

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/BP3325SA
The Applicant / Operator is: Grid Powr (UK) Ltd
The Installation is located at: Houghton Main EfW, Park Spring Road, Houghton Main, Barnsley, S72 7GX

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/BP3325SA/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/BP3325SA. We refer to the proposed permit as “the **Permit**” in this document.

The Application was duly made on 04/08/2023.

The applicant is Grid Powr (UK) Ltd. We refer to Grid Powr (UK) Ltd as “the **Applicant**” in this document. Where we are talking about what would happen after the Permit is granted we call Grid Powr (UK) Ltd “the **Operator**”.

Grid Powr (UK) Ltd’s proposed facility is located at Houghton Main EfW, Park. We refer to this as “the **Installation**” in this document.

How this document is structured

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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	Best Available Techniques (BAT) Reference Documents for Waste Incineration
BAT C	BAT conclusions
CCW	Countryside Council for Wales
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
EMAS	EU Eco Management and Audit Scheme
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154) as amended
EQS	Environmental Quality Standard
ES	Environmental standard
EWC	European waste catalogue
FGC	Flue gas cleaning
FGR	Flue gas recirculation
FPP	Fire prevention plan
FSA	Food Standards Agency
GWP	Global Warming Potential

HHRAP	Human Health Risk Assessment Protocol
HPA	Health Protection Agency (now UKHSA – UK Health Security Agency)
HRA	Human Rights Act 1998
HW	Hazardous waste
HWI	Hazardous waste incinerator
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCPD	Large Combustion Plant Directive (2001/80/EC) – now superseded by IED
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LADPH	Local Authority Director(s) of Public Health
LOI	Loss on Ignition
MBT	Mechanical biological treatment
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NO _x	Oxides of nitrogen (NO plus NO ₂ expressed as NO ₂)
OTNOC	Other than normal operating conditions
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
PHE	Public Health England (now UKHSA – UK Health Security Agency)
POP(s)	Persistent organic pollutant(s)
PPS	Public participation statement
PR	Public register
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated biphenyls
PXDF	Poly-halogenated di-benzo furans
RDF	Refuse derived fuel

RGN	Regulatory Guidance Note
SAC	Special Area of Conservation
SED	Solvent Emissions Directive (1999/13/EC) – now superseded by IED
SCR	Selective catalytic reduction
SHPI(s)	Site(s) of High Public Interest
SNCR	Selective non-catalytic reduction
SPA(s)	Special Protection Area(s)
SS	Sewage sludge
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

Links to guidance documents

The table below provides links to the key guidance documents referred to in this document. The links were correct at the time of producing this document.

Name of guidance document	Link
RGN 6: Determinations involving sites of high public interest	RGN 6
CHP Ready Guidance for Combustion and Energy from Waste Power Plants	CHP ready
Risk assessments for your environmental permit	Risk assessments
Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – version 4”.	Metals guide
The Incineration of Waste (EPR 5.01)	EPR 5.01
Waste incineration BREF and BAT conclusions	BREF and BAT C
UKHSA: Municipal waste incinerators emissions: impact on health	UKHSA reports

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 (EPR) 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 that the details provided are sufficient and satisfactory to make use of the standard condition acceptable and 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, an explanation of the reason(s) for choosing the option that has been specified.

2 How we reached our decision

2.1 Receipt of Application

The Application was duly made on 4 August 2023. 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 section 2.3 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 carried out consultation on the Application in accordance with the EPR, our statutory Public Participation Statement (PPS) and our own internal guidance RGN 6 for Determinations involving Sites of High Public Interest. RGN 6 was withdrawn as external guidance, but it is still relevant as Environment Agency internal guidance.

We consider that this process satisfies, and frequently goes beyond the requirements of the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, which are directly incorporated into the IED, which applies to the Installation and the Application. We have also taken into account our obligations under the Local Democracy, Economic Development and Construction Act 2009 (particularly Section 23). This requires us, where we consider it appropriate, to take such steps as we consider appropriate to secure the involvement of representatives of interested persons in the exercise of our functions, by providing them with information, consulting them or involving them in any other way. In this case, we consider that our consultation already satisfies the requirements of the 2009 Act.

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 also placed an advertisement in the Sheffield Star and the Barnsley Chronicle, both on 29 September, that contained the same information.

We made a copy of the Application and all other documents relevant to our determination available to view on Citizen Space. The Application was advertised on the Environment Agency website from 29 September 2023 to 27 October 2023. 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”:

- Local Authority – Environmental Health
- Local Authority – Planning
- Fire & Rescue
- Director of PH/UKHSA
- Health and Safety Executive
- Food Standards Agency
- Sewerage Authorities
- National Grid

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.

In addition to our advertising the Application, we undertook a programme of extended public consultation. 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 an information notice on 02/02/2024. A copy of the information notice was placed on our public register as well as the response when received.

In addition to our information notices, we received additional information during the determination from of an updated Fire Prevention Plan on 10/07/2024. We made a copy of this information available to the public in the same way as the response to our information notice.

3 The legal framework

The Permit will be 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 section 7 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.

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” (DAA) for EPR purposes, such as air pollution control plant, and the ash storage bunker, 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 activities and directly associated activities comprise the Installation.

4.1.2 The Site

The installation is located within the Metropolitan District of Barnsley at NGR SE4162006370. The site is bounded by an industrial unit to the east and a medium combustion plant to the south-east. The remaining surroundings are open land/wetlands/River Dearne, which form the Dearne Valley Wetlands (SSSI). The nearest residential receptor is 0.7km to the south-west.

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 installation 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.

Although the process used to thermally treat the waste is an advanced thermal treatment process, where waste will be gasified to produce a synthetic gas (syngas); for the process not to be considered to be a waste incineration plant, the resultant gases from the gasification process must be purified to such an extent that they are no longer a waste prior to their combustion and can cause emissions no higher than those from the burning of natural gas. The Applicant has not demonstrated to our satisfaction that the gases have passed the 'end of waste' test as referred to in the Waste Framework Directive; therefore the whole process is considered to be a waste incineration plant and therefore subject to the requirements of Chapter IV of the IED.

The installation processes up to maximum 145,000 tonnes of waste per year (16.6 tonnes per hour of waste per line) in two incineration lines. The incineration lines utilise an advanced thermal treatment process, where waste will be gasified to produce a synthetic gas (syngas). The syngas is then combusted for the purposes of raising superheated steam through a steam boiler plant. Waste is delivered to the facility by road in covered vehicles or containers and tipped within the Fuel Reception Hall. The delivered RDF feedstocks will then be transferred either directly to the pre-processing plant or to one of two fuel bunkers. The RDF will be stored within the temporary storage area for no longer than 1 day before being transferred to the pre-processing plant. The RDF feedstocks will then be transferred directly to the pre-processing equipment which consists of two shredders, two magnetic separators and two eddy-current separators. Once pre-processed the RDF will then be transferred to one of two bunkers for storage prior to loading via crane into the hybrid combustion system. The waste reception hall is equipped with rapid action roller shutter doors for vehicle access and egress and operates under slight negative pressure relative to the external environment as a result of the extraction of combustion air for the incineration process. A process flow chart is included below.

Heat from the combustion process is used to generate high pressure steam in a multi stage boiler plant which is integral to the combustion process. The high pressure steam is fed to a steam turbine to generate electricity. The ERF facility has a total capacity of around 51.7MW (thermal input) and is capable of generating up to 15.5 MWe of electrical power, of which up to 12.7 MWe is exported to the National Grid. Provision has been made in the design for the plant to be capable of supplying heat in the form of steam or hot water, once a viable heat user becomes available to take the heat as an output.

The furnace design ensures that a temperature of at least 850°C for a period of at least two seconds is achieved in the combustion chamber. To ensure that the temperature does not fall below 850°C, auxiliary burners firing low sulphur fuel oil are automatically triggered by online process monitoring equipment. The auxiliary burners are also used to achieve and maintain the minimum furnace temperature during start up and shutdown periods.

Combustion gases are cleaned before they are released to atmosphere. There are four components to the flue gas cleaning and abatement technique:

- Selective Non-Catalytic Reduction (SNCR), involving the injection of ammonium hydroxide into the combustion chamber and Selective Catalytic Reduction (SCR), through ammonium hydroxide injection after the bag filtration unit provides for the abatement of nitrogen oxides;
- Sodium bicarbonate injection to neutralise acid gas compounds;
- activated carbon, injected to absorb mercury, dioxins and furans; and
- bag filtration to remove fine particulates. The residues which are collected on the bag filters are directed to a residues silo. Part of the residues are recycled to the reagent injection points to ensure maximum usage of the lime content.

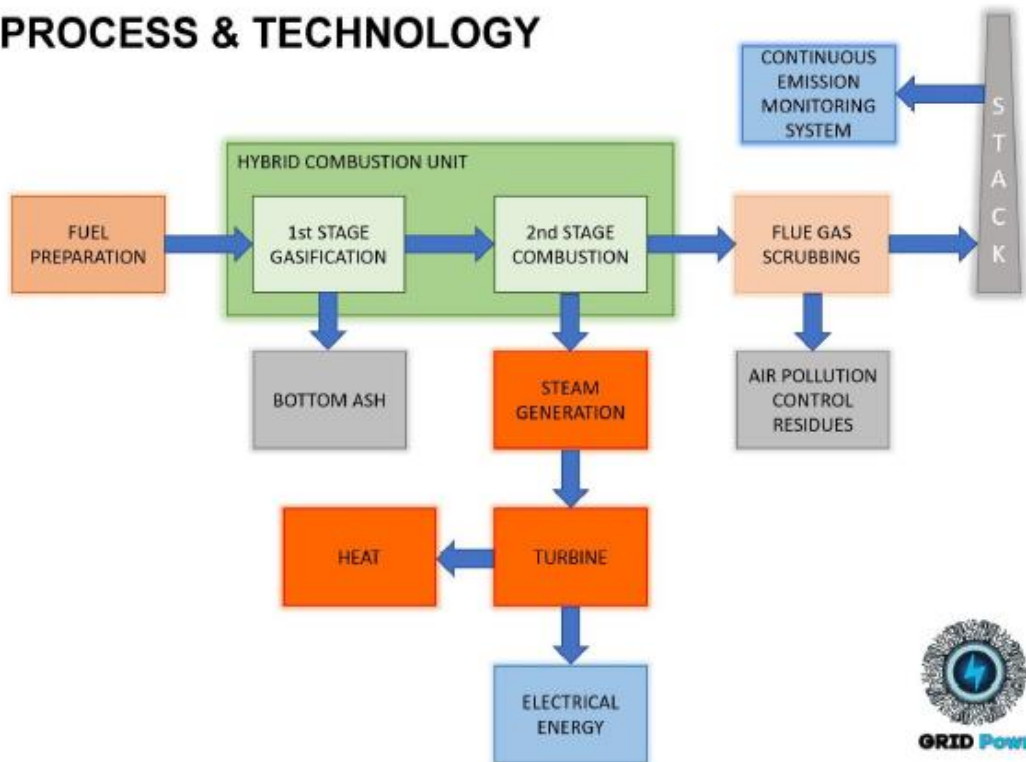
Cleaned flue gases exiting the abatement system of each incinerator line are discharged through two 45m tall stacks each within a common windshield. Exhaust flue gases are continuously monitored for particulate matter, oxides of nitrogen, nitrous oxide, sulphur dioxide, carbon monoxide, total organic carbon, hydrogen chloride and ammonia. Monitoring for heavy metals, dioxins, dioxin-like PCBs, PAHs, brominated dioxins and hydrogen fluoride is carried out periodically.

Under normal circumstances there are no liquid effluent emissions from the installation. Although some rainwater is harvested for use in the process, the site has a net consumption of water. Wastewater arising from boiler blowdown and water treatment backwash are recycled to the Incinerator Bottom Ash (IBA) quench system.

The incineration process results in solid residues of IBA and air pollution control (APC) residues. The IBA from the combustion process is transferred by water cooled screw to a container, then periodically transferred to an appropriately authorised facility for treatment.

APC residues are collected and temporarily stored on site in a silo prior to being removed from the site in enclosed tankers for subsequent treatment or disposal at an appropriately authorised facility.

PROCESS & TECHNOLOGY



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

Waste throughput	72,500 /annum (per line)	16.6 /hour (both lines)
Waste processed	MSW, RDF	
Number of lines	2	
Furnace technology	Reciprocating grate	
Auxiliary Fuel	Diesel	
Acid gas abatement	Dry	Sodium bicarbonate
NOx abatement	SCR/SNCR	Ammonia hydroxide
Reagent consumption	Auxiliary Fuel 189 te/annum Ammonia : 1,234 te/annum Sodium bicarbonate : 1,952te/annum Activated carbon: 98 te/annum Process water: 122,640 te/annum	
Flue gas recirculation	Yes	
Dioxin abatement	Activated carbon	
Stack	Grid Reference SE4160006400	
	Height, 45 m	Diameter, 1.20m per stack (2 stacks total)
Flue gas	Flow, 13.88Nm ³ /s per stack	Velocity, 16.7m/s
	Temperature 170°C	
Electricity generated	15.5MWe	
Electricity exported	12.7 MWe	
Steam conditions	Temperature, 430 °C	Pressure, 77 bar

4.1.4 Key Issues in the Determination

The key issues arising during determination of the Application were emissions to air and we therefore describe how we determined these issues in greater detail in the body of this document.

