



Appendix GG

| *Operational data from
Staffordshire ERF (Four
Ashes facility)*



Staffordshire ERF

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Annual Report 2017

EPR/HP3431HK

Written by: Christine Skaramaga

Approved by: Scott Francis

Approved Date: 26/01/2018

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1. INTRODUCTION

This is the Annual Performance Report for the Staffordshire Energy Recovery Facility (Staffordshire ERF) for 2017. This annual report is the facility's fifth complete annual report.

2. FACILITY INFORMATION

Plant Operator	Veolia ES Staffordshire Ltd
Name of Facility	Staffordshire Energy Recovery Facility
EPR Permit Number	HP3431HK
Facility Address	Staffordshire Energy Recovery Facility The Dell Enterprise Drive Four Ashes Wolverhampton Staffordshire WV10 7DF
Telephone Number	0203 567 6300

The ERF is operated by Veolia ES Staffordshire Ltd, a wholly owned subsidiary of Veolia. The plant is designed to burn predominantly residual municipal solid waste and now has a capacity to process up to 340,000 Tonnes annually. The facility has been built to serve Staffordshire County Council, its eight constituent Councils, and its other partner authorities.

The facility can generate approximately 29MW of electricity from waste. The facility uses 3.2MW and the balance is exported to the national grid. In tangible terms the electricity generated is equivalent to 66,000 homes.

The facility is designed so that it can supply heat, if a client becomes available in the future.

Technical details of the plant:

- Constructions Industrielles de la Mediterranee (CNIM) - Design
- Maximum Permitted Refuse throughput – 340,000 tonnes per annum
- Two waste streams each with a capacity of 20 tonnes per hour.
- Storage capacity 4,500 Tonnes – Approximately four and a half days full plant capacity
- Number of tipping bays – 5
- Steam output – 64.5 tonnes of steam per hour at 400°C at 60 BAR
- Flue gas treatment – CNIM ammonia injection for the reduction of NOx, dry lime injection for the removal of acid gases, activated carbon injection for removal of metals and dioxins followed by high performance bag filters for removal of particulates, dispersal via two 80 metre high stacks.
- Maximum energy generating capacity 29MW

The ERF is regulated by the Environment Agency and is certified in compliance with:

- ISO 9001 : 2008
- ISO 14001 : 2004, and
- OHSAS 18001 : 2007

The facility is permitted to accept the following waste types:

Waste code	Description
02	WASTES FROM AGRICULTURE, HORTICULTURE, AQUACULTURE, FORESTRY, HUNTING AND FISHING, FOOD PREPARATION AND PROCESSING
02 02	wastes from the preparation and processing of meat, fish and other foods of animal origin
02 02 02	animal-tissue waste
02 02 03	materials unsuitable for consumption or processing
16	WASTES NOT OTHERWISE SPECIFIED IN THE LIST
16 03	off-specification batches and unused products
16 03 06	organic wastes other than those mentioned in 16 03 05
18	WASTES FROM HUMAN OR ANIMAL HEALTH CARE AND/OR RELATED RESEARCH (except kitchen and restaurant wastes not arising from immediate health care)
18 01	wastes from natal care, diagnosis, treatment or prevention of disease in humans
18 01 04	wastes whose collection and disposal is not subject to special requirements in order to prevent infection(for example dressings, plaster casts, linen, disposable clothing, diapers)
19	WASTES FROM WASTE MANAGEMENT FACILITIES, OFF-SITE WASTE WATER TREATMENT PLANTS AND THE PREPARATION OF WATER INTENDED FOR HUMAN CONSUMPTION AND WATER FOR INDUSTRIAL USE
19 12	wastes from the mechanical treatment of waste (for example sorting, crushing, compacting, pelletising) not otherwise specified
19 12 01	paper and cardboard
19 12 07	Wood other than that mentioned in 19 12 06
19 12 08	textiles
19 12 10	Combustible waste (refuse derived fuel)
19 12 12	other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11

Waste code	Description
20	MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS
20 01	separately collected fractions (except 15 01)
20 01 01	paper and cardboard
20 01 08	biodegradable kitchen and canteen waste
20 01 10	clothes
20 01 11	textiles
20 01 38	Wood other than that mentioned in 20 01 37
20 01 39	plastics
20 01 99	other fractions not otherwise specified (hygiene waste collected from domestic facilities that is not classified as clinical waste)
20 02	garden and park wastes (including cemetery waste)
20 02 01	biodegradable waste
20 03	other municipal wastes
20 03 01	Mixed municipal waste
20 03 02	Waste from markets
20 03 03	Street cleaning residues
20 03 07	Bulky waste

3. OPERATIONAL INFORMATION

Operational Details		
Operational hours	Line 1: 8280 Line 2: 8251	Hours
Total Waste Incinerated	337,701	Tonnes
Total Municipal Waste Incinerated	303,968	Tonnes
Total Commercial Waste Incinerated	33,733	Tonnes
Metals Recovered	3,206	Tonnes
Incinerator Bottom Ash Produced	66,518	Tonnes
APC Residues	8,267	Tonnes

Reporting of Water and Other Raw Material Usage for the year 2017

Raw Material	Usage	Unit	Specific Usage	Unit
Mains water	41,692	m ³	125.6	kg/t
Total water usage	41,692	m ³	125.6	kg/t
Ammonia	1,063	Tonnes	3.1	Kg/t
Activated carbon	82	Tonnes	0.24	kg/t
Lime/hydrated lime	4,092.4	Tonnes	12.1	kg/t

(Specific Usage is measured in kg/tonne waste incinerated)

Reporting of Energy Usage/Export for the year 2017

Energy Source	Energy (MWh)	Specific energy	Units
Electricity produced	229,059.5	676.2	KWh/tonne of waste incinerated (dry basis)
Electricity imported	625.8	2.7	
Electricity Exported	204,665	603.9	
Electricity used by ERF	25,020.2	74.4	
Gas Oil	251,040.5 Litres	0.8	L/tonne of waste incinerated (dry basis)
Thermal Energy produced (Steam Production)	857,719.1 Tonnes	3.1	Tonnes/Tonne waste incinerated
Waste heat utilised by ERF	0	0	KWh/tonne of waste incinerated (dry basis)

Reporting of Waste Disposal and Recovery for the year 2017

Waste Description	Disposal Route	Annual Tonnes	Recovery Tonnes	Kg / Tonne Waste
1) Hazardous Wastes				
APC Residues	Empire /Minosus	8,267	0	24.5
IBA which is classified as hazardous waste		0	0	0
Total hazardous waste	Empire /Minosus	8,267	0	24.5
2) Non-Hazardous Wastes				
IBA	Recycling	66,518	66,518	19.7
Other non-hazardous wastes	Metals Recycled	3,206	3,206	0.9
Total non-hazardous waste		69,724	69,724	
TOTAL WASTE	-	77,991	69,724	45.1

Reporting of other performance indicators for the period 2017

Parameter	Result
Number of periods of WID abnormal operation	1
Cumulative hours of WID abnormal operation for 2017	2.5

4. EMISSIONS TO AIR

All gaseous emissions generated during the combustion process pass through an extensive flue gas cleaning process which starts in the boiler directly above the furnace with injected ammonia to reduce the levels of oxides of nitrogen. After the boiler, super heater and economiser the gases are cooled to approximately 150 degrees centigrade. Activated carbon is added to remove metals and dioxins, and lime is added to remove acidic gases such as SO₂ and HCL. Most of this reaction occurs in the bag filters where particulates are removed and APCr is formed. There is a recirculation of APC where the used lime and carbon is recirculated further to remove chlorinated gases via a recirculation silo. This secondary reactant is recirculated back to the original process via a lab loop. The cleaned gasses are finally released into the atmosphere through the chimney after the bag house.

In compliance with the IED and EPR Permit, the flue gasses are continuously monitored using MCERTS accredited equipment. In addition to the continuous monitoring, an extractive sampling campaign is undertaken on a quarterly basis by an approved service supplier. The organisation used for analysis and monitoring are accredited by the United Kingdom Accreditation Service (UKAS) and the Environment Agency's Monitoring Certification Scheme (MCERTS).

The parameters measured and their frequency of monitoring are summarised below.

Parameters	Continuous	Jan – Jun	Jul – Dec
Particulate Matter	✓		
TOC	✓		
Hydrogen Chloride	✓		
Oxides of Nitrogen	✓		
Carbon Monoxide	✓		
Sulphur Dioxides	✓		
Ammonia	✓		
Nitrous Oxide		✓	✓
Hydrogen Fluoride		✓	✓
Mercury		✓	✓
Arsenic		✓	✓
Cadmium		✓	✓
Chromium		✓	✓
Copper		✓	✓
Cobalt		✓	✓
Nickel		✓	✓
Manganese		✓	✓
Antimony		✓	✓
Lead		✓	✓
Thallium		✓	✓
Vanadium		✓	✓
Dioxins and Furans		✓	✓
Dioxin-like PCBs		✓	✓
PAHs		✓	✓

4.1 Continuous Emissions

Through the process there is continuous emissions monitoring of six main pollutants with ELVs using MCERTS approved instruments. The pollutants measured in this way comprise: particulates, total organic carbon, carbon monoxide, sulphur dioxide and oxides of nitrogen.

