Energy Efficiency Plan

Birch Airfield Composting

Report produced for **Birch Airfield Composting Services Limited**

Provided by Walker Resource Management Ltd (WRM)

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1.1	26/03/2024	Update Draft
1.2	09/04/2024	Amendments following client review
2.0	17/04/2024	Second Issue

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1.0 INTRODUCTION

This plan outlines the commitments of Birch Airfield Composting Limited (hereon referred to as BACS) to manage their energy performance. This plan details key energy management strategies which includes:

- A description and review of the site energy demand;
- A review of current practice; and,
- Monitoring and targeting procedures.

The aim of energy efficiency management is to eliminate gross energy inefficiencies and to identify and implement effective energy-saving techniques. Such techniques include measures to (1) Lower energy consumption (2) Improve energy efficiency and (3) Use renewable energy. Efficiency techniques which lower the consumption of energy in industrial processes reduce environmental impacts and can contribute towards national and global pollution and emissions targets.

Following the Paris agreement in 2015, the UK have committed to a long-term target to reduce greenhouse gas emissions by at least 80% by 2050, relative to 1990 levels. This 2050 target was derived as a contribution to a global emissions path aimed at keeping global average temperature to around 2°C above pre-industrial levels.

2.0 RESOURCE EFFICIENCY MANAGEMENT AT THE BIRCH AIRFIELD COMPOSTING SITE

In line with the appropriate measures for the biological treatment of waste, BACS will monitor and review the consumption of water, energy and raw materials as well as the annual generation of residues and wastewater for the BACS facility at least once a year. Residues includes the generation of waste and any waste compost conferred to land under an EA-approved deployment.

2.1 Process Flow Diagram

A process flow diagram of where energy is used within the process is shown in Figure 1. This information is based on nominal waste flows at the time of writing and reflects the activities undertaken at the site.

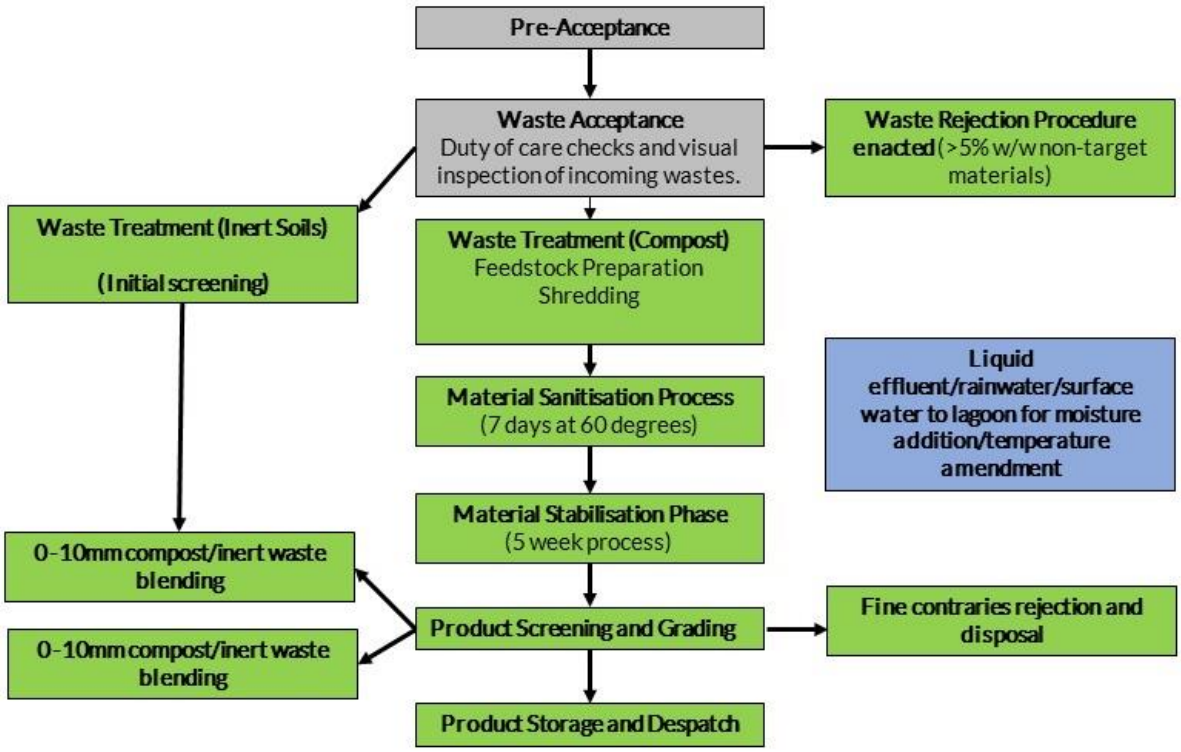

Figure 1 - Process flow diagram for the Birch Airfield site.

2.2 Process Energy Usage Register

Based on the current process as detailed in BAC – Permit Management System, the energy used within the process typically comprises the levels as shown in Table 1 showing the flow of material and the specific energy use at each activity. The effect of the waste treatment activities on the mass of material throughout the process has also been considered.

