Determination of an Application for an Environmental Permit under the Environmental Permitting (England & Wales) Regulations 2016

Decision document recording our decision-making process

The Permit Number is:	EPR/XP3730QZ
The Applicant / Operator is:	Equitix EEEF WTE (Baddesley) Limited.
The Installation is located at:	Baddesley Energy from Waste plant, off Merevale Lane, Baxterley, Near Atherstone, Warwickshie, CV9 2LA.

What this document is about

This is a decision document, which accompanies a permit.

It explains how we have considered the Applicant's Application, and why we have included the specific conditions in the permit we are issuing to the Applicant. It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position. Unless the document explains otherwise, we have accepted the Applicant's proposals.

We try to explain our decision as accurately, comprehensively and plainly as possible. Achieving all three objectives is not always easy, and we would welcome any feedback as to how we might improve our decision documents in future. A lot of technical terms and acronyms are inevitable in a document of this nature: we provide a glossary of acronyms near the front of the document, for ease of reference.

Preliminary information and use of terms

We gave the application the reference number EPR/XP3730QZ/A001. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we have given to the permit is EPR/XP3730QZ. We refer to the permit as “the **Permit**” in this document.

The Application was duly made on 20/8/18.

The Applicant is Equitix EEEF WTE (Baddesley) Limited. We refer to them as “the **Applicant**” in this document. Where we are talking about what would happen after the Permit is granted (if that is our final decision), we call them “the **Operator**”.

The Applicant’s proposed facility is located at Baddesley Energy from Waste plant, off Merevale Lane, Baxterley, Near Atherstone, Warwickshire,CV9 2LA. We refer to this as “the **Installation**” in this document.

How this document is structured

Glossary of acronyms

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Glossary of acronyms used in this document

(Please note that this glossary is standard for our decision documents and therefore not all these acronyms are necessarily used in this document.)

AAD	Ambient Air Directive (2008/50/EC)
APC	Air Pollution Control
AQS	Air Quality Strategy
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
CEM	Continuous emissions monitor
CFD	Computerised fluid dynamics
CHP	Combined heat and power
COMEAP	Committee on the Medical Effects of Air Pollutants
CROW	Countryside and rights of way Act 2000
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision document
EAL	Environmental assessment level
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission limit value
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154) as amended
ES	Environmental standard
EWC	European waste catalogue
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HPA	Health Protection Agency (now PHE – Public Health England)
HRA	Human Rights Act 1998
HW	Hazardous waste
HWI	Hazardous waste incinerator
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive (2010/75/EU)

I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCV	Lower calorific value – also termed net calorific value
LOI	Loss on Ignition
MCPD	Medium Combustion Plant Directive (EU) 2015/2193
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
PHE	Public Health England
POP(s)	Persistent organic pollutant(s)
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated biphenyls
PXDF	Poly-halogenated di-benzo furans
RDF	Refuse derived fuel
RGS	Regulatory Guidance Series
SAC	Special Area of Conservation
SCR	Selective catalytic reduction
SGN	Sector guidance note
SNCR	Selective non-catalytic reduction
SPA(s)	Special Protection Area(s)
SSSI(s)	Site(s) of Special Scientific Interest
SWMA	Specified waste management activity
TDI	Tolerable daily intake
TEF	Toxic Equivalent Factors
TGN	Technical guidance note
TOC	Total Organic Carbon
UHV	Upper heating value –also termed gross calorific value
UN_ECE	United Nations Environmental Commission for Europe
US EPA	United States Environmental Protection Agency

WFD	Waste Framework Directive (2008/98/EC)
WHO	World Health Organisation
WID	Waste Incineration Directive (2000/76/EC) – now superseded by IED

1 Our decision

We have decided to grant the Permit to the Applicant. This will allow it to operate the Installation, subject to the conditions in the Permit.

We consider that, in reaching that decision, we have taken into account all relevant considerations and legal requirements and that the permit will ensure that a high level of protection is provided for the environment and human health.

This Application is to operate an installation which is subject principally to the Industrial Emissions Directive (IED).

The Permit contains many conditions taken from our standard Environmental Permit template including the relevant Annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the permit, we have considered the Application and accepted the details are sufficient and satisfactory to make the standard condition appropriate. This document does, however, provide an explanation of our use of "tailor-made" or installation-specific conditions, or where our Permit template provides two or more options.

2 How we reached our decision

2.1 Receipt of Application

The Application was duly made on 20/8/18. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below.

The Applicant made no claim for commercial confidentiality. We have not received any information in relation to the Application that appears to be confidential in relation to any party.

2.2 Consultation on the Application

We advertised the Application by a notice placed on our website, which contained all the information required by the IED, including telling people where and when they could see a copy of the Application.

We made a copy of the Application and all other documents relevant to our determination (see below) available to view on our Public Register at: Environment Agency, Sentinel House, 9 Wellington Crescent, Fradley Park, Lichfield, Staffs, WS13 8RR and on our website. Anyone wishing to see these documents could do so and arrange for copies to be made.

We sent copies of the Application to the following bodies, which includes those with whom we have "Working Together Agreements":

- Public Health England
- Local Authority Director of Public Health
- Local planning authority, North Warwickshire Borough Council
- Environmental Health, North Warwickshire Borough Council
- National Grid
- Health and Safety Executive.
- Natural England

These are bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly. Note under our Working Together Agreement with Natural England, we only inform Natural England of the results of our assessment of the impact of the installation on designated Habitats sites.

Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 4. We have taken all relevant representations into consideration in reaching our determination.

2.3 Requests for Further Information

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued information notices on 20/12/18, 03/03/19 & 13/6/19. We also requested further information via emails dated 17/07/19 and 15/08/19. A copy of each information notice was placed on our public register.

In addition to our information notices, we received additional information during the determination from the Applicant on 17/5/19 requesting a change to the discharge to water and on 17/6/19 providing a revised assessment of the impacts to water. We made a copy of this information available to the public in the same way as the responses to our information notices.

3 The legal framework

The Permit will is granted, under Regulation 13 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

- an *installation* and a *waste incineration plant* as described by the IED;

- an *operation* covered by the WFD, and
- subject to aspects of other relevant legislation which also have to be addressed.

We address some of the major legal requirements directly where relevant in the body of this document. Other requirements are covered in a section towards the end of this document.

We consider that, in granting the Permit, it will ensure that the operation of the Installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document.

4 The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

The Installation is subject to the EPR because it carries out an activity listed in Part 1 of Schedule 1 to the EPR:

- Section 5.1 Part A(1)(b) – incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity of 3 tonnes or more per hour.

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The IED definition of “waste incineration plants” and “waste co-incineration plants” says that it includes:

> *“all incineration lines or co-incineration lines, waste reception, storage, on-site pre-treatment facilities, waste, fuel and air supply systems, boilers, facilities for the treatment of waste gases, on-site facilities for treatment or storage of residues and waste water, stacks, devices for controlling incineration or co-incineration operations, recording and monitoring incineration or co-incineration conditions.”*

Many activities which would normally be categorised as “directly associated activities” for EPR purposes (see below), such as air pollution control plant, (including storage of treatment chemicals), and ash storage, are therefore included in the listed activity description.

An installation may also comprise “directly associated activities”, which at this Installation includes the generation of electricity using a steam turbine and a back up electricity generator for emergencies. These activities comprise one installation, because the incineration plant and the steam turbine are successive steps in an integrated activity.

Together, these listed and directly associated activities comprise the Installation.

The site will have a 4.3MWth backup generator which as discussed above is a directly associated activity. Due to its size it will be subject to the Medium Combustion Plant Directive (MCPD), but as it only be used for emergency use it will be excluded from requiring emission limits under the MCPD. As it will only be tested for less than 50 hours per year it is classed as an excluded generator and is also exempt from the requirements of Schedule 25B "Specified Generator regulations" of the EPR.

4.1.2 The Site

The site is located within the Merevale and Blyth Estate. The Site comprises 1.4 hectares of levelled land surrounded by a landscaped bund, located approximately 0.25 km to the east of the village of Baxterley and 0.8 km to the south east of the village of Baddesley Ensor. The nearest major town is Atherstone, located approximately 1.9 km to the north east of the site. The centre of the proposed site location is at National Grid Reference SP 28184 97270.

Ensor's Pool SAC (Special Area of conservation), is located 9.5km SE of the site, Bentley Park Wood (SSSI) is locate 1.1km SE, and there are several local wildlife sites (LWS) and ancient woodlands within 2km of the site, the closest being Baddesley Common(LWS).

The Applicant submitted a plan which we consider is satisfactory, showing the site of the Installation and its extent. A plan is included in Schedule 7 to the Permit, and the Operator is required to carry on the permitted activities within the site boundary.

Further information on the site is addressed below at 4.3.

4.1.3 What the Installation does

The Applicant has described the facility as Energy from Waste. Our view is that for the purposes of IED (in particular Chapter IV) and EPR, the installation is a waste incineration plant because:

Notwithstanding the fact that energy will be recovered from the process; the process is never the less 'incineration' because it is considered that its main purpose is the thermal treatment of waste.

The key features of the Installation can be summarised in the table below.

Waste throughput, Tonnes/line	103,000 tonnes/annum nominal; 130,000 tonnes/annum (if ran all year)	14.75 tonnes /hour
Waste processed	RDF	
Number of lines	1	
Furnace technology	Moving Grate	
Auxiliary Fuel	Gas Oil <0.1% sulphur (Diesel)	
Acid gas abatement	Semi-dry	Hydrated lime
NOx abatement	SCR	Ammonia solution
Reagent consumption	Auxiliary Fuel 68 te/annum Ammonia : 400 te/annum Hydrated Lime : 1,160 te/annum Activated carbon: 50 te/annum Process water: 182,080 te/annum	
Flue gas recirculation	No	
Dioxin abatement	Powdered Activated Carbon	
Stack	Grid Reference: SP2814397186	
	Height, 25.0 m	Diameter, 1.53 m
Flue gas	Flow, 22.0 Nm^3/s	Velocity, 18.9 m/s
	Temperature 456°K	
Electricity generated	10.4 MWe (average)	
Electricity exported	8.74 MWe	
Steam exported	None	
Waste heat use	None	

4.1.4 Key Issues in the Determination

The key issues arising during this determination were:

1. The stack height and its effect on air dispersion;

2. The impacts of air emissions and in particular the impact on the nearby Bentley Park Wood SSSI ; and

3. The impact of emissions to water on the unnamed tributary of the river Anker and the discharge to sewer.

and we therefore describe how we determined these issues in detail in this document.

4.2 The site and its protection

4.2.1 Site setting, layout and history

The proposed Installation is located within the Merevale and Blyth Estate, off Merevale Lane on the boundary of the Parishes of Merevale and Baxterley, near Atherstone, Warwickshire CV9 2LA. The Site comprises 1.4 hectares of levelled land surrounded by a landscaped bund, located approximately 0.25 km to the east of the village of Baxterley and 0.8 km to the south east of the village of Baddesley Ensor. The nearest major town is Atherstone, located approximately 1.9 km to the north east of the site. The centre of the proposed site location is at National Grid Reference SP 28184 97270.

The site consists of previously developed land together with a linear access route. There is an existing bund or land-bank surrounding three sides of the site, varying in height from 15 m to 25 m. The land directly to the north is occupied by the adjacent Biogen UK anaerobic digestion (AD) plant activity. The other surrounding land use consists of land in agricultural use together with areas of former open cast coal extraction land used for car storage and residential properties generally situated in local villages.

An unnamed stream crosses the site in a north to north east direction. The stream was culverted during earlier work and is located 20 m below finished ground levels. The stream is a tributary of the River Anker, situated approximately 1.8 km to the north east of the site.

The main site activity will be combustion of refuse derived fuel (RDF) for the generation of electricity to export to the national grid, with a small proportion of the electricity generated being used by the plant itself. The associated activities to be undertaken at the site include waste fuel storage, auxiliary burner and fuel storage, flue gas treatment and bottom ash, boiler and economiser ash, skimmer ash and air pollution control (APC) residue storage prior to treatment/disposal, as shown on Drawing 773-SK138-R02 Site Storage Plan - 180517.

The published geology of the area and ground investigations at the site have indicated that the site is underlain by made ground, Halesowen Formation and Pennine Middle Coal Measures Formation. The bedrock is classified as secondary A or moderately productive aquifer. Perched groundwater was identified underneath the site during the 2017 site investigation.

Historical site uses have identified potential historical contamination sources, namely the use of the site itself and nearby areas for colliery and spoil heaps.

Baseline data has been provided (Jomas Associates Ltd, Nov. 2017), in the form of soil and groundwater sampling and analysis against an appropriate analysis suite. Based on the information provided to us, we agree that these concentrations do not appear to represent a significant risk to controlled waters.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

The RDF waste bunker has a maximum capacity of 6,230 m3. It has two main areas: the fuel delivery pit (1,030 m3) and the fuel storage pit (5,200 m3). The waste will be unloaded from the containerised vehicles into the fuel delivery pit, from which waste is transferred via an overhead crane. The waste bunker has been specifically designed to prevent waste and associated leachate from being released to ground/groundwater. Therefore the potential for a release to soil or groundwater from the bunker is considered to be low.

All process storage tanks will be built of suitable materials which are resistant to the vessel content. A maintenance programme will be established for the inspection of all storage tanks. All process areas will be located on hardstanding and all bunds provided for chemical and fuel storage tanks will be manually inspected to ensure they remain empty. All liquid reagent storage tanks will be bunded to 110% of the capacity of the storage tank. Bunds will be constructed to appropriate standards and lined with materials that are impervious to the content of the material they hold. All bunds will be visually checked each day to ensure that they are empty.

The chemicals will be subject to appropriate storage and handling practices which will be described and enforced through the site's EMS.

Bulk deliveries will be overseen by a trained member of staff who will be responsible for checking that there is sufficient capacity in the storage vessel to receive the delivery.

A site spill procedure will be developed and followed in the event of a spillage. Spill kits will be available to contain and clean up the spill.

Potential release to groundwater would require simultaneous failure of both storage and containment. Given the infrastructure and management measures that will be in place, the potential for harmful emissions to the soil or groundwater is considered to be low.

Under Article 22(2) of the IED the Applicant is required to provide a baseline report containing at least the information set out in paragraphs (a) and (b) of the Article before starting operation.

The Applicant has submitted a site condition report which includes a report on the baseline conditions as required by Article 22. We have reviewed that report. The report itself concludes that:

"The relevant hazardous substances associated with the materials received, stored and processed at the site with the potential for land and water contamination during site operation include: ammonia, PCBs, PAHs and TPHs. Although site investigation data has been collected for the site, the location of the monitoring boreholes are not in proximity to the areas where these materials will be stored.

It is recommended that further testing is undertaken in proximity to the diesel and ammonium hydroxide storage tanks prior to the facility coming into operation to baseline the site in these areas."

We have therefore set a pre-operational condition (PO5) requiring the Operator to provide this information prior to the commencement of operations.

The operator also modified their application to discharge process water to sewer which include a dedicated drain running to the public sewer. This line is considered to be a DAA and so part of the Installation, and so pre-operational condition PO5 also requires the inclusion of this extension within the updated SCR.

The baseline report is an important reference document in the assessment of contamination that might arise during the operational lifetime of the installation and at cessation of activities at the installation

4.2.3 <u>Closure and decommissioning</u>

The Applicant states that a site closure plan will be developed in order to demonstrate that the EfW facility will be decommissioned, once it has reached the end of its operational lifetime, to avoid any pollution risk and return the site of operation to its original condition at the time of commencing operation. At this stage we consider this to be adequate.

At the definitive cessation of activities, the Operator has to satisfy us that the necessary measures have been taken so that the site ceases to pose a risk to soil or groundwater, taking into accounts both the baseline conditions and the site's current or approved future use. To do this, the Operator will apply to us for surrender of the permit, which we will not grant unless and until we are satisfied that these requirements have been met.

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

The Applicant is the sole Operator of the Installation.

We are satisfied that the Applicant is the person who will have control over the operation of the Installation after the granting of the Permit; and that the Applicant will be able to operate the Installation so as to comply with the conditions included in the Permit.

The incineration of waste is not a specified waste management activity (SWMA). The Environment Agency has considered whether any of the other activities taking place at the Installation are SWMAs and is satisfied that none are taking place.

4.3.2 Management

The Applicant has stated in the Application that they will implement an Environmental Management System (EMS) that will be based on the requirements of ISO14001. A summary of the key procedures are provided in the Application and the Applicant states these will be in place before commencement of operations.

We are satisfied that appropriate management systems and management structures will be in place for this Installation, and that sufficient resources are available to the Operator to ensure compliance with all the Permit conditions.

An Environmental Management System is required under the general management permit condition 1.1.1.

4.3.3 Site security

Having considered the information submitted in the Application, we are satisfied that appropriate infrastructure and procedures will be in place to ensure that the site remains secure.

4.3.4 Accident management

The Applicant has not submitted an Accident Management Plan. However, having considered the other information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that accidents that may cause pollution are prevented but that, if they should occur, their consequences are minimised.

An Accident Management Plan will be established prior to commencing operation of the EfW facility. This Accident Management Plan will form part of the Environmental Management System required under the general management permit condition 1.1.1.

The Applicant has submitted a Fire Prevention Plan (FPP).
The original FPP submitted with the application was assessed and found not to be acceptable according to our guidance. Aspects around a commitment to staff training and regular test exercises on the site, the fire site plan, written waste acceptance procedures, water supply provision, fire water containment and diversion of wastes during a site fire were not adequately addressed. Following a Schedule 5 Notice dated 03 April 2019, these aspects were reviewed by the Applicant and an amended FPP was submitted. The Environment Agency are satisfied that the FPP is now appropriate for the site fire prevention and management of combustible wastes. A pre-operational condition has been set within the permit with regards to providing a report to the Environment Agency for approval regarding the design and accreditation of the fire detection and suppression system to be installed at the facility as the detailed design for this was not available at the time of the application determination.

4.3.5 Off-site conditions

We do not consider that any off-site conditions are necessary.

4.3.6 Operating techniques

We have specified that the Applicant must operate the Installation in accordance with the documents contained in the Application and listed in Table S1.2 in the Permit.

The details set out above describe the techniques that will be used for the operation of the Installation that have been assessed by the Environment Agency as BAT; they form part of the Permit through Permit condition 2.3.1 and Table S1.2 in the Permit Schedules.

We have also specified the following limits and controls on the use of raw materials and fuels:

Raw Material or Fuel	Specifications	Justification
Gas Oil	< 0.1% sulphur content	As required by Sulphur Content of Liquid Fuels Regulations.

Article 45(1) of the IED requires that the Permit must include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2005/532/EC, EC, if possible, and containing information on the quantity of each type of waste, where appropriate. The Application contains the wastes code by the European Waste Catalogue (EWC) number, which the Applicant will accept in the waste streams entering the plant and which the plant is capable of burning in an environmentally acceptable way. We have specified the permitted waste type, description and where appropriate quantity which can be accepted at the installation in Table S2.2.

We are satisfied that the Applicant can accept the waste contained in Table S2.2 of the Permit because the plant is specifically designed for RDF and the wastes are all categorised as non-hazardous in the European Waste Catalogue and are capable of being safely burnt at the installation.

We have limited the capacity of the Installation to 130,000 tonnes per annum. This is based on the installation operating 8760 hours per year at a nominal capacity of 14.75 tonnes per hour, with a design calorific value of 11.5MJ/kg. This is the maximum throughput for the facility, whereas the actual rate is likely to be less than this due to downtime for maintenance.

The Installation will be designed, constructed and operated using BAT for the incineration of the permitted wastes. We are satisfied that the operating and abatement techniques are BAT for incinerating these types of waste. Our assessment of BAT is set out later in this document.

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

We have considered the issue of energy efficiency in the following ways:

1. The use of energy within, and generated by, the Installation which are normal aspects of all EPR permit determinations. This issue is dealt with in this section.

2. The extent to which the Installation meets the requirements of Article 50(5) of the IED, which requires *"the heat generated* during the incineration and co-incineration process is *recovered as far as practicable through the generation of heat, steam or power*". This issue is covered in this section.

3. The combustion efficiency and energy utilisation of different design options for the Installation are relevant considerations in the determination of BAT for the Installation, including the Global Warming Potential of the different options. This aspect is covered in the BAT assessment in section 6 of this Decision Document.

4. The extent to which the Installation meets the requirement of Article 14(5) of the Energy Efficiency Directive which requires new thermal electricity generation installations with a total thermal input exceeding 20 MW to carry out a cost-benefit assessment to "*assess the cost and benefits of providing for the operation of the installation as a high-efficiency cogeneration installation*".
   Cogeneration means the simultaneous generation in one process of thermal energy and electrical or mechanical energy and is also known as combined heat and power (CHP)
   High-efficiency co-generation is cogeneration which achieves at least 10% savings in primary energy usage compared to the separate generation of heat and power – see Annex II of the Energy Efficiency Directive for detail on how to calculate this.

(ii) Use of energy within the Installation

Having considered the information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that energy is used efficiently within the Installation.

The Application details a number of measures that will be implemented at the Installation in order to increase its energy efficiency:

- The EfW facility has been designed to be enabled to produce both electrical power and heat;
- Efficient heating and cooling systems employed at the EfW facility;
- The furnace section will be effectively insulated and lined to ensure heat is retained;
- Design and construction of the EfW facility to avoid uncontrolled air ingress;
- Optimisation of the EfW facility layout to avoid excessive transfer of materials, where possible;
- Effective plant maintenance regime to ensure energy efficiency is maintained over time and reduce down time or prolonged outages;
- Staff training will be used to raise awareness to encourage efficient energy use.

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 130 kWh/tonne, based on the mass and energy balances. The installation maximum capacity is *130,000* t/a, the mass and energy balances are based on the operational capacity 102,400 t/a.

Data from the BREF for Municipal Waste Incinerators shows that the range of specific energy consumptions is as in the table below.