Each pollutant has its own Emission Limit Value (ELV). A summary is shown below.

Pollutant	Chemical Symbol	ELV	Measurement	Monitoring Standard
Particulates	PMx	30mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Total Organic Carbon	TOC	20mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Hydrogen Chloride	HCL	60mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		10mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Carbon Monoxide	CO	100mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		50mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Sulphur Dioxide	SO2	200mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		50mg/m3	daily average	BS EN 14181 and BS EN 15267-3
Oxides of Nitrogen	NO and NO2 as NOX	400mg/m3	half hour average	BS EN 14181 and BS EN 15267-3
		200mg/m3	daily average	BS EN 14181 and BS EN 15267-3

A summary of the continuous emissions can be seen below for 2017 for average daily figures per month:

Stream 1 Monthly mean

	ELV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dust	10	0	0	0	0	0	0	0	0	0	0.2	0.2	0.2
Total Organic Carbon	10	0.2	0.3	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0	0.1
Hydrogen Chloride	10	7.5	7	6.5	7.5	5.2	5.6	6.7	7.2	7.1	7.5	6.8	6.2
Carbon Monoxide	50	3	3.5	2.9	1.8	1.6	1.6	1.6	1.6	2	3.5	3.7	3.8
Sulphur Dioxide	50	16	22	16.6	16.4	24.2	21.4	19	18.8	18.9	27.1	28.7	26.2
Oxides of Nitrogen	200	146	146	148	150.6	137.9	141.8	141.4	143.4	145.4	158.2	150.6	152.8

Stream 2 Monthly mean

	ELV	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dust	10	0	0	0	0	0	0	0	0	0	0	0	0
Total Organic Carbon	10	0.1	0.1	0.2	0.2	0.1	0.1	0	0.1	0.1	0.1	0	0.1
Hydrogen Chloride	10	7.1	7	7.6	7.7	5.9	5.1	5.2	5.8	6.1	8	5.6	5.1
Carbon Monoxide	50	1.8	2.6	2.0	1.3	0.9	0.9	0.7	0.9	1.2	2.2	2.7	2.4
Sulphur Dioxide	50	21	22	21.8	21.8	25.4	25.9	24.8	22.8	21.2	31.9	26.9	26.6
Oxides of Nitrogen	200	160	155	158.6	157.3	155.5	152.1	153.2	147.4	148.8	165.5	151.6	152.8

An interpretation shows that the emission levels are consistently stable from month to month. This data is communicated monthly to the public via our Veolia website in terms of a percentage of each ELV. A more detailed WID report is sent to the EA each month showing emissions per pollutant per line, per month in terms of half hourly averages and daily averages.

4.2 Extractive Sampling

Typically these pollutants are far harder to measure and are only present in very low concentrations so are taken from the stack using appropriate methodologies.

Extractive testing data is shown in Appendix B.

An interpretation of the data shows that the extractive samples are an order of magnitude below the prescribed limits in the permit.

4.3 Annual Mass Emissions

CEMS gas mass emissions are calculated by the MCERT Software developed by Envirosoft. These are shown in Appendix B.

An interpretation of the CEMS Mass Emission is that there is generally a steady state of control. Extractive mass emissions are calculated by using CEMS data and extractive results.

Annual Mass Emissions		
Parameter	Units	Annual Total
Hydrogen Fluoride	Kg	44.6
Mercury	Kg	2.2
Arsenic	Kg	1
Cadmium	Kg	1.2
Chromium	Kg	4.9
Copper	Kg	6.7
Nickel	Kg	7.6
Manganese	Kg	6
Antimony	Kg	2.8
Lead	Kg	4.8
Thallium	Kg	1.1
Dioxins and Furans*	Kg	0.00003169
PAHs	Kg	5.6
PCBs*	Kg	0.00086
Cobalt	Kg	1
Vanadium	Kg	1.3

*Measured concentrations were used to derive these mass emissions ie NOT converted to toxic equivalence first. Non-detects included

5 INCINERATOR BOTTOM ASH (IBA) AND AIR POLLUTION CONTROL (APC) RESIDUE

5.1 IBA

The plant has undergone rigorous testing to prove that the IBA is non-hazardous. The IBA is of a consistently high standard and there have been no failures in the last 24 samples. IBA is transported to Ballast Phoenix in Castle Bromwich, where it is reprocessed into a number of different graded aggregates. Metals are further extracted from the process and recycled.

In addition to Dioxins/Furans and dioxin-like PCB's, Total Organic Carbon, metals tested in IBA are Antimony, Cadmium, Thallium, Mercury, Lead, Chromium, Copper, Manganese, Nickel, Arsenic, Cobalt, Vanadium, Zinc and their compounds.

Frequency	Monitoring	Test	Limit
Monthly	IBA	TOC	< 3%
Monthly	IBA	Metals, dioxins/furans and dioxin-like PCB's	No limit

The results can be seen in Appendix C.

An interpretation shows that the results are uniform and that the IBA quality does not vary a great deal and is fully compliant.

5.2 APC

APC residue is the fine particulate matter that is removed at the end of the gas cleansing process. It contains residues from the waste gas and the reactants used to treat the gas. APC is captured in the bag house filters in the plant before the gas is emitted and dispersed through the ERF's two 80m stacks. The APC from the Staffordshire ERF is sent to another Veolia facility for use in their treatment facility, Empire Works or for permanent underground storage at Minosus.

The results can be seen in Appendix C.

An interpretation shows that the results are uniform and that the APC quality does not vary and is uniform.

6 ENVIRONMENTAL CONTROLS

Staffordshire ERF has an experienced Veolia management team from other existing plants. The plant has been designed using proven technology and experience and is performing well. The plant supports our company ethos, as we operate 10 facilities in the UK. Reliable environmental controls and a robust management system ensure that compliance with the Industrial Emissions Directive and EPR Permit.

Veolia staff are aware of the environmental impacts of their work and exercise a high standard of housekeeping. Training and competency of staff is controlled by the Veolia Business Management System. The Management System covers training, awareness and competence. The company identifies the training requirements of its employees and provides suitable resources to ensure they have the required knowledge, skills and expertise to carry out their duties.

APPENDIX A – EXTRACTIVE EMISSIONS
APPENDIX B – MASS EMISSIONS
APPENDIX C – IBA AND APC RESULTS

APPENDIX A

Permit Number: ERR/HP3431HK Operator: Veolia ES Staffordshire Ltd
 Facility: Staffordshire ERF Form Number: Air7 / 01/01/2012
 Reporting of periodically monitored emissions to air for the period from 01/01/17 to 30/06/17

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result ^[1]	Test Method	Result Date and Time ^[2]	Uncertainty ^[3]
A1 & A2	Hydrogen fluoride	2 mg/m ³	Periodic over minimum 1-hour period	A1: 0,02 mg/m ³ A2: 0,02 mg/m ³	BS ISO 15713	A1: 7/04/2017 7:15 – 8:15 A2: 7/04/2017 9:00 – 10:00	14% 14%
A1 & A2	Cadmium & thallium and their compounds (total)	0.05 mg/m ³	over minimum 30 minute, maximum 8 hour period	A1: 0,0011 mg/m ³ A2: 0,0011 mg/m ³	BS EN 14385	A1: 6/04/2017 7:15 – 9:17 A2: 6/04/2017 10:00 – 12:02	8% 8%
A1 & A2	Mercury and its compounds	0.05 mg/m ³	over minimum 30 minute, maximum 8 hour period	A1: 0,0011 mg/m ³ A2: 0,00067 mg/m ³	BS EN 14385	A1: 6/04/2017 7:15 – 9:17 A2: 6/04/2017 10:00 – 12:02	11% 13%
A1 & A2	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m ³	over minimum 30 minute, maximum 8 hour period	A1: 0,020 mg/m ³ A2: 0,011 mg/m ³	BS EN 14385	A1: 6/04/2017 7:15 – 9:17 A2: 6/04/2017 10:00 – 12:02	5% 4%
A1 & A2	N ₂ O	N/A	Periodic Over minimum 1-hour period	A1: 0,20 mg/m ³ A2: 0,21 mg/m ³	EA TGN M22	A1: 5/04/2017 11:25-12:25 A2: 4/04/2017 10:00-11:00	8% 8%
A1 & A2	Dioxins / Furans (I-TEQ)	0.1 ng/m ³	over minimum 6 hour period, maximum 8 hour period	A1: 0,011 – 0,011 ng/m ³ A2: 0,01 – 0,011 ng/m ³	BS EN 1948	A1: 5/04/2017 7:05 – 13:10 A2: 4/04/2017 7:15 – 13:20	14% 13%

