services Ltd., trading as Greenking Composting Ltd. at Coolbeg, County Wicklow. The Waste Licence for the facility (Ref. No. W0218-01) was issued by the Environmental Protection Agency (EPA) on the 25th October 2005; the facility started its operation on the 6th June 2006. This AER covers the period from January 2012 to December 2012.

The content of this Annual Environmental Report is based on Schedule G of Waste Licence W0218-01.

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 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 40,000t of green waste annually.

The composting operations involve pre treatment of green waste, shredding and mixing, composting in open windrows, maturation and post treatment and impurities removal.

The finished product is suitable for horticultural and agricultural use.

2.3 Waste Activities

The following are the licensed Waste Activities undertaken at the site, as per the Fourth Schedule of the Waste Management Acts 1996 to 2003 granted in the waste licence:

- Recycling and reclamation of other organic substances which are not used as solvents (including composting and other biological processes).
- 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.

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 3-1
Organisation Structure

Staff Name	Role	Experience
Charlie King & Paddy King	Owner	Completed FAS Waste Management Course.
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 emergency response procedures were updated. The schedule of Objectives and Targets for 2012 and proposed schedule of targets for 2013 are outlined below.

3.2.1 Schedule of Objectives and Targets 2012

The Schedule of Objectives and Targets for 2012 are outlined in table 3-3.

Table 3-2
Schedule of Objectives and Targets for 2012

No	Objective	Target	Timescale	Responsibility
1	Reduce the energy /fuel usage at the facility.	Monitor diesel and electricity usage at least annually.	Diesel usage reduced.	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. Review the EMP in accordance with the Licence	Reviewed in March 2012	Facility Manager
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

3.2.2 Schedule of Objectives and Targets 2013

The Schedule of Objectives and Targets for 2013 are outlined in table 3-3.

Table 3-3
Schedule of Objectives and Targets for 2013

No	Objective	Target	Timescale	Responsibility
1	Reduce the energy /fuel usage at the facility.	Monitor diesel and electricity usage at least annually.	Q4 2013	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 2013	
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 2012 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 Emissions Monitoring.

3.4 Staff Awareness and Training

No staff training was carried out in 2012.

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 2 (Site Layout Plan) of this AER.

4.1 Noise Monitoring

Noise monitoring was carried out in 2012. Noise monitoring frequency at the Coolbeg Composting facility was reduced to biennial (once every two years). Noise monitoring was carried out three locations (N1, N2, and NSL1), see Figure 2 (Site Layout Plan) for monitoring locations .The results for 2012 are as follows: -

Monitoring for compliance with the noise emission conditions of the Waste Licence (No. W0247-01) was carried out on the 7th November 2012.

At the measurement positions, the following noise level indices were recorded:

- $L_{Aeq,T}$ – the A-weighted equivalent continuous sound pressure level over the measurement period, effectively represents an “average” energy level of all the sampled levels.

- $L_{A90,T}$ – the A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe the background noise.
- $L_{A10,T}$ – the A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe or identify road traffic noise

A small difference in $L_{A10,T}$, $L_{Aeq,T}$ and $L_{A90,T}$ will indicate a relatively constant noise emission (or a lack of intermittent noise). The greater the difference between the $L_{A10,T}$, $L_{Aeq,T}$ and $L_{A90,T}$ noise levels, the greater the proportion of noise arising from intermittent sources such as traffic.

A-weighting is the process by which noise levels are corrected to account for the non-linear frequency response of the human ear. All noise levels are quoted in dB(A) relative to a sound pressure of 20μPa.

The survey microphone was placed 1.5m above the ground in free-field conditions, *i.e.* at least 3.5m from the nearest vertical, reflecting surface.

The measurements were carried out using Larson Davis Model 831 Sound Level Meter (Serial number: 0001642) which was field calibrated using Larson Davis Calibrator Cal 200 (Serial number: 6970) before and after measurement. The Larson Davis Model 831 Sound Level Meter has integrated octave frequency analyser for the tonal noise analysis. All noise equipment had been calibrated to a traceable standard by UKAS-accredited laboratories within 12 months preceding the survey. Standard windshield was used on the microphone during the survey.

The weather conditions during the survey periods were acceptable for noise monitoring. Measurements were taken in the neutral weather conditions (absence of wind – below 5m/sec - and precipitation). The prevailing weather conditions at the time of survey are detailed below:

7th November 2012: Overcast but dry, Cloud over 95 %, Temp 9^0C,
Wind speed 0.5 – 1.7 m/sec, Wind direction: SW.

Schedule B.2 and Schedule C.2.3 of the Waste Licence (No. W0218-01) sets out the following noise emission limits :

"Equivalent sound levels attributable to all on site operations associated with development shall not exceed the limit value(s):

- *Daytime L_{Aeq} (30minutes) of 55 dB(A)*
- *Night-time L_{Aeq} (30minutes) of 45 dB(A)*

When measured at the monitoring locations. There shall be no clearly audible tonal component or impulsive component in the noise emission from the activity at any noise sensitive location. "

Table 4-1
Summary of Noise Monitoring Results

Location	Date	Time	Measured Noise Levels – dB(A)		
			$L_{Aeq,T}$	$L_{A10,T}$	$L_{A90,T}$
N1	7/11/12	10:10-11:40	53.9	55.5	47.8
N2	7/11/12	10:43-11:13	53.3	55.3	47.7
NSL1	7/11/12	11:21-11:51	54.5	58.3	49.7

N1

At the time of survey noise levels at this location were influenced by traffic on N11, traffic entering and exiting the site, natural noises such as the breeze through the trees and birds singing. Site activities (front loader) were audible at this location during noise monitoring.

N2

At the time of survey noise levels at this location were influenced by traffic on N11, traffic entering and exiting the site, natural noises such as the breeze through the trees and birds singing. Site activities (compost loading activities) were audible at this location during noise monitoring.

NSL1

At the time of survey noise levels at this location were influenced by constant traffic on N11, natural noises such as the breeze through the trees and birds singing, site activities were not audible at this location.

Tonal Analysis Results

British Standard 7445:1991 – Description and measurement of environmental noise gives guidance on tonality, and suggests that where a single 1/3rd-octave band level is at least 5 dB higher than the level in both of the two adjacent bands, then tonal character may be present. There were no observed changes in activity at the site during the monitoring periods.

On examination of the 1/3 Octave Band Noise Spectra recorded on 7th November 2012, no tonal components were identified within the measured range (6.3 Hz to 20 kHz) at any of the monitoring locations (See Figure 3, Figure 4 and Figure 5 below).

ISO 1996-2 'Acoustics – Description and measurement of environmental noise – Part 2: Acquisition of data pertinent to land use' states

'If tonal components are clearly audible and their presence can be detected by a one-third octave analysis, the adjustment may be 5 to 6 dB. If the components are only just detectable by the observer and demonstrated by narrow-band analysis, an adjustment of 2 to 3 dB may be appropriate'.

In this instance, the observer did not detect any tonal or impulsive components and no tonal components were identified by one-third octave analysis. In such circumstances no adjustment of the measured noise levels is warranted.

