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

The Permit Number is: EPR/SP3609BX
The Applicant / Operator is: Fortum Carlisle Limited

The Installation is located at: Kingmoor Energy Recovery Facility
Land North of Kings Drive
Kingmoor Park industrial Estate
Carlisle

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/SP3609BX/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/SP3609BX**. We refer to the permit as "the **Permit**" in this document.

The Application was duly made on 12/06/2020.

The Applicant is Fortum Carlisle Limited. We refer to Fortum Carlisle Limited as "the **Applicant**" in this document. Where we are talking about what will happen after the Permit is granted, we call Fortum Carlisle Limited "the **Operator**".

Fortum Carlisle Limited's facility is located at Land North of Kings Drive, Kingmoor Industrial Estate Carlisle. We refer to this as "the **Installation**" in this document.

How this document is structured

- Glossary of acronyms
- Our decision
- How we reached our decision
- The legal framework
- The Installation
    - Description of the Installation and general issues
    - The site and its protection
    - Operation of the Installation – general issues
- Minimising the installation's environmental impact
    - Assessment Methodology
    - Air Quality Assessment
    - Human health risk assessment
    - Impact on Habitats sites, SSSIs, non-statutory conservation sites etc.
    - Impact of abnormal operations
- Application of Best Available Techniques
    - Scope of Consideration
    - BAT and emissions control
    - BAT and global warming potential
    - BAT and POPs
    - Other Emissions to the Environment
    - Setting ELVs and other Permit conditions
    - Monitoring
    - Reporting
- Other legal requirements
    - The EPR 2016 and related Directives
    - National primary legislation
    - National secondary legislation
    - Other relevant EU legislation
    - Other relevant legal requirements
- Annexes
    - Application of the Industrial Emissions Directive
    - Pre-Operational Conditions
    - Improvement Conditions
    - Consultation Reponses

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
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
CW	Clinical waste
CWI	Clinical waste incinerator
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
ES	Environmental standard
EWC	European waste catalogue
FGC	Flue gas cleaning
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol

HPA	Health Protection Agency (now 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
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LADPH	Local Authority Director(s) of Public Health
LNR	Local Nature Reserves
LOI	Loss on Ignition
LWS	Local wildlife sites
MBT	Mechanical biological treatment
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NOx	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 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
RGS	Regulatory Guidance Series
Rw	Weight Sound Reduction
SAC	Special Area of Conservation

SCR	Selective catalytic reduction
SGN	Sector guidance note
SHPI(s)	Site(s) of High Public Interest
SNCR	Selective non-catalytic reduction
NSR	Noise Sensitive Receptors (NSR)
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

1 Our decision

We have granted the Permit to the Applicant. This will allow them 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 the details are sufficient and satisfactory to make the standard condition appropriate. This document does, however, provide an explanation of our use of "tailor-made" or installation-specific conditions, or where our Permit template provides two or more options.

2 How we reached our decision

2.1 Receipt of Application

The Application was duly made on 12/06/2020. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below.

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

2.2 Consultation on the Application

We carried out consultation on the Application in accordance with the EPR, our statutory Public Participation Statement (PPS) and our own internal guidance RGS Note 6 for Determinations involving Sites of High Public Interest. 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, our consultation already satisfies the Act's requirements.

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 Cumberland News on 31/07/2020.

We made a copy of the Application and all other documents relevant to our determination (see below) available to view on our Public Register. Anyone wishing to see these documents could request a copy.

Due to the Covid 19 pandemic our offices were closed. We took the following steps to inform people of the consultation:

A newsletter was delivered to approximately 12,000 residences in the local area. The newsletter contained:
details of the application received, and consultation;
issues we could / could not take into account as part of the consultation;
how to view and comment on the application;
a summary of the permitting process.
The consultation period was also extended from a 20 working day consultation period to a 70 working day period to ensure all consultees had sufficient time to access the relevant documents and respond to the consultation.
All Application documents were available to view on our website where people could also comment on them.

We are satisfied that we took appropriate steps to inform people about the Application and how to get involved despite the restrictions brought about due to the pandemic.

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

Carlisle City Council
Health and Safety Executive
United Utilities plc
Director of Public Health
Public Health England (now the UK Health Security Agency)
Food Standards Agency
Local fire service

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

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

2.3 Requests for Further Information

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it and issued information notices on 31/03/2021 and 24/06/2021. A copy of each information notice and responses when received were placed on our public register.

2.4 Consultation on our draft decision

We consulted on our draft decision from 02/12/2022 until 27/01/2023. Whilst the consultation closed on 27/01/2023, we accepted (and considered) any representations received after this date up to permit issue. A summary of the consultation responses and how we have taken into account all relevant representations is shown in Annex 4, Part B.

3 The legal framework

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

an *installation* and a *waste incineration plant* as described by the IED;
an *operation* covered by the waste framework directive (WFD), and
subject to aspects of other relevant legislation which also have to be addressed.

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

We consider that 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” for EPR purposes (see below), 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”. At this Installation the generation of electricity using a steam turbine and a back up electricity generator for emergencies is a Directly Associated Activity. These activities comprise one Installation, because the incineration plant and the steam turbine are successive steps in an integrated activity.

4.1.2 The Site

The Kingmoor Energy Recovery Facility (ERF) site is located on land south of the Kingmoor Park Industrial Estate, near Carlisle, which is accessible from the A689 via Kingmoor Park Road. A number of industrial facilities are located to the north, east and south of the Installation boundary. With the closest residential receptors ~ 830 m to the south/southeast. Carlisle town centre lies approximately 5 km south east of the Site. Recreational areas including Lowry Gardens are located 1280 m to the south/southeast and the River Eden is ~1 km to the west. Solway Firth Special Area of Conservation (SAC), River Eden (SAC), Solway Firth (potential Special Protection Area (SPA)) and Upper Solway Flats and Marshes (SPA & Ramsar) are within 10 km of the

Installation. River Eden and Tributaries (Site of Special Scientific Interest (SSSI)) is within 2km of the Installation. There are several Local Wildlife Sites and Local Nature Reserves within 2 km of the installation.

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

Further information on the site is addressed below at 4.3.

4.1.3 What the Installation does

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

Notwithstanding the fact that energy will be recovered from the process; the process is nevertheless 'incineration' because it is considered that its main purpose is the thermal treatment of waste.

The Installation will receive incoming waste to the facility from enclosed vehicles or other appropriate containers which will be unloaded in the enclosed waste reception area, and into the waste bunker. Cranes will transfer waste into the hopper, the waste will be transferred onto the grate where the waste is burned.

The combustion chamber will utilise a conventional moving grate technology which will agitate the waste bed to promote a good burnout of the waste and a uniform heat release. The furnace will be designed to ensure that the exhaust gases are raised to a minimum temperature of 850°C, with a minimum of 2 seconds flue gas residence time. Primary combustion air will be drawn from the waste bunker area to maintain negative pressure in this area with the extracted air being fed into the combustion chamber beneath the grate. Secondary combustion air will be injected into the flame body above the grate to facilitate the combustion of waste on the grate.

Emissions to air will be via a 70m high stack and will be minimised by cleaning the waste combustion gases as follows:

The flue gas treatment system will consist of the following:

- selective non-catalytic reduction (SNCR) with ammonia solution for the abatement of oxides of nitrogen;
- lime injection (dry system) to be used as a reagent for the abatement of acid gases
- activated carbon will abate emissions of mercury, organic compounds and dioxins
- particulate matter and metals abated by fabric bag filters

The boiler will be equipped with economisers and superheaters to optimise thermal cycle efficiency without prejudicing boiler tube life, having regard for the nature of the waste that is combusted. Low grade heat will be extracted from the turbine and used to preheat combustion air in order to improve the efficiency of the thermal cycle. The remainder of the steam left after the turbine will be condensed back to water to generate the pressure drop to drive the turbine. A fraction of the steam will condense at the exhaust of the turbine in the form of wet steam, however the majority will be condensed and cooled using an air-cooled condenser. The condensed steam will be returned as condensate to the feedwater tank and from there again as feedwater to the closed-circuit pipework system to the boiler.

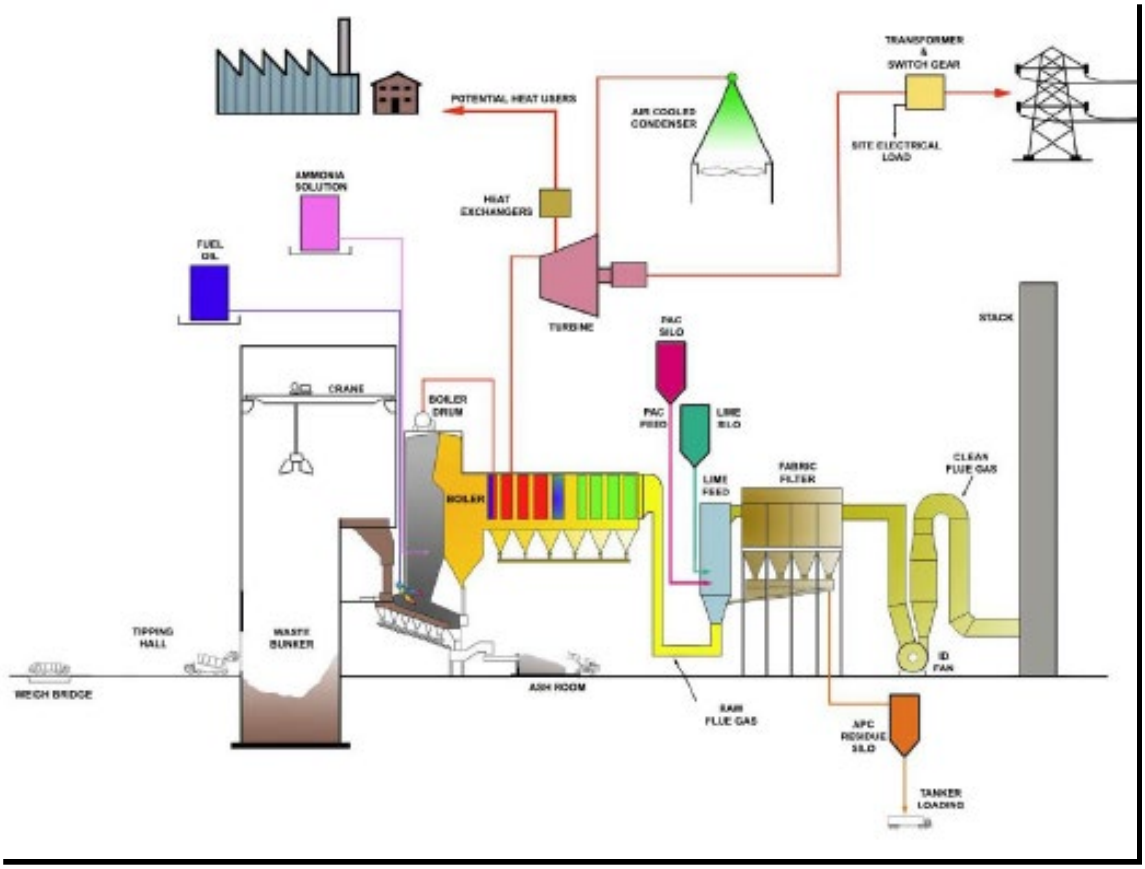
Bottom ash will be collected at the end of the combustion grate and fall into the discharger, which will be a water-filled trough (ash quench). The quenched ash will be transferred, via inclined conveyor, to the Incinerator Bottom Ash (IBA) storage area with capacity for the storage of up to 650 tonnes of IBA (equivalent to approximately 4 days storage capacity). There will be regular collections of IBA from the IBA storage area for transfer off-site to a suitably licensed waste facility. In addition, any overflow from the ash quench system will be contained in the process effluent drainage system, and hence there will not be any release to water of effluent from the ash quench system.

Surface water run-off from buildings, roadways and areas of hardstanding will be discharged, via silt traps and fuel interceptors where appropriate, into the surface water drainage system. The surface water drainage system will flow to a surface water storage tank designed for Sustainable Drainage System (SUDS) requirements and then to a surface water attenuation pond, with an eventual discharge to the Cargo Beck watercourse. Where practicable process effluents will be re-used within the process. Excess amount of process effluent will require discharge, which will be discharged into the foul water sewer system in accordance with a Trade Effluent Consent to be obtained from the Sewerage Undertaker (United Utilities).

Air Pollution Control residues (APCr) will be sent to a suitably licensed hazardous waste landfill for disposal as a hazardous waste.

Assuming electricity-only mode and average ambient temperature, the Facility will generate approximately 29.3 MWe of electricity in full condensing mode. The Facility will have a parasitic load of approximately 1.9 MWe. Therefore, the export capacity of the Facility with average ambient temperature is approximately 27.4 MWe.

The operator will have an environmental management system and intends to have it certified to ISO 14001.



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

Waste throughput, Tonnes/line	274,000 /year	31.3 /hour
Waste processed	MSW	
Number of lines	1	
Furnace technology	Grate	
Auxiliary Fuel	Gas Oil	
Acid gas abatement	Dry	Lime
NOx abatement	SNCR	Ammonia

Reagent consumption	Auxiliary Fuel 200 t/annum Ammonia/Urea : 1,600 t/annum Lime/Other : 3,500 t/annum Activated carbon: 100 t/annum Process water: 82,125 t/annum	
Flue gas recirculation	No	
Dioxin abatement	Activated carbon	
Stack	NY 38145 59189	
	Height, 70 m	Diameter, 2.29 m
Flue gas	Flow, 45 Nm^3/s	14.8, m/s
	Temperature 135 °C	
Electricity generated	29.3 MWe	234,000 MWh
Electricity exported	27.4 MWe	219,200 MWh
Steam conditions	Temperature, 425°C	Pressure, 56 bar

4.1.4 Key Issues in the Determination

The key issues arising during this determination included assessment of the impact from air emissions, noise emissions and the assessment of BAT and we therefore describe how we determined these issues in most detail in this document.

4.2 The site and its protection

4.2.1 Site setting, layout and history

The site is located in the eastern area of the Kingmoor Park Estate to the north-east of Carlisle City Centre. A number of industrial buildings are located to the north and south of the Site. A pond/lagoon is also located to the south. Cargo Beck runs along the northern boundary of the Site and leads to a culvert below the West Coast Mainline. The West Coast Mainline is located approximately 100 m to the west of the Site and an area of low lying semi-improved grassland is located immediately to the east. Located between the Site and the West Coast Mainline is an embankment of over 20 m in height

The proposed development site is situated on land formerly occupied by Royal Air Force (RAF) Carlisle. The Site consists of low lying land accommodating scrub and grassland. No noteworthy trees or permanent waterbodies are located on the Site, although there are areas of standing water at certain times of the year. A topographical survey of the Site and surrounding area has been undertaken and demonstrates that the Site and surrounding area is relatively flat with a gentle slope from north to south.

The underlying Mercia Mudstone Group are classified a Secondary B Aquifer which predominantly comprise lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

The Applicant described measures to prevent pollution to ground and groundwater from potentially polluting substances. They are summarised below:

The surfaces of the waste reception, handling and storage areas will be impermeable. Areas where receipt, handling and storage of waste takes place will drain to the process water system. The process effluent pit (or dirty water pit) will be impermeable to the liquid that is being stored. The process effluent pit will be a concrete structure, designed in accordance with recognised standard '*Eurocode 2 – Design of Concrete Structures – Part 3: Liquid retaining and containment structures*'.

The process effluent drainage network will be entirely separate from the surface water drainage network and will be a fully sealed system, with the

exception of those circumstances where it is required to discharge excess effluent from the clean water pits (i.e. the link to sewer). The foul drainage system is connected to the process effluent drainage system and the only interaction between the two will be the combining of the effluents prior to pumping to foul sewer.

- The integrity of areas of hardstanding will be periodically verified by visual inspection. Regular maintenance of the drainage systems will be undertaken in accordance with documented management procedures.
- Chemicals: Deliveries will be from sealed tankers and off-loaded via a hose. Spillage will be prevented by good operating procedures, high tank level alarm/trips.
- Tanks will be located within suitably designed secondary containment. Tanker off-loading of fuel oil and chemicals will take place within areas where the drainage is contained with the appropriate capacity to contain a spill during delivery.
- All chemicals will be stored in an appropriate manner incorporating the use of suitable secondary and other measures (such as acid and alkali resistant coatings) to ensure appropriate containment and tertiary abatement measures.
- This will include areas of hardstanding with kerbed containment, to prevent any potential spills from causing pollution of the ground/groundwater and surface water. The potential for accidents, and associated environmental impacts, is therefore limited.
- Secondary containment for storage vessels will prevent pollution from overfill of vessels.
- Secondary containment facilities will have capacity to contain whichever is the greater of 110% of the tank capacity or 25% of the total volume of materials being stored, in case of failure of the storage systems.
- Spillages will be cleaned up in accordance with documented management systems.
- The APC residues silo will be unloaded by chute that contains inner core (used for the unloading of APC) and an outer ‘bellow’ which will extract displaced air from the silo and pass it through a dust filter, with air subsequently vented back into the silo. All containers or vessels used for the transfer of ash off-site will be sealed or covered to prevent the release of dust or excess water when in transport.
- All ash handling arrangements (including loading into vehicles for transfer off-site) will be undertaken within enclosed buildings and on areas of hardstanding, preventing the release of any wastewater from the ash handling and quench system to the site surface water drainage system. All containers or vessels used for the transfer of ash off-site will be sealed or covered to prevent the release of dust or excess water when in transport.
- The Environmental Management System (EMS) will include procedures to control the inspection, storage and onward disposal of unacceptable waste.

- Under normal operation there will be no emissions of process effluent from the Installation discharged to water. In the event of excess process effluent it will be discharged to sewer, in accordance with a Trade Effluent Consent.

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

Having considered the information submitted in the Application, we are satisfied that the appropriate measures will be in place for the closure and decommissioning of the Installation, as referred to in Section 2.11 of the Application Supporting Information. The added pre-operational condition 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 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 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 not submitted an Accident Management Plan. However, having considered the other information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that accidents that may cause pollution are prevented but that, if they should occur, their consequences are minimised. An Accident Management Plan will form part of the Environmental Management System and must be in place prior to commissioning as required by a pre-operational condition.

The Applicant submitted a Fire Prevention Plan. We are satisfied that the plan will minimise the risk of a fire and limit the impact of a fire in the event that one occurred. We have included a pre-operational condition to provide an updated FPP to account for any changes following detailed design stage, and prior to commissioning of the Installation. Any updated plan will require approval from the Environment Agency.

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 EPR/SP3609BX/A001	Section 2.10 Management of the Supporting information document provided as a response to question 3 of application form B2 The following relevant section of the Supporting information document provided as a response to question 3 of application form B3: 2.1 Raw materials, 2.2.1 Waste to be processed in the facility, 2.2.2 Waste handling, 2.3 Water use, 2.4.1 Point source emissions to air, 2.4.3 Point source emissions to water, 2.4.5 Point source emissions to sewer, 2.5 Monitoring methods, 2.6 Technology selection (BAT), 2.8.2.2 Operating and maintenance procedures, 2.9 Residue recovery and disposal, Appendix C Noise Assessment	These are parts of the Application that contain key operating techniques
Response to Schedule 5 Notice dated 31/03/2021	Details provided at section 4 Waste management, 5 Water management, 6 Flood risk, 7 Chemical delivery and storage and 8 Fugitive emissions, Appendix C : Fire prevention plan	
Response to Schedule 5 Notice dated 24/06/2021	Details provided at section 2 Best available techniques, 3 Feedstock sampling, 4 Abatement/BAT, 5 FPP Quarantine area, 8 Storage handling, 10 Odour management Plan, 11 Noise.	
Additional information received 20/03/2023	Clarifications on ammonia storage and diesel generator	

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

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

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

Article 45(1) of the IED requires that the Permit must include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2005/532/EC, EC, if possible, and containing information on the quantity of each type of waste, where appropriate. The Application contains 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:

- these wastes are categorised as municipal waste in the European Waste Catalogue or are non-hazardous wastes similar in character to municipal waste;
- the wastes are all categorised as non-hazardous in the European Waste Catalogue and are capable of being safely burnt at the installation;
- these wastes are likely to be within the design calorific value (CV) range for the plant;
- 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. Permit conditions restrict the receipt of separately collected fractions

We have limited the capacity of the Installation to 274,000 tonnes per annum. This is based on the installation operating 8,760 hours per year at a nominal capacity of 32.8 tonnes per hour. The Applicant has stated that the Grate will be designed to operate safely, whilst achieving the ash burn out guarantee, at waste throughputs of up to 105% of the Maximum Grate Throughput.

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:

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.

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.

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.

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 including high efficiency motors, high efficiency variable speed drives, high standards of cladding and insulation.

An energy efficiency plan will be built into the operation and maintenance procedures of the Facility ensuring maximum, practical, sustainable, safe and controllable electricity generation. This plan will be reviewed regularly as part of the environmental management systems. An Environmental Management System plan must be in place prior to commissioning as required by a pre-operational condition.

During normal operation, procedures will be reviewed and amended, where necessary, to include improvements in efficiency as and when proven new equipment and operating techniques become available. These will be assessed on the implementation cost compared with the anticipated benefits.

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 60 kWh/tonne. The installation capacity is 274,000 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 10 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 CHP Ready Guidance - February 2013 considers that BAT for energy efficiency for Energy from Waste (EfW) plant is the use of CHP in circumstances where there are technically and economically viable opportunities for the supply of heat from the outset.
The term CHP in this context represents a plant which also provides a supply of heat from the electrical power generation process to either a district heating network or to an industrial / commercial building or process. However, it is recognised that opportunities for the supply of heat do not always exist from the outset (i.e. when a plant is first consented, constructed and commissioned).

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

The BREF says that 0.4 – 0.8 MWh of electricity can be generated per tonne of waste. Our technical guidance note, SGN EPR S5.01, states that where electricity only is generated, 5-9 MW of electricity should be recoverable per 100,000 tonnes/annum of waste (which equates to 0.4 – 0.72 MWh/tonne of waste).

The Installation will generate electricity only and has been specified to maximise electrical output with little or no use of waste heat. The Sankey diagram in section 2.8.2 of the Application shows 29.3 MW of electricity produced for an annual burn of 274,000 tonnes, which represents 10.7 MW per 100,000 tonnes/yr of waste burned (0.94MWh/tonne of waste). The Installation is therefore at the top of in 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 33.75%. The BAT AEEL for gross electrical efficiency is 25-35%.

The value calculated by the Applicant is towards the top of the BAT AEEL range, which is where we would expect the plant to be based on it using higher steam conditions.

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.

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

The location of the Installation largely determines the extent to which waste heat can be utilised, and this is a matter for the planning authority. The Applicant carried out a feasibility study [and provided a CHP-R assessment as part of their application], which showed there was potential to provide up to 12 MWth (the exact amount of heat exported will depend on the demand of local heat users and commercial agreements with the heat users) to 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. In our role as a statutory consultee on the planning application, we ensured that the issue of energy utilisation was brought to the planning authority's attention.

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

(v) Choice of Steam Turbine

The Applicant confirmed that the steam conditions will be 425 ^{o}C and 56 Bar. We are satisfied that this represents BAT in terms of steam conditions to ensure efficient energy recovery.

(vi) Choice of Cooling System

The Applicant has chosen an air cooled cooling system. This was justified on the basis that it will reduce water usage, not require a cooling tower so no visual plume and not result in a water discharge.

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

The Operator submitted a cost-benefit assessment of opportunities for high efficiency co-generation within 15 km of the installation, in which they calculated net present value (NPV). If the NPV is positive (i.e. any number more than zero) it means that the investors will make a rate of return that makes the scheme commercially viable. A negative NPV means that the project will not be commercially viable.

The Applicant's assessment showed a net present value of -5.11% which demonstrates that operating as a high-efficiency cogeneration installation will not be financially viable. We agree with the Applicant's assessment and will not require the Installation to operate as a high-efficiency cogeneration.

(viii) Permit conditions concerning energy efficiency

A pre-operational condition 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. 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 Environment Agency to monitor energy recovery efficiency at the Installation and take action if at any stage the energy recovery efficiency is less than proposed.

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

4.3.8 Efficient use of raw materials

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

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

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

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

The first objective is to avoid producing waste at all. Waste production will be avoided by achieving a high degree of burnout of the ash in the furnace, which results in a material that is both reduced in volume and in chemical

reactivity. Condition 3.1.3 and associated Table S3.5 specify limits for total organic carbon (TOC) of <3% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnace and waste generation is being avoided where practicable.

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

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

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

It is not currently proposed to recover metals from the bottom ash. Municipal solid waste (MSW) or commercial and industrial (C&I) waste accepted at the Facility will have undergone either source segregation (i.e. kerbside recycling) and/or pre-treatment (for example at a waste transfer station) prior to transfer to the Facility. Therefore, the quantities of metals within the waste will be small having been removed prior to delivery to the site.

The IBA will be transferred off-site for processing at a suitable licensed waste management company prior to re-use (e.g. as a secondary aggregate). Metals recovery may be undertaken at the IBA processing facility. Having considered the information submitted in the Application, we are satisfied that the waste hierarchy referred to in Article 4 of the WFD will be applied to the generation of waste and that any waste generated will be treated in accordance with this Article.

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

5. Minimising the Installation's environmental impact

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

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

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

5.1 Assessment Methodology

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

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

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

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

and surrounding conditions, including local meteorology – these techniques are expensive but normally lead to a lower prediction of PC.

5.1.2 Use of Air Dispersion Modelling

For incineration applications, we normally require the Applicant to submit a full air dispersion model as part of their Application. Air dispersion modelling enables the PC 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). ES are described in our web guide 'Air emissions risk assessment for your environmental permit'.

Our web guide sets out the relevant ES as:

- Ambient Air Directive Limit Values
- Ambient Air Directive and 4th Daughter Directive Target Values
- UK Air Quality Strategy Objectives
- Environmental Assessment Levels

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

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

PCs are screened out as **Insignificant** if:

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

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

- It is unlikely that an emission at this level will make a significant contribution to air quality;

- The threshold provides a substantial safety margin to protect health and the environment.

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

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

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

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

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

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

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

5.2 Assessment of Impact on Air Quality

The Applicant's assessment of the impact of air quality is set out in their Air Quality Assessment of the Application. The assessment comprises:

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

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

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the 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 Carlisle and supplemented it with data from Spadeadam. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

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

- First, they assumed that the ELVs in the Permit would be the maximum permitted by Article 15(3), Article 46(2) and Annex VI of the IED. These substances are:
  - Oxides of nitrogen (NO_x), expressed as NO_2
  - Total dust
  - Carbon monoxide (CO)
  - Sulphur dioxide (SO_2)
  - Hydrogen chloride (HCl)
  - Hydrogen fluoride (HF)
  - Metals (Cadmium, Thallium, Mercury, Antimony, Arsenic, Lead, Chromium, Cobalt, Copper, Manganese, Nickel and Vanadium)
  - Polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans (referred to as dioxins and furans)
  - Gaseous and vaporous organic substances, expressed as Total Organic Carbon (TOC)
  - Ammonia (NH_3)

- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term ELVs, i.e. the maximum permitted emission rate.

- 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 5.2.1.

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

The Applicant has carried out background air quality monitoring to augment the data available from local authority monitoring. This data is summarised in

the Application and has been used by the Applicant to establish the background (or existing) air quality against which to measure the potential impact of the incinerator.

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

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

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

We did not agree with the applicant's conclusions for ecological receptors and in particular for the ammonia, nitrogen and acid deposition impacts at the River Eden SAC and SSSI. This is considered further in section 5.4 of this decision document.