MSWI plant size range (t/yr)	**Process energy demand (kWh/t waste input)**
Up to 150,000	300 – 700
150,000 – 250,000	150 – 500
More than 250,000	60 – 200

The BREF says that it is BAT to reduce the average installation electrical demand to generally below 150 kWh/tonne of waste with an LCV of 10.4 MJ/kg. The LCV in this case is expected to be *11.5* MJ/kg. Taking account of the difference in LCV, the specific energy consumption in the Application is better than that set out above.

(iii) Generation of energy within the Installation - Compliance with Article 50(5) of the IED

Article 50(5) of the IED requires that *"the heat generated during the incineration and co-incineration process is recovered as far as practicable*".

Our CHP Ready Guidance - February 2013 considers that BAT for energy efficiency for Energy from Waste (EfW) plant is the use of CHP in circumstances where there are technically and economically viable opportunities for the supply of heat from the outset.

The term CHP in this context represents a plant which also provides a supply of heat from the electrical power generation process to either a district heating network or to an industrial / commercial building or process. However, it is recognised that opportunities for the supply of heat do not always exist from the outset (i.e. when a plant is first consented, constructed and commissioned).

In cases where there are no immediate opportunities for the supply of heat from the outset, the Environment Agency considers that BAT is to build the plant to be CHP Ready (CHP-R) to a degree which is dictated by the likely future opportunities which are technically viable and which may, in time, also become economically viable.

The BREF says that where a plant generates electricity only, it is BAT to recover 0.6 – 1.0 MWh/tonne of waste (based on LCV of 15.2 MJ/kg) for pre-treated wastes. Our technical guidance note, SGN EPR S5.01, states that where electricity only is generated, 5-9 MW of electricity should be recoverable per 100,000 tonnes/annum of waste (which equates to 0.4 – 0.72 MWh/tonne of waste).

The Installation will generate electricity only and has been specified to maximise electrical output with little or no use of waste heat. The Energy balance diagram of the Application shows 8.74 MW of net electricity produced for an annual burn of 102,400 tonnes, which represents 8.54 MW per 100,000 tonnes/yr of waste burned (0.68 MWh/tonne of waste). The Installation is therefore in the indicative BAT range.

The SGN and Chapter IV of the IED both require that, as well as maximising the primary use of heat to generate electricity; waste heat should be recovered as far as practicable.

The location of the Installation largely determines the extent to which waste heat can be utilised, and this is a matter for the planning authority. The Applicant carried out a feasibility study and provided a CHP-R assessment as part of their application, which showed there was potential to provide district heating to local businesses; suitable opportunities are being explored, though there are no firm commitments at this stage. The Applicant has identified several locations where low-grade steam can be extracted from the system for a district heating scheme, however they have not added any extra extraction points as they do not know at this stage where the optimal extraction points would be if/when a viable heat demand arises. Establishing a district heating network to supply local users would involve significant technical, financial and planning challenges such that this is not seen as a practicable proposition at present.

Our CHP-R guidance also states that opportunities to maximise the potential for heat recovery should be considered at the early planning stage, when sites are being identified for incineration facilities.

We consider that, within the constraints of the location of the Installation explained above, the Installation will recover heat as far as practicable, and therefore that the requirements of Article 50(5) are met.

(iv) R1 Calculation

The R1 calculation does not form part of the matters relevant to our determination. It is however a general indicator that the installation is achieving a high level of energy recovery.

The Applicant has not presented an R1 calculation with this application, nor have we received a separate application for a determination on whether the installation is a recovery or disposal facility.

(vii) Compliance with Article 14(5) of the Energy Efficiency Directive

The Applicant has carried out an assessment of the potential for operating the installation as a high-efficiency cogeneration installation and has concluded that this will not be possible because

- There are no identifiable heat loads in the area that are regarded as being currently commercially viable because of a combination of distance, and the available grade of heat.
- The site is constrained by a number of factors, including the road/motorway routes in the area; the route of the West Coast Mainline and (to the west) by land whose use is currently restricted because of HS2 development.

We agree with the Applicant's assessment. Therefore no cost benefit assessment is required.

(viii) Permit conditions concerning energy efficiency

Condition 1.2.2 has also been included in the Permit, which requires the Operator to review the options available for heat recovery on an ongoing basis.

Condition 1.2.1 has been included in the permit requiring the operator to operate as a high-efficiency co-generation installation in the manner described within the cost-benefit assessment carried out to satisfy the requirements of Article 14(5) of the Energy Efficiency Directive.

The Operator is required to report energy usage and energy generated under condition 4.2 and Schedule 4. The following parameters are required to be reported: total electrical energy generated; electrical energy exported; total energy usage and energy exported as heat (if any). Together with the total RDF burned per year, this will enable the Environment Agency to monitor energy recovery efficiency at the Installation and take action if at any stage the energy recovery efficiency is less than proposed.

There are no site-specific considerations that require the imposition of standards beyond indicative BAT, and so the Environment Agency accepts that the Applicant's proposals represent BAT for this Installation.

4.3.8 Efficient use of raw materials

Having considered the information submitted in the Application, we are satisfied that the appropriate measures will be in place to ensure the efficient use of raw materials and water.

The Operator is required to report with respect to raw material usage under condition 4.2. and Schedule 5, including consumption of hydrated lime, activated carbon and urea / ammonia used per tonne of waste burned. This will enable the Environment Agency to assess whether there have been any changes in the efficiency of the air pollution control plant, and the operation of the SCR to abate NO_x. These are the most significant raw materials that will be used at the Installation, other than the waste feed itself (addressed elsewhere). The efficiency of the use of auxiliary fuel will be tracked separately as part of the energy reporting requirement under condition [4.2.1]. Optimising reagent dosage for air abatement systems and minimising the use of auxiliary fuels is further considered in the section on BAT.

4.3.9 Avoidance, recovery or disposal with minimal environmental impact of wastes produced by the activities

This requirement addresses wastes produced at the Installation and does not apply to the waste being treated there. The principal waste streams the Installation will produce are bottom ash, boiler and economiser fly ash, skimmer residues, and air pollution control residues.

The first objective is to avoid producing waste at all. Waste production will be avoided by achieving a high degree of burnout of the ash in the furnace, which results in a material that is both reduced in volume and in chemical reactivity. Condition 3.1.3 and associated Table S3.5 specify limits for total organic carbon (TOC) of <3% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable.

Incinerator bottom ash (IBA) will normally be classified as non-hazardous waste. However, IBA is classified on the European List of Wastes as a "mirror entry”, which means IBA is a hazardous waste if it possesses a hazardous property relating to the content of dangerous substances. Monitoring of incinerator ash will be carried out in accordance with the requirements of Article 53(3) of IED. Classification of IBA for its subsequent use or disposal is controlled by other legislation and so is not duplicated within the permit.

Air pollution control (APC) residues from flue gas treatment are hazardous waste and therefore must be sent for disposal to a landfill site permitted to accept hazardous waste, or to an appropriately permitted facility for hazardous waste treatment. The amount of APC residues is minimised through optimising the performance of the air emissions abatement plant.

In order to ensure that the ash and residues are adequately characterised, pre-operational condition PO2 requires the Operator to provide a written plan for approval detailing the sampling protocols. Table S3.5 requires the Operator to carry out an ongoing programme of monitoring.

The Application also proposes that, where possible, bottom ash will be transported to a suitable recycling facility, from where it could be re-used in the construction industry as an aggregate. The Applicant is currently investigating options for the use of bottom ash in road construction.

Boiler ash from most UK EfW facilities is deemed non-hazardous and combined with bottom ash before being further processed for re-use. On this basis a recycle use is expected, subject to confirmation via testing of the boiler ash. Subject to testing boiler the boiler ash may be combined with bottom ash and the sent for off-site processing as a combined stream.
The skimmer fly ash residues will be tested and where possible reprocessed, although reprocessing options for this residue remain under review. In the event that the skimmer ash cannot be reprocessed then it would be landfilled at a licensed facility.

The separate collection of the skimmer fly ash reduces the amount of fly ash entering the bag filters in the first instance and a large proportion of the APC residues will be recycled back into the flue gas treatment plant to optimize the chemical reactions. As for the skimmer ash the APC residues will be tested and further processed off-site subject to a suitable reprocessing option being secured. In the event that reprocessing cannot be secured the material will be landfilled at a suitably licensed facility.

Having considered the information submitted in the Application, we are satisfied that the waste hierarchy referred to in Article 4 of the WFD will be applied to the generation of waste and that any waste generated will be treated in accordance with this Article.

We are satisfied that waste from the Installation that cannot be recovered will be disposed of using a method that minimises any impact on the environment. Standard condition 1.4.1 will ensure that this position is maintained.

5. Minimising the Installation's environmental impact

Regulated activities can present different types of risk to the environment, these include odour, noise and vibration; accidents, fugitive emissions to air and water; as well as point source releases to air, discharges to ground or groundwater, global warming potential and generation of waste and other environmental impacts. Consideration may also have to be given to the effect of emissions being subsequently deposited onto land (where there are ecological receptors). All these factors are discussed in this and other sections of this document.

For an installation of this kind, the principal emissions are those to air, although we also consider those to land and water.

The next sections of this document explain how we have approached the critical issue of assessing the likely impact of the emissions to air from the Installation on human health and the environment and what measures we are requiring to ensure a high level of protection.

5.1 Assessment Methodology

5.1.1 Application of Environment Agency guidance 'risk assessments for your environmental permit'

A methodology for risk assessment of point source emissions to air, which we use to assess the risk of applications we receive for permits, is set out in our guidance 'Air emissions risk assessment for your environmental permit' and has the following steps:

- Describe emissions and receptors
- Calculate process contributions
- Screen out insignificant emissions that do not warrant further investigation
- Decide if detailed air modelling is needed
- Assess emissions against relevant standards
- Summarise the effects of emissions

The methodology uses a concept of "process contribution (PC)", which is the estimated concentration of emitted substances after dispersion into the receiving environmental media at the point where the magnitude of the concentration is greatest. The methodology provides a simple method of calculating PC primarily for screening purposes and for estimating process contributions where environmental consequences are relatively low. It is based on using dispersion factors. These factors assume worst case dispersion conditions with no allowance made for thermal or momentum plume rise and so the process contributions calculated are likely to be an overestimate of the actual maximum concentrations. More accurate calculation of process contributions can be achieved by mathematical dispersion models, which take into account relevant parameters of the release and surrounding conditions, including local meteorology – these techniques are expensive but normally lead to a lower prediction of PC.

5.1.2 Use of Air Dispersion Modelling

For incineration applications, we normally require the Applicant to submit a full air dispersion model as part of their application. Air dispersion modelling enables the process contribution to be predicted at any environmental receptor that might be impacted by the plant.

Once short-term and long-term PCs have been calculated in this way, they are compared with Environmental Standards (ES).

Where an Ambient Air Directive (AAD) Limit Value exists, the relevant standard is the AAD Limit Value. Where an AAD Limit Value does not exist, AAD target values, UK Air Quality Strategy (AQS) Objectives or Environmental Assessment Levels (EALs) are used. Our web guide sets out EALs which have been derived to provide a similar level of protection to Human Health and the Environment as the AAD limit values, AAD target and AQS objectives. In a very small number of cases, e.g. for emissions of lead, the AQS objective is more stringent that the AAD value. In such cases, we use the AQS objective for our assessment.

AAD target values, AQS objectives and EALs do not have the same legal status as AAD limit values, and there is no explicit requirement to impose stricter conditions than BAT in order to comply with them. However, they are a standard for harm and any significant contribution to a breach is likely to be unacceptable.

PCs are considered **Insignificant** if:

- the **long-term** process contribution is less than **1%** of the relevant ES; and
- the **short-term** process contribution is less than **10%** of the relevant ES.

The **long term** 1% process contribution insignificance threshold is based on the judgements that:

- It is unlikely that an emission at this level will make a significant contribution to air quality;
- The threshold provides a substantial safety margin to protect health and the environment.

The **short term** 10% process contribution insignificance threshold is based on the judgements that:

- spatial and temporal conditions mean that short term process contributions are transient and limited in comparison with long term process contributions;
- the threshold provides a substantial safety margin to protect health and the environment.

Where an emission is screened out in this way, we would normally consider that the Applicant's proposals for the prevention and control of the emission to be BAT. That is because if the impact of the emission is already insignificant, it follows that any further reduction in this emission will also be insignificant.

However, where an emission cannot be screened out as insignificant, it does not mean it will necessarily be significant.

For those pollutants which do not screen out as insignificant, we determine whether exceedances of the relevant ES are likely. This is done through detailed audit and review of the Applicant's air dispersion modelling taking background concentrations and modelling uncertainties into account. Where an exceedance of an AAD limit value is identified, we may require the Applicant to go beyond what would normally be considered BAT for the Installation or we may refuse the application if the applicant is unable to provide suitable proposals. Whether or not exceedances are considered likely, the application is subject to the requirement to operate in accordance with BAT.

This is not the end of the risk assessment, because we also take into account local factors (for example, particularly sensitive receptors nearby such as a SSSIs, SACs or SPAs). These additional factors may also lead us to include more stringent conditions than BAT.

If, as a result of reviewing of the risk assessment and taking account of any additional techniques that could be applied to limit emissions, we consider that emissions **would cause significant pollution**, we would refuse the Application.

5.2 <u>Assessment of Impact on Air Quality</u>

The Applicant's assessment of the impact of air quality is set out in 'Baddesley Energy From Waste Facility, Merevale Lane, Baxterley, Air Quality Assessment' Document ref Baddesley AQA_R03 of the Application. The assessment comprises:

- Dispersion modelling of emissions to air from the operation of the incinerator.
- A study of the impact of emissions on nearby sensitive conservation sites.

This section of the decision document deals primarily with the dispersion modelling of emissions to air from the incinerator chimney and its impact on local air quality. The impact on conservation sites is considered in section 5.4

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the AERMOD dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years of meteorological data collected from the weather station at Coleshill between 2011 and 2015. Coleshill is located at approximately 12 km southwest the facility. Coleshill has a prevailing southerly wind direction likely to be similar to that at the EfW stack. Birmingham Airport, located 17 km southwest, has a slightly different wind rose with a south-westerly component. We have therefore included sensitivity to different meteorological data in our check modelling. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

The air impact assessments, and the dispersion modelling upon which they were based, employed the following assumptions.

- First, they assumed that the ELVs in the Permit for the following pollutants would be the maximum permitted by Article 46(2) and Annex VI of the IED

  These substances are:

  - Total dust
  - Carbon monoxide (CO)
  - Sulphur dioxide (SO_2)
  - Hydrogen chloride (HCl)
  - Hydrogen fluoride (HF)
  - Metals (Cadmium, Thallium, Mercury, Antimony, Arsenic, Lead, Chromium, Cobalt, Copper, Manganese, Nickel and Vanadium)
  - Polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans (referred to as dioxins and furans)
  - Gaseous and vaporous organic substances, expressed as Total Organic Carbon (TOC)

- Oxides of nitrogen (NOx), expressed as NO2

The consultant modelled NOx emissions at lower Emission Limit Values (ELVs) than those permitted by Article 46(2) and Annex VI of the IED (120 and 240 mg/Nm3 for long and short-term, respectively) this is due to the use of Selective Catalytic Reduction (SCR) for Secondary NOx abatement, where they claim that a 60% reduction in NOX is achievable. The installation will be permitted at these limits, however, we have included sensitivity analysis to the highest NOX concentrations from IED (i.e. 200 and 400 mg/Nm3 for long and short-term, respectively).

- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term ELVs, i.e. the maximum permitted emission rate (except for emissions arsenic, chromium and nickel, which are considered in section 5.2.3 of this decision document).

- Third, the model also considered emissions of pollutants not covered by Annex VI of IED, specifically ammonia (NH_3), polycyclic aromatic hydrocarbons (PAH) and Polychlorinated biphenyls (PCBs). Emission rates used in the modelling have been drawn from data in the Waste Incineration BREF and are considered further in section 5.2.5.

Emissions from the backup generator were not assessed as it will only be used for emergency use and will only be tested for less than 50 hours per year.

We are in agreement with this approach. The assumptions underpinning the model have been checked and are reasonably precautionary.

As well as calculating the peak ground level concentration, the Applicant has modelled the concentration of key pollutants at a number of specified locations within the surrounding area.

The way in which the Applicant used dispersion models, its selection of input data, use of background data and the assumptions it made have been reviewed by the Environment Agency's modelling specialists to establish the robustness of the Applicant's air impact assessment. The output from the model has then been used to inform further assessment of health impacts and impact on habitats and conservation sites.

Our review of the Applicant's assessment leads us to agree with the Applicant's conclusions. We have also audited the air quality and human health impact assessment and similarly agree that the conclusions drawn in the reports were acceptable.

The Applicant's modelling predictions are summarised in the following sections.

5.2.1 Assessment of Air Dispersion Modelling Outputs

The Applicant's modelling predicted peak ground level exposure to pollutants in ambient air and at discreet receptors. The tables below show the ground level concentrations at the most impacted receptor.

Whilst we have used the Applicant's modelling predictions in the table below, we have made our own simple verification calculation of the percentage process contribution and predicted environmental concentration. These are the numbers shown in the tables below and so may be very slightly different to those shown in the Application. Any such minor discrepancies do not materially impact on our conclusions.

Assessment of Emissions to Air (1)

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	μg/m^3		μg/m^3	μg/m^3	% of EAL	μg/m^3	% of EAL
NO_2	40	1	12.6	0.43	1.08	13.0	32.6
	200	2	25.2	32.4	16.2	57.6	28.8
PM_{10}	40	1	15	0.053	0.13	15.1	37.6
	50	3	17.7	0.18	0.36	17.88	35.8
$PM_{2.5}$	25	1	10.9	0.053	0.21	10.95	43.8
SO_2	50	1			0.00	0.00	0.0
	266	4	9.6	128	48.1	137.6	51.7
	350	5	7.2	63.6	18.17	70.8	20.2
	125	6	4.2	7.7	6.2	11.9	9.5
HCl	750	7	0.48	31.6	4.21	32.1	4.28
HF	16	8	0.5	0.0142	0.09	0.514	3.21
	160	7	1	2.1	1.3125	3.10	1.9
CO	10000	9	189	19.6	0.20	209	2.1
	30000	10	270	52.7	0.18	323	1.1
TOC (as Benzene)	5	1	0.31	0.053	1.1	0.40	8.1
	195	2	0.62	0.62	5.3	12.8	6.6
PAH	0.00025	1	0.000062	0.000053	21.20	0.000115	46.0
NH_3	180	1	1.8	0.03	0.02	1.83	1.02
	2500	10	3.6	5.1	0.20	8.7	0.3
PCBs	0.2	1	0.00044	0.000027	0.01	0.00047	0.23
	6	10	0.00088	0.0026	0.04	0.00348	0.1
Dioxins			7.00E-09	5.30E-10		7.53E-09	

TOC as Benzene
PAH as benzo[a]pyrene

1 Annual Mean
2 99.79th %ile of 1-hour means

3 90.41st %ile of 24-hour means
4 99.9th ile of 15-min means
5 99.73rd %ile of 1-hour means
6 99.18th %ile of 24-hour means
7 1-hour average
8 Monthly average
9 Maximum daily running 8-hour mean
10 1-hour maximum

Assessment of Emissions to Air 2

Pollutant	EQS / EAL		Back-ground	Process Contribution		Predicted Environmental Concentration	
	μg/m³		μg/m³	μg/m³	% of EAL	μg/m³	% of EAL
Cd	0.005	1	0.00076	0.00047	9.4	0.00123	24.6
Tl	0.005	1	0.00076	0.00047	9.4	0.00123	24.6
Hg	0.25	1	0.0012	0.00047	0.19	0.00167	0.67
	7.5	2	0.0024	0.061	0.81	0.06340	0.845
Sb	5	1	0	0.0047	0.09	0.0047	0.09
	150	2	0	0.061	0.04	0.06100	0.041
Pb	0.25	1	0.0044	0.0047	1.88	0.00910	3.64
Co	0.2		0.000047	0.0047	2.35	0.00475	2.4
Cu	10	1	0.0028	0.0047	0.05	0.0075	0.075
	200	2	0.0056	0.61	0.31	0.61560	0.308
Mn	0.15	1	0.0022	0.0047	3.13	0.0069	4.60
	1500	2	0.0044	0.61	0.04	0.61440	0.0410
V	5	1	0.0011	0.0047	0.09	0.0058	0.12
	1	3	0.0013	0.61	61.00	0.61130	61.13
As	0.003	1	0.00047	0.0047	156.67	0.00517	172.3
Cr (II)(III)	5	1	0.00061	0.0038	0.08	0.00441	0.088
	150	2	0.0012	0.61	0.41	0.61120	0.4075
Cr (VI)	0.0002	1	0.00015	0.00094	470.00	0.00109	545.0
Ni	0.02	1	0.00083	0.0047	23.50	0.00553	27.7

1 Annual Mean
2 1-hr Maximum
3 24-hr Maximum

(i) Screening out emissions which are insignificant

From the tables above the following emissions can be screened out as insignificant in that the process contribution is < 1% of the long term ES and <10% of the short term ES. These are:

- *PM10*
- *HCL*
- *HF*
- *CO*
- *NH3*
- *PCB's*
- Metals: Hg, Sb, Cu, Cr (II)(III)

Therefore we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation subject to the detailed audit referred to below.

(ii) Emissions unlikely to give rise to significant pollution

Also from the tables above the following emissions (which were not screened out as insignificant) have been assessed as being unlikely to give rise to significant pollution in that the predicted environmental concentration is less than 100% (taking expected modelling uncertainties into account) of both the long term and short term ES.

The consultant assumed that all TOC emissions are benzene but have omitted the assessment of 1,3-butadiene Environmental Assessment Level (EAL). We have included this in our checks.

- *NO_2*
- *$PM_{2.5}$*
- *SO_2*
- *TOC*
- *PAH*
- *Metals:* Co ,Pb, Mn , Ni

For these emissions, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the Best Available Techniques to prevent and minimise emissions of these substances. This is reported in section 6 of this document.

5.2.2 Consideration of key pollutants

(i) Nitrogen dioxide (NO_2)

The impact on air quality from NO_2 emissions has been assessed against the ES of 40 $\mu g/m^3$ as a long term annual average and a short term hourly average of 200 $\mu g/m^3$. The model assumes a 70% NO_X to NO_2 conversion for the long term and 35% for the short term assessment in line with Environment Agency guidance on the use of air dispersion modelling.

