



# Buckinghamshire Residual Waste Performance Report 2017/2018

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# 1.0 Introduction

**In 2013 FCC Buckinghamshire Limited (FCC) were awarded a 30 year contract by Buckinghamshire County Council (BCC) for the management and treatment of residual waste.**

In order to service the contract FCC constructed and now operates Greatmoor Energy from Waste (EfW) facility near Woodham in the north of the county. This facility is used to sustainably manage the disposal of Buckinghamshire's household residual waste, by diverting waste from landfill and recovering energy from the process. Electricity generated from Greatmoor EfW is sufficient to power 40,000 homes.

As part of the contract, FCC also operates High Heavens Waste Transfer Station (WTS) in High Wycombe situated in the south of the county. This site is used as a bulking facility to load Refuse Collection Vehicle (RCV) deliveries from Chiltern, Wycombe and South Bucks District Councils into articulated vehicles for efficient transfer of waste to Greatmoor EfW. Residual waste from Aylesbury Vale District Council is delivered directly into Greatmoor EfW due to close proximity to the site.

Map 1 – Location of FCC facilities and district councils



Full service of the contract commenced in June 2016 following the construction of both facilities and successful commissioning of the EfW. This Annual Service Report provides an overview of the contract performance during the second contract year (April 2017 – March 2018).

## During the second contract year:



of residual waste were handled for energy recovery, 110,038 tonnes of which was Buckinghamshire County Council contract waste.



average electricity generated from waste recovery at Greatmoor EfW.



Our electricity output was the equivalent to that needed to power 40,000 homes.



through the operation of High Heavens Waste Transfer Station to feed contract waste to Greatmoor EfW.



was diverted from landfill.



engaged with during 12 educational outreach sessions.



to Greatmoor over 115 community engagement tours.



with the Environmental Permit at both facilities.

## 2.0 Waste management

### Total waste volumes handled

**During the contract year FCC handled 291,666 tonnes of residual waste. Contract Waste (managed by BCC) was delivered by the various districts within Buckinghamshire and also from the household recycling centres (HRC).**

Bulky waste from the HRC sites is shredded by BCC and delivered to High Heavens Waste Transfer Station to allow this material to be accepted at Greatmoor EfW, thus diverting this tonnage from landfill disposal. In addition to Contract Waste, Third Party Residual waste was handled at Greatmoor EfW. A summary of the total waste inputs is displayed in table 1.

Table 1 – Summary of waste inputs handled at the facilities on the contract by supplier

Waste inputs	Tonnes
Aylesbury Vale District Council	31,628
Chiltern & Wycombe District Councils	45,219
South Bucks District Council	11,071
Household Recycling Centre (Residual) (BCC)	13,915
Shredded bulky waste (BCC)	8,205
Third Party Residual Waste	181,628
<b>Total waste handled</b>	<b>291,666</b>

## 3.0 High Heavens Waste Transfer Station

### 3.1 Background

**High Heavens (WTS) is located on the BCC High Heavens Waste Complex in High Wycombe situated in the south of the county.**

The waste complex consists of several waste operations for BCC, with the waste transfer station being developed at the complex to service the residual waste treatment contract operated by FCC.

The new WTS was constructed and commissioned by FCC and became operational in November 2015 ahead of full service commencement in June 2016. The WTS is used as a local delivery point by southern district councils (South Bucks, Wycombe and Chiltern)

for onward transfer of their residual waste to be processed at Greatmoor EfW in the north of the county. Residual waste delivered into the WTS is loaded onto articulated vehicles to reduce the amount of transport required to move the waste by maximising the amount of waste on each transport vehicle. The location of the site was selected as a central delivery point for the southern districts to provide efficient transfer of waste to Greatmoor EfW compared to collection vehicles travelling there directly. This significantly reduces waste transport requirements and associated impacts across the county whilst also allowing the collection contracts to operate more efficiently.

Map 2 – High Heavens WTS and Greatmoor EfW, location of council districts and transport route across Buckinghamshire



There is a predetermined transport route between the two facilities. This is a condition of the planning permission and requires transport vehicles to use the main roads to access and egress the motorway for the prominent route of transport to eliminate use of smaller roads and the associated impacts of the transport vehicles.

### 3.2 Waste inputs

**74,233 tonnes of waste was handled at High Heavens WTS during the contract year.**

The volume of residual waste handled at High Heavens WTS during the contract year demonstrates the benefit of its location as a bulking station to Greatmoor EfW due to the population density in the south of the county. The breakdown of waste inputs by supplier across this period is displayed in figure 1 and table 2.

Figure 1 – High Heavens WTS waste inputs (% by supplier)

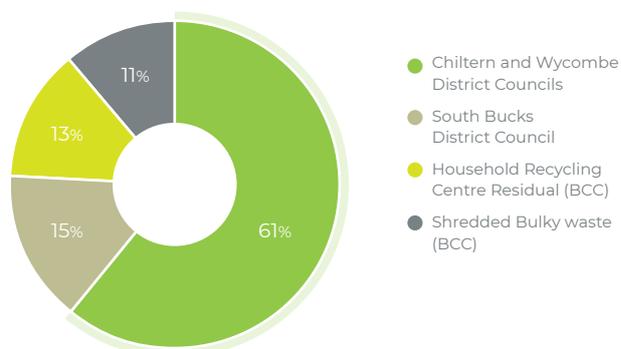


Table 2 – Tonnes of waste delivered into High Heavens WTS during the contract year by supplier

Waste inputs	Tonnes
Chiltern and Wycombe District Councils*	45,219
South Bucks District Council	11,071
Household Recycling Centre Residual (BCC)	9,738
Shredded Bulky waste (BCC)	8,205
<b>Total</b>	<b>74,233</b>

\* Chiltern and Wycombe District Councils operate a joint waste collection service and therefore tonnages are reported as combined.

### 3.3 Waste outputs

**The majority of outputs from High Heavens WTS were residual waste bulked to Greatmoor EfW.**

There was a small tonnage of bulky waste removed from the site for shredding at a neighbouring BCC facility within the High Heavens complex.

This is where bulky waste unsuitable for the EfW is removed for shredding before being delivered back to High Heavens WTS. Bulky waste is deemed unsuitable as it can affect the efficiency of the EfW process due to blockages in the system or poor combustion. Once removed and shredded, this material is then transferred with the residual waste and diverted from landfill in a similar manner to the management of bulky waste from the HRC sites.

When bulky waste is identified and separated, feedback is provided to BCC. Gas bottles and other non-conforming materials unsuitable for the EfW process have also been removed, segregated and reported in a similar manner and they are then collected for recycling or disposal.