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 the peak ground level concentrations.

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

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m^3		µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
NO_2	40	1	13.5	2.22	5.55	15.72	30.3
	200	2	27	25.52	12.76	52.52	26.26
PM_{10}	40	1	11.65	0.13	0.33		
	50	3	23.3	0.34	0.68		
$PM_{2.5}$	25	1	7.24	0.13	0.53		
SO_2							
	266	4	5.96	39.26	14.76	45.22	17
	350	5	5.96	36.34	10.38	42.3	12.09
	125	6	5.96	47.71	38.1	53.67	42.9
HCl	750	7	1.42	24.73	3.3	26.15	3.49
HF	16	8	2.35	0.03	0.17		
	160	7	4.7	1.65	1.03		
CO	10000	3	504	25.64	0.26		
	30000	10	504	61.82	0.21		
TOC	5	1	086	0.26	5.29	1.12	22.49
	195	7	1.72	4.12	2.11	5.84	3
	2.25	1	0.15	0.26	11.75	0.41	18.41
PAH	0.00025	1	0.00016	0.00000277	1.11	0.163	65.11
NH_3	180	1	3	0.036	1.02	3.04	101.2
	2500	10	8.46	4.12	0.16		
PCBs	0.2	1	0.00013	0.00013	0.07		
	6	10	0.00025	0.002	0.03		

1 Annual Mean
2 99.79th %ile of 1-hour means
3 90.41st %ile of 24-hour means
4 99.9th ile of 15-min means
5 99.73rd %ile of 1-hour means
6 99.18th %ile of 24-hour means
7 1-hour average
8 Monthly average
9 Maximum daily running 8-hour mean
10 1-hour maximum

Pollutant	EQS / EAL		Back-ground	Process Contribution		Predicted Environmental Concentration	
	µg/m³		µg/m³	µg/m³	% of EAL	µg/m³	% of EAL
Cd	0.005	1	0.00004	0.00053	10.75	0.00057	11.33
Tl				0.001		0.001	
Hg	0.25	1	0.00151	0.00053	0.21		
	7.5	2	0.00303	0.00824	0.11		
Sb	5	1	0.00068	0.00793	0.16		
	150	2	00.00136	0.124	0.08		
Pb	0.25	1	0.0013	0.00793	3.17	0.00923	3.69
Co			0.00003	0.00793		0.00796	
Cu	10	1	0.00071	0.00793	0.08		
	200	2	0.00142	0.124	0.06		
Mn	0.15	1	0.001	0.00793	5.29	0.00893	5.59
	1500	2	0.002	0.124	0.01		
V	5	1	0.00048	0.00793	0.16		
	1	3	0.00096	0.124	12.4	0.125	12.5
As	0.003	1	0.00071	0.00793	264	0.0081	270
Cr (II)(III)	5	1	0.0014	0.00243	0.05		
	150	2	0.0028	0.03791	0.03		
Cr (VI)	0.0002	1	0.00028	0.00793	3964.00	0.00821	4104.0
Ni	0.02	1	0.0.0054	0.0793	39.6	0.00847	42.3

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

(i) Screening out emissions which are insignificant

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

- $PM_{2.5}$, PM_{10}, CO, HCl, HF, PCBs, Sb, Cu and Ni

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

(ii) Emissions unlikely to give rise to significant pollution

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

- NO_2, SO_2, PAH, NH_3, Pb and Mn

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

(iii) Emissions requiring further assessment

Finally from the tables above the following emissions are considered to have the potential to give rise to pollution in that the Predicted Environmental Concentration exceeds 100% of the long term or short term ES.

- As and Cr (VI)

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

We have also carefully considered whether additional measures are required above what would normally be considered BAT in order to prevent significant pollution. Consideration of additional measures to address the pollution risk from these substances is set out in section 5.2.4. The impacts from As and Cr(VI) are considered in more detail below in section 5.2.3.

5.2.2 Consideration of key pollutants

(i) Nitrogen dioxide (NO_2)

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

The above tables show that the peak long term PC is greater than 1% of the ES (5.55%). The maximum PC at a receptor was 1.8% of the ES. Therefore it cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded. The peak short term PC is marginally above the level that would screen out as insignificant (>10% of the ES). However it is not expected to result in the ES being exceeded.

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

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

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

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

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

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

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

The above assessment also shows that the predicted process contribution for emissions of $PM_{2.5}$ is also below 1% of the ES. Therefore, the Environment Agency concludes that particulate emissions from the installation, including emissions of PM_{10} or $PM_{2.5}$, will not give rise to significant pollution.

There is currently no emission limit prescribed nor any continuous emissions monitor for particulate matter specifically in the PM_{10} or $PM_{2.5}$ fraction. Whilst the Environment Agency is 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 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 the Environment Agency is 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, SO_2, HCl and HF

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

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

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

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

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

The above tables show that for VOC emissions, the peak long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded. However, it is not expected to result in the ES being exceeded. The peak short term PC for CO is less than 10% of the ES and so can be screened out as insignificant.

There are two VOCs for which an ES has been set: benzene and 1,3-butadiene. For the purpose of this analysis, it has been assumed that the entire VOC emissions consist of only benzene or 1,3- butadiene. This is a highly conservative assumption as it does not take into account the speciation of VOCs in the emissions and the modelling does not take into account the volatile nature of the compounds.

The above tables show that for PCB emissions, the peak long term PC is less than 1% of the ES and the peak short term PC is less than 10% of the ES for PCBs and so can be screened out as insignificant. Therefore, we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

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

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

There is no ES for dioxins and furans as the principal exposure route for these substances is by ingestion and the risk to human health is through the

accumulation of these substances in the body over an extended period of time. This issue is considered in more detail in section 5.3

The ammonia emission is based on a release concentration of 10 mg/m^3. We are satisfied that this level of emission is consistent with the operation of a well controlled SNCR NO_x abatement system.

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

(V) Summary

For the above emissions to air, for those emissions that do not screen out, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the BAT to prevent and minimise emissions of these substances. This is reported in 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/m^3 for mercury and its compounds (formerly WID group 1 metals).
- An aggregate emission limit value of 0.02 mg/m^3 for cadmium and thallium and their compounds (formerly WID group 2 metals).
- An aggregate emission limit of 0.3 mg/m^3 for antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium and their compounds (formerly WID group 3 metals).

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

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

- Hg, Sb, Co, Cu, Mn, V and 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:

- Cd, Pb, Mn, and Ni

This left emissions of As and Cr(VI) requiring further assessment.

Where the BREF sets an aggregate limit, the Applicant's assessment assumes that each metal (including As and Cr(VI)) are 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 As and Cr(VI) the Applicant Used representative emissions data from other municipal waste incinerators using our guidance note Please refer to "Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – version 4".

- 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 (and using our guidance note) emissions of As and Cr(VI) are screened out as insignificant:

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

5.2.4 Consideration of Local Factors

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

Carlisle City Council declared 6 Air Quality Management Areas (AQMA) between 2005 and 2008. On the 3rd July 2019, two of these were revoked (AQMA 3 and AQMA 6) leaving 4 AQMA's remaining with respect to NO_2.

The Local Air Quality Management (LAQM) Annual Status Report 2020 details that air quality within Carlisle City is generally good with small pockets where the NO_2 annual mean objective of 40µg/m^3 is exceeded, primarily due to road traffic sources.

The four AQMAs are located as follows:

- AQMA 1: An area encompassing the A7 between Hardwicke Circus and J44 of the M6, and Brampton Road for a distance of 100m from the Stanwix Bank junction.
- AQMA 2: An area encompassing Currock Street and the properties immediately to the west of it, between the junction with James St/Water St and Crown St.
- AQMA 4: An area along the north side of the A595 at Bridge Street, northbound from the junction with Shaddongate.

- AQMA 5: An area encompassing the junction of Dalston Road and Junction Street.

AQMA 1 is the closest to the Installation (at approximately 1.5 km to the south-east). In July 2019 this AQMA was reduced in size following recorded NOx concentrations below the ES. There have been no exceedances of the current annual objective and revocation is being considered where concentrations remain at current levels. The process contribution in this AQMA is less than 1% and can be screened out as 'insignificant'. The contribution from the Installation is negligible and will not impact of any plans by the local authority to improve air quality.

AQMA 4 (roadside location at Bridge Street) is located over 3 km from the Installation. At this AQMA exceedances of the NO_2 objective of 40µg/m^3 have been recorded (2020 Air Quality Annual Status Report). This AQMA is approximately 2.5km beyond where the modelled process contribution from the Installation is at 1% (insignificant). At this distance, even though the background is already above the ES, the contribution from the Installation is negligible and will not impact of any plans by the local authority to improve air quality.

AQMA 2 and AQMA 5 are located further away from the Installation. No exceedances have been measured since 2015. At this distance the contribution from the Installation is negligible and will not impact of any plans by the local authority to improve air quality.

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

5.3 Human health risk assessment

Our role in preventing harm to human health

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

i) Applying Statutory Controls

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

The main conditions in an EfW permit are based on the requirements of the IED. Specific conditions have been introduced to specifically ensure compliance with the requirements of Chapter IV. The aim of the IED is to prevent or, where that is not practicable, to reduce emissions to air, water and land and prevent the generation of waste, in order to achieve a high level of protection of the environment taken as a whole. IED achieves this aim by

setting operational conditions, technical requirements and emission limit values to meet the requirements set out in Articles 11 and 18 of the IED. These requirements may in some circumstances dictate tighter emission limits and controls than those set out in the BAT conclusions 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, global warming potential and generation of waste. For an installation of this kind, the principal environmental effects are through emissions to air, although we also consider all of the other impacts listed. Section 5.1 and 5.2 above explain how we have approached the critical issue of assessing the likely impact of the emissions to air from the Installation on human health and the environment and any measures we are requiring to ensure a high level of protection.

iii) Expert Scientific Opinion

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

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

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

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

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

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

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

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

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

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

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

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

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

The **British Society for Ecological Medicine (BSEM) published a report in 2005** on the health effects associated with incineration and concluded that

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

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

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

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

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

which require the installation to be well-run and regulate the installation to ensure compliance with such permit conditions.

iv) Health Risk Models

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

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

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

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

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

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

COMEAP identified a number of factors and assumptions that would contribute to the uncertainty of the estimates. These were summarised in the Defra review as below:

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

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

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

v) Consultations

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

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

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

The human health risk assessment calculates the dose of dioxins and furans that would be received by local receptors if their food and water were sourced from the locality where the deposition of dioxins, furans and dioxin like PCBs is predicted to be the highest. This is then assessed against the Tolerable

Daily Intake (TDI) levels established by the COT of 2 picograms WHO-TEQ / Kg bodyweight/ day.

The results of the Applicant's assessment of dioxin intake are detailed in the table below. The results showed that the predicted daily intake of dioxins, furans and dioxin like PCBs at all receptors, resulting from emissions from the proposed facility, were significantly below the recommended TDI levels. The results show that the intake at the point of maximum impact is (child at agriculture site) at 1.05% of the TDI

Residential (point of maximum impact)	0.15	0.47
Agriculture (maximum impact at receptor note1) PC%	0.74	1.05

Calculated maximum daily intake of dioxins by local receptors resulting from the operation of the proposed facility (WHO-TEQ/ kg-BW/day)
Note 1 : maximum impact at receptor (agricultural) not point of maximum impact as this does not relate to agricultural land.

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

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

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

5.3.3 Particulates smaller than 2.5 microns

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

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

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

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

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

that in 2016 municipal waste incineration contributed 0.03% to ambient ground level PM_{10} levels and 0.05% to ambient ground level PM2.5 levels. The 2016 data also shows that road traffic contributed to 5.35% of PM10 and 4.96% of PM2.5 and that domestic wood burning contributed 22.4% to PM10 and 34.3% of PM2.5 levels.

This is consistent with the assessment of this application which shows emissions of PM_{10} 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

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

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

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

The Applicant's assessment of the impact of all pollutants either screened out as insignificant or where they have not been screened out as insignificant, the assessment still shows that the predicted environmental concentrations are within air quality standards or environmental action levels.

The Environment Agency has reviewed the methodology employed by the Applicant to carry out the health impact assessment. We are satisfied with the Applicant's conclusions that there will not be a significant impact on health.

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

Public Health England and the Local Authority Director of Public Health were consulted on the Application and concluded that they had no significant concerns regarding the risk to the health of humans from the installation.

The Food Standards Agency was also consulted during the permit determination process and it concluded that it is unlikely that there will be any unacceptable effects on the human food chain as a result of the operations at the Installation. Details of the responses provided by Public Health England, the Local Authority Director of Public Health and the FSA to the consultation on this Application can be found in Annex 4 of this document.

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

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

5.4.1 Sites Considered

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

- Solway Firth SAC
- River Eden SAC
- Upper Solway Flats and Marshes SPA
- Solway Firth Potential SPA
- Upper Solway Flats and Marshes Ramsar

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

- River Eden and Tributaries SSSI

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

- Kingmoor Slidings Local Nature Reserve (LNR)
- Kingmoor South LNR

- Sidings Local Wildlife Site (LWS)
- Harke Moss LWS - 2.2 km (slightly outside screening distance – assessed)
- Rockliffe Moss LWS - 3.2 km (outside screening distance – assessed)

5.4.2 Habitats Assessment

The Applicant's Habitats assessment was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that there would be no likely significant effect on the interest features of the protected sites and will not damage the special features of any SSSI. As part of reaching this conclusion we performed further detailed assessment for the River Eden SAC and SSSI.

The impact of emissions from the Installation have been compared to the critical levels and critical loads.

Critical levels

Modelled process contributions at designated habitat sites against critical levels - as a % of the Critical level

Designated site	Annual mean NOx	Annual mean SO_2	Annual mean NH_3	Max. 24 hour mean NOx	Max. 24 hour mean HF
Critical level (µg/m3)	**30**	**20** **10 (sensitive lichen)**	**1**	**75**	**5**
Modelled concentration as % of air quality standard/guideline					
Solway Firth PSPA, SAC / Upper Solway Flats and Marshes SPA, Ramsar	0.07%	0.03%	0.06%	0.91%	0.11%
River Eden SAC	1.44%	1.08%	3.59%	6.69%	0.84%

Further Analysis – River Eden & Tributaries

Designated site	Pollutant	PC		Background Concentration		PEC	
		µg/m3	% of CL	µg/m3	% of CL	µg/m3	% of CL
River Eden & Tributaries SAC	NOx	0.431	1.44%	7.91	26.37%	8.34	27.80%
	SO_2	0.108	1.08%	0.72	7.20%	0.83	8.28%
	NH_3	0.036	3.59%	3.00	300.0%	3.036	303.6%

Critical loads

Nitrogen and Acid deposition

Deposition of nitrogen can cause nutrient enrichment. Deposition of Nitrogen, sulphur, hydrogen chloride and ammonia can cause acidification and should be taken into consideration when assessing the impact of the Facility.

Presented below are the critical loads and results at each of the identified statutory designated ecological receptors. The contribution from the Facility

has been assessed against the most sensitive feature in each statutory designated site.

Nitrogen Deposition Critical Loads

Site	Habitat Type	NCL Class	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Maximum Background (kgN/ha/yr)
European and UK Statutory Designated Sites					
Solway Firth/Upper Solway Flats and Marshes SAC/SPA/Ramsar	Fixed coastal dunes with herbaceous vegetation	Coastal stable dune grasslands - acid type	8	10	21.1
River Eden & Tributaries SAC/SSSI	Broad-leaved, mixed and yew woodland	Meso- and eutrophic Quercus woodland	15	20	46.9

Acid Deposition Critical Loads

Site	Habitat Type	Acidity Class	Minimum Critical Load Function (keq/ha/yr)			Maximum Background (keq/ha/yr)	
			CLminN	CLmaxN	CLmaxS	N	S
Solway Firth/Upper Solway Flats and Marshes SAC/SPA/Ramsar	Perennial vegetation of stony banks	Acid Grassland	0.223	0.606	0.24	1.5	0.5
River Eden & Tributaries SAC/SSSI	Broad-leaved, mixed and yew woodland	Broadleaved / Coniferous unmanaged woodland	0.142	0.64	0.36	3.4	1.4

Nitrogen Deposition

Site	NCL Class	Deposition Velocity	Process Contribution			Predicted Environmental Concentration		
			(kgN/ha/yr)	% of Lower CL	% of Upper CL	PEC N dep (kgN/ha/yr)	% of Lower CL	% of Upper CL
European and UK Statutory Designated Sites								
Solway Firth/Upper Solway Flats and Marshes SAC/SPA/Ramsar	Coastal stable dune grasslands - acid type	Grassland	0.0115	0.14 %	0.12 %	N/A – PC is under 1%		
River Eden & Tributaries SAC/SSSI	Meso- and eutrophic Quercus woodland	Woodland	0.367	2.45 %	1.83 %	47.267	315.1%	236.3%

Acid Deposition

Site	Habitat Type	Deposition Velocity	Process Contribution			Predicted Environmental Concentration		
			(keq/ha/yr)	S (keq/ha/yr)	% of Min CL Function	N (keq/ha/yr)	S (keq/ha/yr)	% of Min CL Function
European and UK Statutory Designated Sites								
Solway Firth /Upper Solway Flats and Marshes SAC/SPA /Ramsar	Perennial vegetation of stony banks (Acidity type – Acid Grassland)	Grassland	0.00821	0.0011	0.32%	N/A – PC is under 1%		
River Eden & Tributarie	Broadleaved, mixed and yew woodland	Woodland	0.0262	0.0479	11.57%	3.426	1.448	761.57 %

s SAC/SSSI	(Acidity type - Broadleaved /Coniferous unmanaged woodland)							

The impact of emissions from the Installation have been compared to the critical levels and critical loads Environmental Quality Standards (EQS). The results show that there is no likelihood of a significant effect on the designated interest features of the European sites, having regard to the conservation objectives of the following sites; Solway Firth PSPA, SAC and Upper Solway Flats and Marshes SPA and Ramsar. As at these European designated sites the process contribution is less than 1% of the long-term and less than 10% of the short-term Critical Level for all pollutants. There is also no short-term effect for NOx and HF at the River Eden SAC.

River Eden and Tributaries SAC:
All pollutants can be screened out as 'insignificant' except for annual mean oxides of nitrogen, sulphur dioxide, and ammonia for the River Eden and Tributaries SAC. Therefore, further analysis has been undertaken.

We have concluded no likely significant effect for long-term NOx and long-term sulphur. Where the PC isn't screened out i.e. <1% of long-term critical levels or critical loads, the PEC is screened out at <70%.

For the River Eden and Tributaries SAC the following cannot be screened out: where the PC is >1% and the PEC is >70% were considered in more detail:

- Ammonia
- Nitrogen deposition,
- Acid deposition

Both the PC and the PEC are greater than the critical level and we have concluded likely significant effect alone. This is considered further below:

Ammonia levels, nitrogen deposition and acid deposition
The effects of ammonia levels, nitrogen deposition and acid deposition on habitats within River Eden Special Area of Conservation (SAC) and River Eden and Tributaries have not screened out.

The designated site covers an extensive area, including the whole of the River Eden and many of its major tributaries such as the Caldew and Irthing. Areas where the model predicts elevated levels or deposition rates (in excess of 1%

of the critical level or critical loads) are confined to a section of the River Eden downstream of Carlisle and upstream of the tidal limit. This is the furthest downstream area of the SAC, extending from the tidal limit up to the confluence with the River Caldew.

The main habitat to consider in the assessment for this area is the river channel itself and associated qualifying / notified species. The closest habitat that supports the features in the area of the SAC that has the highest predicted impact of ammonia are riverine habitats, and therefore subject to continual dilution by water. The main risk of ammonia to the receiving environment would be likely to be through its contribution to total nitrogen deposition (acidification and nutrient enrichment) to the habitats and vegetation rather than from aerial concentrations of ammonia directly. Any impacts on the designated species will be indirect through influences on plant and animal food sources, vegetation composition and cover, associated mainly with nutrient enrichment. Overall ammonia deposition is likely to be of low importance as the inputs are likely significantly below the large nutrient loadings from river tidal inputs.

Designated feature	**Distance**
Alder woodland on floodplains	Closest are 6.9 km SSE
Rivers with floating vegetation often dominated by watercrowfoot	Closest reach is 1 km
Atlantic salmon Salmon salar	Closest reach is 1 km
Otter Lutra Lutra	Closest reach is 1 km
River lamprey Lampetra fluviatilis	Closest reach is 1 km
Sea lamprey Petromyzon marinus	Closest reach is 1 km. There is spawning in this part of the river.
Bullhead Cottus gobio	Closest reach is 1 km, but not certain where the closest bullhead will be, but probably in the R Caldew, which is within 10 km.

Natural England (NE) advised on 21 October 2020 that the following features are part of the River Eden SAC designation, but they are not found in the vicinity of the Installation:

Brook lamprey, Freshwater crayfish, Oligotrophic to mesotrophic standing water with vegetation and Alluvial woods with *A. glutinosa*, *F. excelsior.* Our assessment concluded that the absence of ammonia-sensitive receptors in the section of the SAC in vicinity of the Installation, and the low magnitude of the process contribution mean that ammonia levels will have no likely significant effect on the SAC.

They confirmed the only qualifying or notified woodland habitats which may occur in the area of the Installation are alder woodlands (Alnus glutinosa) located 6.7 km form the site. The Air Pollution Information Systems (APIS)

specifies they are not considered sensitive to nitrogen or acid deposition, and the contour mapping shows that the NH3 screens out at <1% beyond 3 km of the facility. It is therefore possible to screen this feature out as no likely significant effect for ammonia levels, nitrogen deposition and acid deposition.

Water courses of plain to montane levels with R. fluitantis
The one remaining protected feature within the River Eden SAC, is that of 'Water courses of plain to montane levels with 'Ranunculous fluitantis'.

Critical loads values for this aquatic species are not available (see additional comments below).

Key issue:
In most lowland rivers and burns, nitrogen inputs from catchment land-use, not deposition from the atmosphere, are likely to be much more significant (Strong et al. 1997, Smith & Stewart 1989, Foy et al. 1982).

Critical Load/Level:
Given that there are no critical load values for 'Water courses of plain to montane levels with Ranunculous fluitantis' and it is highly reasonable that any minor emissions to this aquatic species are massively diluted by the riverine flow and not directly absorbed by Ranunculous species, we are confident that there will be no likely significant effect.

In the absence of data we have taken the most likely and practical reasoning to reach our conclusion. This is detailed in the consultation with Natural England on 7th June 2021 (see annex 4).

In-combination impacts

We considered whether the proposed Installation could act in combination with other plans, proposals or permissions (PPPs). The main PPPs that could act in combination would be other PPPs that could emit similar combustion emissions to the proposed Installation. We also checked for intensive farms that could give rise to ammonia emissions. Existing operating plants will already be included in the consideration of background pollution levels. So the in combination assessment concentrated on PPPs that are not yet operating.

We checked for permit applications that we have in progress and permitted sites that have not yet started to operate. We did not find any sites that have the potential to act in combination.

We consulted the following authorities to check if they have any PPPs that could act in combination:

- Dumfries and Galloway
- Allderdale District
- Carlisle District

No further PPPs were identified.

See ANNEX 4 for consultation with Natural England.
Stage 1 Habitats Regulations Assessment and SSSI Assessment form: Appendix 4 are included on public register and citizen space.

The River Eden and Tributaries SSSI has the same features as the SAC (see above for those features within 2 km) and some additional habitats and species: invertebrate assemblage of river shingles and river bank, colonies of breeding sandmartins and wetland communities however Natural England has advised these are also unlikely to be within 2 km of the Installation.

The Applicant's assessment of SSSIs was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that the proposal will not damage the special features of the SSSI(s). A CROW form was completed and sent to Natural England for information only.

5.4.4 Assessment of other conservation sites

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

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

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

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

Locally designated sites						
Site	**NO_x**		**SO_2(1)**	**HF**		**NH_3(1)**
	Annual Mean	**Daily Mean**	**Annual Mean**	**Weekly Mean**	**Daily Mean**	**Annual Mean**
Kingmoor Sidings LNR	0.36%	3.64%	0.27%	1.48%	0.45%	0.90%
Kingmoor South LNR	1.72%	8.44%	1.29%	4.68%	1.05%	4.31%
Kingmoor Sidings LWS	10.35%	19.39%	7.76%	17.60%	2.42%	25.87%
Harker Moss LWS	0.51%	2.62%	0.38%	1.05%	0.33%	1.27%
Rockliffe Moss LWS	0.28%	1.76%	0.21%	0.59%	0.22%	0.70%
Kingmoor South LNR	1.72%	8.44%	1.29%	4.68%	1.05%	4.31%

(1) The lower Critical Levels for sulphur and ammonia for the protection of lichens and bryophytes have been applied for all sites except the Solway Firth/Upper Solway Flats and Marshes designated site.

The tables above show that the PCs are very significantly below the critical levels or loads. We are satisfied that the Installation will not cause significant pollution at the sites. The Applicant is required to prevent, minimise, and control emissions using BAT, this is considered further in Section 6.

Annex 4 provides further detail of the consultation with Natural England regarding the above. We have placed a copy of SSSI Assessment / Habitats Risk Assessment on citizen space and the public register.

5.5 Impact of abnormal operations

Article 50(4)(c) of IED requires that waste incineration and co-incineration plants shall operate an automatic system to prevent waste feed whenever any of the continuous emission monitors show that an emission limit value (ELV) is exceeded due to disturbances or failures of the purification devices. Notwithstanding this, Article 46(6) allows for the continued incineration and co-incineration of waste under such conditions provided that this period does not (in any circumstances) exceed 4 hours uninterrupted continuous operation, or the cumulative period of operation does not exceed 60 hours in a calendar year. This is a recognition that the emissions during transient states (e.g. start-up and shut-down) are higher than during steady-state operation, and the overall environmental impact of continued operation with a limited 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 at all times. The CO and TOC limits are the same as for normal operation, and are intended to ensure that good combustion conditions are maintained. The backstop limit for particulates is

150 mg/m^3 (as a half hourly average) which is five times the limit in normal operation.

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

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

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

- Dioxin emissions of 6 ng/m^3 (100 times normal)
- Emission concentration of mercury has been assumed to be 100% of the Best Available Techniques Associated Emission Level (BAT-AEL) concentration of 0.02 mg/m^3
- NO_x emissions of 500 mg/m^3
- Particulate emissions of 150 mg/m^3
- Metal emissions other than mercury are 5 times those of normal operation
- SO_2 emissions of 450 mg/m^3
- HCl emissions of 900 mg/m^3
- HF emissions of 20 mg/m^3
- PCBs 0.5 mg/Nm^3

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	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m^3		µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
NO_2	200	2	27	31.9	16	58.9	29.5
PM_{10}	50	3	23.3	10.3	20.5	33.6	67.1
SO_2	266	4	5.96	88.3	33.2	94.3	35.4
	350	5	5.96	81.8	23.4	87.7	25.1
	125	3	5.96	47.7	38.2	53.7	42.9
HCl	750	6	1.42	370.9	49.5	372.3	49.1
HF	160	6	4.7	0.82	5.2	-	-
Hg	7.5	1	0.00303	0.8242	10.99	0.8242	11
As	0.0003		0.00071	0.00036	0.007	-	-
Sb	150	1	0.00068	0.1422	0.09	-	-
Cu	200	1	0.00142	0.3585	0.18	-	-
Mn	1500	1	0.002	0.7418	0.05	-	-
V	1	1	0.00096	0.0742	7.42	-	-
PCBs	6	1	0.00025	0.2061	3.43	-	-
Cr (II)(III)	150	1	0.0028	1.1374	0.76	-	-

1 1-hr Maximum

2 99.79th %ile of 1-hour means

3 90.41st %ile of 24-hour means

4 99.9th ile of 15-min means

5 99.73rd %ile of 1-hour means

6 1-hour average

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

All metals, PCBs and HF

Also from the table above all other 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.