Permit Number: ERR/HP3431HK
Facility: Staffordshire ERF

Operator: Veolia ES Staffordshire Ltd
Form Number: Air7 / 01/01/2012

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result ^[1]	Test Method	Result Date and Time ^[2]	Uncertainty ^[3]
A1 & A2	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,000027 - 0,0016 ng/m ³ A2: 0,0017 - 0,0018 ng/m ³	BS EN 1948	A1: 5/04/2017 7:05 – 13:10 A2: 4/04/2017 7:15 – 13:20	21% 21%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,000014 - 0,000089 ng/m ³ A2: 0,000096 – 0,000096 ng/m ³	BS EN 1948	A1: 5/04/2017 7:05 – 13:10 A2: 4/04/2017 7:15 – 13:20	19% 19%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,0033 - 0,0048 ng/m ³ A2: 0,0049 – 0,0049 ng/m ³	BS EN 1948	A1: 5/04/2017 7:05 – 13:10 A2: 4/04/2017 7:15 – 13:20	13% 13%
A1 & A2	Dioxins / furans (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,012 - 0,012 ng/m ³ A2: 0,011 – 0,011 ng/m ³	BS EN 1948	A1: 5/04/2017 7:05 – 13:10 A2: 4/04/2017 7:15 – 13:20	16% 15%
A1 & A2	Dioxins / furans (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,012 - 0,012 ng/m ³ A2: 0,011 – 0,011 ng/m ³	BS EN 1948	A1: 5/04/2017 7:05 – 13:10 A2: 4/04/2017 7:15 – 13:20	16% 16%
A1 & A2	Dioxins / furans (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,016 - 0,017 ng/m ³ A2: 0,015 – 0,015 ng/m ³	BS EN 1948	A1: 5/04/2017 7:05 – 13:10 A2: 4/04/2017 7:15 – 13:20	19% 18%

Permit Number:
Facility:

ERR/HP3431HK
Staffordshire ERF

Operator:
Form Number:

Veolia ES Staffordshire Ltd
Air7 / 01/01/2012

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result ^[1]	Test Method	Result Date and Time ^[2]	Uncertainty ^[3]
A1 & A2	Poly-cyclic aromatic hydrocarbons (PAHs) Total	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 5,04 µg/m ³ A2: 4,48 µg/m ³	BS ISO 11338-1 and BS ISO 11338-2	5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	9% 12%
A1 & A2	Anthanthrene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	>100% >100%
A1 & A2	Benzo[a]anthracene	No limit applies		A1: 0,35 µg/m ³ A2: 0,19 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Benzo[b]fluoranthene	No limit applies		A1: 0,24 µg/m ³ A2: 0,054 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Benzo[k]fluoranthene	No limit applies		A1: 0,11 µg/m ³ A2: 0,027 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Benzo[b]naph(2,1-d)thiophene	No limit applies		A1: 0,042 µg/m ³ A2: 0,068 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Benzo[c]phenanthrene	No limit applies		A1: 0,070 µg/m ³ A2: 0,054 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Benzo[ghi]perylene	No limit applies		A1: 0,070 µg/m ³ A2: 0,24 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Benzo[a]pyrene	No limit applies		A1: 0,21 µg/m ³ A2: 0,068 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Cholanthrene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	>100% >100%
A1 & A2	Chrysene	No limit applies		A1: 0,34 µg/m ³ A2: 0,23 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Cyclopenta(c,d)pyrene	No limit applies		A1: 0,13 µg/m ³ A2: 0,054 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Dibenzo[ah]anthracene	No limit applies		A1: 0,028 µg/m ³ A2: 0,014 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% >100%
A1 & A2	Dibenzo[a,i]pyrene	No limit applies		A1: 0,028 µg/m ³ A2: 0,014 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% >100%
A1 & A2	Fluoranthene	No limit applies		A1: 2,39 µg/m ³ A2: 3,12 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Indo[1,2,3-cd]pyrene	No limit applies		A1: 0,084 µg/m ³ A2: 0,041 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%
A1 & A2	Naphthalene	No limit applies		A1: 0,92 µg/m ³ A2: 0,27 µg/m ³		5/04/17 7:05 – 13:10 4/04/17 7:15 – 13:20	18% 18%

[1] For dioxins and dioxin-like PCBs, the result are to be reported as a range based on: All congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum

[2] The date and time of the sample that produced the result is given.

[3] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed
(authorised to sign as representative of Operator)

Date.....9.1.17.17

Permit Number: ERR/HP3431HK Operator: Veolia ES Staffordshire Ltd
Facility: Staffordshire ERF Form Number: Air7 / 01/01/2012
Reporting of periodically monitored emissions to air for the period from 01/07/17 to 31/12/17

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result ^[1]	Test Method	Result Date and Time ^[2]	Uncertainty ^[3]
A1 & A2	Hydrogen fluoride	2 mg/m ³	Periodic over minimum 1-hour period	A1: 0,03 mg/m ³ A2: 0,03 mg/m ³	BS ISO 15713	A1: 3/10/2017 8:00 – 9:00 A2: 4/10/2017 8:00 – 9:00	14% 14%
A1 & A2	Cadmium & thallium and their compounds (total)	0.05 mg/m ³	over minimum 30 minute, maximum 8 hour period	A1: 0,0014 mg/m ³ A2: 0,0013 mg/m ³	BS EN 14385	A1: 5/10/2017 10:15 – 12:16 A2: 5/10/2017 12:45 – 14:46	8% 8%
A1 & A2	Mercury and its compounds	0.05 mg/m ³	over minimum 30 minute, maximum 8 hour period	A1: 0,0015 mg/m ³ A2: 0,0014 mg/m ³	BS EN 14385	A1: 5/10/2017 10:15 – 12:16 A2: 5/10/2017 12:45 – 14:46	14% 13%
A1 & A2	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m ³	over minimum 30 minute, maximum 8 hour period	A1: 0,024 mg/m ³ A2: 0,023 mg/m ³	BS EN 14385	A1: 5/10/2017 10:15 – 12:16 A2: 5/10/2017 12:45 – 14:46	5% 5%
A1 & A2	N ₂ O	N/A	Periodic Over minimum 1-hour period	A1: 0,47 mg/m ³ A2: 0,45 mg/m ³	EA TGN M22	A1: 3/10/2017 10:00-11:00 A2: 4/10/2017 10:00-11:00	10% 10%
A1 & A2	Dioxins / Furans (I-TEQ)	0.1 ng/m ³	over minimum 6 hour period, maximum 8 hour period	A1: 0,019 – 0,019 ng/m ³ A2: 0,024 - 0,024 ng/m ³	BS EN 1948	A1: 3/10/2017 7:10 – 13:15 A2: 4/10/2017 7:10 – 13:15	14% 14%

Permit Number:
Facility:

ERR/HP3431HK
Staffordshire ERF

Operator:
Form Number:

Veolia ES Staffordshire Ltd
Air7 / 01/01/2012

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result ^[1]	Test Method	Result Date and Time ^[2]	Uncertainty ^[3]
A1 & A2	Dioxin-like PCBs (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,0065 - 0,0065 ng/m ³ A2: 0,0056 - 0,0056 ng/m ³	BS EN 1948	A1: 3/10/2017 7:10 – 13:15 A2: 4/10/2017 7:10 – 13:15	20% 20%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,00035 - 0,00035 ng/m ³ A2: 0,00031 – 0,00031 ng/m ³	BS EN 1948	A1: 3/10/2017 7:10 – 13:15 A2: 4/10/2017 7:10 – 13:15	19% 19%
A1 & A2	Dioxin-like PCBs (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,019 - 0,019 ng/m ³ A2: 0,018 – 0,018 ng/m ³	BS EN 1948	A1: 3/10/2017 7:10 – 13:15 A2: 4/10/2017 7:10 – 13:15	12% 13%
A1 & A2	Dioxins / furans (WHO-TEQ Humans / Mammals)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,021 - 0,021 ng/m ³ A2: 0,027 – 0,027 ng/m ³	BS EN 1948	A1: 3/10/2017 7:10 – 13:15 A2: 4/10/2017 7:10 – 13:15	14% 14%
A1 & A2	Dioxins / furans (WHO-TEQ Fish)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,02 - 0,02 ng/m ³ A2: 0,025 – 0,025 ng/m ³	BS EN 1948	A1: 3/10/2017 7:10 – 13:15 A2: 4/10/2017 7:10 – 13:15	15% 15%
A1 & A2	Dioxins / furans (WHO-TEQ Birds)	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,029 - 0,03 ng/m ³ A2: 0,037 – 0,037 ng/m ³	BS EN 1948	A1: 3/10/2017 7:10 – 13:15 A2: 4/10/2017 7:10 – 13:15	18% 18%

Permit Number:
Facility:

ERR/HP3431HK
Staffordshire ERF

Operator:
Form Number:

Veolia ES Staffordshire Ltd
Air7 / 01/01/2012

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result ^[1]	Test Method	Result Date and Time ^[2]	Uncertainty ^[3]
A1 & A2	Poly-cyclic aromatic hydrocarbons (PAHs) Total	No limit applies	over minimum 6 hour period, maximum 8 hour period	A1: 0,62 µg/m ³ A2: 0,81 µg/m ³	BS ISO 11338-1 and BS ISO 11338-2	6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	15% 14%
A1 & A2	Anthanthrene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Benzo[a]anthracene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Benzo[b]fluoranthene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Benzo[k]fluoranthene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Benzo[b]naph(2,1-d)thiophene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Benzo[c]phenanthrene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Benzo[ghi]perylene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Benzo[a]pyrene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Cholanthrene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Chrysene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Cyclopenta(c,d)pyrene	No limit applies		A1: 0,043 µg/m ³ A2: 0,043 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Dibenzo[ah]anthracene	No limit applies		A1: 0,014 µg/m ³ A2: 0,029 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Dibenzo[a,i]pyrene	No limit applies		A1: 0,014 µg/m ³ A2: 0,029 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Fluoranthene	No limit applies		A1: 0,028 µg/m ³ A2: 0,087 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	18% 18%
A1 & A2	Indo[1,2,3-cd]pyrene	No limit applies		A1: 0,014 µg/m ³ A2: 0,014 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	>100% >100%
A1 & A2	Naphthalene	No limit applies		A1: 0,37 µg/m ³ A2: 0,46 µg/m ³		6/10/17 7:10 – 13:12 9/10/17 7:20 – 13:22	18% 18%

[1] For dioxins and dioxin-like PCBs, the result are to be reported as a range based on: All congeners less than the detection limit assumed to be zero as a minimum, and all congeners less than the detection limit assumed to be at the detection limit as a maximum

[2] The date and time of the sample that produced the result is given.

[3] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed
(authorised to sign as representative of Operator)

Date.....25.01.18.....

APPENDIX B

OPERATIONAL SUMMARY for each month of the YEAR to 31/12/2017

Operator: Veolia

Installation: Stafford EfW

Confidence adjusted values

Release Point: Unit 1

Average concentrations from valid 30 min averages.

Month	NO x (mg/m3)	CO (mg/m3)	SO2 (mg/m3)	HCl (mg/m3)	VOC (mg/m3)	NH3 (mg/m3)	Dust (mg/m3)	Flow (Nm3/hr)
January	146	3	16	7.5	0.2	0.85	0	123437
February	146	3.5	22	7	0.3	1.33	0	124212
March	148	2.9	16.6	6.5	0.4	2.44	0	122539
April	150.6	1.8	16.4	7.5	0.2	2.94	0	125377
May	137.9	1.6	24.2	5.2	0.2	6.52	0	123427
June	141.8	1.6	21.4	5.6	0.1	3.88	0	122510
July	141.4	1.6	19	6.7	0.1	2.80	0	128016
August	143.4	1.6	18.8	7.2	0.1	3.35	0	127234
September	145.4	2	18.9	7.1	0.1	4.86	0	125790
October	158.2	3.5	27.1	7.5	0.1	5.54	0.2	121944
November	150.6	3.7	28.7	6.8	0	5.81	0.2	123414
December	152.8	3.8	26.2	6.2	0.1	4.51	0.2	122228
Yearly Average	146.8	2.6	21.3	6.7	0.2	3.65	0.1	124213

Mass release

Month	NO x (kg)	CO (kg)	SO2 (kg)	HCl (kg)	VOC (kg)	NH3 (kg)	Dust (kg)	Burn time (hrs)
January	16163.5	296.7	1743.7	1100.16	28.39	79.00	0.04	742
February	14583.7	303.7	2165.0	930.18	29.31	111.59	0.41	669
March	15125.3	257.0	1677.7	878.74	48.10	206.50	0.00	688
April	16416.5	174.4	1779.7	1081.99	25.95	267.54	0.01	719
May	9211.3	93.4	1601.6	461.54	13.49	360.13	0.01	447
June	15035.1	148.5	2240.2	779.30	17.40	341.00	0.01	715
July	16230.9	155.9	2162.0	1016.24	13.46	259.60	112.21	717
August	16655.9	168.7	2161.9	1106.31	15.49	311.39	0.00	725
September	16587.4	201.8	2129.7	1070.06	12.90	441.10	0.01	720
October	17546.2	345.0	2976.3	1098.11	9.08	488.38	20.35	723
November	16861.0	359.0	3208.2	1020.26	5.24	515.12	25.09	718
December	16312.7	353.2	2773.0	881.18	6.78	383.12	26.09	694
Total	186729.5	2857.4	26619.0	11424.06	225.59	3764.47	184.23	8275

OPERATIONAL SUMMARY for each month of the YEAR to 31/12/2017

Operator: Veolia

Installation: Stafford EfW

Confidence adjusted values

Release Point: Unit 2

Average concentrations from valid 30 min averages.

Month	NO x (mg/m3)	CO (mg/m3)	SO2 (mg/m3)	HCl (mg/m3)	VOC (mg/m3)	NH3 (mg/m3)	Dust (mg/m3)	Flow (Nm3/hr)
January	160	1.8	21	7.1	0.1	5.65	0	114817
February	155	2.6	22	7	0.1	5.75	0	120862
March	158.6	2	21.8	7.6	0.2	4.18	0	124581
April	157.3	1.3	21.8	7.7	0.2	2.97	0	122011
May	155.5	0.9	25.4	5.9	0.1	4.43	0	121997
June	152.1	0.9	25.9	5.1	0.1	3.22	0	122118
July	153.2	0.7	24.8	5.2	0	2.97	0	121945
August	147.4	0.9	22.8	5.8	0.1	4.14	0	122112
September	148.8	1.2	21.2	6.1	0.1	4.70	0	124137
October	165.5	2.2	31.9	8	0.1	4.64	0	122269
November	151.6	2.7	26.9	5.6	0	5.19	0	125220
December	152.8	2.4	26.6	5.1	0.1	4.25	0	125703
Yearly Average	154.8	1.6	24.3	6.4	0.1	4.34	0.0	122323

Mass release

Month	NO x	CO	SO2	HCl	VOC	NH3	Dust	Burn time
	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(hrs)
January	16283.2	160.7	2083.7	957.37	9.79	460.65	0.00	707
February	15386.7	226.0	2228.8	964.34	12.20	463.74	0.00	672
March	16543.8	188.6	2266.0	1048.55	24.35	366.18	0.00	701
April	16161.3	120.1	2231.1	1049.42	19.77	257.34	0.00	705
May	11189.0	56.5	1818.6	559.66	11.36	268.23	0.02	493
June	15844.7	86.3	2680.1	707.37	7.92	283.43	0.00	715
July	16168.5	63.7	2584.6	721.39	5.65	254.01	853.51	693
August	15965.3	84.0	2450.3	827.14	15.09	360.45	0.07	706
September	16684.3	116.6	2356.4	912.22	17.10	420.34	0.04	720
October	18402.0	220.2	3526.2	1188.79	11.36	412.01	0.01	725
November	17146.7	265.8	3017.5	836.10	5.35	467.01	0.01	720
December	16345.9	231.8	2834.2	721.75	9.08	363.91	0.03	679
Total	192121.3	1820.3	30077.5	10494.11	149.02	4377.30	853.69	8233

APPENDIX C

Permit Number : ERR/HP3431HK

Operator : Veolia ES Staffordshire Ltd

Permit Reference Number: EPR/3431HK

Operator : Veolia

Analysis month: Jan-17

Installation : Staffordshire ERF

Form Number : Residue 1/01/01/2012

Reporting of Ash Composition for the period from

Ash Composition (LOI/TOC):		
	LOI (%)	% Carbon (TOC) ^{w/w}
Bottom ash		1.19

* At least one of LOI or TOC to be reported

Ash Composition (Metals, Dioxins, etc.)															DIOXINS, FURANS & DIOXIN-LIKE PCBs		
	Sb mg/kg	Cd mg/kg	Tl mg/kg	Hg mg/kg	Pb mg/kg	Cr mg/kg	Cu mg/kg	Mn mg/kg	Ni mg/kg	As mg/kg	Co mg/kg	V mg/kg	Zn mg/kg	DIOXIN & FURANS I-TEQ ng/kg	WHO-TEQ ng/kg		
															Humans/ mammals	Birds	Fish
Bottom ash	76.0	5.38	0.08	0.40	328	86.6	2062	709	81.2	7.71	32.5	74.3	1974	3.62	3.72	7.06	3.94
APC residue	704	123	0.70	6.00	1011	71.4	510	438	22.6	47.6	7.20	48.7	8270	586	595	1371	673

Signed:



Date:

26/4/17

(authorised to sign as representative of Operator)

Permit Number : ERR/HP3431HK

Operator : Veolia ES Staffordshire Ltd

Permit Reference Number: EPR/3431HK

Operator : Veolia

Analysis month: Apr-17

Installation : Staffordshire ERF

Form Number : Residue 1/01/01/2012

Reporting of Ash Composition for the period from

Ash Composition (LOI/TOC):		
	LOI (%)	% Carbon (TOC) ^{w/w}
Bottom ash		1,30

* At least one of LOI or TOC to be reported

Ash Composition (Metals, Dioxins, etc.)															DIOXINS, FURANS & DIOXIN-LIKE PCBs		
	Sb mg/kg	Cd mg/kg	Tl mg/kg	Hg mg/kg	Pb mg/kg	Cr mg/kg	Cu mg/kg	Mn mg/kg	Ni mg/kg	As mg/kg	Co mg/kg	V mg/kg	Zn mg/kg	DIOXIN & FURANS I-TEQ ng/kg	WHO-TEQ ng/kg		
															Humans/ mammals	Birds	Fish
Bottom ash	55,5	6,64	0,08	0,38	738	82,2	1989	629	76,1	7,35	26,0	68,1	1916	3,09	3,13	4,38	3,22
APC residue	758	187	0,70	7,30	1236	81,1	517	438	25,7	46,9	6,70	22,0	9056	2060	2215	3917	2327