Figure 3
N1 1/3rdOctave Band Analysis

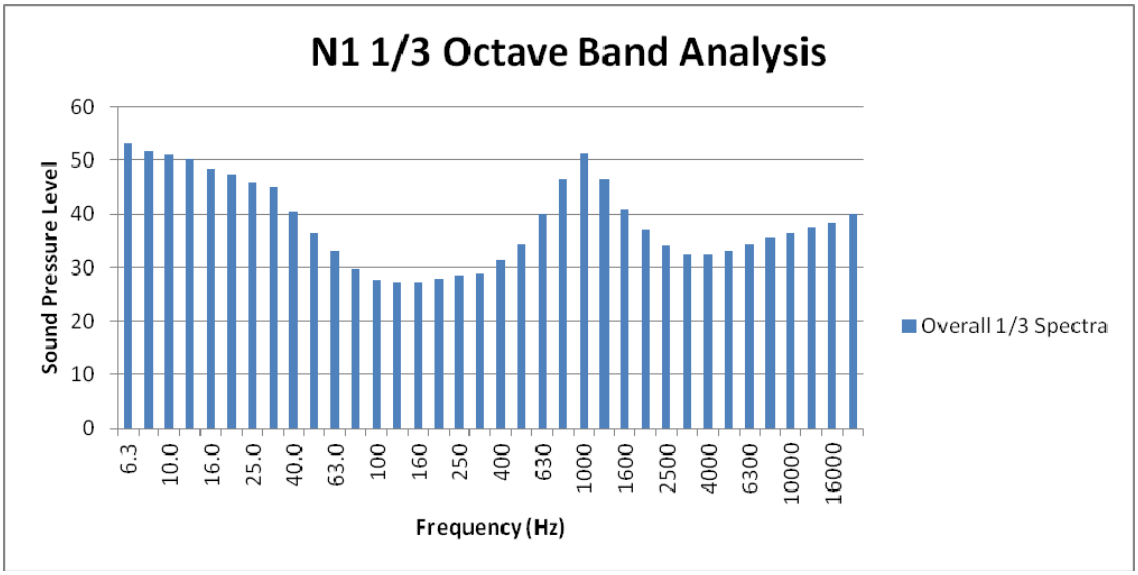


Figure 4
N2 1/3rdOctave Band Analysis

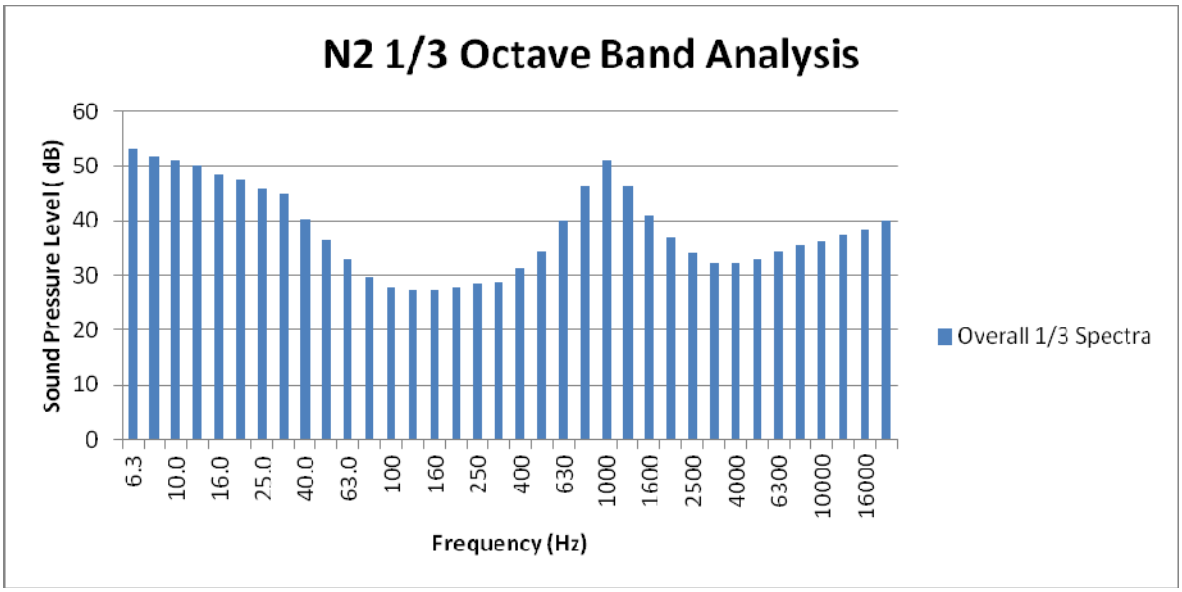
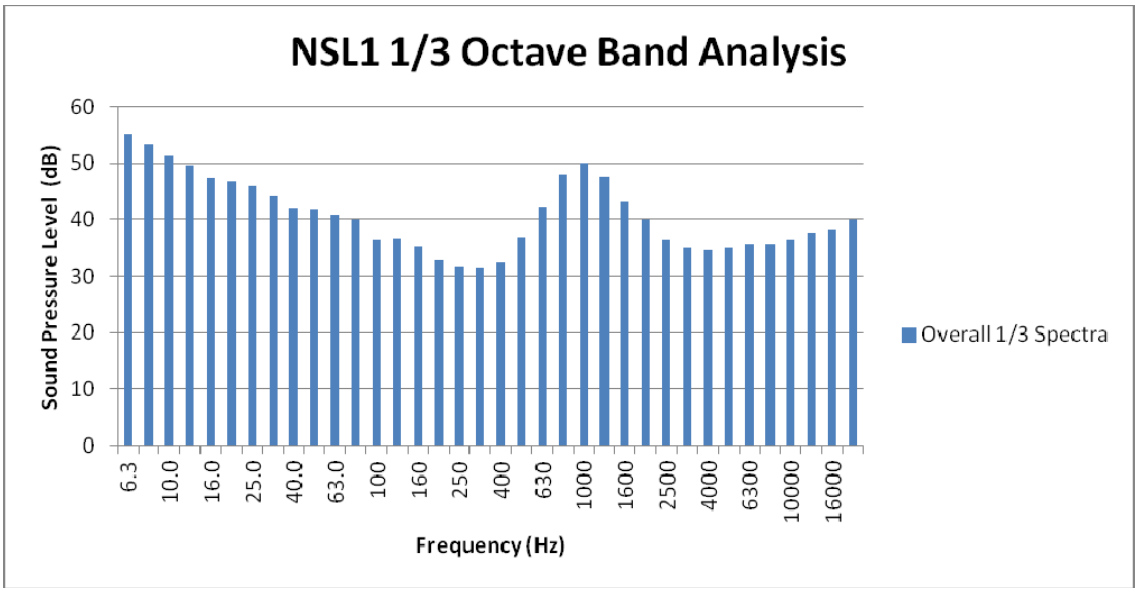


Figure 5
NSL1 1/3rd Octave Band Analysis



Noise levels at N1, N2 and NSL1 comply with noise emission limits set out by its Waste Licence.

4.2 Dust Monitoring

Dust deposition monitoring was carried out quarterly in 2012. Dust monitoring stations have been established at three locations (D1, D2, and D3), see Figure 2 (Site Layout Plan) for monitoring locations .The results for 2012 are as follows: -

Table 4-2
Summary of Dust Monitoring Results

	Period		Deposition (mg/m²/day)			Dust Deposition Limits
Quarter	From	To	D1	D2	D3	mg/m²/day
Q1	6/03/12	03/05/12	6	30	6	350
Q2	03/05/12	06/06/12	<1	30	1	350
Q3	06/07/12	08/08/12	93	20	17	350
Q4	07/11/12	12/12/12	66	8	5	350

The dust monitoring results are comfortably 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 samples were taken from monitoring location SW1 as shown on Figure 2 (Site Layout Plan) on the 3rd May 2012 and 13th December 2012 by SLR Consulting personnel. Samples were analysed by ALcontrol Laboratories. The certificate of analysis is provided in Appendix A.