### 3.4 Waste transfer

#### Transport savings through bulk transfer of waste from High Heavens WTS.

High Heavens WTS operates as a bulking station for transfer of residual waste to Greatmoor EfW. Due to the high volumes of waste handled at the site, the bulking operation successfully reduced transport vehicle miles of contracted waste by over 137,697 miles during the contract year. The breakdown of this is shown in table 3.

Table 3 – Summary of vehicle movements and associated miles saved due to bulk waste transfer from High Heavens WTS

Waste transferred	Vehicle movements saved	Miles saved due to bulk transfer of waste from High Heavens WTS
BCC Residual	10,628	118,337
Household Recycling Centre Residual (BCC)	829	12,067
Shredded Bulky waste (BCC)	173	7,292
<b>Total</b>	<b>11,630</b>	<b>137,697</b>

The mileage saving is calculated by analysing the number of vehicle deliveries, miles travelled from each location and tonnes delivered, then adding the bulking transfer mileage of this waste to Greatmoor. A comparison between this and the total mileage for collection vehicles to deliver directly into Greatmoor EfW, rather than through High Heavens WTS was made to highlight the saving.

The mileage savings also take into account the predetermined route from High Heavens WTS to Greatmoor EfW which is a condition of the planning permission, this route being longer than the shortest available.

This highlights the benefits and importance of High Heavens WTS to the residual waste contract within the county and the reduced transport implications as a result of the operation of the site.

#### Transport mileage savings



on district council collections. That's more than four and a half times around the world.



on residual waste from Household Recycling Centres, the equivalent of a return trip from London to Hong Kong.



on Shredded Bulky waste. That's the same as travelling from London to Jakarta.

## Transport fleet

FCC has awarded a contract for the haulage of residual waste from High Heavens WTS to Greatmoor EfW to Fred Sherwood & Sons Limited. FCC Buckinghamshire has built a good working relationship with Fred Sherwood & Sons providing confidence that a robust service delivery could be achieved.

The contract includes performance guarantees for service delivery such as provision of sufficient vehicles to deliver the service and also restrictions to ensure contract compliance is maintained with BCC.

Branded trailers are also in place to promote the Greatmoor EfW facility and to highlight the contract partnership between BCC and FCC on the transport vehicles that travel daily up and down the M40.

*Greatmoor trailers*



## 3.5 Environmental management

### High Heavens WTS operates under permit number XP3091ER issued by the Environment Agency.

There were no permit breaches recorded during the contract year at High Heavens. The Environment Agency conducted one inspection of the facility and no concerns or issues were raised.

Full details of the Environmental Permit (XP3091ER) can be found [here](#)

## 3.6 Complaints

### During the contract year, there was one complaint logged with High Heavens Transfer Station.

This complaint related to a bulk haulage vehicle driving closely to a vehicle being driven by a member of the public between the two facilities, this was responded to promptly and addressed with the driver.

During the first contract year, there were four complaints received at High Heavens that were attributable to FCC, all of which related to litter. There was a reduction in the number of complaints received in the second contract year, with only one complaint attributable to FCC at High Heavens. There were two complaints that were reported to FCC but were not attributable to FCC, however, FCC assisted in the response and preventative action associated with the complaints received for other contractors.

The noticeable reduction in complaints received demonstrates FCC's focus on continuously improving service delivery for BCC and the residents within Buckinghamshire.

## 4.0 Greatmoor EfW

### 4.1 Background

**Greatmoor EfW is located near Woodham situated to the north of the county adjacent to Calvert Landfill site which is also operated by FCC.**

Construction of the EfW commenced in September 2013 as part of the residual waste contract and the site became fully operational in June 2016.

The EfW processes non-recyclable residual waste which had previously been sent for landfill disposal. The process involves burning the residual waste to harvest thermal energy to heat a boiler and produce high pressure steam. The steam produced from the combustion process is used to power a turbine to generate electricity sufficient to supply 40,000 homes.

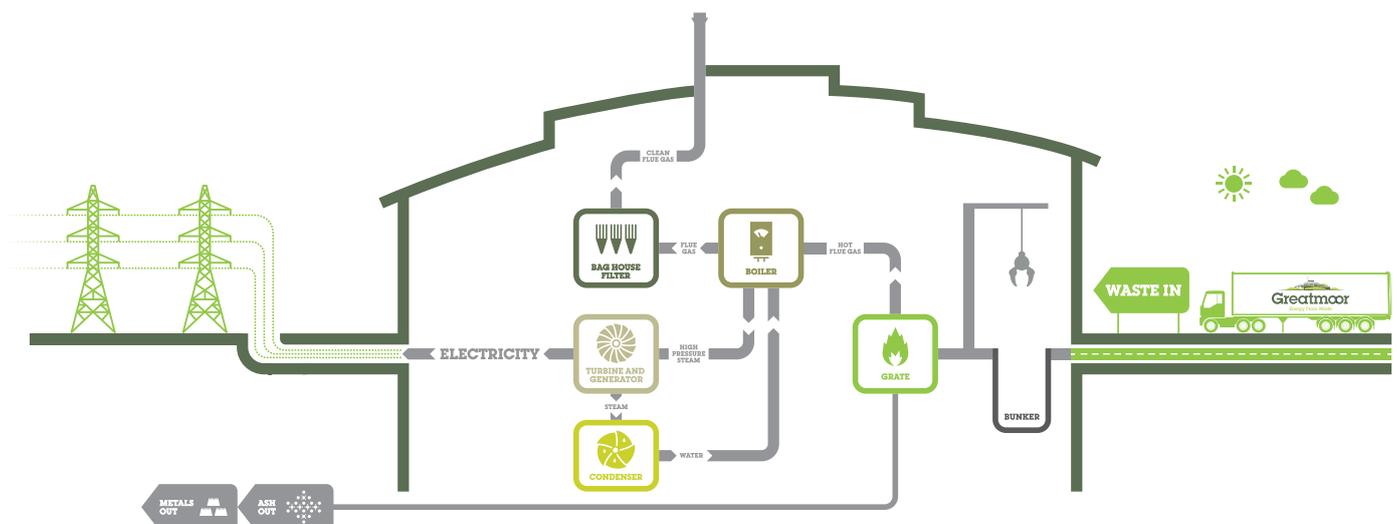
There are also residual outputs from the EfW process including ash and flue gases. Ashes and unburnt non-combustible materials are removed after the combustion phase and treated to recover metals for recycling prior to landfill disposal. Flue gases and fly ash emitted throughout combustion undergo rigorous physical and chemical processes called flue gas treatment (FGT).

The FGT process neutralises emissions before being released to the atmosphere. The process generates by-products that are removed for landfill disposal following specialist hazardous waste treatment at another FCC facility. Efficient EfW operation moderates the volumes of residual by-product outputs and further recovery methods are used to further reduce this and minimise landfill disposal. A diagrammatic flow illustrating the Greatmoor EfW process is included in figure 2 below.