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 6 ng/m^3 for the maximum period of abnormal operation, this would result in an increase of approximately 70% in the intake reported in section 5.3.2. In these circumstances the PC would be 0.00266 pg(WHO-TEQ/ kg-BW/day), which is 1.76% of the COT TDI.

5.6 Impact of emissions during 'other than normal operating conditions' [OTNOC]

IED article 14 (3) states that BAT conclusions shall be the reference for setting the permit conditions. Article 14 (3) states that the competent authority shall set emission limit values that, under normal operating conditions, do not exceed the emission levels associated with the best available techniques as laid down in the decisions on BAT conclusions. These limits are set in Table S3.1. In addition, the IED also sets maximum limits for certain emissions that should not be exceeded and would still apply outside normal operating conditions. These limits are set in Tale S3.1(b) and are normally higher that the BAT AELs

The IED and BAT conclusions therefore make provision for plants to have short term fluctuations where BAT AELs could be exceeded but the IED limits are not other than under abnormal operation. These periods are called 'Other than normal operating.' (OTNOC). Although the BAT AELs can be exceeded during OTNOC setting BAT AELs as emission limits is controlling emissions because plants will need to ensure that the plant is capable of meeting the BAT AELs during normal operation which will apply for most of the time the plant is operational.

Although BAT AELs do not apply during periods of OTNOC the IED annex VI emission limits do still apply.

Periods of OTNOC will be of short duration and limited in nature. The Applicant used the IED annex VI half hour average limits to assess short term impacts, therefore no further specific assessment of the impacts during OTNOC was required.

A pre-operational condition requires the Operator to have an EMS and that the EMS will include an OTNOC management plan in line with BAT conclusions 1 and 18. The Operator will be required to identify potential OTNOC scenarios and any required monitoring in their management plan and will require our approval of scenarios before they can be classed as OTNOC. We may impose further monitoring and limits, through table S3.1(b) of the Permit, once we have approved the OTNOC scenarios.

6. Application of Best Available Techniques

6.1 Scope of Consideration

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

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

- We then consider in particular control measures for the emissions which were not screened out as insignificant in the previous section on minimising the installation's environmental impact.

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

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

Chapter IV of the IED specifies a set of maximum emission limit values. Although these limits are designed to be stringent, and to provide a high level of environmental protection, they do not necessarily reflect what can be achieved by new plant. Article 14(3) of the IED says that BAT Conclusions shall be the reference for setting the permit conditions, so it may be possible and desirable to achieve emissions below the limits referenced in Chapter IV. The BAT conclusions were published on 18/12/2019.

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

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

6.1.1 Consideration of Furnace Type

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

The 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 listed below would be considered as BAT provided the Applicant has justified it in terms of:

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

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

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Rotary Kiln	Can accept liquids and pastes as well as gases Solid feeds more limited than grate (due to refractory damage) often applied to hazardous Wastes	<16 t/h	• 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
Fluid bed - bubbling	• 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	• Good mixing • Fly ashes of good leaching quality	• Careful operation • required to avoid clogging bed. • Higher fly ash quantities.	TOC <1%	FGT cost may be lower. Costs of waste preparation

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Fluid bed - circulating	• 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 70 t/h	• Good mixing • High steam parameters up to 500oC • Greater fuel flexibility than BFB • Fly ashes of good leaching quality	• Cyclone required to conserve bed material • Higher fly ash quantities	TOC <1%	• FGT cost may be lower. • Costs of waste preparation
Spreader - stoker combustor	• RDF and other particle feeds • Poultry manure • Wood wastes	No information	• Simple grate construction • Less sensitive to particle size than FB	Only for well defined mono-streams	No information	No information
Gasification - fixed bed	• Mixed plastic wastes • Other similar consistent streams • Gasification less widely used/proven than incineration	Up to 20 t/h	• Low leaching residue • Good burnout if oxygen blown • Syngas available • Reduced oxidation of recyclable metals	• Limited waste feed • Not full combustion • High skill level • Tar in raw gas • Less widely proven	• Low leaching bottom ash • Good burnout with oxygen	High operating/ maintenance costs

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Gasification - entrained flow	• Mixed plastic wastes • Other similar consistent streams • Not suited to untreated MSW • Gasification less widely used/proven than incineration	Up to 10 t/h	• Low leaching slag • Reduced oxidation of recyclable metals	• Limited waste feed • Not full combustion • High skill level • Less widely proven	low leaching slag	• High operation/ maintenance costs • High pre-treatment costs
Gasification - fluidised bed	• 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	• 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	• 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	• Pre-treated MSW • High metal inert streams • Shredder residues/plastics • Pyrolysis is less widely used/proven than incineration	~ 5 t/h (short drum) 5 – 10 t/h (medium drum)	• No oxidation of metals • No combustion energy for metals/inert • In reactor acid neutralisation possible • Syngas available	• Limited wastes • Process control and engineering critical • High skill level • Not widely proven • Need market for syngas	• 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
Fixed Hearth
Pulsed Hearth
Rotary and oscillating Kiln
Fluidised Bed combustor
Pyrolysis / Gasification

The Applicant's assessment is summarised below.

Moving grate furnace: Grate systems are designed for large quantities of heterogeneous waste and so would be appropriate for the fuel to be processed at the Facility.
Fixed hearth: These are not considered suitable for large volumes of waste. They are best suited to low volumes of consistent waste.
Pulsed hearth: Pulsed hearth technology has been used for waste fuels, such as those proposed in the Facility, as well as other solid wastes. However, there have been difficulties in achieving reliable and effective burnout of the waste and it is considered that the burnout criteria required by Article 50 (1) of the IED would be difficult to achieve.
Rotary and oscillating kilns: An oscillating kiln is used for the incineration of municipal waste at only two currently known sites, the energy conversion efficiency in these systems is lower than that of other thermal treatment technologies due to the large areas of refractory lined combustion chamber. In addition, oscillating kiln units have a maximum processing capacity of 8 tonnes per hour, so not appropriate for plant of proposed scale (31.3 t/hr).
Fluidised bed combustor: Fluidised beds are designed for the combustion of relatively homogeneous fuel. Therefore, fluidised beds are appropriate for waste which has been pre-processed to produce an RDF. Fluidised beds can have elevated emissions of nitrous oxide, a potent greenhouse gas. Some have been designed to minimise the formation of nitrous oxide.
Pyrolysis/Gasification: In pyrolysis, the waste is heated in the absence of air, leading to the production of a syngas with a higher calorific value than from gasification. However, the process normally requires some form of external heat source, which may be from the combustion of part of the syngas. It can achieve low emissions but is not proven for mixed municipal waste at the scale proposed for this Installation.

The Applicant has proposed to use a furnace technology comprising moving grate all of which are identified in the tables above as being considered BAT in the BREF or TGN for this type of waste feed.

The Applicant proposes to use gasoil as support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on having a guaranteed supply as the fuel can be stored in a dedicated storage tank

Boiler Design

In accordance with BAT 30 of the BAT C and our Technical Guidance Note, EPR 5.01, the Applicant has confirmed that the boiler design will include the following features to minimise the potential for reformation of dioxins within the de-novo synthesis range:

ensuring that the steam/metal heat transfer surface temperature is a minimum where the exhaust gases are within the de-novo synthesis range;
design of the boilers using CFD to ensure no pockets of stagnant or low velocity gas;
boiler passes are progressively decreased in volume so that the gas velocity increases through the boiler; and
Design of boiler surfaces to prevent boundary layers of slow moving gas.
Any of the options listed in the BREF and summarised in the table above can be BAT. The Applicant has chosen a furnace technique that is listed in the BREF and we are satisfied that the Applicant has provided sufficient justification to show that their technique is BAT. This is not to say that the other techniques could not also be BAT, but that the Applicant has shown that their chosen technique is at least comparable with the other BAT options. We believe that, based on the information gathered by the BREF process, the chosen technology will achieve the requirements of Chapter IV of the IED and BAT conclusions for the air emission of TOC/CO and the TOC on bottom ash.

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 flue-gas treatment (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 Technical Guidance Note points to a range of technologies being BAT subject to circumstances of the Installation.

6.2.1 Particulate Matter

Particulate matter				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Bag / Fabric filters (BF)	Reliable abatement of particulate matter to below 5mg/m^3	Max temp 250°C 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. Liquid effluent produced	Require reheat to prevent visible plume and dew point problems.	Where scrubbing required for 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^oC 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/m^3 and are BAT for most installations. The Applicant proposes to use multiple compartment filters with burst bag detection to minimise the risk of increased particulate emissions in the event of bag rupture.

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

6.2.2 Oxides of Nitrogen

Oxides of Nitrogen: Primary Measures				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Low NOx burners	Reduces NOx at source		Start-up, supplementary firing.	Where auxiliary burners required.
Starved air systems	Reduce CO simultaneously.			Pyrolysis, Gasification systems.
Optimise primary and secondary air injection				All plant.
Flue Gas Recirculation (FGR)	Reduces the consumption of reagents used for secondary NOx control. May increase overall energy recovery	Some applications experience corrosion problems. 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 non-catalytic reduction (SNCR)	NOx emissions 80 -180 mg/m^3 Lower energy consumption than SCR Lower costs than SCR	Relies on an optimum temperature around 900 °C, and sufficient retention time for reduction May lead to Ammonia slip	Port injection locations	All plant unless lower NOx 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_2O 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.
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. Flue gas recirculation will not be employed at the Facility - the Applicant stated that where furnaces have been designed to operate without FGR optimised (design focussed on primary and secondary air control) FGR gives little benefit. We agree with that assessment and in addition FGR can result in corrosion issues and reduced energy efficiency

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/m^3 and can be applied to all plant, it is generally more expensive than SNCR and requires reheating of the waste gas stream which reduces energy efficiency, periodic replacement of the catalysts also produces a hazardous waste.

The use of SCR by catalytic filter bags can reduce emissions to 50 -120 mg/m^3 with low investment costs. The applicant has discounted the use catalytic filter bags stating that additional abatement would likely be required for additional mercury removal. In addition, the temperature of flue gases at the boiler exit is expected to be approximately 160°C, and further downstream approximately 135°C (after FGT). This temperature would require re-heating (for treatment in a catalytic filter bags) and this would reduce the overall efficiency of the process.

SNCR can typically reduce NO_x levels to between 80 and 180 mg/m^3, 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 N_2O. Both reagents are BAT, and the use of one over the other is not normally significant in environmental terms.

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

Emissions of NO_x cannot be screened out as insignificant but are considered unlikely to give rise to significant pollution in that the predicted environmental concentration is less than 100%.

The Applicant has carried out a cost / benefit study of the alternative techniques. The cost per tonne of NO_x abated over the projected life of the plant has been calculated and compared with the environmental impact as shown in the table below.

	Cost of NO_x removal £/tonne	PC (long term)	PEC (long term)
SCR	£3,820	1.48	14.98
SNCR	£1,510	2.22	15.72

Based on the figures above the Applicant considers that the additional cost of SCR over SNCR is not justified by the reduction in environmental impact. Thus SCR is not BAT in this case, and SNCR is BAT for the Installation. The Applicant has justified the use of ammonia as BAT. The Environment Agency agrees with this assessment.

The amount of ammonia used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH_3 slip. We have added an Improvement condition that requires the Operator to report to the Environment

Agency on optimising the performance of the NO_x abatement system. The BAT AEL for ammonia has been set and the Operator is also required to monitor and report on N_2O emissions every 6 months.

6.2.3 Acid Gases, SO_x, HCl and HF

Acid gases and halogens : Primary Measures				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Low sulphur fuel, (< 0.1%S gasoil or natural gas)	Reduces SOx at source		Start-up, supplementary firing.	Where auxiliary fuel required.
Management of waste streams	Disperses sources of acid gases (e.g. PVC) through feed.	Requires closer control of waste management		All plant with heterogeneous waste feed

Acid gases and halogens : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	**Advantages**	**Disadvantages**	**Optimi sation**	**Defined as BAT in BREF or TGN for:**
Wet	High reaction rates Low solid residues production Reagent delivery may be optimised by concentration and flow rate	Large effluent disposal and water consumption if not fully treated for re-cycle Effluent treatment plant required May result in wet plume Energy required for effluent treatment and plume reheat		Used for wide range of waste types Can be used as polishing step after other techniques 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	Higher solid residue production Reagent consumption controlled only by input rate		All plant

	recycling in plant Lower energy use Higher reliability Lowest visible plume potential			
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 emissions and reduced reagent usage			Generally applicable to grate and rotary kiln plants.
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	Efficient temperature range may be at upper end for use with bag filters	Not proven at large plant	CWIs

	Dry recycle systems proven	Leachable solid residues Bicarbonate more expensive		

The Applicant proposes to implement the following primary measures:

Use of low sulphur fuels for start up and auxiliary burners – gas should be used if available, where fuel oil is used, this will be low sulphur (i.e. <0.1%), this will reduce SO_x at source. The Applicant has justified its choice of gasoil as the support fuel on the basis that it will provide guaranteed supply 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 the Environment Agency agrees 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. The applicant has confirmed that this would need to be carried out in combination with additional flue gas treatment (for acid gas abatement), and this would add additional costs (operational and maintenance) and also increase the use of reagent raw materials. In this case, the Applicant proposes to dry system using lime and activated carbon injection. and has confirmed that this will be designed to achieve BAT-AELs. The Environment Agency is satisfied that this is BAT.

6.2.4 Carbon monoxide and volatile organic compounds (VOCs)

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

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

6.2.5 Dioxins and furans (and Other POPs)

Dioxins and furans				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Optimise combustion control	All measures will increase oxidation of these species.		Covered in section on furnace selection	All plants
Avoid *de novo* synthesis			Covered in boiler design	All plant
Effective Particulate matter removal			Covered in section on particulate matter	All plant
Activated Carbon injection	Can be combined with acid gas absorber or fed separately. 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.
Use of catalytic filter bags. These can achieve low levels of emissions but mercury is not removed.

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

6.2.6 Metals

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

	Can be impregnated with bromine or sulphur to enhance reactivity, for use during peak emissions.			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.

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 Permit. Emissions of carbon dioxide (CO_2) and other greenhouse gases differ from those of other pollutants in that, except at gross levels, they have no localised environmental

impact. Their impact is at a global level and in terms of climate change. Nonetheless, CO_2 is clearly a pollutant for IED purposes.

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

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

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

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

Factors influencing GWP and CO_2 emissions from the Installation are:
On the debit side
CO_2 emissions from the burning of the waste;
CO_2 emissions from burning auxiliary or supplementary fuels;
CO_2 emissions associated with electrical energy used;
N_2O from the de-NOx process.

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

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

The Applicant considered energy efficiency and BAT for the de-NOx process in its BAT assessment. This is set out in sections 4.3.7, 6.1.1 and 6.2.2 of this decision 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. Ammonia has no direct GWP effect.

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

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

6.4 BAT and POPs

International action on Persistent Organic pollutants (POPs) is required under the UN's Stockholm Convention, which entered into force in 2004. The EU implemented the Convention through the POPs Regulation (2019/1021), which is directly applicable in UK law. The Environment Agency is required by national POPs Regulations (SI 2007 No 3106) to give effect to Article 6(3) of the EC POPs Regulation when determining applications for environmental Permits.

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

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

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

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

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

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

maintaining furnace temperature of 850^{o}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^{o}C
use of bag filters and the injection of activated carbon or coke to adsorb residual POPs components.

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

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

The release of **dioxins and furans** to air is required by the IED to be assessed against the I-TEQ (International Toxic Equivalence) limit of 0.1 ng/m^3. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK’s independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both

dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. The Permit requires that, in addition to the requirements of the IED, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be monitored for reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. The Permit also requires monitoring of a range of PAHs and dioxin-like PCBs at the same frequency as dioxins are monitored. We have included a requirement to monitor and report against these WHO-TEQ values for dioxins and dioxin-like PCBs and the range of PAHs as listed in the Permit. We are confident that the measures taken to control the release of dioxins will also control the releases of dioxin-like PCBs and PAHs. Section 5.2.1 of this document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation.

Hexachlorobenzene (HCB) is released into the atmosphere as an accidental product from the combustion of coal, waste incineration and certain metal processes. It has also been used as a fungicide, especially for seed treatment although this use has been banned in the UK since 1975. Natural fires and volcanoes may serve as natural sources. Releases of (HCB) are addressed by the European Environment Agency (EEA), which advises that:
"*due to comparatively low levels in emissions from most (combustion) processes special measures for HCB control are usually not proposed. HCB emissions can be controlled generally like other chlorinated organic compounds in emissions, for instance dioxins/furans and PCBs: regulation of time of combustion, combustion temperature, temperature in cleaning devices, sorbents application for waste gases cleaning etc*." [reference http://www.eea.europa.eu/publications/EMEPCORINAIR4/sources_of_HCB.pdf]

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

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

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

6.5 Other Emissions to the Environment

6.5.1 Emissions to water

Surface water run-off from buildings, roadways and external areas of hardstanding will be discharged into the surface water drainage system. The surface water will pass through silt traps and oil interceptors, where appropriate, prior to being discharged into a surface water storage tank. The surface water storage tank will have a discharge into an on-site attenuation pond prior to release off-site into the Cargo Beck watercourse.

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

Where practicable process effluents will be re-used within the process. In the event of excess amount of process effluent it will be discharged to sewer, accordance with a Trade Effluent Consent.

We have assessed the impact assessment (H1 tool) for emissions to sewer. All emissions screen out at stage 2 [without the inclusion of sewage reduction factors, which would otherwise provide further reduction], therefore showing the assessment provided to be conservative. 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 of Article 46(5) must be arranged.

Waste reception and handling will be undertaken in enclosed waste reception areas which prevent the release of litter and dusts. The waste will then be tipped into and stored in a bunker.
Primary combustion air will be drawn from the waste bunker area to maintain negative pressure in waste bunker area and fed into the combustion chamber beneath the grate.
Additional bunker management procedures, and the inclusion of a daily clean down of the waste reception areas, minimise the release of litter and dusts.
The APCr silo will be unloaded by a chute system. The unloading chute will be designed with an inner core, which will be used for the unloading of APCr of the silo, and an outer ‘bellow’ which will extract displaced air from the silo and pass it through a filter with the air subsequently vented back into the silo.
Dusty air from the unloading of silo will be extracted and vented to atmosphere via bag filters fitted to prevent the release of dusts from silo unloading operations.

All containers or vessels used for the transfer of ash off-site will be sealed or covered to prevent the release of dust or excess water when in transport.
Where practicable process effluents will be re-used within the process.
Excess amount of process effluent will require discharge, which will be discharged into the foul sewer system in accordance with a Trade Effluent Consent first obtained from the Sewerage Undertaker.
Uncontaminated surface water run-off collected from buildings, roadways and external areas of hardstanding will be discharged into the surface water drainage system. The surface water storage tank will have a discharge into an on-site attenuation pond prior to release off-site into the Cargo Beck watercourse.
The surface water will pass through silt traps and oil interceptors, where appropriate, prior to being discharged into a surface water storage tank.
Storage of liquid chemicals will be within bunded areas with the secondary and tertiary containment having sufficient capacity to contain a spill. Regular inspections will be undertaken of storage vessels as part of the regular preventative maintenance of the Facility. Other measures (such as acid and alkali resistant coatings will also be employed).
Deliveries of all chemicals will be unloaded and transferred to suitable storage facilities. Bulk liquids (low sulphur fuel oil, ammonia solution) will be stored in tanks provided with bunding of 110%. Bulk dry materials (Lime, Activated Carbon) will be stored in silos on hardstanding within a contained area.
Smaller volume liquids (water treatment chemicals) will be delivered and stored in IBCs within a contained drainage area provided with bunding of 110%, and solids in packaging / bags stored within a contained drainage area.
Tanker off-loading of fuel oil and chemicals will take place within areas where the drainage is contained with the appropriate capacity to contain a spill during delivery (including measures such as areas of hardstanding with falls to a gully and/or sump).
In the event of a fire, contaminated water used for fighting fires will be collected through the wastewater drainage system. Site drainage for external areas will be fitted with an isolation valve to prevent the discharge of contaminated water from the surface water drainage system in the event of a fire
In the case of a fire or a significant spill occurring at the Facility, an isolation valve will prohibit the discharge of contaminated effluent off-site.
Adequate quantities of spillage absorbent materials will be made available at easily accessible location(s), where chemicals are stored.

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

6.5.4 Odour

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise odour and to prevent pollution from 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 periods of planned shutdown, the waste storage quantity will be run-down prior to these periods, all doors to the waste bunker area will remain closed and all incoming waste stopped. In the event that further measures are required, the Applicant proposes use of an air extraction and abatement system (utilising carbon filters) to maintain negative pressure and reduce odour within the waste bunker area. Abated emissions from the odour abatement system will be released from a dedicated odour abatement stack. The combination of both enclosing the waste bunker area and the design of the odour abatement system will ensure that the potential for the release of odours outside the building is minimised.

In the event of an unplanned shutdown, the abatement system will be used to maintain the negative pressure environment and minimise the risk of odours being released from the waste bunker area. This will help to contain any odour within the waste bunker area and ensure that the abatement system is effective in preventing the release of odour.

The Applicant submitted an updated odour management plan (OMP) in response to schedule 5 notice. The applicant has confirmed that further information will be provided at the detailed design stage, and we have required this by pre-operational condition.

6.5.5 Noise and vibration

The following techniques will be employed at the Facility to prevent or reduce noise emissions:

- Waste deliveries will take place primarily during daytime hours, and any mobile plant will be fitted with broadband type noise reversing alarm.
- Buildings will contain acoustic cladding to aid noise containment. Plant rooms will be acoustically designed for limiting noise emissions (including for acceptable levels for compliance with relevant workplace regulations). Doors to buildings will remain closed as far as is reasonably practicable, and the tipping hall will employ automatic fast acting doors.
- Ventilation openings will be formed by acoustic louvres kept to a minimum weight sound reduction (Rw) of 15dB. Turbine ventilation openings fitted with either double bank acoustic louvres or attenuators to minimum Rw 24dB.
- Use of low-noise equipment to minimise the noise level. Any external plant will be designed to prevent any perceptible tonal noise character. Any impulse noise (e.g. noise from any pressure relief valves, bag

filters or valves) will be fitted with silencers to control noise character, unless enclosed within the building.
- Equipment will be subject to regular inspection and maintenance.

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.

We have checked the consultant's modelling assumptions, numerical predictions and conclusions regarding impact in accordance with BS4142
A difference of around +10dB or more is likely to be an indication of significant adverse impact, depending on the context.
A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

The numerical values show that rating levels are below the background sound levels by 8 dB(A) at Cargo Road (R1) and by 13 dB(A) at Lowry Hill Road (R2), which is indicative of low impact, depending on the context.

As a result of our analysis, we agree with the Applicants conclusions provided the proposed attenuation schemes described in the report are implemented. This refers to the proposed sound insulation performance of building envelope elements such as external façades, roofs, doors, windows and ventilation openings/louvres. We have included an improvement condition to validate the noise assessment during normal operation.

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

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

BAT conclusions for waste incineration or co-incineration were published in December 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 (Article 18).

(i) Local factors

We have considered the location in assessing BAT. However no measures beyond BAT were required. We are satisfied that the measures described above as BAT will ensure a high level of protection for the environment as a whole at this location.

(ii) National and European ESs

We are satisfied that the Installation will not result in an exceedance of any National or European ES.

(iii) Global Warming

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

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

(iv) Commissioning

A pre-operational condition will ensure that measures to protect the environment during commissioning are agreed with the Environment Agency.

6.7 Monitoring

6.7.1 Monitoring during normal operations

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

For emissions to air, the methods for continuous and periodic monitoring are in accordance with the Environment Agency's Guidance 'Monitoring stack emissions: environmental permits - GOV.UK (www.gov.uk) 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 2.3.12 of the permit requires that the abnormal operating conditions apply.

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

The BAT conclusions 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 included in table S1.3 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 5 of the Permit either to meet the reporting requirements set out in the IED, or to ensure data is reported to enable timely review by the Environment Agency to ensure compliance with permit conditions and to monitor the efficiency of material use and energy recovery at the installation.

7 Other legal requirements

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

7.1 The EPR 2016 and related Directives

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

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

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

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

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

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

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

- The Environmental Statement submitted with the planning application (which also formed part of the Environmental Permit Application).
- The decision of the Cumbria County Council to grant planning permission on 24 October 2016.
- 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:

- the types and quantities of waste that may be treated;
- for each type of operation permitted, the technical and any other requirements relevant to the site concerned;
- the safety and precautionary measures to be taken;
- the method to be used for each type of operation;
- such monitoring and control operations as may be necessary;
- 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 is being 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, both on the original application and later, separately. 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*".

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

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

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

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

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

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

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

(iv) Section 6(6) (Fisheries)

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

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

(v) Section 7 (Pursuit of Conservation Objectives)

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

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

(vi) Section 39 (Costs and Benefits)

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

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

(vii) Section 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.

(viii) National Emissions Ceiling Regulations 2018

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

7.2.2 **Section 108 Deregulation Act 2015 – Growth duty**

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this Permit.

Paragraph 1.3 of the guidance says:

“The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation.”

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

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

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. The assessment is summarised in greater detail in section 5.4 of this document.

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

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

7.2.7 **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 guidance agreed jointly with Natural England and concluded that there will be no likely significant effect on any European Site.

We consulted Natural England by means of a HRA, and they did not agree with all of our conclusions.

The habitats assessment is summarised in greater detail in section 5.4 and Annex 4 of this document. We have placed a copy of SSSI Assessment / Habitats Risk Assessment on citizen space and the public register.

7.3.2 **Water Environment (Water Framework Directive) Regulations 2017 2003**

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

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

7.3.3 **The Persistent Organic Pollutants Regulations 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.

7.4 Other relevant legal requirements

7.4.1 Duty to Involve

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

The way in which the Environment Agency has consulted with the public and other interested parties is set out in section 2 of this document. The way in which we have taken account of the representations we have received is set out in Annex 4. Our public consultation duties are also set out in the EP Regulations, and our statutory Public Participation Statement, which implement the requirements of the Public Participation Directive. In addition to meeting our consultation responsibilities, we have also taken account of our guidance in Environment Agency Guidance Note RGS6 and the Environment Agency's Building Trust with Communities toolkit.

