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Our Ref: GBEDS/19/01

Date: 23rd July 2019

BIOAEROSOL MONITORING REPORT

Log No. 1631

BIOAEROSOL MONITORING REPORT FROM GROWING BEDS, RAVENSDEN

Sampling performed 8th July 2019

The composing site at **Growing Beds, Ravensden** was visited on 8th July 2019.

Sampling for the enumeration of airborne micro-organisms was undertaken by Richard Smith of Biodet following so far as reasonably practicable, the Standardised Protocol for the Monitoring of Bioaerosols at Open Composting Facilities (Association for Organic Recycling (AfOR), 2009).

All sampling was carried out on a normal working day whilst operational activities were taking place, which are detailed in Appendix 1: Site data during sampling. The prevailing weather conditions (wind direction, wind speed, temperature and humidity) were recorded at the time of sampling.

On-site activity (turning, screening etc.) was recorded.

Sampling Points

Sampling points were chosen to correspond with the criteria of the AfOR Protocol (see page 3: Plan of Site, for further details on the positions):

1. Upwind of the composting activities at approximately 25 metres from the operational boundary, east (103° from north) of the centre of the site operations.

2. Downwind of composting activities at three points approximately 315 to 330 metres from the centre of screening activities downwind of the shredding operation. Sites were selected downwind, and at +30 and -30 degrees to downwind.

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The sample points are indicated on the site map (page 3).

* *A sensitive receptor is defined as 'any building, structure or installation in which at least one person normally lives or works, other than a building, structure or installation within the same ownership or control as the operator / owner of the composting facility.'* - Standardised Protocol for the Sampling and Enumeration of Airborne Microorganisms at Composting Facilities: [The Composting Association]

In the case of Growing Beds, the nearest sensitive receptor was determined to be the cottages and farm to the south-west of the site.

The sample points are indicated on the site map (page 3).

Samples were taken at a height of 1.5 metre, using SKC IOM bioaerosol sampling heads at 2.0 litres per minute.

The recovered membranes were tested for mesophilic bacteria and for *Aspergillus fumigatus*. Nutrient agar (NA) was used to culture mesophilic bacteria and the plates were incubated for 2 days at 37 C.
Malt extract agar (MEA) was used to culture *Aspergillus fumigatus* and the plates were incubated for 2 days at 41 C.

Tests were performed in triplicate at each sampling point.

Identification of *Aspergillus fumigatus* was performed by microscopy.

Results:

Site **Growing Beds, Ravensden**

Date of visit: 8th July 2019
Operator: R. Smith
Wind Direction: Easterly
Wind Speed: 2-5 mph
Operation: Shredding & material movement

Weather:

- Dry and warm.
- Temperature ranged from 19.6 C to 25.2 C, the average was 22.4 C.
- Relative humidity ranged from 38.7% to 51.3%, the average was 45.0 %.
- Wind speed ranged from 2 mph to 5 mph, the average was 3.5 mph.
- Wind direction was on average from the East