Signed:



Date:

22/7/27

(authorised to sign as representative of Operator)

Permit Number : ERR/HP3431HK

Operator : Veolia ES Staffordshire Ltd

Permit Reference Number: EPR/3431HK

Operator : Veolia

Analysis month: Jul-17

Installation : Staffordshire ERF

Form Number : Residue 1/01/01/2012

Reporting of Ash Composition for the period from

Ash Composition (LOI/TOC):		
	LOI (%)	% Carbon (TOC) % _w
Bottom ash		0,59

* At least one of LOI or TOC to be reported

Ash Composition (Metals, Dioxins, etc.)															DIOXINS, FURANS & DIOXIN-LIKE PCBs		
	Sb mg/kg	Cd mg/kg	Tl mg/kg	Hg mg/kg	Pb mg/kg	Cr mg/kg	Cu mg/kg	Mn mg/kg	Ni mg/kg	As mg/kg	Co mg/kg	V mg/kg	Zn mg/kg	DIOXIN & FURANS I-TEQ ng/kg	WHO-TEQ ng/kg		
															Humans/ mammals	Birds	Fish
Bottom ash	82.0	7,84	0,08	0,42	442	123.0	1885	808	101.0	7,76	52.0	24,8	2123	2,45	2,52	4,75	2,70
APC residue	702	176	0,80	6,30	1127	74,3	481	394	24,3	40,4	6,30	16.0	8183	2019	2195	3550	2287

Signed:



Date: 3/20/17

(authorised to sign as representative of Operator)

Permit Number : ERR/HP3431HK

Operator : Veolia ES Staffordshire Ltd

Permit Reference Number: EPR/3431HK

Operator : Veolia

Analysis month: Oct-17

Installation : Staffordshire ERF

Form Number : Residue 1/01/01/2012

Reporting of Ash Composition for the period from

Ash Composition (LOI/TOC):

	LOI (%)	% Carbon (TOC) ^{w/w}
Bottom ash		1,02

* At least one of LOI or TOC to be reported

Ash Composition (Metals, Dioxins, etc.)

	Sb mg/kg	Cd mg/kg	Tl mg/kg	Hg mg/kg	Pb mg/kg	Cr mg/kg	Cu mg/kg	Mn mg/kg	Ni mg/kg	As mg/kg	Co mg/kg	V mg/kg	Zn mg/kg	DIOXIN I-TEQ ng/kg	DIOXINS, FURANS & DIOXIN-LIKE PCBs		
															WHO-TEQ ng/kg		
															Humans/ mammals	Birds	Fish
Bottom ash	73,3	4,35	0,07	0,37	965	81.0	1557	525	68	6,37	36,8	30,4	1778	2,70	2,83	4,65	2,71
APC residue	768	177	0,70	7.00	959	73.0	440	465	20,8	46,8	8,70	23,7	9242	397	383	849	427

Signed:



Date:

25.01.18

(authorised to sign as representative of Operator)



**Analysis of Staffordshire
(Four Ashes)
EfW Feedstock**

**Summary Report
July 2017**



Project details and acknowledgements	2
Methodology	3
Composition of Feedstock	4
Biodegradable and Combustible Content	5
Energy Content and Qualifying Proportion	6

Project details and acknowledgements

Title	Analysis of Four Ashes EfW Plant Feedstock
Client	Veolia Environmental Services
Project number	17001
Client reference	-
Author	Philip Wells
Research Manager	Philip Wells

M·E·L Research would like to thank Veolia and individual EfW plant officers and staff who participated and helped in the setup and fieldwork stages of the project, and those who provided additional data and other information to inform the project. This report highlights key results and discusses the findings using tables and charts. The views and opinions expressed in this report are those of M·E·L Research and are not necessarily shared by officers from Veolia Environmental Services.

M·E·L Research

2nd Floor, 1 Ashted Lock, Birmingham Science Park Aston, Birmingham. B7 4AZ

Email: info@melresearch.co.uk

Web: www.melresearch.co.uk

Tel: 0121 604 4664



Methodology

Methodology for the acquisition of a representative sample of feedstock for the Four Ashes Energy from Waste Plant, July 2017.

Sampling was determined in terms of the source contribution into the Four Ashes EfW with the delivered feedstock being formed from household residual waste with some from the trade sector. Vehicles that deliver into the EfW were chosen on these terms. The drivers of selected vehicles were asked to discharge a proportion of the contents of their vehicle onto the floor of the reception hall. Ten samples of 50Kg were taken from the selected vehicles forming a total of 500kg.

Table 1: Sampling for the Four Ashes Energy from Waste Plant – July 2017

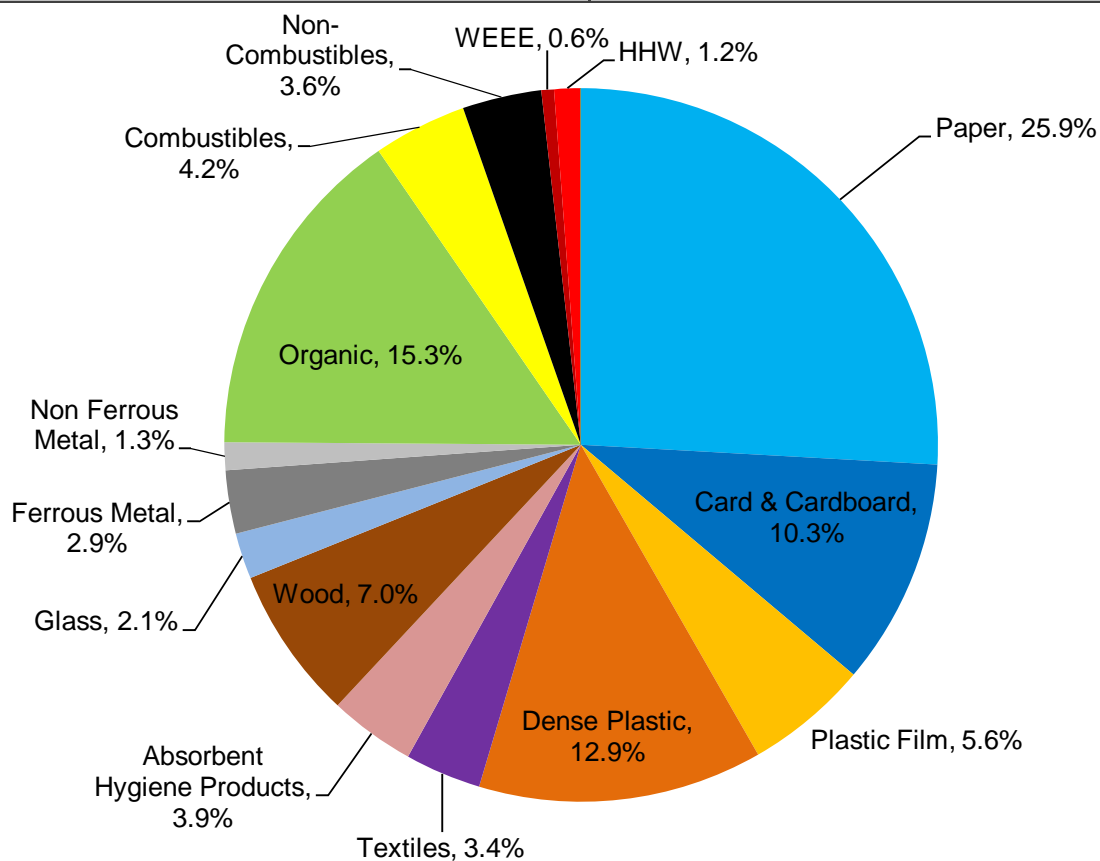
VEOLIA FOUR ASHES - 17001 Vehicle Record Sheet July 2017				
Time	Vehicle reg.	Collection Area	HH / trade	Weight Taken (Kg)
12:40	MX17 FMJ	NOTTINGHAM TRADE	TRADE	50.00
12:52	DA63 SXE	FOUR ASHES	HH	50.00
12:58	VU66 NTV	WOLVERHAMPTON	HH	50.00
13:13	VX16 AFN	CANNOCK	HH	50.00
13:17	VA57 KLO	STAFFORD	HH	50.00
13:20	VX16 AOH	CANNOCK	HH	50.00
13:44	VX16 AFO	CANNOCK	HH	50.00
11:10	VX13 LRZ	PENKERIDGE	HH	50.00
11:36	VX13 LPY	WHEATON ASTON	HH	50.00
11:40	VU66 NTV	WOLVERHAMPTON	HH	50.00
TOTAL				500.00

Composition of Feedstock

This section details the make-up of the waste sample derived from the selected vehicles delivering to the site at the time of analysis.