4.2 The site and its protection

4.2.1 Site setting, layout and history

The site is located at Houghton Main Energy Centre, Park Spring Road, Barnsley, S72 7GX. The site is located to the north of the town of Darfield, to the north, east, south, and west is heavily dominated by agricultural or rural land. The site is bound to the south, north and west by agricultural sites, with the east being bound by the A6195. The River Dearne is located approximately 10m to the north of the proposed development, running north south along the western border. The site is roughly triangular in shape and covers an area of approximately 4.9 hectares. The site currently comprises a car park area on the north-eastern extent of the site, which is on concrete hardstanding and will remain unchanged. The remainder of the site consists of undeveloped and rural land. The nearest residential area to the site is Ings Lane which lies approximately 625m south of the site immediately west of the A6195 road.

Earliest available mapping in 1854 shows the site is primarily utilised for agricultural purposes, however there is a railway running northwest, southeast along the bottom corner of the site. Several villages are also present, including Edderthorpe, approximately 780m southwest to the site boundary with multiple farms found here. The entirety of the area is in keeping with this, with the land primarily used for agricultural purposes. The River Dearne is found approximately 30m west of the site boundary. A quarry is also identified approximately 800m north of the site. The next available mapping from 1890 shows the development of Houghton Main Colliery, found approximately 100m southeast of the site. This colliery connected to the railway and was less than 50m from the River Dearne. There were no significant changes in the remainder of the area. In 1904 a second railway line is present to the north of the existing line, found to border the northern extent of the site; a further line is found to dissect the site into two halves from the north to the south. The colliery works has enlarged and includes a sewage works 300m southeast, development is also seen in the surrounding villages, most notably Great Houghton. Further increase of development to the colliery works size is seen at the next available mapping in 1931, seeing spoil heaps and an aerial cable present, as well as further development to Little Houghton, with housing getting closer to the colliery works. There are little changes seen in the surrounding area by the next mapping in 1955, however the sewage works at the Colliery is no longer labelled, indicating closure of the works. The site does not see change until 1981, where the onsite railway lines see dismantling to all tracks. Pump houses can also be seen approximately 800m northwest of the site boundary. The surroundings see changes made to the colliery works, with equipment reorganised, this moves some works closer to

site, with buildings now present 50m southeast of the site. More growth is seen to the colliery works with further spoil heaps added to the northeast in 1983-1993. The site and surroundings see further dismantling of the railway in 2001, the surroundings see the end of the colliery works now labelled as a quarry, with demolition occurring and no buildings remaining, spoil heaps to the northeast remain. The Park Spring Road is also present on this version of mapping, running 80m north of the site. Mapping from 2010 show development of a large development 100m east of the site, as well as the road being brought closer to the boundary of the site. The most recent mapping from 2023 shows the Great Houghton Quarry previously found to the north of the site to be gone, a lake is also located 250m northwest of the site.

The site layout plan is included below.



4.2.2 Proposed site design: potentially polluting substances and prevention measures

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 and consider that it adequately describes the condition of the soil and groundwater prior to the start of operations.

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 Closure and decommissioning

Pre-operational condition PO1 requires the Operator to have an Environmental Management System in place before the Installation is operational, and this will include a site closure plan.

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.

4.3.2 Management

The Applicant has stated in the Application that they will implement an Environmental Management System (EMS) that will be certified under ISO14001. A pre-operational condition (PO1) is included requiring the Operator to provide a summary of the EMS prior to commissioning of the plant and to make available for inspection all EMS documentation. The Environment Agency recognises that certification of the EMS cannot take place until the Installation is operational. An improvement condition (IC1) is included requiring the Operator to report progress towards gaining accreditation of its EMS.

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.

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 submitted an Accident Management Plan. Having considered the Plan and 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 form part of the Environmental Management System and must be in place prior to commissioning as required by a pre-operational condition (PO1).

The Applicant submitted a Fire Prevention Plan. We have reviewed the applicant's submitted plan. We are satisfied that the plan will meet the objectives of our guidance.

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 following documents contained in the Application:

Description	Parts Included	Justification
The Application	Sections 3, 4, 5, 6 and 7 of 'EPR Application Support Document' June 2023	
Response to Schedule 5 Notice 02/02/2024	Responses 2a-2h, 8 and 9.	These responses demonstrate adherence to BAT (2a-2h), Fire Prevention requirements (8) and drainage requirements (9).
Fire Prevention Plan (v3)	All parts	The operator will need to comply with the commitments made in the FPP

The details set out above describe the techniques that will be used for the operation of the Installation that have been assessed by us 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 a list of those wastes coded 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 types, descriptions and where appropriate quantities which can be accepted at the installation in Table S2.2.

We are satisfied that the Applicant can accept the wastes contained in Table S2.2 of the Permit because: -

- (i) these wastes are categorised as municipal waste in the European Waste Catalogue or are non-hazardous wastes similar in character to municipal waste;
- (ii) the wastes are all categorised as non-hazardous in the European Waste Catalogue and are capable of being safely burnt at the Installation.
- (iii) these wastes are likely to be within the design calorific value (CV) range for the plant;
- (iv) these wastes are unlikely to contain harmful components that cannot be safely processed at the Installation.

The incineration plant will take municipal waste, which has not been source-segregated or separately collected or otherwise recovered, recycled or composted. The amount of recyclable material in the waste feed is largely outside the remit of this permit determination with recycling initiatives being a matter for the local authority. However Permit conditions 2.3.5 and 2.3.6 limit the burning of separately collected fractions in line with regulation 12 of the Waste (England and Wales) Regulations 2011.

We have limited the capacity of the Installation to 145,000 tonnes per annum. This is based on the installation operating 8,760 hours per year at a nominal capacity of 16.6 tonnes per hour.

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:

- All plant and equipment will be individually monitored and controlled using a DCS monitoring system and PLC controls, optimised for efficiency of operation;

- All heat generated by the combustion plant will be recovered and used for the generation of electricity;
- All aspects of the combustion plant are controlled in real time to ensure maximum thermal efficiency and operational control;
- All plant energy data will be monitored and recorded and targeted to ensure optimal plant performance; and
- As part of the company's environmental management system, targets will be set regarding the increased thermal efficiency of the plant and the potential export of heat to neighbouring facilities

The Application shows that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 75 KWh/tonne. The installation capacity is 145,000 t/a.

The BREF says that electricity consumption is typically between 60 KWh/t and 190 KWh/t depending on the LCV of the waste.

The LCV in this case is expected to be 9.5 MJ/kg. The specific energy consumption in the Application is in line with 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 combined heat and power (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, we consider 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 0.4 – 0.8 MWh of electricity can be generated per tonne of waste.

Our technical guidance note, 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 R1 assessment calculations submitted in response to the Schedule 5 request dated 02/02/2024 shows 15.5 MW of electricity produced for an annual burn of 121,000 tonnes (n.b. this tonnage is lower than the permitted tonnage as the operator carried out their calculations using a waste calorific value of 12 MJ/Kg whereas LCV is likely to be 9.5MJ/kg), which represents 12.81 MW per 100,000 tonnes/yr of waste burned (0.83 MWh/tonne of waste). The Installation is therefore at the top end of the indicative BAT range.

The Applicant provided a calculation of the gross electrical efficiency and compared it to the BAT AEEL specified in BAT conclusions BAT 20.

The gross electrical efficiency was calculated as 29.9%. The BAT AEEL for gross electrical efficiency is 25-35% for new plant.

In accordance with BAT 2, table S3.4 of the Permit requires the gross electrical efficiency to be measured by carrying out a performance test at full load.

Guidance note EPR 5.01 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 applicant has carried out a study into the feasibility of utilising CHP. This study concluded that 0.38MW of heat could be realistically provided to local businesses. The provision of this level of heat would not make the facility a high efficiency plant.

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. There is provision within the design of the steam turbine to extract low-grade steam for a district heating scheme. 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.

Note that the availability or non-availability of financial incentives for renewable energy such as the ROC and RHI schemes is not a consideration in determining this application.

(v) Choice of Steam Turbine

The steam conditions to be employed at the facility are detailed in the summary table above. These high steam conditions is BAT, in line with BAT condition 20.

(vi) Choice of Cooling System

- A system has been designed to ensure that flue gas is rapidly cooled through the critical de novo synthesis temperature (around 170°C);
- Computational Fluid Dynamic modelling (CFD) will be undertaken to confirm that there are 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
- The design of the boiler ensures that boundary layers of slow moving gas are prevented.

(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 it will not be technically feasible to supply the required amount of heat and we agree with the applicant's assessment. Therefore no cost benefit assessment is required.

(viii) Permit conditions concerning energy efficiency

Pre-operational condition PO2 requires the Operator to carry out a comprehensive review of the available heat recovery options prior to commissioning, in order to ensure that waste heat from the plant is recovered as far as possible.

Conditions 1.2.2 and 1.2.3 have also been included in the Permit, which require the Operator to review the options available for heat recovery on an ongoing basis, and to provide and maintain the proposed steam/hot water pass-outs.

The Operator is required to report energy usage and energy generated under condition 4.2 and Schedule 5 of the Permit. 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 MSW burned per year, this will enable the us 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 we accept 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 that the Operator will make 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 4 including consumption of lime, activated carbon and 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 SNCR / 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 permitted 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 incinerator bottom ash (IBA), air pollution control (APC) residues and recovered metals (metals segregated prior to combustion).

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.

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 IBA at the Installation 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.

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 IBA residues are adequately characterised, pre-operational condition PO3 requires the Operator to provide a written plan for approval detailing the IBA sampling protocols. Table S3.5 requires the Operator to carry out an ongoing programme of monitoring.

The Application proposes that, where possible, bottom ash will be transported to a suitable treatment facility, from where it could be re-used in the construction industry as an aggregate.

Having considered the information submitted in the Application, we are satisfied that the waste hierarchy referred to in Article 4 of the Waste Framework Directive (WFD) will be applied to the generation of waste and that any waste generated will be treated in accordance with that 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 (GWP) 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) for air emissions. ES are described in our web guide 'Air emissions risk assessment for your environmental permit'.

Our web guide sets out the relevant ES as:

- Air Quality Standards Regulations 2010 Limit Values
- Air Quality Standards Regulations 2010 Target Values
- UK Air Quality Strategy Objectives

- Environmental Assessment Levels

Where a Limit Value exists, the relevant standard is the Limit Value. Where a Limit Value does not exist, 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 limit values, target values and AQS objectives. In a very small number of cases, e.g. for emissions of lead, the AQS objective is more stringent than the Limit Value. In such cases, we use the AQS objective for our assessment.

Target values, AQS objectives and EALs do not have the same legal status as 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 screened out as **Insignificant** if:

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

The **long term** 1% PC 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 human health and the environment.

The **short term** 10% PC 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 human health and the environment.

Where an emission is screened out in this way, we would normally consider 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 exceedences 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 exceedences 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 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 Assessment of Impact on Air Quality

The Applicant's assessment of the impact of air quality is set out in the following Application documents:

- Annex D – Air Quality Assessment, June 2023, ref: SOL_22_PO96_GP
- Annex D – Ecological Assessment for Environmental Permit, 15/05/2023, ref: K23-003

The assessment comprises:

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

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 air dispersion model software ADMS 5.2 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 Robin Hood Airport between 2015 and 2019. This is the most representative data currently available for the area and, in line with normal practice, it is essential to use a verified source of data which meets stringent criteria. The effect 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 would be the maximum permitted by Article 15(3), Article 46(2) and Annex VI of the IED, (or in the case of NO_x and ammonia (NH₃), more stringent ELVs of 100 mg/m³ and 5 mg/m³ respectively) These substances are:
 - Oxides of nitrogen (NO_x), expressed as NO₂
 - Total dust
 - Carbon monoxide (CO)
 - Sulphur dioxide (SO₂)
 - 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)
 - Ammonia (NH₃)
- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term ELVs, i.e. the maximum permitted emission rate (metals are considered further 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, 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 5.2.2.

We are in agreement with this approach. The assumptions underpinning the model have been checked and are a reasonable worst-case .

The Applicant established the background (or existing) air quality against which to measure the potential impact of the incinerator. We broadly agree with the background concentrations assumed by the consultant. Background concentrations for mercury were not provided. Background mercury monitoring data is sparse so we have used 0.001533 ug/m³ which is the 2019 annual average from the UKEAP Automatic Mercury Chilbolton site.

As well as predicting the maximum ground level concentration of the pollutants within the modelling domain, the Applicant has modelled several discrete receptor locations to represent human and ecological exposure.

The Applicant's use of the dispersion models, selection of input data, use of background data and the assumptions made, have been reviewed by our 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 human health impacts and impact on protected conservation areas. Our audit takes account of modelling uncertainties. We make

reasonable worst case assumptions and use the uncertainties (minimum 140%) in analysing the likelihood of exceeding any particular standard.

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 predictions are summarised in the tables below.

The Applicant's modelling predicted peak ground level exposure to pollutants in ambient air and at discreet receptors. The tables below show their predicted ground level concentrations at the most impacted receptor, except for metals, which shows the maximum predicted ground level concentrations.

As part of our checks, we carry out sensitivity analysis of the data provided and conduct our own check modelling to ensure that the applicant's modelling predictions are reliable.

Whilst we have used the Applicant's modelling predictions in the table below, we have made our own simple verification calculation of the percentage PC and predicted environmental concentration (PEC). Any such minor discrepancies do not materially impact on our conclusions.