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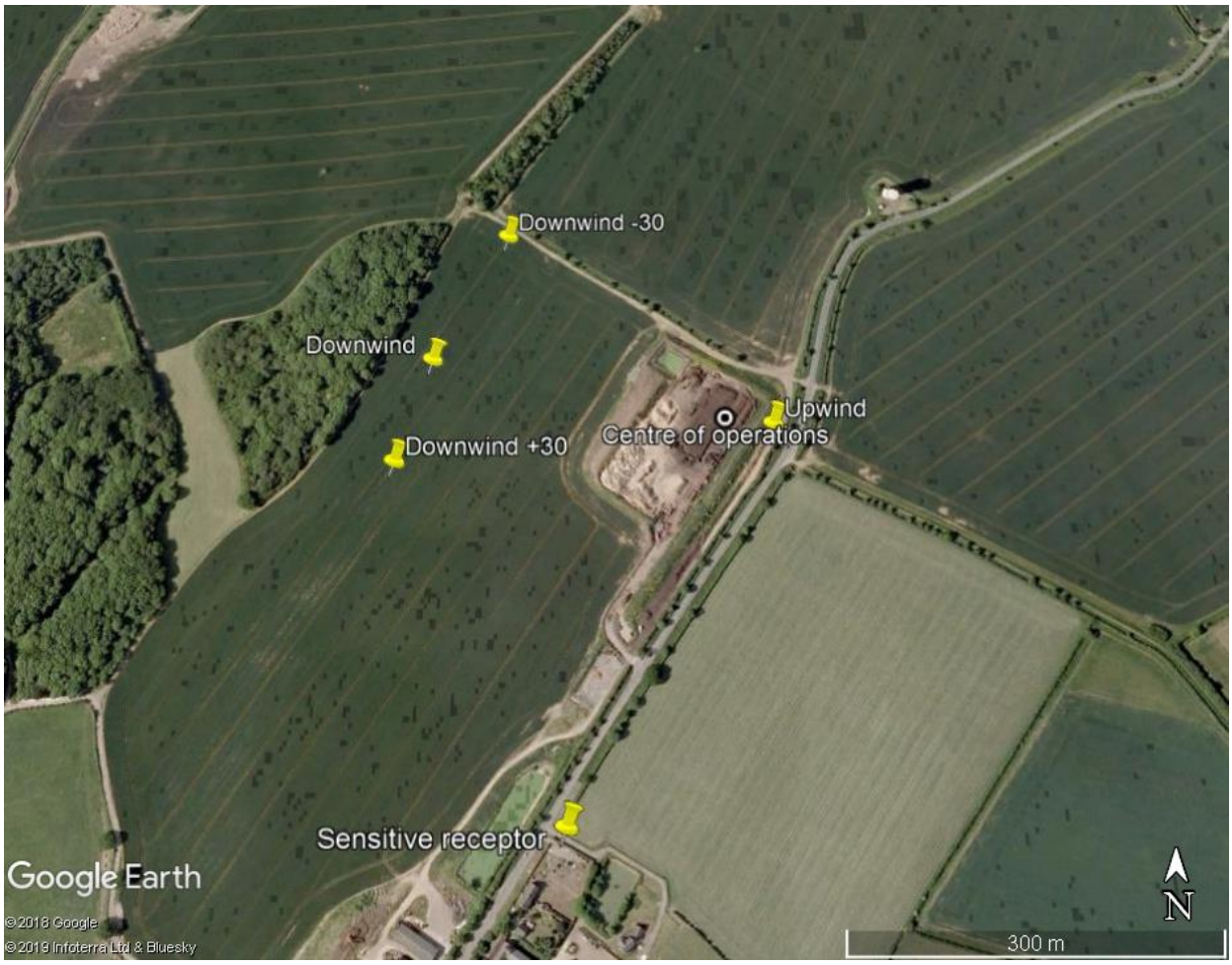
Growing Beds Plan: 8th July 2019



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Microbiological Results:

Site: Growing Beds, Ravensden **Date: 8th July 2019**				**Site Operator: Mark Evans** **Commissioning Lab: Biodet, University of Hertfordshire** **Materials processed on site: Green waste**				
Location	Sample ref no.	Distance from shredding operation (m)	Sampling times (hh:min:ss)	Sampling volume (litres)	Microbial type	Calculated concentration of airborne micro organisms (CFU/m^3)	Arithmetic mean of parallel samples (CFU/m^3)	Comments relating to activities
Upwind	U1	45	12:04-12:49	90	MB	75	345	Material shredding
Upwind	U2	45	12:04-12:49	90	MB	888		
Upwind	U3	45	12:04-12:49	90	MB	75		
Upwind	U1	45	12:04-12:49	90	AF	<75	<75	Material shredding
Upwind	U2	45	12:04-12:49	90	AF	<75		
Upwind	U3	45	12:04-12:49	90	AF	<75		

MB = Mesophilic bacteria, AF = *Aspergillus fumigatus*

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Location	Sample ref no.	Distance from shredding operation (m)	Sampling times (hh:min:ss)	Sampling volume (litres)	Microbial type	Calculated concentration of airborne micro organisms (CFU/m^3)	Arithmetic mean of parallel samples (CFU/m^3)	Comments relating to activities
Downwind -30	D1	313	13:20-14:05	90	MB	150	123	Material shredding
Downwind -30	D1	313	13:20-14:05	90	MB	150		
Downwind -30	D1	313	13:20-14:05	90	MB	75		
Downwind -30	D1	313	13:20-14:05	90	AF	<75	<75	Material shredding
Downwind -30	D1	313	13:20-14:05	90	AF	<75		
Downwind -30	D1	313	13:20-14:05	90	AF	<75		