Run-off from process areas is directed to the leachate storage lagoon and is kept isolated from the surface water drainage system.

Run-off from non-process paved areas and roof areas is collected and directed 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.

Surface water 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 below.

Table 4-3
Surface Water Monitoring Results

Parameter	Unit	SW1 3/05/12	SW1 13/12/12	MAC*
Electrical Conductivity	*mS/cm @ 20deg C*	0.233	0.369	-
pH	*pH Units*	7.66	8.27	4.5-9.0[1] 6.0-9.0[2]
Suspended Solids	*mg/l*	<2	3	-
Ammoniacal Nitrogen (as N)	*mg/l*	0.167	0.103	High Status ≤0.04 (mean) or ≤ 0.09 (95%) Good status ≤0.065 (mean) or ≤0.140 (95%)
BOD	*mg/l*	<2	<2	High Status ≤1.3 or ≤ 2.2(95%) Good status ≤1.5 or ≤2.6 (95%)
Faecal Coliforms	*cfu/100m*	100	34	-
Total Coliforms	*cfu/100m*	68700	4880	-

[1]Water hardness ≤100 mg/l CaCO3
[2]Water hardness >100 mg/l CaCO3
MAC Maximum Admissible Concentration
* European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (S.I. No. 272 of 2009).

The surface water quality is consistent with previous analyses and shows good chemical quality. The presence of faecal and total coliforms has occurred periodically in the surface water samples from SW1 and the licence holder made efforts in 2011 to investigate this issue, with assistance from SLR.

4.4 Groundwater Monitoring

A groundwater sample was taken from one monitoring location (PW1), as shown on Figure 2 (Site Layout Plan), on the 3rd May 2012 by SLR Consulting personnel. Samples were analysed by ALcontrol Laboratories. The certificate of analysis is provided in Appendix B.

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 4-4.

Table 4-4
Groundwater Monitoring Results

Parameter	Unit	PW1 12/05/11	MAC*
Electrical Conductivity	*mS/cm @ 20 deg C*	0.222	1.875
pH	*pH Units*	7.82	-
Chloride	*mg/l*	21.2	187.5
Ammoniacal Nitrogen	*mg/l*	0.074	0.175
Faecal Coliforms	*cfu/100m*	0	-
Total Coliforms	*cfu/100m*	<1	-
Arsenic	*µg/l*	<0.12	7.5
Boron	*µg/l*	14	750
Cadmium	*µg/l*	<0.1	3.75
Chromium	*µg/l*	1.78	37.5
Copper	*µg/l*	10.2	1500
Lead	*µg/l*	0.125	18.75
Nickel	*µg/l*	0.455	15
Zinc	*µg/l*	17.8	-
Mercury	*µg/l*	<0.01	0.75

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 quality testing shows that tested parameters are below the overall threshold values for chemical status of groundwater. The groundwater quality is very good with no sign of contamination from site activities.

4.5 Bioaerosol monitoring

Bioaerosol monitoring was carried out by Odour Monitoring Ireland on the 30th November 2012, as specified in Schedule C of the waste Licence W0218-01. The results of bioaerosol monitoring are summarised in Table 4-5. The full report is included in Appendix C. Bioaerosol monitoring locations are shown on Figure 2.1 of the Bioaerosol, Odour and Hydrogen Sulphide Impact Assessment Report.

Table 4-5
Bioaerosols concentration levels

Location ID	Average *Aspergillus fumigatus* Concentration (CUF m^{-3})[1]	Average *Mesophillic Bacteria* Concentration (CUF m^{-3})[1]	Sampling Count[2]
Loc 1	<4	<5	3
Loc 2	31	78	3
Loc 3	25	51	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. 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 30th November 2012 as specified in Schedule C of the waste Licence W0218-01. The results of odour monitoring are summarised in Table 4-6. The full report is included in Appendix C. Odour monitoring locations are shown on Figure 2.1 of the Bioaerosol, Odour and Hydrogen Sulphide Impact Assessment Report.

Table 4-6
Odour Threshold Concentration and Hydrogen Sulphide Results

Date	Sample Location	Odour threshold concentration (Ou_E m^{-3})	H_2s (ppb)	Comment
30/11/12	Loc 1	49	<3	No Distinct Odour
30/11/12	Loc 2	53	<3	No Distinct Odour

Date	Sample Location	Odour threshold concentration (Ou_E m^{-3})	H_2S (ppb)	Comment
30/11/12	Loc 3	45	<3	No Distinct Odour
30/11/12	Loc 4	42	<3	No Distinct Odour
30/11/12	Loc 5	--	<3	No Distinct Odour
30/11/12	Loc 6	57	<3	No Distinct Odour
30/11/12	Loc 7	--	<3	No Distinct Odour
30/11/12	Loc 8	49	<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 57 Ou_E/m^3, therefore there is no indication of any significant odour impact. All Hydrogen sulphide concentrations recorded at each monitoring location were less than 3 ppb in ambient air.

4.7 Application for Licensing Data and Environmental Reporting

Under the European Pollution and Transfer Register Regulation King Tree Services Ltd. are required to submit information annually to the EPA.

A copy of the ALDER Emission Reporting Workbook for 2012 submitted to the Agency via the web- based data reporting system is provided in the Appendix D.

5.0 AGENCY MONITORING AND ENFORCEMENT

5.1 Sampling and Analysis

During 2012 the EPA did not conduct any emission sampling at the Coolbeg Composting Facility.

5.2 Site Visits and Inspections

The Agency not carried out a site inspection in 2012.

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 2012, and it is envisaged that construction of concrete bays for storing finished products works might be carried out in 2013 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. The Tanks and Pipeline Testing was carried out in 2011, next testing is not due until 2014.

8.0 RESOURCE USE AND ENERGY EFFICIENCY

8.1 Energy Efficiency Audit

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 an individually adjusted thermostat. There are only two staff members at the facility full time and the use of energy is very low. The main user of electricity is the office equipment.

8.2 Resource Consumption Summary

Table 8-1 presents an estimate of resources used on-site from January to December 2012.

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.

Carbon footprint for 2012 was 30 tonnes mostly based on diesel and electricity usage. The carbon footprint has been reduced by 2 tonnes, which is mostly due to reduction in electricity and diesel usage.

Table 8-1
Resource Consumption summary

Energy Stream	Annual Quantity	Units	Period
Electricity	1288	kWh	2012
Diesel	8000	Litres	2012
Heating Oil	400	Litres	2012
Hydraulic and Engine Oil	50	Litres	2012

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 2012. 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 2012 and December 2012 was 1814 tonnes.

Table 9-1
Waste Received in 2012

EWC	Description	Waste in (tonnes)
20 02 01	Green Waste	1814
	Total Received	1814

Table 9-2 shows the quantities of waste received in previous years.

Table 9-2
Waste Received during 2006 to 2011

EWC	Description	2011	2010	2009	2008	2007	2006
20 02 01	Green Waste	1,413	2,034	2,351	3,377	4,062	1,179
	Total Received	1,413	2,034	2,351	3,377	4,062	1,179

9.2 Compost Monitoring

In compliance with Schedule F of the waste licence W0218-01 produced compost have been tested. Copies of the compost monitoring records are provided in Appendix E.

Table 9-3
Compost Consigned in 2012

EWC	Description	Waste (tonnes)
20 02 01	Compost	604
	Total	604

9.3 Waste Removed /Rejected

No waste rejected from site.

9.4 Waste Consigned

No waste oil removed in 2012.