The use of an EfW to service the residual waste contract was proposed by FCC as a sustainable waste management solution to divert Buckinghamshire's residual waste from landfill disposal whilst also producing electricity. The location of the facility was selected due to the existing waste management infrastructure in place at Calvert Landfill site and its suitability to service deliveries from across the county. In addition to this, the site also benefits from a rail siding providing the option to import waste via the rail network as identified in Buckinghamshire Minerals and Waste Core Strategy 2012.

For more background on EfW please visit [www.greatmoor.co.uk/what-is-an-efw/](http://www.greatmoor.co.uk/what-is-an-efw/)

### The process of producing Energy from Waste



## 4.2 Waste inputs

**A total of 291,814 tonnes were delivered to Greatmoor EfW during the contract year.**

The total inputs at Greatmoor EfW during the contract year are slightly more than the total waste handled during the contract year due to the extra stock at High Heavens WTS from the last contract year. This accounts for the -148 tonne difference which you can see in table 4.

The breakdown of waste inputs is shown in figure 2 and table 4. All of the residual waste received at High Heavens WTS was bulked to Greatmoor EfW. Greatmoor EfW has been able to process a large amount of Third Party waste due to plant efficiencies that allowed the site to handle more waste than originally estimated.

Figure 2 – Breakdown of waste inputs at Greatmoor EfW during the contract year shown by percentage by supplier

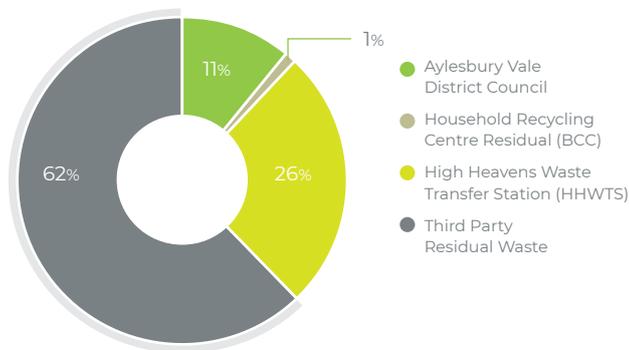


Table 4 – Tonnes of waste delivered into Greatmoor EfW during the contract year by supplier including residual stock of contract waste at High Heavens WTS

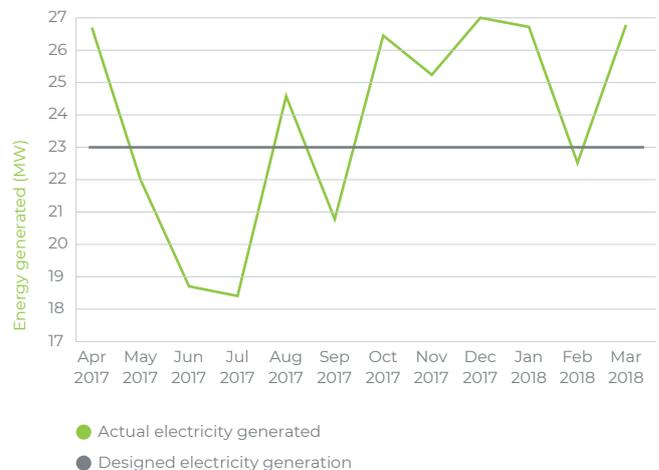
Waste inputs	Tonnes
Aylesbury Vale District Council	31,628
Household Recycling Centre Residual (BCC)	4,177
High Heavens Waste Transfer Station (HHWTS)	74,381
<b>Total BCC inputs</b>	<b>110,186</b>
Third Party Residual Waste	181,628
<b>Total inputs to Greatmoor EfW</b>	<b>291,814</b>
Residual stock at High Heavens WTS	-148
<b>Total waste handled on contract</b>	<b>291,666</b>

## 4.3 Outputs

### Power generation

24 megawatts (MW) average per hour of electricity was generated during the contract year which is above the designed output of 22.9MW. The line graph in figure 3 shows the average monthly export of electricity over a full year of operation. The lower performance is associated with the annual outage and unplanned shutdown events.

Figure 3 – Monthly electricity exported from Greatmoor EfW throughout the contract year



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## Residual outputs

Table 5 provides a breakdown of residual waste outputs from Greatmoor EfW during the contract year.

Table 5 – Residual waste outputs from Greatmoor EfW

Waste outputs	Tonnes
APCr (Landfill – after treatment)	11,794
IBA (Landfill)	53,416
Non-conforming waste (Landfill)	47
<b>Total outputs</b>	<b>65,257</b>

Of the 291,814 tonnes treated at Greatmoor EfW, there were 65,257 tonnes of ash and residues from the process including Air Pollution Control Residues (APCr) and Incinerator Bottom Ash (IBA). Air Pollution Control Residues (APCr) are residual materials from the flue gas treatment process used to control emission limits, this material is sent for specialist hazardous waste treatment at another FCC facility in preparation for landfill. IBA generally consists of non-combustible material residue such as stone and metal following burning of the waste. Once removed, IBA is processed onsite to recover metals for local recycling to further reduce landfill volumes as the remaining material is sent for non-hazardous landfill disposal/ restoration material.

Other residual material includes non-conforming materials that are considered unsuitable for the process and removed during the pre-sorting and inspection stage. These materials are deemed unsuitable due to potential implications on plant efficiency and emissions controls, unsuitable materials like this are therefore sent for landfill disposal. The volume of non-conforming material is relatively low due to waste inspection procedures in place with BCC and Third Party customers which FCC continue to focus on improving to prevent these materials being landfilled.

Compared to last year there has been a significant reduction in non-conforming waste that has been delivered to the facility. This can be attributed to more stringent duty of care being taken out by both facilities and the Third party input source locations.

A total of 22.4% of all waste handled was sent for landfill disposal from the residual outputs of the EfW process.

In addition 3201.49 tonnes of metal was separated out from the IBA and disposed as metal recyclable material.

## Waste inspection procedures

FCC operates a waste inspection procedure at the High Heavens WTS and Greatmoor EfW facilities to ensure waste is suitable for EfW treatment. This is in place to remove materials that could potentially release toxic emissions or affect the efficiency of the plant resulting in downtime or greater proportions of residual outputs through poor combustion processes. For example, large bulky items or high proportions of non-combustible materials could cause blockages or not burn effectively. Ensuring the feedstock is suitable allows the plant to be run more efficiently and therefore maximises throughput and landfill diversion.

The inspection process includes regular inspection and sampling of waste inputs, along with feedback to BCC and other Third Party suppliers to ensure waste specifications are adhered to. Operators at both facilities are trained to inspect waste during tipping to allow non-conforming material to be identified at source. Greatmoor EfW also has a separate bay for inspection of random samples taken from waste deliveries throughout the day. If unsuitable materials are identified during inspection processes, materials are segregated and stored for appropriate collection or landfill disposal. For example, gas cylinders removed from waste will be stored in a locked cage and collected for recycling. FCC endeavour to recover and recycle materials from non-conforming waste to minimise landfill disposal through activities such as shredding bulky waste or collections of scrap metal.