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Site: Growing Beds, Ravensden **Site Operator: Mark Evans**
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Materials processed on site: Green waste

Location	Sample ref no.	Distance from shredding operation (m)	Sampling times (hh:min:ss)	Sampling volume (litres)	Microbial type	Calculated concentration of airborne micro organisms (CFU/m^3)	Arithmetic mean of parallel samples (CFU/m^3)	Comments relating to activities
Downwind	D2	315	13:25-14:10	90	MB	75	<213	Material shredding
Downwind	D2	315	13:25-14:10	90	MB	222		
Downwind	D2	315	13:25-14:10	90	MB	<75		
Downwind	D2	315	13:25-14:10	90	AF	<75	<75	Material shredding
Downwind	D2	315	13:25-14:10	90	AF	<75		
Downwind	D2	315	13:25-14:10	90	AF	<75		

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Date: 8th July 2019 **Commissioning Lab: Biodet, University of Hertfordshire**
Materials processed on site: Green waste

Location	Sample ref no.	Distance from shredding operation (m)	Sampling times (hh:min:ss)	Sampling volume (litres)	Microbial type	Calculated concentration of airborne micro organisms (CFU/m^3)	Arithmetic mean of parallel samples (CFU/m^3)	Comments relating to activities
Downwind +30	D3	340	12:14-12:59	60	MB	150	<148	Material shredding
Downwind +30	D3	340	12:14-12:59	60	MB	<75		
Downwind +30	D3	340	12:14-12:59	60	MB	222		
Downwind +30	D3	340	12:14-12:59	60	AF	<75	<75	Material shredding
Downwind +30	D3	340	12:14-12:59	60	AF	<75		
Downwind +30	D3	340	12:14-12:59	60	AF	<75		

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Controls:

Site: Growing Beds, Ravensden **Date: 8th July 2019**				**Site Operator: Mark Evans** **Commissioning Lab: Biodet, University of Hertfordshire** **Materials processed on site: Green waste**			
Location	Sample ref no.	Distance from shredding operation (m)	Sampling times (hh:min:ss)	Sampling volume (litres)	Microbial type	Calculated concentration of airborne micro organisms (CFU/membrane)	Comments relating to activities
Control 1	C1	n/a	n/a	n/a	MB	<10	Membrane loaded on-site but no air passed through
Control 1	C1	n/a	n/a	n/a	AF	<10	Membrane loaded on-site but no air passed through
Control 2	C2	n/a	n/a	n/a	MB	<10	Membrane loaded on-site but no air passed through
Control 2	C2	n/a	n/a	n/a	AF	<10	Membrane loaded on-site but no air passed through

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Comments:

Bacteria and fungi occur naturally are commonly present in the air. Concentrations are highly variable, but background levels of micro-organisms do not normally exceed 1000 cfu/m^3 (colony forming units per cubic metre).
Environment Agency guidance levels of 1000 cfu/$m^3$for bacteria and 500 cfu/$m^3$for fungi have been used within this report, when assessing the concentrations of bioaerosols.

Upwind position
A fumigatus spp was not detected at the upwind position.
Mesophilic bacteria were isolated in low numbers from the upwind position during the sampling period (345 cfu/m^3); though concentrations were therefore below the 1000 cfu/m^3 EA reference level. There were no observable reasons for mesophilic bacteria to be in the air.

Downwind 1, 2 and 3
A. fumigatus spp was not detected at any downwind positions (<74 cfu/m^3).
Mesophilic bacteria was detected in low numbers at the downwind sampling positions (123, <123 & <148 cfu/m^3). Concentrations at all three sites were therefore below the 1000 cfu/m^3 EA reference level.

Sampling Comments

The wind direction (easterly) meant that the downwind sampling points were selected at appropriate locations and distances downwind.

23rd July 2019

R. SMITH DATE

DIRECTOR OF BIODET