Non-metals

Pollutant	ES		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m ³	Reference period		µg/m ³	µg/m ³	% of EAL	µg/m ³
NO ₂	40	Annual Mean	8.4	0.88	2.20	9.3	23.2
	200	99.79th %ile of 1-hour means	16.8	8.3	4.2	25.1	12.6
PM ₁₀	40	Annual Mean	12.6	0.063	0.16	12.7	31.7
	50	90.41st %ile of 24-hour means	14.9	0.2	0.40	15.1	30.2

PM _{2.5}	20	Annual Mean	7.1	0.063	0.32	7.16	35.8
SO ₂	266	99.9th %ile of 15-min means	18.8	8.4	3.2	27.2	10.2
	350	99.73rd %ile of 1-hour means	14	6.8	1.94	20.8	5.9
	125	99.18th %ile of 24-hour means	8.3	3.4	2.7	11.7	9.4
HCl	750	1-hour average	1	2.6	0.3	3.6	0.48
HF	16	Monthly average	0.5	0.058	0.36	0.558	3.49
	160	1-hour average	1	0.44	0.275	1.44	0.9
CO	10000	Maximum daily running 8-hour mean	237	9.8	0.10	247	2.5
	30000	1-hour average	338	21.8	0.07	360	1.2
TOC	2.25	Annual Mean	0.21	0.13	5.78	0.34	15.11
	30	Daily average	0.53	1.7	5.67	2.23	7.43
PAH	0.00025	Annual Mean	0.00039	0.0000011	0.44	0.00039	156.4
NH ₃	180	Annual Mean	2.6	0.063	0.04	2.66	1.48
	2500	1-hour average	5.2	2.2	0.09	7.4	0.3
PCBs	0.2	Annual Mean	0.000024	0.00001	<0.01	0.00003	<0.02
	6	1-hour average	0.000048	0.001	<0.02	0.00105	<0.02
TOC as 1,3 butadiene for long term and benzene for short term							
PAH as benzo[a]pyrene							

Metals

Pollutant	ES		Back-ground ng/m ³	Process Contribution		Predicted Environmental Concentration	
	ng/m ³	Reference period		ng/m ³	% of EAL	ng/m ³	% of EAL
Cd	5	Annual mean	0.35	0.25	5.0	0.60	12.0
Hg	250	Annual mean	0.153	0.25	0.1	0.40	0.16
	7500	1-hour average	0.153	7.5	0.1	7.65	0.1
Sb	5000	Annual mean	Not available	3.768	0.08		
	150000	1-hour average	Not available	51	0.03		
Pb	250	Annual mean	14.1	3.768	1.51	17.87	7.15
Cu	10000	Annual mean	15.9	3.768	0.04	19.67	0.197
	200000	1-hour average	31.8	51	0.03	82.80	0.041
Mn	150	Annual mean	34.2	3.768	2.51	37.97	25.31
	1500000	1-hour average	68.4	51.00	0.003	119.40	0.01
V	5000	Annual mean	1.2	3.768	0.08	4.97	0.10
	1000	24-hr average	1.4	51.00	5.10	52.40	5.24
As	6	Annual mean	0.97	3.768	62.80	4.74	79.0
Cr (II)(III)	5000	Annual mean	32.3	3.768	0.08	36.07	0.721
	150000	1-hour average	64.6	51	0.03	115.60	0.0771
Cr (VI)	0.25	Annual mean	6.46	3.768	1507.20	10.23	4091.2
Ni	20	Annual mean	13.50	3.768	18.84	17.27	86.3

(i) Screening out emissions which are insignificant

From the table above the following non-metal emissions can be screened out as insignificant in that the PC is < 1% of the long term ES and <10% of the short term ES. These are:

- NO₂ (short term)
- PM10
- PM 2.5
- SO₂
- HCL
- HF
- CO
- TOC (short term)
- PAH (Annual Mean)

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 non-metals table 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 PEC is less than 100% (taking expected modelling uncertainties into account) of both the long term and short term ES.

- NO₂ (long term)
- TOC (long term)

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

(iii) Emissions requiring further assessment

All non-metal emissions either screen out as insignificant or where they do not screen out as insignificant are considered unlikely to give rise to significant pollution. Therefore, we are satisfied that there are no emissions requiring further assessment.

5.2.2 Consideration of key pollutants

(i) Nitrogen dioxide (NO₂)

The impact on air quality from NO₂ emissions has been assessed against the ES of 40 µg/m³ as a long term annual average and 200 µg/m³ as a short term hourly average.

The model assumes a 70% NO_x to NO₂ 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 maximum 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 the maximum long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. However, from the table above, the emission is not expected to result in the ES being exceeded. However, it is not expected to result in the ES being exceeded.

(ii) Particulate matter PM₁₀ and PM_{2.5}

The impact on air quality from particulate emissions has been assessed against the ES for PM₁₀ (particles of 10 microns and smaller) and PM_{2.5} (particles of 2.5 microns and smaller). For PM₁₀, the ES are a long term annual average of 40 µg/m³ and a short term daily average of 50 µg/m³. For PM_{2.5} the ES of 20 µg/m³ as a long-term annual average was used, having changed from 25 µg/m³ in 2020.

The Applicant's predicted impact of the Installation against these ES is shown in the tables above. The assessment assumes that **all** particulate emissions are present as PM₁₀ for the PM₁₀ 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 (PM₁₀) 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 table shows that the predicted PC for emissions of PM₁₀ 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 table also shows that the predicted PC 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 PM₁₀ or PM_{2.5}, will not give rise to significant pollution.

There is currently no emission limit prescribed nor any continuous emissions monitor for particulate matter specifically in the PM₁₀ or PM_{2.5} fraction. Whilst we are confident that current monitoring techniques will capture the fine particle fraction (PM_{2.5}) for inclusion in the measurement of total particulate matter, an improvement condition (IC2) has been included that will require a full analysis of particle size distribution in the flue gas, and hence determine the ratio of fine to coarse particles. In the light of current knowledge and available data however we are satisfied that the health of the public would not be put at risk by such emissions, as explained in section 5.3.3.

(iii) Acid gases, sulphur dioxide (SO₂), hydrogen chloride (HCl) and hydrogen fluoride (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. The ES for HCl is 750 µg/m³, this is an hourly short term average, there is no long term ES for HCl. HF has 2 assessment criteria – a 1-hr ES of 160 µg/m³ and a monthly ES of 16 µg/m³ – the process contribution is <1% of the monthly ES 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 SO₂ for the protection of human health. Protection of ecological receptors from SO₂ for which there is a long term ES is considered in section 5.4. There are three short term ES, hourly of 350 µg/m³, 15 – minute of 266 µg/m³ and daily of 125 µg/m³.

From the above table, emissions of SO₂ can be screened out as insignificant in that the short term process contribution is <10% of each of the three short term ES values. Therefore, we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

(iv) Emissions to air of carbon monoxide (CO), Volatile Organic Compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), Dioxins and ammonia (NH₃)

The above tables show that for CO, the maximum long term PC is less than 1% of the ES and the maximum 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 VOC emissions (based on the ELV for total organic carbon) , the maximum short term PC is less than 10% of the ES and so can be screened out as insignificant. The above tables show that the maximum long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. However, the emission is not expected to result in the ES being exceeded.

The Applicant has used the ES for 1,3 butadiene for their assessment of the impact of VOC. This is based on 1,3 butadiene having 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 PAH and PCB emissions, the maximum long term PC is less than 1% of the ES and the maximum 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 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

From the tables above all the other emissions can be screened out as insignificant in that the PC is < 1% of the long term ES and <10% of the short term ES.

The ammonia emission is based on a release concentration of 5 mg/m³ which is a more stringent release concentration to that normally associated with new plant, however, we are satisfied that this level of emission is achievable with the operation of a well controlled SNCR and 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 ES. 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 have not screened out as insignificant, 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 section 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.

There are three sets of BAT AELs for metal emissions:

- An emission limit value of 0.02 mg/m³ for mercury and its compounds (formerly WID group 1 metals).
- An aggregate emission limit value of 0.02 mg/m³ for cadmium and thallium and their compounds (formerly WID group 2 metals).
- An aggregate emission limit of 0.3 mg/m³ 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
- Mn (short term)
- V
- 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:

- Cadmium
- Lead
- Mn (long term)
- As
- Ni

This left emissions of 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 the BREF 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 metals *Cr (VI)* the Applicant Used representative emissions data from other municipal waste incinerators using our guidance note “Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – version 4”.

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.

Data for Cr (VI) was based on total Cr emissions measurements and the proportion of total Cr to Cr (VI) in APC residues.

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

- *Cr (VI)*

The installation has been assessed as meeting BAT for control of metal emissions to air. See section 6 of this document.

Note: We were not able to re-create the process contribution figures presented by the applicant in their air quality report for Cr (VI). The figures presented in the metals table above differ from those presented by the applicant, however, at Step 2 screening, as detailed in our guidance note, we agree that process contributions are below 1% and therefore classed as insignificant.

5.2.4 Consideration of Local Factors

The topography is flat close to the plant, however there are gradients approaching 1 in 10 within approximately 500 m of the facility where there are locations of public exposure. The applicant assessed the impact of terrain (with 100 m resolution) within their model. We consider that terrain may affect the dispersion of pollutants and therefore agree with this approach. We have undertaken additional sensitivity analysis, using terrain data with a 60 m resolution to account for local topography.

The applicant has identified three wind turbines located to the northeast of the facility and included them within their modelling. The closest turbine is approximately 450 m from the stack. The turbines have a hub height of 75 m and blade diameter of 103 m. We have checked sensitivity to the wind turbines in our modelling. 3.9

The consultant’s background concentrations, summarised in Table 4.3 in the AQA, were obtained from various sources, including monitoring and national modelling data maps. We have reviewed the relevant sources. The consultant has used the APIS website to select relevant critical levels, loads and background values. We have reviewed these choices using the APIS website. We broadly agree with the background concentrations assumed by the consultant.

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

No AQMAs have been declared within an area likely to be affected by emissions from the Installation.

The Applicant is required to prevent, minimise and control emissions using the best available techniques; this is considered further in Section 6.

5.2.5 Consideration of Additional Measures to Control Emissions

Within the application, lower values have been proposed for NO_x and NH₃ (100 mg/m³ and 5 mg/m³ respectively). We have made our assessment against these values and added these limits to the permit.

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. The EPR include the requirements of relevant EU Directives, notably, the IED, the WFD, and ADD.

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 of the IED. 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 may in some circumstances dictate tighter emission limits and controls than those set out in the BAT conclusions (BAT-C) or 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, GWP and the 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

There is a significant amount of literature on whether there are links between operation of incineration plants and effects on health. We have not referenced them here, but we have included information on one of the most recent studies that was commissioned by the UK Health Security Agency (UKHSA), previously Public Health England (PHE). The overall weight of the evidence is that there is not a significant impact on human health.

UKHSA review research undertaken to examine suggested links between emissions from municipal waste incinerators and effects on health. UKHSA's risk assessment is that modern, well run and regulated municipal waste incinerators are not a significant risk to public health. While it is not possible to rule out adverse health effects from these incinerators completely, any potential effect for people living close by is likely to be very small.

UKHSA keep literature on health effects under review and would inform us if there were any changes to the above position. Similarly, we would consult UKHSA if new evidence was provided to us.

In 2012 the UK Small Area Health Statistics Unit (SAHSU) at Imperial College was commissioned by 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.

UKHSA 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, UKHSA have further stated that their position remains that modern, well run and regulated municipal waste incinerators are not a significant risk to public health.

We agree with the view stated by the UKHSA. We 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 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 mathematical 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 to allow for different body size, such as for adults and children of different ages. In the UK, the COT has set a TDI for dioxins, furans and dioxin

like PCBs of 2 picograms WHO-TEQ/kg-body weight/day (a picogram is a millionth of a millionth (10^{-12}) of a gram).

In addition to an assessment of risk from dioxins, furans and dioxin like PCBs, 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.

The Committee on the Medical Effects of Air Pollution (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”. Defra reviewed this methodology and concluded that the use of the COMEAP methodology is not generally recommended for modelling the human health impacts of individual installations.

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 modelling 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 the lifetime of the receptor.

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 WHO-TEQ / kg body weight/ day.

The results of the Applicant’s assessment of dioxin intake are detailed in the table below (worst case results for each category are shown). 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. The maximum daily intake shown in the table below is a maximum of 2.95% of the TDI for an adult and 4.25% for a child, which are both below the TDI threshold of 2 picograms WHO-TEQ / kg body weight/ day.

Receptor	Adult (pg I-TEQ kg-1 d-1)	Child (pg I-TEQ kg-1 d-1)
Agricultural	0.059	0.085
Residential	0.00044	0.0012

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

In 2010, the FSA studied the levels of chlorinated, brominated and mixed (chlorinated-brominated) dioxins and dioxin-like PCBs in fish, shellfish, meat and eggs consumed in the 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 UKHSA 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 UKHSA 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 PM₁₀ 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. UKHSA 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 µg/m³ 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."

UKHSA also point out that in 2007 incinerators contributed 0.02% to ambient ground level PM₁₀ levels compared with 18% for road traffic and 22% for industry in general. UKHSA 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 PM₁₀. It goes on to say that PM₁₀ includes and exceeds PM_{2.5} which in turn includes and exceeds PM_{0.1}. The National Atmospheric Emissions Inventory (NAEI) figures show that in 2016 municipal waste incineration contributed 0.03% to ambient ground level PM₁₀ levels and 0.05% to ambient ground level PM_{2.5} levels. The 2016 data also shows that road traffic contributed to 5.35% of PM₁₀ and 4.96% of PM_{2.5} and that domestic wood burning contributed 22.4% to PM₁₀ and 34.3% of PM_{2.5} levels.