The above tables show that the peak long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded. The peak short term PC is marginally above the level that would screen out as insignificant (>10% of the ES). However it is not expected to result in the ES being exceeded.

(ii) Particulate matter PM_{10} and $PM_{2.5}$

The impact on air quality from particulate emissions has been assessed against the ES for PM_{10} (particles of 10 microns and smaller) and $PM_{2.5}$ (particles of 2.5 microns and smaller). For PM_{10}, the ES are a long term annual average of 40 $\mu g/m^3$ and a short term daily average of 50 $\mu g/m^3$. For $PM_{2.5}$ the ES of 25 $\mu g/m^3$ as a long-term annual average to be achieved by 2010 as a Target Value and by 2015 as a Limit Value has been used.

The Applicant's predicted impact of the Installation against these ESs is shown in the tables above. The assessment assumes that **all** particulate emissions are present as PM_{10} for the PM_{10} assessment and that **all** particulate emissions are present as $PM_{2.5}$ for the $PM_{2.5}$ assessment.

The above assessment is considered to represent a worst case assessment in that: -

- It assumes that the plant emits particulates continuously at the IED Annex VI limit for total dust, whereas actual emissions from similar plant are normally lower.
- It assumes all particulates emitted are below either 10 microns (PM_{10}) or 2.5 microns ($PM_{2.5}$), when some are expected to be larger.

We have reviewed the Applicant's particulate matter impact assessment and are satisfied in the robustness of the Applicant's conclusions.

The above assessment shows that the predicted process contribution for emissions of PM_{10} is below 1% of the long term ES and below 10% of the short term ES and so can be screened out as insignificant. Therefore we consider the Applicant's proposals for preventing and minimising the emissions of particulates to be BAT for the Installation.

The above assessment also shows that the predicted process contribution for emissions of $PM_{2.5}$ is also below 1% of the ES. Therefore the Environment

Agency concludes that particulate emissions from the installation, including emissions of PM_{10} or $PM_{2.5}$, will not give rise to significant pollution.

(iii) Acid gases, SO_2, HCl and HF

From the tables above, emissions of HCl and HF can be screened out as insignificant in that the process contribution is <10% of the short term ES. There is no long term ES for HCl. HF has 2 assessment criteria – a 1-hr ES and a monthly EAL – the process contribution is <1% of the monthly EAL and so the emission screens out as insignificant if the monthly ES is interpreted as representing a long term ES.

There is no long term EAL for SO_2 for the protection of human health. Protection of ecological receptors from SO_2 for which there is a long term ES is considered in section 5.4.

Whilst SO_2 emissions cannot be screened out as insignificant, the Applicant's modelling shows that the installation is unlikely to result in a breach of the ES. The Applicant is required to prevent, minimise and control SO_2 emissions using BAT, this is considered further in Section 6. We are satisfied that SO_2 emissions will not result in significant pollution.

(iv) Emissions to Air of CO, VOC , PAHs, PCBs, Dioxins and NH_3

The above tables show that for CO the peak short term PC is less than 10% of the ES and so can be screened out as insignificant. Therefore we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

The above tables show that for TOC emissions, the peak long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded.

The consultant assumed that all TOC emissions are benzene but have omitted the assessment of 1,3-butadiene Environmental Assessment Level (EAL). We have included this in our checks.

The Applicant has used the ES for benzene for their assessment of the impact of VOC. This is based on benzene having one of the lowest ES of organic species likely to be present in VOC (other than PAH, PCBs, dioxins and furans).

The above tables show that for PCB emissions, the peak long term PC is less than 1% of the ES and the peak short term PC is less than 10% of the ES for PCBs and so can be screened out as insignificant. Therefore we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation. The above tables show that for PAH emissions, the peak long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded.

The Applicant has also used the ES for benzo[a]pyrene (BaP) for their assessment of the impact of PAH. We agree that the use of the BaP ES is sufficiently precautionary.

There is no ES for dioxins and furans as the principal exposure route for these substances is by ingestion and the risk to human health is through the accumulation of these substances in the body over an extended period of time. This issue is considered in more detail in section 5.3

The ammonia emission is based on a release concentration of 5.7 mg/m^3. We are satisfied that this level of emission is consistent with the operation of a well controlled SCR NO_x abatement system.

Whilst all emissions cannot be screened out as insignificant, the Applicant's modelling shows that the installation is unlikely to result in a breach of the EAL. The Applicant is required to prevent, minimise and control PAH and VOC emissions using BAT, this is considered further in Section 6. We are satisfied that PAH and VOC emissions will not result in significant pollution.

(V) Summary

For the above emissions to air, for those emissions that do not screen out, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the BAT to prevent and minimise emissions of these substances. This is reported in secti on 6 of this document. Therefore we consider the Applicant's proposals for preventing and minimising emissions to be BAT for the Installation. Dioxins and furans are considered further in section 5.3.2.

5.2.3 Assessment of Emission of Metals

The Applicant has assessed the impact of metal emissions to air, as previously described.

Annex VI of IED sets three limits for metal emissions:

- An emission limit value of 0.05 mg/m^3 for mercury and its compounds (formerly WID group 1 metals).
- An aggregate emission limit value of 0.05 mg/m^3 for cadmium and thallium and their compounds (formerly WID group 2 metals).

- An aggregate emission limit of 0.5 mg/m^3 for antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium and their compounds (formerly WID group 3 metals).

In addition the UK is a Party to the Heavy Metals Protocol within the framework of the UN-ECE Convention on long-range trans-boundary air pollution. Compliance with the IED Annex VI emission limits for metals along with the Application of BAT also ensures that these requirements are met.

In section 5.2.1 above, the following emissions of metals were screened out as insignificant:

- *Hg*
- *Sb*
- *Cu*
- *Cr (ii)(iii)*

Also in section 5.2.1, the following emissions of metals whilst not screened out as insignificant were assessed as being unlikely to give rise to significant pollution:

- *Mn*
- *Ti*
- *Pb*
- *Cd*
- *V*
- *Ni*
- Co

This left emissions of As and Cr (VI) requiring further assessment. For all other metals, the Applicant has concluded that exceedances of the EAL for all metals are not likely to occur.

Where Annex VI of the IED sets an aggregate limit, the Applicant's assessment assumes that each metal is emitted individually at the relevant aggregate emission limit value. This is a something which can never actually occur in practice as it would inevitably result in a breach of the said limit, and so represents a very much worst case scenario.

For Metal As the Applicant Used (non-aggregated) 11% of the maximum IED limits (1/9th of the ELV). For Cr (IV) the Applicant Used representative emissions data from other municipal waste incinerators using our guidance note Please refer to "Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – version 4".

Based on the above, the following emissions of metals were screened out as insignificant:

- Cr(Iv)
- As

The 2009 report of the Expert Panel on Air Quality Standards (EPAQS) – "Guidelines for Metal and Metalloids in Ambient Air for the Protection of Human Health", sets non statutory ambient air quality guidelines for Arsenic, Nickel and Chromium (VI). These guidelines have been incorporated as ESs in our guidance 'Air emissions risk assessment for your environmental permit'

Chromium (VI) is not specifically referenced in Annex VI of IED, which includes only total Chromium as one of the nine Group 3 metals, the impact of which has been assessed above. The EPAQS guidelines refer only to that portion of the metal emissions contained within PM_{10} in ambient air. The guideline for Chromium (VI) is 0.2 ng/m^3.

- Measurement of Chromium (VI) at the levels anticipated at the stack emission points is expected to be difficult, with the likely levels being below the level of detection by the most advanced methods. We have considered the concentration of total chromium and chromium (VI) in the APC residues collected upstream of the emission point for existing Municipal Waste incinerators and have assumed these to be similar to the particulate matter released from the emission point. This data shows that the mean Cr(VI) emission concentration (based on the bag dust ratio) is $3.5 * 10^{-5}$ mg/m^3 (max $1.3 * 10^{-4}$).

There is little data available on the background levels of Cr(VI). Taking a precautionary approach. we have assumed that the background level already exceeds the ES.

The Applicant has used the above data to model the predicted Cr(VI) impact. The Maximum off- site PC is predicted as 0.61% of the EAL.

This assessment shows that emissions of Chromium (VI) screen out as insignificant. We agree with the Applicant's conclusions. The installation has been assessed as meeting BAT for control of metal emissions to air. See section 6 of this document.

5.2.4 Consideration of Local Factors

(i) Impact on Air Quality Management Areas (AQMAs)

No Air Quality Management Areas (AQMAs) have been declared within an area likely to be affected by emissions from the incinerator.

5.3 Human health risk assessment

5.3.1 Our role in preventing harm to human health

The Environment Agency has a statutory role to protect the environment and human health from all processes and activities it regulates. We assessed the effects on human health for this application in the following ways:

i) Applying Statutory Controls

The plant will be regulated under EPR. These regulations include the requirements of relevant EU Directives, notably, the industrial emissions directive (IED), the waste framework directive (WFD), and ambient air directive (AAD).

The main conditions in an EfW permit are based on the requirements of the IED. Specific conditions have been introduced to specifically ensure compliance with the requirements of Chapter IV. The aim of the IED is to prevent or, where that is not practicable, to reduce emissions to air, water and land and prevent the generation of waste, in order to achieve a high level of protection of the environment taken as a whole. IED achieves this aim by setting operational conditions, technical requirements and emission limit values to meet the requirements set out in Articles 11 and 18 of the IED. These requirements include the application of BAT, which may in some circumstances dictate tighter emission limits and controls than those set out in Chapter IV of IED on waste incineration and co-incineration plants. The assessment of BAT for this installation is detailed in section 6 of this document.

ii) Environmental Impact Assessment

Industrial activities can give rise to odour, noise and vibration, accidents, fugitive emissions to air and water, releases to air (including the impact on Photochemical Ozone Creation Potential (POCP)), discharges to ground or groundwater, global warming potential and generation of waste. For an installation of this kind, the principal environmental effects are through emissions to air, although we also consider all of the other impacts listed. Section 5.1 and 5.2 above explain how we have approached the critical issue of assessing the likely impact of the emissions to air from the Installation on human health and the environment and any measures we are requiring to ensure a high level of protection.

iii) Expert Scientific Opinion

We take account of the views of national and international expert bodies. The gathering of evidence is a continuing process. Although gathering evidence is not our role we keep the available evidence under review. The following is a summary of some of the publications which we have considered (in no particular order).

An independent review of evidence on the health effects of municipal waste incinerators was published by **DEFRA** in 2004. It concluded that there was no convincing link between the emissions from MSW incinerators and adverse effects on public health in terms of cancer, respiratory disease or birth defects. On air quality effects, the report concluded "Waste incinerators contribute to local air pollution. This contribution, however, is usually a small proportion of existing background levels which is not detectable through environmental monitoring (for example, by comparing upwind and downwind levels of airborne pollutants or substances deposited to land). In some cases, waste incinerator facilities may make a more detectable contribution to air pollution. Because current MSW incinerators are located predominantly in urban areas, effects on air quality are likely to be so small as to be undetectable in practice."

The European Integrated Pollution Prevention and Control Bureau stated in the Reference Document on the Best Available Techniques for Waste Incineration August 2006 "European health impact assessment studies, on the basis of current evidence and modern emission performance, suggest that the local impacts of incinerator emissions to air are either negligible or not detectable."

HPA (now PHE) in 2009 states that "The Health Protection Agency has reviewed research undertaken to examine the suggested links between emissions from municipal waste incinerators and effects on health. While it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable".

In 2012 the UK Small Area Health Statistics Unit (SAHSU) at Imperial College was commissioned by Public Heath England (PHE) to carry out a study to extend the evidence base and to provide further information to the public about any potential reproductive and infant health risks from municipal waste incineration (MWIs).

A number of papers have been published by SAHSU since 2012 which show no effect on birth outcomes. One paper in the study looked at exposure to emissions from MWIs in the UK and concluded that exposure was low. Subsequent papers found no increased risk of a range of birth outcomes (including stillbirth and infant mortality) in relation to exposure to PM10 emissions and proximity to MWIs, and no association with MWIs opening on changes in risks of infant mortality or sex ratio.

The final part of the study, published on 21/06/19, found no evidence of increased risk of congenital anomalies from exposure to MWI chimney emissions, but a small potential increase in risk of congenital anomalies for children born within ten kilometres of MWIs. The paper does not demonstrate a causal effect, and it acknowledges that the observed results may well be down to not fully adjusting the study for factors such as other sources of pollution around MWIs or deprivation.

PHE have stated that ‘While the conclusions of the study state that a causal effect cannot be excluded, the study does not demonstrate a causal association and makes clear that the results may well reflect incomplete control for confounding i.e. insufficiently accounting for other factors that can cause congenital anomalies, including other sources of local pollution. This possible explanation is supported by the fact no increased risk of congenital anomalies was observed as a result of exposure to emissions from an incinerator.’

Following this study, PHE have further stated that ‘PHE’s position remains that modern, well run and regulated municipal waste incinerators are not a significant risk to public health, and as such our advice to you [i.e. the Environment Agency] on incinerators is unchanged.’

The **Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (CoC) issued** a statement in 2000 which said that “any potential risk of cancer due to residency (for periods in excess of 10 years) near to municipal solid waste incinerators was exceedingly low and probably not measurable by the most modern epidemiological techniques.” In 2009, CoC considered six further relevant epidemiological papers that had been published since the 2000 statement, and concluded that “there is no need to change the advice given in the previous statement in 2000 but that the situation should be kept under review”.

Republic of Ireland Health Research Board report stated that “It is hard to separate the influences of other sources of pollutants, and other causes of cancer and, as a result, the evidence for a link between cancer and proximity to an incinerator is not conclusive".

The **Food Safety Authority of Ireland (FSAI) (2003)** investigated possible implications on health associated with food contamination from waste incineration and concluded: "In relation to the possible impact of introduction of waste incineration in Ireland, as part of a national waste management strategy, on this currently largely satisfactory situation, the FSAI considers that such incineration facilities, if properly managed, will not contribute to dioxin levels in the food supply to any significant extent. The risks to health and sustainable development presented by the continued dependency on landfill as a method of waste disposal far outweigh any possible effects on food safety and quality."

Health Protection Scotland (2009) considered scientific studies on health effects associated with the incineration of waste particularly those published after the Defra review discussed earlier. The main conclusions of this report were: "(a) For waste incineration as a whole topic, the body of evidence for an association with (non-occupational) adverse health effects is both inconsistent and inconclusive. However, more recent work suggests, more strongly, that there may have been an association between emissions (particularly dioxins) in the past from industrial, clinical and municipal waste incinerators and some forms of cancer, before more stringent regulatory requirements were implemented. (b) For individual waste streams, the evidence for an association with (non-occupational) adverse health effects is inconclusive. (c) The magnitude of any past health effects on residential populations living near incinerators that did occur is likely to have been small. (d) Levels of airborne emissions from individual incinerators should be lower now than in the past, due to stricter legislative controls and improved technology. Hence, any risk to the health of a local population living near an incinerator, associated with its emissions, should also now be lower."

The **US National Research Council Committee on Health Effects of Waste Incineration (NRC) (NRC 2000)** reviewed evidence as part of a wide ranging report. The Committee view of the published evidence was summarised in a key conclusion: "Few epidemiological studies have attempted to assess whether adverse health effects have actually occurred near individual incinerators, and most of them have been unable to detect any effects. The studies of which the committee is aware that did report finding health effects had shortcomings and failed to provide convincing evidence. That result is not surprising given the small populations typically available for study and the fact that such effects, if any, might occur only infrequently or take many years to appear. Also, factors such as emissions from other pollution sources and variations in human activity patterns often decrease the likelihood of determining a relationship between small contributions of pollutants from incinerators and observed health effects. Lack of evidence of such relationships might mean that adverse health effects did not occur, but it could mean that such relationships might not be detectable using available methods and sources."

The **British Society for Ecological Medicine (BSEM) published a report in 2005** on the health effects associated with incineration and concluded that "Large studies have shown higher rates of adult and childhood cancer and also birth defects around municipal waste incinerators: the results are consistent with the associations being causal. A number of smaller epidemiological studies support this interpretation and suggest that the range of illnesses produced by incinerators may be much wider. Incinerator emissions are a major source of fine particulates, of toxic metals and of more than 200 organic chemicals, including known carcinogens, mutagens, and hormone disrupters. Emissions also contain other unidentified compounds whose potential for harm is as yet unknown, as was once the case with dioxins. Abatement equipment in modern incinerators merely transfers the toxic load, notably that of dioxins and heavy metals, from airborne emissions to the fly ash. This fly ash is light, readily windborne and mostly of low particle size. It represents a considerable and poorly understood health hazard."

The BSEM report was reviewed by the HPA and they concluded that "Having considered the BSEM report the HPA maintains its position that contemporary and effectively managed and regulated waste incineration processes contribute little to the concentrations of monitored pollutants in ambient air and that the emissions from such plants have little effect on health." The BSEM report was also commented on by the consultants who produced the Defra 2004 report referred to above. They said that "It fails to consider the significance of incineration as a source of the substances of concern. It does not consider the possible significance of the dose of pollutants that could result from incinerators. It does not fairly consider the adverse effects that could be associated with alternatives to incineration. It relies on inaccurate and outdated material. In view of these shortcomings, the report's conclusions with regard to the health effects of incineration are not reliable."

A **Greenpeace** review on incineration and human health concluded that a broad range of health effects have been associated with living near to incinerators as well as with working at these installations. Such effects include cancer (among both children and adults), adverse impacts on the respiratory system, heart disease, immune system effects, increased allergies and congenital abnormalities. Some studies, particularly those on cancer, relate to old rather than modern incinerators. However, modern incinerators operating in the last few years have also been associated with adverse health effects."

The Health Protection Scotland report referred to above says that "the authors of the Greenpeace review do not explain the basis for their conclusion that there is an association between incineration and adverse effects in terms of criteria used to assess the strength of evidence. The weighting factors used to derive the assessment are not detailed. The objectivity of the conclusion cannot therefore be easily tested."

From this published body of scientific opinion, we take the view stated by the HPA that "While it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable". We therefore ensure that permits contain conditions which require the installation to be well-run and regulate the installation to ensure compliance with such permit conditions.

iv) Health Risk Models

Comparing the results of air dispersion modelling as part of the Environmental Impact assessment against European and national air quality standards effectively makes a health risk assessment for those pollutants for which a standard has been derived. These air quality standards have been developed primarily in order to protect human health via known intake mechanisms, such as inhalation and ingestion. Some pollutants, such as dioxins, furans and dioxin like PCBs, have human health impacts at lower ingestion levels than lend themselves to setting an air quality standard to control against. For these pollutants, a different human health risk model is required which better reflects the level of dioxin intake.

Models are available to predict the dioxin, furan and dioxin like PCBs intake for comparison with the Tolerable Daily Intake (TDI) recommended by the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment, known as COT. These include the HHRAP model.

HHRAP has been developed by the US EPA to calculate the human body intake of a range of carcinogenic pollutants and to determine the mathematic quantitative risk in probabilistic terms. In the UK, in common with other European Countries, we consider a threshold dose below which the likelihood of an adverse effect is regarded as being very low or effectively zero.

The TDI is the amount of a substance that can be ingested daily over a lifetime without appreciable health risk. It is expressed in relation to bodyweight in order to allow for different body size, such as for children of different ages. In the UK, the COT has set a TDI for dioxins, furans and dioxin like PCB's of 2 picograms I-TEQ/Kg-body weight/day (N.B. a picogram is a million millionths (10-12) of a gram).

In addition to an assessment of risk from dioxins, furans and dioxin like PCB's, the HHRAP model enables a risk assessment from human intake of a range of heavy metals. In principle, the respective ES for these metals are protective of human health. It is not therefore necessary to model the human body intake.

COMEAP developed a methodology based on the results of time series epidemiological studies which allows calculation of the public health impact of exposure to the classical air pollutants (NO_2, SO_2 and particulates) in terms of the numbers of "deaths brought forward" and the "number of hospital admissions for respiratory disease brought forward or additional". COMEAP has issued a statement expressing some reservations about the applicability of applying its methodology to small affected areas. Those concerns generally relate to the fact that the exposure-response coefficients used in the

COMEAP report derive from studies of whole urban populations where the air pollution climate may differ from that around a new industrial installation. COMEAP identified a number of factors and assumptions that would contribute to the uncertainty of the estimates. These were summarised in the Defra review as below:

- Assumption that the spatial distribution of the air pollutants considered is the same in the area under study as in those areas, usually cities or large towns, in which the studies which generated the coefficients were undertaken.
- Assumption that the temporal pattern of pollutant concentrations in the area under study is similar to that in the areas in which the studies which generated the coefficients were undertaken (i.e. urban areas).
- It should be recognised that a difference in the pattern of socio-economic conditions between the areas to be studied and the reference areas could lead to inaccuracy in the predicted level of effects.
- In the same way, a difference in the pattern of personal exposures between the areas to be studied and the reference areas will affect the accuracy of the predictions of effects.

The use of the COMEAP methodology is not generally recommended for modelling the human health impacts of individual installations. However it may have limited applicability where emissions of NO_x, SO_2 and particulates cannot be screened out as insignificant in the Environmental Impact assessment, there are high ambient background levels of these pollutants and we are advised that its use was appropriate by our public health consultees.

Our recommended approach is therefore the use of the methodology set out in our guidance for comparison for most pollutants (including metals) and dioxin intake model using the HHRAP model as described above for dioxins, furans and dioxin like PCBs. Where an alternative approach is adopted for dioxins, we check the predictions ourselves.

v) Consultations

As part of our normal procedures for the determination of a permit application, we consult with Local Authorities, Local Authority Directors of Public Health, FSA and PHE. We also consult the local communities who may raise health related issues. All issues raised by these consultations are considered in determining the application as described in Annex 4 of this document.

5.3.2 Assessment of Intake of Dioxins, Furans and Dioxin like PCBs

For dioxins, furans and dioxin like PCBs, the principal exposure route is through ingestion, usually through the food chain, and the main risk to health is through accumulation in the body over a period of time.