Table 2: Sampling for the Four Ashes Energy from Waste Plant – July 2017

FOUR ASHES EFW	% COMPOSITION
PAPER	25.88%
CARD & CARDBOARD	10.27%
PLASTIC FILM	5.59%
DENSE PLASTIC	12.88%
TEXTILES	3.43%
ABSORBENT HYGIENE PRODUCTS	3.90%
WOOD	6.96%
GLASS	2.08%
FERROUS METAL	2.86%
NON FERROUS METAL	1.26%
ORGANIC	15.29%
COMBUSTIBLES	4.22%
NON-COMBUSTIBLES	3.60%
WEEE	0.57%
HHW	1.20%
FINES	0.00%
TOTAL	100.00%



Biodegradable and Combustible Content

The percentage figures for biodegradable and combustible content for each material type shown in Table 3 below are calculated using values in DEFRA's *Biodegradability of Municipal Solid Waste report 2012* (Table 23 p.30). From the waste that was compositionally analysed the combustible content was estimated at 88.6% with the biodegradable content estimated to be 61.5%.

Table 3: Combustible and biodegradable contributions by waste material.

FOUR ASHES EFW	COMBUSTIBLE CONTENT	BIODEGRADABLE CONTENT
PAPER	25.88%	25.88%
CARD & CARDBOARD	10.27%	10.27%
PLASTIC FILM	5.59%	0.00%
DENSE PLASTIC	12.88%	0.00%
TEXTILES	3.43%	1.71%
ABSORBENT HYGIENE PRODUCTS	3.90%	1.95%
WOOD	6.96%	3.48%
GLASS	0.00%	0.00%
FERROUS METAL	0.00%	0.00%
NON FERROUS METAL	0.00%	0.00%
ORGANIC	15.29%	15.29%
COMBUSTIBLES	4.22%	2.11%
NON-COMBUSTIBLES	0.00%	0.75%
WEEE	0.00%	0.00%
HHW	0.18%	0.00%
FINES	0.00%	0.00%
TOTAL	88.60%	61.45%

Energy Content and Qualifying Proportion

Table 4: Waste Energy data (MJ) and qualifying proportion (%).

FOUR ASHES EFW	WEIGHTED CV* (MJ)	% BY CV	% QUALIFYING
PAPER	2.71	21.65%	21.65%
CARD & CARDBOARD	1.30	10.35%	10.35%
PLASTIC FILM	1.17	9.36%	0.00%
DENSE PLASTIC	3.57	28.46%	0.00%
TEXTILES	0.55	4.40%	2.20%
ABSORBENT HYGIENE PRODUCTS	0.21	1.69%	0.84%
WOOD	1.16	9.22%	4.61%
GLASS	0.00	0.00%	0.00%
FERROUS METAL	0.00	0.00%	0.00%
NON FERROUS METAL	0.00	0.00%	0.00%
ORGANIC	1.03	8.25%	8.25%
COMBUSTIBLES	0.70	5.57%	2.78%
NON-COMBUSTIBLES	0.05	0.00%	0.00%
WEEE	0.00	0.00%	0.00%
HHW	0.08	0.67%	0.00%
FINES	0.00	0.00%	0.00%
TOTAL	12.53	99.62%	50.69%

*Calculated using GCVar values derived from data in Defra's Biodegradability of Municipal Solid Waste report 2012

Figure 2: Material types - % Contribution by CV

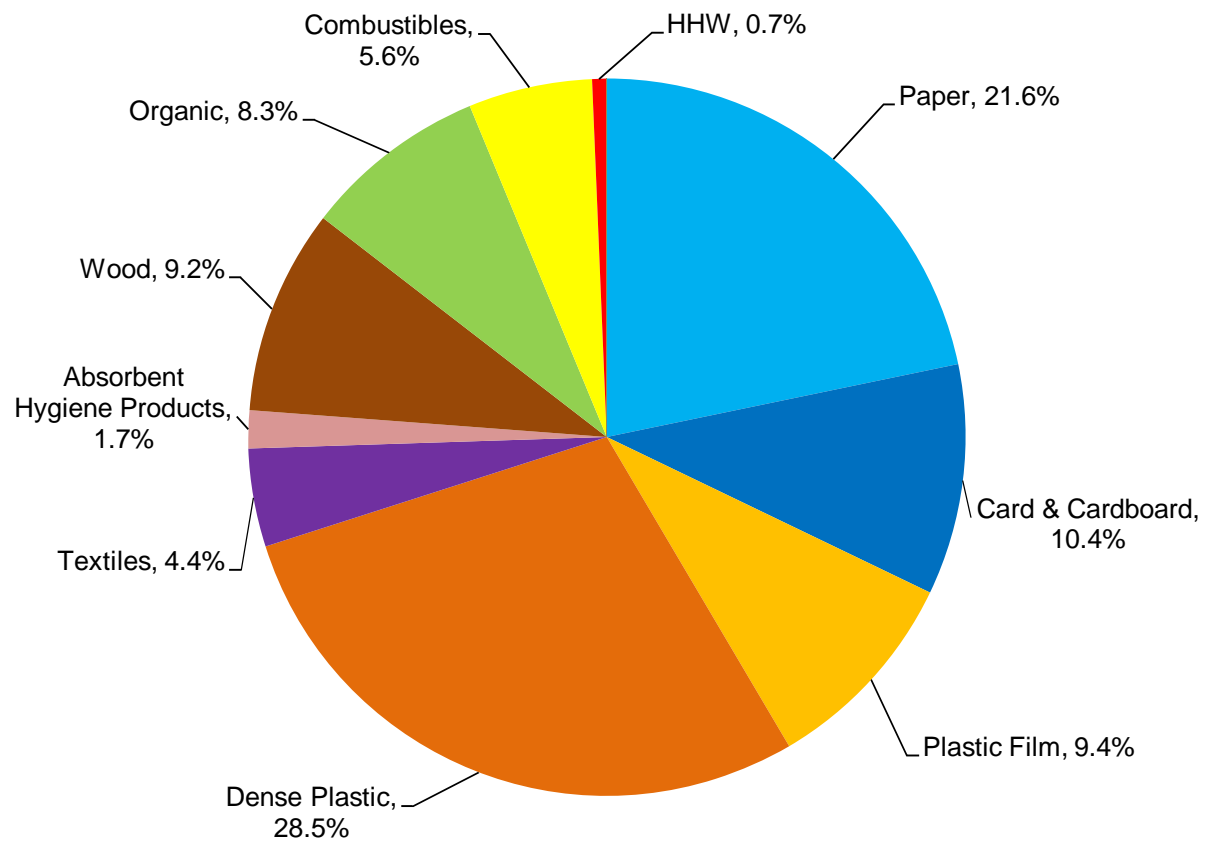


Table 5: Four Ashes EfW full data appendix

Prime Categories	Sub-categories	% by weight*	Gross CVar (MJ/Kg)**	Weighted CV (MJ)	Combustibility	% by CV	Biodegradability	Qualifying	Biodegradable Content	Combustible Content
Paper	Newspapers	4.58%	11.59	0.53	1	4.23%	1	4.23%	4.58%	4.58%
	Magazines	0.49%	11.2	0.06	1	0.44%	1	0.44%	0.49%	0.49%
	Recyclable Paper	13.16%	11.22	1.48	1	11.78%	1	11.78%	13.16%	13.16%
	All Other Paper	7.65%	8.51	0.65	1	5.19%	1	5.19%	7.65%	7.65%
Card & Cardboard	Card Packaging	3.68%	10.33	0.38	1	3.03%	1	3.03%	3.68%	3.68%
	Other Card	2.00%	13.62	0.27	1	2.18%	1	2.18%	2.00%	2.00%
	All Corrugated Cardboard	4.59%	14.05	0.64	1	5.14%	1	5.14%	4.59%	4.59%
Plastic Film	Plastic Bags	1.47%	18.32	0.27	1	2.15%	0	0.00%	0.00%	1.47%
	Plastic Film Packaging	3.00%	22.21	0.67	1	5.32%	0	0.00%	0.00%	3.00%
	Other Plastic Film	1.12%	21.17	0.24	1	1.89%	0	0.00%	0.00%	1.12%
Dense Plastic	All Dense Plastic	12.88%	27.7	3.57	1	28.46%	0	0.00%	0.00%	12.88%
Textiles	Mixed Textiles	3.43%	16.09	0.55	1	4.40%	0.5	2.20%	1.71%	3.43%
Absorbent Hygiene Products	Disposable Nappies, AHP & Clinical Waste	3.90%	5.42	0.21	1	1.69%	0.5	0.84%	1.95%	3.90%
Wood	All Wood Waste	3.51%	16.28	0.57	1	4.56%	0.5	2.28%	1.76%	3.51%
	Composite Wood Waste	3.45%	16.94	0.58	1	4.66%	0.5	2.33%	1.72%	3.45%
Glass	All Glass	2.08%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
Ferrous Metal	All Ferrous Metal	2.86%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
Non Ferrous Metal	All Non-Ferrous Metal	1.26%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
Organic	Garden Waste	1.77%	3.15	0.06	1	0.44%	1	0.44%	1.77%	1.77%
	Food Waste	13.06%	7.19	0.94	1	7.49%	1	7.49%	13.06%	13.06%
	Organic Pet Bedding or Litter	0.00%	13.21	0.00	1	0.00%	1	0.00%	0.00%	0.00%
	Other Organics inc consumable liquids	0.46%	8.67	0.04	1	0.32%	1	0.32%	0.46%	0.46%
Combustibles	Shoes & Clothing Accessories	0.00%	20.12	0.00	1	0.00%	0.5	0.00%	0.00%	0.00%
	Carpet / Underlay	1.06%	15.42	0.16	1	1.31%	0.5	0.65%	0.53%	1.06%
	All Other Combustibles	3.16%	16.92	0.53	1	4.26%	0.5	2.13%	1.58%	3.16%
Non-Combustibles	Inorganic Pet Litter	1.51%	3.15	0.05	0	0.00%	0.5	0.00%	0.75%	0.00%
	All Other Non-Combustibles inc soil and sand	2.10%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
WEEE	All WEEE Items	0.57%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
HHW	Paint / Varnish / Oil	0.18%	46.4	0.08	1	0.67%	0	0.00%	0.00%	0.18%
	All Other HHW	1.02%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
FINES	All <10mm	0.00%	6.93	0.00	1	0.00%	0.5	0.00%	0.00%	0.00%
Total		100.00%		12.53		99.62%		50.69%	61.45%	88.60%