This is consistent with the assessment of this Application which shows emissions of PM₁₀ to air to be insignificant.

A 2016 a paper by Jones and Harrison concluded that 'ultrafine particles (<100nm) in flue gases from incinerators are broadly similar to those in urban air and that after dispersion with ambient air ultrafine particle concentrations are typically indistinguishable from those that would occur in the absence of the incinerator.

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 Assessment of Health Effects from the Installation

Our assessment of health impacts is summarised below

- i. We have applied the relevant requirements of the Environmental legislation in imposing the permit conditions. We are satisfied that compliance with these conditions will ensure protection of the environment and human health.
- ii. In carrying out air dispersion modelling as part of the environmental impact assessment and comparing the PC and PEC with the ES, the Applicant has effectively made a health risk assessment for many pollutants. The ES have been developed primarily to protect human health. The Applicant's assessment of the impact from:
 - NO₂ (short term)
 - PM10
 - PM 2.5
 - SO₂
 - HCL
 - HF
 - CO
 - TOC (short term)
 - PAH (Annual Mean)
 - Hg
 - Sb
 - Cu
 - Mn (short term)
 - V
 - Cr (II) (III)
 - Cr (VI) (at Step 2 assessment)

have all indicated that the Installation emissions screen out as insignificant; where the impact of emissions of

- NO₂ (*long term*)
- TOC (*long term*)
- Cadmium
- Lead
- Mn (*long term*)
- As
- Cr (VI)
- Ni

have not been screened out as insignificant, the assessment still shows that the PEC are well within the ES.

- iii. 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).
- iv. We have reviewed the methodology employed by the Applicant to carry out the health impact assessment.

We have audited the applicant's air quality assessment and have made observations on their methodology and assumptions. We have conducted our own checks on the modelling and have analysed potential modelling sensitivities. As a result, we find that:

- For all pollutants, either PCs screen out as insignificant or PECs are below the ES at relevant human receptors.
- Abnormal emissions will not have a significant impact on air quality.
- The impact of dioxin and furan and dioxin-like PCB emissions are not significant.

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 risk to human health.

- v. We agree with the conclusion reached by UKHSA that modern, well run and regulated municipal waste incinerators are not a significant risk to public health. While it is not possible to rule out adverse health effects from these incinerators completely, any potential effect for people living close by is likely to be very small.
- vi. UKHSA and the Local Authority Director of Public Health] were consulted on the Application. They concluded that they had no significant concerns regarding the risk to the health of humans from the installation. The Local Authority Director of Public Health did not provide a response. The Food Standards Agency was also consulted during the permit determination process and did not provide a response to our consultation. Details of the responses provided by UKHSA to the consultation on this Application can be found in Annex 4.

We are therefore satisfied that the Applicant's conclusions presented above are reliable and we conclude that the potential emissions of pollutants including dioxins, furans and metals from the proposed facility are unlikely to have a significant impact on human health.

5.4 Impact on protected conservation areas (SPAs, SACs, Ramsar sites and SSSIs and local nature sites)

5.4.1 Sites Considered

There are no Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites within 10 km of the proposed Installation.

The following Sites of Special Scientific Interest (SSSI) are located within 2 km of the Installation:

- Dearne Valley Wetlands
- Carlton Main Brickworks

The following local nature sites (ancient woodlands, local wildlife sites and national and local nature reserves) are located within 2 km of the Installation:

- West Haigh Wood
- Sunny Bank, Horse Carr and Storrs Wood
- Edderthorpe Ingsnj
- Houghton Marsh
- Little Park

5.4.2 SSSI Assessment

The Applicant's assessment of SSSIs was reviewed by our technical specialists for air dispersion modelling and assessment and subsequently our specialists for habitats and conservation, who agreed with the assessment's conclusions, that the proposal does not damage the special features of the SSSIs.

All emissions to the Carlton Main Brickworks SSSI screened out as insignificant and so further assessment is not required. The tables below include the figures for both SSSIs as taken from supporting documents submitted alongside the application, but the emphasis for the rest of this section is on the potential for damage to the Dearne Wetlands SSSI.

The applicant employed an ecologist to conduct a field survey and produce a report outlining the results as well as an ecological interpretation of the air quality assessment where modelling predicted exceedances of the critical loads/levels. This was submitted alongside the permit application.

Table 1: NOx process contributions for both SSSIs

Habitat Site	Annual Mean		24-Hour Mean	
	PC ($\mu\text{g}/\text{m}^3$)	PC (% of CL)	PC ($\mu\text{g}/\text{m}^3$)	PC (% of CL)
H1A. Dearne Valley Wetlands SSSI	1.2	4.0%	17.0	22.7%
H1B. Dearne Valley Wetlands SSSI	0.35	1.2%	4.4	5.8%
H1C. Dearne Valley Wetlands SSSI	0.23	0.8%	4.4	5.8%
H2. Carlton Main Brickworks SSSI	0.17	0.6%	1.8	2.4%

As shown above, the maximum predicted 24-hour mean concentration of NOx for receptor H1A at Dearne Valley Wetlands exceeds 10% of the short-term critical level and the annual concentration exceeds 1% of the CL, and therefore both are potentially significant. However, the background NOx at the location of maximum impact is $12.3 \mu\text{g}/\text{m}^3$ and therefore the PEC would be $13.5 \mu\text{g}/\text{m}^3$. This is 45.0% of the CL and so it can be concluded it is unlikely to lead to damage to the SSSI.

Table 2: SO₂ process contributions for both SSSIs

Habitat Site	Annual Mean	
	PC ($\mu\text{g}/\text{m}^3$)	PC (% of CL)
H1A. Dearne Valley Wetlands SSSI	0.36	3.6%
H1B. Dearne Valley Wetlands SSSI	0.11	1.1%
H1C. Dearne Valley Wetlands SSSI	0.069	0.7%
H2. Carlton Main Brickworks SSSI	0.052	0.5%

As a worst-case, the applicant applied the most stringent CL of $10 \mu\text{g}/\text{m}^3$ to all habitat sites. For the Dearne Valley Wetlands SSSI (receptor H1A), the maximum predicted annual mean concentrations of SO₂ at 3.6% are in excess of 1% of the CL and are potentially significant. However, the background SO₂ concentration at the location of maximum impact is $1.7 \mu\text{g}/\text{m}^3$ and the PEC would be $2.06 \mu\text{g}/\text{m}^3$. This equates to 20.6% of the CL and is therefore unlikely to lead to damage to the SSSI.

Table 3: Ammonia process contributions for both SSSIs

Habitat Site	Annual Mean	
	PC ($\mu\text{g}/\text{m}^3$)	PC (% of CL)
H1A. Dearne Valley Wetlands SSSI	0.060	6.0%
H1B. Dearne Valley Wetlands SSSI	0.018	1.8%
H1C. Dearne Valley Wetlands SSSI	0.012	1.2%
H2. Carlton Main Brickworks SSSI	0.009	0.9%

For the Dearne Valley Wetlands SSSI, the maximum annual mean NH₃ concentration at $0.060 \mu\text{g}/\text{m}^3$ is 6.0% of the most stringent critical level of $1 \mu\text{g}/\text{m}^3$ and is potentially significant. However, based on information found on

the Air Pollution Information System (APIS) it is considered appropriate to apply the upper CL of 3 µg/m³ as the lower CL is only used where bryophyte and/or lichen communities are notified, which is not the case here. This means the PC would be 2.0% of the CL, and PEC 88.7%. As this is below the CL it is considered unlikely to lead to damage to the SSSI.

Table 4: HF process contributions for both SSSIs

Habitat Site	Weekly Mean		24-Hour Mean	
	PC (µg/m ³)	PC (% of CL)	PC (µg/m ³)	PC (% of CL)
H1A. Dearne Valley Wetlands SSSI	0.057	11.5%	0.17	3.4%
H1B. Dearne Valley Wetlands SSSI	0.026	5.1%	0.044	0.9%
H1C. Dearne Valley Wetlands SSSI	0.013	2.7%	0.044	0.9%
H2. Carlton Main Brickworks SSSI	0.008	1.6%	0.018	0.4%

Except for the maximum predicted PC at one point of the Dearne Valley Wetlands SSSI, weekly and 24-hour mean concentrations of HF are less than 10% of the critical levels. Therefore, the impact of HF emissions on these habitats would be assessed as not significant.

With regards to the remaining receptor location, the pattern of HF threshold exceedance differs from other parameters, being located in two small areas in SSSI unit 5 (see Figure 1).

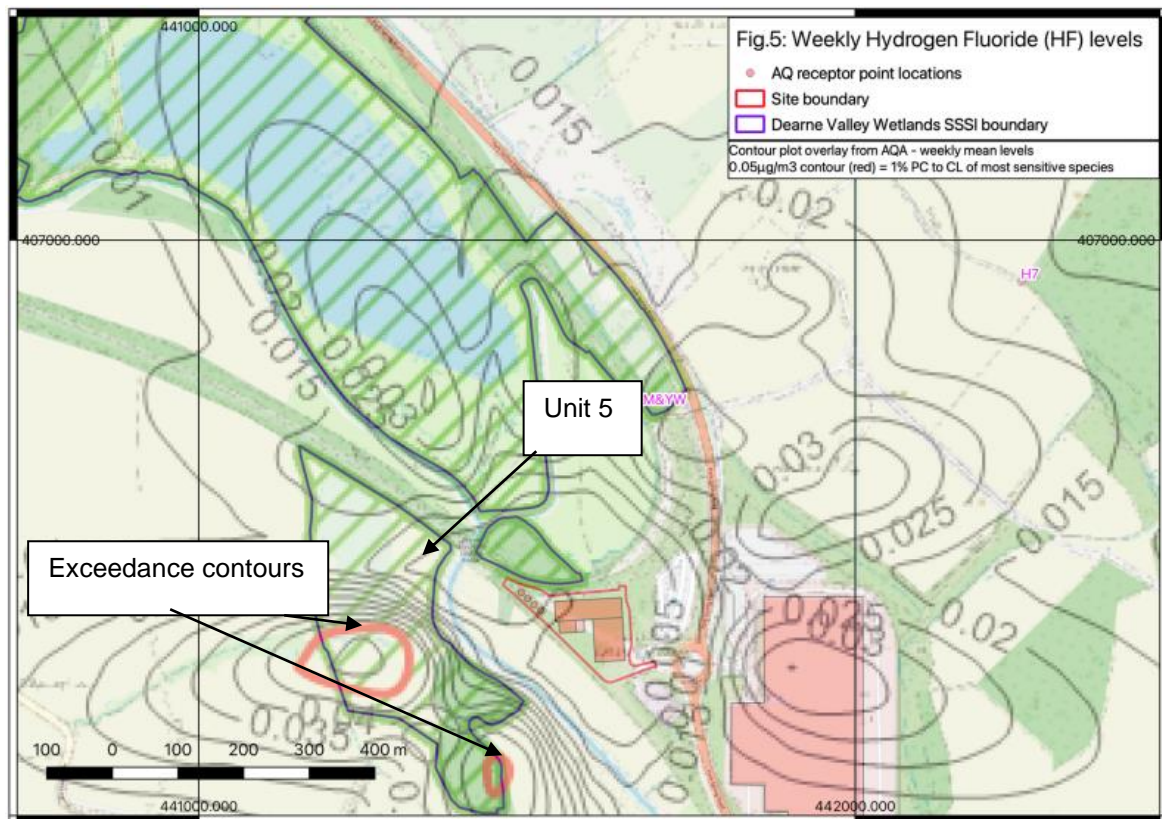


Figure 1: HF emission impact.

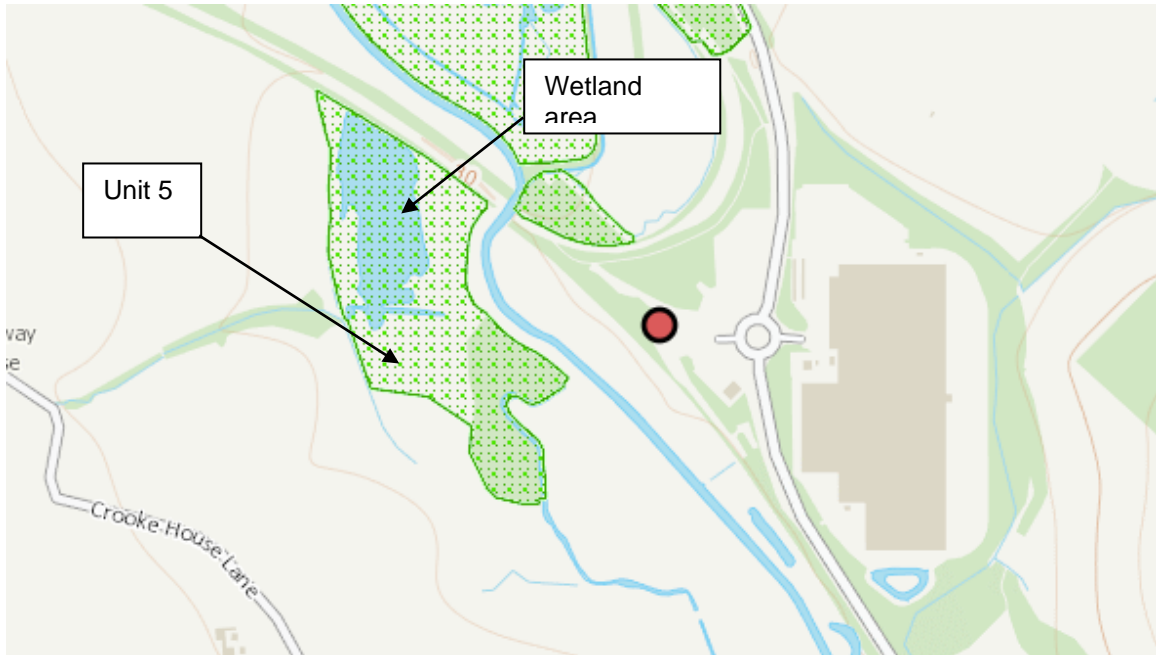


Figure 2: Showing wetland location in Unit 5.