Table 9-4
Waste Consigned in 2011

EWC	Description	Waste OUT (Litres)	Destination
13 02 05	Waste Oil	0	
	Total Consigned	0	

9.5 Waste Recovery Report

All waste received at the facility was used to produce compost; therefore the facility had a 100% recovery rate in 2012.

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.

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 – This is directed to a biocycle unit that is serviced at appropriate intervals.

- *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.

The site monitoring in 2012 has shown that the prevention measures employed at the site are currently operating effectively.

FIGURES

Figure 1Site Location Map
Figure 2Site Layout Plan

NOTES

1. *Ordnance Survey Ireland Licence No. SU 0000712 (c) Ordnance Survey Ireland & Government of Ireland*

2. *Extract from 1:50,000 OSI Discovery Series Map No. 56 & 62*

LEGEND

SITE LOCATION MAP

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

KING TREE SERVICES LTD.

COOLBEG, COUNTY WICKLOW

SITE LOCATION MAP

DRAWING D01

Scale	Date
1; 50,000	MARCH 20123

00221.00001.0.07.002.0.SiteLocation.dwg

N

W E

S

NOTES

BASED ON DIGITAL MAP PROVIDED BY ORDNANCE SURVEY IRELAND AND TOPOGRAPHIC SURVEY

ORDNANCE SURVEY IRELAND LICENCE NO. SU0000712 (c) ORDNANCE SURVEY IRELAND & GOVERNMENT OF IRELAND

LEGEND

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

D1
N1
Bio1
Bio2
NSL1
Bio5
D2
SW1
PW1
D3
N2
100.92m
COOLBEG
74.3196
72.8678
71.031
69.7582
68.2579
72.4696
65.4452
62.3918
59.7934
61.2873
65.4336
10kv
5m
5m

0 20 40 60 80m 120 160 200

Metres
1:2000

SLR CONSULTING IRELAND
7 DUNDRUM BUSINESS PARK
WINDY ARBOUR
DUBLIN 14
T: +353-1-2964667
F: +353-1-2964676
www.slrconsulting.com

KING TREE SERVICES LTD.

COOLBEG, COUNTY WICKLOW

SITE LAYOUT PLAN

DRAWING D02

Scale	Date
1; 2,000	MARCH 2013

00221.00002.0.07.002.0.EnvMonLoc.dwg

Appendix A
Surface Water Analysis Certificated

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

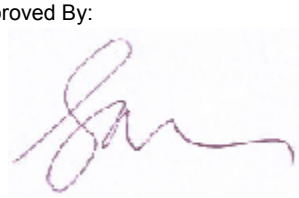
Date:	15 May 2012
Customer:	D_SLRCON_DUB
Sample Delivery Group (SDG):	120504-88
Your Reference:	501.00221.00001
Location:	King Tree Services Ltd
Report No:	181023

We received 2 samples on Thursday May 03, 2012 and 2 of these samples were scheduled for analysis which was completed on Tuesday May 15, 2012. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
5543376	PW1	GW		03/05/2012
5543375	SW1	SW		03/05/2012

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

LIQUID

Results Legend

X Test

N No Determination Possible

			Lab Sample No(s)	5543376	5543375
			Customer Sample Reference	PW1	SW1
			AGS Reference	GW	SW
			Depth (m)		
			Container	1l green glass bottle	1lplastic (ALE221)	Dublin - 1L Plastic	H2SO4 (ALE244)	1lplastic (ALE221)	Dublin - 1L Plastic	H2SO4 (ALE244)
Ammonium Low	All	NDPs: 0 Tests: 2				X		X
Anions by Kone (w)	All	NDPs: 0 Tests: 1		X				
BOD True Total	All	NDPs: 0 Tests: 1					X	
Coliforms (W)	All	NDPs: 0 Tests: 2			X			X
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2		X			X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1		X				
Mercury Dissolved	All	NDPs: 0 Tests: 1	X					
pH Value	All	NDPs: 0 Tests: 2		X			X	
Suspended Solids	All	NDPs: 0 Tests: 1					X	

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
§	Deviating sample.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed

Component	LOD/Units	Method	Customer Sample Ref.	PW1	SW1				
			Depth (m)	.	.				
			Sample Type	Water(GW/SW)	Water(GW/SW)				
			Date Sampled	03/05/2012	03/05/2012				
			Sample Time	.	.				
			Date Received	03/05/2012	03/05/2012				
			SDG Ref	120504-88	120504-88				
			Lab Sample No.(s)	5543376	5543375				
			AGS Reference	GW	SW				
Faecal Coliforms (W)*	CFU/100ml	SUB		0	100				
Coliforms, Total*	CFU/100ml	SUB		<1	68700				
Suspended solids, Total	<2 mg/l	TM022			<2 #				
BOD, unfiltered	<1 mg/l	TM045			<2 #				
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.074 #	0.167 #				
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120		0.222 #	0.223 #				
Arsenic (diss.filt)	<0.12 µg/l	TM152		<0.12 #					
Boron (diss.filt)	<9.4 µg/l	TM152		14 #					
Cadmium (diss.filt)	<0.1 µg/l	TM152		<0.1 #					
Chromium (diss.filt)	<0.22 µg/l	TM152		1.78 #					
Copper (diss.filt)	<0.85 µg/l	TM152		10.2 #					
Lead (diss.filt)	<0.02 µg/l	TM152		0.125 #					
Nickel (diss.filt)	<0.15 µg/l	TM152		0.455 #					
Zinc (diss.filt)	<0.41 µg/l	TM152		17.8 #					
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #					
Chloride	<2 mg/l	TM184		21.2 #					
pH	<1 pH Units	TM256		7.82 #	7.66 #				

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
SUB		Subcontracted Test		
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters		
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	5543376	5543375
Customer Sample Ref.	PW1	SW1
AGS Ref.	GW	SW
Depth		
Type	LIQUID	LIQUID
Ammonium Low	14-May-2012	14-May-2012
Anions by Kone (w)	11-May-2012	
BOD True Total		10-May-2012
Coliforms (W)	10-May-2012	10-May-2012
Conductivity (at 20 deg.C)	08-May-2012	08-May-2012
Dissolved Metals by ICP-MS	09-May-2012	
Mercury Dissolved	11-May-2012	
pH Value	08-May-2012	08-May-2012
Suspended Solids		11-May-2012

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Appendix

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 2 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors
employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5 -C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

SOLID MATRICES EXTRACTION SUMMARY

ANALYSIS	D&C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
SOLVENT EXTRACTABLE MATTER	D&C	DCM	SOXTHERM	GRAVIMETRIC
CYCLOHEXANE EXT. MATTER	D&C	CYCLOHEXANE	SOXTHERM	GRAVIMETRIC
ELEMENTAL SULPHUR	D&C	DCM	SOXTHERM	HPLC
PHENOLS BY GCMS	WET	DCM	SOXTHERM	GC-MS
HERBICIDES	D&C	HEXANE: ACETONE	SOXTHERM	GC-MS
PESTICIDES	D&C	HEXANE: ACETONE	SOXTHERM	GC-MS
EPH (DRO)	D&C	HEXANE: ACETONE	END OVER END	GC-FID
EPH (MIN OIL)	D&C	HEXANE: ACETONE	END OVER END	GC-FID
EPH (CLEANED UP)	D&C	HEXANE: ACETONE	END OVER END	GC-FID
EPH CWG BY GC	D&C	HEXANE: ACETONE	END OVER END	GC-FID
PCB AROCLOR 1254 / PCB CON	D&C	HEXANE: ACETONE	END OVER END	GC-MS
POLYAROMATIC HYDROCARBONS (MS)	WET	HEXANE: ACETONE	MICROWAVE TM218.	GC-MS
>C6-C40	WET	HEXANE: ACETONE	SHAKER	GC-FID
POLYAROMATIC HYDROCARBONS RAPID GC	WET	HEXANE: ACETONE	SHAKER	GC-FID
SEMI VOLATILE ORGANIC COMPOUNDS	WET	DCM:ACETONE	SONICATE	GC-MS