ANNEX 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) and S3.2 in Schedule 3 of the Permit.
45(1)(d)	The permit shall include the requirements for pH, temperature and flow of waste water discharges.	Not Applicable
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 3.6.4 and Tables S3.1, S3.1(a), S3.2, 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 2.3.12 and 2.3.13.
45(2)(a)	The permit shall include a list of the quantities of the different categories of hazardous waste which may be treated.	Not Applicable
45(2)(b)	The permit shall include the minimum and maximum mass flows of those hazardous waste,	Not Applicable

IED Article	Requirement	Delivered by
	their lowest and maximum calorific values and the maximum contents of polychlorinated biphenyls, pentachlorophenol, chlorine, fluorine, sulphur, heavy metals and other polluting substances.	
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Condition 2.3.1 and Table S1.2 of Schedule 1 of the Permit.
46(2)	Emission into air shall not exceed the emission limit values set out in part 3 of Annex VI.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1a.
46(3)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(4)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(5)	Prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. Adequate storage capacity for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting.	The application explains the measures to be in place for achieving the directive requirements. 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/m3), CO and TOC not to be exceeded during this period.	Conditions 2.3.12 and 2.3.13

IED Article	Requirement	Delivered by
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 2.3.9
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 and S3.1(a) and S3.2. Reference conditions are defined in Schedule 6 of the Permit.
48(2)	Installation and functioning of the automated measurement systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	Conditions 3.6.1, 3.6.3, table S3.1, S3.1(a) and S3.4
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	Conditions 3.6.1. pre-operational condition PO8
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) and S3.2
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 850ºC for two seconds, as measured at representative point of the combustion chamber.	Condition 2.3.9, pre-operational condition PO9 and Improvement condition IC5 and Table S3.4
50(3)	At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than	Condition 2.3.14

IED Article	Requirement	Delivered by
	those resulting from the burning of gas oil liquefied gas or natural gas.	
50(4)(a)	Automatic shut to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.9
50(4)(b)	Automatic shut to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.9
50(4)(c)	Automatic shut to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.9
50(5)	Any heat generated from the process shall be recovered as far as practicable.	(a) The plant will generate electricity (b) Operator to review the available heat recovery options prior to commissioning (PO2) and then every 4 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 me.	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

IED Article	Requirement	Delivered by
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.
52(3)	Prior to accepting hazardous waste, the operator shall collect available information about the waste for the purpose of compliance with the permit requirements specified in Article 45(2).	Not Applicable
52(4)	Prior to accepting hazardous waste, the operator shall carry out the procedures set out in Article 52(4).	Not Applicable
52(5)	Granting of exemptions from Article 52(2), (3) and (4).	Not Applicable
53(1)	Residues to be minimised in their amount and harmfulness and recycled where appropriate.	Conditions 1.4.1, 1.4.2 and 3.6.1 with Table S3.5
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	Conditions 1.4.1 2.3.1, 2.3.2 and 3.3.1.
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 be publicly available.	All documents are accessible from the Environment Agency Public Register.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2 and 4.2.3.

ANNEX 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 3.5.1 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	Not applicable
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 3.8.1
13	Storage and handling of clinical waste	Not applicable
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, 3.5.1 and table S3.5

BAT conclusion	Criteria	Delivered by
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 and condition 1.1.1
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, 3.3.1, 3.3.2, 3.4.1. 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	Not applicable
24	Techniques to prevent or reduce diffuse emissions to air from treatment of slags and ashes	Not applicable
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	No treatment carried out 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 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_2O, 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 S1.22.3.1, 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 6.5.3 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 2.3.15
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, and 3.5.1. Improvement condition to validate noise assessment during normal operation.

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 S1.4 Pre-operational measures	
Reference	**Pre-operational measures**
PO1	Prior to the commencement of commissioning, the Operator shall:- • Provide an updated Odour Management Plan (OMP) for written approval • Provide a copy of discharge consent (table S3.3) • 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. 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: • 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 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. 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.
PO2	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.
PO3	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency, and obtain the Environment Agency's written approval to it, a 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.

Table S1.4 Pre-operational measures	
Reference	**Pre-operational measures**
PO4	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 plan as approved. Commissioning report to be provided by improvement condition IC3 in Table S1.3 of this permit.
PO5	Prior to 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, 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. The procedure shall be implemented in accordance with the written approval from the Environment Agency.
PO6	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.
PO8	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 (www.gov.uk):- • Monitoring stack emissions: measurement locations • Monitoring stack emissions: environmental permits • M20 quality assurance of continuous emission monitoring systems. The report shall include the following: • Plant and equipment details, including accreditation to MCERTS; • Methods and standards for sampling and analysis; and • Details of monitoring locations, access and working platforms.
PO9	At least 3 months before the commencement of commissioning (or other date agreed in writing with the Environment Agency) the Operator

Table S1.4 Pre-operational measures	
Reference	**Pre-operational measures**
	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.
PO10	At least 3 months before the commencement of commissioning (or other date agreed in writing with the Environment Agency) the Operator shall provide confirmation of the final design details of Installation prior to commissioning.
PO11	The operator shall submit a revised fire prevention plan to the Environment Agency and seek the Environment Agency's approval to it, after the detailed design stage of the installation. The revised plan shall include any changes required after the detailed design stage. The plan shall be in line with current Environment Agency guidance on fire prevention plans.

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		
Ref.	**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.	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 point A1, identifying the fractions within the PM_{10}, and $PM_{2.5}$ ranges. On receipt of written approval from the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	Within 6 months of the completion of commissioning.
IC3	The Operator shall submit a written report to the Environment Agency on the commissioning of the installation in accordance with the plan agreed by pre-operational condition PO4. 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, as approved through PO9 (table S1.4) is planned for. 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. The operator shall submit a written report to the Environment Agency on the validation of residence time, oxygen and	Notification at least 3 weeks prior to validation testing Validation tests completed before the end of commissioning Report submitted within 2 months of the completion of commissioning.

Table S1.3 Improvement programme requirements		
Ref.	**Requirement**	**Date**
	temperature whilst operating under normal load, minimum turn down and overload conditions. The report shall identify the process controls used to ensure residence time and temperature requirements are complied with during operation of the incineration plant.	
IC5	The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of: • The Selective Non Catalytic Reduction (SNCR) system and combustion settings to minimise oxides of nitrogen (NOx).The report shall include an assessment of the level of NOx, N_2O and NH_3 emissions that can be achieved under optimum operating conditions. • The lime injection system for minimisation of acid gas emissions • The carbon injection system for minimisation of dioxin and heavy metal emissions. The Operator shall carry out a further assessment of the performance of the SNCR system and submit a written report to the Environment Agency on the feasibility of complying with an emission limit value (ELV) for NOx of 100 mg/Nm^3 as a daily average, including a description of any relevant cross-media effects identified. If an ELV for NOx of 100 mg/Nm^3 as a daily average is determined not to be feasible, the report shall propose an alternative ELV which would provide an equivalent level of NOx reduction on a long-term basis such as an annual mass emission limit or percentile-based ELV.	Within 4 months of the completion of commissioning. Within 12 months of the completion of commissioning
IC6	The Operator shall carry out an assessment of the impact of emissions to air of the following component metals subject to emission limit values: As and Cr. A report on the assessment shall be made to the Environment Agency. Emissions monitoring data obtained during the first year of operation shall be used to compare the actual emissions with those assumed in the impact assessment submitted with the Application. An assessment shall be made of the impact of each metal against the relevant environmental standard (ES). In the event that the assessment shows that an ES can be exceeded, the report shall include proposals for further investigative work.	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 Tables S3.1 and S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3. The report shall include the results of calibration and verification testing.	Initial calibration report to be submitted to the Environment Agency within 3 months of completion of commissioning. Full summary evidence compliance report

Table S1.3 Improvement programme requirements		
Ref.	**Requirement**	**Date**
		to be submitted within 18 months of completion of commissioning.
IC8	During commissioning, the Operator shall carry out tests to demonstrate whether the furnace combustion air will ensure that negative pressure is achieved throughout the reception hall. The tests shall demonstrate whether air is pulled through the reception hall and bunker area and into the furnace with dead spots minimised. The Operator shall also carry out tests of methods used to maintain negative pressure during shut-down periods to ensure that adequate extraction will be achieved from the odour abatement system. The Operator shall submit a report to the Environment Agency, for approval, summarising the findings along with any proposed improvements if required.	Within 3 months of completion of commissioning.
IC9	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 3 months of completion of commissioning or as agreed in writing with the Environment Agency
IC 10	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 3 months of completion of commissioning or as agreed in writing with the Environment Agency
IC 11	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). 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 PM_{10} and $PM_{2.5}$ sampling. 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.	Report to be submitted to the Agency within 3 months of completion of commissioning.
IC 12	The Operator shall undertake a noise assessment during normal operations in accordance with the procedures given in BS4142:2014 (Rating industrial noise affecting mixed	Report to be submitted to the Agency within 3

Table S1.3 Improvement programme requirements		
Ref.	**Requirement**	**Date**
	residential and industrial areas) and BS7445: 2003 (Description and measurement of environmental noise) or other methodology as agreed with the Environment Agency - in order to validate the assessment provided within the application. The assessment shall include, but not be limited to: A review of the noise sources from the facility. Where any noise source(s) are identified as exhibiting tonal contributions, they shall be quantified by means of frequency analysis. A review of noise levels from static plant. Considerations of on-site vehicle movements. A report shall be provided to the Environment Agency detailing the findings of the assessment.	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 decision is summarised in this Annex. Copies of all consultation responses have been placed on the Environment Agency public register.

The Application was advertised on the Environment Agency website from 24/07/2020 to 30/11/2020 and in the Cumberland News on 24/07/2020. The Application was made available to view through the Public Register, as result of the COVID-19 pandemic Environment Agency buildings were not open to the public however all documents were provided upon request.

The following statutory and non-statutory bodies were consulted:

- LPA Carlisle
- Environmental Health
- Health and Safety Executive
- United Utilities plc – Sewage Authorities
- Director of Public Health
- Public Health England
- Food Standards Agency
- Fire services
- Natural England

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from Natural England	
Comments from Natural England	**Response from Environment Agency**
The list of designated features for the River Eden is incorrect. *Molinia* meadows on calcareous, peat or clay-silt soil, Mountain hay meadows, Old sessile oak woods with *Ilex* and *Blechnum* in the UK are **not** designated features.	List of features amended accordingly.
The following features are part of the River Eden SAC designation, but they are not found in the vicinity of the facility: Brook lamprey, Freshwater crayfish, Oligotrophic to mesotrophic standing water with vegetation and Alluvial woods with A. glutinosa, F. excelsior*.	We have noted this information in the HRA document
There are also a number of other Sites of Scientific Interest in the area (e.g. Oulton Moss, Scaleby Moss, Thurstonfield Lough, Finglandrigg Woods, Drumburgh Moss, Black Snib, White Moss Crosby Moor), all of which have habitats that are sensitive to aerial pollution.	The CRoW Appendix was completed for the River Eden and Tributaries SSSI as this is the only SSSI that falls within our 2 km screening distance of the proposed installation.
….the invertebrate assemblage of river shingles and river bank, colonies of breeding sandmartins and wetland communities are within 10km, and these are likely to be sensitive to aerial pollution.	We find no evidence to indicate that these features will be sensitive to air emissions - especially as they are more than 2 km away from the emission point. Furthermore, any aerial deposition will be heavily masked by aquatic sources of nutrients.
In table 2 you have included the critical loads for the Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation (H3260), as far as I can tell. The data in APIS states that after Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoeto-Nanojuncetea (H3130), this is the most sensitive habitat in the River Eden SAC. However as oligotrophic to mesotrophic waters is not present within the vicinity of the proposed facility and so detailed assessment for this habitat does not need to be considered. It would be useful in this table if you could include the critical level figures for the designated features present in this location (H3260, salmon, sea lamprey, river lamprey, otter, possibly bullhead) and state the source of the data.	The HRA was amended accordingly.

Comments from Natural England	Response from Environment Agency
You have then expressed the emissions from the facility as a proportion of the critical level, and concluded that there is a potential issue with regards to annual mean oxides of nitrogen, sulphur dioxide, and ammonia for the River Eden SAC. Therefore, further analysis of these pollutants has been undertaken. I agree that this further analysis and assessment is required. Therefore I do not understand why in Tables 4, 5, 6 and 7 for nitrogen deposition and acid deposition critical loads you have included the data for Broad-leaved, mixed and yew woodland which is not a designated SAC feature for the River Eden SAC (and is not an interest feature of the SSSI – and is not present in this location within the designated sites). You should include the figures for at least the most sensitive, but preferably all, of the SAC designated features for the HRA, that are present in the vicinity of the facility (i.e watercourses of flood to montane levels, salmon, sea lamprey, river lamprey, otter, possibly bullhead).	The HRA was amended accordingly.
The discussion after these tables considers the impact on the river, but this is not supported by the correct data. This discussion states that overall ammonia deposition is likely to be of low importance as the inputs are probably significantly below the large nutrient loadings from river tidal inputs and there is unlikely to be an issue with regard to the river habitat due to the dilution etc. This is likely to be true, but do you have any data to support this statement? What are the nutrient loadings for this section of the river? This paragraph does not discuss the nitrogen deposition and acid deposition.	The HRA was amended / justification added.
In this section you also say Natural England have confirmed the only qualifying or notified woodland habitats which may occur in the area of concern are alder woodlands located 6.7km from the site. I think you may have mis-interpreted my emails from last autumn where I calculated the distances from the Kingmoor facility of the designated features that are within 10km – see table below.	The HRA was amended accordingly.
Section 9 – there are additional SAC features present for the River Eden (see above), therefore you need to reconsider this statement. Alder woodland on floodplains — Closest are 6.9km SSE	These were addressed in the HRA accordingly.

Comments from Natural England		Response from Environment Agency
Rivers with floating vegetation often dominated by watercrowfoot	Closest reach is 1km	
Atlantic salmon Salmo salar	Closest reach is 1km	
Otter Lutra lutra River lampreyLampetra fluviatilis	Closest reach is 1km Closest reach is 1km	
Sea lamprey Petromyzon marinus	Closest reach is 1km. There is spawning in this part of the river	
Bullhead Cottus gobio	Closest reach is 1km, but not certain where the closest bullhead will be, but probably in the R Caldew, which is within 10km.	
Whilst you have taken some aspects of our comments of 7 June on board, there are still major inaccuracies in the HRA and you have misunderstood many of our comments, particularly with respect to the designated features that are present – you have either not amended the inaccuracies in the previous draft or said the opposite to the advice we provided last October and June. These are detailed below. There is also a confusion between the Stage 1 ALSE and Stage 2 Appropriate Assessment that I did not spot before.		We have carefully taken steps to address the suggestions from NE, within this complex HRA. We are also confident that the assessment approach we have taken is compliant with our routine process to assess information within Stage 1 of an HRA. As opposed to a Stage 2.
Section 7 – HRA Screening table: You have concluded that there is a likely significant effect alone on the Alluvial woods with A. glutinosa, F. excelsior designated feature. However, this habitat is 6.7km away, i.e. more than the 3km that you have stated will comprise the zone of impact/influence of the aerial pollution from the proposal, so surely it can be concluded that there is no ALSE? In previous correspondence we have stated that Atlantic salmon, Bullhead, River lamprey, Sea lamprey, Otter and Water courses of plain to montane levels with R. fluitantis are within 3km of the proposed facility and we agree that there is a likely significant impact. We have previously stated that Brook lamprey, Freshwater crayfish and Oligotrophic to mesotrophic standing water are not present within 3km of the proposed facility and it is therefore		The HRA was amended accordingly. However, we do not agree that there is a LSE from air emission to Atlantic salmon, Bullhead, River lamprey, Sea lamprey, Otter and Water courses of plain to montane levels with R. fluitantis. As explained in the final Stage 1 HRA.

Comments from Natural England	Response from Environment Agency
reasonable to conclude that there will be no likely significant effect on these habitats and species.	
You have expressed the emissions from the facility as a proportion of the critical level, and concluded that there is a potential issue with regards to of annual mean oxides of nitrogen, sulphur dioxide, and ammonia for the River Eden SAC. Therefore, further analysis of these pollutants has been undertaken. I agree that this further analysis and assessment is required.	The final Stage 1 HRA explains the potential for LSE and then confirms why this is not occurring. This extra assessment and analysis are all part of the routine process within the Stage 1 HRA.
Section 8: This should really be the Stage 2 Appropriate Assessment. Section 7 has ascertained (or should do when it is revised) that there is a LSE on some of the habitats and species designated within the River Eden SAC: Atlantic salmon, Bullhead, River lamprey, Sea lamprey, Otter and Water courses of plain to montane levels with *R. fluitantis*. The next stage is then to consider in additional depth and detail, in an Appropriate Assessment (an EA Stage 2 assessment) whether the potential impacts outlined in Section 7 will have an adverse impact on the integrity of the River Eden SAC.	Respectfully we disagree here. Calculating possible emissions concentrations is all part of the Stage 1 assessment, where we validate an applicant's model and use this identify possible risks. Further, the outcome will still remain the same even, if this was taken to a Stage 2 HRA.
Section 8 does contain much of this information, though there are still major inaccuracies, and some further justification is required. Tables 4, 5, 6, 7 all refer to Alluvial woodlands when we have previously advised that this habitat is not present within 3km of the facility. These tables need to include figures and information for Atlantic salmon, Bullhead, River lamprey, Sea lamprey, Otter and Water courses of plain to montane levels with R. fluitantis which are with this zone. We do recognise that there is little information on APIS for this habitat and species, but the presence of these designated features, discussion and lack of data still needs to be included here. Page 37: Whilst the Brook lamprey, Freshwater crayfish, Oligotrophic to mesotrophic standing water with vegetation and Alluvial woods with A. glutinosa, F. excelsior are not in the vicinity of the facility (and Table 7 should be stating this and concluding no LSE) there are designated species and habitats that are present,	Tables 4, 5, 6, 7: The format and layout of our HRA is consistent with all EA HRA's. We list all potential species as designated, as opposed to just narrowing this down to those we are told are in the vicinity. Page 37: We do consider the risks to these species and have concluded that there is no LSE. Page 37: Last paragraph. Agreed – we have included the copies of your emails for reference. Page 38: Amended. Page 38: The EA feels that we have demonstrated robustly the scale of nutrient impact. We are confident that this does not indicate LSE.

Comments from Natural England	Response from Environment Agency
and they need to be considered further, rather than discounted at this stage. Page 37 – last paragraph. NE did not confirm that the only qualifying or notified woodland habitats which may occur in the area of concern are alder woodlands which are located 6.7km form the site. In October last year and in June we confirmed (in a table) that Atlantic salmon, Bullhead, River lamprey, Sea lamprey, Otter and Water courses of plain to montane levels with R. fluitantis were present in the vicinity of the proposed vicinity. Page 38 - Water courses of plain to montane levels with R. fluitantis is a habitat not a species as it is described in the HRA. Page 38: we appreciate that there is little data on APIS for Water courses of plain to montane levels, salmon, bullhead, river and sea lamprey and otter. However, the HRA still needs to have more discussion, explanation and rationale with regard to potential impacts even given the lack of critical load data on APIS, rather than just discounting this habitat and species, and the HRA needs to determine whether there is an adverse impact on the integrity of the SAC. E.g What are the N targets for this unit of River Eden SAC? What are the N levels already present in this unit? How much additional N will be introduced into the water course from the proposed facility and how significant will this be and in terms of background levels? What are the river flows and tidal influence in this stretch of river? Given this how much dilution of any nutrient input will there be and how significant will this be? Section 9 is still wrong – there are riverine SAC habitats and species present in the vicinity of the SAC and these need to be considered in combination with other plans or projects that are concurrent within this part of the River Eden SC. The HRA has not identified any other plans or projects here – these need to be included.	Section 9: As you have noted for Page 38, if we cannot identify an impact alone due to the sensitive features being aquatic, with no Critical Loads, we similarly would not be able to identify an impact in combination. In summary we believe our conclusion of No LSE alone and in combination is robust.

Comments from Natural England	Response from Environment Agency
Section 12: Section 7 should have already determined no LSE. This section should be considering and summarising whether there is an adverse impact on the integrity of the River Eden SAC.	The format of our HRA is a jointly agreed format with Natural England. Section 12 is the final decision. No changes made.
We have considered the revisions you have made and draw your attention to the comments previously given by my colleague, Karen Slater (email 13th September 2021 – original comments 7th June 2021 are included in the revised HRA). The revisions made do not address all of the comments previously given, and the HRA is still in the format of a Stage 1 Assessment of Likely Significant Effect, and has not been taken to a Stage 2 Appropriate Assessment as indicated in the previous comments. As such, Natural England have no further comments to make other than those already supplied.	We have taken advice from Natural England into account and have decided to proceed with the determination of the application without further consultation. This decision has been taken because the Environment Agency feels that it has demonstrated robustly the scale of emission impact, and is confident that the assessment approach we have taken is compliant with our routine process to assess information within Stage 1 of a HRA. We are also confident that this does not indicate Likely Significant Effect (LSE) alone. We have carefully taken steps to address the suggestions from Natural England, within the HRA. We do not agree that there is a LSE from air emission to Atlantic salmon, Bullhead, River lamprey, Sea lamprey, Otter and Water courses of plain to montane levels with R. fluitantis. If we cannot identify an impact alone due to the sensitive features being aquatic, with no Critical Loads, we similarly would not be able to identify an impact in-combination. In summary we believe our conclusion of No LSE alone and in combination is robust. We are also of the opinion that changing from a Stage 1 to 2 format, would still have not identified any cogent reasons why a finding of No LSE at HRA Stage 1 was not robust.

Response Received from Public health England (PHE)	
Brief summary of issues raised:	Summary of action taken / how this has been covered
The main emissions of potential concern within this permit application are point source emissions to atmosphere from the combustion of non-hazardous waste. These include nitrogen oxides (NOx), sulphur dioxide (SO_2), other acid gases (hydrogen chloride (HCl) and hydrogen fluoride (HF), dioxins, heavy metals, and particulate matter. Based on the information contained in the application supplied to us, no significant concerns regarding the risk to the health of the local population from the installation, this consultation response is based on the assumption that the permit holder shall take all appropriate measures to prevent or control pollution, in accordance with the relevant sector guidance and industry best practice. It was recommended that the regulator satisfies itself that the modelling assumptions used to reach these conclusions are appropriate and valid. Reducing public exposures to non-threshold pollutants (such as particulate matter and nitrogen dioxide) below air quality standards has potential public health benefits. Therefore, we support approaches which minimise or mitigate public exposure to non-threshold air pollutants and address inequalities (in exposure) and encourage their consideration during site design, operational management, and regulation.	Emission limits have been set for sulphur dioxide, volatile organic compounds, particulate matter, and nitrogen dioxide in line with chapter IV of the IED and the BAT conclusions - BAT AELs. We are satisfied that the facility will be operated using BAT. We have audited the assessment and concluded contributions from the proposed ERF are unlikely to exceed any Environmental Standard set for protection of human health. The permit will require emissions to be prevented or where that is not practicable minimised. Detailed modelling showed no significant impacts.

Response Received from Carlisle City Council	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Concern over lack of detail on noise mitigation measures.	Further detail on noise was provided in response to a request for further information. 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

Concerns the noise data for measures to control noise is not representative of the proposed plant.	We carried out an audit of the applicants noise assessment, along with check modelling. Despite finding sound rating levels slightly higher than those from the applicant, we find that noise impacts from the facility are low.
Concerns over the procedure for investigating noise and responding to complaints.	The Operator will have a complaints procedure. The Permit contains conditions to control noise. We will regulate the site to ensure that the Operator operates the plant as described in the Application and complies with these conditions. If there are noise issues we will investigate them and take enforcement action if required and/or require additional measures to be implemented to reduce noise.
Concerns minimum stack height has not been approached / addressed appropriately	We are satisfied that the stack height has been calculated in accordance with IED article 46(1). Having assessed the Application as a whole we are satisfied that the measures proposed, of which stack height is one aspect, are BAT
Concern over the effect of terrain type on dispersion:	We have performed sensitivity modelling with and without impacts from terrain from Ordnance Survey data. We are satisfied that they were appropriately considered and will not have a significant impact.
Concerns the OMP is inadequate and should be improved.	The Applicant described measures in the odour management plan and subsequent schedule 5 response. We are satisfied that the measures are appropriate.
Concern over the impact of abnormal operations: in particular Increased dioxin emissions,	We have assessed the impact from abnormal operation, and we are satisfied that there will not be a significant impact including from dioxins, this is also explained in section 5.5. The assessment of abnormal operation considered complete failure of abatement plant and as such considers the worst case. We are satisfied that abnormal operation will not give rise to significant impacts.
Concern over dust impacts. A dust management plan (DMP) and assessment of dust impacts should be provided by the applicant	The Applicant has provided details of how they will manage dust within the Application. We are satisfied with the measures proposed and we consider that a dust management plan or further risk assessment is not required. Permit condition 3.3.2 would allow us to require the Applicant to submit a DMP in the unlikely event that a dust issue did occur.
The health risk assessment should be amended to include exposure via consumption of fish and locally grazed cattle.	We audited the HHRA and we are satisfied with the assumptions that were used. The HHRA is very much a worst case assessment with based on the dose of dioxins and furans that would be received by local receptors if all their

Concerns over details of model parameters and data sources - should include adult, child and breast feed body weights, inhalation volumes and quantities of different food types consumed The Environment Agency needs to ensure that the facility complies with the new Tolerable Weekly Intake for exposure to dioxins and furans.	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 was considered in the Applicant's HHRA. We are satisfied that impacts will not be significant. Based on advice from PHE to the Environment Agency we are satisfied that assessment using the tolerable daily intake (TDI) is appropriate.
Concern over method to monitor particulates including ultrafine particles.	Monitoring is specified in schedule 3 of the Permit. We are satisfied that the monitoring is appropriate. Further information on the monitoring of fine particulates is in section 5.3.3. of this decision document.
Assessment of metals and PCBs: concerned that average rather than maximum emission concentration used	The Applicant considered PCBs (maximum monitored PCB concentration concerted to an emission rate using the volumetric flow) in their impact assessment. The impact was shown to be insignificant. Further information is in section 5.2 of this decision document. The Applicant used the maximum monitored data from our group 3 metals guidance in their AQA. We conducted check modelling and sensitivity analysis to the maximum measured concentration in the 2019 BREF. We agree with the consultant's conclusions. We checked these when we audited the Applicant's risk assessment. We are satisfied that they were appropriately considered.
The stand-By Generator should be fuelled by natural gas	The Applicant clarified that the generator was for use in the event of loss of main electricity to the plant. The generator is for emergency use only and requires a guaranteed fuel supply.
Concerns over emission measurement uncertainties	Emission limit values used in modelling-based assessments are used without the measurement uncertainties (confidence intervals (CIs)) added or subtracted. CIs are used for regulated sites in reporting emission concentrations to the regulator (monitoring). They are a measure of monitoring uncertainty, and where applied, remove any reasonable doubt (required for instances where enforcement action might be considered). Modelling for permit applications is different in that the aim is the assessment of risk to human health and habitats for the site operating scenarios (e.g. site operating at BAT). As specified in our guidance, we would always expect modelling uncertainties to be quantified. In many

	cases, modelling at the ELVs would represent the upper-end of the uncertainty range in relation to pollutant emission scenarios and would be considered to be a reasonable 'worst case' scenario.
Concerns over the inaccurate description of the location and surrounding land use.	The applicant provided further detail in response to schedule 5 notice - including location and surrounding land use. We are satisfied that the description is accurate to ensure impact was correctly assessed.
Concern over the meteorological data used in dispersion modelling; it is 10-15 years old and may no longer be relevant	We carried out detailed check modelling using ADMS 5.2. Our checks included sensitivity to the meteorological data. Changes in land use, such as urbanisation, and technological advances in meteorological observation equipment are the main factors that lead to some meteorological datasets becoming outdated. There are no known such issues with the meteorological data used. Our check modelling with our own meteorological data years indicated agreement with applicant's conclusions.
Concern over decision to use mass burn over gasification.	We are satisfied that the proposed mass burn moving grate furnace is BAT. Section 6 has further details.
Concern over Impacts at River Eden Special Area of Conservation, alone and in combination	Our assessment at ecological sites is described in section 5.4 of this decision document. We are satisfied that there will not be a significant likely effect. We consulted with Natural England on our assessment.
Radioactivity checks should be carried out.	UK radioactive substances regulation is sufficiently robust so as to minimise the risk of radioactive material inadvertently being sent to incinerators, therefore our position is that all waste poses low risk and that radioactivity detection is not required at any incineration plants (unless site-specific circumstances warrant additional measures or future evidence indicates an increased risk).
Concern that asbestos will be received and burned	These waste types are not permitted to be received and burned at the Installation. The Operator will have waste pre-acceptance and waste acceptance procedures to ensure that only waste authorised by the Permit is received and burned. We have set a pre-operational condition that requires the Operator to submit details of the procedures for approval.