The human health risk assessment calculates the dose of dioxins and furans that would be received by local receptors if their food and water were sourced from the locality where the deposition of dioxins, furans and dioxin like PCBs is predicted to be the highest. This is then assessed against the Tolerable Daily Intake (TDI) levels established by the COT of 2 picograms I-TEQ / Kg bodyweight/ day.

The results of the Applicant's assessment of dioxin intake are detailed in the table below. The results showed that the predicted daily intake of dioxins, furans and dioxin like PCBs at all receptors, resulting from emissions from the proposed facility, were significantly below the recommended TDI levels.

Receptor Name	Adult	Child
Farmer Northeast 1	0.033	0.048
Farmer Northeast 2	0.034	0.049
Farmer Northeast 3	**0.034**	**0.050**
Farmer Southeast 1	0.013	0.018
Farmer Southeast 2	0.013	0.019
Farmer Southeast 3	0.0087	0.013
Farmer West 1	0.0087	0.013
Farmer West 2	0.0082	0.012
Farmer West 3	0.0079	0.011
Resident Atherstone 1	0.000039	0.000084
Resident Atherstone 2	0.000037	0.000081
Resident Baddesley Ensor 1	0.000051	0.00011
Resident Baddesley Ensor 2	0.000051	0.00011
Resident Baxterley 1	**0.00014**	**0.00030**
Resident Baxterley 2	0.00014	0.00030
Resident Baxterley 3	0.00014	0.00030
Resident Baxterley 4	0.00013	0.00029
Resident Baxterley Common 1	0.00011	0.00023
Resident Baxterley Common 2	0.000085	0.00018
Resident Grendon 1	0.00013	0.00028
Resident Grendon 2	0.000080	0.00017
Resident Grendon Common	0.000074	0.00016
WHO TDI	*1 to 4 pg I-TEQ kg-BW^{-1} d^{-1}*	
Committee on Toxicity (COT) TDI	*2 pg I-TEQ kg-BW^{-1} d^{-1}*	

Calculated maximum daily intake of dioxins by local receptors resulting from the operation of the proposed facility (I-TEQ/ kg-BW/day)

The FSA has reported that dietary studies have shown that estimated total dietary intakes of dioxins and dioxin-like PCBs from all sources by all age groups fell by around 50% between 1997 and 2001, and are expected to continue to fall. A report in 2012 showed that Dioxin and PCB levels in food have fallen slightly since 2001. In 2001, the average daily intake by adults in the UK from diet was 0.9 pg WHO-TEQ/kg bodyweight. The additional daily intake predicted by the modelling as shown in the table above is substantially below this figure.

In 2010, FSA studied the levels of chlorinated, brominated and mixed (chlorinated-brominated) dioxins and dioxin-like PCBs in fish, shellfish, meat and eggs consumed in UK. It asked COT to consider the results and to advise on whether the measured levels of these PXDDs, PXDFs and PXBs indicated a health concern ('X' means a halogen). COT issued a statement in December 2010 and concluded that " The major contribution to the total dioxin toxic activity in the foods measured came from chlorinated compounds. Brominated compounds made a much smaller contribution, and mixed halogenated compounds contributed even less (1% or less of TDI). Measured levels of PXDDs, PXDFs and dioxin-like PXBs do not indicate a health concern". COT recognised the lack of quantified TEFs for these compounds but said that "even if the TEFs for PXDDs, PXDFs and dioxin-like PXBs were up to four fold higher than assumed, their contribution to the total TEQ in the diet would still be small. Thus, further research on PXDDs, PXDFs and dioxin-like PXBs is not considered a priority."

In the light of this statement, we assess the impact of chlorinated compounds as representing the impact of all chlorinated, brominated and mixed dioxins / furans and dioxin like PCBs.

5.3.3 Particulates smaller than 2.5 microns

The Operator will be required to monitor particulate emissions using the method set out in Table S3.1 of Schedule 3 of the Permit. This method requires that the filter efficiency must be at least 99.5 % on a test aerosol with a mean particle diameter of 0.3 μm, at the maximum flow rate anticipated. The filter efficiency for larger particles will be at least as high as this. This means that particulate monitoring data effectively captures everything above 0.3 μm and much of what is smaller. It is not expected that particles smaller than 0.3 μm will contribute significantly to the mass release rate / concentration of particulates because of their very small mass, even if present. This means that emissions monitoring data can be relied upon to measure the true mass emission rate of particulates.

Nano-particles are considered to refer to those particulates less than 0.1 μm in diameter ($PM_{0.1}$). Questions are often raised about the effect of nano-particles on human health, in particular on children's health, because of their high surface to volume ratio, making them more reactive, and their very small size, giving them the potential to penetrate cell walls of living organisms. The small size also means there will be a larger number of small particles for a given mass concentration. However the HPA statement (referenced below) says that due to the small effects of incinerators on local concentration of particles, it is highly unlikely that there will be detectable effects of any particular incinerator on local infant mortality.

The HPA (now PHE) addresses the issue of the health effects of particulates in their September 2009 statement 'The Impact on Health of Emissions to Air from Municipal Incinerators'. It refers to the coefficients linking PM_{10} and $PM_{2.5}$ with effects on health derived by COMEAP and goes on to say that if these coefficients are applied to small increases in concentrations produced, locally, by incinerators; the estimated effects on health are likely to be small. PHE note that the coefficients that allow the use of number concentrations in impact calculations have not yet been defined because the national experts have not judged that the evidence is sufficient to do so. This is an area being kept under review by COMEAP.

In December 2010, COMEAP published a report on The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom. It says that “a policy which aims to reduce the annual average concentration of $PM_{2.5}$ by 1 $\mu g/m^3$ would result in an increase in life expectancy of 20 days for people born in 2008.” However, “The Committee stresses the need for careful interpretation of these metrics to avoid incorrect inferences being drawn – they are valid representations of population aggregate or average effects, but they can be misleading when interpreted as reflecting the experience of individuals.”

PHE also point out that in 2007 incinerators contributed 0.02% to ambient ground level PM_{10} levels compared with 18% for road traffic and 22% for industry in general. PHE noted that in a sample collected in a day at a typical urban area the proportion of $PM_{0.1}$ is around 5-10% of PM_{10}. It goes on to say that PM_{10} includes and exceeds $PM_{2.5}$ which in turn includes and exceeds $PM_{0.1}$.

This is consistent with the assessment of this application which shows emissions of PM_{10} to air to be insignificant.

We take the view, based on the foregoing evidence, that techniques which control the release of particulates to levels which will not cause harm to human health will also control the release of fine particulate matter to a level which will not cause harm to human health.

5.3.4 <u>Assessment of Health Effects from the Installation</u>

We have assessed the health effects from the operation of this installation in relation to the above (sections 5.3.1 to 5.3.3). We have applied the relevant requirements of the national and European legislation in imposing the permit conditions. We are satisfied that compliance with these conditions will ensure protection of the environment and human health.

Taking into account all of the expert opinion available, we agree with the conclusion reached by PHE that “While it is not possible to rule out adverse health effects from modern, well regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable.”

In carrying out air dispersion modelling as part of the Environmental Impact assessment and comparing the predicted environmental concentrations with European and national air quality standards, the Applicant has effectively made a health risk assessment for many pollutants. These air quality standards have been developed primarily in order to protect human health.

The Applicant's assessment of the impact from PM10, HCL, HF, CO, NH3, PCB's, Metals: Hg, Sb, Cu, Cr (II)(III), CR(IV) and As have all indicated that the Installation emissions screen out as insignificant; where the impact of emissions of NO2, PM2.5, S02, TOC, PAH, Metals: Co ,Pb, Mn, Ni have not been screened out as insignificant, the assessment still shows that the predicted environmental concentrations are well within air quality standards or environmental action levels.

The Environment Agency has reviewed the methodology employed by the Applicant to carry out the health impact assessment and concluded that the applicant's conclusion for air pollution and health risk at sensitive human receptors can be used for permit determination.

Based on:

- Predicted Environmental Concentrations at human receptors are likely to remain below the Environmental Standards.

- Predicted risks as a consequence of dioxins and furans emissions are well within limits for the protection of human health.

Overall, taking into account the conservative nature of the impact assessment (i.e. that it is based upon an individual exposed for a life-time to the effects of the highest predicted relevant airborne concentrations and consuming mostly locally grown food), it was concluded that the operation of the proposed facility will not pose a significant carcinogenic or non-carcinogenic risk to human health.

Public Health England and the Local Authority Director of Public Health were consulted on the Application and concluded that they had no significant concerns regarding the risk to the health of humans from the installation. Details of the responses provided by Public Health England, to the consultation on this Application can be found in Annex 2.

The Environment Agency is therefore satisfied that the Applicant's conclusions presented above are soundly based and we conclude that the potential emissions of pollutants including dioxins, furans and metals from the proposed facility are unlikely to have an impact upon human health.

5.4 Impact on Habitats sites, SSSIs, non-statutory conservation sites etc.

5.4.1 Sites Considered

The following Habitats (i.e. Special Areas of Conservation, Special Protection Areas and Ramsar) sites are located within 10Km of the Installation:

- Ensor's Pool (SAC) ~ 9472m Away

No further assessment is required.

The following Sites of Special Scientific Interest are located within 2Km of the Installation:

- Bentley Park Wood (SSSI)

The following non-statutory local wildlife and conservation sites are located within 2Km of the Installation

- Lloyds Coppice
- Bentley Common 905m Radial
- Wards Hill 1938m Radial
- Mineral Railway Baddesley 496m Radial
- Ensor-Birch Coppice
- Coopers Grove 1853m Radial
- Baddesley Spinney 1959m Radial
- Baddesley Colliery Slopes 434m Radial
- Baddesley Common 277m Radial
- Grendon Wood 1310m Radial
- Grendon Wood South 578m Radial
- Grendon Heath 887m Radial
- Merevale Park Grassland 1206m Radial
- Merevale Lake Woodlands 1577m Radial
- Atherstone Coal Wharf 1990m Radial
- Captains Wood 1682m Radial
- Drybrooks Wood 1539m Radial
- CAPTAINS WOOD 1681m Radial
- SQUARE WOOD 1923m Radial
- WHEATLEYS WOOD 1147m Radial
- BENTLEY PARK 1120m Radial
- DRYBROOKS WOOD 1538m Radial
- GALLOPS HILL WOOD 1179m Radial
- HOLLY THICKS 686m Radial
- GALLOPS HILL WOOD 1949m Radial
- BIG ROUGH 2100m Radial
- COOPERS GROVE 1852m Radial

- GRENDON WOOD 1310m Radial

No further assessment is required.

5.4.2 Habitats Assessment

The applicant has assessed the impact at Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar within 10km. They assessed against the critical levels for NO_X and SO_2 and against the site relevant critical loads provided by APIS. Background NO_X and SO_2 concentrations and acid and nutrient nitrogen deposition fluxes were also obtained from APIS.

The Applicant's Habitats assessment was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that there would be no likely significant effect on the interest feature(s) of the protected site please see section 7.3.

Ensor's Pool (SAC)

Pollutant	ES / EAL (µg/m³)	Back-ground (µg/m³)	Process Contribution (PC) (µg/m³)	PC as % of ES	Predicted Environmental Concentration (PEC) (µg/m³)	PEC as % ES
Direct Impacts[2]						
NO_x Annual	30	21.981	0.019	0.064	22.0	54.9
NO_x Daily Mean	75		0.30	0.40	26.2	34.9
SO_2	10 (1)	25.9	0.0080	0.080	0.38	1.9
Ammonia	1 (1)	2.49	0.00092	0.031	2.5	81.7
HF Weekly Mean	0.5	0.499	0.00035	0.070	0.5	2.5
HF Daily Mean	5	0.4975	0.0025	0.05	0.50	10.1
Deposition Impacts[2]						
N Deposition (kg N/ha/yr)	Clo not assigned	12.0	0.010	0.1	n/a	n/a
Acidification (Keq/ha/yr)	Clo not assigned	Maximum: 0.86|0.21 Minimum: 0.86|0.21 Average: 0.86|0.21	0.0074	0.66[3]	n/a	n/a

(1) The lichen and bryophyte sensitivity standards for ammonia and sulphur dioxide have been assigned for this assessment as the presence of these features has been recorded in the site Management Plan for at least one of the sections of the site.

(2) Direct impact units are μg/m³ and deposition impact units are kg N/ha/yr or Keq/ha/yr.

(3) Of the existing background deposition rate as no Clo assigned for site/features

Ensor's Pool SAC is approximately 9.5km South West of the site and just within the screening distance of 10km for emissions to air set for plans and permissions for protected conservation areas (SAC/SPA/Ramsar). Due to the distance from the proposed operation to the designated site all atmospheric impacts are found to be insignificant.

5.4.3 SSSI Assessment

The applicant has assessed the impact at Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar within 2km. They assessed against the critical levels for NO_X and SO_2 and against the site relevant critical loads provided by APIS. Background NOX and SO2 concentrations and acid and nutrient nitrogen deposition fluxes were also obtained from APIS.

The Applicant's assessment of SSSIs was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services.

Bentley Park Wood (SSSI)

Pollutant	ES (μg/m³)	Back-ground (μg/m³)	Process Contribution (PC) (μg/m³)	PC as % of ES	Predicted Environmental Concentration (PEC) (μg/m³)	PEC as % ES
Direct Impacts[2]						
NO_x Annual	30	18.12	0.18	0.59	18.3	45.7
NO_x Daily Mean	75	21.4	3.4	4.6	24.8	33.1
SO2	10 (1)	0.387	0.073	0.73	0.46	2.3
Ammonia	1 (1)	2.491	0.0084	0.84	2.5	251
HF Weekly Mean	0.5	0.496	0.0039	0.78	0.5	2.5
HF Daily Mean	5	0.501	0.029	0.57	0.53	10.6
Deposition Impacts[2]						
N Deposition (kg N/ha/yr)	*10-20*	36.68	0.12	1.2	36.8	368
Acidification	Max CLF	Acid	0.04	0.9		65.6

Pollutant	ES (µg/m³)	Back-ground (µg/m³)	Process Contribution (PC) (µg/m³)	PC as % of ES	Predicted Environmental Concentration (PEC) (µg/m³)	PEC as % ES
(Keq/ha/yr)	CLminN:.357 CLmaxN: 4.618 CLmaxS: 4.476	Deposition Nitrogen | Sulphur (keq/ha/yr): Maximum: 2.72|0.27 Minimum: 2.41|0.27				
	Min CLF CLminN: .142 CLmaxN: 1.363 CLmaxS: 1.006			2.9		199

(1) The lichen and bryophyte sensitivity standards for ammonia and sulphur dioxide have been assigned for this assessment as the presence of these features has been recorded in the site Management Plan for at least one of the sections of the site.

(2) Direct impact units are µg/m³ and deposition impact units are kg N/ha/yr or Keq/ha/yr.

The maximum predicted nutrient nitrogen deposition rate at Bentley Park Wood SSSI is 1.2% of the critical load which is slightly in excess of the 1% insignificance level, however APIS indicates that the existing background nutrient nitrogen deposition rate is already significantly in excess of the critical load and therefore the PC is considered not insignificant. The modelling data shows that the predicted impact at the SSSI is below 1% of the critical load range over the entire habitat site with the exception of a very small fraction near the north-western extremity of the designated area.

The maximum predicted acidification rate at Bentley Park Wood SSSI is <1% of the maximum CLo range and is therefore considered insignificant. The maximum PC is 2.9% of the minimum CLo range and is therefore potentially significant since the background is already exceeded and combined N and S acidification (2.67) alone is 196% of the minimum CLo.

The dispersion modelling data shows that the acid deposition process impacts exceed 1% of the minimum CLo over approximately 50% of the designated area. However, the area in which the process impact is over 2% of the CLo is confined to a small fraction in the north-western extremity of the designated area.

The Environment Agency (EA) sent Formal Notice to Natural England (NE) for consultation on 13th June 2019 under the requirements of Section 28I of the Wildlife and Countryside Act 1981 as amended by the Countryside and Rights of Way Act (CRoW) 2000. As is our duty in relation to granting any consent, licence or permit for activities likely to damage Sites of Special Scientific Interest (SSSI).

Natural England responded to the consultation on the 02nd August 2019 and advised that the operation could go ahead. Please also see section 6.1.2 of this document.

5.4.4 Assessment of other conservation sites

Conservation sites are protected in law by legislation. The Habitats Directive provides the highest level of protection for SACs and SPAs, domestic legislation provides a lower but important level of protection for SSSIs. Finally the Environment Act provides more generalised protection for flora and fauna rather than for specifically named conservation designations. It is under the Environment Act that we assess other sites (such as local wildlife sites) which prevents us from permitting something that will result in significant pollution; and which offers levels of protection proportionate with other European and national legislation. However, it should not be assumed that because levels of protection are less stringent for these other sites that they are not of considerable importance. Local sites link and support EU and national nature conservation sites together and hence help to maintain the UK's biodiversity resilience.

For SACs SPAs, Ramsar's and SSSIs we consider the contribution PC and the background levels in making an assessment of impact. In assessing these other sites under the Environment Act we look at the impact from the Installation alone in order to determine whether it would cause significant pollution. This is a proportionate approach, in line with the levels of protection offered by the conservation legislation to protect these other sites (which are generally more numerous than Natura 2000 or SSSIs) whilst ensuring that we do not restrict development.

Critical levels and loads are set to protect the most vulnerable habitat types. Thresholds change in accordance with the levels of protection afforded by the legislation. Therefore the thresholds for SAC SPA and SSSI features are more stringent than those for other nature conservation sites.

Therefore we would generally conclude that the Installation is not causing significant pollution at these other sites if the PC is less than the relevant critical level or critical load, provided that the Applicant is using BAT to control emissions.

Habitat Site	Annual NOx	Daily NOx	Annual SO_2	Weekly HF (a)	Daily HF	Annual NH_3
Critical Level	**30**	**75**	**10**	**0.5**	**5**	**1 (b)**
Baxterley Common (north of Site)	2.0%	21.2%	1.8%	2.3%	5.3%	2.0%
Baxterley Common (east of Site)	2.0%	26.2%	1.8%	1.9%	12.5%	1.2%
Baxterley Common (south of Site)	0.4%	4.8%	0.3%	0.3%	1.2%	0.3%
Baxterley Common (west of Site)	0.7%	7.2%	0.6%	0.7%	1.8%	0.3%
Baddesley Colliery Slopes Extension	0.9%	9.7%	0.8%	1.2%	2.4%	0.8%
Mineral Railway Baddesley Ensor Birch Coppice	0.9%	7.3%	0.8%	0.8%	1.8%	0.9%
Grendon Wood South	1.0%	6.4%	0.8%	0.7%	1.7%	0.9%
Grendon Heath	1.5%	9.6%	1.3%	1.1%	2.4%	1.4%
Grendon Wood	0.7%	6.0%	0.6%	0.6%	1.5%	0.7%
Baddesley Colliery Slopes	0.9%	8.4%	0.8%	0.9%	2.2%	0.8%
Coopers Grove	0.2%	3.4%	0.2%	0.2%	0.9%	0.2%
Baddesley Common	1.0%	7.4%	0.8%	1.0%	1.8%	0.9%
Drybrooks Wood	0.4%	4.1%	0.4%	0.5%	1.0%	0.4%
Captains Wood	0.5%	5.9%	0.4%	0.6%	1.5%	0.5%
Lloyds Coppice	0.3%	3.4%	0.3%	0.4%	0.8%	0.3%
Bentley Common	1.4%	11.8%	1.3%	1.3%	3.0%	1.4%
Merevale Park Grassland	0.7%	7.5%	0.6%	0.5%	1.9%	0.7%
Merevale Lake Woodlands	0.6%	5.7%	0.5%	0.4%	1.4%	0.6%
Holly Thicks	1.1%	7.4%	1.0%	0.8%	1.9%	1.1%
Wheatley's Wood	0.7%	5.5%	0.6%	0.8%	1.4%	0.7%
Square Wood	0.4%	4.1%	0.3%	0.4%	1.0%	0.3%
Gallops Hill	0.6%	5.3%	0.5%	0.4%	1.4%	0.6%

(a) It is not possible to predict weekly concentrations using the dispersion model, therefore the monthly mean concentrations have been compared with the CL.

(b) Presence of lichens assumed as a worst-case.

The tables above show that for all non-statutory sites:

- the short-term PC is less than 100% of the short-term environmental standard
- the long-term PC is less than 100% of the long-term environmental standard

We are therefore satisfied that the Installation will not cause significant pollution at the sites. The Applicant is required to prevent, minimise and control emissions using BAT, this is considered further in Section 6.

5.5 Impact of abnormal operations

Article 50(4)(c) of IED requires that waste incineration and co-incineration plants shall operate an automatic system to prevent waste feed whenever any of the continuous emission monitors show that an emission limit value (ELV) is exceeded due to disturbances or failures of the purification devices. Notwithstanding this, Article 46(6) allows for the continued incineration and co-incineration of waste under such conditions provided that this period does not (in any circumstances) exceed 4 hours uninterrupted continuous operation or the cumulative period of operation does not exceed 60 hours in a calendar year. This is a recognition that the emissions during transient states (e.g. start-up and shut-down) are higher than during steady-state operation, and the overall environmental impact of continued operation with a limited exceedence of an ELV may be less than that of a partial shut-down and re-start.

For incineration plant, IED sets backstop limits for particulates, CO and TOC which must continue to be met at all times. The CO and TOC limits are the same as for normal operation, and are intended to ensure that good combustion conditions are maintained. The backstop limit for particulates is 150 mg/m^3 (as a half hourly average) which is five times the limit in normal operation.

Article 45(1)(f) requires that the permit shall specify the maximum permissible period of any technically unavoidable stoppages, disturbances, or failures of the purification devices or the measurement devices, during which the concentrations in the discharges into the air may exceed the prescribed emission limit values. In this case we have decided to set the time limit at 4 hours, which is the maximum period prescribed by Article 46(6) of the IED.