Table 1 - Birch Airfield Green Waste Composting & Inert Soils/Blending Process

Process Step Description	*Specific energy used per tonne of typical composting material (KWh)
Movement of green waste	12.9
Loading of shredder	14.6
Shredding activity	85.3
Windrow formation	12.9
Sanitisation phase windrow turning	25.8
Stabilisation phase windrow turning	23.2
Loading of screener (compost)	12.9
Loading of screener (inert soil) **(Estimated)	12.9
Screening (compost)	13.8
Screening (inert soil)**(Estimated)	13.8
Blending activity – 0-10mm compost/inert soil** (Estimated)	7.8
Movement of compost	6.5
Movement of oversize	1.3
Total kWh per tonne	58
Total waste intake	110,000
Total MJ/tonne intake	235.9 MJ/tonne
Total GJ per year	25,949
Total MWh per year	6,438

**Figures presented above are typical for the activities undertaken onsite. Figures can vary with feedstock type, air temperature and moisture content.

A summary of energy used within the process is provided in Table 2 below:

Table 2 - Summary of Energy Inputs

	Tonne input per year	Total Energy Output (GJ/year)	Total Energy Input (MWh/year)	Of which x MWh is factored from national grid electricity supply
BACS Composting and Blending activities.	110,000	15,336	6,438	0 – Electricity supplied from On-site solar farm.

3.0 PRODUCT PTOENTIAL ENERGY GENERATION

3.1 Site Operations

The facility is an open windrow composting facility and is designed to biodegradable wastes and convert them to products or similarly useful materials that will have a benefit to the environment. Products resulting from the on-site operations at Birch Airfield include the following:

Table 3 - Summary of Product Outputs and Exportable Energy

Process Type	Tonnes Input per year	Type of output	Tonnes production per year (Estimated)	Process Description	Environmental Benefit
Open Windrow Composting	100,000	PAS 100 certified compost	30,000	The organic material reduces due to respiration and evaporative losses.	The compost nutrients can offset the use of fossil fuel fertilisers; and the organic material helps conserve soil as well as providing ecological benefits.
0-10mm/Inert soil blending	10,000	BS3882 Certified topsoil	10,000 – 12, 000	Some organic material is lost through the composting process and oversize fraction screened out.	Topsoil for multi-purpose use and provides good support for the growth of vegetation. Suitable for most applications used in the garden or landscaping situations.

3.2 Energy Exported in the Form of Compost

Tables 4 and 5 below provide a summary of the energy savings generated through the use of PAS 100 compost against manufactured artificial fertilisers.

Typical energy inputs for the production of fossil fuel-based fertilisers comprise are detailed in Table 4.

Table 4 - Energy requirements in the manufacture of Artificial fertilisers

Primary Nutrient	Nitrogen	Phosphate	Potash
Energy Requirement (MJ/kg)	72	13	10

Table 5 shows the typical energy equivalence of the nutrients present in compost produced under the PAS 100 scheme.

Table 5 - Energy Equivalence of the Nutrients in Compost

PAS 100 compost			
Fertiliser	**Nitrogen**	**Phosphate**	**Potash**
Typical analysis (kg/tonne)	8	4	6
Energy Equivalences (MJ/kg nutrient)	72	13	10
Energy Equivalencies (MJ/tonne of compost	576	52	60
Total Energy equivalent/tonne MJ/ tonne compost	690 MJ/tonne		
Compost export/year (tonnes)	30,000		
Exportable energy equivalent (GJ/year)	26,995		

4.0 WATER RESOURCES

Mains water usage for the site totalled 105m^3 in 2023 with an average of 0.3m^3 of water was used on site per day. For the first 7 days of the composting process leachate is utilised from the on-site lagoon and all water/liquid generated on-site is captured within the lagoons. For the moisture amendment to windrows and temperature control proceeding the first 7 days of the composting process water will be provided from the farms reservoirs which are filled via fresh water spring.

5.0 ENERGY EFFICIENCY PLAN

5.1 Energy Consumption Reduction Strategy.

The site undertakes practical measures to help reduce energy consumption insofar as possible. Measures are proportionate to the nature and scale of the operations undertaken on-site and are detailed below:

- All vehicles switched off when not in use;
- Minimising vehicle movements and machinery operation wherever possible;
- Recirculation and re-use of water generated on-site;
- Mobile plant and machinery serviced in line with manufacturer recommendations to ensure efficient operation; and,
- Replacement of spare parts as necessary to reduce machinery wear and tear, and maintain efficient operation of the machinery.

Further to the above, the site undertakes a periodic review of all plant and machinery involved in the composting process to ensure they remains fit for purpose.

6.0 OTHER RAW MATERIAL INPUTS

Minimal quantities of hydraulic oils, lubricants, other fluids, greases and anti-freeze are used on site for mobile machinery.

The site has access to a stock of spare parts. Spare parts are used to replace wearing parts on machinery as required or during servicing of machinery in line with the manufacturer's servicing recommendations.

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