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## 4.4 Environmental management

**Greatmoor EfW is regulated by the Environment Agency under the Environmental Permitting Regulations; this integrates various European Commission (EC) directives such as the Industrial Emissions Directive into British law.**

EC directives are European Legislation that all member states are required to comply with, under European Law. Under this law, FCC are required to have an Environmental Permit in place for the operations carried out at Greatmoor EfW and the facility must comply with the conditions of the permit.

Greatmoor EfW has robust emissions control technologies in place in order to comply with the permit requirements. Gas and ash by products generated from burning waste pass through modern, reliable and well understood combustion and pollution abatement technologies where filters and chemical neutralising systems are used to clean the emissions before leaving the stack and entering the atmosphere. The emissions are closely monitored to ensure compliance with legislation and the requirements of the Environmental Permit is maintained.

Under the Environmental Permit UP3734HT, FCC is obliged to submit an annual report to the Environment Agency detailing compliance with emissions data. This section provides a summary of requirements within the Permit and monitoring data from the second contract year. The report demonstrates there were no Permit breaches at Greatmoor during this period.

FCC applied to increase the permitted annual capacity for the Facility. As the original Permit capacity was not consistent with the maximum design capacity of the Facility. Following the firing diagram, the maximum design capacity of the Facility should be calculated from the design calorific value (9.3 MJ/kg) of the waste – processing 39.4 tonnes per hour of waste – with an operational availability of 8,760 hours per annum. This is equivalent to a maximum capacity of 345,000 tonnes per annum.

Taking the above into consideration, a new Environmental Permit UP3734HT/V004 was granted by the Environment Agency on the 19th of January 2018 with an increased throughput to 345,000 tonnes per year.

For more information on emissions data including detailed charts for each substance please visit [www.greatmoor.co.uk/emissions-reports](http://www.greatmoor.co.uk/emissions-reports)

Full details of the Environmental Permit (UP3734HT) can be found [here](#)

## Permit monitoring requirements

The monitoring requirements are set out in Schedule 3 of the Environmental Permit. There are continuous and periodic monitoring requirements for various substance emissions displayed in table 6.

Table 6 – Emission Monitoring Requirements

Substance	Continuously	Periodically
Particulates	✓	
Total organic carbon	✓	
Hydrogen chloride	✓	
Carbon monoxide	✓	
Sulphur dioxide	✓	
Nitrogen oxides	✓	
Ammonia	✓	
Nitrous oxide		✓
Hydrogen fluoride		✓
Cadmium & thallium		✓
Mercury		✓
Heavy metals		✓
Dioxins and furans		✓

Periodic monitoring is undertaken quarterly. With the new Environmental Permit there is a different requirement for Nitrous Oxides to be monitored periodically instead of continuous.

Monitoring methodology of the criteria included in table 6 includes:

Continuously monitored substances are measured using continuous emissions monitoring system (CEMs) technology. Gas samples are extracted using a sample probe and analysers used to measure concentrations of each parameter. This information updates on the plant control system that is constantly recorded and monitored by the operations team.

Periodic monitoring is carried out twice a year by competent contractors who are accredited by the Environment Agency which is a highly regulated method of emissions testing. Gas samples are taken from the emissions stack and sent for laboratory analysis.

In addition to monitoring emissions, ash residues from the combustion process including Incinerator Bottom Ash (IBA) and Air Pollution Control Residues (APCr) are tested to identify the concentrations of various substances set out in the permit. This information is submitted to the EA as part of the emission reports to gather and monitor data for further investigation if deviations occur. Testing of residues is required to be carried out monthly during the first year of operation and then quarterly thereafter. IBA undergoes further testing twice per month for waste characterisation to determine whether it can be classified for non-hazardous landfill disposal.

## Emissions limits

The Environmental Permit specifies Emission Limit Values (ELV) for all of the monitoring criteria. The plant emissions must not exceed these limits to ensure compliance is maintained and if emissions limits are exceeded, notification must be submitted to the Environment Agency. There were no exceedances of emissions limits throughout operation of the plant during the contract year.

## Continuous monitoring limits

The limits specified in the Environmental Permit refer to averages of a half hour and a 24 hours period and are displayed in table 7. Emission limit values are therefore reported using these metrics.

Table 7 – Half hourly average and daily average Emission Limit Values (ELV) by Substance

Substance	Half hour average (mg/m <sup>3</sup> )	Daily average (mg/m <sup>3</sup> )
Particulates	30	10
Hydrogen chloride	60	10
Nitrogen oxides	400	200
Sulphur dioxide	200	50
Total organic carbon	20	10

Substance	10 min average (mg/m <sup>3</sup> )	Daily average (mg/m <sup>3</sup> )
Carbon monoxide	150	50

The graph in figure 4 shows the combined results for the operational period for each criterion that requires continuous monitoring displayed as half hour maximum and maximum average measured over a 24 hour period as a percentage of the specified Emission Limit Value (ELV).

Figure 4 – Maximum half hour and daily average emissions shown as a percentage of the Emission Limit Value for each substance that was continuously monitored during the contract year

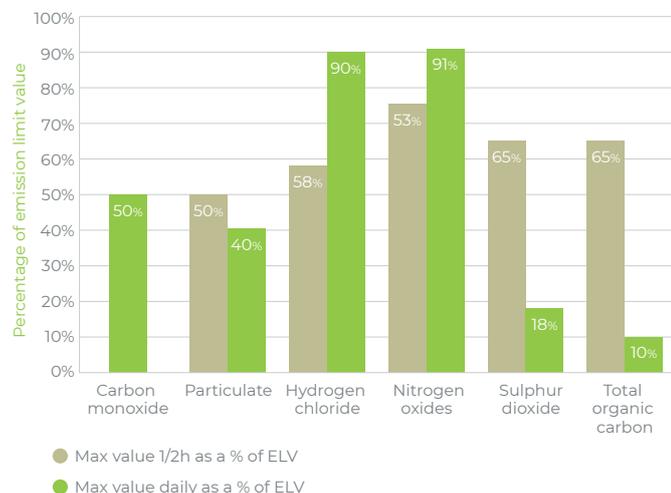


Figure 5 shows that the maximum half hourly and daily emissions were all within the limits as the chart displays each value as a percentage of the limits specified in the Environmental Permit. Therefore, each limit was 100% compliant during the contract year which can also be shown in the compliance summary in table 8.