Based on APIS advice on sensitivity, the most vulnerable habitat would be aquatic marginal vegetation around the margins of open water if it were to contain any yellow iris (*Iris pseudacorus*), which is regarded as relatively sensitive. Yellow iris was not recorded in the field survey, however the emergent *Typha* beds on the western shore of the wetland (shown in Figure 2) could contain this species. The modelled 10% ($0.057\mu\text{g}/\text{m}^3$) exceedance contour does not reach this habitat, so damage to the SSSI is considered unlikely.

Table 5: Nutrient Nitrogen Deposition

Habitat Site	PC	Total Deposition (PEC)	Lowest CL	PC (% CL)
H1A. Dearne Valley Wetlands SSSI	0.81	37.31	10	8.1%
H1B. Dearne Valley Wetlands SSSI	0.14	21.44	15	0.9%
H1C. Dearne Valley Wetlands SSSI	0.093	21.09	15	0.6%
H2. Carlton Main Brickworks SSSI	0.070	21.67	20	0.3%

The maximum predicted deposition rate at the Dearne Valley Wetlands SSSI is 0.81 kg N/ha/yr, which is 8.1% of the critical load and is potentially significant. The background deposition rate at the location of maximum impact is 36.5 kgN/ha/yr. This equates to 373% of the critical load. The applicant assessed nutrient nitrogen deposition for both grassland and woodland

habitats. Figures 2 and 3 show the spatial extent of exceedance of the 1% PC threshold for both habitats.

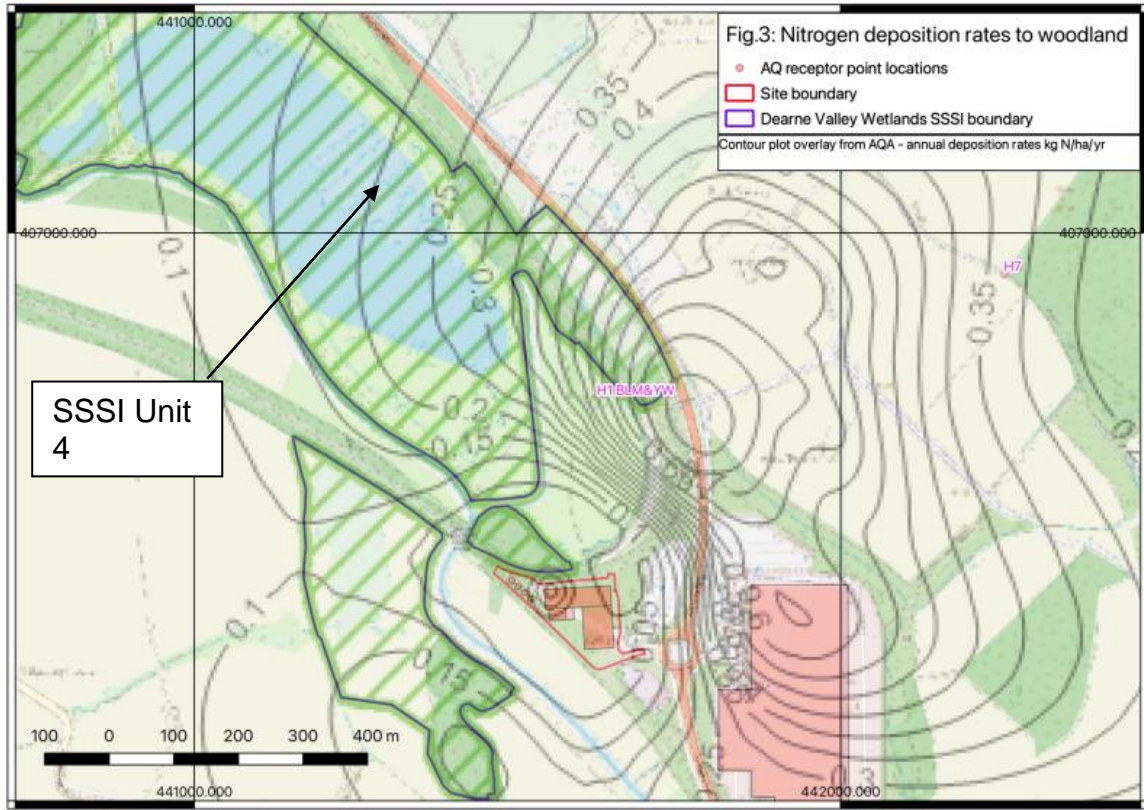


Figure 3: nutrient nitrogen impact contours (woodland)

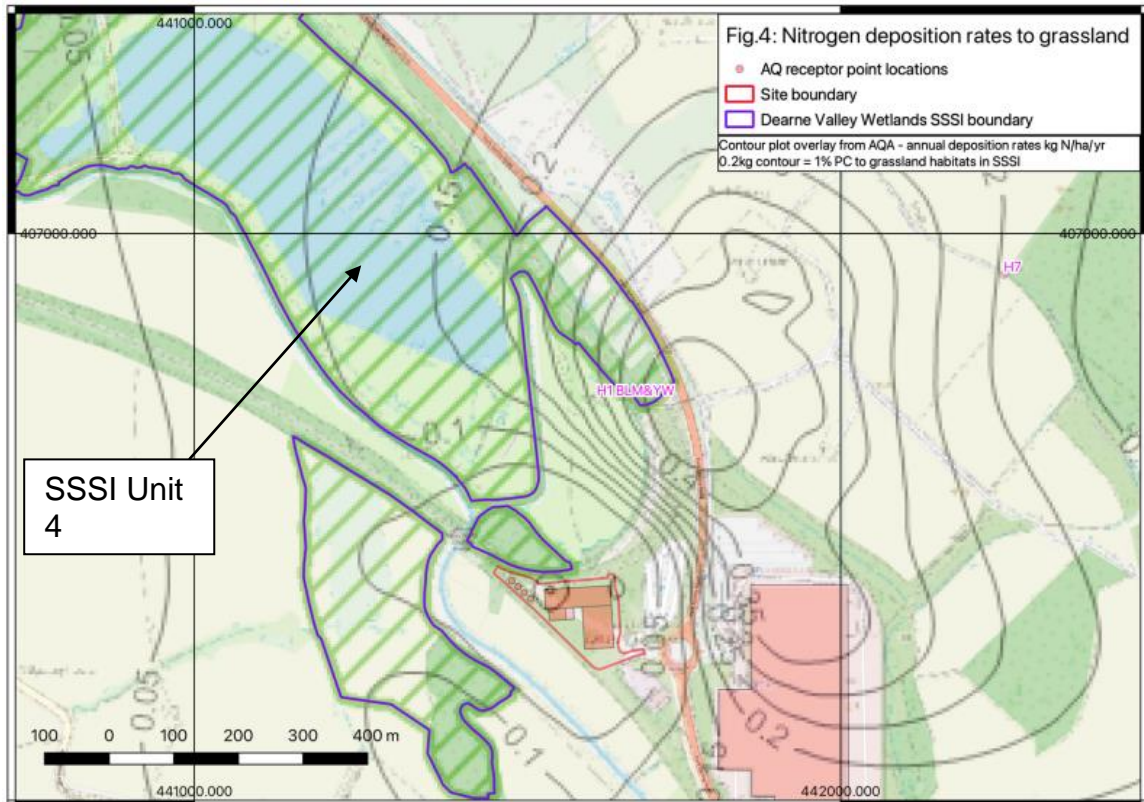


Figure 4: nutrient nitrogen impact contours (grassland)

The 1% contour (0.2kg N/ha/yr) is restricted to an area of grassland habitat on the eastern margin of the Edderthorpe Flash section of the SSSI (unit 4). Whilst there is a credible effect pathway, the risk of any effect on SSSI notified features is very low; the area affected with a >1% PC is sub-optimal in any event for breeding waders and waterfowl due to its location adjoining woodland habitats at the edge of the grassland and so it is expected that the increase is unlikely to translate to any damage to the SSSI. It is further noted that the relevant SSSI unit has been recently assessed as being in favourable condition, and concerns over nutrient enrichment in the Views About Management document relate to water bodies rather than grassland or woodland.

Table 6: Acid Deposition

Habitat Site	PC (N)	PC (S)	PC (% CL)	PEC (% CL)
H1A. Dearne Valley Wetlands SSSI	0.058	0.16	7.1%	99.4%
H1B. Dearne Valley Wetlands SSSI	0.010	0.021	Not sensitive	
H1C. Dearne Valley Wetlands SSSI	0.0066	0.014	Not sensitive	
H2. Carlton Main Brickworks SSSI	0.0050	0.011	0.3%	33.2%

The maximum predicted total deposition rate at the Dearne Valley Wetlands SSSI is 0.22 keq/ha/yr which is 7.1% of the critical load and is potentially significant. The background deposition rate at the location of maximum impact is 2.81 keq/ha/a and the PEC would be 3.03 keq/ha/yr. At 99.4% of the critical load this means there is a risk that the CL could be exceeded however, looking at national trends in acid deposition in order to consider the likelihood of this, there is a clear downward trend in acid deposition critical load exceedance, with a decline in the total percentage area subject to exceedance from 1996 – 2018, largely due to reductions in SO₂ during that period. It is expected that predicted future reductions in NO_x emissions ([2020 NO_x and PM projections data \(2018 reference year\) - Defra, UK](#)) will lead to further reductions in acid deposition. It is therefore unlikely that the CL will be exceeded during the facility’s operational lifespan, and so no damage to the Dearne Wetlands SSSI is expected.

It is also noted that the air emissions modelling conducted by the applicant utilised the worst-case conditions i.e. assuming worst case meteorological conditions and that the facility would operate at all hours in the year with the pollutant concentrations exactly at the daily emission limit value prescribed by the IED, the BREF or as adopted for the facility. This is a cautious assumption since the facility could never operate with release rates as high as this in

practice whilst remaining compliant with legislation. As such, all emissions are considered conservative in nature and likely higher than will occur during operation.

Carlton Main Brickworks SSSI

The proposed permission is not likely to damage any of the flora, fauna or geological or physiological features which are of special interest.

Dearne Valley Wetlands SSSI

The proposed permission is not likely to damage any of the flora, fauna or geological or physiological features which are of special interest.

5.4.3 Assessment of local nature sites

Conservation sites are protected in law by legislation which provides the highest level of protection for SACs and SPAs, and also for protection of protection for SSSIs. Finally, the Environment Act 1995 provides more generalised protection for flora and fauna rather than for specifically named conservation designations. It is under the Environment Act 1995 that we assess other sites (such as ancient woodlands, local wildlife sites and national and local nature reserves) 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, Ramsars and SSSIs we consider the PC and the background levels in making an assessment of impact. In assessing the local nature sites under the Environment Act 1995 we look at the impact from the Installation alone 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 local nature 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.

In the case of the facility, the maximum PC for Nox, SO₂, NH₃ and HF at any designated habitat site, is present at Dearne Valley SSSI, the affects upon which are discussed above. We agree with the applicant that the impact from the can be assessed as not significant.

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 the 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 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 exceedance 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 during abnormal operation. 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/m³ (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 hours 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 of 10 ng/m³ (100 x normal)
- Mercury emissions are 100 times those of normal operation

- NO_x emissions of 500 mg/m³ (1.2x normal daily ELV)
- Particulate emissions of 150 mg/m³ (5 x normal)
- Metal emissions other than mercury are 30 times those of normal operation
- SO₂ emissions of 434mg/m³ (2.17x normal daily ELV)
- HCl emissions of 144mg/m³ (2.4x normal DAILY ELV)
- 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.

Pollutant	ES		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m ³			µg/m ³	µg/m ³	% of EAL	µg/m ³
NO ₂	200	99.79th %ile of 1-hour means	16.8	76.2	38.1	93	46.5
PM ₁₀	50	90.41st %ile of 24-hour means	14.9	4.9	9.8	19.8	39.6
SO ₂	266	99.9th %ile of 15-min means	18.8	253	95.1	271.8	102.2
	350	99.73rd %ile of 1-hour means	14	189	54.0	203	58.0
	125	99.18th %ile of 24-hour means	8.3	16.4	13.1	24.7	19.8
HCl	750	1-hr average	2	62.5	8.3	64.5	8.60

HF	160	1-hr average	1	49.8	31.1	50.8	31.75
	ng/m³		ng/m³	ng/m³	% of EAL	ng/m³	% of EAL
Hg	7500	1-hr average	0.15	871	11.6	871.2	11.615
Sb	150000	1-hr average	Not available	3919	2.6		
Cu	200000	1-hr average	31.8	3919	1.96	3950.8	1.975
Mn	1500000	1-hr average	68.4	3919	0.26	3987.4	0.2658
PCBs	6000	1-hr average	0.02	0.00016	0.00	0.0	0.0004
Cr (II)(III)	150000	1-hr average	64.6	3919	2.61	3983.6	2.7

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.

- PM10
- HCl
- Sb
- Cu
- Mn
- PCBs
- 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.