These abnormal operations are limited to no more than a period of 4 hours continuous operation and no more than 60 hour aggregated operation in any calendar year. This is less than 1% of total operating hours and so abnormal operating conditions are not expected to have any significant long term environmental impact unless the background conditions were already close to, or exceeding, an ES. For the most part therefore consideration of abnormal operations is limited to consideration of its impact on short term ESs.

In making an assessment of abnormal operations the following worst case scenario has been assumed:

- Dioxin emissions (100 x normal)
- Mercury emissions are 100 times those of normal operation
- NO_x emissions of 686mg/m^3 (2.8x normal)
- Particulate emissions of 150 mg/m^3 (5 x normal)
- Metal emissions other than mercury are 5 times those of normal operation
- SO_2 emissions of 667mg/m^3 (3.3x normal)

- HCl emissions of 300mg/m^3 (5x normal)
- PCBs (100 x normal)

This is a worst case scenario in that these abnormal conditions include a number of different equipment failures not all of which will necessarily result in an adverse impact on the environment (e.g. a failure of a monitoring instrument does not necessarily mean that the incinerator or abatement plant is malfunctioning). This analysis assumes that any failure of any equipment results in all the negative impacts set out above occurring simultaneously.

The result on the Applicant's short-term environmental impact is summarised in the table below.

<u>Assessment of Emissions to Air (3)</u>

Pollutant	**EQS / EAL**		**Back-ground**	**Process Contribution (PC)**		**Predicted Environmental Concentration (PEC)**	
	µg/m^3		**µg/m^3**	**µg/m^3**	**% of EAL**	**µg/m^3**	**% of EAL**
NO_2	200	2	25.2	52.1	25.8	77.3	38.65
PM_{10}	50	3	17.7	2.1	4.2	19.8	39.6
SO_2	266	4	9.6	227	85.3	236.6	88.94
	350	5	7.2	134	38.3	141.2	40.34
HCl	750	6	0.48	85.3	11.4	85.78	11.43
HF	160	6	1	4.6	2.8	5.6	3.5
Hg	7.5	1	0.0024	0.089	1.2	0.0914	1.21
Sb	150	1	0	0.89	0.59	0.89	0.593
Cu	200	1	0.0056	0.89	0.44	0.8956	0.4478
Mn	150	1	0.0044	0.89	0.59	0.8944	0.596
PCBs	6	1	0.0008	0.14	2.33	0.1408	5.96
Cr (II)(III)	150	1	0.0012	0.18	0.12	0.1812	0.54

1 1-hr Maximum
2 99.79th %ile of 1-hour means
3 90.41st %ile of 24-hour means
4 99.9th ile of 15-min means
5 99.73rd %ile of 1-hour means
6 1-hour average

From the table above the emissions of the following substances can still be considered insignificant, in that the PC is still <10% of the short-term ES.

- HF, Hg, Sb, Cu, Mn, PCBs and Cr (II)(III)

Also from the table above emissions of the following emissions (which were not screened out as insignificant) have been assessed as being unlikely to give rise to significant pollution in that the predicted environmental concentration is less than 100% of short term ES.

- NO_2, PM_{10}, SO_2 and HCl

We are therefore satisfied that it is not necessary to further constrain the conditions and duration of the periods of abnormal operation beyond those permitted under Chapter IV of the IED.

We have not assessed the impact of abnormal operations against long term ESs for the reasons set out above. Except that if dioxin emissions were at 10 ng/m^3 for the maximum period of abnormal operation, this would result in an increase of approximately 70% in the TDI reported in section 5.3.3. In these circumstances the TDI would be 0.0578 pg(I-TEQ/ kg-BW/day) for a worst case Adult, which is 2.89% of the COT TDI. At this level, emissions of dioxins will still not pose a risk to human health.

5.6 Impact of Emission to Water

5.6.1 Background

The aqueous discharges from the EfW facility will comprise process water discharge to sewer and surface rainwaters which will discharge to surface water. This water will be clean rainwater, any surface waters from roadways, car-parking areas etc, where there is the potential for oil contamination, will pass via an interceptor.

The original Application outlined the basis for management of process wastewaters from the facility in Section 5.5 of the application document as follows:

"Process waste waters will be discharged to the Grendon STW in Warwickshire, where they will be treated and discharged to sewer under a trade effluent consent (TEC), when issued, from Severn Trent Water."

The Application stated that the process waste waters will comprise effluents from the hybrid cooler plant, boiler blow down and reverse osmosis treatment plant and these will all be included in the discharge to sewer.

Subsequent discussions between the Applicant and Severn Trent Water determined that there is insufficient capacity at the Grendon Sewage Treatment Works (STW) to accept the full discharge volumes from the EfW facility for treatment. On 17/5/19 the Applicant informed us that they proposed that the process wastewaters be split between the Grendon STW and the local brook as follows:

- process waste waters from the hybrid cooler plant will be discharged to the local unnamed brook along with clean surface waters;
- with the remainder of the process wastewaters, i.e. boiler blowdown, and reverse osmosis concentrate, discharged to sewer and ultimately into the Penmire Brook.

In order to be able to assess for various substances in both discharges to sewer and to the unnamed brook, concentrations from a similar facility have been assessed. The Operator confirmed that the similar facility was considered to be 'similar' based Fnox

on the following factors:

- The similar plant comprises an RO treatment from the mains supply, and a Jaeggi Hybrid Cooler plant.
- The similar facility comprises Hybrid Coolers from the same manufacturer as the Baddesley plant. The manufacturer is Jaeggi. The model of the coolers is exactly the same as for the proposed Baddesley plant. Analogous to the Baddesley site, the Hybrid Coolers at the similar facility are using treated water from the RO treatment plant.
- The similar facility comprises an RO treatment plant from the same manufacturer as the Baddesley plant. The manufacturer is Culligan. The model of the RO units is exactly the same as for the proposed Baddesley plant. The RO treatment plant prepares the water that is used in the Jaeggi Hybrid Coolers.
- The function of the RO units at the similar facility is analogous with the function at the Baddesley plant: The reverse osmosis units – like at the proposed Baddesley site - take in potable water and generate 2 outputs during normal operation:

- Permeate: This is the purified water, which is forwarded to the Jaeggi Hybrid Coolers; and
- Concentrate, also called reject: This contains the majority of the impurities that have been removed from the incoming potable water.

5.6.2 Screening Methodology used

In assessing the impact of these emissions the Applicant has followed the Environment Agency's "Surface water pollution risk assessment for your environmental permit" guidance and H1 assessment tool. This sets out a number of progressive screening tests.

Phase 1 is a coarse screening step that is used to screen out substances which are not liable to cause pollution. Substances that are not "screened out" in this phase will pass to Phase 2 modelling for more detailed assessment. The requirement for modelling in Phase 2 can therefore be limited to those substances which may potentially have a significant environmental impact.

The Environment Agency defines "liable to cause pollution" as either a risk of breaching EQS downstream of a discharge, or a deterioration in receiving water quality of more than 10 percent of EQS.

The screening consists of a number of tests. Each step introduces an additional level of complexity to assess substances until each one is eliminated or passed through for modelling.

The screening is precautionary, using raw data which typically represent a "worst case scenario". This will ensure that all substances that are potentially "liable to cause pollution" are carried forward to Phase 2 modelling

A summary of the phase 1 screening tests are as follows:

Test 1: Does the concentration of the substance in the discharge exceed 10 percent of the EQS?

If the concentration of the substance in the effluent exceeds 10 percent of the EQS, it is potentially significant and should be carried forward to Test 2. If it does not, the substance is insignificant and is "screened out" i.e. it is not liable to cause pollution and requires no control. No further screening tests therefore need to be carried out for this substance.

Test 2: Does the Process Contribution (PC) exceed 4 percent of the EQS?

Process Contribution (PC) is the concentration of a discharged substance in the receiving water after dilution.

If the PC exceeds 4 percent of the EQS, it is potentially significant and should be carried forward to Test 3. If it does not, the substance is insignificant and is screened out i.e. it is not liable to cause pollution and requires no control.

Test 3: Does the difference between upstream quality and the Predicted Environmental Concentration (PEC) exceed 10 percent of the EQS?

The PEC is the predicted concentration in the receiving water downstream of the discharge. The PEC is a combination of the Process Contribution (PC) and background concentration.

If the difference between upstream quality and the PEC is greater than 10 percent of the EQS, the substance is potentially significant and will need to be assessed in Phase 2 modelling. If it is not, proceed to Test 4.

Test 4: Does the PEC exceed the EQS in the receiving water downstream of the discharge?

This test assesses whether the discharge, when combined with the existing upstream water quality, will contribute to an EQS failure in the receiving water. It therefore takes account of in-combination effects with existing discharges. If the PEC exceeds the EQS, the substance is potentially significant and needs to be assessed in Phase 2 modelling. If it is not exceeded, the substance is insignificant and is screened out i.e. it is not liable to cause pollution and requires no control. Note: Substances can fail Tests 1 and 2 but, if they pass both Tests 3 and 4, they can be screened out i.e. they are not liable to cause pollution and are therefore insignificant and require no control.

As the H1 tool applies a chemical specific assessment approach some substances cannot be assessed using H1. These are discussed in the relevant sections below.

5.6.3 <u>Assessment of process water discharge to sewer</u>

The H1 tool has been used to assess the following parameters: boron, chloride, copper, fluoride, iron, manganese, sulphate and sodium bisulphite (as sulphite). The results are as follows:

Test 1: Does the concentration of the substance in the discharge exceed 10 percent of the EQS?
Boron, manganese and iron are released at <10% of their EQS and so screen out with this test.

Test 2: Does the Process Contribution (PC) exceed 4 percent of the EQS?

Chloride, copper, fluoride and sodium bisulphite (as sulphite) are screened out by Test 2 as the calculated PCs are <4% of the EQS

Tests 3 &4: Does the difference between upstream quality and the (PEC) exceed 10 percent of the EQS? Does the PEC exceed the EQS in the receiving water downstream of the discharge?
Sulphate passes both these tests and so also screens out.

Relevant parameters not assessed using H1 are as follows:

pH – the average pH discharge will be 8.34, which is within the standard pH range specified in H1 Annex D2 Assessment of sanitary and other pollutants within Surface Water Discharges. Severn Trent Water Limited have indicated that any required pH limitations will be specified within the Trade Effluent Discharge Consent.

Nitrates - there is no EQS for nitrates or nitrogen in fresh water to assess the concentration against. The Grendon STW does not have an emission limit for Nitrates, though it will treat and remove a significant proportion of Nitrates. As there is no EQS, this is not considered a pollutant of concern.

Phosphates (as phosphorus) – the permitted limit for phosphorus for discharge from the Grendon STW is 2 mg/l. The discharge from the Installation is far lower than this at just 0.04mg/l, so will not have an impact.

5.6.4 Assessment of process water discharge to un-named Brook

The H1 tool has been used to assess the following parameters: boron, chloride, copper, fluoride, iron, manganese, sulphate and sodium bisulphite (as sulphite). The results are as follows:

Test 1: Does the concentration of the substance in the discharge exceed 10 percent of the EQS?

Boron, chloride, fluoride, iron, manganese and sulphate in the treated process wastewaters are released at <10% of the EQS. Therefore, those pollutants are screened out by Test 1.

Test 2: Does the Process Contribution (PC) exceed 4 percent of the EQS?

Sodium bisulphite (as sulphite) are screened out by Test 2 as the calculated PCs are <4% of the EQS

Tests 3 &4: Does the difference between upstream quality and the (PEC) exceed 10 percent of the EQS? Does the PEC exceed the EQS in the receiving water downstream of the discharge?

Copper passes both these tests and so also screens out.

Relevant parameters not assessed using H1 are as follows:

pH - the minimum, maximum and average pH are shown to be consistently within the range of pH 7.3 and 7.8. As this is a neutral pH, it is unlikely to alter the pH of the local brook and therefore no adverse effects to the water quality would be expected.

Phosphate- an assessment for phosphate was carried out by the Environment Agency using Monte Carlo water quality (WQ) modelling based on a proposed mean concentration of phosphate of 0.05 mg/l or 50 µg/l and the maximum volume specified within the operators H1 assessment (103.68 m^3/day based on flow rate of 0.0012 m^3/sec). As there is no upstream/background WQ data available for the receiving watercourse (tributary of the River Anker), we have completed a number of modelling scenarios which demonstrate that the proposed concentration of phosphate within the discharge is acceptable:

1) Using WQ data from Environment Agency monitoring point on the River Anker at Fieldon Bridge (Environment Agency monitoring point 59394420 from 2009 to 2019). This WQ data demonstrates the current status of the watercourse for phosphate is poor in terms of its WFD (Water Framework Directive) status (for phosphate), although it is not far from moderate status (the target is to get the River Anker to good status for phosphate by 2027). Using the available WQ data (mean and standard deviation values) for orthophosphate (reactive as P) from the upstream river Anker WQ dataset, there are no concerns in terms of impact (i.e. unacceptable deterioration of mean and 90%ile upstream WQ) that would require control of phosphate (i.e. numeric compliance limits, additional effluent treatment, effluent monitoring or environmental monitoring).
2) Using WQ mid-class statistics for Good WFD status for phosphate: This WQ data is used as proxy data to demonstrate the upstream water quality as already achieving 'Good' WFD status, and to determine the potential impact as a result of the discharge. Given there are no known inputs of Phosphate into the watercourse upstream of the proposed discharge, it is reasonable to assume the existing WQ within the unnamed watercourse is 'Good' status for Phosphate. Based on the outcomes of the modelling exercise, the impact on WQ is acceptable and no formal controls ((i.e. numeric compliance limits, additional effluent treatment, effluent monitoring or environmental monitoring) are required.
3) As above within 2.), but using WQ mid-class statistics for Moderate WFD status for phosphate to determine the impact as a result of the discharge (no concerns or formal control required as a result of the discharge).
4) As above within 2.) and 3.), but using WQ mid-class statistics for High WFD status for Phosphate to determine the impact as a result of the discharge (no concerns or formal control required as a result of the discharge).

The Operator has confirmed that they do not add any substances containing phosphate at the site to any process water. Any phosphate present in the discharge to the receiving watercourse is present in the mains water before it enters the facility.

Temperature - the temperature of the discharge to the un-named brook was also considered. It is expected that the temperature of the effluent will reach approximately 15 °C in winter and 20 °C in summer, which is acceptable according to our H1 Annex D2 guidance "Assessment of sanitary and other pollutants within surface water discharges". It is also worth noting that the hybrid cooling towers do not need to use cooling water when the air temperature drops below 7^{o}c.

Finally, there are no habitats sites (SAC's, SPA's or Ramsars) within the relevant screening distances for water. There are also no SSSI's, or local wildlife sites or protected species within the relevant screening distance for this type of Installation.

5.6.5 <u>Conclusion</u>

We agree with the Applicant's conclusion that the pollutants discharged to the sewer and un-named brook are not liable to cause pollution and are therefore insignificant. As a result of this they require no control. And so no limits have been set within the permit.

We have set improvement condition IC8, to require the Operator to monitor the emissions from the Installation, to confirm that the actual emissions are as predicted and confirm that the impacts will not cause pollution.

5.7 Other Emissions

Noise is not expected to have a significant impact, as discussed in section 6.5.5 of this document

Odour problems are not expected from the EfW facility. The primary source of odour from the proposed EfW facility will be from the incoming waste. The RDF that will be accepted at this EfW facility is a processed fuel which has had putrescible organic material removed.

6. Application of Best Available Techniques

6.1 Scope of Consideration

In this section, we explain how we have determined whether the Applicant's proposals are the Best Available Techniques for this Installation.

- The first issue we address is the fundamental choice of incineration technology. There are a number of alternatives, and the Applicant has explained why it has chosen one particular kind for this Installation.

- We then consider in particular control measures for the emissions which were not screened out as insignificant in the previous section on minimising the installation's environmental impact. They are: NO_2, SO_2, $PM_{2.5}$, VOC, PAH, Dioxin and Furans, and Metals.

- We also have to consider the combustion efficiency and energy utilisation of different design options for the Installation, which are relevant considerations in the determination of BAT for the Installation, including the Global Warming Potential of the different options.

- Finally, the prevention and minimisation of Persistent Organic Pollutants (POPs) must be considered, as we explain below.

Chapter IV of the IED specifies a set of maximum emission limit values. Although these limits are designed to be stringent, and to provide a high level of environmental protection, they do not necessarily reflect what can be achieved by new plant. Article 14(3) of the IED says that BAT Conclusions shall be the reference for setting the permit conditions, so it may be possible and desirable to achieve emissions below the limits referenced in Chapter IV. A final draft of the BAT conclusions was published in December 2018, however it is not expected that the BAT conclusions will be published (and come into force) until the second half of 2019.

Even if the Chapter IV limits are appropriate, operational controls complement the emission limits and should generally result in emissions below the maximum allowed; whilst the limits themselves provide headroom to allow for unavoidable process fluctuations. Actual emissions are therefore almost certain to be below emission limits in practice, because any Operator who sought to operate its installation continually <u>at</u> the maximum permitted level would almost inevitably breach those limits regularly, simply by virtue of normal fluctuations in plant performance, resulting in enforcement action (including potentially prosecution) being taken. Assessments based on, say, Chapter IV limits are therefore "worst-case" scenarios.

Should the Installation, once in operation, emit at rates significantly below the limits included in the Permit, we will consider tightening ELVs appropriately. We are, however, satisfied that emissions at the permitted limits would ensure a high level of protection for human health and the environment in any event.

6.1.1 Consideration of Furnace Type

The prime function of the furnace is to achieve maximum combustion of the waste. Chapter IV of the IED requires that the plant (furnace in this context) should be designed to deliver its requirements. The main requirements of Chapter IV in relation to the choice of a furnace are compliance with air emission limits for CO and TOC and achieving a low TOC/LOI level in the bottom ash.

The Waste Incineration BREF elaborates the furnace selection criteria as:

- the use of a furnace (including secondary combustion chamber) dimensions that are large enough to provide for an effective combination of gas residence time and temperature such that combustion reactions may approach completion and result in low and stable CO and TOC emissions to air and low TOC in residues.
- use of a combination of furnace design, operation and waste throughput rate that provides sufficient agitation and residence time of the waste in the furnace at sufficiently high temperatures.
- The use of furnace design that, as far as possible, physically retain the waste within the combustion chamber (e.g. grate bar spacing) to allow its complete combustion.

The BREF also provides a comparison of combustion and thermal treatment technologies and factors affecting their applicability and operational suitability used in EU and for all types of wastes. There is also some information on the comparative costs. The table below has been extracted from the BREF tables. This table is also in line with the Guidance Note "The Incineration of Waste (EPR 5.01)). However, it should not be taken as an exhaustive list nor that all technologies listed have found equal application across Europe.

Overall, any of the furnace technologies listed below would be considered as BAT provided the Applicant has justified it in terms of:

- nature/physical state of the waste and its variability
- proposed plant throughput which may affect the number of incineration lines
- preference and experience of chosen technology including plant availability
- nature and quantity/quality of residues produced.
- emissions to air – usually NOx as the furnace choice could have an effect on the amount of unabated NOx produced
- energy consumption – whole plant, waste preparation, effect on GWP
- Need, if any, for further processing of residues to comply with TOC
- Costs

<u>Summary comparison of thermal treatment technologies</u> (reproduced from the Waste Incineration BREF)

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Moving grate (air-cooled)	Low to medium heat values (LCV 5 – 16.5 GJ/t) Municipal and other heterogeneous solid wastes Can accept a proportion of sewage sludge and/or medical waste with municipal waste Applied at most modern MSW installations	1 to 50 t/h with most projects 5 to 30 t/h. Most industrial applications not below 2.5 or 3 t/h.	Widely proven at large scales. Robust Low maintenance cost Long operational history Can take heterogeneous wastes without special preparation	generally not suited to powders, liquids or materials that melt through the grate	TOC 0.5 % to 3 %	High capacity reduces specific cost per tonne of waste
Moving grate (liquid Cooled)	Same as air-cooled grates except: LCV 10 – 20 GJ/t	Same as air-cooled grates	As air-cooled grates but: higher heat value waste is treatable better Combustion control possible.	As air-cooled grates but: risk of grate damage/ leaks higher complexity	TOC 0.5 % to 3 %	Slightly higher capital cost than air-cooled

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Rotary Kiln	Can accept liquids and pastes solid feeds more limited than grate (owing to refractory damage) often applied to hazardous Wastes	<10 t/h	Very well proven with broad range of wastes and good burn out even of HW	Throughputs lower than grates	TOC <3 %	Higher specific cost due to reduced capacity
Fluid bed - bubbling	Only finely divided consistent wastes. Limited use for raw MSW often applied to sludges	1 to 10 t/h	Good mixing Fly ashes of good leaching quality	Careful operation required to avoid clogging bed. Higher fly ash quantities.	TOC <3 %	FGT cost may be lower. Costs of waste preparation
Fluid bed - circulating	Only finely divided consistent wastes. Limited use for raw MSW, often applied to sludges / RDF.	1 to 20 t/h most used above 10 t/h	Greater fuel flexibility than BFB Fly ashes of good leaching quality	Cyclone required to conserve bed material Higher fly ash quantities	TOC <3 %	FGT cost may be lower. Costs of preparation.
Oscillating furnace	MSW / heterogeneous wastes	1 – 10 t/h	Robust Low maintenance Long history	-higher thermal loss than with grate furnace - LCV under 15 GJ/t	TOC 0.5 – 3 %	Similar to other technologies

			Low NOX level Low LOI of bottom ash			

Technique	**Key waste characteristics and suitability**	**Throughput per line**	**Advantages**	**Disadvantages / Limitations of use**	**Bottom Ash Quality**	**Cost**
Pulsed hearth	Only higher CV waste (LCV >20 GJ/t) □mainly used for clinical wastes	<7 t/h	can deal with liquids and powders	bed agitation may be lower	Dependen t on waste type	Higher specific cost due to reduced capacity
Stepped and static hearths	Only higher CV waste (LCV >20 GJ/t) Mainly used for clinical wastes	No information	Can deal with liquids and powders	Bed agitation may be lower	Dependen t on waste type	Higher specific cost due to reduced capacity
Spreader - stoker combustor	- RDF and other particle feeds - poultry manure - wood wastes	No information	- simple grate construction - less sensitive to particle size than FB	only for well defined mono-streams	No informatio n	No information
Gasification - fixed bed	- mixed plastic wastes - other similar consistent streams - gasification less widely used/proven than incineration	1 to 20 t/h	-low leaching residue -good burnout if oxygen blown - syngas available - Reduced oxidation of recyclable metals	- limited waste feed - not full combustion - high skill level - tar in raw gas - less widely proven	-Low leaching bottom ash -good burnout with oxygen	High operation/ maintenance costs

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Gasification - entrained flow	- mixed plastic wastes - other similar consistent streams - not suited to untreated MSW - gasification less widely used/proven than incineration	To 10 t/h	- low leaching slag - reduced oxidation of recyclable metals	- limited waste feed - not full combustion - high skill level - less widely proven	low leaching slag	High operation/ maintenance costs pre-treatment costs high
Gasification - fluid bed	- mixed plastic wastes - shredded MSW - shredder residues - sludges - metal rich wastes - other similar consistent streams - less widely used/proven than incineration	5 – 20 t/h	-temperatures e.g. for Al recovery - separation of non-combustibles -can be combined with ash melting - reduced oxidation of recyclable metals	-limited waste size (<30cm) - tar in raw gas - higher UHV raw gas - less widely proven	If Combined with ash melting chamber ash is vitrified	Lower than other gasifiers
Pyrolysis	- pre-treated MSW - high metal inert streams - shredder residues/plastics - pyrolysis is less widely used/proven than incineration	~ 5 t/h (short drum) 5 – 10 t/h (medium drum)	- no oxidation of metals - no combustion energy for metals/inert - in reactor acid neutralisation possible - syngas available	- limited wastes - process control and engineering critical - high skill req. - not widely proven - need market for syngas	- dependent on process temperature - residue produced requires further processing e.g. combustion	High pre-treatment, operation and capital costs

The Applicant has carried out a review of the following candidate furnace types:

- Moving Grate Furnace
- Fluidised Bed
- Gasification
- Pyrolysis

Moving grate technologies are the most widely used combustion process for MSW and MSW derived fuel applications and as such are well proven and reliable. The moving grate system is capable of burning processed fuels such as RDF or solid recovered fuel (SRF), as well as MSW. Exhaust gases from the furnace will require treatment to achieve compliance with the emission limit requirements of the IED. Moving grate systems typically will produce two residues, bottom ash (usually combined with boiler ash, but this can be collected separately) and air pollution control (APC) residues. Bottom ash, which is the larger (in quantity) of the two residues, can be reused as an aggregate, uses for APC residues are available subject to testing of the residue.