Record of correspondence from Natural England.

Consultation of the HRA is covered within section 5.4.2 **and copy of HRA included in Annex 5**	

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

The consultation responses received were wide ranging and a number of the issues raised were outside the Environment Agency's remit in reaching its permitting decisions. Specifically, questions were raised which fall within the jurisdiction of the planning system, both on the development of planning policy and the grant of planning permission.

Guidance on the interaction between planning and pollution control is given in the National Planning Policy Framework. It says that the planning and pollution control systems are separate but complementary. We are only able to take into account those issues, which fall within the scope of the Environmental Permitting Regulations.

a) Representations from Local MP, Councillors and Parish / Town / Community Councils

Representations were received from Councillor for Stanwix Urban and Houghton, Irthington Parish Council, Kingmoor Parish Council, Councillor for Belah and Kingmoor Ward of Carlisle, Councillor for Currock and Upperby Ward of Carlisle, Ricardo Energy and Enviroment on behalf of Carlisle City Council, Stanwix Rural Parish Council, Scaleby Parish Council who raised the following issues.

Brief summary of issues raised:	**Summary of action taken / how this has been covered**

Concerns over mistakes in the planning process.	The planning process and EPR permitting process are different processes. We have assessed the Application submitted to us. The Permit will require the Installation to be operated as described in the Application.
Comments about air emissions and air risk assessment	
Concern that prevailing wind is towards villages and the impact on those areas	Weather data was included in the dispersion modelling and therefore the wind direction and its impacts have been taken into account. We are satisfied that there will not be any significant impacts – further details are in section 5.2.
Concerns over stack height suitability	We are satisfied that the stack height has been calculated in accordance with IED article 46(1). Having assessed the Application as a whole we are satisfied that the measures proposed, of which stack height is one aspect, are BAT. We are satisfied that human health and the environment will be safeguarded.
Concern over the meteorological data that was used. Temperature inversions should be considered	The Environment Agency's modelling specialists audited the dispersion modelling. The audit included the weather data used by the Applicant including using our own weather data from Carlisle. We are satisfied with the data that was used. Temperature inversions typically occur on clear nights with calm winds. They develop during the night and typically break up a few hours after sunrise. The applicant's ADMS model will have considered the impact under such conditions. We agree with Applicant's modelling conclusions.
Concern over background pollution data use in the modelling Baseline air quality: Baseline levels of metals may have been under-estimated and should be re-evaluated. Concerns taken from a rural background when they should have been taken from an urban background	The Applicant considered existing pollution (background) levels in their dispersion modelling. As part of our audit, we checked the background levels, and we are satisfied that they were appropriate, and that significant pollution will not be caused. We have reviewed all background concentrations, with particular focus on recorded values presented in the Annual Status Report of Carlisle City Council and Defra UK Air website. Following our review of the background and check modelling, although we do not agree with the Applicant's absolute numerical predictions, we agree with their conclusions.

Receptor locations – concerns not all receptors have been included in the assessment	The dispersion modelling considered nearby receptors including the closest housing. The Applicant has reported maximum concentrations in the modelled grid, these represent 'worst case' predictions and do not necessarily represent public exposure. We are satisfied the worst case emissions will not give rise to significant pollution of the environment or harm to human health. As a result, making predictions at further discrete receptor locations is not required as these will be less than the reported maximums which are already considered to be permissible and not cause any significant air quality pollution issues.
Concerns diesel generators have not been assessed in the air quality assessment.	The diesel generator is only expected to operate for short-term periods (<50 hours per year) for testing purposes, or for use in the event of loss of main electricity to the plant. Due to the size (6 MWth) and small operating time any impacts will be insignificant.
Comments about odour emission impacts	
Concerns over odour from mixed waste streams	We are satisfied that there will not be a significant impact from odour, further details are in section 6.5.4 of this decision document.
Concern over odour control during shut-down when the furnace not operating.	We are satisfied that the measures proposed in the Application will prevent significant odour including during periods when the furnace is not operating. Further details are in section 6.5.4 of this decision document.
Concerns over odour impacts on residents downwind of the Installation	The Applicant considered relevant receptors (including downwind) in the vicinity of the Installation in their assessment. We are satisfied that there will not be a significant impact from odour, further details are in section 6.5.4 of this decision document.
Comments about noise emission impacts	
Concerns over noise impacts on residents downwind of the Installation	The Applicant considered relevant receptors (including downwind) in the vicinity of the installation in their assessment. We are satisfied that noise will not cause a significant impact. See section 6.5.5 for further details. We are satisfied that noise will be adequately controlled.
Information is inconsistent with the non-material amendments to the planning application.	The Applicant confirmed that the non-material amendment was withdrawn The design presented in the Application is the 'latest'/current design and is consistent with the approved design within the planning consent (Ref: 1/18/9012).

	We have consulted the planning authority as part of this determination. Aspects relating to the determination of the planning authority are not within the remit of the Environment Agency. The operator will need to comply with both permitting and planning regimes.
Concern that a modal value was used for background noise levels.	Paragraph 8.1.4 and Note 1 of BS4142:2014+A1:2019 states: The monitoring duration should reflect the range of background sound levels for the period being assessed. In practice, there is no “single” background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment should be representative of the period being assessed. *Note1: To obtain a representative background sound level a series of either sequential or disaggregated measurements should be carried out for the period(s) of interest, possibly on more than one occasion. A representative level should* *account for the range of background sound levels and should not automatically be assumed to be either the minimum or modal value.* We audit the Applicant’s modelling and agree with the Applicant’s conclusions.
Background monitoring (surveys as required in BS4142:2014) has not taken into account uncertainty; e.g. the risk of tolerances in predictions, measurements and other variables resulting in inaccuracies in the conclusions of the assessment.	Applicant confirmed in response to schedule 5 notice (2) : Noise level meters used for the baseline survey are precision grade Class 1 and microphones are Type 1. Calibration certificates provided with schedule 5 response. The weather station does not have a means of calibration and the unit used for the monitoring was purchased in October 2019 and so was brand new. All meters were time checked with GMT and set to `synchro’ to ensure they would start at 15-minute intervals relative to the clock. Meters were calibrated using portable calibrator prior to and after the survey with no drift in calibration reported. We have performed check modelling (including uncertainty checks) and are satisfied that the conclusions do not depart from the noise assessment provided with the Application.
Background monitoring (surveys) has not taken into account prevailing weather conditions as required in BS4142:2014.	Applicant confirmed in response to schedule 5 notice (2) : The baseline noise survey (November 2019) was carried out over a 5-day period, which included a weekend period to cover the lowest likely representative background sound levels.

	The results of the weather station monitoring show that the weather conditions were suitable for monitoring baseline and conditions remained dry, with low winds and variable wind directions (i.e. ideal conditions). The location for the weather station was considered to be suitable, as it was positioned in the most exposed area of monitoring (i.e. measured the highest likely wind speed) and close enough to the other monitoring positions to show that the conditions were suitable (i.e. no rain and light wind conditions). No data was removed for rain or high wind speed as the conditions showed all data was acceptable. We have performed check modelling and are satisfied that the conclusions do not depart from the noise assessment provided with the application.
The noise modelling did not correctly take into account the character of the area. Typical or quiet suburban area containing a number of sensitive receptors including Kingmoor Junior School, Kingmoor Sidings Local Nature Reserve (LNR) and County Wildlife Site (CWS), River Eden SAC and River Eden SSSI Impact Risk Zone (IRZ).	Applicant confirmed in response to schedule 5 notice (2) : The nearest sensitive receptors are those identified as residential dwellings and are characterised as having high sensitivity, which have been adopted in the Noise Assessment. The site and surrounding land uses has been classified/characterised as mixed industrial and residential in a suburban area, which is consistent with the location of the Facility as it is located on the urban fringe of Carlisle. This classification/characterisation has no bearing on the assessment methodology or the conclusions of the assessment. We are satisfied that the modelling allowed us to assess the impacts on the surrounding area. Our check modelling showed that the conclusions do not depart from the noise assessment provided with the application.
Not provided information about BS4142:2014 corrections with regard to the tonality, impulsivity and intermittency of the predicted noise.	Applicant confirmed in response to schedule 5 notice (2) : The rating level for the site has been determined, any noise character would be removed by design. Where any significant external plant is proposed that is not contained within the building envelope, they will be designed to ensure that they do not generate any tonal, impulse or intermittency character. This control requirement would form part of any technical specification for the design and construction of the Facility. There are no significant intermittency characteristics (i.e. identifiable on/off conditions that are readily distinctive above the residual noise climate) associated with the operation of an energy from waste facility.

	The operation of safety valves is only necessary during occasional daytime safety valve tests and in an emergency situation and is not deemed to be a regular intermittent source. We have performed check modelling with consideration for tonality, impulsivity and intermittency and are satisfied that the conclusions do not depart from the noise assessment provided with the application. We have included an improvement condition to validate the noise assessment during normal operation. Permit condition 3.5.2 allows a noise and vibration management plan to be obtained for approval where it is identified necessary.
Comments about waste streams	
Feedstock Quality: concerns over wide variation leading to potential problems in control	Permitted wastes are specified in table S2.2 of the Permit and we are satisfied that these wastes are suitable for burning at the Installation. Contracts will be held with a limited number of waste suppliers that will supply incoming waste to the Facility. Contracts will be in place with these suppliers to provide the incoming waste in accordance with a specification. Documented procedures for pre-acceptance and acceptance of all wastes will be developed prior to the commencement of operation, in accordance with the documented management systems for the Facility. We have set a pre-operational condition that requires the Operator to submit details of the procedures for approval.
Concern over waste acceptance procedures	The Operator will have waste pre-acceptance and waste acceptance procedures to ensure that only waste authorised by the Permit is received and burned. We have set a pre-operational condition that requires the Operator to submit details of the procedures for approval. We will check that these procedures are being adhered to when we inspect the Installation.
Comments about health impacts	
Concerns over lack of reference to the Health Risk Assessment in the application	A Human Health Risk Assessment was contained within Appendix E – Air Quality Assessment.
Concerns over the risks to health in relation to very small particulates (ultrafine)	The impact from particulate emissions was shown to be insignificant. Section 5.2.1 of this decision document has more details on particulate

	impacts. We are satisfied that there will not be a significant impact from very fine particles. Section 5.3 of this decision document also has further details on fine particulate emissions (in relation to human health).
Concerns over the risks to health in relation to dioxins.	The Applicant's health risk assessment included the impact from dioxins/furans and is described in more detail in section 5.3 of this decision document. We are satisfied that impacts will not be significant.
Concern that dioxins could contaminate soil and water.	The HHRA considered uptake of dioxins the assessment showed no significant impact, we are therefore satisfied that ground and water will not be significantly impacted.
Concerns over impact on health.	We are satisfied that this Installation will not have a significant effect on human health. See section 5.3 for further details
Comments about Green House Gases (GHG) and Climate Change impacts	
Concerns over carbon emissions and its impact on climate change.	Our assessment of global warming is covered in sections 6.3 and 6.6 of this decision document.
Concerns over the impacts due to flooding	Flooding is primarily a consideration for the planning process. In any event the Facility has been designed with a SUDS system to mitigate the risk of off-site flooding and to manage the discharge of surface water from the installation. We are satisfied the procedures in place will prevent pollution in event of a flood.
No account made of the annual potential use of auxiliary burners nor of the resulting CO_2 emitted.	The has been assumed the auxiliary burners will be in operation for 100 hours per annum, they have been included in the Air Quality Assessment. The auxiliary burners will consume approximately 6,100 MWh of fuel oil per annum. This corresponds to an approximate 1,500 tonnes per year of carbon dioxide equivalent from the combustion of fuel oil for auxiliary firing.
No account taken of the CO_2 emitted in the production of raw materials that will used in the Installation Concerns over energy usage of ancillary plant.	Consideration of impacts from material production is outside the scope of this permit determination which relates to emissions from the activity itself. The applicant has provided details of the plants energy consumption that is typical for this type of incinerator, and which meets the required benchmarks for a for MSW incineration plant.

	The applicant is required to reported annually energy enabling us to monitor it
Comments about installation design	
Concerns over the technology being used in relation to the abatement of emissions to air	The technology proposed by the Applicant is listed in the BREF as a BAT option. We are satisfied that the Applicant's proposals are BAT, this is discussed in more detail in section 6 of this decision document.
Concern that the plant will not be CHP	The Applicant assessed the possibility of supplying heat to the local area. The conclusion was that opportunities are not currently viable. Section 4.3.7 of this decision document has further details.
Concern over efficiency of the steam turbine	The proposed technology is well proven in the UK and across Europe. Steam turbine use in the way proposed in the application is BAT. Energy efficiency is covered in section 4.3.7.
Concern over flue gas abatement during start-up in particular condensation on bag filters	The bag filter will not require a flue gas bypass station, as the bag filters will be preheated allowing start-up without a bypass, which is considered to represent BAT.
Comments about Traffic	
Concerns over increased in traffic as a result of the plant	Movement of traffic to and from the Installation is a relevant consideration for the grant of planning permission, but does not form part of the Environmental Permit decision making process.
Waste should be transported by rail	Movement of traffic to and from the Installation is a relevant consideration for the grant of planning permission, but does not form part of the Environmental Permit decision making process.
Comments about fuel type	
Natural gas should be used for the auxiliary fuel.	Auxiliary burner firing is only required intermittently, i.e. during start-up, shutdown and when the temperature in the combustion chamber falls to 850°C. When firing this requires large volumes of gas, which would need to be supplied from a high-pressure gas main within a reasonable distance from the Facility. The Applicant is not aware of a high-pressure gas main with sufficient capacity already being available at the Facility.
Comments about BAT, emissions limits and control measures	
Furnace BAT assessment not sufficient, in particular fluidised bed not considered	The furnace BAT assessment is set out in section 6.1.1 of this decision document, fluidised bed was considered. We are satisfied that the proposed moving grate furnace is BAT

Plant should be made carbon capture ready.	We require combustion plants that generate 300 MW or more electricity to be carbon capture ready. This Installation is well below this level and carbon capture is not currently considered appropriate at this scale. We can vary the Permit if required in the event that this position changes in the future.
Concerns over whether bag filters are BAT.	Bag filters are a recognised BAT for control of emissions of particulates and work well at MSW plants in the UK. The way we assessed BAT is set out in section 5.
Comments about residues	
Concerns over ash handling and vapour during quenching	Measures for handling of IBA and APC residues are summarised in section 4.2.2 of this decision document. Ash handling (including quenching) will be undertaken within enclosed buildings, reducing the risk of vapour to air. We are satisfied that the measures are appropriate.
Concern that bottom ash could be hazardous waste.	Incinerator bottom ash (IBA) is normally a non-hazardous waste which can be recycled. As part of the commissioning process a protocol for the sampling and testing of bottom ash for the purposes of assessing its hazard status will be carried out. Sampling and testing shall be carried out in accordance with the protocol as approved
Comments about other issues	
Concerns over whether 'soot blowing' or equivalent will be practiced.	Soot-blowing is considered BAT for boiler cleaning, and we do not have concerns over its use.
Comments about monitoring	
Concern as to whether real time data will be available to the public.	All monitoring data required by the Permit will be reported to the Environment Agency and placed on public register. Making live monitoring results available would be at the discretion of the operator
Comments about Accidents	
Bunker Fire Risk: concerns that the safety duration of bunker walls is given as two hours while the maximum time to quell fire in bunker as four hours.	The Applicant submitted a Fire Prevention Plan. We have approved this plan and incorporated this within operating techniques table S1.2 meaning that the site has to follow such requirements.

	EA FPP guidance states that fire walls must "have a fire resistance period of at least 120 minutes to allow waste to be isolated and to enable a fire to be extinguished within 4 hours. The applicant has confirmed that fire walls meet the requirement and we are satisfied with measures in the FPP. We are satisfied that appropriate measures will be in place to prevent fires and to minimise the impact from a fire if it was to occur.

b) Representations from Community and Other Organisations

Representations were received from Carlisle Residents Against Incineration (CRAIN), a number of these issues are the same as those raised by the Local MP / Councillors/ Town Council. Of the additional issues raised,

Brief summary of issues raised:	Summary of action taken / how this has been covered
Comments about air emissions and air risk assessment	
Concerns the emissions arising from the odour management system [such as during shut down].	The use of combustion air in the furnace to generate negative pressure in the reception hall, and carbon filter system during periods of shutdown is used in many incineration plants and generally works well to control odour. We are satisfied that there will not be a significant impact from odour
Concerns that the applicant's Assessment of Dioxins does not consider the point of maximum impact.,	The point of maximum impact at receptor has been assessed., and we are satisfied that this is appropriate in the HHRA. We audited the HHRA and we are satisfied with the assumptions that were used.
Concern over the assumption that the PAH emission will be 100% B[a]P	The Expert Panel on Air Quality Standards (EPAQS) reviewed the evidence on PAH and recommended the current air quality standard of 0.25 ng/m3 for benzo[a]pyrene (B[a]P). Both the EPAQS and the WHO consider B[a]P as a marker of the carcinogenic potency of the PAH mixture when recommending their respective standards and guidelines for PAHs.

Metals PCs exceed standards	The impact from metal emissions is considered further in section 5.2. We are satisfied that impacts will not be significant.
Concern over emission concentration that was used for PAHs	The emission level of PAH was based on data from the BREF We are satisfied that the emission level used in this Application is appropriate.
Background Pollution Levels	
Concerns for the consideration of the likely growth in background pollution as the area becomes more industrialised	In theory an increase in traffic or industry in the area could lead to an increase in the level of oxides of nitrogen. The local authority is responsible for local air quality due to traffic emissions. New developments will require planning permission where effects on local air quality would be considered in assessing the planning applications. From the Applicants model, the process contribution at each of the AQMAs declared by Carlisle City Council is predicted to be well below 1% of the ES and can be considered insignificant. Therefore the contribution from the Installation is negligible in these areas.
Concerns that the NO_2 PEC is close to the 70% threshold.	The 70% threshold is for initial screening to determine whether a detailed dispersion modelling assessment is required. Dispersion modelling has been undertaken. The NO_2 PECs do not exceed any environmental standards at the detailed modelling assessment stage.
Concerns CBAL (Carrs Billington Agriculture (Operations) Limited) PM emissions have not been included in the cumulative assessment.	CBAL (Carrs Billington Agriculture (Operations) Limited) is a permitted feed mill site which is approximately 1.1 km east of the proposed stack, as a result cumulative impacts are not likely and we are satisfied with this. We are satisfied with the background levels used in the assessments.
Increased impacts of NO2 as a result of HGVs.	Off-site traffic emissions do not form part of the Environmental Permitting decision process except to the extent that they could affect the prevailing background levels.
Dispersion Modelling	

Concerns over the accuracy of Dispersion Modelling Figures and that uncertainty should have been considered	The uncertainties associated with dispersion models are accounted for within our decision. We took uncertainty into account when we audited the Applicant's dispersion modelling. We are satisfied with the accuracy of the figures.
Concerns that future changes in weather patterns may impact the results of the model	'We aim to use 5 years of met data that is generally less than 10 years old. Climate change is assumed to be less than the inter year variation in the data and so is not expected to affect the predictions significantly.'
Concerns over aviation platform and the impact of this structure will have on the results	Detailed dispersion modelling was undertaking using the model ADMS 5.2. The model includes modules to take account of the effect of buildings and complex terrain. There is unlikely to be any impact beyond that already taken into account from such platform affecting dispersion of the pollutants released from the stack.
Concerns over the modelling of the cumulative impact of emissions with the other local sources of emissions such: • BSW Timber Biomass Plant • Kingmoor Power Limited Gas Peaking	In our judgement, the nearby Kingmoor Power Limited gas peaking (with an operation starting in 2019) is the only facility that is not included in the background. However, our checks indicate that this facility is unlikely to have a significant cumulative effect, as the plumes only overlap to affect receptors at specific locations for relatively infrequent wind directions. The rest of the facilities in the surrounding area have been either operating prior to 2019 (therefore included in the background), or in locations unlikely to coincide with emissions from the ERF.
Concerns that incorrect hours of operation used	The Applicant stated that the nominal plant capacity is 250,000 tonnes per year operating for 8000 hours per year at a nominal capacity of 31.3 tonnes per hour. The maximum capacity of the Installation is 274,000 tonnes per annum. The air quality assessment was based on continual operation at a throughput of 274,000 tonnes annually which is the maximum continuous rating (8,760 hours of operation - Assuming that the Facility is operating at the BAT-AELs for 8,700 hours per year and at the plausible abnormal emission levels for 60 hours per year).
Concerns correct building height has not been used as it differs to the planning application	A review of the site layout was undertaken ensuring all applicable buildings that could significantly affect the dispersion of the atmospheric emissions were considered in the modelling. The planning application and this environmental permitting Application are separate processes. The operator is required to follow the application as

	applied, or where any changes are required, will be subject to separate application for variation (for either application).
Concerns over whether the Air Cooled Condensers could affect the dispersal of emissions from the plant	The modelling accounted for dispersion with Air Cooled Condensers in operation.
Concerns over how surface roughness was considered in the modelling	We have audited the applicants Air Quality Modelling – including how surface roughness was considered. We have also performed detailed modelling sensitivity checks on the parameters used. We are satisfied that the Air Quality Modelling is appropriate.
Concern over the impact from particulate matter and carbon monoxide emissions.	The impacts from CO and PM were assessed and were screened out as insignificant. Further details are in section 5.2 of this decision document.
Concern that a COMEAP assessment would show significant health impacts	Our view is that a COMEAP assessment is not required. Section 5.3 of this decision document has further details. We audited the Applicant's risk assessment including the HHRA and we are satisfied that there will not be a significant impact on health.
Concerns low NOx emissions concentration is being used by the Air Dispersion Model and the correct NOx emissions concentration should be 500 mg /Nm3.	This is referring to the engines from Kingmoor Power peaking plant in the cumulative assessment, the engines were modelled at 190 mg/Nm3 at 273 K, dry and 15% oxygen. This is approximately equivalent to 500 mg/Nm3 273 K, dry and 5% oxygen. This is the correct NOX ELVs for existing natural gas engines.
Concern was expressed as to whether the dispersion modelling was carried out correctly including concern over: i. Monin-Obukhov length ii. Terrain	We checked the modelling in our audit and were are satisfied it was appropriate. The submitted AQA includes a sensitivity analysis to model predictions using a minimum Monin-Obukhov length of 1m to 10m. The minimum Monin-Obukhov length was set based on the site surroundings, i.e. on the outskirts of Carlisle. The selected value is considered to be within the likely range for this parameter. The submitted AQA did not include complex terrain because the topography is relatively flat (slope gradients less than 1 in 10) close to the plant and for

	most sensitive receptors. There are gradients above 1 in 10 further from the site, we therefore conducted sensitivity analysis to account for terrain and found this does not change model predictions to any significant extent.
Concerns over impacts if the plan operates below maximum capacity.	The Applicant provided a sensitivity analysis comparing the 'nominal capacity' to the 'maximum capacity'. The results in Section 8.2 of the submitted AQA are based on the 'maximum capacity'. The sensitivity analysis indicates that the 'maximum capacity leads to higher predictions and the results are therefore more conservative. The applicant will be required to meet relevant emission limit values.
Concern as to whether an appropriate modelling grid size was used.	In order to represent the dispersion site, the consultant modelled a 6km by 6km grid with a 60 m resolution. We agree that the modelling grid size used is appropriate.
The Air Quality Assessment does not consider the air quality impact of vehicles on site.	Vehicle movements within the Installation boundary are considered within the remit of the Environmental Permit. The emissions from this limited area will not be significant and will not affect the conclusions of the air quality impact assessment.
Stack Emissions Data – It unclear whether the model is predicting the concentration of each metal or a total of all metals.	The consultant presents metal emissions assuming that each metal would emit at the maximum concentrations presented in the IED for all metals in combination as Step 1 and then, where the PCs do not screen out as insignificant, assume that they would emit at the maximum concentrations presented in table A1 of our Metals Guidance. For most metals, PCs are predicted to be insignificant, for those that are not screened insignificant the PECs are not predicted to exceed the environmental standards. We agree with this approach – section 5.2.3 has further details.
Concerns the applicant should provide evidence to demonstrate that the metal emission levels will not be worse than the emissions figures in Appendix A of the 'Guidance on assessing group 3 metals stack emissions from incinerators – V.4 June 2016	We are satisfied that use of emission levels based on our guidance is appropriate. In addition improvement condition IC6 will require the Applicant to confirm this with operational monitoring data.
Concerns over what measures will be in place to minimise impacts from abnormal operation.	Permit limits periods of abnormal operation to 4 hours individual occurrence and 60 hours per year. We assessed the impact based on these maximum

	periods (see section 5.5) and are satisfied that there will not be a significant impact. We have included pre-operational condition PO1 which includes the requirement for 'other than normal operating conditions (OTNOC)' management plan [in accordance with BAT 18]. This requires approval and incorporation into the EMS. The operator must inform us within 24 hours of any breach of the emissions limits, followed by a fuller report of the size of the release, its impact and how they propose to avoid this happening in the future. The operator's monitoring results will be placed on the public registers. If there is a breach then we will take appropriate enforcement action and/or prosecute.
Concern over the particle sizes assumed in the modelling. Concerns that that the distribution of PM2.5 emitted from the incinerator may result in much higher concentrations of PM2.5 than shown in the modelling.	100% of particulate emissions were assumed to be in the PM10 and PM2.5 fraction, this is considered a conservative worst case assumption. The submitted AQA modelling method is appropriate for PM10 and PM2.5 assessment.
Concern was expressed over the Environmental Standards that were used. It was claimed that they are higher than some WHO levels.	We are satisfied that the Environmental Standards are appropriate. The use of the standards and the basis of them is explained in section 5.1 of this decision document.
Concerns that the facility will result in large numbers of secondary particulates formed after the bag filter either in the stack or in the air after emission	Secondary particles are formed through reactions taking place in ambient air. They are long range pollutants and will not be an issue for local air quality. Emissions from the proposed incinerator will not have a significant impact upon this.
Concerns there are no safe levels for either benzene or 1,3-Butadiene so, predicted PC levels should not be considered safe.	We are satisfied that the Environmental Standards are appropriate to prevent any significant impact.
Concern over cadmium impact on soils.	We have assessed Cd against the ES, and concluded the impacts are not significant and the ES is protective of health/impacts so no further specific assessment on soils is required.
Concerns about the deposition velocities with reference to the "recommended" velocities in AQTAG 6.	We assessed velocity from the stack when we audited the Applicant's risk assessment. We are satisfied that they were appropriately considered.