LIQUID MATRICES EXTRACTION SUMMARY

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB AROCLOR 1254	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	ACETONE	SOLID PHASE EXTRACTION	GC MS
TPH by INFRARED (IR)	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
MINERAL OIL by IR	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
GLYCOLS	NONE	DIRECT INJECTION	GC FID

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials or those identified as potentially asbestos containing during sample description which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -
Trace -Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

Date:	03 January 2013
Customer:	D_SLRCON_DUB
Sample Delivery Group (SDG):	121215-29
Your Reference:	501.00221.00001
Location:	King Tree Services Ltd
Report No:	207282

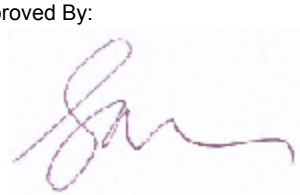
This report has been revised and directly supersedes 207281 in its entirety.

We received 1 sample on Friday December 14, 2012 and 1 of these samples were scheduled for analysis which was completed on Thursday January 03, 2013. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	121215-29	**Location:**	King Tree Services Ltd	**Order Number:**	1881
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	207282
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	207281

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
6671067	SWO1			13/12/2012

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	121215-29	**Location:**	King Tree Services Ltd	**Order Number:**	1881
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	207282
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	207281

LIQUID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	
			6671067	SWO1			1plastic (ALE221)	H2SO4 (ALE244)
Ammonium Low	All	NDPs: 0 Tests: 1						X
BOD True Total	All	NDPs: 0 Tests: 1					X	
Coliforms (W)	All	NDPs: 0 Tests: 1					X	
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 1					X	
pH Value	All	NDPs: 0 Tests: 1					X	
Suspended Solids	All	NDPs: 0 Tests: 1					X	

CERTIFICATE OF ANALYSIS

SDG:	121215-29	**Location:**	King Tree Services Ltd	**Order Number:**	1881
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	207282
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	207281

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-4&+§@	Sample deviation (see appendix)

		Customer Sample R	SWO1
		Depth (m)	.
		Sample Type	Water(GW/SW)
		Date Sampled	13/12/2012
		Sample Time	.
		Date Received	14/12/2012
		SDG Ref	121215-29
		Lab Sample No.(s)	6671067
		AGS Reference	
Component	**LOD/Units**	**Method**	
Faecal Coliforms (W)*	CFU/100ml	SUB	34
Coliforms, Total*	CFU/100ml	SUB	4880
Suspended solids, Total	<2 mg/l	TM022	3 #
BOD, unfiltered	<1 mg/l	TM045	<2 #
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099	0.103 #
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120	0.369 #
pH	<1 pH Units	TM256	8.27 #

CERTIFICATE OF ANALYSIS

SDG:	121215-29	**Location:**	King Tree Services Ltd	**Order Number:**	1881
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	207282
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	207281

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
SUB		Subcontracted Test		
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters		
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	121215-29	**Location:**	King Tree Services Ltd	**Order Number:**	1881
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	207282
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	207281

Test Completion Dates

Lab Sample No(s)	6671067
Customer Sample Ref.	SWO1
AGS Ref.	
Depth	
Type	LIQUID
Ammonium Low	28-Dec-2012
BOD True Total	20-Dec-2012
Coliforms (W)	03-Jan-2013
Conductivity (at 20 deg.C)	18-Dec-2012
pH Value	21-Dec-2012
Suspended Solids	20-Dec-2012

SDG:	121215-29	**Location:**	King Tree Services Ltd	**Order Number:**	1881
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	207282
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	207281

Appendix
General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 2 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors
employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

Sample Deviations

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
4	**Holding time exceeded before sample received**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -
Trace -Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix B
Groundwater Analysis Certificated

ALcontrol Laboratories

Unit 18A
Rosemount Business Park
Ballycoolin
Dublin 11
Tel : (0035) 3188 29893

SLR Consulting Ireland
CSA House
Unit 7
Dundrum Business Park
Windy Harbour
Dublin
Dublin14

Attention: Aldona Binchy

CERTIFICATE OF ANALYSIS

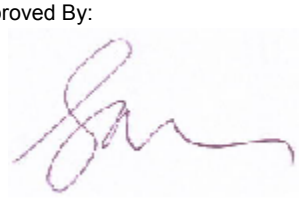
Date:	15 May 2012
Customer:	D_SLRCON_DUB
Sample Delivery Group (SDG):	120504-88
Your Reference:	501.00221.00001
Location:	King Tree Services Ltd
Report No:	181023

We received 2 samples on Thursday May 03, 2012 and 2 of these samples were scheduled for analysis which was completed on Tuesday May 15, 2012. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
5543376	PW1	GW		03/05/2012
5543375	SW1	SW		03/05/2012

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

LIQUID

Results Legend

X Test

N No Determination Possible

			Lab Sample No(s)	5543376	5543375
			Customer Sample Reference	PW1	SW1
			AGS Reference	GW	SW
			Depth (m)		
			Container	1l green glass bottle	1lplastic (ALE221)	Dublin - 1L Plastic	H2SO4 (ALE244)	1lplastic (ALE221)	Dublin - 1L Plastic	H2SO4 (ALE244)
Ammonium Low	All	NDPs: 0 Tests: 2				X		X
Anions by Kone (w)	All	NDPs: 0 Tests: 1		X				
BOD True Total	All	NDPs: 0 Tests: 1					X	
Coliforms (W)	All	NDPs: 0 Tests: 2			X			X
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2		X			X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1		X				
Mercury Dissolved	All	NDPs: 0 Tests: 1	X					
pH Value	All	NDPs: 0 Tests: 2		X			X	
Suspended Solids	All	NDPs: 0 Tests: 1					X	

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
§	Deviating sample.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed

Component	LOD/Units	Method	Customer Sample Ref.	PW1	SW1				
			Depth (m)	.	.				
			Sample Type	Water(GW/SW)	Water(GW/SW)				
			Date Sampled	03/05/2012	03/05/2012				
			Sample Time	.	.				
			Date Received	03/05/2012	03/05/2012				
			SDG Ref	120504-88	120504-88				
			Lab Sample No.(s)	5543376	5543375				
			AGS Reference	GW	SW				
Faecal Coliforms (W)*	CFU/100ml	SUB		0	100				
Coliforms, Total*	CFU/100ml	SUB		<1	68700				
Suspended solids, Total	<2 mg/l	TM022			<2 #				
BOD, unfiltered	<1 mg/l	TM045			<2 #				
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.074 #	0.167 #				
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120		0.222 #	0.223 #				
Arsenic (diss.filt)	<0.12 µg/l	TM152		<0.12 #					
Boron (diss.filt)	<9.4 µg/l	TM152		14 #					
Cadmium (diss.filt)	<0.1 µg/l	TM152		<0.1 #					
Chromium (diss.filt)	<0.22 µg/l	TM152		1.78 #					
Copper (diss.filt)	<0.85 µg/l	TM152		10.2 #					
Lead (diss.filt)	<0.02 µg/l	TM152		0.125 #					
Nickel (diss.filt)	<0.15 µg/l	TM152		0.455 #					
Zinc (diss.filt)	<0.41 µg/l	TM152		17.8 #					
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 #					
Chloride	<2 mg/l	TM184		21.2 #					
pH	<1 pH Units	TM256		7.82 #	7.66 #				