Fluidised Bed (FB) technology is capable of achieving somewhat lower NOx concentrations in the raw gas than are typically achievable in moving grate systems, through lower bed temperatures reducing thermal NOx formation. However, additional abatement using either SCR or SNCR will still be required to guarantee IED compliance. Solid waste streams from the process typically include bottom ash, cyclone ash (usually mixed with the bottom ash), and APC residues. Although overall a similar total amount of residues will arise in a fluidised bed plant compared with that from a moving grate system, a higher proportion will be classified as hazardous waste. As with moving grate plant, the bottom ash can be reused as an aggregate.

Gasification is reported by some as offering the opportunity for higher efficiency electrical generation compared to conventional combustion technologies. However, to achieve this, the syngas needs to be burnt in a turbine specifically designed to burn low calorific value syngas and, in practice, it will be necessary to provide clean-up of the syngas and these processes both consume and lose energy. Operationally, a homogeneous incoming waste stream with a high organic content is required to obtain consistent gas quality. Ash and char are also produced from the gasification process. The ash from some gasification processes is suitable for re-use as an aggregate material. Residues from exhaust gas cleaning, similar to those from conventional combustion plant would be disposed of as hazardous waste. Whilst showing some recent success in certain cases, the technology remains in its infancy with few successful facilities of similar scale to that proposed.

Solid residues from pyrolysis plant have high carbon content. Unlike combustion bottom ash or the residue from some gasification plant, this material will require landfilling or further treatment. There is limited experience of the application of pyrolysis technology for the treatment of MSW or RDF, its presence in the market is not well established and its commercial application is limited.

The Applicant has proposed to use a furnace technology comprising Moving Grate Furnace, of which is identified in the tables above as being considered BAT in the BREF or TGN for this type of waste feed.

The Applicant proposes to use diesel as support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on the lack of natural gas infrastructure and onsite storage of diesel provides guaranteed availability.

Boiler Design

In accordance with our Technical Guidance Note, EPR 5.01, the Applicant has confirmed that the boiler design will include the following features to minimise the potential for reformation of dioxins within the de-novo synthesis range:

- ensuring that the steam/metal heat transfer surface temperature is a minimum where the exhaust gases are within the de-novo synthesis range;
- design of the boilers using CFD to ensure no pockets of stagnant or low velocity gas;
- boiler passes are progressively decreased in volume so that the gas velocity increases through the boiler; and
- Design of boiler surfaces to prevent boundary layers of slow moving gas.

Any of the options listed in the BREF and summarised in the table above can be BAT. The Applicant has chosen a furnace technique that is listed in the BREF and we are satisfied that the Applicant has provided sufficient justification to show that their technique is BAT. This is not to say that the other techniques could not also be BAT, but that the Applicant has shown that their chosen technique is at least comparable with the other BAT options. We believe that, based on the information gathered by the BREF process, the chosen technology will achieve the requirements of Chapter IV of the IED for the air emission of TOC/CO and the TOC on bottom ash.

6.1.2 Stack height

The proposed stack height is 25m due to visual impact concerns, which is relatively low. As a consequence the Applicant is using SCR rather than SNCR for NOx abatement which is considered to be BAT and results in a significant reduction in NOx emissions when compared to SNCR.

The Applicant was asked to carry out a stack sensitivity analysis which they did in appendix F of the updated Air Emissions Risk assessment. Based on the results of the sensitivity study a stack height of 25m was selected on visual impact grounds and it also ensured that the maximum impact on the acid deposition at the Bentley wood SSSI is less than 1% of the maximum critical load functions. The acid deposition compared against the minimum critical load functions and the N deposition cannot be screened out as insignificant, however as discussed in section 5.4.3 Natural England were consulted on this and accepted the proposal. The Applicants sensitivity analysis shows that a 5m increase in stack height will only reduce the PC (as a %age of the CL) by 0.8% which is an insignificant reduction. Even a 10m increase in stack height is likely to only reduce the PC by less than 1.6% which is a very small improvement and considering that the Natural England agree that Installation is unlikely to cause damage, we agree with the Applicant that the 25m stack height is sufficient. Furthermore, it is expected that sulphur dioxide emissions will be around 60% of those modelled due to the operational set point and so will have significantly lower than predicted impacts.

At 25m, the NOx peak long term PC is only just over 1% of the ES for human health but consequently cannot be screened out as insignificant. Even so, the emission is not expected to result in the ES being exceeded as the PEC is well below the ES. The peak short term PC is marginally above the level that would screen out as insignificant (>10% of the ES). However, again it is not expected to result in the ES being exceeded as the PEC is well below the ES. As discussed above the Applicant has used SCR to reduce NOx emissions (compared with SNCR) which is of far greater environmental benefit than increasing the stack height which simply improves dispersion.

Based on the above we are satisfied that the proposed stack height is acceptable.

6.2 BAT and emissions control

The prime function of flue gas treatment is to reduce the concentration of pollutants in the exhaust gas as far as practicable. The techniques which are described as BAT individually are targeted to remove specific pollutants, but the BREF notes that there is benefit from considering the FGT system as a whole unit. Individual units often interact, providing a primary abatement for some pollutants and an additional effect on others.

The BREF lists the general factors requiring consideration when selecting flue-gas treatment (FGT) systems as:

- type of waste, its composition and variation
- type of combustion process, and its size
- flue-gas flow and temperature
- flue-gas content, size and rate of fluctuations in composition
- target emission limit values
- restrictions on discharge of aqueous effluents
- plume visibility requirements
- land and space availability
- availability and cost of outlets for residues accumulated/recovered
- compatibility with any existing process components (existing plants)
- availability and cost of water and other reagents
- energy supply possibilities (e.g. supply of heat from condensing scrubbers)
- reduction of emissions by primary methods
- release of noise.

Taking these factors into account the Technical Guidance Note points to a range of technologies being BAT subject to circumstances of the Installation.

6.2.1 Particulate Matter

Particulate matter				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Bag / Fabric filters (BF)	Reliable abatement of particulate matter to below 5mg/m^3	Max temp 250°C	Multiple compartments Bag burst detectors	Most plants
Wet scrubbing	May reduce acid gases simultaneously.	Not normally BAT. Liquid effluent produced	Require reheat to prevent visible plume and dew point problems.	Where scrubbing required for other pollutants
Ceramic filters	High temperature applications	May "blind" more than fabric filters		Small plant. High

	Smaller plant.			temperature gas cleaning required.
Electrostatic precipitators	Low pressure gradient. Use with BF may reduce the energy consumption of the induced draft fan.	Not normally BAT.		When used with other particulate abatement plant

The Applicant proposes to use fabric filters for the abatement of particulate matter. Fabric filters provide reliable abatement of particulate matter to below 5 mg/m^3 and are BAT for most installations. The Applicant proposes to use multiple compartment filters with burst bag detection to minimise the risk of increased particulate emissions in the event of bag rupture.

Emissions of particulate matter have been previously screened out as insignificant, and so the Environment Agency agrees that the Applicant's proposed technique is BAT for the installation.

6.2.2 Oxides of Nitrogen

Oxides of Nitrogen : Primary Measures				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Low NOx burners	Reduces NOx at source		Start-up, supplementary firing.	Where auxiliary burners required.
Starved air systems	Reduce CO simultaneously.			Pyrolysis, Gasification systems.
Optimise primary and secondary air injection				All plant.
Flue Gas Recirculation (FGR)	Reduces the consumption of reagents used for secondary NOx control. May increase overall energy recovery	Some applications experience corrosion problems.		All plant unless impractical in design (needs to be demonstrated)

Oxides of Nitrogen : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Selective catalytic reduction (SCR)	NOx emissions < 70mg/ m^3 Reduces CO, VOC, dioxins	Expensive. Re-heat required – reduces plant efficiency		All plant
Selective non-catalytic reduction (SNCR)	NOx emissions typically 150 - 180mg/m^3	Relies on an optimum temperature around 900 °C, and sufficient retention time for reduction May lead to Ammonia slip	Port injection location	All plant unless lower NOx release required for local environmental protection.
Reagent Type: Ammonia	Likely to be BAT Lower nitrous oxide formation	More difficult to handle Narrower temperature window		All plant

Reagent Type: Urea	Likely to be BAT			All plant

The Applicant proposes to implement the following primary measures:

- Low NO_x burners – this technique reduces NO_x at source and is defined as BAT where auxiliary burners are required.
- Optimise primary and secondary air injection – this technique is BAT for all plant.
- Flue gas recirculation – this technique reduces the consumption of reagents for secondary NO_x control and can increase overall energy recovery, although in some applications there can be corrosion problems. In this case the operator is not using FGR due to corrosion concerns.

There are two recognised techniques for secondary measures to reduce NO_x. These are Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR). For each technique, there is a choice of urea or ammonia reagent.

SCR can reduce NO_x levels to below 70 mg/m^3 and can be applied to all plant, it is generally more expensive than SNCR and requires reheating of the waste gas stream which reduces energy efficiency, periodic replacement of the catalysts also produces a hazardous waste. SNCR can typically reduce NO_x levels to between 150 and 180 mg/m^3, it relies on an optimum temperature of around 900 deg C and sufficient retention time for reduction. SNCR is more likely to have higher levels of ammonia slip. The technique can be applied to all plant unless lower NO_x releases are required for local environmental protection. Urea or ammonia can be used as the reagent with either technique, urea is somewhat easier to handle than ammonia and has a wider operating temperature window, but tends to result in higher emissions of N_2O. Either reagent is BAT, and the use of one over the other is not normally significant in environmental terms.

The Applicant proposes to use SCR with ammonia as the reagent.

The amount of ammonia used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH_3 slip. Improvement condition IC4 requires the Operator to report to the Environment Agency on optimising the performance of the NO_x abatement system. The Operator is also required to monitor and report on NH_3 emissions every 6 months. Regular N_2O emissions monitoring is not required under draft BAT conclusion 4, and so has not been required in the permit.

6.2.3 Acid Gases, SO_x, HCl and HF

Acid gases and halogens : Primary Measures				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF**

				or TGN for:
Low sulphur fuel, (< 0.1%S gasoil or natural gas)	Reduces SOx at source		Start-up, supplementary firing.	Where auxiliary fuel required.
Management of waste streams	Disperses sources of acid gases (e.g. PVC) through feed.	Requires closer control of waste management		All plant with heterogeneous waste feed

Acid gases and halogens : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Wet	High reaction rates Low solid residues production Reagent delivery may be optimised by concentration and flow rate	Large effluent disposal and water consumption if not fully treated for re-cycle Effluent treatment plant required May result in wet plume Energy required for effluent treatment and plume reheat		Plants with high acid gas and metal components in exhaust gas – HWIs
Dry	Low water use Reagent consumption may be reduced by recycling in plant Lower energy use Higher	Higher solid residue production Reagent consumption controlled only by input rate		All plant

	reliability			
Semi-dry	Medium reaction rates Reagent delivery may be varied by concentration and input rate	Higher solid waste residues		All plant
Reagent Type: Sodium Hydroxide	Highest removal rates Low solid waste production	Corrosive material ETP sludge for disposal		HWIs
Reagent Type: Lime	Very good removal rates Low leaching solid residue Temperature of reaction well suited to use with bag filters	Corrosive material May give greater residue volume if no in-plant recycle	Wide range of uses	MWIs, CWIs
Reagent Type: Sodium Bicarbonate	Good removal rates Easiest to handle Dry recycle systems proven	Efficient temperature range may be at upper end for use with bag filters – Leachable solid residues Bicarbonate more expensive	Not proven at large plant	CWIs

The Applicant proposes to implement the following primary measures:

- Use of low sulphur fuels for start up and auxiliary burners – gas should be used if available, where fuel oil is used, this will be low sulphur (i.e. <0.1%), this will reduce SO_x at source. The Applicant has justified its choice of gasoil as the support fuel on the basis that natural gas infrastructure is lacking and *the onsite storage of diesel provides guaranteed availability* and we agree with that assessment.

There are three recognised techniques for secondary measures to reduce acid gases. These are wet, dry and semi-dry. Wet scrubbing produces an effluent for treatment and disposal in compliance with Article 46(3) of IED. It will also require reheat of the exhaust to avoid a visible plume. Wet scrubbing is unlikely to be BAT except where there are high acid gas and metal components in the exhaust gas as may be the case for some hazardous waste incinerators. In this case, the Applicant does not propose using wet scrubbing, and the Environment Agency agrees that wet scrubbing is not appropriate in this case.

The Applicant has therefore considered dry and semi-dry methods of secondary measures for acid gas abatement. Either can be BAT for this type of facility.

Both dry and semi-dry methods rely on the dosing of powdered materials into the exhaust gas stream. Semi-dry systems (i.e. hydrated reagent) offer reduced material consumption through faster reaction rates, but reagent recycling in dry systems can offset this.

In both dry and semi-dry systems, the injected powdered reagent reacts with the acid gases and is removed from the gas stream by the bag filter system. The powdered materials are either lime or sodium bicarbonate. Both are effective at reducing acid gases, and dosing rates can be controlled from continuously monitoring acid gas emissions. The decision on which reagent to use is normally economic. Lime produces a lower leaching solid residue in the APC residues than sodium bicarbonate and the reaction temperature is well suited to bag filters, it tends to be lower cost, but it is a corrosive material and can generate a greater volume of solid waste residues than sodium bicarbonate. Either reagent is BAT and the use of one over the other is not significant in environmental terms in this case.

In this case, the Applicant proposes to a semi-dry system with hydrated lime The Environment Agency is satisfied that this is BAT.

6.2.4 Carbon monoxide and volatile organic compounds (VOCs)

The prevention and minimisation of emissions of carbon monoxide and volatile organic compounds is through the optimisation of combustion controls, where all measures will increase the oxidation of these species.

Carbon monoxide and volatile organic compounds (VOCs)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Optimise combustion control	All measures will increase oxidation of these species.		Covered in section on furnace selection	All plants

6.2.5 Dioxins and furans (and Other POPs)

Dioxins and furans				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Optimise combustion control	All measures will increase oxidation of these species.		Covered in section on furnace selection	All plants
Avoid *de novo* synthesis			Covered in boiler design	All plant
Effective Particulate matter removal			Covered in section on particulate matter	All plant
Activated Carbon injection	Can be combined with acid gas absorber or fed separately.	Combined feed rate usually controlled by acid gas content.		All plant. Separate feed normally BAT unless feed is constant and acid gas control also controls dioxin release.

The prevention and minimisation of emissions of dioxins and furans is achieved through:

- optimisation of combustion control including the maintenance of permit conditions on combustion temperature and residence time, which has been considered in 6.1.1 above;
- avoidance of de novo synthesis, which has been covered in the consideration of boiler design;
- the effective removal of particulate matter, which has been considered in 6.2.1 above;
- injection of activated carbon. This can be combined with the acid gas reagent or dosed separately. Where the feed is combined, the combined feed rate will be controlled by the acid gas concentration in the exhaust. Therefore, separate feed of activated carbon would normally be considered BAT unless the feed was relatively constant. Effective control of acid gas emissions also assists in the control of dioxin releases.

In this case the Applicant proposes separate feed and we are satisfied their proposals are BAT.

6.2.6 Metals

Metals

Technique	Advantages	Disadvantages	Optimisation	Defined as BAT in BREF or TGN for:
Effective Particulate matter removal			Covered in section on particulate matter	All plant
Activated Carbon injection for mercury recovery	Can be combined with acid gas absorber or fed separately.	Combined feed rate usually controlled by acid gas content.		All plant. Separate feed normally BAT unless feed is constant and acid gas control also controls dioxin release.

The prevention and minimisation of metal emissions is achieved through the effective removal of particulate matter, and this has been considered in 6.2.1 above.

Unlike other metals however, mercury if present will be in the vapour phase. BAT for mercury removal is also dosing of activated carbon into the exhaust gas stream. This can be combined with the acid gas reagent or dosed separately. Where the feed is combined, the combined feed rate will be controlled by the acid gas concentration in the exhaust. Therefore, separate feed of activated carbon would normally be considered BAT unless the feed was relatively constant.

In this case the Applicant proposes separate feed and we are satisfied their proposals are BAT.

6.3 BAT and global warming potential

This section summarises the assessment of greenhouse gas impacts which has been made in the determination of this Permit. Emissions of carbon dioxide (CO_2) and other greenhouse gases differ from those of other pollutants in that, except at gross levels, they have no localised environmental impact. Their impact is at a global level and in terms of climate change. Nonetheless, CO_2 is clearly a pollutant for IED purposes.

The principal greenhouse gas emitted is CO_2, but the plant also emits small amounts of N_2O arising from the operation of secondary NO_x abatement. N_2O has a global warming potential 310 times that of CO_2. The Applicant will therefore be required to optimise the performance of the secondary NO_x abatement system to ensure its GWP impact is minimised.

The major source of greenhouse gas emissions from the installation is however CO_2 from the combustion of waste. There will also be CO_2 emissions from the burning of support fuels at start up, shut down and should it be necessary to maintain combustion temperatures. BAT for greenhouse gas emissions is to maximise energy recovery and efficiency.

The electricity that is generated by the Installation will displace emissions of CO_2 elsewhere in the UK, as virgin fossil fuels will not be burnt to create the same electricity.

The Installation is not subject to the Greenhouse Gas Emissions Trading Scheme Regulations 2012 therefore it is a requirement of IED to investigate how emissions of greenhouse gases emitted from the installation might be prevented or minimised.

Factors influencing GWP and CO_2 emissions from the Installation are:
On the debit side

- CO_2 emissions from the burning of the waste;
- CO_2 emissions from burning auxiliary or supplementary fuels;
- CO_2 emissions associated with electrical energy used;
- N_2O from the de-NOx process.

On the credit side

- CO_2 saved from the export of electricity to the public supply by displacement of burning of virgin fuels;

The GWP of the plant will be dominated by the emissions of carbon dioxide that are released as a result of waste combustion. This will constant for all options considered in the BAT assessment. Any differences in the GWP of the options in the BAT appraisal will therefore arise from small differences in energy recovery and in the amount of N_2O emitted.

The Applicant considered energy efficiency and compared SCR to SNCR in its BAT assessment. This is set out in sections 4.3.7, 6.1.1 and 6.2.2 of this decision document and table 6.3:

Table 6.3: Summary Ranking

Option	**1**	**2**
	SCR	**SNCR**
NO_x performance – long term	1	2
NO_x performance – short term	1	2
Ammonia performance	1	2
GWP performance	2	1
POCP performance	1	2
Sub total	*6*	*9*
Other		
Waste	2	1
Sub total	*2*	*1*
Environmental Performance Total	***8***	***10***

Note: 1 = Highest Ranking, 2 = Lowest Ranking

Taking all these factors into account, the Applicant's assessment shows that the difference in global warming potential between the best option in terms of GWP and the Applicant's preferred option is minor. The purpose of a BAT appraisal is to determine which option minimises the impact on the environment as a whole. In this context the small benefit in terms of GWP of the other options is considered to be more than offset by the other benefits of the preferred option, i.e. SCR.

The Environment Agency agrees with this assessment and that the chosen option is BAT for the installation.

6.4 BAT and POPs

International action on Persistent Organic pollutants (POPs) is required under the UN's Stockholm Convention, which entered into force in 2004. The EU implemented the Convention through the POPs Regulation (850/2004), which is directly applicable in UK law. The Environment Agency is required by national POPs Regulations (SI 2007 No 3106) to give effect to Article 6(3) of the EC POPs Regulation when determining applications for environmental Permits.