Concerns in relation to the modelling software developer's quality assurance and the extent to which it may be applicable.	The software used by the applicant is recognised and accepted as appropriate.
Concerns regarding the provided map and implication for modelling assessment.	We assessed the map when we conducted the modelling assessment and consider this adequate. We have also performed detailed modelling sensitivity checks. We are satisfied that they were appropriately considered.
Concerns regarding model validation and confidence levels.	We considered the model validation and confidence levels when we conducted the modelling assessment. We are satisfied that they were appropriately considered.
Concerns regarding stack source parameters used for modelling.	We assessed the use of stack source parameters when we conducted the modelling assessment. We are satisfied that they were appropriately considered.
Concerns regarding the monitoring of particulate matter.	We have included monitoring requirements for particulate matter in the permit and an improvement condition to determine the size distribution of the particulate matter in the exhaust gas.
Concerns regarding the provided albedo and priestley-taylor parameters.	We have assessed these parameters when we conducted the modelling assessment. We are satisfied that they were appropriately considered.
Concerns regarding the contour plots produced for each air quality objective.	We have assessed the contour plots when we conducted the modelling assessment. We are satisfied that they were appropriately considered.
Concerns regarding molecular weight assumption of VOCs and whether the actual emissions could significantly exceed the ELV.	We have assessed VOCs as part of our audit of the Air Quality modelling. We are satisfied that they have been appropriately considered.
Concerns that our guidance shows the AAD limit value for NO2 to be 30 µg/m3 “if nature or conservation sites are in your area”.	The value of 30 was used to assess impact at ecological sites. We are satisfied that they were appropriately considered.
Concerns over the toxicity of particulate emissions.	We have assessed against the ES for particulates section 5.3. We are satisfied that they were appropriately considered.
Concerns over the list of input parameters in the HHRA and uncertainties.	We have audited the applicant’s human health risk assessment model including input parameters, and are satisfied that the parameters were appropriately considered.
Concerns over modelling of worst-case scenario emissions	We assessed the worst case scenarios when we conducted the modelling assessment. We are satisfied that they were appropriately considered.

Concern over the assessment of Chromium (VI) including:- • Use of 20% of the max total Chromium for background level • Whether the use of typical emission figures for Chromium rather than emissions limit figures is a worst case for the proposed incinerator • the monitoring and control of emissions cannot result in the AQAL being exceeded even under abnormal conditions	We have audited the modelling and we are satisfied that it is suitable for assessing the impact from the Installation. The Permit requires monitoring to be carried out to ensure that the emission limit values that were used in the modelling are met. • The 20% of total background chromium for chromium VI assessment is in-line with our guidance on assessing group 3 metals. The 20% ratio in our guidance is derived from information in the EPAQS Guidelines for metals and metalloids in ambient air for the protection of human health, May 2009. • Predicted Cr(VI) PCs at the sensitive receptors are insignificant so background Cr(VI) is of less importance. • Abnormal emissions are not predicted to change the conclusions for Cr(VI) at sensitive receptors. • Cr(VI) was assessed following our guidance. Our guidance on assessing group 3 metal stack emissions advises a two-stepped approach: Step 1- worst case screening with emissions at the emissions limit; and Step 2- case specific screening using more realistic emissions data. Step 1 is a theoretical worst case scenario, whilst Step 2 is more reasonable worst case scenario.
Comments about assessment of impact of dioxins	
Concern over the use of dioxin TWI for the assessment Concerns that dioxin intake is already in excess of the TDI or TWI	Our checks on dioxins, furans and dioxin-like PCB intakes indicate that the PC is likely to be less than the PHE insignificance threshold of the COT-TDI and the more stringent TWI. Note that COT have reviewed the TWI and PHE have advised the COT-TDI should be used for assessment. Further details are in section 5.3 of this decision document.
Concern that other Sources of Dioxins and Dioxin - like PCBs had not been considered.	The HHRA is a very conservative assessment meaning that consideration of background levels is not required (further details in section 5.3).
Concerns that the applicant needs to expand the human health impact to include other pollutants.	We completed assessments for other pollutants assessed against the ES which are protective for human health and so no further assessment is required.

Concerns the applicant has not confirmed that the model results show the maximum intake figure over any single day or week at the most impacted location and not an average daily/weekly figure calculated over the lifetime of the facility at the most impacted location Concerns the lifetime of the Facility is taken as 30 years: but the operational lifetime could be 40 or even 50 years so applicant should determine if an extended operational lifetime of the facility would significantly increase the intake of dioxins	The HHRA results are based on maximum impact (or where that relates to land not for agriculture, the receptor of maximum impact). We have performed sensitivity to our own worse-case emission rates derived from operator self-monitoring data (2008-2012). 3.21 Our HHRA screening check calculations of dioxins, furans and dioxin-like PCB intakes, indicate that the PC is likely to be less than 10% of the COT-TDI and a more stringent TDI of 0.29 pgWHO-TEQ/kg(BW)/day. We have assessed long and short term impacts. The permit will form part of the 'permit review cycle' by which operational standards will be maintained or improved where advances in BAT have been made. We do not set a lifetime duration on operation.
Concern over which pathways were considered in the HHRA.	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. 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. We have audited the applicants assessment and our HHRA screening check calculations of dioxins, furans and dioxin-like PCB intakes and satisfied that appropriate pathways were considered.
Concerns fisheries close to the installation site have not been included in modelling	The Environment Agency has agreed to a position with Public Health England (PHE) that a metals assessment is only needed if fish consumption is a significant pathway; otherwise, the environmental standards for metals are protective for human health. We agree that the ingestion of fish is unlikely to be a pathway. We have performed a screening check satisfied that appropriate pathways were considered.
Concern that the grid reference for location of maximum impact in the HHRA is incorrect	Grid reference in Table 3 of Human Health Risk Assessment (HHRA) is incorrect. However, Figure 2 of HHRA shows location of the point of maximum impact and proximity to discrete sensitive receptors. We have undertaken our HHRA screening check and satisfied that the conclusions are appropriate.

Concerns over the accuracy of the assessment of the impact of dioxins on human health, and the uncertainty in the dioxin model results using the approach defined in the HHRAP	Uncertainty is discussed in section 8.4 of the submitted HHRA. We conducted our own HHRA screening using the US EPA HHRAP and find the intake PCs in the submitted HHRA are likely to be at the upper-end of the uncertainty range. We did sensitivity checks to our own worse-case emission rates derived from operator self-monitoring data (2008-2012). The uncertainties associated with dispersion models are accounted for within our decision.
Concerns linked to the HHRA modelling: • Concerns for the constant values used. • Concerns for the parameters and inputs used.	Soil loss constant is calculated based on the US EPA HHRAP. The submitted HHRA used IRAP-h model which implements the HHRAP. The soil loss constant is calculated based on parameters specific to each contaminant of potential concern (COPC) which have been taken from the US EPA chemical database which supports HHRAP. We audited the Applicant's HHRA which included checking the key parameters and inputs. We are satisfied that the HHRA was carried our correctly and that there is no significant risk to health. The dioxin and furan and dioxin-like PCB PCs are below the PHE threshold for significance at sensitive receptor locations where there could be relevant exposure and consumption of food.
Concern over intake via breast milk	We audited the HHRA and we are satisfied with the assumptions that were used. Any elevated intake of dioxins and furans and dioxin-like PCBs by breast fed babies will be due to the levels already in the adult female, rather than the PC from the Installation which will be insignificant.

Concerns over increased dioxin emissions during start-up and shut-down	For dioxins and furans, the principle exposure route is through ingestion, usually through the food chain, and the main risk to health is through accumulation in the body over a period of time. Elevated levels of dioxins at start up will therefore not significantly impact on exposure. A report by AEA for the Environment Agency showed that the mass of dioxins emitted during shutdown and start-up for a four day planned outage was similar to the emission which would have occurred during normal operation in the same period.
Concerns over measurement capabilities that will quickly detect dioxin emissions that exceed limits so that action can be taken to bring emissions levels back within limits or shutdown the facility. Concerns that continuous monitoring should be applied to detect these failures	The Permit requires continuous monitoring for emissions to air of particulates, oxides of nitrogen, sulphur dioxide, carbon monoxide, total organic carbon, hydrogen chloride and ammonia. The prevention and minimisation of dioxins and furans is achieved through injection of activated carbon, optimisation of combustion control, avoidance of de novo synthesis and the effective removal of particulate matter. The plant has to shut down if abatement is not operating outside of abnormal operation. The Permit also requires continuous monitoring of several process variables (e.g. combustion temperature) to ensure that the incinerator is running optimally and minimising emissions. We are satisfied that the continuous monitoring of these process controls (used to prevent and minimise dioxins and furans) are appropriate and will ensure minimal time from identifying abnormal operations to shutdown of the plant.
Concern over other local sources of dioxin emissions.	No other local sources of dioxins, including polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) and dioxin-like polychlorinated biphenyls (DL-PCBs) are needed in the HHRA where the PC is insignificant. This is based on Public Health England (PHE) advice that “an additional dioxin intake of 10% of the Tolerable Daily Intake (TDI) on the consumption by the average or high level consumer is unlikely to result in an exceedance of the TDI, and even if exceedance were to occur, it is unlikely

	that an additional 10% would result in significant risk". Note that an assessment of this type is highly conservative (and therefore protective) assuming the entire dietary intake is sourced at the receptor location as affected by dioxin emissions from the plant. In practice, dietary intake will be substantially less than the predicted value.
Concerns over ash monitoring.	The Permit implements monitoring requirements in line with IED. Also Bottom ash will need to be sampled to establish its hazard status and any material found to be hazardous will then need to be handled as hazardous waste. A sampling protocol will be developed to ensure that the sampling and hazardous testing is done properly. A pre-operational condition requires that the protocol is in place and approved.
Catalytic Filter Bags do not appear to have been considered.	The applicant has considered the use of Catalytic Filter Bags in response to schedule 5 notice. We are satisfied with the applicants justification (including the additional measures that would need to be employed) for why this is not considered BAT at this Installation.
Concerns whether facility is in accordance with Article 44 (c) of Chapter IV of IED to minimise residue and their harmfulness.	The Applicant included measures to minimise residues and their harmfulness and we are satisfied that those measures are BAT In addition permit condition 1.1 requires a written management system that minimises risks of pollution, including those arising from operations, maintenance, accidents, incidents, non-conformances and closure. Permit condition 1.4 includes conditions relating to the avoidance, recovery and disposal of wastes produced by the activities.

Child Exposure Duration: concerns over consideration of child receptors for the facility's expected lifetime concerns over the changes in childs body/weight over an expected exposure duration of six years,	We are satisfied that there will not be a significant impact on health of children. The TDI is the amount of a substance that can be ingested daily over a lifetime without appreciable health risk. It is expressed in relation to bodyweight in order to allow for different body size, such as for children of different ages. In the UK, the COT has set a TDI for dioxins, furans and dioxin like PCBs of 2 picograms WHO-TEQ/Kg-body weight/day (N.B. a picogram is a million millionths (10-12) of a gram).
Toxic Equivalent Factors: Concerns the applicant needs to apply IED TEFs to determine the TEQ rather than WHO-TEFs, or to apply them both and use the worse case	I-TEFs are used for compliance with ELVs or BAT-AELs. WHO-TEFs are used for comparison against the COT-TDI. Differences in toxic equivalence from using the two different TEFs are not significant and does not change conclusions.
Concerns that the actual ambient air temperatures has not been used in the HHRA	Ambient temperature was accounted for in the hourly sequential meteorological data used to make the predictions, which are the basis of the HHRA.
Comments about Flooding	
Concerns flood risk assessment does not consider contaminated water entering the groundwater and Cargo beck and flowing to River Eden SAC/ SSSI	The facility has been designed with a sustainable urban drainage (SUD) system to mitigate the risk of off-site flooding and to manage the discharge of surface water from the installation and therefore this is not required.
Concern over risks of the culverts under the railway becoming blocked, the waste screen becoming blocked and the danger of flooding to the building, the pits, the tanks and the bunker.	The Environment Agency provides advice and guidance to the local planning authority on flood risk in our consultation response to the local planning authority. Our advice on these matters is normally accepted by both Applicant and Planning Authority. When making permitting decisions, flood risk is still a relevant consideration, but generally only in so far as it is taken into account in the accident management plan and that appropriate measures are in place to prevent pollution in the event of a credible flooding incident

	We are satisfied the procedures to prevent fugitive emissions will avoid the culvert becoming blocked.
Comments about Green House Gases (GHG) and Climate Change impacts	
Concerns the Climate Change Risk Assessment, does not adequately assess the flood risk	The facility has been designed with a sustainable urban drainage (SUD) system to mitigate the risk of off-site flooding and to manage the discharge of surface water from the installation We are satisfied with the 'climate change risk assessment' submitted with the application. We have included permit condition 1.5.1 which requires regular review and update.
Concerns whether the plant will always function in "full condensing mode", and if not, what the efficiency of the plant can be expected to be when full condensing mode is not achieved and what percentage of the time "full condensing mode" will be achieved	The permit will control operation so that it does not operate without generating electricity. The plant will be required to operate in according with the techniques listed in table S1.2 of the permit. The permit also requires the reporting of data that we check, alongside site audits.
Concerns over what the efficiency of the plant will be at the expected ambient temperatures including the expected variation from day/night, seasonal changes and expected temperature increase due to climate change.	Warmer temperatures in warmer parts of Europe can make energy recovery less efficient. However we are satisfied that as much energy as practicable will be recovered from the waste. The assessment of energy efficiency is considered in more detail in section 4.3.7 of this decision document.
Concerns over proportion of waste coming from fossil fuel origin (plastics).	The Applicant confirmed that large amounts of plastic will not be burned. Permit conditions 2.3.4, 2.3.5 and 2.3.6 relate to waste acceptance and the restriction of separately collected fractions. We are satisfied that the plastics proposed in the Application can be burned whilst complying with the Permit emission limits.
Concerns over the assumption of the length of time the facility will operate annually that differs throughout other documents.	The Applicant stated that the nominal capacity is 250,000 tonnes per year operating for 8000 hours per year at a nominal capacity of 31.3 tonnes per hour. The maximum capacity is proposed to be 274,000 tonnes per annum, and the risk assessments have been performed at the maximum capacity (which is the maximum continuous rating (8,760 hours of operation) and we agree with this approach to ensure the risk assessments are conservative. The permit includes a limit of 274,000 tonnes per annum in table S2.2.
Concerns over different figures being used in the greenhouse gas assessment (*Nitrous oxide (N2O) is emitted at a concentration of 10 mg/m^3)* assessment and the BAT assessment (*Nitrous Oxide emissions to be <40 mg/Nm^3)*	Where SNCR is applied for de-NOX, the formation of N2O may increase, dependent upon reagent dose rates and temperature. Values of 20–60 mg/m3 have been measured where higher SNCR dose rates are used to

	achieve lower NOX emission levels, in particular when urea is used as the reagent, rather than ammonia. For municipal waste incineration, N2O emissions of 1–12 mg/Nm3 (for individual measurements) and averages of 1–2 mg/Nm3 are seen. For the incineration of MSW in fluidised bed plants, the measured N2O emission values (individual measurements) are usually higher. In the application the global warming potential value of 76,431 was presented as 76,000 within the BAT assessment (rounded to nearest 1,000).
Concerns over energy used to produce reagents such as ammonia and lime	Impacts from production of materials at other plants is not within the scope of the Permit determination. Other legislation controls greenhouse gas emissions at other plants where required.
Concerns over the parasitic load figures.	The BREF says that electricity consumption is typically between 60 KWh/t and 190 KWh/t depending on the Lower calorific value LCV of the waste. The LCV in this case is expected to be 10 MJ/kg. The specific energy consumption in the Application is in line with that set out above
Emissions from backup diesel generator not included in the greenhouse gas calculations.	The diesel generator is only expected to operate for short-term periods (<50 hours per year) for testing purposes or for use in the event of loss of main electricity to the plant and so it is not considered necessary to include it in the calculation.
Nuclear power would have lower global warming potential than the incinerator	The Application is for a waste incineration plant whose primary purpose is the disposal of waste. We have assessed BAT for that type of plant.
Concern over the way the greenhouse gas assessment has been carried out including: Assumption that fossil fuels are displaced The way CO_2 emissions were calculated	Our consideration of global warming is an assessment of incineration BAT options. Emissions of carbon dioxide will occur when waste is burned with the amount determined by waste composition and not the technology. So our consideration of BAT is to ensure that the chosen incineration option is BAT in terms of energy recovery from the waste. Section 6.3 has further details.
CHP Opportunities: concerns not all opportunities have been considered	We are satisfied there are no technically and economically viable opportunities for the supply of heat from the outset. However a pre-operational condition 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.

Concerns over the discrepancies between the heat export figures - design for up to 12 MWth but capacity 10.69MWth.	The Installation has the capacity to be able to export up to 12 MWth of heat. The value of 10.69 MWth is based on the heat network identified within the heat plan, for which the design can fulfil.
Concern that the plant will not be classed as R1	The Applicant has not submitted an R1 application. However we are satisfied that energy recovery will be BAT
Concerns “reduction in primary energy usage” calculations may be in error.	We have checked the primary energy savings (PES) against the calculation given in the our CHP ready guidance to ascertain whether a CBA is required. Our conclusion agrees with the applicants’, in that the PES is not less than 10%, and therefore a cost-benefit assessment under Article 14 is not required.
Steam Extraction Point: Concerns there is not extraction point in the current designs and what this means for adding it at a later date.	The Applicant has committed to being CHP ready and the Permit includes condition 1.2.2 that requires steam pass outs to be maintained.
Concerns over lack of information on current land use, and that the proposed facility requires “proximity of suitable connection point to the National Grid Electricity Transmission System, and available capacity for export to the Electricity Transmission System”	We are satisfied with the level of detail provided on the local land use. The supporting documents also state a grid connection compound will be included as part of the facility construction. The grid connection is limited to a maximum of 35 MWe export capacity.
Treatment Plant: concerns over whether water treatment plant is an adequate size to support a CHP.	A water treatment plant will produce high quality make-up water for the boiler. Demineralized water production will take place for the treatment of the boiler feedwater. We are satisfied that that the treatment plant is appropriately sized. Where any changes are considered in the future (such as developments in BAT / availability) then the operator will be required to demonstrate that BAT is being employed which may include additional changes to plant such as the water treatment plant.
Standby Boiler Expansion Area: Concerns over lack of building planning permission for expansion to include back-up source of heat - therefore the building is not HEAT and power ready. Concerns the applicant needs to include a building on the plan for the back-up source of heat (not just the location of the building) and obtain planning permission for this building before construction of the plant so that it is clear that the plant really is heat and power ready	The planning application and this environmental permitting Application are separate processes. We have assessed the energy efficiency measures and recovery measures that were submitted in the Application. The applicant has committed to being CHP ready we have assessed their CHP assessment and are satisfied that this can be achieved. Where any changes are considered in the future (such as developments in BAT / availability) then the operator will be required to demonstrate that BAT is being employed which may include additional changes to plant – for which planning permission will be required to make any changes on site. Any concerns relating to the planning decision are a matter for the planning authority.

Comments about Abnormal Operations	
Concern over how Start up and shut down will be defined and determined:	Start-up and shut-down are defined in schedule 6 of the Permit.
Concern that particulate emissions limit of 150 mg/Nm3 and the TOC ELV could be exceeded during abnormal operation	The Permit requires waste feed to stop if these levels are exceeded.
Concerns over the EMS and whether it will include learning from abnormal incidents.	The Operator will have an EMS in place that will be certified to ISO 14001. A pre-operational condition requires EMS to be in line with BAT 1. The EMS includes the requirement to learn from incidents or events and to implement measures to avoid any future occurrences.
Concerns flow characteristics may be different, and how these and their impacts have been considered. If the data is not available will worse case be assumed.	We are satisfied with the data provided. Worst case conservative assumptions have been made.
Concerns Failure of the acid gas scrubbing system would result in unabated emissions of SO2, HCl and HF.	The impacts from unabated emissions of these pollutants was considered in the submitted abnormal emissions assessment. The PCs were insignificant for HCl and HF and SO2 PECs were below the environmental standards. Periods of abnormal operation are limited by the Permit and impacts considered in section 5.5 of this decision document.
Concerns over the emission levels used in the abnormal operation impact assessment. Dioxin: Concerns that unabated emissions of dioxins, PCBs and mercury could be much higher than 99% reduction rate Cadmium: concerns as to why a concentration of half the BAT-AEL can be considered worst case in the event of an abatement system failure.	The plausible abnormal emission levels for the Facility have been identified based on the performance of similar plants in the UK. We are satisfied these are typical for this type of incinerator. Cadmium (as an individual metal) was based on a 30 fold increase from an emission of half of the group BAT-AEL for 'cadmium and thallium' (which is an aggregate value for the group). We are satisfied with this approach. Pre-operational condition PO1 requires an update on the design of critical equipment to minimise OTNOC since permit application.
Comments about Management and EMS	
Concern over the accuracy of the Application documents.	The Applicant confirmed that there were a number of typing mistake in some of the submitted documents providing clarity where appropriate. This did not affect the conclusions of the documents. The applicant also provided updated documents where appropriate. We are satisfied that overall the documents are accurate and that we had sufficient information to determine the application. The Permit requires the plant to be operated as described in specified parts of the Application and we are satisfied with the accuracy of the information in those parts.

Concerns EMS not in place prior to issue of the permit	This is not practicable for a plant that will not start to operate for a considerable time. Section 4.3.2 of the decision document states that we are satisfied that an appropriate EMS will be in in place. Information in the Application confirmed that the EMS would meet the requirements of our guidance and the BAT C. A pre-operational condition requires the EMS to be in place prior to operation.
Concerns that the EMS does not already have demonstrate ISO 14001 certification.	The Environment Agency recognises that certification of the EMS cannot take place until the Installation is operational. An improvement condition is included requiring the Operator to report progress towards gaining accreditation of its EMS.
BAT 18 requires the OTNOC management plan to include design of critical equipment, this should be available prior to permit issue	The application provides sufficient information with regards to design of critical equipment. Section 4.3.2 of the decision document states that we are satisfied that an appropriate EMS will be in in place. The OTNOC management plan will form part of the EMS and as such we consider that the application is compliant with BAT 18.
Concerns regarding Operator's management and Fire management plan	Operator management and Fire management plans have been considered as part of the assessment. We are satisfied that the plan will minimise the risk of a fire and limit the impact of a fire in the event that one occurred. We have included a pre-operational condition to provide an updated FPP to account for any changes following detailed design stage, and prior to commissioning of the Installation. Any updated plan will require approval from the Environment Agency. We are satisfied that they were appropriately considered.
Comments about consultation	
Concern that the consultation period was not long enough.	We carried out consultation on the Application in accordance with the EPR, our statutory PPS and our own internal guidance RGS Note 6 for Determinations involving Sites of High Public Interest. Our usual consultation period is 20 working days. For this Application we extended the consultation period to 90 working days. We consider that this was more than an appropriate period of time to allow people to comment on the Application. This was borne out by the number of responses that we received.

Concerns over impartiality of completing the enhanced pre-app and determining the application.	It is standard practise for the Environment Agency officers to give chargeable pre-application advice to environmental permit applicants when requested to do so. This advice is designed to save time and resources by making sure that applicants submit all the information we need to make our decision. Pre-application advice is not an environmental consultation service and there is no conflict of interest.
Concern that there was a delay in making some consultation documents available.	When the consultation opened, we were satisfied that all the appropriate documents needed for people to fully take part were on our on line consultation tool (Citizen Space). However, there was some interest from residents in additional documents that weren't available on Citizen Space. We published these documents because of this interest and further extended the consultation period.
Concerns over accessible Information: IRAP modelling not provided in a readable format	All documents were provided in a readable format
Will the members of the public have the full consultation period to comment on the document when the final version of the documents are submitted for consideration by the EA	The minded to issue consultation is an opportunity for the public to comment on the draft decision. The draft decision document and draft Permit are available to view and comment on through our website. Information submitted in response to any schedule 5 notices It will run for what we consider is an appropriate and reasonable period.
Concern that there was not a drop in session or other public event (in person or on-line) to discuss the Application.	We have a discretion as to what consultation to undertake and we are satisfied that we took appropriate steps to inform people about the Application and to inform people about the consultation. This was proven by the large number of consultation responses that we received. Further details on how we consulted are in section 2.2 of this decision document. Our role at a public event is to inform members of the public how they can make a representation for consideration as part of that application. The alterative measures put in place for this application (due to the pandemic) have achieved this role. These measures included extended consultation and mail drop of a newsletter. A telecon (as alternative measure) was discounted due to constraint in providing everybody an equal opportunity to take part at the same time.

Concerns over errors with the consultation: Website Reported Consultation as Closed on 2/11/2020 newsletter incorrect date of closure on it expired before distribution, not received by all residents until at least 28/10/20 even though distributed 28/09/20, didn't fully explain how to get involved in consultation. consultation did not provide all submitted documents by the applicant information not readily available	We apologise if there were any periods of service interruption, incorrect details on the Website. We received over 150 responses, most via the website showing that it was working for the vast majority of the time. The newsletter was printed prior to the start of the consultation. The delay in delivering them was to ascertain if a drop in session could be carried out, however due to the pandemic this was not considered appropriate. We extended the consultation period twice to allow for the delay to the delivery of the newsletters and to allow a consolation period for the documents that did not form part of the consultation but were requested as a result of a FOI We have considered all representations that came in both before, during and after the consultation period.
Comments about Guidance referenced throughout the document	
Concerns over the relevance of some frequently quoted documents in previous decision documents	The concern relates to reports we quote in section 5.3 on health impacts. Some of the reports data from several year ago, not withstanding the dates the conclusions of section 5.3 that there will not be a significant effect of health are correct and the UKHSA agree with that position. We keep this under review and consider the documents mentioned are still relevant.
Energy Efficiency	
Concern over boiler cleaning frequency	The Operator will conduct online and offline boiler cleaning through a regular maintenance schedule to reduce dust residence time and accumulation in the boiler, thus reducing PCDD/F formation in the boiler. We are satisfied with the frequency proposed and that the measures are BAT.
Concerns over the energy efficiency.	We have considered energy efficiency of the part of our assessment. We are satisfied that it has been appropriately considered.
Secondary air heating and condensate heating should be used to max energy efficiency.	Primary and secondary combustion air fans will be used: Low grade heat will be extracted from the turbine and used to preheat combustion air in order to improve the efficiency of the thermal cycle. We are satisfied that the Applicants proposed techniques are in line with BAT 20 in relation to energy efficiency.

Energy efficiency measures in offices and mess facilities	These do not form part of the permitted activities
Comments about Incineration Technology	
Concern over the moving grate vs fluidised bed BAT assessment including: How costs were considered Residue quantities NOx emissions Reagent usage	We are satisfied that a moving grate furnace is BAT in this case for mixed municipal and commercial wastes. Fluidised bed requires a homogenous waste feedstock and for mixed municipal wastes would require a significant amount of pre-treatment. Further details are in section 6.1.1 of this decision document.
Flue gas recirculation (FGR) should be used to minimise NOx emissions	Our view is that FGR is not BAT for this Installation. See section 6.2.2 for further details.
SCR should be considered for further dioxin abatement.	SCR, when used, is normally for NOx abatement. The Applicant considered that SNCR is BAT for NOx abatement as we agree with that assessment. SCR can be used for dioxin abatement however we are satisfied that the Applicant's proposed method of carbon injection is BAT.
Concern over the Acid gas abatement BAT assessment:	We are satisfied that the use of a dry lime abatement system is BAT. Section 6.2.3 has further details.
Fuel oil: Concern over choice fuel oil instead of gas for auxiliary fuel. Higher emissions from fuel oil	The choice of support fuel is based on having a guaranteed supply as The fuel can be stored in a dedicated storage tank
No Sulphur specification provided by applicant for fuel oil. Concerns how it will be regulated	A sulphur specification for the fuel oil is specified in the Permit. We will check this when we inspect the site.
Concern that applicant stated 'fuel oil can be stored in dedicated storage tank'	The fuel oil will be stored in storage tanks located in a covered area with a dedicated concrete sump or other appropriate bunding. The Applicant confirmed that all storage tanks used for the storage of liquid raw materials (such as fuel oil, ammonia) will be bunded to 110% capacity. All storage and containment facilities will be designed and operated in accordance with relevant guidance relating to the design and construction of containment systems. The ammonia and fuel oil tanks will be metal tanks located within an area with secondary containment (i.e. bunding) which will be able to contain a spill.
Dioxins: Concern that a by-pass could be used. It is only stated that a 'bag filter' by-pass will not be used - what about other types of by-pass?	The applicant has confirmed that no additional bypass systems will be used within the flue gas treatment process
Concern over the emission to sewer.	The Applicant has provided an H1 assessment in regards to the site emissions to sever. We have assessed their submission and are satisfied with it. Further details are provided in section 6.5.2.