Table 8 – Summary of Emission Limit Value Compliance

Monitoring Element	Compliance
Particulates	100%
Carbon monoxide	100%
Total organic carbon	100%
Hydrogen chloride	100%
Sulphur dioxide	100%
Nitrogen oxides	100%

## Periodic monitoring

Under the Environmental Permit, FCC is also required to undertake quarterly stack emission testing which is part of the emissions monitoring requirements as shown in table 6. Results of the periodic monitoring are displayed in figures 5 and 6.

Figure 5 shows the highest levels of dioxins and furans are at 9.80% of the limit. Figure 6 shows the levels of Cadmium and Thallium, Heavy metals, Mercury and Hydrogen Fluoride as a percentage of the limit and all levels are within the limits specified within the permit, all of them been below 10% of the limit. This data demonstrates that all the quarterly emission values are significantly less than the 100% limits specified in the Permit.

Figure 5 – Quarterly Emission values for Dioxins and Furans during the contract year shown as a percentage of the Emission Limit Value specified in the Environmental Permit

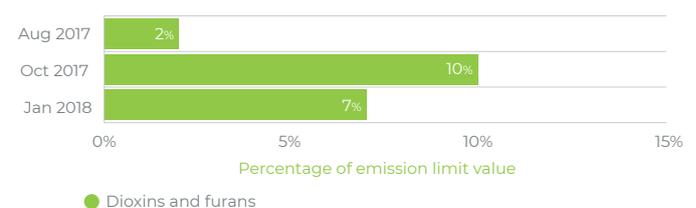
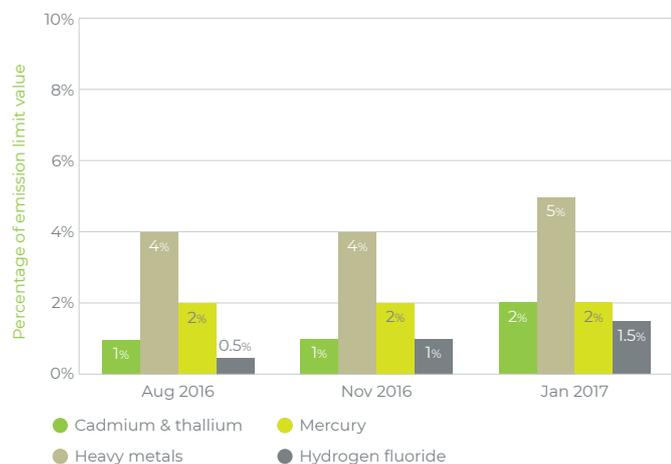


Figure 6 – Quarterly Emission values for Cadmium & Thallium, Heavy Metals, Mercury and Hydrogen Fluoride during the contract year shown as a percentage of the Emission Limit Value specified in the Environmental Permit



## Summary of plant compliance

There were no notifications of emission exceedances throughout the contract year. The results of the emissions monitoring requirements as above show emissions performance was below limits for all criteria for both continuous and periodic monitoring and therefore compliant with the environmental permit. However the facility received 2 x Compliance Classification Scheme category 3 scores for a breach of condition 3.3.1 of the permit: Monitoring of table 3.1(a) Emission Limits during Abnormal Operation. There were no Total Organic Carbon measurements during plant Start-up following a shutdown for 3 hours on the 29th of May 2017. The double scoring corresponds to a lack of monitoring and lack of competency and training.

CCS score: the Compliance Classification Scheme (CCS) is the approach the Environment Agency uses to classify permit breaches. The compliance band you fall into is determined by your Compliance Classification Scheme score accumulated over the previous calendar year. A good compliance record means you will pay a lower subsistence charge than if you have a poor compliance record. Each CCS score 3 is 4 points, a total of 8 points put Greatmoor into a Compliance Band B.

Once the year ends the site will return to Band A and the scoring system will start again.

To eliminate the possibility of this happening in the future the following actions have been put in place:

- The start-up procedure has been updated with 3 additional steps to ensure the MIR-FT and FID is in service and recording.
- Local procedures have been put in the CEMs cabinet explaining what to do and how to restart the monitoring equipment.
- A CEMs specific toolbox talk was written and delivered to all of the operations team indicating the importance of ensuring the system is running.

After the first year of operation, the testing for IBA and APCr has reduced from monthly to quarterly. All data has been submitted to the EA as part of the emissions reports and there was no concern raised regarding the results. IBA was continuously classified as non-hazardous waste throughout the waste characterisation testing carried out over the course of the contract year and was therefore suitable for non-hazardous landfill disposal.

## 4.5 Complaints

### **In January we received a complaint for a resident who was concerned with the dark plume from the stack.**

Due to the weather conditions, (low temperature and sunset) there was a visible plume of water vapour from the stack which depending on the shadow could look darker than normal. We reassured the complainant that there were no issues on site and the plume was water vapour.

In February a member of the public stated that she was driving behind an articulated vehicle that came from the Greatmoor Access Road joining the A41 at the roundabout, bags of rubbish were blowing out of the top of the trailer. The contractor was notified and preventative actions put in place to avoid recurrence.

To prevent further occurrences an email was sent to the delivery contractor's Transport Manager to notify them of this complaint and remind them of the site/Tipping hall rules that all drivers must ensure that there is no waste hanging from their vehicle before leaving the tipping hall. To assist drivers FCC have provided tools to make this task more efficient.

In addition the Day Operations Supervisor spoke with the Day Operations team to notify them of the complaint and that extra vigilance is required to ensure that the driver clear all hanging waste from their trailer before leaving the Tipping hall/Weighbridge.

## 5.0 Integrated Management System

**FCC operates an Integrated Management System (IMS) to ISO 9001, ISO 14001, OHSAS18001 and ISO 50001 standards and all contract facilities are managed and operated under the IMS requirements. The IMS is in full use at both Greatmoor EfW and High Heavens WTS.**

### 5.1 Accreditation

The contract facilities have been audited by British Standards Institute (BSI) and accreditations for the above standards achieved at both facilities.

### 5.2 Internal auditing

Greatmoor EfW and High Heavens WTS have both undergone internal IMS audits within the contract year and both successfully passed with scores above 95% which is shown in table 9.

Table 9 – Summary of IMS audit scores

Facility	Audit date	Audit score
Greatmoor	08/03/2018	97.62%
High Heavens	05/09/2017	95.62%

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## 5.3 Health & Safety

**Through near miss, accident and incident reporting and monitoring and review of Health & Safety data, FCC were able to successfully implement the following measures to focus on continuous improvement of Health & Safety.**

- Implementation of a behavioural safety programme to focus on positive engagement from managers and supervisors to focus on improving behavioural safety at both the Greatmoor and High Heavens sites has now been fully implemented.
- Improvements around the levels of supervision required under our Permit to Work system.
- Higher levels of competency required from contractors entering and working in confined spaces.
- Introduction of Safe Contractor accreditation for contractors visiting site.
- Mechanical modifications made to the process to minimise exposure to hazards including Air chocks to agitate ash in the hopper to eliminate blockages.
- Continuation of liaison meetings with external operations teams to effectively monitor H&S issues and implement improvements where necessary through communication.
- Access platforms installed to gain improved access to conveyors and E-Containers.
- Additional over height barrier installed at the weighbridge to prevent bridge strikes.
- Weighbridge access and IBA pad access paths installed for safer access to these areas.
- Applying the hierarchy of control to improve site procedures including vehicle and pedestrian segregation and improved communications to isolate people from the exposure to hazards and provide safer and more efficient traffic control. As part of this, physical modifications to site and investment in further safety improvements have been made to continuously improve the management of risk.