However, it needs to be borne in mind that this application is for a particular type of installation, namely a waste incinerator. The Stockholm Convention distinguishes between intentionally-produced and unintentionally-produced POPs. Intentionally-produced POPs are those used deliberately (mainly in the past) in agriculture (primarily as pesticides) and industry. Those intentionally-produced POPs are not relevant where waste incineration is concerned, as in fact high-temperature incineration is one of the prescribed methods for destroying POPs.

The unintentionally-produced POPs addressed by the Convention are:
- dioxins and furans;
- HCB (hexachlorobenzene)
- PCBs (polychlorobiphenyls) and
- PeCB (pentachlorobenzene)

The UK's national implementation plan for the Stockholm Convention, published in 2007, makes explicit that the relevant controls for unintentionally-produced POPs, such as might be produced by waste incineration, are delivered through the requirements of IED. That would include an examination of BAT, including potential alternative techniques, with a view to preventing or minimising harmful emissions. These have been applied as explained in this document, which explicitly addresses alternative techniques and BAT for the minimisation of emissions of dioxins.

Our legal obligation, under regulation 4(b) of the POPs Regulations, is, when considering an application for an environmental permit, to comply with article 6(3) of the POPs Regulation:

> “Member States shall, when considering proposals to construct new facilities or to significantly modify existing facilities using processes that release chemicals listed in Annex III , give priority consideration to alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of substances listed in Annex III, without prejudice to Directive 2010/75/EU of the European Parliament and of the Council”

The 1998 Protocol to the Convention recommended that unintentionally produced should be controlled by imposing emission limits (e.g 0.1 ng/m^3 for MWIs) and using BAT for incineration. UN Economic Commission for Europe (Executive Body for the Convention) (ECE-EB) produced BAT guidance for the parties to the Convention in 2009. This document considers various control techniques and concludes that primary measures involving management of feed material by reducing halogenated substances are not technically effective. This is not surprising because halogenated wastes still need to be disposed of and because POPs can be generated from relatively low concentrations of halogens. In summary, the successful control techniques for waste incinerators listed in the ECE-EB BAT are:

- maintaining furnace temperature of 850°C and a combustion gas residence time of at least 2 seconds
- rapid cooling of flue gases to avoid the *de novo* reformation temperature range of 250-450°C
- use of bag filters and the injection of activated carbon or coke to adsorb residual POPs components.

Using the methods listed above, the UN-ECE BAT document concludes that incinerators can achieve an emission concentration of 0.1 ng TEQ/m^3.

We believe that the Permit ensures that the formation and release of POPs will be prevented or minimised. As we explain above, high-temperature incineration is one of the prescribed methods for destroying POPs. Permit conditions are based on the use of BAT and Chapter IV of IED and incorporate all the above requirements of the UN-ECE BAT guidance and deliver the requirements of the Stockholm Convention in relation to unintentionally produced POPs.

The release of **dioxins and furans** to air is required by the IED to be assessed against the I-TEQ (International Toxic Equivalence) limit of 0.1 ng/m^3. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK’s independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. The Permit requires that, in addition to the requirements of the IED, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be monitored for reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. The Permit also requires monitoring of a range of PAHs and dioxin-like PCBs at the same frequency as dioxins are monitored. We have included a requirement to monitor and report against these WHO-TEQ values for dioxins and dioxin-like PCBs and the range of PAHs as listed in the Permit. We are confident that the measures taken to control the release of dioxins will also control the releases of dioxin-like PCBs and PAHs. Section 5.2.1 of this document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation.

Hexachlorobenzene (HCB) is released into the atmosphere as an accidental product from the combustion of coal, waste incineration and certain metal processes. It has also been used as a fungicide, especially for seed treatment although this use has been banned in the UK since 1975. Natural fires and volcanoes may serve as natural sources. Releases of (HCB) are addressed by the European Environment Agency (EEA), which advises that:

> "*due to comparatively low levels in emissions from most (combustion) processes special measures for HCB control are usually not proposed. HCB emissions can be controlled generally like other chlorinated organic compounds in emissions, for instance dioxins/furans and PCBs: regulation of time of combustion, combustion temperature, temperature in cleaning devices, sorbents application for waste gases cleaning etc*." [reference http://www.eea.europa.eu/publications/EMEPCORINAIR4/sources_of_HCB.pdf]

Pentachlorobenzene (PeCB) is another of the POPs list to be considered under incineration. PeCB has been used as a fungicide or flame retardant, there is no data available however on production, recent or past, outside the UN-ECE region. PeCBs can be emitted from the same sources as for PCDD/F: waste incineration, thermal metallurgic processes and combustion plants providing energy. As discussed above, the control techniques described in the UN-ECE BAT guidance and included in the permit, are effective in controlling the emissions of all relevant POPs including PeCB.

We have assessed the control techniques proposed for dioxins by the Applicant and have concluded that they are appropriate for dioxin control. We are confident that these controls are in line with the UN-ECE BAT guidance and will minimise the release of HCB, PCB and PeCB.

We are therefore satisfied that the substantive requirements of the Convention and the POPs Regulation have been addressed and complied with.

6.5 Other Emissions to the Environment

6.5.1 Emissions to surface water

Based upon the information in the application we are satisfied that appropriate measures will be in place to prevent and /or minimise emissions to water. The applicant proposes to use an anti-scalent that does not contain phosphate or phosphonates.
Surface run-off will be discharged to the unnamed brook. The drainage system includes a penstock valve and sampling chamber. In the event of suspected contamination, the penstock will be closed and water will overflow to the sampling chamber. Water can be pumped from the sampling chamber to a tanker to be removed off site until all contamination has been removed.

6.5.2 <u>Emissions to sewer</u>

Emissions have been assessed to be insignificant and so, based upon the information in the application, we are satisfied that appropriate measures will be in place to prevent and /or minimise emissions to sewer.

6.5.3 <u>Fugitive emissions</u>

The IED specifies that plants must be able to demonstrate that the plant is designed in such a way as to prevent the unauthorised and accidental release of polluting substances into soil, surface water and groundwater. In addition storage requirements for waste and for contaminated water of Article 46(5) must be arranged.

The incoming waste material storage bunker will be constructed of concrete and will be water tight.

All process areas will be located on hard standing.

All bunds provided for chemical and fuel storage tanks will be designed to contain at least 110% of the contents of the largest storage tank or 25% of the total tankage, whichever is the greater and will be impermeable and resistant to the material which they are designed to contain. Procedures will be in place for visual inspection of all bunds to ensure they remain free from accumulation of rainwater. Any discharge of rainwater will go via an interceptor to remove hydrocarbons.

RDF has a low potential for dust. All handling will take place within a building and access to the fuel hall will be via fast acting weather tight doors which will remain closed unless vehicles are unloading RDF into the bunker. The fast acting doors will open to expose a moveable door curtain that will form a seal around the trailer when off-loading. Induced draught fans are located above the bunker to create a slight negative pressure to prevent dust leaving the building.

Based upon the information in the application we are satisfied that appropriate measures will be in place to prevent and /or minimise fugitive emissions.

6.5.4 Odour

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent and minimise odour and to prevent pollution from odour.

Under normal operation, effective odour control of any potential odours from the storage of the waste materials will be achieved through the extraction of air from above the waste storage bunker and used as combustion air within the furnace, thereby destroying any potentially odorous compounds. The fuel hall will be constructed with louvre wall sections to allow air into the fuel hall while the doors are closed. The system fans will also draw air from the space around the trailers of the delivery vehicles. This will mean that the seal between the trailer and the building is under negative pressure to prevent any leaks of air and possible odours from the building.

In the event of an outage contract waste will not continue to be delivered to the site. Any waste already on site, will remain in the storage bunker which will be kept closed during the shutdown time in order to minimise escape of odour into the environment. For waste stored in the bunker during such times odour control will be maintained through ensuring that the waste reception building doors remain closed (other than for access).

Indicative BAT for minimising and/or preventing the generation of odours includes:

- confining waste to designated area(s)
- regular cleaning of waste handling areas and the design of areas to facilitate cleaning
- ensuring that the transport of waste and ash is in covered vehicles
- drawing air from odorous areas at a rate which will ensure that odour is captured and treating such extracted air prior to release to destroy the odours.

If further treatment is required, scrubbing with acids or oxidising agents such as potassium permanganate maybe an option or the use of carbon filters and is recognised as indicative BAT.

6.5.5 Noise and vibration

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise noise and vibration and to prevent pollution from noise and vibration outside the site.

The Qualitative Noise Screening Assessment Tool was run using the application parameters, and the screening outcome was that a Noise Impact Assessment (NIA) or Noise Management Plan (NMP) would not be required.

Whilst not required, the application contained a NIA which identified local noise-sensitive receptors, potential sources of noise at the proposed plant and noise attenuation measures. Measurements were taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS 4142:2014 to compare the predicted plant rating noise levels with the established background levels. The assessment concluded that the noise from the proposed plant is predicted to be below or around existing background noise levels during both daytime and night-time periods and, therefore, will have a low impact.

The application also contained a noise and vibration risk assessment and management, which covered noise from vehicle movements and the proposed plant. The conclusion was that the impact from noise and vibration would be considered insignificant.

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

Article 14(3) of IED states that BAT conclusions shall be the reference for permit conditions. Article 15(3) further requires that under normal operating conditions; emissions do not exceed the emission levels associated with the best available techniques as laid down in the decisions on BAT conclusions.

At the time of writing of this document, no BAT conclusions have been published for waste incineration or co-incineration.

The use of IED Chapter IV emission limits for air dispersion modelling sets the worst case scenario. If this shows emissions are insignificant then we have accepted that the Applicant's proposals are BAT, and that there is no justification to reduce ELVs below the Chapter IV limits in these circumstances.

Due to its size, the 4.3MWth backup generator, will be subject to the Medium Combustion Plant Directive, but as it only be used for emergency use and will only be tested for less than 50 hours per year it will not require any emission limits setting under the MCPD and it is also classed as an excluded generator and is exempt from the requirements of Schedule 25B of the EPR. We have set restrictions on the operational hours in table S1.1 to ensure that the generator does not run for more than 500 hours and so is exempt from MCPD emission limits under article 6(8), and will be tested for less than 50 hours per year to make it exempt from the requirements of Schedule 25B of the EPR.

The Applicant has modelled ammonia at 5.7mg/m^3 and say that they cannot achieve a lower limit. We have set this as the emission limit, which we consider is achievable when using SCR.

Below we consider whether, for those emission not screened out as insignificant, different conditions are required as a result of consideration of local or other factors, so that no significant pollution is caused (Article 11(c)) or to comply with environmental quality standards (Article 18).

(i) Local factors

The oxides of nitrogen emission limits have been set to 120mg/m3 daily average and 240mg/m3 half-hourly average, which below that required by the IED, to ensure that Bentley Park Wood SSSI is not likely to be harmed by NOx and nitrogen deposition from the Installation.

Acid gas emissions have not screened out at Bentley Park Wood SSSI as insignificant, however our assessment is that stricter requirements are not needed to ensure no significant pollution is caused. The Applicant has confirmed that the operating level for the main acid gas, sulphur dioxide, will be well below the daily 50mg/m3 limit required by the IED. As a consequence we have set improvement condition IC4 to review the performance of the acid gas abatement and the emission limit for sulphur dioxide, and propose a lower limit if relevant.

(ii) National and European ESs

No changes required.

(iii) Global Warming

CO_2 is an inevitable product of the combustion of waste. The amount of CO_2 emitted will be essentially determined by the quantity and characteristics of waste being incinerated, which are already subject to conditions in the Permit. It is therefore inappropriate to set an emission limit value for CO_2, which could do no more than recognise what is going to be emitted. The gas is not therefore targeted as a key pollutant under Annex II of IED, which lists the main polluting substances that are to be considered when setting emission limit values (ELVs) in Permits.

We have therefore considered setting equivalent parameters or technical measures for CO_2. However, provided energy is recovered efficiently (see section 4.3.7 above), there are no additional equivalent technical measures (beyond those relating to the quantity and characteristics of the waste) that can be imposed that do not run counter to the primary purpose of the plant, which is the destruction of waste. Controls in the form of restrictions on the volume and type of waste that can be accepted at the Installation and permit conditions relating to energy efficiency effectively apply equivalent technical measures to limit CO_2 emissions.

(iv) Commissioning

A pre-operating condition (PO3) has been set to require the submission of a commissioning plan. The plan will include the expected emissions to the environment during the different stages of commissioning, the expected durations of commissioning activities and the actions to be taken to protect the environment and report to the Environment Agency in the event that actual emissions exceed expected emissions. Commissioning is required to be carried out in accordance with the commissioning plan as approved.

A follow up improvement condition (IC2) has also been set to summarise the environmental performance of the plant against the design parameters and against the conditions of the Permit. It also requires details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions.

6.7 Monitoring

6.7.1 Monitoring during normal operations

We have decided that monitoring should be carried out for the parameters listed in Schedule 3 using the methods and to the frequencies specified in those tables. These monitoring requirements have been imposed in order to demonstrate compliance with emission limit values and to enable correction of measured concentration of substances to the appropriate reference conditions; to gather information about the performance of the SCR system; to establish data on the release of dioxin-like PCBs and PAHs from the incineration process and to deliver the requirements of Chapter IV of IED for monitoring of residues and temperature in the combustion chamber.

For emissions to air, the methods for continuous and periodic monitoring are in accordance with the Environment Agency's Guidance M2 for monitoring of stack emissions to air.

There will be two MCERTS accredited CEMs to measure gaseous pollutants, two MCERTS accredited CEMs to monitor particulate matter and flow will be continuously measured by a MCERTS accredited CEM. This Duty/Redundant system will ensure there are no gaps in data during calibrations and maintenance activities.

Based on the information in the Application and the requirements set in the conditions of the permit we are satisfied that the Operator's techniques, personnel and equipment will have either MCERTS certification or MCERTS accreditation as appropriate.

6.7.2 Monitoring under abnormal operations arising from the failure of the installed CEMs

The answer to question 7 of appendix 6 of part B3 of the application states that the Applicant does **not** want to take advantage of the Article 45 (1)(f) allowance (i.e. setting higher emission limits) if the particulates, CO or TOC continuous emission monitors (CEM) fail. They have also **not** stated that they will provide back-up CEMS working in parallel to the operating CEMS.

Consequently CO, TOC or dust CEMS failure will result in the condition 2.3.11 requiring a shutdown rather than entering abnormal operations

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

Chapter IV of IED specifies manual extractive sampling for heavy metals and dioxin monitoring. However, Article 48(5) of the IED enables The Commission to act through delegated, authority to set the date from which continuous measurements of the air emission limit values for heavy metals, dioxins and furans shall be carried out, as soon as appropriate measurement techniques are available within the Community. No such decision has yet been made by the Commission.

The Environment Agency has reviewed the applicability of continuous sampling and monitoring techniques to the installation.

Recent advances in mercury monitoring techniques have allowed standards to be developed for continuous mercury monitoring, including both vapour-phase and particulate mercury. There is a standard which can apply to CEMs which measure mercury (EN 15267-3) and standards to certify CEMs for mercury, which are EN 15267-1 and EN 15267-3. Furthermore, there is an MCERTS-certified CEM which has been used in trials in the UK and which has been verified on-site using many parallel reference tests as specified using the steps outlined in EN 14181.

In the case of dioxins, equipment is available for taking a sample for an extended period (several weeks), but the sample must then be analysed in the conventional way. A CEN committee has agreed Technical Specifications (EN TS 1948-5) for continuous sampling of dioxins. This specification will lead to a CEN standard following a validation exercise which is currently underway. According to IED Article 48(5), "As soon as appropriate measurement techniques are available within the Union, the Commission shall, by means of delegated acts in accordance with Article 76 and subject to the conditions laid down in Articles 77 and 78, set the date from which continuous measurements of emissions into the air of heavy metals and dioxins and furans are to be carried out. This is yet to happen. However, our extant 'dioxin enforcement policy' recommends continuous sampling of dioxins where multiple emission exceedances occur and no clear root cause can be identified. Therefore should continuous sampling be required at a later date during the operation of the installation, then sampling and analysis shall comply with the requirements of EN TS 1948

For either continuous monitoring of mercury or continuous sampling of dioxins to be used for regulatory purposes, an emission limit value would need to be devised which is applicable to continuous monitoring. Such limits for mercury and dioxins have not been set by the European Commission. Use of a manual sample train is the only technique which fulfils the requirements of the IED. At the present time, it is considered that in view of the predicted low levels of mercury and dioxin emission it is not justifiable to require the Operator to install additionally continuous monitoring or sampling devices for these substances.

In accordance with its legal requirement to do so, the Environment Agency reviews the development of new methods and standards and their performance in industrial applications. In particular the Environment Agency considers continuous sampling systems for dioxins to have promise as a potential means of improving process control and obtaining more accurate mass emission estimates.

6.8 Reporting

We have specified the reporting requirements in Schedule 4 of the Permit either to meet the reporting requirements set out in the IED, or to ensure data is reported to enable timely review by the Environment Agency to ensure compliance with permit conditions and to monitor the efficiency of material use and energy recovery at the installation.

7 Other legal requirements

In this section we explain how we have addressed other relevant legal requirements, to the extent that we have not addressed them elsewhere in this document.

7.1 The EPR 2016 and related Directives

The EPR delivers the requirements of a number of European and national laws.

7.1.1 Schedules 1 and 7 to the EPR 2016 – **IED Directive**

We address the requirements of the IED in the body of this document above and the specific requirements of Chapter IV in Annex 1 of this document.

There is one requirement not addressed above, which is that contained in Article 5(3) IED. Article 5(3) requires that "In the case of a new installation or a substantial change where Article 4 of Directive 85/337/EC (now Directive 2011/92/EU) (the EIA Directive) applies, any relevant information obtained or conclusion arrived at pursuant to articles 5, 6 and 7 of that Directive shall be examined and used for the purposes of granting the permit."

- Article 5 of EIA Directive relates to the obligation on developers to supply the information set out in Annex IV of the Directive when making an application for development consent.
- Article 6(1) requires Member States to ensure that the authorities likely to be concerned by a development by reason of their specific environmental responsibilities are consulted on the Environmental Statement and the request for development consent.
- Article 6(2)-6(6) makes provision for public consultation on applications for development consent.
- Article 7 relates to projects with transboundary effects and consequential obligations to consult with affected Member States.

The grant or refusal of development consent is a matter for the relevant local planning authority. The Environment Agency's obligation is therefore to examine and use any relevant information obtained or conclusion arrived at by the local planning authorities pursuant to those EIA Directive articles.

In determining the Application we have considered the following documents: -

- The Environmental Statement submitted with the planning application (which also formed part of the Environmental Permit Application).
- The decision of the Warwickshire County Council to grant planning permission on 27/10/17.
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

From consideration of all the documents above, the Environment Agency considers that no additional or different conditions are necessary.

The Environment Agency has also carried out its own consultation on the Environmental Permitting Application which includes the Environmental Statement submitted to the local planning authority. The results of our consultation are described elsewhere in this decision document.

7.1.2 Schedule 9 to the EPR 2016 – **Waste Framework Directive**

As the Installation involves the treatment of waste, it is carrying out a *waste operation* for the purposes of the EPR 2016, and the requirements of Schedule 9 therefore apply. This means that we must exercise our functions so as to ensure implementation of certain articles of the WFD.

We must exercise our relevant functions for the purposes of ensuring that the waste hierarchy referred to in Article 4 of the Waste Framework Directive is applied to the generation of waste and that any waste generated is treated in accordance with Article 4 of the Waste Framework Directive. (See also section 4.3.9)

The conditions of the permit ensure that waste generation from the facility is minimised. Where the production of waste cannot be prevented it will be recovered wherever possible or otherwise disposed of in a manner that minimises its impact on the environment. This is in accordance with Article 4.

We must also exercise our relevant functions for the purposes of implementing Article 13 of the Waste Framework Directive; ensuring that the requirements in the second paragraph of Article 23(1) of the Waste Framework Directive are met; and ensuring compliance with Articles 18(2)(b), 18(2)(c), 23(3), 23(4) and 35(1) of the Waste Framework Directive.

Article 13 relates to the protection of human health and the environment. These objectives are addressed elsewhere in this document.

Article 23(1) requires the permit to specify:

- (a) the types and quantities of waste that may be treated;
- (b) for each type of operation permitted, the technical and any other requirements relevant to the site concerned;
- (c) the safety and precautionary measures to be taken;
- (d) the method to be used for each type of operation;
- (e) such monitoring and control operations as may be necessary;
- (f) such closure and after-care provisions as may be necessary.

These are all covered by permit conditions.

The permit does not allow the mixing of hazardous waste so Article 18(2) is not relevant.

We consider that the intended method of waste treatment is acceptable from the point of view of environmental protection so Article 23(3) does not apply. Energy efficiency is dealt with elsewhere in this document but we consider the conditions of the permit ensure that the recovery of energy take place with a high level of energy efficiency in accordance with Article 23(4).

Article 35(1) relates to record keeping and its requirements are delivered through permit conditions.

7.1.3 Schedule 22 to the EPR 2016 – **Water Framework and Groundwater Directives**

To the extent that it might lead to a discharge of pollutants to groundwater (a "groundwater activity" under the EPR 2016), the Permit is subject to the requirements of Schedule 22, which delivers the requirements of EU Directives relating to pollution of groundwater. The Permit will require the taking of all necessary measures to prevent the input of any hazardous substances to groundwater, and to limit the input of non-hazardous pollutants into groundwater so as to ensure such pollutants do not cause pollution, and satisfies the requirements of Schedule 22.

No releases to groundwater from the Installation are permitted. The Permit also requires material storage areas to be designed and maintained to a high standard to prevent accidental releases.

7.1.4 Directive 2003/35/EC – **The Public Participation Directive**

Regulation 60 of the EPR 2016 requires the Environment Agency to prepare and publish a statement of its policies for complying with its public participation duties. We have published our public participation statement.

This Application has been consulted upon in line with this statement. This satisfies the requirements of the Public Participation Directive.