No details on how often the boiler will be inspected for boiler deposits, how, and how quickly resolved	The boiler will be equipped with economisers and superheaters to optimise thermal cycle efficiency without prejudicing boiler tube life, having regard for the nature of the waste fuel that is combusted. The Applicant has provided details regarding the on-line/off line cleaning procedures. We are satisfied with these. Furthermore, inspections of the boilers falls under preventive maintenance and it is covered in the EMS.
Acid gas abatement dosing:Will the acid gas dosing be optimised?	Lime usage will be minimised by trimming reagent dosing to accurately match the acid load using fast response upstream acid gas monitoring. The plant preventative maintenance regime will include regular checks and calibration of the reagent dosing system to ensure optimum operation. Activated carbon dosing will be based on flue gas volume flow measurement. The activated carbon dosing screw speed frequency control responds automatically to the increase and decrease of flue gas volume. The reagent will be recirculated to optimise usage. We have also included an improvement condition that requires them to submit a report on optimisation.
Concerns that not enough information was provided on the detail of the plant design.	We are satisfied that the Applicant provided sufficient information to demonstrate that the plant and control measures will be BAT. The Permit will ensure that the plant operates in line with BAT.
Not clear what acid gas reagent will be used. It is stated as hydrated lime for back-up system but lime for main system	Lime is more reactive than hydrated lime, but the principle of using either reagent in flue gas treatment is the same. In systems that demand large quantities of reagent, lime can be preferable as it is more dense than hydrated lime (therefore reduced storage and transportation costs). Hydrated lime is more suitable for processes with a small-to-medium demand – equipment is simpler and does not need to be designed to handle an exothermic reaction as is the case with lime. We have determined that the use of lime at this facility is considered BAT due to increased reaction effectiveness, reduced storage and transportation costs, and a lower consumption rate.
Interlock system: Concern over whether the interlock system will comply with all the EPR 5.01 requirements	The interlocks will prevent the charging of waste until the temperature within the combustion chamber has reached 850°C. During normal operation, if the temperature falls below 850°C, the burners will be initiated to maintain the temperature above this minimum. This is in accordance with EPR 5.01 requirements.

No information on how plant systems will be tested	The Operator will have an EMS in place. The EMS will include a preventative maintenance programme to prevent failure of key equipment. We have included pre-operational conditions to ensure that the Operator will carry out the necessary system tests at the commissioning stage and the EMS will be updated to include various findings that could influence the preventative maintenance programme.
Start-up: Concern over how end of start-up will be determined	A signal will be sent from the main plant control system to the CEMS system to indicate when the plant is operational and burning waste
Oxygen enrichment: Concern as to whether this will be used - see section 7 of EPR 5.01	Oxygen enrichment is normally applied at small plants that are generally dedicated to the destruction of particular (often hazardous) waste streams. It is not appropriate for this Installation.
Concerns over Bag filter heating will be achieved	This is standard practice at modern MSW incineration plants and we have no concerns over its use or safety.
Concerns if material that passes through the grate will be recovered	Inert bottom ash material that will be transferred off-site to a suitably licensed waste treatment facility for recovery (of any recoverable fractions) or disposal.
Concerns over lack of detail of the control of instrument technology.	The Facility will be controlled from a dedicated control room. A modern control system, incorporating the latest advances in control and instrumentation technology, will be utilised to control operations, optimising the process relative to efficient heat release, good burn-out and minimum particle carry-over. The system will control and/or monitor the main features of the plant operation. We are satisfied with the measures proposed.
Combustion temperature monitoring: Concern as to how temp monitoring will be carried out and checked	The Permit requires continuous monitoring of several process variables including combustion temperature to ensure that the incinerator is running optimally and minimising emissions. Pre-operational condition PO9 and improvement condition IC4 have been included in the permit relating to the validation of combustion conditions.
Bag filters: Concern over failure of pressure drop measurement and how would be remedied how quickly etc.	Differential pressure across the bag filters will be measured, in order to optimise the performance of the cleaning system and to detect bag failures The Operator will have an EMS in place which will include a preventative maintenance programme to prevent failure of key equipment.
Comments about odour	
Concerns raised that, in line with BAT 1, odour monitoring standards should be stated by the applicant.	Whilst odour monitoring has its role our approach is to impose operational controls which should prevent odour impacts occurring in the first place.

	We impose monitoring where odour at receptors is expected. Our view is that odour monitoring is not required in this case. We will use Permit condition 3.4.1 to control and regulate odour. If there are odour complaints we will investigate and look into the source and cause. There are several ways we can do this including visiting the site, discussions with the complainant and with the Operator. If appropriate we will require the Operator to put measures in place to rectify any issues. The operator submitted an updated odour management plan (OMP) in response to schedule 5 notice. The applicant has confirmed that further information will be provided at the detailed design stage, and we have required this by pre-operational condition PO1.
Concerns over how frequently the odour inspections will take place.	In order to generate a detailed record for the Facility, regular inspections at the installation boundary will be undertaken by the Operator. This will ensure a detailed data set of data will maintained throughout the year. Inspections will not be conducted at a set time of day, in order to maintain flexibility in monitoring strategy. Instead, the monitoring will be conducted when waste deliveries are expected to the site or residues transferred from the site. Inspections will be also undertaken upon receipt of an odour complaint to identify and record the odours present at the time of the complaint. The operator submitted an updated odour management plan (OMP) in response to schedule 5 notice. The applicant has confirmed that further information will be provided at the detailed design stage, and we have required this by pre-operational condition PO1.
No info on how often odour carbon filters will be inspected and changed	An operating and maintenance manual (O&M manual) will be developed and completed through the commissioning phase of the installation. The O&M Manual will set out detailed operating and maintenance instructions for all the plant and equipment which requires maintenance. Improvement condition IC3 requires the operator to submit a written report to the Environment Agency on the commissioning of the installation in accordance with the plan agreed by pre-operational condition PO4.
Concerns raised what negative pressure level will be achieved or air flow rate will be required and info on whether this will be enough to control odour	The method proposed by the Applicant of creating negative pressure by extracting combustion air from the reception area is used at most municipal waste incinerators. It is an effective methods of odour control and we are satisfied that it's use is appropriate in this case. Also we have set an

	improvement condition for tests to be carried out to ensure the system is working correctly.
Concerns raised over the lack of info in the OMP to indicate the steps that will be taken should the initial steps at controlling odour fail	We consider that there is sufficient information in the OMP and we are satisfied appropriate measures to prevent odour emissions will be in place.
Concerns raised over the adequacy of the doors to the waste reception area	The main access doors to the reception area that will be used for the waste delivery vehicles are fast closing roller shutters and will be kept closed (except during vehicles coming in and leaving) to maintain odour control. We are satisfied with what has been proposed.
Concern that door size will be too big for the size of vehicle. Smaller door will reduce diffuse emissions.	Access points to the building have been appropriately sized.
Concerns there is not enough info on waste acceptance procedures on the OMP to control waste residence times as per BAT 13	BAT13 refers to the storage and handling of clinical waste, the Facility will not process clinical waste. Furthermore, the Facility will not receive hazardous waste.
Max storage times not established	The Applicant has confirmed within the second schedule 5 response that waste will be typically stored in the bunker for approximately 3-4 days; however, allowing for extended periods of shutdown, the maximum amount of time the waste will be stored in the bunker is 3-4 weeks. In the event (such as shut down) that combustion air is not taken from the waste bunker area (for negative pressure) then an air extraction and abatement system utilising carbon filters will be used where required.
Concerns OMP does not contain details on amounts of types of waste and odour potential of those wastes.	The Operator will have waste pre-acceptance and waste acceptance procedures to ensure that only waste authorised by the Permit is received and burned. The operator submitted an updated odour management plan (OMP) in response to schedule 5 notice [and we are satisfied with the information provided]. The operator has confirmed that further information will be provided at the detailed design stage, and we have required this by pre-operational condition PO1 (by update of OMP with approval required by the Environment Agency).
Concern that ASDA identified as moderately sensitive to odour as there is no evidence to back this up	We are satisfied that the OMP covers appropriate receptors. Customers using Asda would spend the majority of the time inside.
Concerns the receptors identified within the OMP don't include all potential receptors.	We are satisfied that the OMP covers appropriate receptors. Odour will dissipate with distance and so receptors further away would be less impacted by odour than those identified.

Concerns that the OMP considers Kingmoor Park Central, Kingmoor Park East, Kingmoor Park South, Kingstowon Industrial Estate and Kingmoor Park Industrial Estate to have a "high tolerance to odour". There is no evidence to back this up.	We have assessed the OMP and we are satisfied that measures proposed will prevent significant odour impacts at all receptors. The way they are identified in the OMP does not affect this conclusion.
Concern that there is no odour prediction at sensitive receptors in the OMP.	Our view is that odour modelling to predict odour concentrations is not required. . We have set permit condition 3.4.1 and will regulate odour through this condition.
Concern that Appendix A (installation boundary plan) in the OMP is blank.	The boundary can be clearly seen in the document labelled Appendix K - indicative monitoring points of the OMP.
Concern that odour arising from the water used to wash down the waste reception hall and waste bunker has not been considered.	Waste waters generated from the process will be reused/recycled within the process we do not consider it poses a likely risk of odour.. 'Dirty' process waters such as the wash down from 'dirty' areas will be used in the ash quench to minimise the generation of dusts from ash handling activities. The Operator confirmed that in the unlikely event that odour emissions are attributed to the process effluent pit, the contents of the pit will be emptied/discharged to sewer.
Concern that the OMP lacks information of what wind direction is considered "away from sensitive receptors" during Planned Odourous Events in section 6.1.3.	We have assessed weather data in figure in the Air Quality Assessment, we can see that the predominant wind direction is to the west, away from the Odour Sensitive Receptors.
Concerns that the OMP doesn't adequately address complaints and including how members of the public will be able to report any unacceptable odour, how they will be recorded, and frequency of complaints procedure.	Section 7.1 of the OMP (provided by schedule 5 response) has the proposed complaints procedure. We are satisfied with the detail provided. During the construction and commissioning phase of the Facility, documented management systems will be developed. This will include odour control procedures to investigate reported odour complaints. Pre-operational condition PO1 (update of OMP) requires this to be provided together with required approval from the Environment Agency.
Concerns raised in the action plan that will suspend highly odorous deliveries instead of all deliveries in the event of emissions of high levels of odour.	In the event of high level of odours, actions to identify the source of odour will be implemented. If the source of odour is a critical failure (plant or fan breakdown), the facility operation will be suspended. In all instances where waste processing is required to be suspended, the receipt of waste at the Facility will be prohibited and incoming waste will be stopped or diverted to an alternative suitably licenced waste treatment facility. It is not intended to suspend all waste deliveries in the event that a single load of waste is identified as being odourous to an unacceptable level.

	In the event that waste is received as odourous to an unacceptable level it will be rejected and returned to the waste supplier with the request to undertake an investigation into why the unacceptable waste was transferred to the facility. We consider the proposed measures appropriate.
Concerns that the NGRs of the stack on the OMP and the Supporting documents differ	The coordinates differ by one meter to the east and 2 meters to the north – this difference is minimal.
Comments about noise	
Error made in determination of planning application (5dB below recommend) but issued at 5dB above.	The applicant has confirmed within the second schedule 5 response that the detailed design of an ERF is a continuous process of optimisation and refinement, reflecting established and emerging best practice. The non-material amendment (NMA) application was developed to incorporate the changes in relation to the design and planning for the Facility. After revisit of the design optimization process (and potential implications for any planning amendments) the operator decided not to proceed with the NMA. The design presented in the EP application is the 'latest'/current design and is consistent with the approved design within the planning consent (Ref: 1/18/9012) for the Facility. We have consulted the planning authority as part of this determination. Aspects relating to the determination of the planning authority are not within the remit of the EA. The operator will be required to comply with both planning and the Environmental Permit.
Concerns raised regarding the accuracy of the noise documents.	We are satisfied with the information and any discrepancies have either been amended or are not significant to our determination
No assessment has been made that the noise characteristics are such that BS4142:2014+A1:2019 is applicable	Representative background and residual sound levels are based on the `most commonplace' or `median' result in accordance with BS4142:2014+A1:2019 (ref.paragraph 8.1.4 Note 4 & Figure 4). Using the minimum value is not considered to be appropriate for the assessment of noise in accordance with BS4142:2014+A1:2019 (ref. paragraph 8.1.4 and Note 1). We have audited the noise assessment and performed check modelling and are satisfied with the data provided.

No assessment has been made of the most appropriate equipment to use for the assessment as required by BS 4142	Applicant confirmed in second schedule 5 response : noise level meters used for the baseline survey are precision grade Class 1 and microphones are Type 1. Calibration certificates are provided and attached and according to BS4142:2014+A1:2019 Appendix B.2.4.2 (Refer to Appendix G.4). Calibrators should be checked once a year and noise meters every two years.
Concern as to whether potential measurement locations have been identified (selection of the measurements locations that would be best for the assessment) as required by BS 4142	Applicant confirmed in response to schedule 5 notice (2) that the baseline noise survey undertaken in November 2019, was carried out over a 5-day period, which included a weekend period to cover the lowest likely representative background sound levels. The location of the baseline fixed noise monitoring is provided within section 3.12 of the Noise Assessment and indicated in Figure 1 as P1, P2 and P3. • Positions P1 and P2 were adjacent to the rear boundaries of residential properties off Lowry Hill Road, which are the nearest receptors to the southeast. These positions were in a wooded area but at the time in a clearing and clear of trees to the rear of the garden of each property, at a distance of circa 4m from the boundary fence, away from the effects of local road traffic and human activity. • Position P3 was in an open field at a similar distance from the road and other noise sources in the area compared with the nearest receptor dwellings off Cargo Road. Taking the above into consideration, all three locations are considered to be representative locations to determine the baseline levels in the area surrounding the Facility, and satisfy the requirements of BS 4142. The variation in baseline levels particularly with LA90 background measurements along a particular street would typically be negligible and, to ensure that the assessment is suitably robust, the lowest representative level for P1 & P2 has been chosen for all receptors on Lowry Hill Road. Where topography is similar, it is not necessary to measure baseline at all receptors, but to establish the baseline at the closest as likely to experience highest site noise levels, in accordance with BS4142.

	In the Noise Assessment submitted with the EP application, two locations circa 180m apart were chosen for a cross section and the lowest representative background level determined. The prediction noise model selects different receptors off Lowry Hill Road to show the variation in predicted noise impacts, and the highest level has been chosen for assessing the noise impact of the Facility (i.e. the lowest background level set against the highest predicted level for robustness). We have audited the noise assessment and performed check modelling and agree with the Applicant's conclusions
Concern as to whether interference from potential sources of interference has been considered in accordance with recognised good practice	Applicant confirmed in response to schedule 5 notice (2) : There are no other potential sources of noise interference identified. Cumulative effects from other sources formed part of the baseline study. We have audited the noise assessment and performed check modelling including analysis and sensitivity checks for the existing background and ambient sound climate. In our consideration of the context of sound emissions from the site in relation to the existing sound climate, residual sound levels (L_{Aeq}, dB) are higher than site specific levels at sensitive receptors, suggesting that operations from the facility are not likely to be audible in relation to the existing sources which make up the existing sound climate, such as the existing industrial, railway and general road traffic sources. The receptors surrounding the facility are sufficiently far away from the site to ensure the impact from the operation of the site will be low. We consider their selected LA_{90} values appropriate for daytime and night-time assessment at the selected receptors.
The description of the area (noise sensitivity) where the plant is to be located is not accurate	Applicant confirmed in response to schedule 5 notice (2) : The nearest sensitive receptors are those identified as residential dwellings (characterised as having high sensitivity) which have been adopted in the Noise Assessment. The site and surrounding land uses has been classified/characterised as mixed industrial and residential in a suburban area, which is consistent with the location of the Facility as it is located on the urban fringe of Carlisle.

	We have audited the noise assessment and performed check modelling and agree with the Applicant's conclusions
The list of commercial receptors is incomplete	Applicant confirmed in response to schedule 5 notice (2) : Changes may have occurred since 2016 which could have an effect on sound levels in the area. This has been acknowledged and a further noise survey was undertaken in November 2019 to inform the assessment. Cumulative effects from the commercial receptors identified would have formed part of the baseline study in November 2019 and as such would have been included in the residual noise measured at NSRs. The predicted noise contribution from the Installation is considered to be very low when compared with established residual sound levels. We have audited the noise assessment and performed check modelling and agree with the Applicant's conclusions.
Multiple locations for receptor R2 are shown so the location used for predicting noise levels is unknown	Applicant confirmed within 2nd schedule 5 response : two locations circa 180m apart were chosen for a cross section and the lowest representative background level determined. This is considered to be a reasonable approach to determine representative baseline conditions at different receptors. We have audited the noise assessment and performed check modelling and agree with the Applicant's conclusions.
Concern that not all relevant residential Human Sensitive Receptors have been considered	Applicant confirmed within 2nd schedule 5 response : the prediction noise model selects different receptors off Lowry Hill Road to show the variation in predicted noise impacts, and the highest level has been chosen for assessing the noise impact of the Facility (i.e. the lowest background level set against the highest predicted level for robustness). Therefore, the predicted noise levels would be lower at the other receptor locations. We have audited the noise assessment and performed check modelling and are satisfied with the conclusion.
The application refers to the latest sound survey but older sound survey data appears to have been used. This also causes uncertainty over the monitoring locations that have been used. Section 3.11 - table has data from 2016 which is not the latest sound survey (see sections 3.6 and 3.7 of the Noise Assessment Review).	Applicant confirmed within 2nd schedule 5 response : the baseline data provided in Table 3.2 within the Noise Assessment is most recent assessment of background levels; therefore, this is considered to be the most relevant baseline data for the purposes of the assessment. The monitoring therefore relate to receptors (Table 3.2) and grid references (paragraph 3.12) presented in the noise assessment.

	We have audited the noise assessment and performed check modelling and agree with the Applicant's conclusions.
Data was omitted from the 2016 noise survey without adequate explanation "Omitted due to meteorological conditions"	The Applicant has used a survey from 2019 (undertaken in November 2019) carried out over a 5-day period. The Applicant confirmed within 2nd schedule 5 response : No data was removed for rain or high wind speed as the conditions showed all data was acceptable. The 2016 noise survey (referred) was just been used as a comparison basis, so omission of any data did not affect our decision. We have audited the noise assessment and performed check modelling and are satisfied with the conclusion.
Concern that it was not clear when the latest sound survey was carried out or to verify the weather data recorded	Applicant confirmed within 2nd schedule 5 response : Monitoring of baseline was undertaken between 7 November 2019 and 11 November 2019. The reference in the `Fieldwork Details' to the survey being undertaken between 7 June and 9 June 2019 are incorrect in terms of the date of the survey, but the dates from the weather station and the baseline monitoring are consistent. Therefore, it is acknowledged that there is a typographical error in the date stated for the Fieldwork.
The location of the weather data recorded is not specified. No indication is given as to where these weather conditions were recorded and whether these conditions can be considered accurate for all these locations	Applicant confirmed within 2nd schedule 5 response : The location for the weather station was considered to be suitable (set up in the area adjacent to the fixed monitoring positions). The location for the weather station was positioned in the most exposed area of monitoring (i.e. measuring the highest likely wind speed) and close enough to the other monitoring positions to show that the conditions were suitable. No data was removed for rain or high wind speed as the conditions showed all data was acceptable. Therefore we are satisfied that the location of the weather data recorded have been considered correctly.
Units for wind speed measurement missing	Applicant confirmed within 2nd schedule 5 response : the units of measurement for wind speed are m/s (metres per second).
No calibration information is given for the weather recording instrumentation	Applicant confirmed / provided within 2nd schedule 5 response copies of calibration certificates for sound level meter.

	The weather station does not have a means of calibration. The unit used was purchased in October 2019 as brand new. We are satisfied with the provided calibration certificates.
No certification number is given for the measurement equipment Sound Level Meters and calibrators should be subject to traceable calibrations every two years	Applicant confirmed / provided copies of Calibration certificates within 2nd schedule 5 response. We are satisfied with the provided calibration certificates.
There is no indication that the date and time information on the measurement information was set correctly	Applicant confirmed / provided within 2nd schedule 5 response: All meters were time checked with GMT and set to `synchro' to ensure they would start at 15-minute intervals relative to the clock.
Concern as to whether the impact of Ground Attenuation Effects and how this may affect the noise measurements (sensitivity analysis) compared to actual receptors should have been considered	Applicant confirmed within 2nd schedule 5 response : the ground effect value (Agr) is defined in ISO9613-2: 1996. Ground attenuation is mainly the result of sound reflected by the ground surface interfering with the sound propagating directly from source to receiver. For hard ground such as concrete, paving or water the ground factor G = 0, for porous ground such as ground covered by grass, trees or other vegetation the ground factor G = 1. Mixed ground, is where the ground surface contains a mixture of porous and hard ground and can vary between 0 and 1. As the intervening ground between the Facility and the receiver is a mixture of hard and porous surfaces (although more porous to the southeast) we have chosen a value of 0.5 for G, which is reasonable and is in line with other good practice (such as for wind turbine noise predictions). Experience of prediction and compliance monitoring at other similar sites in the UK has shown that this provides a robust method of calculation. The effect of changing the G factor from 0.5 to 1 (mixed to porous) would reduce noise levels by between 0.7dB(A) and 1.5dB(A). The effect of changing the G factor from 0.5 to 0 (mixed to hard ground) would increase noise levels by between 1dB(A) and 2.9dB(A), and this would not change the outcome of the assessment. We have audited the noise assessment and performed check modelling and agree with the Applicant's conclusions.
Multiple issues with the statistical results table have been raised including the meaning of some of the information, exactly what data has been analysed and how this relates to the results table, and the number of measurements considered and how this compares to the data in the results table	Applicant confirmed within 2nd schedule 5 response : the table header within Table 3.2 of the Noise Assessment has labels which define the receptor. The first two columns of date within Table 3.2 identify the relevant receptor locations as P1 - Lowry Hill Road (north) for day (column 1) & night (column 2); columns 3 and 4 relate to P2 Lowry Hill Road (south) day (column 3) &

	night (column 4); and columns 5 and 6 relate to P3 Cargo Road day (column 5) & night (column 6). The number of measurements correlates with the corresponding daytime and night-time number of values in the results table in Appendix 2 of Noise Assessment. As the survey did not include any weather conditions that included rain or high wind speeds no values were excluded. We have audited the noise assessment and performed check modelling and agree with the Applicant's conclusions.
Concern that noise level variations were recorded but no identification and understanding of sounds heard as required by BS 4142 has been made. LA90 (dB) measurements at Lowry Hill (north) were measured as approximately 50.2-53.0 (dB) in the afternoon of Thursday 7/11/19, whereas on Friday measurements were 46.1-50.0 (dB) and on Monday and Appendix 8.5 of the 1/16/9005 planning application shows LA90 measurements in the afternoon in the range 42.8 to 47.6 (dB).	We have audited the noise assessment and performed check modelling. We consider the selected LA_{90} values appropriate for daytime and night-time assessment at the selected receptors (i.e. 45 dB(A) and 40 dB(A), respectively), noting that they are based on the measured levels from the 2019 survey, which are overall lower than in 2016. We consider this to be a conservative approach. We agree with the Applicant's conclusions.
Concern that old baseline data (2016) has been used for commercial receptors and may no longer be representative	Applicant confirmed within response to 2nd schedule 5 response : A further noise survey was undertaken in November 2019 to inform the assessment. Cumulative effects from the commercial receptors identified would have formed part of the baseline study in November 2019 and as such would have been included in the residual noise measured at NSRs. We have audited the noise assessment and performed check modelling. We consider the selected LA_{90} values appropriate for daytime and night-time assessment at the selected receptors (i.e. 45 dB(A) and 40 dB(A), respectively), noting that they are based on the measured levels from the 2019 survey, which are overall lower than in 2016. We consider this to be a conservative approach. We are satisfied with the conclusion.
Night-time noise data at commercial receptors has not been measured	Applicant confirmed within response to 2nd schedule 5 response : The representative background level has been determined using statistical Analysis [Table 3.2 of the Noise Assessment]. Representative background and residual sound levels are based on the `most commonplace' or `median' result in accordance with BS4142:2014+A1:2019 (ref. paragraph 8.1.4 Note 4 & Figure 4). Using the minimum value is not considered to be appropriate for the assessment of noise in accordance with BS4142:2014+A1:2019 (ref. paragraph 8.1.4 and Note 1).

	We have audited the noise assessment and performed check modelling and agree with the Applicant's conclusions
Ecological receptors are referred to but there is no indication of what ecological receptors	Applicant confirmed within response to 2nd schedule 5 response : reference to `ecological' receptors is a typographical error and should read `commercial'. This does not change any of the calculations or conclusions of the noise Assessment as it has been assessed as a `commercial' receptor. We have audited the noise assessment and performed check modelling and are satisfied with the conclusion.
There is a lack of information on what similar projects the predicted noise levels are based and whether these can be considered representative of the proposed facility	We are satisfied that this is representative of data from other similar regulated sites in the UK.
Concern re lack of clarity as to when plant selection will be optimised to reduce noise level or when this will/will not be appropriate	Applicant confirmed within response to 2nd schedule 5 response : *The proposed technology provider will optimise plant selection (using low-noise equipment), where appropriate, to reduce the noise level*." The phrase 'where appropriate' in relation to plant selection means that low noise equipment will be installed unless this will have a significant effect on the efficiency of the Facility. In the event that low noise equipment will have a significant effect on the efficiency of the Facility, alternative noise mitigation measures, i.e. measures which provide the same level of noise attenuation, which have less effect on the efficiency of the plant, will be implemented. Therefore, the design of the Facility will ensure a balance between efficiency and noise impacts. We have audited the noise assessment and performed check modelling and are satisfied with the measures proposed.

Concern as to whether the proposals are compliant with BAT 37 which requires the prevention of noise emissions or, where that is not practicable, the use of one or a combination of techniques	Applicant confirmed within response to 2nd schedule 5 response : low noise equipment will be selected where it is considered to represent BAT. Should this not be viable (e.g. in relation to efficiency or costs), Fortum will ensure that noise is reduced as far as reasonably practicable via alternative techniques. Noisy activities will normally be limited to safety valve tests which would typically occur only during commissioning. Testing of the safety valves is a planned operational activity with a frequency driven by legislation. The mitigation strategy in Appendix 3 includes for a silencer to limit the noise from this testing and would be programmed during daytime periods (0900-1700) to avoid un-necessary short-term impacts at sensitive receptors. Following commencement of operation of the Facility, steam purging would typically not occur during operation of the Facility. However, in the exceptional circumstance that there is an over pressurisation and uncontrolled event within the pressurised boiler, the pressure relief valve system will function to release the pressure to safe levels within the boiler. This pressure relief event (via the safety valve) would occur for 2-4 minutes, thereby avoiding a significant incident and risk to personnel safety. If the cause of the over-pressurisation has been understood, resolved and stable conditions resumed within the boiler then normal operation will resume. However, if the cause of the over-pressurisation is not resolved, the boiler will shut down safely to enable the issue to be investigated and resolved prior to restarting the plant. We are satisfied that they will be compliant with BAT 37. The applicant is required to confirm the final design / any changes (see pre-operational condition).
Predicted noise levels are based on technology provider's data from similar plant. This suggests the noise mitigation strategy is to perform at a similar level, which is inconsistent with optimising plant selection.	The operator will be required to demonstrate compliance with BAT. They have used data from other sites (existing operation) as representative assessment data for worst case scenario (in order to assess the worse case impacts). During detailed design, the selection of equipment will take into consideration the resulting noise impacts and selection of low noise equipment wherever possible. We have audited the noise assessment and performed check modelling and are satisfied with the conclusion.