## 6.0 Maintenance management

**Maintenance management is in place at all contract facilities to ensure they operate efficiently, safely and demonstrate compliance with necessary legislation.**

Greatmoor EfW utilises a maintenance management system called Dynamics AX. This software package allows for robust scheduling and tracking of maintenance to ensure maintenance management is carried out efficiently.

Greatmoor EfW carries out an annual shutdown to undertake lifecycle maintenance and overhaul of wear parts to ensure plant performance and longevity is sustained. This year the annual shutdown was carried out in May. When the annual shutdown is undertaken, scheduling and management of waste inputs will be put in place to ensure that contract waste continues to be delivered during the shutdown periods.

### 6.1 Maintenance issues

During the contract year there were a total of 41.5 days lost availability. The two major issues were:

- There was some cracking found in the ID fan ducting. On further investigation it was discovered that there was a lot of resonance in the exit of the ID fan and the plating required additional supports following the repair. The line was shut down to allow the supports to be put in place and the whole ducting was replaced in the annual outage 2018.
- During operation a leak detection alarm came up on the generator. On further investigation a leak was discovered on the cooler. The turbine was shut down to allow the cooler to be removed. The cooler was replaced in the 2018 outage. Waste fire was not turned off during this period of time.

## 7.0 Community liaison

**FCC employs a dedicated Waste Awareness and Education Manager with the aim to raise public awareness of waste issues, including waste prevention, reuse and recycling through educational initiatives.**

Greatmoor EfW has an on-site visitor centre which hosts site tours of the facility for local community groups and schools. Tours includes showing visitors the control room to demonstrate how the plant is operated, along with views of waste tipping into the 23m deep bunker, and loading the system by the large grab crane.

Visitors can also look inside the furnace inspection hatch to see waste being burnt. As well as hosting on-site tours, FCC also carry out outreach visits to involve local schools within the county.

The Waste Awareness and Education Manager attends school classes and assemblies to educate and raise awareness about recycling and waste management.

### 7.1 Greatmoor EfW Visitor Centre

The headline figures for 2017 – 18:

- 1,559 Visitors
- 153 Tours
- 2,644 attended Outreach Events
- 80% increase in visitors from local community, community groups, schools and education facilities
- 91.5% Excellent or Very Good feedback across six key questions

During the contract year there were:

Table 10 – Number of Visitors over the contract year

	1st April 2017 – 31st March 2018	1st July 2016 – 31st March 2017
Adult visitors	1,178	1,162
Under 16s	381	154
Total visitors	1,559	1,316
No of tours	153	116

This shows an 18% increase in visitors from the previous year, as the 2016-17 data is for a period of 9 months this could be considered a drop in visitor numbers.

However if the types of visitors are analysed then it shows an increase in visitors from the local community and educational facilities.

This shows an increase of 80% in visits from Community Organisations, Primary Schools and members of the local community.

Figure 7 – Breakdown of visitors to Greatmoor EfW by audience (%)

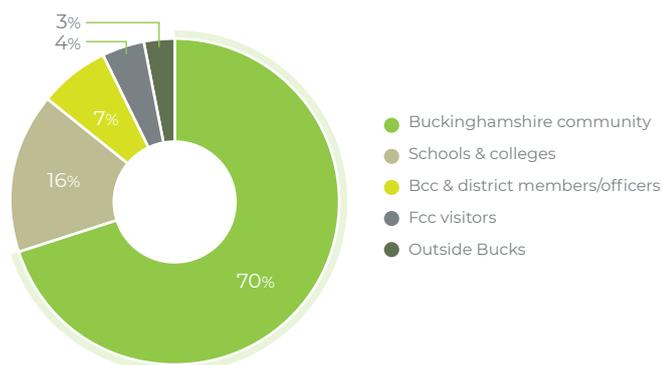


Table 11 – Total number of visitors 2016-17 and 2017-18

	1st April 2017 – 31st March 2018	1st July 2016 – 31st March 2017
Community organisations	823	542
Schools – primary	183	69
Local community (inc. open days)	172	45
BCC officers	55	125
Higher Education facilities	55	37
Thames Valley Police	50	0
FCC internal visitors	40	37
DC officers/members	38	13
CLG	35	44
FCC external visitors	29	105
Other local authorities (inc. WEERM)	23	0
Community organisations – outside Bucks	23	39
BCC members	13	31
Community forums	11	38
Other educational organisations	5	0
Other	3	0
BCC partnerships	1	30
Schools – special	0	15
Conferences	0	23
Special events	0	123

Correspondingly there are decreases in visits from FCC external visitors and BCC officers and members as the first year's promotional visits have mostly run their course. Additionally there were the official opening and the handover events last year, which contributed 9% of last year's visitor numbers.

## 7.2 Outreach visits

During the contract year 19 outreach visits were undertaken to raise awareness on prevention, reuse and recycling. A total of 2,644 people took part in the outreach visits.

Type of visit	Number of visits	Number of under 16s	Number of adults	Number of assemblies/presentations	Number of activity sessions
Primary schools	10	1,277	67	6	17
Secondary schools	2	261	28	0	13
Big Bang conference	2	675	80	0	5
Bucks skills show	2	79	74	0	0
Community groups	2	30	40	1	1
Bucks libraries	1	13	20	0	2
<b>Total</b>	<b>19</b>	<b>2,335</b>	<b>309</b>	<b>7</b>	<b>38</b>

## 7.3 Other highlights

### Website

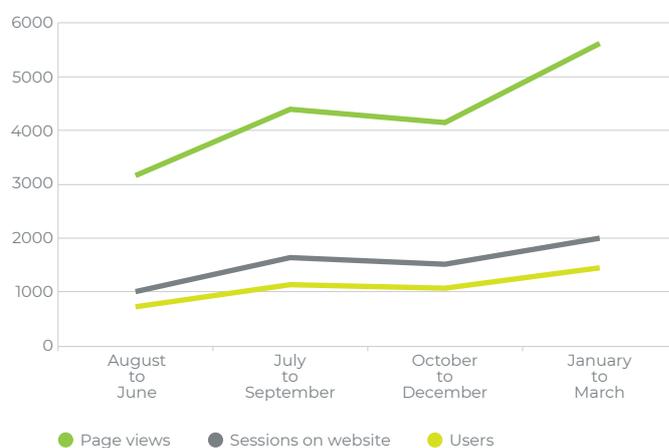
FCC launched a new website specifically for the BCC contract in January 2017. The website features information on the project to date covering both High Heavens WTS and Greatmoor EfW. The website is regularly updated with news, events and monthly emissions data.