- N02
- S02 (1 hour mean and 24 hour mean)
- HF

- Hg

For SO₂ (15 minute mean), the PEC is greater than the short term ES. However, 35 exceedances of the limit value (99.9th percentile compliance) are allowed per year. The predicted 99.9th percentile of 15-minute SO₂ concentrations, assuming that the facility operates continuously at the abnormal emission, is 122 µg/m³ (45.9% of the PEC) and we agree with the operator that it is very unlikely that the PEC will be exceeded.

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/m³ 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 0.1445 pg(WHO-TEQ/ kg-BW/day), which is 7.23% of the COT TDI for children. At this level, emissions of dioxins will still not pose a risk to human health.

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 BAT 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:
 - NO₂ (long term)
 - TOC (long term)
 - Cadmium
 - Lead
 - Mn (long term)
 - As
 - Cr (VI)
 - Ni

- 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 GWP 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 ELV. 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-C shall be the reference for setting the permit conditions,. The BAT-C were published on 03/12/2019 and set BAT AELs for various substances mainly as daily average values which are in many cases lower than the chapter IV limits.

Operational controls complement the ELV 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 that sought to operate its installation continually at the maximum permitted limits would almost inevitably breach those limits regularly, simply by virtue of normal fluctuations in plant performance, resulting in enforcement action (including potentially prosecution, suspension or revocation) being taken. Assessments based on BAT AELs or Chapter IV limits are therefore “worst-case” scenarios.

We are 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 BREF states that Municipal Waste can be incinerated in traveling grates, rotary kilns and fluidised bed technology. Fluidised bed technology requires MSW to be of a certain particle size range, which usually requires some degree of pre-treatment even when the waste is collected separately. The BREF describes other process such as gasification and pyrolysis. The BREF notes that some of the processes have encountered technical and economic problems when scaled up to commercial, industrial sizes. Some are used on a commercial basis in Japan and are being tested in demonstration plants in Europe but still only have a small share of overall capacity.

Section 4.3 of the BREF provides a comparison of combustion and thermal treatment technologies, used in Europe and factors affecting their applicability and operational suitability for various waste types. 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 identified in the BREF 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 NO_x as the furnace choice could have an effect on the amount of unabated NO_x produced
- energy consumption – whole plant, waste preparation, effect on GWP
- Need, if any, for further processing of residues to comply with TOC
- Costs

Summary comparison of thermal treatment technologies (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)	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 1 to 50 t/h with most projects 5 to 30 t/h. • Most industrial applications not below 2.5 or 3 t/h. 	<ul style="list-style-type: none"> • Widely proven at large scales. • Robust • Low maintenance cost • Long operational history • Can take heterogeneous wastes without special preparation 	<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • higher heat value waste is treatable • Better combustion control possible. 	As air-cooled grates but: <ul style="list-style-type: none"> • risk of grate damage/leaks • higher complexity 	TOC 0.5% to 3%	Slightly higher capital cost than air-cooled
Rotary Kiln	Can accept liquids and pastes as well as gases Solid feeds more limited than grate (due to refractory damage) often applied to hazardous Wastes	<16 t/h	<ul style="list-style-type: none"> • Very well proven • Broad range of wastes • Good burn out even of HW 	Throughputs lower than grates	TOC <3 %	Higher specific cost due to reduced capacity

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Fluid bed - bubbling	<ul style="list-style-type: none"> • Wide range of CV (5-25 MJ/kg) • Only finely divided consistent wastes. • Limited use for raw MSW • Often applied to sludges co fired with RDF, shredded MSW, sludges, poultry manure 	Up to 25 t/h	<ul style="list-style-type: none"> • Good mixing • Fly ashes of good leaching quality 	<ul style="list-style-type: none"> • Careful operation required to avoid clogging bed. • Higher fly ash quantities. 	TOC <1%	FGT cost may be lower. Costs of waste preparation
Fluid bed - circulating	<ul style="list-style-type: none"> • Wide range of CV (6-25 MJ/kg) • Only finely divided consistent wastes. • Limited use for raw MSW • Often applied to sludges co-fired with RDF, coal, wood waste 	Up to 70 t/h	<ul style="list-style-type: none"> • Good mixing • High steam parameters up to 500°C • Greater fuel flexibility than BFB • Fly ashes of good leaching quality 	<ul style="list-style-type: none"> • Cyclone required to conserve bed material • Higher fly ash quantities 	TOC <1%	<ul style="list-style-type: none"> • FGT cost may be lower. • Costs of waste preparation
Spreader - stoker combustor	<ul style="list-style-type: none"> • RDF and other particle feeds • Poultry manure • Wood wastes 	No information	<ul style="list-style-type: none"> • Simple grate construction • Less sensitive to particle size than FB 	Only for well defined mono-streams	No information	No information

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Gasification - fixed bed	<ul style="list-style-type: none"> • Mixed plastic wastes • Other similar consistent streams • Gasification less widely used/proven than incineration 	Up to 20 t/h	<ul style="list-style-type: none"> • Low leaching residue • Good burnout if oxygen blown • Syngas available • Reduced oxidation of recyclable metals 	<ul style="list-style-type: none"> • Limited waste feed • Not full combustion • High skill level • Tar in raw gas • Less widely proven 	<ul style="list-style-type: none"> • Low leaching bottom ash • Good burnout with oxygen 	High operating/maintenance costs
Gasification - entrained flow	<ul style="list-style-type: none"> • Mixed plastic wastes • Other similar consistent streams • Not suited to untreated MSW • Gasification less widely used/proven than incineration 	Up to 10 t/h	<ul style="list-style-type: none"> • Low leaching slag • Reduced oxidation of recyclable metals 	<ul style="list-style-type: none"> • Limited waste feed • Not full combustion • High skill level • Less widely proven 	low leaching slag	<ul style="list-style-type: none"> • High operation/maintenance costs • High pre-treatment costs
Gasification - fluidised bed	<ul style="list-style-type: none"> • Mixed plastic wastes • Shredded MSW • Shredder residues • Sludges • Metal rich wastes • Other similar consistent streams • Gasification less widely used/proven than incineration 	5 – 20 t/h	<ul style="list-style-type: none"> • Can use low reactor temperatures e.g. for Al recovery • Separation of main non combustibles • Can be combined with ash melting • Reduced oxidation of recyclable metals 	<ul style="list-style-type: none"> • 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

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Pyrolysis	<ul style="list-style-type: none"> • Pre-treated MSW • High metal inert streams • Shredder residues/plastics • Pyrolysis is less widely used/proven than incineration 	<p>~ 5 t/h (short drum) 5 – 10 t/h (medium drum)</p>	<ul style="list-style-type: none"> • No oxidation of metals • No combustion energy for metals/inert • In reactor acid neutralisation possible • Syngas available 	<ul style="list-style-type: none"> • Limited wastes • Process control and engineering critical • High skill level • Not widely proven • Need market for syngas 	<ul style="list-style-type: none"> • Dependent on process temperature • Residue produced requires further processing and sometimes combustion 	High pre-treatment, operation and capital costs

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

Moving Grate Furnace: designed to process large volumes of waste. This is a well proven technology and has been demonstrated to conform to the requirements of IED.

Pyrolysis/Gasification: this technology is currently in development for MWI but is not yet considered to be proven. Systems that generate a syngas can take advantage of gas engines which are more efficient at generating electricity than steam turbines; however, the losses incurred in the process of producing syngas means the overall efficiency may not be as high as that for combustion plant. Systems have a modular design and are likely to incur higher capital cost for the volume of waste to be treated in this proposal. The technology is currently commercially unproven in the UK and is likely to be more suited to waste that has been pre-treated or of a more homogeneous physical composition than raw MSW.

Fluidised Bed: waste for this type of furnace needs pre-treatment before it can be introduced, thus incurring additional energy costs. Fluidised bed combustion can lead to lower NO_x generation but not so low as to avoid secondary NO_x abatement requirements. Experience in the UK of fluidised bed combustion of MSW has been limited. Two plants are operational, but both have had significant operational problems. One is operating well below its design capacity while the other is still being commissioned

The Applicant has considered the emissions, waste, residue generated, odour, raw materials, noise, accidents, electrical generation efficiency, flexibility, design and reliability from the technologies listed above. The Operator concluded that:

- All technologies could meet the IED emission limits
- Moving grate was most suitable for municipal waste
- Gasification/pyrolysis produced the lowest levels of residues
- Gasification/pyrolysis used the lowest levels of raw materials
- There was an increased potential for accidents from gasification/pyrolysis

The Applicant's choice of moving grate is primarily based on its proven operation at commercial scales.

The Applicant has proposed to use a furnace technology comprising advanced thermal treatment (a combination of moving grate and gasification/multi-zone combustion), all of which are identified in the tables above as being considered BAT in the BREF for this type of waste feed.

The Applicant proposes to use gasoil (low sulphur) as support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on is due to the location of the mains gas and consumption rates. The facility does not have an existing main gas supply located on site, so is therefore

reliant on either gas oil or LPG. Given that the auxiliary fuel supply is also utilised for the emergency back-up generators a common fuel has been Selected. Gasoil does not pose the same safety risks as those associated with the storage of LPG.

Boiler Design

In accordance with BAT 30 of the BAT-C and our guidance, 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 computerised fluid dynamics (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/LOI on bottom ash. We are also satisfied that the proposed boiler design will be BAT.

We have included pre-operational condition PO6 that requires the Applicant to submit a report providing details and conclusions from the CFD modelling design study for the specified combustion unit and boiler system design that has been selected for the plant.

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 Flue Gas Cleaning System (FGC) 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 FGC systems as:

- type of waste, its composition and variation
- type of combustion process, and its size
- flue-gas flow and temperature
- flue-gas content, including magnitude and rate of composition fluctuations
- 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
- noise
- arrangement of different flue-gas cleaning devices if possible with decreasing flue-gas temperatures from boiler to stack

Taking these factors into account the BREF 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 Higher energy use than ESP Sensitive to condensation and corrosion	Multiple compartments Bag burst detectors	Most plants
Wet scrubbing	May reduce acid gases simultaneously.	Not normally BAT.	Require reheat to prevent visible plume	Where scrubbing required for

		Liquid effluent produced	and dew point problems.	other pollutants
Ceramic filters	High temperature applications Smaller plant.	May “blind” more than fabric filters		Small plant. High temperature gas cleaning required.
Electrostatic precipitators (ESP)	Low pressure gradient. Use with BF may reduce the energy consumption of the induced draft fan.	Not normally BAT by itself Risk of dioxin formation if used in 200-400°C range		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/m³ and are BAT for most installations. The flue gas filtration plant will operate with multiple banks of filter bags, with each compartment being fitted with ‘burst bag’ detection that subsequently feeds back to the process monitoring and alarm systems associated with the SCADA/DCS controls.

The design of the filter plant enables any compartment with a burst failure to be isolated whilst enabling the plant to continue to operate. The bag filtration system has been designed with sufficient capacity to ensure that the plant performance is unaffected in the event of a bag failure.

Emissions of particulate matter have been previously screened out as insignificant, and so we agree 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. Can result in elevated CO and other products of incomplete combustion		Justify if not used

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 40-150mg/ m ³ Reduces CO, VOC, dioxins	Expensive. Re-heat required – reduces plant efficiency		All plant
SCR by catalytic filter bags	50-120 mg/m ³			Applicable to new and existing plants with or without existing SNCR. Can be used with NH ₃ as slip catalyst with SNCR
Selective	NOx emissions	Relies on an	Port injection	All plant

non-catalytic reduction (SNCR)	80 -180 mg/m ³ Lower energy consumption than SCR Lower costs than SCR	optimum temperature around 900 °C, and sufficient retention time for reduction May lead to Ammonia slip	locations	unless lower NO _x release required for local environmental protection.
Reagent Type: Ammonia	Likely to be BAT	More difficult to handle Lower nitrous oxide formation Narrower temperature window		All plant
Reagent Type: Urea	Likely to be BAT	Higher N ₂ O emissions than ammonia, optimisation particularly important		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.
- Starved air systems (sub stoichiometric system) – this technique also simultaneously reduces CO and is defined as BAT for pyrolysis and gasification systems.
- 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.

There are three recognised techniques for secondary measures to reduce NO_x. These are Selective Catalytic Reduction (SCR), SCR by catalytic filter bags and Selective Non-Catalytic Reduction (SNCR) with or without catalytic filter bags. For each technique, there is a choice of urea or ammonia reagent.

SCR can reduce NO_x levels to below 50 mg/m³ 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. The use of SCR by catalytic filter bags can reduce emissions to 50 -120 mg/m³ with low investment costs. SNCR can typically reduce NO_x levels to between 80 and 180 mg/m³, it relies on an optimum temperature of around 900 °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 N₂O. Both reagents are BAT, and the use of one over the other is not normally significant in environmental terms.

The Applicant proposes to use both SNCR with ammonia hydroxide as the reagent and SCR with ammonia hydroxide as the reagent.

The amount of ammonia used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH₃ slip. Improvement condition IC5 requires the Operator to report to the Environment Agency on optimising the performance of the NO_x abatement system. A more stringent limit (5 mg/m³) than the BAT AEL for ammonia has been proposed by the Operator who is also required to monitor and report on N₂O emissions every quarter.