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
SUB		Subcontracted Test		
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981;BS EN 872	Determination of total suspended solids in waters		
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	5543376	5543375
Customer Sample Ref.	PW1	SW1
AGS Ref.	GW	SW
Depth		
Type	LIQUID	LIQUID
Ammonium Low	14-May-2012	14-May-2012
Anions by Kone (w)	11-May-2012	
BOD True Total		10-May-2012
Coliforms (W)	10-May-2012	10-May-2012
Conductivity (at 20 deg.C)	08-May-2012	08-May-2012
Dissolved Metals by ICP-MS	09-May-2012	
Mercury Dissolved	11-May-2012	
pH Value	08-May-2012	08-May-2012
Suspended Solids		11-May-2012

CERTIFICATE OF ANALYSIS

SDG:	120504-88	**Location:**	King Tree Services Ltd	**Order Number:**	1695
Job:	D_SLRCON_DUB-64	**Customer:**	SLR Consulting Ireland	**Report Number:**	181023
Client Reference:	501.00221.00001	**Attention:**	Aldona Binchy	**Superseded Report:**	

Appendix

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 2 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors
employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5 -C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

SOLID MATRICES EXTRACTION SUMMARY

ANALYSIS	D&C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
SOLVENT EXTRACTABLE MATTER	D&C	DCM	SOXTHERM	GRAVIMETRIC
CYCLOHEXANE EXT. MATTER	D&C	CYCLOHEXANE	SOXTHERM	GRAVIMETRIC
ELEMENTAL SULPHUR	D&C	DCM	SOXTHERM	HPLC
PHENOLS BY GCMS	WET	DCM	SOXTHERM	GC-MS
HERBICIDES	D&C	HEXANE: ACETONE	SOXTHERM	GC-MS
PESTICIDES	D&C	HEXANE: ACETONE	SOXTHERM	GC-MS
EPH (DRO)	D&C	HEXANE: ACETONE	END OVER END	GC-FID
EPH (MIN OIL)	D&C	HEXANE: ACETONE	END OVER END	GC-FID
EPH (CLEANED UP)	D&C	HEXANE: ACETONE	END OVER END	GC-FID
EPH CWG BY GC	D&C	HEXANE: ACETONE	END OVER END	GC-FID
PCB AROCLOR 1254 / PCB CON	D&C	HEXANE: ACETONE	END OVER END	GC-MS
POLYAROMATIC HYDROCARBONS (MS)	WET	HEXANE: ACETONE	MICROWAVE TM218.	GC-MS
>C6-C40	WET	HEXANE: ACETONE	SHAKER	GC-FID
POLYAROMATIC HYDROCARBONS RAPID GC	WET	HEXANE: ACETONE	SHAKER	GC-FID
SEMI VOLATILE ORGANIC COMPOUNDS	WET	DCM:ACETONE	SONICATE	GC-MS

LIQUID MATRICES EXTRACTION SUMMARY

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB AROCLOR 1254	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	ACETONE	SOLID PHASE EXTRACTION	GC MS
TPH by INFRARED (IR)	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
MINERAL OIL by IR	TCE	STIRRED EXTRACTION (STIR-BAR)	IR
GLYCOLS	NONE	DIRECT INJECTION	GC FID

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials or those identified as potentially asbestos containing during sample description which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -
Trace -Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix C
Bioaerosol, Odour and Hydrogen Sulphide Impact Assessment Report

ODOUR monitoring IRELAND

ODOUR & ENVIRONMENTAL CONSULTANTS

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

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

YEAR 2012 - BIOAEROSOL, ODOUR AND HYDROGEN SULPHIDE IMPACT ASSESSMENT AT GREEN KING COMPOSTING LTD, COOLBEG, CO. WICKLOW

PREPARED BY:	Dr. Brian Sheridan
ATTENTION:	Ms. Aldona Binchy
DATE:	16th Jan 2013
REPORT NUMBER:	2013553(1)
DOCUMENT VERSION:	Version 1
REVIEWERS:	

TABLE OF CONTENTS

Document Amendment Record

Client: ***SLR Consulting Ireland***

Title: Year 2012 - Bioaerosol, Odour and H_2S Impact Assessment at Green King Composting Ltd, Coolbeg, Co. Wicklow

Project Number: 2013553(1)			**Document Reference:** Year 2012 - Bioaerosol, Odour and H_2S Impact Assessment at Green King Composting Ltd, Coolbeg, Co. Wicklow		
2013553(1)	Document for review	B.A.S.	JMC	B.A.S	16/01/2013
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

1. Introduction

Odour Monitoring Ireland was commissioned to perform a bioaerosol, odour and hydrogen sulphide (H_2S) 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 Mesophillic bacteria and Aspergillus *fumigatus* sampling was performed using equivalent Andersen single stage impactors. Triplicate sampling was performed at each of the three identified sampling locations within and in the vicinity of Green King Composting facility located at Coolbeg, Co. Wicklow.

The odour assessment was carried out in accordance with EN 13725:2003. Hydrogen sulphide (H_2S) 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 53 Ou_E/m^3. 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 Mesophillic 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 H_2S 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 Mesophillic bacteria and Aspergillus fumigatus, Odour[1], H_2S	Upwind of site
Loc 2	Total Mesophillic bacteria and Aspergillus fumigatus, Odour[1], H_2S	Beside green waste, downwind of site
Loc 3	Total Mesophillic bacteria and Aspergillus fumigatus, Odour[1], H_2S	Downwind of site at entrance
Loc 4	H_2S, Odour[1]	Western boundary
Loc 5	H_2S	Upwind of site
Loc 6	H_2S, Odour[1]	Upwind of site
Loc 7	H_2S	Downwind of site
Loc 8	H_2S Odour[1]	Downwind on entrance road