Visit the Greatmoor EfW website:  
[www.greatmoor.co.uk](http://www.greatmoor.co.uk)

Table 13 – Website statistics

Users	<b>4,189 (4,152 new users)</b>
Sessions	<b>6,170</b>
Page views	<b>17,309</b>

Figure 8 – Website activity from April 2017 to March 2018 Quarterly Summary



## Open days

In addition to the organised tours provided at Greatmoor EfW for local community groups and schools, FCC also holds open days at the facility where members of the public can attend a tour of the EfW. This provides an opportunity for those not involved with local community groups to visit the facility. The first open day was held on 18th March 2017 and due to the success of the day and feedback from residents, further open days will be carried out on a quarterly basis moving forwards. Details of open days are advertised on the Greatmoor website and have also been included in local newspapers. In the second contract year 4 Open Days were held.

## 7.4 Summary of visitor feedback

FCC encourages feedback from those visiting Greatmoor EfW by providing feedback forms after tours to highlight positive feedback and also identify areas for improvement to continuously focus on delivering the best service possible. Feedback from visitors has been excellent, comments included the structure of the visits and suitable levels of detail for the audience providing attendees with a classroom overview to gain an initial understanding followed by seeing the plant in action. Visitor feedback has also shown commitment to change behaviours towards recycling.

Table 14 – Feedback summary

	<b>% Excellent or very good</b>
Introduction	<b>94</b>
Guided tour	<b>95</b>
Visitor centre facilities	<b>90</b>
Visitor centre staff	<b>100</b>
Information provided before visit	<b>85</b>
Greatmoor website	<b>85</b>

## 7.5 Local employment

There are a total of 44 members of staff working on the Contract, 37 at Greatmoor EfW and 7 at High Heavens WTS. 48% of the staff employed on the contract live within Buckinghamshire itself, with others from the local surrounding areas of Oxfordshire, Northamptonshire and Berkshire. There are a small number of staff who travel from outside of the local vicinity of the contract but the majority are from the area demonstrating good levels of local employment.

## 7.6 Liaison group meetings

Since April 2017 there have been 4 Greatmoor Liaison Group meetings. The meetings occur quarterly and from Service Commencement have been held in conjunction with the Calvert Landfill Community Liaison Group (CLG). These sessions are attended by local residents, parish councillors, interest groups, EA officers, councillors and FCC. The Greatmoor CLG is an opportunity for members to ask questions in relation to the EfW and raise issues of concern.

High Heavens also has a joint High Heavens Liaison Group attended by similar groups as the above. As the site is also shared with other operators, representatives from each operation are also in attendance to provide a collaborative response to queries or concerns raised in the meetings. Since April 2017 there have been 2 meetings.

## 8.0 Conclusion

### **The first contract year for the Buckinghamshire residual waste contract between BCC and FCC proved to be a success with a strong partnership being developed throughout the early stages of the 30 year contract.**

The second contract year for the Buckinghamshire residual waste contract between BCC and FCC has built on the success of the previous contract year.

FCC has delivered a service this contract year that has been safe, environmentally friendly and efficient through excellent operational performance at the facilities on the contract. The performance at Greatmoor EfW also exceeded expectations due to effective process management and delivered a successful maintenance outage. There has also been a lot of success in optimising the system to increase the efficiency of the plant and lower consumable usage.

In addition to this, utilising a bulking transfer station at High Heavens WTS has provided a significant reduction in transport mileage waste movements to the EfW due to the geography of the contract with large proportions of contract waste being moved through the facility from the south of the county.

Greatmoor has also received an award for Excellence in the best design of a waste management facility 2017 and is in the final shortlist for the Excellence in corporate social responsibility award in the 2018 Buckinghamshire Business awards.

Following these successes of the contract year, FCC will continue to ensure a robust service delivery is maintained for BCC into the next contract year and beyond.

For more information about FCC Greatmoor, please visit [www.greatmoor.co.uk](http://www.greatmoor.co.uk)

For more information about FCC Environment, please visit [www.fccenvironment.co.uk](http://www.fccenvironment.co.uk)

For more information about Energy from waste from Buckinghamshire County Council, please visit [www.buckscc.gov.uk/services/waste-and-recycling/energy-from-waste/](http://www.buckscc.gov.uk/services/waste-and-recycling/energy-from-waste/)

## 9.0 Glossary

### **Air pollution control residue (APCr)**

By products of the flue gas cleaning process and typically include ash, carbon and lime due to fly ash materials emitted from the combustion process and injection of neutralising agents to clean the gases before being released to the atmosphere. These materials are hazardous and are removed and disposed of by authorised licence holders for appropriate collection and disposal.

### **Automatic Number Plate Recognition (ANPR)**

Automatic number plate recognition (ANPR) is a technology that uses optical character recognition on images to read vehicle registration plates to create vehicle location data. It can use existing closed-circuit television, road-rule enforcement cameras, or cameras specifically designed for the task.

### **Aylesbury Vale District Council (AVDC)**

Aylesbury Vale District Council (AVDC) is one of four local government districts in the non-metropolitan county of Buckinghamshire and act as the Waste Collection Authority for this district responsible for the collection of residual waste. AVDC is located to the north of the county.

### **Buckinghamshire County Council (BCC)**

BCC is the administrative body governing the county of Buckinghamshire who are responsible for the disposal of the county's residual waste and therefore act as the Waste Disposal Authority. BCC are in a 30 year contract with FCC for the treatment of this waste for energy recovery as a more sustainable alternative than landfill disposal.

### **Carbon monoxide (CO)**

Carbon monoxide is a common naturally occurring chemical but can also be produced from human activity. It is a colourless, odourless, poisonous gas.

### **Chiltern District Council (CDC)**

Chiltern District Council (CDC) is one of four local government districts in the non-metropolitan county of Buckinghamshire and act as the Waste Collection Authority for this district responsible for the collection of residual waste. CDC is located to the south-east of the county.

### **Community liaison group (CLG)**

An organised group involving local community representatives, residents and other interest groups to facilitate communication, share information and encourage engagement for those who may be affected by the operation of the waste management facilities. These sessions are hosted by the council and operators to provide a transparent platform for attendee's to ask questions.

### **Continuous emissions monitoring systems (CEMS)**

Continuous emissions monitoring system (CEMS) technologies are used to constantly monitor emissions from the Energy from Waste process against the emission limit values specified within the Environmental Permit. Gas samples are extracted using a sample probe and analysers used to measure concentrations of each parameter.