* Figures derived from hand sorted waste analysis July 2017

** Figures calculated using values derived from Biodegradability of Municipal Solid Waste report DEFRA 2012, Table 25 p.33



**Analysis of Staffordshire
(Four Ashes)
EfW Feedstock**

**Summary Report
March 2017**



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Methodology	3
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Biodegradable and Combustible Content	5
Energy Content and Qualifying Proportion	6

Project details and acknowledgements

Title	Analysis of Four Ashes EfW Plant Feedstock
Client	Veolia Environmental Services
Project number	17001
Client reference	-
Author	Philip Wells
Research Manager	Philip Wells

M·E·L Research would like to thank Veolia and individual EfW plant officers and staff who participated and helped in the setup and fieldwork stages of the project, and those who provided additional data and other information to inform the project. This report highlights key results and discusses the findings using tables and charts. The views and opinions expressed in this report are those of M·E·L Research and are not necessarily shared by officers from Veolia Environmental Services.

M·E·L Research

2nd Floor, 1 Ashted Lock, Birmingham Science Park Aston, Birmingham. B7 4AZ

Email: info@melresearch.co.uk

Web: www.melresearch.co.uk

Tel: 0121 604 4664



Methodology

Methodology for the acquisition of a representative sample of feedstock for the Four Ashes Energy from Waste Plant, March 2017.

Sampling was determined in terms of the source contribution into the Four Ashes EfW with the delivered feedstock being formed from household residual waste. Vehicles that deliver into the EfW were chosen on these terms. The drivers of selected vehicles were asked to discharge a proportion of the contents of their vehicle onto the floor of the reception hall. Ten samples of approximately 50Kg were taken from the selected vehicles forming a total of 514.47kg.

Table 1: Sampling for the Four Ashes Energy from Waste Plant – March 2017

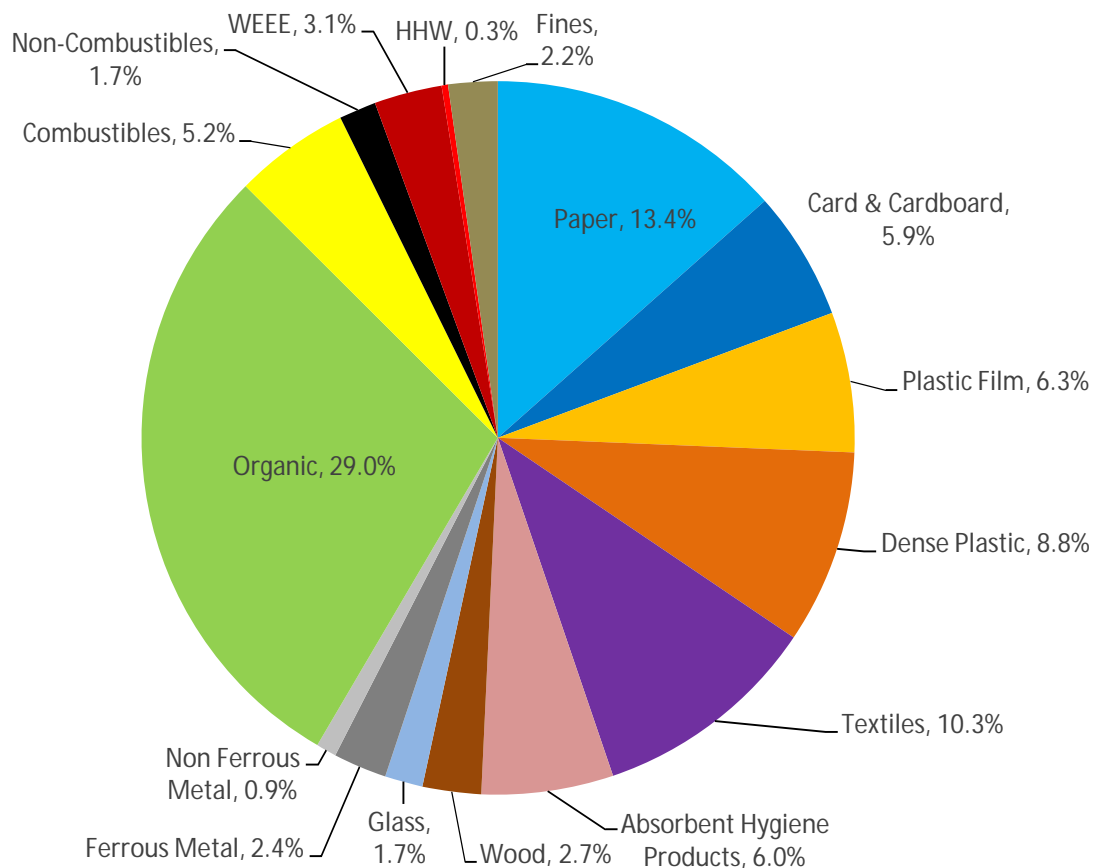
VEOLIA FOUR ASHES - 17001 Vehicle Record Sheet March 2017				
Time	Vehicle reg.	Collection Area	HH / trade	Weight Taken (Kg)
09:25	VX16 AFK	ROUND 3 CC	HH	52.30
09:29	VX16 AFD	DRY WASTE 5	HH	51.28
10:30	VX16 AOH	ROUND 4	HH	51.84
10:47	VX16 LRA	ROUND 3 CC	HH	50.63
11:00	VX16 AOJ	ROUND 2	HH	50.78
11:02	VA57 KLP	ROUND 4	HH	51.90
11:30	VX13 LPN	ROUND 1	HH	51.54
11:41	VX16 AFK	ROUND 3 CC	HH	51.60
13:28	VX16 AFV	ROUND 1	HH	51.04
11:10	PO58 KZC	WALSALL / WOLVERHAMPTON	HWRC	51.56
TOTAL				514.47

Composition of Feedstock

This section details the make-up of the waste sample derived from the selected vehicles delivering to the site at the time of analysis.

Table 2: Sampling for the Four Ashes Energy from Waste Plant – March 2017

FOUR ASHES EFW	% COMPOSITION
PAPER	13.44%
CARD & CARDBOARD	5.88%
PLASTIC FILM	6.34%
DENSE PLASTIC	8.80%
TEXTILES	10.33%
ABSORBENT HYGIENE PRODUCTS	5.96%
WOOD	2.66%
GLASS	1.74%
FERROUS METAL	2.40%
NON FERROUS METAL	0.93%
ORGANIC	29.01%
COMBUSTIBLES	5.24%
NON-COMBUSTIBLES	1.66%
WEEE	3.08%
HHW	0.30%
FINES	2.24%
TOTAL	100.00%



Biodegradable and Combustible Content

The percentage figures for biodegradable and combustible content for each material type shown in Table 3 below are calculated using values in DEFRA's *Biodegradability of Municipal Solid Waste report 2012* (Table 23 p.30). From the waste that was compositionally analysed the combustible content was estimated at 90.1% with the biodegradable content estimated to be 62.1%.

Table 3: Combustible and biodegradable contributions by waste material.