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 SO _x 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	Large effluent disposal and water consumption if not fully treated for re-cycle Effluent treatment plant required		Used for wide range of waste types Can be used as polishing step after other techniques

	and flow rate	May result in wet plume Energy required for effluent treatment and plume reheat		where emissions are high or variable
Dry	Low water use Higher reagent consumption to achieve emissions of other FGC techniques but may be reduced by recycling in plant Lower energy use Higher reliability Lowest visible plume potential	Higher solid residue production Reagent consumption controlled only by input rate		All plant
Semi-dry (also described as semi-wet in the Bref)	Medium reaction rates Reagent delivery may be varied by concentration and input rate	Higher solid waste residues than wet but lower than dry system		All plant
Direct injection into boiler	Reduced acid loading to subsequent cleaning stages. Reduced peak			Generally applicable to grate and rotary kiln plants.

	emissions and reduced reagent usage			
Direction desulphurisation	Reduced boiler corrosion	Does not improve overall performance. Can affect bottom ash quality. Corrosion problems in flue gas cleaning system.		Partial abatement upstream of other techniques in fluidised beds
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	Not proven at large plant	CWIs

		expensive		
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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 fuel oil as the support fuel on the basis of site location and lack of mains gas connection and we agree with that assessment.
- Management of heterogeneous wastes – this will disperse problem wastes such as PVC by ensuring a homogeneous waste feed.

There are five recognised techniques for secondary measures to reduce acid gases, all of which can be BAT. These are wet, dry, semi-dry, boiler sorbent injection and direct desulphurisation. 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 we agree that wet scrubbing is not appropriate in this case. Direct desulphurisation is only applicable for fluidised bed furnaces.

The Applicant has considered dry and semi-dry methods of secondary measures for acid gas abatement. Any of these methods 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. Both reagents are BAT, and the use of one over the other is not significant in environmental terms in this case.

Direct boiler injection is applicable for all plants and can improve overall performance of the acid gas abatement system as well as reducing reagent usage.

In this case, the Applicant proposes to dry flue gas scrubbing using sodium bicarbonate as it is the most efficient removal method. We are 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 <i>de novo</i> 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. Metallic mercury is also absorbed.	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.
Catalytic filter bags	High destruction efficiency	Does not remove mercury. Higher cost than non-catalytic filter bags		

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. Can be impregnated with bromine or sulphur to enhance reactivity, for use during peak emissions.	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.
Fixed or moving bed adsorption	Mainly for mercury and other metals, as well as organic compounds			Limited applicability due to pressure drop

Boiler bromine injection	Injection during mercury peaks. Oxidation of mercury leading to improved removal in downstream removal method.	Consumption of aqueous bromine. Can lead to formation of polybrominated dioxins. Can damage bag filter. Effects can be limited use is restricted to dealing with peak emissions		Not suitable for pyrolysis or gasification. Can deal with mercury peaks.
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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 one or a combination of the techniques listed above. The Applicant has proposed 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. We are satisfied that

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 Application. Emissions of carbon dioxide (CO₂) 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, CO₂ is clearly a pollutant for IED purposes.

The principal greenhouse gas emitted is CO₂, but the plant also emits small amounts of N₂O arising from the operation of secondary NO_x abatement. N₂O has a global warming potential 310 times that of CO₂. 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 CO₂ from the combustion of waste. There will also be CO₂ 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 CO₂ 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 the IED to investigate how emissions of greenhouse gases emitted from the installation might be prevented or minimised.

Factors influencing GWP and CO₂ emissions from the Installation are:

On the debit side

- CO₂ emissions from the burning of the waste;
- CO₂ emissions from burning auxiliary or supplementary fuels;
- CO₂ emissions associated with electrical energy used;
- N₂O from the de-NO_x process.

On the credit side

- CO₂ 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 will be released as a result of waste combustion. This will be 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 N₂O emitted.

The Applicant considered energy efficiency and BAT for the de-NO_x process in its BAT assessment. This is set out in sections 4.3.7, 6.1.1 and 6.2.2 of this document.

Note: avoidance of methane which would be formed if the waste was landfilled has not been included in this assessment. If it were included due to its avoidance it would be included on the credit side.

Taking all these factors into account, the Operator's assessment shows their preferred option is best in terms of GWP.

We agree 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 (2019/1021), which is directly applicable in UK law. We are 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 the 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 POPs should be controlled by imposing emission limits (e.g 0.1 ng/m³ 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/m³.

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 the 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 International Toxic Equivalence (I-TEQ) limit of 0.1 ng/m³. 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 the 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 the 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 water

Uncontaminated clean surface water runoff captured from roof drainage and external roadways / car parking areas will be discharged to the existing surface water drainage system.

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.

6.5.2 Emissions to sewer

Any effluent arising from the process plant will be collected in an effluent collection tank and discharged via sewer. There will be a maximum of 4m³/hr of effluent discharged to sewer which will mainly consist of treated effluent from the water treatment plant.

All domestic foul effluent arisings will also be discharged via sewer.

All discharges will be made under consent to Yorkshire 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 sewer.

6.5.3 Fugitive emissions

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 under Article 46(5) of the IED must be arranged.

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

Waste accepted at the installation will be delivered in covered vehicles or within containers and bulk storage of waste will only occur in the installation's waste bunker.

A roller shutter door will be used to close the entrance to the tipping hall outside of the waste delivery periods and combustion air will be drawn from above the waste storage bunker in order to prevent odours and airborne particulates from leaving the facility building.

During complete shut-down the Applicant has stated that no more waste will be accepted on site and if any waste stored on site exceeds the maximum storage times on site, it will be removed from site. Also, the facility has two lines, making a complete shutdown less likely.

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 odour and to prevent pollution from odour.

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 Application contained a noise impact assessment 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 found that the total, aggregate environmental noise impact arising from the proposed operation of the plant results in a “low” noise impact at the worst affected noise sensitive receptors.

For ecological receptors: Noise is expected to slightly exceed the “no likely effect” threshold of 55dB LAeq,T at the nearest ecological receptor (Site of Special Scientific Interest – SSSI) as located 13 metres distance to the site. However, the “no likely effect” threshold will be met at c.10 metres distance into the boundary of the worst affected SSSI for daytime periods, and c.3 metres distance into the site boundary of the worst affect SSSI for night time periods. Further afield, and for all other SSSI, LWS, the predicted specific sound level is expected to fall below the “no likely effect” threshold.

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

Article 14(3) of the IED states that BAT-C 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 BAT as laid down in the decisions on BAT-C.

BAT-C for waste incineration or co-incineration were published on 03/12/2019

The use of BAT AELs and 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 BAT AELs and Chapter IV limits.

Below we consider whether, for those emissions 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 (EQS) (Article 18).

(i) Global Warming

CO₂ is an inevitable product of the combustion of waste. The amount of CO₂ 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 ELV for CO₂, 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 the IED, which lists the main polluting substances that are to be considered when setting ELVs in permits.

We have therefore considered setting equivalent parameters or technical measures for CO₂. 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 recovery of energy from 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 CO₂ emissions.

(ii) Commissioning

Before the plant can become fully operational it will be necessary for it to be commissioned.

Before commissioning can commence the Operator is required by pre-operational condition PO4 to submit a commissioning plan to the Environment Agency for approval. Commissioning can only begin and be carried out in accordance with the approved proposals in the plan.

In addition, it is recognised that certain information presented in the Application was based on design data, or data from comparable equipment, the commissioning phase is the earliest opportunity to verify much of this information. The following pre-operational / improvement conditions have been included in the permit so that appropriate verifications will be determined by the Applicant:

- Pre-operational condition PO8 requires the Operator to provide plant and equipment details, including accreditation to MCERTS. Methods and standards for sampling and analysis and details of monitoring locations, access and working platforms. Improvement condition IC7 supports this pre-operational condition by requiring the Operator to confirm the performance of the CEMS.
- Pre-operational condition PO9 requires the Operator to provide the methodology for the 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. Improvement condition IC4 supports this pre-operational condition by requiring the Operator to verify the furnace residence time, temperature and oxygen content.
- Pre-operational condition PO6 requires the Operator to provide 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.

- The plant in total conforms to the permit conditions and that satisfactory process control procedures for the plant have been developed (IC3).
- Abatement plant optimisation details (IC5).

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 ELVs and to enable correction of measured concentration of substances to the appropriate reference conditions; to gather information about the performance of the SNCR and SCR systems; 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 the 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 our guidance for monitoring of stack emissions to air.

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 Operator has stated that they will provide back-up CEMS working in parallel to the operating CEMS. These will be switched into full operation immediately in the event that there is any failure in the regular monitoring equipment. The back-up CEMS measure the same parameters as the operating CEMS. In the unlikely event that the back-up CEMS also fail Condition 2.3.10 of the permit requires that the abnormal operating conditions apply.

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

The BAT-C specify either manual extractive monitoring or long term monitoring for dioxins. For mercury either continuous or long term monitoring is specified, manual extractive monitoring is specified for other metals.

For dioxins long term monitoring does not apply if emissions are stable, and for mercury long term monitoring can be used instead of continuous if the mercury content of the waste is low and stable.

Based on the waste types and control measures proposed in the Application we expect that emissions of dioxins will be stable and that the mercury content of the waste will be low and stable. We have therefore set manual extractive monitoring in the Permit. However the Permit requires the stable and low criteria to be demonstrated through Improvement conditions IC10 and IC11 and we can require long term monitoring for dioxins and continuous monitoring for mercury if required.

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 us to ensure compliance with the 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 Barnsley Metropolitan Borough Council to grant planning permission on 29/06/2015.
- The report and decision notice of the local planning authority accompanying the grant of planning permission.

- 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, as well as with our guidance RGS6 on Sites of High Public Interest, which addresses specifically extended consultation arrangements for determinations where public interest is particularly high. This satisfies the requirements of the Public Participation Directive.

Our decision in this case has been reached following a programme of extended public consultation, on the original application. The way in which this has been done is set out in Section 2. A summary of the responses received to our consultations and our consideration of them is set out in Annex 4.

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”.

(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.

(v) Section 7 (General Environmental Duties)

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 or urban area or on any such flora, fauna, features, buildings, sites or objects.

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.

(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.

We have had regard to the National Air Pollution Control Programme (set under the National Emissions Ceiling Regulations 2018) and consider that our decision complies with the Strategy, and that no additional or different conditions are appropriate for this Permit.

7.2.2 Section 108 Deregulation Act 2015 – Growth duty

We 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 statutory guidance issued by the Department of Business, Energy and Industrial Strategy in March 2017 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 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. It also ensures that any pollution that may arise from the regulated facility does not adversely affect local businesses.

7.2.3 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.

7.2.4 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.

7.2.5 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 will not damage the special features of any SSSI. This was recorded on a CROW Appendix 4 form,

The Wildlife and Countryside Act (CRoW) assessment is summarised in greater detail in section 5.4 of this document. A copy of the full Appendix 4 Assessment can be found on the public register.

7.2.6 Natural Environment and Rural Communities Act 2006

Section 40 of the Natural Environment and Rural Communities Act 2006 has been amended with effect from 1 January 2023 to require consideration of the general biodiversity objective, which is to further the conservation and enhancement of biodiversity through the exercise of our functions. We have considered the general biodiversity objective when carrying out our permit application determination and, consider that no different or additional conditions are required in the permit.

7.2.7 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.

7.2.8 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. There is no National Park which could be affected by the Installation.

7.3 National secondary legislation

7.3.1 Conservation of Habitats and Species Regulations 2017

We have assessed the Application in accordance with our guidance and concluded that there will be no likely significant effects on any European Site.

The Habitats Regulations Assessment is summarised in greater detail in section 5.4 of this document. A copy of the Habitats Regulations Assessment can be found on the public register.

We have also considered our general duties under Regulation 9(3) to have regard to the requirements of the Habitats Directive in the exercise of our powers and under Regulation 10 in relation to wild bird habitat to take such steps in the exercise of their functions as they consider appropriate so far as lies within our powers to secure preservation, maintenance and re-establishment of a sufficient diversity and area of habitat for wild birds.

We considered whether we should impose any additional or different requirements in the permit in terms of these duties but concluded that we should not.

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, amongst other things, 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.

7.3.3 The Persistent Organic Pollutants Regulations 2007

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

7.5 Other relevant legal requirements

7.5.1 Duty to Involve

Section 23 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. Section 24 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 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.