Notes: [1] denotes duplicate odour samples taken

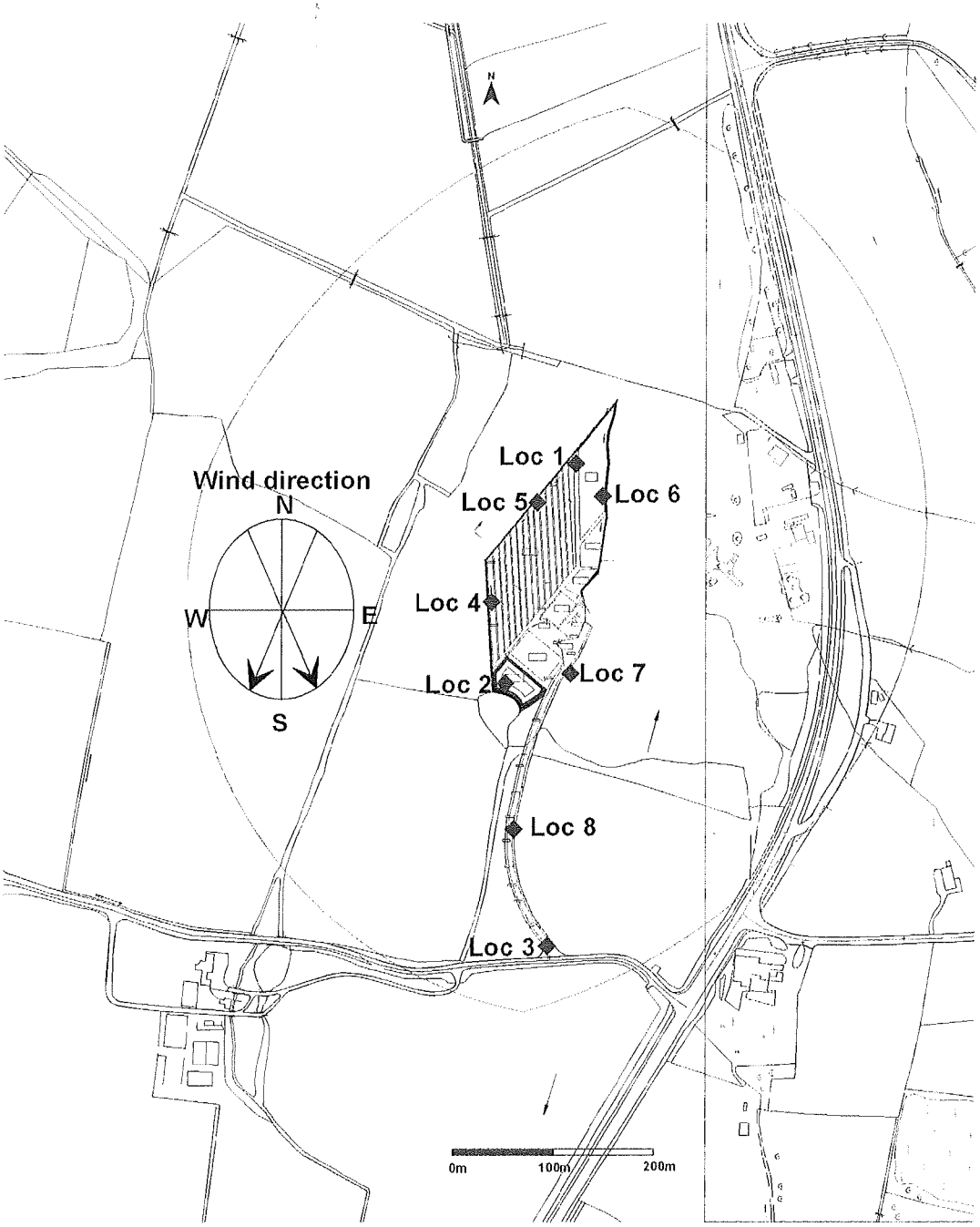


Figure 2.1. Schematic overview of Bioaerosol, Odour and H_2S monitoring locations.

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 high with an octave rating of 6 to 8 (i.e. on an 8 point scale). Barometric pressure was approximately 998 mbar. Relative humidity was 71% while temperature was low from 1 degree 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 30/11/2012
Wind direction (From)	60 to 340
Wind speed (m s^{-1})	1
Barometric pressure	998
Temperature (^{0}C)	1
Relative humidity (%)	71

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 Mesophillic bacteria. MEA media facilitates the sporulation of Aspergillus *fumigatus*, which is used to identify the species. Sterile fresh 90mm plates were supplied by Cruinn Diagnostics accredited laboratory services and placed in sealed coolers. Fresh plates were used to eliminate the formation of a skin upon the plate upper surface (i.e. develops with age). It was thought that this may cause problems while using an impaction method (i.e. particle bounce off).

2.4. Transport of bioaerosol samples

All sampling plates during monitoring were allowed to equilibrate to ambient temperature before sampling. This allowed for the development of less harsh conditions upon impacted bioaerosols. It was also noticed that cooled plates (approximately 5^0C) formed an outer "skin" which could facilitate particle bounce. Following equilibration, it was apparent from observation, better "knitting" of impactor plates occurred. Before each sampling event, the Biostage impactors were sterilised using cotton wool and 70% iso-proponal. The impactors were autoclaved for complete sterilisation before sampling. Once sampled, all agar plates were inverted, sealed with parafilm, placed within a flexible plastic container, and neatly stacked within a mobile cooler for delivery to Irish Equine Centre laboratory located in Kill, Co. Kildare. Once received, they were incubated at the appropriate temperatures of 30^0C for Total viable counts (i.e. Mesophillic bacteria) and 37^0C 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 123µg of n-butanol evaporated in one cubic meter of neutral gas at standard conditions (CEN, 2003).

2.8. H_2S measurement

A Jerome real time data-logging H_2S 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 H_2S concentrations. This was used, as H_2S 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 Aspergillus *fumigatus*)[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 Mesophillic bacteria were assessed on the day of sampling 30th November 2012.

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

Location ID	Average Aspergillus *fumigatus* concentration (CFU m^{-3})[1]	Average Mesophillic bacteria concentration (CFU m^{-3})[1]	Sample count[2]
Loc 1	<4	<5	3
Loc 2	31	78	3
Loc 3	25	51	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 mesophillic 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 mesophillic 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 Mesophillic bacteria.

2.11. Odour and H_2S 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_2S (ppb)	Comment
30/11/12	Loc 1	49	<3	No distinct odour
30/11/12	Loc 2	53	<3	No distinct odour
30/11/12	Loc 3	45	<3	No distinct odour
30/11/12	Loc 4	42	<3	No distinct odour
30/11/12	Loc 5	--	<3	No distinct odour
30/11/12	Loc 6	57	<3	No distinct odour
30/11/12	Loc 7	-	<3	No distinct odour
30/11/12	Loc 8	49	<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 57 Ou_E/m^3, 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 D
Copy of the PRTR Report

Guidance to completing the PRTR workbook

AER Returns Workbook

Version 1.1.16

REFERENCE YEAR	2012

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	
	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 62422
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?	No
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) ?	

4.1 RELEASES TO AIR Link to previous years emissions data | PRTR# : W0218 | Facility Name : Kings Trees Services Composting Facility | Filename : W0218_2012.xls | Return Year : 2012 | 27/03/2013 11:52

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (As required in your Licence)

RELEASES TO AIR					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD				QUANTITY		
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

Additional Data Requested from Landfill operators

For the purposes of the National Inventory on Greenhouse Gases, landfill operators are requested to provide summary data on landfill gas (Methane) flared or utilised on their facilities to accompany the figures for total methane generated. Operators should only report their Net methane (CH4) emission to the environment under T(total) KG/yr for Section A: Sector specific PRTR pollutants above. Please complete the table below:

Landfill: Kings Trees Services Composting Facility

Please enter summary data on the quantities of methane flared and / or utilised	T (Total) kg/Year	M/C/E	Method Used		Facility Total Capacity m3 per hour	
			Method Code	Designation or Description		
Total estimated methane generation (as per site model)	0.0				N/A	
Methane flared	0.0				0.0	(Total Flaring Capacity)
Methane utilised in engine/s	0.0				0.0	(Total Utilising Capacity)
Net methane emission (as reported in Section A above)	0.0				N/A	

4.2 RELEASES TO WATERS

Link to previous years emissions data

SECTION A : SECTOR SPECIFIC PRTR POLLUTANTS

Data on ambient monitoring of storm/surface water or groundwater, conducted as part of your licence requirements, should NOT be submitted under AER / PRTR Reporting as this or

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING PRTR POLLUTANTS

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION C : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO WATERS					Please enter all quantities in this section in KGs			
POLLUTANT					QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

4.3 RELEASES TO WASTEWATER OR SEWER

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
No. Annex II	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE-WATER TREATMENT OR SEWER					Please enter all quantities in this section in KGs			
POLLUTANT		METHOD			QUANTITY			
			Method Used					
Pollutant No.	Name	M/C/E	Method Code	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	F (Fugitive) KG/Year
					0.0	0.0	0.0	0.0

* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

4.4 RELEASES TO LAND

Link to previous years emissions data

SECTION A : PRTR POLLUTANTS

RELEASES TO LAND	
POLLUTANT	
No. Annex II	Name

* Select a row by double-clicking on the Pollutant Name (Column B)

SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)

RELEASES TO LAND	
POLLUTANT	
Pollutant No.	Name

* Select a row by double-clicking on the Pollutant Name (Column B)

			Please enter all quantities
METHOD			
	Method Used		
M/C/E	Method Code	Designation or Description	Emission Point 1
			0.0

) then click the delete button

			Please enter all quantities
METHOD			
	Method Used		
M/C/E	Method Code	Designation or Description	Emission Point 1
			0.0

) then click the delete button

in this section in KGs	
QUANTITY	
T (Total) KG/Year	A (Accidental) KG/Year
0.0	0.0

in this section in KGs	
QUANTITY	
T (Total) KG/Year	A (Accidental) KG/Year
0.0	0.0

Appendix E
Compost Monitoring Records

5. ONSITE TREATMENT & OFFSITE TRANSFERS OF WASTE

Please enter all quantities on this sheet in Tonnes

3

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	1814.0	biodegradable waste	R3	M	Weighed	Onsite of generati	King Tree Services Ltd. ,W0218-01	Coolbeg,Coolbeg,Wicklow,Co Wicklow,Ireland		

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

BORD NA MÓNA

BORD NA MÓNA HORTICULTURE LIMITED

ANALYSIS OF GREENWASTE FROM GREENKING

REPORT

REPORT NO: **GW 120911**

ATTENTION:

Ian Browne,
Greenking,
Coolbeg,
Wicklow.

PREPARED BY:

Dearbháil Ní Chualáin
Chief Research Scientist,
Bord na Móna.

Sarah Lombard,
Scientist,
Bord na Móna ltd.

DATE: 30th October 2012

Table of Contents

1 Introduction

Sample number 23-09-12
This compost has been through an open windrow composting process at Greenking Composting Ltd. The compost is made from green garden waste primarily arising from landscaping activities

2 Applied Standards

This compost has been tested as per EPA requirements in Greenkings Licence (W0218-1) Schedule F

SCHEDULE F Standards for Compost Quality

The following criteria are deemed a quality standard for the use of compost as a soil improver and should not be deemed as criteria for fertiliser. In addition N, P, K, NH_4-N, NO_3-N, pH and dry matter content should also be measured.

Compost shall be deemed unsatisfactory if more than 10% of samples fail the criteria below. No sample shall exceed 1.2 times the quality limit values set.

1. Maturity

Compost shall be deemed to be mature if it meets two of the following requirements:

- C/N ratio ≤ 25
- oxygen uptake rate ≤ 150 mg O_2/kg volatile solids per hour;
- germination of cress (Lepidium sativum) seeds and of radish (Raphanus sativus) seeds in compost must be greater than 90 percent of the germination rate of the control sample, and the growth rate of plants grown in a mixture of compost and soil must not differ more than 50 percent in comparison with the control sample;
- elimination of the following test organisms (used to evaluate composting system efficiency in removing plant pathogens and weed seeds during the composting process): Plasmodiophora brassicae, tobacco-mosaic-virus (TMV) and tomato seeds.

Guidance on test may be obtained from the German document LAGA M10 'Quality Criteria and Application Recommendations for Compost'.

2. Foreign Matter

Compost must not contain any sharp foreign matter measuring over a 2mm dimension that may cause damage or injury to humans, animals and plants during or resulting from its intended use.

Foreign matter content as a percentage of oven-dried mass	≤1.5%
Foreign matter, maximum dimensions, in mm	25 mm

3. Trace Elements

Maximum Trace Element Concentration Limits for Compost[Note 2]

Trace Elements	(mg/kg, dry mass)
Arsenic (As)[Note 1]	15
Cadmium (Cd)	1.5
Chromium (Cr)	100
Copper (Cu)	100
Mercury (Hg)	1
Molybdenum (Mo)[Note 1]	5
Nickel (Ni)	50
Lead (Pb)	150
Selenium (Se)[Note 1]	2
Zinc (Zn)	350

Note 1: Monitoring of these parameters required if waste from an industrial source.
Note 2: The above alone should not be taken as an indication of suitability for addition to soil as the cumulative metal additions to soil should be first calculated.

4. Pathogens

Pathogenic organism content must not exceed the following limits:

- Escherichia coli ≤1,000 CFU/g
- Salmonella species absent in 25 g sample.

Results of Analysis

A sample was received from Greenking on the 29th September 2012 (GW 120911). It was received in good condition. Analysis was carried out on this sample as requested by the client.

Compost Testing and Analysis Service

Report ref: GW 120911

Sample reference: GW 120911
Sample matrix: Composted greenwaste

Maturity Tests

Oxygen Uptake Rate

Sample no	Test Method	OUR Stability results ($mmolO_2/kg$ OS/h)
GW 120911	PrEN 16087-1	9.6

Self Heating

Sample no	**Maximum Temperature reached (ambient 20^0C)**
GW 120911	20

Plant Nutrient

Sample no	**pH**	**EC** $\mu S.cm^{-1}$
GW 120911	8.38	726
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** $mg.L^{-1}$
GW120911	2	12	6	1050
Test Method	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652	I.S. EN 13652

Total Plant Nutrients and Carbon Content (Dry Wt. Basis)

Sample no	**N** %	**P** **%**	**K** %	**C** %
GW120911	1.3	0.2	0.6	23
Test Method	I.S.EN 13554-1	I.S. EN 13650	I.S. EN 13650	I.S. EN 13039

Heavy Metals (Dry Wt. Basis)

Sample no	**Cd** **$mg.kg^{-1}$**	**Cr** **$mg.kg^{-1}$**	**Cu** **$mg.kg^{-1}$**	**Hg** **$mg.kg^{-1}$**
GW120911	0.77	90.2	37.9	0.120
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** **$mg.kg^{-1}$**
GW120911	34.6	53.9	145
Test Method	I.S. EN 13650	I.S. EN 13650	I.S. EN 13650

Sample no	**As** **$mg.kg^{-1}$**	**Mo** **$mg.kg^{-1}$**	**Se** **$mg.kg^{-1}$**
GW120911	8.1	4.6	0.43

Physical Analysis

Sample no	**H_20** %	**Dry Matter** %	**Organic Matter** %
GW120911	41.2	58.8	42.1
Test Method	I.S. EN 13041	I.S. EN 13041	I.S. EN 13039

Particle Size Analysis (Dry Wt. Basis)

<1mm %	**1-2mm %**	**2-4mm %**	**4-8mm %**	**8-16.5mm %**	**16.5-31.5mm %**	**>31.5 mm %**
40	18	16	19	7	<0.01	<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	0.9	<0.01	<0.01	<0.01	<0.01
4-8mm	2.6	<0.01	<0.01	<0.01	<0.01
8-16mm	1.6	<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

Cress Germination Test

Sample no	Sample Diluted with **0%** peat to bring to correct EC	% Germination compared to control*	Root Index Compared to control (%)	MLVI compared to control (%)
GW 120911		93	105	104

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

Microbiological Analysis

Sample no	**E. coli** (cfu/g)	**Salmonella** (spp/25g)
GW120911	<10	Not Detected
Test Method	ISO 11866-2	I.S. EN ISO 6579