### **Contract waste**

Waste materials that are included in the residual waste treatment contract between FCC and BCC. This includes all residual household waste collected across the county by the district councils and residual wastes disposed of at the Household Recycling Centres.

### **Dioxins and Furans**

Dioxins (polychlorinated dibenzodioxin, PCDD) and furans (polychlorinated dibenzofuran, PCDF) are families of complex chemicals containing chlorine. There are several hundred dioxin substances. They are crystalline solids which dissolve in organic (carbon-containing) solvents, fats and oils – but not in water.

### **District Council**

The District Councils within Buckinghamshire act as the Waste Collection Authority and are responsible for the collection of household waste and delivery to the facilities on the contract.

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## Emission limit value (ELV)

Emission Limit Values (ELV) are specified limits for various pollutant emissions from the Energy from Waste process and are set out as conditions of the Environmental Permit. Emissions must be monitored against the ELV for each pollutant and reported to the Environment Agency. Emissions must remain within the specified limits to maintain compliance with the Environmental Permit.

## Energy from waste (EfW)

Incineration process in which residual waste is converted into thermal energy to generate steam that drives turbines for electricity production. Energy from waste is a method of recovery and therefore preferable over landfill disposal.

## Environment Agency (EA)

The Environment Agency (EA) is a non-departmental public body sponsored by the United Kingdom government's Department for Environment, Food and Rural Affairs (DEFRA), with responsibilities relating to the protection and enhancement of the environment.

## Environmental Permit

The Environmental Permitting (England and Wales) Regulations 2016 requires waste management facilities to obtain an environmental permit before they are allowed to operate. Both Greatmoor EfW and High Heavens WTS are operated under Environmental Permits, which are regulated by the Environment Agency.

## FCC

FCC Environment is one of the UK's leading waste and resource management companies who has been contracted by BCC for the treatment of the county's residual waste.

## Flue gas treatment (FGT)

FGT is the cleaning process to remove pollutants from flue gasses emitted during combustion. The treatment includes a series of chemical processes and filters to neutralise gasses and remove particulates before releasing to the atmosphere.

## Heavy Metals

A metal of relatively high density, or of high relative atomic weight and includes Arsenic, Antimony, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Mercury, Nickel, Thallium, Vanadium.

## Household recycling centre (HRC)

A facility where members of the public can reuse, recycle and dispose of their household waste.

## Hydrogen chloride (HCl)

Hydrogen chloride is a naturally occurring chemical, but can also occur in manufacturing processes. It is a colourless, reactive gas with a strong, pungent odour. In solution with water it forms hydrochloric acid.

## Hydrogen Fluoride

Under normal conditions, Hydrogen fluoride will be a colourless gas, which has a sharp, pungent smell. It is highly toxic and irritating, but non-flammable. Hydrogen fluoride is however usually found as a strong solution in water, whereby it is Hydrofluoric acid. Hydrofluoric acid is an extremely strong acid. It will severely corrode metals, glass, minerals and many organic (carbon-containing) substances – and will release highly flammable hydrogen in the process.

## Incinerator bottom ash (IBA)

Incinerator bottom ash (IBA) is a form of ash produced as a residue from the incineration of waste in Energy from Waste (EfW) facilities. This material is discharged during combustion and is often processed to recover ferrous metals prior to onward treatment or disposal of the ash products.

## Integrated management systems (IMS)

An integrated management system (IMS) combines related management systems of a business into one system for easier management and operations. Quality, Environmental, and Safety management systems are often combined and managed as an IMS through combined policies and procedures for more efficient and robust management processes.

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## Landfill disposal

A disposal site where residual waste is buried, spread into layers and compacted. Modern landfills are engineered to prevent any pollutants from leaking into the surrounding soil and water courses. Landfill is considered the least sustainable method of waste disposal and therefore other methods of recycling and energy recovery are sought before landfill.

## Megawatt (MW)

A unit of electricity equal to 1 million watts, or 1,000 Kilowatts. This unit of electricity is the constant used to represent the power generated from energy from waste recovery. Greatmoor EfW is designed to generate 22MW of electricity which is sufficient to power 36,000 homes.

## Nitrogen oxides (NO<sub>x</sub>)

The term 'nitrogen oxides' (NO<sub>x</sub>) is usually used to include two gases – nitric oxide (NO), which is a colourless, odourless gas and nitrogen dioxide (N<sub>2</sub>O), which is a reddish-brown gas with a pungent odour. These contribute to acid rain, depletion of the ozone layer and have detrimental effects on health. They are also greenhouse gases.

## Particulates

Particulates is the term used to describe tiny particles in the air, made up of a complex mixture of soot, organic and inorganic materials with a particle size less than or equal to 10 microns diameter (10 microns is equal to one hundredth part of a mm).

## Refuse collection vehicle (RCV)

A vehicle commonly referred to as a dustcart specially designed to collect waste and/or recycling, and transport the collected materials to an onwards waste treatment facility.

## Residual waste

Waste tonnages that remain after reuse, recycling and composting activities have taken place. This typically refers to everything that is disposed of in household black bin bags.

## South Bucks District Council (SBDC)

South Bucks District Council (SBDC) is one of four local government districts in the non-metropolitan county of Buckinghamshire and act as the Waste Collection Authority for this district responsible for the collection of residual waste. SBDC is located to the south of the county.

## Sulphur dioxide (SO<sub>2</sub>)

Sulphur dioxide is man-made and naturally occurring colourless gas with a penetrating odour. It dissolves in water to form an acidic solution. Sulphur dioxide gas is one of the main chemicals that causes acid rain, which can damage crops and forests and acidify sensitive soils and water bodies.

## Third party waste

Residual waste that is not included in the residual waste treatment contract between FCC and BCC. Third Party waste includes other municipal waste contracts that FCC have with nearby local authorities. Third party waste is processed at Greatmoor to fill the capacity of the plant, increase landfill diversion and maximise electricity generation for Buckinghamshire.

## Total organic carbon (TOC)

Total Organic Carbon is a measurement of Volatile Organic Compounds (VOC). VOC is a term used to classify a large group of liquids and gases (containing carbon) that are gaseous or easily vaporize at room temperature.

## Waste transfer station

A waste transfer station is a building used for the bulking of residual waste prior to onward transfer of waste to a treatment or disposal facility. The transfer station operating on the residual waste contract is High Heavens located in High Wycombe in the South of the County. This site services the southern district councils whose RCVs tip residual waste on site prior to bulk waste transfer to Greatmoor EfW.

## Wycombe District Council (WDC)

Wycombe District Council (WDC) is one of four local government districts in the non-metropolitan county of Buckinghamshire and act as the Waste Collection Authority for this district responsible for the collection of residual waste. WDC is located to the south-west of the county.