FOUR ASHES EFW	COMBUSTIBLE CONTENT	BIODEGRADABLE CONTENT
PAPER	13.44%	13.44%
CARD & CARDBOARD	5.88%	5.88%
PLASTIC FILM	6.34%	0.00%
DENSE PLASTIC	8.80%	0.00%
TEXTILES	10.33%	5.16%
ABSORBENT HYGIENE PRODUCTS	5.96%	2.98%
WOOD	2.66%	1.33%
GLASS	0.00%	0.00%
FERROUS METAL	0.00%	0.00%
NON FERROUS METAL	0.00%	0.00%
ORGANIC	29.01%	29.01%
COMBUSTIBLES	5.24%	2.62%
NON-COMBUSTIBLES	0.00%	0.52%
WEEE	0.00%	0.00%
HHW	0.20%	0.00%
FINES	2.24%	1.12%
TOTAL	90.09%	62.05%

Energy Content and Qualifying Proportion

Table 4: Waste Energy data (MJ) and qualifying proportion (%).

FOUR ASHES EFW	WEIGHTED CV* (MJ)	% BY CV	% QUALIFYING
PAPER	1.35	11.45%	11.45%
CARD & CARDBOARD	0.74	6.25%	6.25%
PLASTIC FILM	1.35	11.50%	0.00%
DENSE PLASTIC	2.44	20.71%	0.00%
TEXTILES	1.66	14.12%	7.06%
ABSORBENT HYGIENE PRODUCTS	0.32	2.74%	1.37%
WOOD	0.44	3.77%	1.89%
GLASS	0.00	0.00%	0.00%
FERROUS METAL	0.00	0.00%	0.00%
NON FERROUS METAL	0.00	0.00%	0.00%
ORGANIC	2.27	19.25%	19.25%
COMBUSTIBLES	0.92	7.82%	3.91%
NON-COMBUSTIBLES	0.03	0.00%	0.00%
WEEE	0.00	0.00%	0.00%
HHW	0.09	0.79%	0.00%
FINES	0.16	1.32%	0.66%
TOTAL	11.77	99.72%	51.84%

*Calculated using GCVar values derived from data in Defra's Biodegradability of Municipal Solid Waste report 2012

Figure 2: Material types - % Contribution by CV

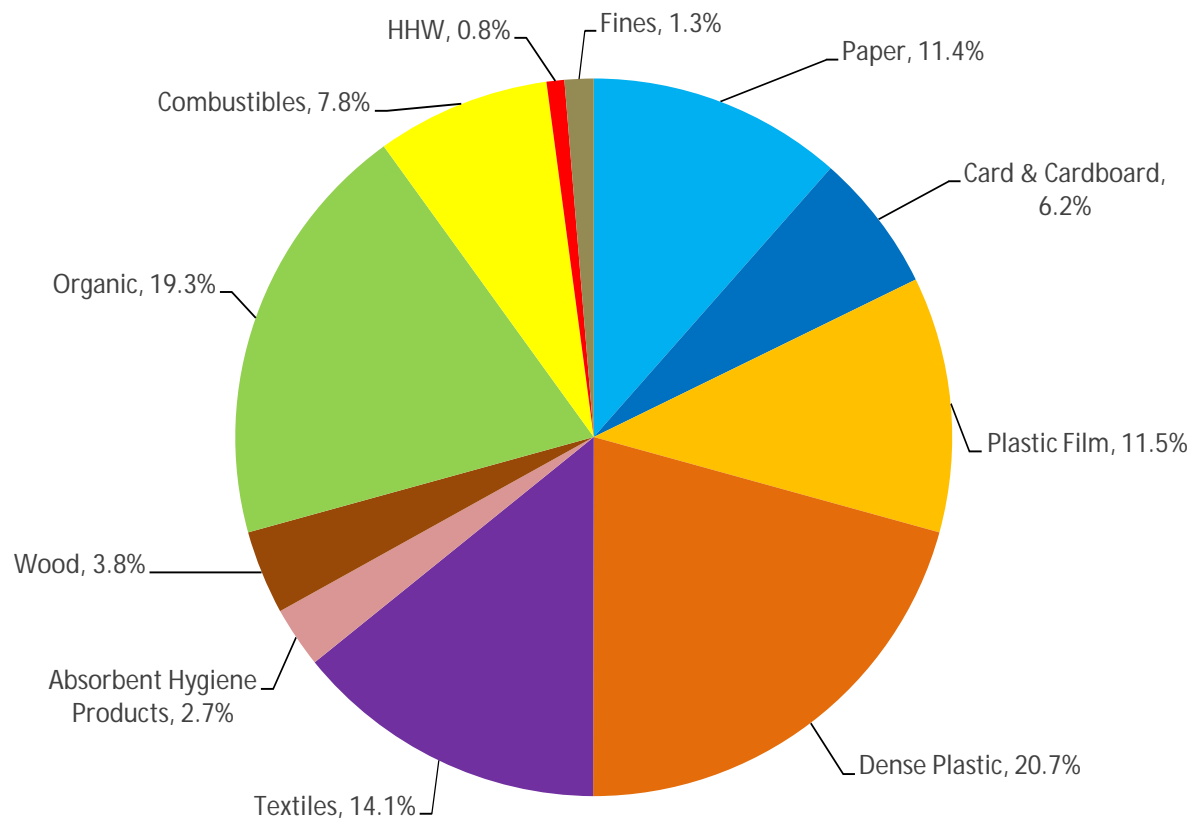


Table 5: Four Ashes EfW full data appendix

Prime Categories	Sub-categories	% by weight*	Gross CVar (MJ/Kg)**	Weighted CV (MJ)	Combustibility	% by CV	Biodegradability	Qualifying	Biodegradable Content	Combustible Content
Paper	Newspapers	0.69%	11.59	0.08	1	0.68%	1	0.68%	0.69%	0.69%
	Magazines	1.52%	11.2	0.17	1	1.45%	1	1.45%	1.52%	1.52%
	Recyclable Paper	5.25%	11.22	0.59	1	5.00%	1	5.00%	5.25%	5.25%
	All Other Paper	5.98%	8.51	0.51	1	4.32%	1	4.32%	5.98%	5.98%
Card & Cardboard	Card Packaging	2.29%	10.33	0.24	1	2.01%	1	2.01%	2.29%	2.29%
	Other Card	1.02%	13.62	0.14	1	1.19%	1	1.19%	1.02%	1.02%
	All Corrugated Cardboard	2.56%	14.05	0.36	1	3.05%	1	3.05%	2.56%	2.56%
Plastic Film	Plastic Bags	0.59%	18.32	0.11	1	0.91%	0	0.00%	0.00%	0.59%
	Plastic Film Packaging	2.61%	22.21	0.58	1	4.92%	0	0.00%	0.00%	2.61%
	Other Plastic Film	3.15%	21.17	0.67	1	5.67%	0	0.00%	0.00%	3.15%
Dense Plastic	All Dense Plastic	8.80%	27.7	2.44	1	20.71%	0	0.00%	0.00%	8.80%
Textiles	Mixed Textiles	10.33%	16.09	1.66	1	14.12%	0.5	7.06%	5.16%	10.33%
Absorbent Hygiene Products	Disposable Nappies, AHP & Clinical Waste	5.96%	5.42	0.32	1	2.74%	0.5	1.37%	2.98%	5.96%
Wood	All Wood Waste	0.87%	16.28	0.14	1	1.20%	0.5	0.60%	0.43%	0.87%
	Composite Wood Waste	1.79%	16.94	0.30	1	2.58%	0.5	1.29%	0.90%	1.79%
Glass	All Glass	1.74%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
Ferrous Metal	All Ferrous Metal	2.40%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
Non Ferrous Metal	All Non-Ferrous Metal	0.93%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
Organic	Garden Waste	0.76%	3.15	0.02	1	0.20%	1	0.20%	0.76%	0.76%
	Food Waste	23.39%	7.19	1.68	1	14.28%	1	14.28%	23.39%	23.39%
	Organic Pet Bedding or Litter	3.07%	13.21	0.41	1	3.44%	1	3.44%	3.07%	3.07%
	Other Organics inc consumable liquids	1.80%	8.67	0.16	1	1.32%	1	1.32%	1.80%	1.80%
Combustibles	Shoes & Clothing Accessories	1.75%	20.12	0.35	1	2.99%	0.5	1.49%	0.87%	1.75%
	Carpet / Underlay	1.45%	15.42	0.22	1	1.89%	0.5	0.95%	0.72%	1.45%
	All Other Combustibles	2.04%	16.92	0.35	1	2.94%	0.5	1.47%	1.02%	2.04%
Non-Combustibles	Inorganic Pet Litter	1.04%	3.15	0.03	0	0.00%	0.5	0.00%	0.52%	0.00%
	All Other Non-Combustibles inc soil and sand	0.62%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
WEEE	All WEEE Items	3.08%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
HHW	Paint / Varnish / Oil	0.20%	46.4	0.09	1	0.79%	0	0.00%	0.00%	0.20%
	All Other HHW	0.10%	0	0.00	0	0.00%	0	0.00%	0.00%	0.00%
FINES	All <10mm	2.24%	6.93	0.16	1	1.32%	0.5	0.66%	1.12%	2.24%
Total		100.00%		11.77		99.72%		51.84%	62.05%	90.09%

* Figures derived from hand sorted waste analysis March 2017

** Figures calculated using values derived from Biodegradability of Municipal Solid Waste report DEFRA 2012, Table 25 p.33