Annexes

Annex 1A: 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) 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
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 3.6.1 to 3.6.54 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 2.3.14 and 2.3.15.
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	Conditions 3.1.1 and

IED Article	Requirement	Delivered by
	the emission limit values set out in parts 4 or determined in accordance with part 4 of Annex VI.	3.1.2 and Tables S3.1, 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. The permit requires that these measures are used. Various permit conditions address this and when taken as a whole they ensure compliance with this requirement.
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/m ³), CO and TOC not to be exceeded during this period.	Conditions 2.3.14 and 2.3.15
47	In the event of breakdown, reduce or close down operations as soon as practicable. Limits on dust (150 mg/m ³), CO and TOC not to be exceeded during this period.	condition 2.3.13
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Conditions 3.6.1 to 3.6.4, 3.2.1, 3.2.2, tables S3.1, S3.1(a). Reference conditions are defined in Schedule 6 of the Permit.
48(2)	Installation and functioning of the automated measurement systems	Conditions 3.6.1, 3.6.3, table S3.1,

IED Article	Requirement	Delivered by
	shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	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 3.6.1. Pre-operational condition PO6
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, 3.1.2, 3.2.1, 3.2.2 and tables S3.1, S3.1(a)
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) < 3% or loss on ignition (LOI) < 5%.	Conditions 3.6.1 and Table S3.5
50(2)	Flue gas to be raised to a temperature of 850°C for two seconds, as measured at representative point of the combustion chamber.	Condition 2.3.9, Pre-operational condition PO6 and Improvement condition IC4 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 2.3.14
50(4)(a)	Automatic shut-down to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.10
50(4)(b)	Automatic shut-down to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.10
50(4)(c)	Automatic shut-down to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.10 and 2.3.14
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

IED Article	Requirement	Delivered by
		the available heat recovery options prior to commissioning (Condition PO2) and then every 2 years (Conditions 1.2.1 to 1.2.3)
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
51(3)	Changes in operating conditions shall include emission limit values for CO and TOC set out in Part 3 of Annex VI.	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, 3.3, 3.4, 3.5 and 3.7
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Condition 2.3.4(a) and Table S2.2 in Schedule 3 of the Permit.
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 1.4.1, 1.4.2 and 3.6.1 with Table S3.10
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	conditions 1.4.1 2.3.1, 2.3.2 and 3.3.1.
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.6.1 and Table S3.5 and pre-operational condition PO3.
55(1)	Application, decision and permit to	All documents are

IED Article	Requirement	Delivered by
	be publicly available.	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 1B: Compliance with Bat Conclusions

BAT conclusion	Criteria	Delivered by
1	Implement environmental management system	Condition 1.1 and Pre-operational condition PO1
2	Determine gross electrical efficiency	Section 4.3.7 of this decision document. Permit table S3.4
3	Monitor key process parameters	Condition 3.6.1 and table S3.4
4	Monitoring emissions to air	Condition 3.6.1 and table S3.1
5	Monitoring emissions to air during OTNOC	Condition 1.1.1 and pre-operational condition PO1
6	Monitoring emissions to water from flue gas treatment and/or bottom ash treatment	There are no such emissions from the installation
7	Monitor unburnt substances in slags and bottom ashes	Conditions 3.1.3 and 3.6.1, and table S3.5
8	Analysis of hazardous waste	Not applicable
9	Waste stream management techniques	The Application explains the measures that will be used. Permit condition 2.3.1, table S1.2 and pre-operational condition PO5
10	Quality management system for bottom ash treatment plant	N/A – no treatment on-site
11	Monitor waste deliveries as part of waste acceptance procedures	The Application explains the measures that will be used. Permit condition 2.3.1, table S1.2 and pre-operational condition PO5
12	Reception, handling and storage of waste	Measures are described in the Application and FPP. Permit conditions 2.3.1, table S1.2 and condition 3.8
13	Storage and handling of clinical waste	Not applicable

BAT conclusion	Criteria	Delivered by
14	Improve overall performance of plant including BAT-AELs for TOC or LOI	Techniques described in the Application. Permit condition 2.3.1, table S1.2, 3.1.3, 3.6.1 and table S3.5
15	Procedures to adjust plant settings to control performance	Measures described in the Application condition 2.3.1 and table S1.2
16	Procedures to minimise start-up and shut down	Measures described in the Application
17	Appropriate design, operation and maintenance of FGC system	FGC measures described in Application. Operation and maintenance procedures will form part of the EMS
18	OTNOC management plan	Pre-operational condition PO1
19	Use of heat recovery boiler	Described in the Application. Permit condition 2.3.1, table S1.2
20	Measures to increase energy efficiency and BAT AEEL	Measures described in the Application. Permit condition 2.3.1, table S1.2 Section 4.3.7 of this decision document.
21	Measures to prevent or reduce diffuse emissions including odour	Measures described in the Application. Permit conditions 2.3.1, table S1.2, 3.4.1, 3.3.1, 3.3.2. Sections 4.2.2, 6.5.3 and 6.5.4 of this decision document.
22	Handling of gaseous and liquid wastes	Not applicable
23	Management system to prevent or reduce dust emissions from treatment of slags and ashes	N/A – no treatment on-site
24	Techniques to prevent or reduce diffuse emissions to air from treatment of slags and ashes	N/A – no treatment on-site
25	Minimisation of dust and metal emissions and compliance with BAT AEL	Section 5.2 of this decision document. Permit conditions 2.3.1, table S1.2, 3.4.1, 3.3.1, 3.3.2. 3.1.1 and 3.1.2 and table S3.1

BAT conclusion	Criteria	Delivered by
26	Techniques and BAT AEL for dust emissions from enclosed slags and ashes treatment	N/A – no treatment on-site
27	Techniques to reduce emissions of HCl, HF and SO ₂	Measures described in the Application. Permit condition 2.3.1 and table S1.2 Permit condition 2.3.1 and table S1.2 Section 5.2 of this decision document.
28	Techniques to reduce peak emissions of HCl, HF and SO ₂ , optimise reagent use and BAT AELs	Measures described in the Application. Permit conditions 2.3.1, table S1.2, 3.1.1 and 3.1.2 and table S3.1
29	Techniques to reduce emissions of NO ₂ , N ₂ O, CO and NH ₃ and BAT AELs	Measures described in the Application. Section 5.2 of this decision document. Permit conditions 2.3.1, table S1.2, 3.1.1 and 3.1.2 and table S3.1
30	Reduce emissions or organic compounds including dioxins/furans and PCBs. BAT AELs	Measures described in the Application. Section 5.2 of this decision document. Permit conditions 2.3.1, table S1.2, 3.1.1 and 3.1.2 and table S3.1
31	Reduce emissions of mercury. BAT AEL	Measures described in the Application. Section 5.2 of this decision document. Permit conditions 2.3.1, table S1.2, 2.3.1, table S1.2, 3.1.1 and 3.1.2 and table S3.1
32	Segregate waste water streams to prevent contamination	Measures described in the Application Sections 4.2.2, 6.5.1 and 6.5.2 of this decision document. Permit conditions 2.3.1, table S1.2, 3.1.1, 3.1.2 and table S3.2
33	Techniques to reduce water usage and prevent or reduce waste water	Measures described in the Application. Sections 4.2.2 and 4.3.8 of this decision document. Permit conditions 1.3.1, 2.3.1, table S1.2

BAT conclusion	Criteria	Delivered by
34	Reduce emissions to water from FGC and/or from treatment or storage of bottom ashes. BAT AELs	Not applicable
35	Handle and treat bottom ashes separately from FGC residues	Permit condition 2.3.17
36	Techniques for treatment of slags and bottom ashes	No treatment carried out on site
37	Techniques to prevent or reduce noise emissions.	Measures are described in the Application. Section 6.5.5 of this decision document. Permit conditions 2.3.1, table S1.2, 3.5.1, 3.5.2

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	<p>Prior to the commencement of commissioning, the Operator shall send a summary of the site Environment Management System (EMS) to the Environment Agency and obtain the Environment Agency's written approval to the EMS summary.</p> <p>The summary shall include a copy of the full other than normal operating conditions (OTNOC) management plan which shall be prepared in accordance with BAT 18 of the BAT conclusions and include:</p> <ul style="list-style-type: none"> • a list of potential OTNOC situations that are considered to be abnormal operation under the definition in Schedule 6 of this permit. • a definition of start-up and shut-down conditions having regard to any Environment Agency guidance on start-up and shut-down. • any updates on the design of critical equipment to minimise OTNOC since the permit application <p>The Operator shall make available for inspection all documents and procedures which form part of the EMS. The EMS shall be developed in line with the requirements set out in Environment Agency web guide on developing a management system for environmental permits (found on www.gov.uk) and BAT 1 of the incineration BAT conclusions. The EMS shall include the approved OTNOC management plan.</p> <p>The documents and procedures set out in the EMS shall form the written management system referenced in condition 1.1.1 (a) of the permit.</p>
PO2	<p>Prior to the commencement of commissioning, the Operator shall send a report to the Environment Agency, and obtain the Environment Agency's written approval to it, which will contain a comprehensive review of the options available for utilising the heat generated, including operating as CHP or supplying district heating, by the waste incineration process in order to ensure that it is recovered as far as practicable. The review shall detail any identified proposals for improving the recovery and utilisation of heat and shall provide a timetable for their implementation.</p>
PO3	<p>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 for the purposes of assessing its hazard status. Sampling and testing shall be carried out in accordance with the protocol as approved.</p>
PO4	<p>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 timelines for completion, 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</p>

Table S1.4A Pre-operational measures	
Reference	Pre-operational measures
	plan as approved.
PO5	<p>Prior to the commencement of commissioning, the Operator shall submit a written report to the Agency, and obtain the Environment Agency's written approval to it, detailing the waste acceptance procedure to be used at the site. The waste acceptance procedure shall include the process and systems by which wastes unsuitable for incineration at the site will be controlled.</p> <p>The procedure shall be implemented in accordance with the written approval from the Agency.</p>
PO6	<p>No later than one month after the final design of the furnace and combustion chamber, 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.</p>
PO8	<p>At least three months before (or other date agreed in writing with the Environment Agency) the commencement of commissioning, the Operator shall submit a written report to the Environment Agency, and obtain the Environment Agency's written approval to it, specifying arrangements for continuous and periodic monitoring of emissions to air to comply with Environment Agency guidance notes M1, M2 and M20. The report shall include the following:</p> <ul style="list-style-type: none"> • Plant and equipment details, including accreditation to MCERTS • Methods and standards for sampling and analysis • Details of monitoring locations, access and working platforms
PO9	<p>At least 3 months 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.</p>

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 report to the Environment Agency on the implementation of its Environmental Management System (EMS) and the progress made in the certification of the system by an external body or if appropriate submit a schedule by which the EMS will be certified. The report shall also include details of a review of the OTNOC management plan and any updates to the plan following the review.	Within 12 months of the completion of commissioning.
IC2	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 points A1 and A2, 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.
IC3	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.
IC4	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 carry out validation testing to 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 PO9.	Validation tests completed before the end of commissioning
	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.	Report submitted within 2 months of the

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
	The report shall identify the process controls used to ensure residence time and temperature requirements are complied with during operation of the incineration plant	completion of commissioning.
IC5	<p>The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of:</p> <ul style="list-style-type: none"> •The sodium bicarbonate injection system for minimisation of acid gas emissions •The carbon injection system for minimisation of dioxin and heavy metal emissions. •The Selective Non Catalytic Reduction (SNCR) and Selective Catalytic Reduction (SCR) system and combustion settings to minimise oxides of nitrogen (NOx). The report shall include an initial assessment of the level of NOx, N₂O and NH₃ emissions that can be achieved under optimum operating conditions. 	Within 4 months of the completion of commissioning.
IC6	<p>The Operator shall carry out an assessment of the impact of emissions to air of the following component metals subject to emission limit values:</p> <p>Cr</p> <p>A report on the assessment shall be made to the Environment Agency.</p> <p>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 ES. In the event that the assessment shows that an environmental standard can be exceeded, the report shall include proposals for further investigative work.</p>	15 months from the completion of commissioning
IC7	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 EN 14181, specifically the requirements of QAL1, QAL2 and QAL3. The report shall include the results of calibration and verification testing,	<p>Initial calibration report to be submitted to the Agency within 3 months of completion of commissioning.</p> <p>Full summary evidence compliance report to be submitted within 18 months of completion of commissioning.</p>
IC9	During commissioning, the operator shall carry out tests to	Within 6

Table S1.3 Improvement programme requirements		
Reference	Requirement	Date
	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	months of completion of commissioning.
IC10	The operator shall carry out a programme of dioxin and dioxin like PCB monitoring over a period and frequency agreed with the Environment Agency. The operator shall submit a report to the Environment Agency with an analysis of whether dioxin emissions can be considered to be stable.	Within 6 months of completion of commissioning or as agreed in writing with the Environment Agency
IC11	The operator shall carry out a programme of mercury monitoring over a period and frequency agreed with the Environment Agency. The operator shall submit a report to the Environment Agency with an analysis of whether the waste feed to the plant can be proven to have a low and stable mercury content.	Within 6 months of completion of commissioning or as agreed in writing with the Environment Agency
IC12	<p>During commissioning, the operator shall carry out tests to assess whether the air monitoring location(s) meet the requirements of BS EN 15259 and supporting Method Implementation Document (MID).</p> <p>A written report shall be submitted for approval setting out the results and conclusions of the assessment including where necessary proposals for improvements to meet the requirements. The report shall specify the design of the ports for PM10 and PM2.5 sampling.</p> <p>Where notified in writing by the Environment Agency that the requirements are not met, the operator shall submit proposals or further proposals for rectifying this in accordance with the time scale in the notification. The proposals shall be implemented in accordance with the Environment Agency's written approval.</p>	Report to be submitted to the Agency within 3 months of completion of commissioning.

Annex 4: Consultation Reponses

A) 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 draft decision is summarised in this Annex. Copies of consultation responses have been placed on the Environment Agency public register.

The Application was advertised on the Environment Agency website from 29 September 2023 to 27 October 2023 and in the Sheffield Star and the Barnsley Chronicle, both on 29 September. The Application was made available to view on Citizen Space.

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

- Local Authority – Environmental Health
- Local Authority – Planning
- Fire & Rescue
- Director of PH/UKHSA
- Health and Safety Executive
- Food Standards Agency
- Sewerage Authorities
- National Grid

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from Barnsley Metropolitan Borough Council	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No issues raised	N/A

Response Received from South Yorkshire Fire & Rescue	
Brief summary of issues raised:	Summary of action taken / how this has been covered
<p>The following should be included in the sites Fire Prevention Plan:</p> <ul style="list-style-type: none"> • Details of fire appliance access onto and within the site • Provision of information to the Fire and Rescue Service on arrival • Arrangements for liaison between the site's operators and the Fire and Rescue Service during and post incident. 	The operator has provided an updated plan covering these points.

Response Received from UKHSA	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No significant concerns raised	None