7.2 National primary legislation

7.2.1 **Environment Act 1995**

(i) Section 4 (Pursuit of Sustainable Development)

We are required to contribute towards achieving sustainable development, as considered appropriate by Ministers and set out in guidance issued to us. The Secretary of State for Environment, Food and Rural Affairs has issued *The Environment Agency's Objectives and Contribution to Sustainable Development: Statutory Guidance (December 2002)*. This document:

> "*provides guidance to the Agency on such matters as the formulation of approaches that the Agency should take to its work, decisions about priorities for the Agency and the allocation of resources. It is not directly applicable to individual regulatory decisions of the Agency*".

Paragraph 4.2 of this Guidance provides the objectives we are to pursue when discharging our main operational functions. As far as determining applications for water discharge permits is concerned, this states that we are:

> *'To protect, enhance and restore the environmental quality of inland and*
> *coastal surface water and groundwater, and in particular:*
> *to address both point source and diffuse pollution;*
> *to implement the EC Water Framework Directive; and*
> *to ensure that all relevant quality standards are met.'*

The Environment Agency considers that it has pursued the objectives set out in the Government's guidance, where relevant, and that there are no additional conditions that should be included in this Permit to take account of the Section 4 duty

In respect of regulation of industrial pollution through the EPR, the Guidance refers in particular to the objective of setting permit conditions "*in a consistent and proportionate fashion based on Best Available Techniques and taking into account all relevant matters…*". The Environment Agency considers that it has pursued the objectives set out in the Government's guidance, where relevant, and that there are no additional conditions that should be included in this Permit to take account of the Section 4 duty.

For waste the guidance refers to ensuring waste is recovered or disposed of in ways which protect the environment and human health. The Environment Agency considers that it has pursued the objectives set out in the Government's guidance, where relevant, and that there are no additional conditions that should be included in this Permit to take account of the Section 4 duty.

(ii) Section 5 (Preventing or Minimising Effects of Pollution of the Environment)

We are satisfied that our pollution control powers have been exercised for the purpose of preventing or minimising, remedying or mitigating the effects of pollution.

(iii) Section 6(1) (Conservation Duties with Regard to Water)

We have a duty to the extent we consider it desirable generally to promote the conservation and enhancement of the natural beauty and amenity of inland and coastal waters and the land associated with such waters, and the conservation of flora and fauna which are dependent on an aquatic environment.

We consider that no additional or different conditions are appropriate for this Permit.

(iv) Section 6(6) (Fisheries)

We have a duty to maintain, improve and develop fisheries of salmon, trout, eels, lampreys, smelt and freshwater fish.

We consider that no additional or different conditions are appropriate for this Permit.

(v) Section 7 (Pursuit of Conservation Objectives)

This places a duty on us, when considering any proposal relating to our functions, to have regard amongst other things to any effect which the proposals would have on sites of archaeological, architectural, or historic interest; the economic and social well-being of local communities in rural areas; and to take into account any effect which the proposals would have on the beauty or amenity of any rural area.

We considered whether we should impose any additional or different requirements in terms of our duty to have regard to the various conservation objectives set out in Section 7, but concluded that we should not.

(vi) Section 39 (Costs and Benefits)

We have a duty to take into account the likely costs and benefits of our decisions on the applications ('costs' being defined as including costs to the environment as well as any person). This duty, however, does not affect our obligation to discharge any duties imposed upon us in other legislative provisions.

In so far as relevant we consider that the costs that the permit may impose on the applicant are reasonable and proportionate in terms of the benefits it provides.

(vii) Section 108 Deregulation Act 2015 – Growth duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit.
Paragraph 1.3 of the guidance says:
"The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a

factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation."

We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

(viii) Section 81 (National Air Quality Strategy)

We have had regard to the National Air Quality Strategy and consider that our decision complies with the Strategy, and that no additional or different conditions are appropriate for this Permit.

We have also had regard to the clean air strategy 2019 and consider that our decision complies with the Strategy, and that no additional or different conditions are appropriate for this Permit.

(ix) National Emissions Ceiling Regulations 2018

We have had regard to the National Air Pollution Control Programme and consider that our decision complies with the Strategy, and that no additional or different conditions are appropriate for this Permit.

7.2.2 **Human Rights Act 1998**

We have considered potential interference with rights addressed by the European Convention on Human Rights in reaching our decision and consider that our decision is compatible with our duties under the Human Rights Act 1998. In particular, we have considered the right to life (Article 2), the right to a fair trial (Article 6), the right to respect for private and family life (Article 8) and the right to protection of property (Article 1, First Protocol). We do not believe that Convention rights are engaged in relation to this determination.

7.2.3 **Countryside and Rights of Way Act 2000 (CROW 2000)**

Section 85 of this Act imposes a duty on Environment Agency to have regard to the purpose of conserving and enhancing the natural beauty of the area of outstanding natural beauty (AONB). There is no AONB which could be affected by the Installation.

7.2.4 **Wildlife and Countryside Act 1981**

Under section 28G of the Wildlife and Countryside Act 1981 the Environment Agency has a duty to take reasonable steps to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which a site is of special scientific interest. Under section 28I the Environment Agency has a duty to consult Natural England in relation to any permit that is likely to damage SSSIs.

We assessed the Application and concluded that the Installation was likely to damage the special features of Bentley Park Woods SSSI. This was recorded on a CROW Appendix 4 form,

The CROW assessment is summarised in greater detail in section 5.4.3 of this document. A copy of the full Appendix 4 Assessment can be found on the public register.

7.2.5 **Natural Environment and Rural Communities Act 2006**

Section 40 of this Act requires us to have regard, so far as is consistent with the proper exercise of our functions, to the purpose of conserving biodiversity. We have done so and consider that no different or additional conditions in the Permit are required.

7.2.6 **Countryside Act 1968**

Section 11 imposes a duty on the Environment Agency to exercise its functions relating to any land, having regard to the desirability of conserving the natural beauty and amenity of the countryside including wildlife. We have done so and consider that no different or additional conditions in the Permit are required.

7.2.7 **National Parks and Access to the Countryside Act 1949**

Section 11A and section 5(1) imposes a duty on the Environment Agency when exercising its functions in relation to land in a National Park, to have regard to the purposes of conserving and enhancing the natural beauty, wildlife and cultural heritage of the areas, and of promoting opportunities for the understanding and enjoyment of National Parks by the public.

We have done so and consider that no different or additional conditions in the Permit are required, as there is no National Park which could be affected by the Installation.

7.3 <u>National secondary legislation</u>

7.3.1 **Conservation of Habitats and Species Regulations 2017**

We have assessed the Application in accordance with guidance agreed jointly with Natural England and concluded that there will be no likely significant effect on any European Site. We have not consulted with Natural England.

7.3.2 **Water Environment (Water Framework Directive) Regulations 2017**

Consideration has been given to whether any additional requirements should be imposed in terms of the Environment Agency's duty under regulation 3 to secure compliance with the requirements of the Water Framework Directive, Groundwater directive and the EQS Directive through (inter alia) environmental permits, and its obligation in regulation 33 to have regard to the river basin management plan (RBMP) approved under regulation 31 and any supplementary plans prepared under regulation 32. However, it is felt that existing conditions are sufficient in this regard and no other appropriate requirements have been identified

We are satisfied that granting this application with the conditions proposed would not cause the current status of the water body to deteriorate, and that it will not compromise the ability of this water body to achieve good status.

7.3.3 **The Persistent Organic Pollutants Regulations 2019**

We have explained our approach to these Regulations, which give effect to the Stockholm Convention on POPs and the EU's POPs Regulation, above.

7.4 Other relevant legal requirements

7.4.1 Duty to Involve

S23 of the Local Democracy, Economic Development and Construction Act 2009 require us where we consider it appropriate to take such steps as we consider appropriate to secure the involvement of interested persons in the exercise of our functions by providing them with information, consulting them or involving them in any other way. S24 requires us to have regard to any Secretary of State guidance as to how we should do that.

The way in which the Environment Agency has consulted with the public and other interested parties is set out in section 2.2 of this document. The way in which we have taken account of the representations we have received is set out in Annex 4. Our public consultation duties are also set out in the EP Regulations, and our statutory Public Participation Statement, which implement the requirements of the Public Participation Directive. In addition to meeting our consultation responsibilities, we have also taken account of our guidance in Environment Agency Guidance Note RGS6 and the Environment Agency's Building Trust with Communities toolkit.

ANNEX 1: APPLICATION OF CHAPTER IV OF THE INDUSTRIAL EMISSIONS DIRECTIVE

IED Article	Requirement	Delivered by
45(1)(a)	The permit shall include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2000/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate.	Condition 2.3.4(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(b)	The permit shall include the total waste incinerating or co-incinerating capacity of the plant.	Condition 2.3.4(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(c)	The permit shall include the limit values for emissions into air and water.	Conditions 3.1.1 and 3.1.2 and Tables S3.1, S3.1(a) and S3.2 in Schedule 3 of the Permit.
45(1)(d)	The permit shall include the requirements for pH, temperature and flow of waste water discharges.	Not Applicable (not using wet flue gas abatement)
45(1)(e)	The permit shall include the sampling and measurement procedures and frequencies to be used to comply with the conditions set for emissions monitoring.	Conditions 3.5.1 to 3.5.5 and Tables S3.1, S3.1(a), S3.3 and S3.4 in Schedule 3 of the Permit.
45(1)(f)	The permit shall include the maximum permissible period of unavoidable stoppages, disturbances or failures of the purification devices or the measurement devices, during which the emissions into the air and the discharges of waste water may exceed the prescribed emission limit values.	Conditions 2.3.10 and 2.3.11.
45(2)(a)	The permit shall include a list of the quantities of the different categories of hazardous waste which may be treated.	Not applicable
45(2)(b)	The permit shall include the minimum and maximum mass flows	Not Applicable

IED Article	Requirement	Delivered by
	of those hazardous waste, their lowest and maximum calorific values and the maximum contents of polychlorinated biphenyls, pentachlorophenol, chlorine, fluorine, sulphur, heavy metals and other polluting substances.	
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Condition 2.3.1(a) and Table S1.2 of Schedule 1 of the Permit.
46(2)	Emission into air shall not exceed the emission limit values set out in part of Annex VI.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1a.
46(3)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(4)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(5)	Prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. Adequate storage capacity for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting.	The application explains the measures to be in place for achieving the directive requirements
46(6)	Limits the maximum period of operation when an ELV is exceeded to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year. Limits on dust (150 mg/m3), CO and TOC not to be exceeded during this period.	Condition 2.3.11 & 2.3.13
47	In the event of breakdown, reduce or close down operations as soon as practicable. Limits on dust (150 mg/m3), CO and TOC not to be exceeded during this period.	Condition 2.3.10

IED Article	Requirement	Delivered by
	<Drafting note emission limits only apply to waste incinerators>.	
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Conditions 3.5.1 to 3.5.5. Reference conditions are defined in Schedule 6 of the Permit.
48(2)	Installation and functioning of the automated measurement systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	condition 3.5.3, and tables S3.1, S3.1(a), and S3.4
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	conditions 3.5.3 and 3.5.4
48(4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Conditions 4.1.1 and 4.1.2, and Tables S4.1 and S4.4
49	The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	conditions 3.1.1 and 3.1.2 and 3.5.5
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) < 3% or loss on ignition (LOI) < 5%.	Conditions 3.5.1 and Table S3.5
50(2)	Flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber.	Condition 2.3.7, Pre-operational condition PO4 and Improvement condition IC3 and Table S3.4
50(3)	At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas.	Condition 2.3.8
50(4)(a)	Automatic shut to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.7
50(4)(b)	Automatic shut to prevent waste feed if the combustion temperature	Condition 2.3.7

IED Article	Requirement	Delivered by
	is not maintained.	
50(4)(c)	Automatic shut to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.7
50(5)	Any heat generated from the process shall be recovered as far as practicable.	(a) The plant will generate electricity (b)Operator to review the available heat recovery options every 4 years (Conditions 1.2.1 & 1.2.2)
50(6)	Relates to the feeding of infectious clinical waste into the furnace.	No infectious clinical waste will be burnt
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit.
51(1)	Different conditions than those laid down in Article 50(1), (2) and (3) and, as regards the temperature Article 50(4) may be authorised, provided the other requirements of this chapter are met.	No such conditions Have been allowed
51(2)	Changes in operating conditions do not cause more residues or residues with a higher content of organic polluting substances compared to those residues which could be expected under the conditions laid down in Articles 50(1), (2) and (3).	No such conditions Have been allowed
52(1)	Take all necessary precautions concerning delivery and reception of Wastes, to prevent or minimise pollution.	Conditions 2.3.1, 2.3.3, 3.2, 3.3, 3.4 and 3.6.
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Condition 2.3.3(a) and Table S2.2 in Schedule 3 of the Permit.
52(3)	Prior to accepting hazardous waste, the operator shall collect available information about the waste for the purpose of compliance with the permit requirements specified in Article 45(2).	Not Applicable
52(4)	Prior to accepting hazardous waste,	Otherwise - Not

IED Article	Requirement	Delivered by
	the operator shall carry out the procedures set out in Article 52(4).	Applicable
52(5)	Granting of exemptions from Article 52(2), (3) and (4).	Otherwise - Not Applicable
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 1.4.1, 1.4.2 and 3.5.1 with Table S3.5
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	conditions 1.4.1 2.3.1, 2.3.2 and 3.2.1.
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.5.1 and Table S3.5 and pre-operational condition PO2.
55(1)	Application, decision and permit to be publicly available.	All documents are accessible from the Environment Agency Public Register.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2 and 4.2.3.

ANNEX 2: Pre-Operational Conditions

Based on the information on the Application, we consider that we do need to impose pre-operational conditions. These conditions are set out below and referred to, where applicable, in the text of the decision document. We are using these conditions to require the Operator to confirm that the details and measures proposed in the Application have been adopted or implemented prior to the operation of the Installation.

Table S1.4A Pre-operational measures

Reference	Pre-operational measures
PO1	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency, and obtain the Environment Agency's written approval, a written commissioning report for the site automated fire detection system. This should include, but is not limited to, the design layout, CCTV and camera locations, alarms, thermal detection, trigger temperatures and control room interactions. The Operator shall submit evidence to show that the design, installation and maintenance of this system will be covered by an appropriate UKAS accredited third party certification scheme or a demonstrable alternative third party accreditation. To include confirmation that it will be operated to comply with UKAS accreditation.
PO2	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency, and obtain the Environment Agency's written approval to it, a protocol for the sampling and testing of incinerator bottom ash, boiler and economiser fly ash, skimmer residues and APC residues for the purposes of assessing its hazard status. Sampling and testing shall be carried out in accordance with the protocol as approved.
PO3	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency, and obtain the Environment Agency's written approval to it, a written commissioning plan, including specifying the various stages and timelines of commissioning and when commissioning will have deemed to have been completed, for approval by the Environment Agency. The commissioning plan shall include the expected emissions to the environment during the different stages of commissioning, the expected durations of commissioning activities and the actions to be taken to protect the environment and report to the Environment Agency in the event that actual emissions exceed expected emissions. Commissioning shall be carried out in accordance with the commissioning plan as approved.
PO4	After the final design of the furnace and combustion chamber and prior to commissioning, the operator shall submit a written report to the Environment Agency, and obtain the Environment Agency's written approval to it, of the details of the computational fluid dynamic (CFD) modelling. The report shall explain how the furnace has been designed to comply with the residence time and temperature requirements as defined by Chapter IV and Annex VI of the IED whilst operating under normal load and the most unfavourable operating conditions (including minimum turn down and overload conditions), and that the design includes sufficient monitoring ports to support subsequent validation of these requirements during commissioning.
PO5	Prior to the commencement of commissioning, the Operator shall submit an updated site report, and obtain the Environment Agency's written approval

Table S1.4A Pre-operational measures	
Reference	**Pre-operational measures**
	to it, on the baseline conditions of soil and groundwater at the installation. The report shall contain the information on further testing undertaken in proximity to the diesel and ammonium hydroxide storage tanks necessary to determine the state of soil and groundwater contamination so as to make a quantified comparison with the state upon definitive cessation of activities provided for in Article 22(3) of the IED. The updated site report will also cover the extended drainage system to sewer. The report shall contain information, supplementary to that already provided in application Site Condition Report, needed to meet the information requirements of Article 22(2) of the IED.
PO6	Before the commencement of commissioning (or other date agreed in writing with the Environment Agency) the Operator shall submit, for approval by the Environment Agency, a methodology (having regard to Technical Report P4-100/TR Part 2 Validation of Combustion Conditions) to verify the residence time, minimum temperature and oxygen content of the gases in the furnace whilst operating under normal load, minimum turn down and overload conditions.

ANNEX 3: Improvement Conditions

Based in the information in the Application we consider that we need to set improvement conditions. These conditions are set out below - justifications for these is provided at the relevant section of the decision document. We are using these conditions to require the Operator to provide the Environment Agency with details that need to be established or confirmed during and/or after commissioning.

Table S1.3 Improvement programme requirements

Reference	Requirement	Date
IC1	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point [A1], identifying the fractions within the PM_{10}, and $PM_{2.5}$ ranges. On receipt of written approval from the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	Within 6 months of the completion of commissioning.
IC2	The Operator shall submit a written report to the Environment Agency on the commissioning of the installation. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions and confirm that the Environmental Management System (EMS) has been updated accordingly.	Within 4 months of the completion of commissioning.
IC3	The operator shall notify the Environment Agency of the proposed date(s) that validation testing is planned for.	Notification at least 3 weeks prior to validation testing
	During commissioning the operator shall validate the residence time, minimum temperature and oxygen content of the gases in the furnace whilst operating under normal load and most unfavourable operating conditions. The validation shall be to the methodology as approved through pre-operational condition PO6.	Validation tests completed before the end of commissioning

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
	The operator shall submit a written report to the Environment Agency on the validation of residence time, oxygen and temperature whilst operating under normal load, minimum turn down and overload conditions. The report shall identify the process controls used to ensure residence time and temperature requirements are complied with during operation of the incineration plant	Report submitted within 2 months of the completion of commissioning.
IC4	The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of: • The Selective Catalytic Reduction (SCR) system and combustion settings to minimise oxides of nitrogen (NOx).The report shall include an assessment of the level of NOx, N_2O and NH_3 emissions that can be achieved under optimum operating conditions. • The hydrated lime injection system for minimisation of acid gas emissions. The report shall include an assessment of the level of SO_2 emissions that can be achieved under optimum operating conditions, and if relevant propose a lower daily emission limit for emission point A1. • The activated carbon injection system for minimisation of dioxin and heavy metal emissions.	Within 4 months of the completion of commissioning.
IC5	The Operator shall carry out an assessment of the impact of emissions to air of the following component metals subject to emission limit values: As and Cr. A report on the assessment shall be made to the Environment Agency. Emissions monitoring data obtained during the first year of operation shall be used to compare the actual emissions with those assumed in the impact assessment submitted with the Application. An assessment shall be made of the impact of each metal against the relevant EQS/EAL. In the event that the assessment shows that an environmental standard can be exceeded, the report shall include proposals for further investigative work.	15 months from the completion of commissioning
IC6	The Operator shall submit a written summary report to the Environment Agency to confirm that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3. The report shall include the results of calibration and verification testing,	Initial calibration report to be submitted to the Agency within 3 months of completion of commissioning. Full summary evidence compliance report to be submitted within 18

Table S1.3 Improvement programme requirements		
Reference	**Requirement**	**Date**
		months of completion of commissioning.
IC7	During commissioning, the operator shall carry out tests to demonstrate whether the furnace combustion air will ensure that negative pressure is achieved throughout the reception hall. The tests shall demonstrate whether air is pulled through the reception hall and bunker area and into the furnace with dead spots minimised. The operator shall submit a report to the Environment Agency, for approval, summarising the findings along with any proposed improvements if required.	Within 3 months of completion of commissioning.
IC8	Submit a written report to the Environment Agency. The report must contain the results of the sampling of the waste waters discharged from the hybrid cooling towers, including the following parameters: concentrations of boron, chloride, fluoride, sulphate, copper, iron, manganese, ortho-phosphate and sodium bisulphite; the maximum, minimum and average temperature; and the maximum, minimum and average pH values. At least 12 samples shall be taken over a period of 6 months. A re-assessment, using the H1 tool, of the impacts on the unnamed brook must also be submitted for the following parameters: boron, chloride, fluoride, sulphate, copper, iron, manganese and sodium bisulphite.	Within 9 months of completion of commissioning.

ANNEX 4: Consultation Reponses

Advertising and Consultation on the Application

The Application has been advertised and consulted upon in accordance with the Environment Agency's Public Participation Statement. The way in which this has been carried out along with the results of our consultation and how we have taken consultation responses into account in reaching our decision is summarised in this Annex. Copies of all consultation responses have been placed on the Environment Agency public register.

The Application was advertised on the Environment Agency website. The Application was made available to view at the Environment Public Register at: Environment Agency, Sentinel House, 9 Wellington Crescent, Fradley Park, Lichfield, Staffs, WS13 8RR and on our website.

The following statutory and non-statutory bodies were consulted: -

- Public Health England;
- Local Authority Director of Public Health;
- Local planning authority, North Warwickshire Borough Council;
- Environmental Health, North Warwickshire Borough Council;
- National Grid;
- Health and Safety Executive;
- Natural England;
- Severn Trent Water Limited.

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from Public Health England 11/10/18	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Permit should contain conditions to ensure that the following emissions: oxides of nitrogen and particulate matter do not impact upon public health.	Emissions to air and their impacts will cause not significant pollution or harm to human health, as discussed in section 5 of this document.
PHE has no significant concerns regarding risk to health of the local population from this proposed activity, providing that the applicant takes all appropriate measures to prevent or control pollution.	We are satisfied that the Applicants proposals utilise the Best Available Techniques. This is discussed in section 6 of this document,

Response Received from Severn Trent Water Limited 15/08/19	
Brief summary of issues raised:	Summary of action taken / how this has been covered

The Severn Trent Water Catchment Team have no comments to make with regards to the discharge to the local brook that flows from the site towards the River Anker.	Emissions to surface water and their impacts will not cause significant harm, as discussed in section 5.6 of this document.

Natural England were also consulted and their comments are discussed in section 6.1.2 of this document.

2) Consultation Responses from Members of the Public and Community Organisations

None