There is no commitment to prevent increases in noise by regular maintenance of plant items. Controlling noise has not been included in the Maintenance Manager role	Applicant confirmed within response to 2nd schedule 5 response : Noise level checks will be carried out on a daily basis as part of the operating and maintenance procedures in the main process areas.
There is no commitment to noise level checks	As above.
Noise management plan is not provided, only a noise assessment.	This is not required as part of the Application. A noise management plan condition is included in the permit. it is not normal to require a noise management plan for this type of facility but in the unlikely event noise becomes an issue the condition allows us to require one to be submitted and implemented. This is the normal practise for this type of facility.
It is unclear what plan “has been provided by Poyry” : layout plans and elevations of the EfW provided by Poyry.	Applicant confirmed within response to 2nd schedule 5 response : The layout plans and elevation drawings that were used and referenced when undertaking the noise assessment provided as Appendix G.1. A higher resolution drawing of Figure 2 is also provided as appendix G.3.
Concern as to whether doors will be kept closed when not in use to minimise noise	Fast-closing roller shutter doors will be installed at the entrance to the tipping hall in accordance with the requirements of EPR 5.01. This will ensure that doors are kept closed except for access to vehicles (for offloading and collection), with the exception of maintenance or emergency vehicles. The use of fast-acting roller shutter doors reduces the potential for emissions of odour and noise from the Facility.
The source of SRI (sound reduction index) values has not been given. No reference or evidence is provided to support the SRI values provided in table 5.1 in section 5.1.3 of the Noise Assessment Review.	The Applicant has confirmed within the second schedule 5 response the detail for cladding type and specification will be determined at the detailed design stage. Reference Rw values have come from reference waste incineration facilities in the UK, and the cladding data has been taken from cladding manufacture data sheets. The level of Rw would enable the technology provider to determine what product is suitable when procuring the cladding for the Facility.
Report suggests the pressure in the Tipping Hall will be 5dB lower at night than during the daytime	The Applicant has confirmed within the second schedule 5 response that the waste will only be delivered to the Facility during day-time periods. Therefore, the modelling has assumed that there would be no HGV movements inside the Tipping Hall during night-time. The modelling has conservatively assumed a value of 5dB lower, with a reverberant sound pressure level of circa 75dB(A) which is considered conservative to when no vehicles are in use.

Document does not state that the building cladding used will provide the same or greater noise insulation that the building cladding used to provide input into the noise model	The detail for cladding type and specification will be determined at the detailed design stage. Reference Rw values have come from reference waste incineration facilities in the UK, and the cladding data has been taken from cladding manufacture data sheets. The level of Rw would enable the technology provider to determine what product is suitable when procuring the cladding for the Facility.
Concern as to the noise assessment of HGVs.	The applicant has confirmed within the second schedule 5 response that the HGV movements occur during daytime hours and the 20 movements into and out of site and are associated with the delivery of waste to the Facility. These are included within the model as a `line' source running at 10 mph, moving into the tipping hall, and then exiting the site via the weighbridge and exit. The noise level of 103dB(A) is a sound power level (or 75dB(A) @ 10m sound pressure level) measured of a moving HGV into a Tipping Hall at a number of similar sites in the UK. This value is deemed to be robust and is typically nearer to 98dB(A). The height of the source is also assumed to be 1.5m above ground. A level of 104-109dB(A) may be expected as a short term level within a building during offloading activity but not for vehicle movements outside the Tipping Hall. We have audited the noise assessment (including vehicles movements) and performed check modelling and are satisfied with the conclusions.
A sensitivity analysis should be carried out on the impact of different meteorological conditions on the noise model results	We have audited the noise assessment and performed check modelling. Our assessment of check modelling shows the impacts to be considered low / therefore any minor changes to the values in the report would not alter the conclusions.
It is unclear where the various heights used in the model have been sourced from	The Applicant has confirmed within the second schedule 5 response that the elevation drawing provided in Appendix G.1 was used to derive the height ranges stated within section 5.2.3 of the noise assessment.
The height of the silencers can be expected to be a source of noise but their height does not appear to have been considered in the model	The applicant has confirmed within the second schedule 5 response that Silencers for the boiler hall roof are included in the noise model and covered in paragraph 5.2.15 and Appendix 3.
Concern as to whether the character of the noise will be disturbing or a nuisance or that tonal or impulsive characteristics of the noise can be removed by design	Applicant confirmed in response to schedule 5 notice (2) : The rating level for the site has been determined, any noise character would be removed by design. Where any significant external plant is proposed that is not contained within the building envelope, they will be designed to ensure that they do not

	generate any tonal, impulse or intermittency character. This control requirement would form part of any technical specification for the design and construction of the Facility. We have included an improvement condition to validate the noise assessment during normal operation. There are no significant intermittency characteristics (i.e. identifiable on/off conditions that are readily distinctive above the residual noise climate) associated with the operation of an energy from waste facility. The operation of safety valves is only necessary during occasional daytime safety valve tests and in an emergency situation and is not deemed to be a regular intermittent source. Therefore, we are satisfied that tonal/impulsive characteristics have been considered correctly.
Concern about the frequency and impact of the noise from safety valves	Applicant confirmed in response to schedule 5 notice (2) : The operation of safety valves is only necessary during occasional daytime safety valve tests and in an emergency situation and is not deemed to be a regular intermittent source. Safety valve tests would typically occur during commissioning only. Testing of the safety valves is a planned operational activity with a frequency driven by legislation. The mitigation strategy in Appendix 3 includes for a silencer to limit the noise from this testing and would be programmed during daytime periods (0900-1700) to avoid un-necessary short-term impacts at sensitive receptors. After commissioning steam purging would typically not occur during operation, unless in the exceptional circumstance that there is an over pressurisation and uncontrolled event within the pressurised boiler, the pressure relief valve system will function to release the pressure to safe levels within the boiler. This pressure relief event (via the safety valve) would occur for 2-4 minutes, thereby avoiding a significant incident and risk to personnel safety. If the cause of the over-pressurisation has been understood, resolved and stable conditions resumed within the boiler then normal operation will resume. However, if the cause of the over-pressurisation is not resolved, the boiler will shut down safely to enable the issue to be investigated and resolved prior to restarting the plant.

	We are satisfied that this would be infrequent / only in emergency situation. The permit includes condition 3.5.1 and 3.5.2 relating to noise and the Operator responsibilities regarding noise pollution.
Comments about waste management	
Concerns regarding what the Annual Disposal rate will be.	The Facility will process approximately 250,000 tonnes per annum (nominal design capacity of 31.3 tph, assuming 8,000 hours availability). The maximum capacity is 274,000 (i.e. if operating without planned shutdown and maintenance etc) and impact assessments have been based at these rates to assume worst case scenario.
Concerns over materials accepted on site.	We have assessed the Applicant's pre-acceptance and acceptance procedures as part of our assessment. We are satisfied that it has been appropriately considered.
Concerns that the composition and quantities of waste being received is not clearly outlined	The Operator will have waste pre-acceptance and waste acceptance procedures to ensure that only waste authorised by the Permit is received and burned. The Permit does not control where the waste comes from because that falls outside the scope of this permit determination.
Concerns over variation in calorific value of each type of waste	Waste with a range of CV will be burned. When operating at lower CV the throughput will be higher and the total energy input and output is not expected to be affected significantly. This does not mean a change in emission concentrations and compliance to emission limit values remain.
Concerns over whether the Waste Framework Directive is being followed given that many of the codes could be disposed of more appropriately, concerns waste hierarchy is not being applied.	We are satisfied that the waste hierarchy referred to in Article 4 of the WFD will be met. The obligation is on waste producers to apply the waste hierarchy and for local authorities to have their own waste strategy. Our role in this determination is to assess whether any residual waste that may be sent for incineration can be dealt with in an environmentally acceptable manner. In addition to this we have set permit conditions 2.3.5 and 2.3.6 that restrict burning of separately collected fractions. Permit condition 1.4.1 also requires the operator to apply the waste hierarchy referred to in Article 4 of the Waste Framework Directive to waste they produce.
Concern over the following relating to received waste: • not be adequately homogenised • bulky Items	We are satisfied that the Installation will be capable of burning the wastes authorised by the Permit.

• batteries	-Bunker management is standard for this type of plant and will ensure waste is sufficiently homogeneous. -Bulky wastes are permitted to be received – EWC 20 03 07 (items such as furniture or mattresses). This waste will likely have been processed at a waste transfer station or MRF prior to delivery to the site therefore arrive in shredded form. Due to robust waste acceptance and pre-acceptance checks in place at the site, it is unlikely that any particularly large and bulky items will be delivered to the site. The application does not request operation of an on-site shredder. In the unlikely event that any particularly large or bulky items are deposited into the waste bunker, these will be identified and removed, using the crane. The Permit does not allow batteries to be received as a specific waste. It is possible that batteries could be placed in household bins and burned if received at the incinerator under the municipal waste code. However they are likely to be small in number and will not affect emissions significantly.
Concerns leaking waste liquid will be prevented from entering the bunker	Liquid waste are not authorised to be received by the Permit.
Concerns Septic Tank Sludge will not be dry before incineration and that odourous waste should be direct Feed into furnace in compliance with BAT22	We consider that small quantities of waste in the septic tank sludge will not cause odour issues. BAT 22 addresses gaseous and liquid waste. These type of waste will not be accepted at the facility and as such, BAT 22 is not applicable.
Concerns with the site design: • Quarantine area • Where Liquid Wastes will be stored • Concerns the site will have appropriate laboratory/checking facilities capable of carrying out the checks such as those for calorific values, content of halogens, metals/metalloids and mercury.	We are satisfied with the waste storage bunker and site design. We are satisfied that waste acceptance measures are in accordance with BATc. Inspection procedures will be employed to ensure that any wastes which would prevent the thermal treatment process from operating in compliance with its permit are segregated and placed in a designated storage area pending removal. The Operator has confirmed that they will meet BAT requirements including BAT9 requiring Periodic sampling of waste deliveries and analysis of key properties, such as calorific value and metal content.
Concerns if the Operator will carry out Audits of their Waste Suppliers	Audits of the waste suppliers and the waste received are part of the waste pre-acceptance procedures.
Concern that radioactive waste could be received.	The Permit will not allow radioactive material to be accepted as a specific waste. Waste acceptance procedures will ensure they are not. It is possible that smoke alarms (containing small radioactive sources) could be placed in

	household bins and received at the incinerator under the municipal waste code. However they are likely to be small in number and have a low level of radioactivity. It is not considered there is any significant risk from radioactive waste. UK radioactive substances regulation is sufficiently robust so as to minimise the risk of radioactive material inadvertently being sent to incinerators, therefore the current position is that all waste poses low risk and that radioactivity detection not required at any incineration plant (unless site-specific circumstances warrant additional measures or future evidence indicates an increased risk).
Concerns over how the charging rate will be controlled	The waste feed rate to the furnace will be controlled by the combustion control system. The control system monitors and determines the adequate oxygen amount for complete combustion of combustible gases. Depending on the oxygen concentration at the boiler exit, the combustion airflows and the waste feed rate will be adjusted. Similarly, the combustion airflows and the waste feed rate will also be adjusted to either reduce the Total Organic Carbon (TOC) content of the bottom ash to less than 3%; or Loss on Ignition (LOI) of the bottom ash to less than 5%. As such, the waste charging and feeding systems will be interlocked with furnace conditions so that charging cannot take place when the temperatures drop below 850°C, both during start-up and if the temperature falls below 850°C during operation. We are satisfied with the measures proposed.
Comments about water management	
Concerns over location of pumps and how blockages will be prevented to maintain the drainage system.	Regular preventative maintenance of the drainage systems at the site will ensure that its integrity is maintained throughout the lifetime of the Facility..
Concerns regarding water management and containment measures	We have considered the applicant's water management and related issues in our assessment. ''We are satisfied with the measures proposed by the Applicant. Section 4.2.2 has further details.

Concerns over standards of water storage tanks and maintenance and inspections of it and what prevention is in place to prevent leakage into the ground water.	The uncontaminated surface water drainage system will flow to a surface water storage tank designed for SUDS requirements and then to a surface water attenuation pond, with an eventual discharge to the Cargo Beck watercourse. Regular maintenance of the drainage systems will be undertaken in accordance with documented management procedures to be developed for the Facility.
Concerns over isolation valve location and how it will operated to prevent pollution.	The site surface water is collected in the attenuation pond prior to discharge to Cargo Beck. The isolation valve is located after the attenuation pond and prior to the discharge point. The isolation valve enables the surface water drainage system to be sealed in the event of a spill or fire event. In case of such an event, the valve will be closed. We are satisfied that the design and technology will meet BAT.
Concerns over whether effluent will be reused	Where practicable, waste waters generated from the process will be reused/recycled within the process, for example in the ash quench system.
Concern over what the hot water pits are used for and how hot water will be contained. Concern over inconsistencies in details and lack of detail on aspects of the drainage system	We are satisfied with the principals as set out in the Application Hot water pits are used for storage of process hot water. As an example, excess process effluents from the ash quenching system is considered hot water. These pits will be designed so that they are impermeable to the liquid that is being stored. Concrete structures will be designed in accordance with recognised standard 'Eurocode 2 – Design of Concrete Structures –Part 3 : Liquid retaining and containment structures '. An updated indicative water flow diagram has been provided as part of the Schedule 5 response, which clarifies the direction and storage of waters. Upon completion of detailed design, a detailed drawing presenting the full drainage arrangements will be developed and will be submitted to the Environment Agency which will include the specific routes of each process water stream and locations/capacities of all above and below ground storage vessels. A pre-operational condition has been included for the provision of final design details.

Slags and Bottom Ashes: Concerns over water in bottom ash not complying with BAT 33d.	Wet handling of IBA is widely used and our view is that it is BAT to minimise fugitive emissions.
Concern over whether water content in bottom ash will be optimised in line with BAT 24 e.	There will not be treatment of slags and/or bottom ashes undertaken on-site. Therefore, the requirements of BAT 24 do not apply to the Installation.
Concern over lack of monitoring of emissions to water	There will be no emissions of process effluent from the Facility discharged to water. Where practicable process effluents will be re-used within the process. Excess amount of process effluent will require discharge, which will be discharged into the foul water sewer system in accordance with a Trade Effluent Consent first obtained from the Sewerage Undertaker. We are satisfied that monitoring is not required in the Permit. The Applicant has provided an H1 assessment in regards to the site emissions to sever. We have assessed their submission and are satisfied with it. Further details are provided in section 6.5.2. Only uncontaminated surface water will be discharged to the Cargo Beck watercourse. We do not require monitoring of uncontaminated site surface water.
Raw Water H.E.: confusion over what this is	The Applicant has confirmed within their response to the second schedule 5 notice : The raw water heat exchanger (H.E) cools the hot boiler blowdown water to 40°C by using 20°C raw water - the boiler blowdown is then cool enough to be discharged into the clean water pit, where it can subsequently be used in the ash quench system or alternatively any excess can be discharged to sewer.
Concerns over Emissions to Water and Process Effluent Discharge: confusion over whether or not there will be process effluent discharged form the facility	Where practicable process effluents will be re-used within the process. Excess amount of process effluent will require discharge, which will be discharged into the foul water sewer system in accordance with a Trade Effluent Consent first obtained from the Sewerage Undertaker. It is expected that the daily volume of process effluents discharged to the sewer will not exceed 121m^3 (covering events such emptying the boiler). Under normal operation effluents will be re-used within the process. The applicant has provided a H1 assessment and all substances have screened out (<4%).

Water/Chemicals: concern over whether the measures to deal with spillages are adequate	We are satisfied that the risk of accidents and their consequences including spillages will be minimised through the EMS and condition 1.1. See section 4.3.4 of this decision document and that there will be appropriate measures in place.
Concerns over Soil and Groundwater Pollution in particular whether inspections and maintenance will be carried out and how testing of soil and groundwater will be performed.	The surfaces of the waste reception, handling and storage areas have been designed and will be constructed as impermeable structures. Adequate drainage infrastructure will be fitted to areas where receipt, handling and storage of waste takes place – these areas will have appropriate falls to the process water drainage system. The integrity of areas of hardstanding will be periodically verified by visual inspection. Regular maintenance of the drainage systems will be undertaken in accordance with documented management procedures to be developed for the Facility. Periodic soil and groundwater sampling and testing is required by Condition 3.3.4 of the permit. Sensitive areas to be selected with reference to the initial site report.
Concerns over what controls will be in place to minimise water usage	Use of a flue gas system (FGC) system by utilising dry sorbet injection of lime and PAC to minimise water use. Where practicable process effluents will be re-used within the process. Excess amount of process effluent will require discharge, which will be discharged into the foul water sewer system.
Comments about impacts at ecological sites	
Concern over impacts on nearby habitat sites	Our assessment at ecological sites is described in section 5.4 of this decision document. We are satisfied that there will not be a significant impact.
Concern over the impact at ecological sites	The impacts of emissions to air on the ecological features of the sites has been considered. See section 5.4 for further details.
Concerns that the Critical Loads and levels will be exceeded at LWS	The tables in section 5.4 show that the PCs are below the critical levels or loads.
Concerns over the cumulative impact of the facility with other sources.	Our assessment at ecological sites is described in section 5.4 of this decision document, which included cumulative impact where relevant. We are satisfied that there will not be a significant impact.

Concerns over impacts where critical levels or loads are already exceeded.	We took this into account in our assessment. Further details are in section 5.4.
Concern over impact at habitat sites including: Correct critical loads Concern that incorrect ammonia background level and incorrect ES was used High background levels Not all features considered The presence of presence of lichens/bryophytes not considered the impact of NOx at the River Eden SAC/SSSI has not been considered	Our assessment at ecological sites is described in section 5.4 of this decision document. We are satisfied that there will not be a significant impact. We reviewed relevant critical levels, critical loads, background levels and for relevant features using APIS (air pollution information system) and found no discrepancies that would affect our conclusions. We checked for the presence lichens/bryophytes and applied the applicable lower critical levels where required. We also checked with Natural England what features are in the vicinity of the installation and required assessment.
Concerns incorrect background NOx levels have been used in the Air Quality Assessment	Background NOx for habitats assessment were obtained from APIS website. This is appropriate in this case. We reviewed background when we audited the assessment and are satisfied that the levels are appropriate.
Concerns the impact of the facility on insects and how this may impact qualifying features of the SAC/SSSI have not been considered	We are satisfied that there will not be an impact on wildlife or species. Section 5.4 has further details.
Comments about health impacts	
Concern over mortality due to NO_2 impacts.	We assessed impacts of NO_2 against the ES which is protective of human health. We are satisfied that there will not be a significant impact. See section 5.2 for further details.
Comments about BAT, emissions limits and control measures	
Concerns technology not appropriate for incineration of sewage sludge and lack of information of pre treatment of sludge	The quantities of these waste types which will be received at the Facility will be small compared to the overall waste capacity of the Facility. Digestate, represented by EWC codes 19 06 04 and 19 06 06 will be dewatered to reduce its moisture content prior to transfer to the Facility. The wastes will be mixed within the bunker with the rest of the waste in the bunker to ensure that it is suitable for incineration. We are satisfied the technology is appropriate for this waste.
Concerns around the bunker depth, seems to be much deeper than other incinerators. BAT 14a is to limit the drop height	BAT14a refers to the overall environmental performance of the incineration of waste: specifically Waste blending and mixing, not depth of the bunker. We

	are satisfied that BAT14a is met, and do not have concerns regarding the drop height.
Concerns over which plants the facility has been compared to and the similarities and the differences between these facilities in particular in relation to: • The waste throughput of the facilities • The emissions abatement systems being used • The control system • The monitoring equipment • The types of waste being burnt	The technology proposed by the Applicant is listed in the BREF as a BAT option, and is comparable to other regulated plants. We are satisfied that the Applicant's proposals are BAT, this is discussed in more detail in section 6 of this decision document. We have specified the permitted waste types, descriptions and where appropriate quantities which can be accepted at the installation in Table S2.2.
Concerns over the chosen boiler design	We have considered the boiler design and mitigation measures as part of Best available technologies assessment. We are satisfied that it has been appropriately considered. See section 6.1.1 'consideration of Furnace Type' for further details
Concerns over pollution control measures.	Our assessment has considered pollution control measures and we are satisfied they are BAT. See section 6 for further details.
Concerns over costs and benefits, section 39 of the Environmental Act 1995.	This is covered in section 7.2.1 of this document. The Applicant's BAT assessment considered costs and benefits where required. We are satisfied with the assessment. See section 6 for further details.
Concerns expressed over data used for GWP/ concern over the CO2 equivalent used in the SCR assessment	All energy suppliers in the Great Britain are required to provide information about the mix of fuels they use to generate the electricity they supply to their customers. This information is known as the Fuel Mix Disclosure and is published annually. Aggregate data for the UK is published by the Department of Business, Energy & Industrial Strategy (BEIS). The calculation basis of BEIS (previously DECC) published data has changed over time and so is not strictly comparable. Considering this, we do not have concerns regarding data used for GWP/ concern over the CO2 equivalent used in the SCR assessment
Concerns over figures used for raw materials and global warming that were used in the BAT assessment:	The figures used for raw materials and global warming that were used in the BAT assessment are consistent with figures in similar installations. We are not concerned in regards to their accuracy.
Concerns over whether the plant will be in line with the BAT Conclusions	The way we assessed BAT is set out in section 5. We are satisfied that the plant will be compliant with the relevant BAT conclusions.

Concern as to how the applicant will optimise furnace conditions to minimise residues - as stated in section 2.2.3.3 of supporting information	Furnace conditions will be optimised in order to minimise the quantity of residues arising for further disposal by optimising the waste feed rate and combustion air flows. Air Pollution control residues: • Lime usage will be minimised by trimming reagent dosing to accurately match the acid load using fast response upstream acid gas monitoring. The plant preventative maintenance regime will include regular checks and calibration of the reagent dosing system to ensure optimum operation. Back-up feed systems will be provided to ensure no interruption in the lime dosing system. The bag filter is designed to build up a filter cake of unreacted acid gas reagent, which acts as a buffer during any minor interruptions in dosing. • Activated carbon dosing will be based on flue gas volume flow measurement. The activated carbon dosing screw speed frequency control responds automatically to the increase and decrease of flue gas volume. The feed rates for the activated carbon and lime dosing systems will have independent controls.
Concern that the timescale in which bag filter failures will be identified, isolated and rectified is not stated.	There will be an immediate response when the pressure drops in the bag filters where the relevant compartments will be isolated to prevent uncontrolled emissions and repaired before being brought back online.
Comments about lack of evidence	
B[a]P - Concerns over lack of evidence that ensures the B[a]P emissions from the facility cannot be worse than the figure quoted Concerns over lack of evidence that the PCB emissions will not be worse than the average emissions from European municipal waste incineration plants and that the use of data for European municipal waste incineration plants will be appropriate for the all types of waste that the facility may incinerate	The consultant has modelled Benzo[a]Pyrene (BaP) using an emission concentration of 0.105 µg/Nm3. We note that the maximum measured BaP concentration mentioned in the annex 8 of the BREF 2019 is 0.4 µg/Nm3 and have tested sensitivity to this and we agree with the applicants conclusion. Our checks indicate that impacts of BaP are insignificant. We have assessed the impact of dioxin and furan and dioxin-like PCB emissions are not significant. HHRA applies approaches to the quantification of health effects from predicted pollutant concentrations published by the United States Environmental Protection Agency (US EPA) Human Health Risk Assessment Protocol (HHRAP).

	We have conducted our own HHRA screening, taking into account a lower tolerable daily intake of approximately 0.29 pg WHO-TEQ/kg(BW)/day based on the tolerable weekly intake (TWI) of 2 pg WHO-TEQ/kg(BW)/week. This level, established by the European Food Safety Authority panel on Contaminants in the Food Chain (CONTAM), has been accepted by the UK COT. Our screening indicates that the PC is likely to be less than 10% of the COT-TDI and a more stringent TDI of 0.29 pgWHO-TEQ/kg(BW)/day.
Concerns over lack of evidence that the 60 hours a year of Abnormal Emissions is a worst case figure	The Permit restricts abnormal operation to a maximum of 60 hours.
Concern over lack of evidence for the energy generation figures.	The figures provided are in line with what we would expect for a new plant. We have no reason to doubt those figures.
Lack of evidence that the BAT 37 requirement to appropriately locate buildings and screening to reduce noise has been done	Applicant confirmed within 2nd schedule 5 response : The design and layout of the Facility has taken into consideration the location and sensitivity of receptors in the local area. The ACCs are located to the northwest of the site which is the furthest away from the large residential area located to the southeast of the site. All significant noise sources from the Facility are located within fully enclosed and clad buildings. It is acknowledged that some significant noise sources have not been located within buildings, such as the ACC and the Turbine Cooler fans; however, these have been located away from the closest receptors to the south-east. The Turbine cooler fans are also located in a screened roof area above the residue building on the northwestern side of the site which will assist in reducing radiating noise levels. The Tipping Hall has been located on the south-western façade of the building to minimise noise impacts for the receptors to the east-southeast of the Facility during daytime operations. The final design of the Facility is subject to detailed design; therefore, at this stage, it is not possible to confirm all of the measures which will be incorporated into the final design to mitigate noise impacts from the Facility. We have included a pre-operational condition for confirmation of final design.
There is a lack of evidence that the BAT 37 requirement to optimise plant selection for noise has been (or will be) done	Applicant confirmed within 2nd schedule 5 response : Upon completion of detailed design of the Facility, further details will be provided to the EA in relation to plant optimisation. At this stage, information regarding detailed

	plant optimisation cannot be provided; however, general measures to be employed (such as those in relation to optimisation of the plant layout) have been described within the responses presented above. We have included a pre-operational condition to confirm detailed design.
Concerns regarding the process and systems by which wastes unsuitable for incineration at the site will be controlled.	Reception, handling and storage of waste measures are described in the Application and FPP. Permit conditions 2.3.1, table S1.2 and FPP chapter 3 and 4. The Operator will have waste pre-acceptance and waste acceptance procedures to ensure that only waste authorised by the Permit is received and burned. Pre-operational condition PO5 requires detailed waste acceptance procedures to be provided (following detailed design). Including wastes unsuitable for incineration, and requires approval. Periodic sampling of waste deliveries (including MCV and metal content) will be taken in accordance with BS EN 14899:2005. Unacceptable waste (such as large, bulky non-combustible items) will be removed from the bunker for further inspection and quarantine, prior to transfer off-site to a suitable disposal/recovery facility.
Fire Water, Make Up and Neutralisation Tanks: - concerns over how these will be used within the flow process - water flow process needs updating to include these	The raw water tank stores water for two purposes. It stores water for firefighting purposes and water for process needs. Boiler feedwater (from the raw tank) will be first treated in a water treatment plant before use in the steam boiler cycle. Make up and neutralisation tanks are used for the steam boiler. The make up tank is an intermediary storage tank between the water treatment plant and the boiler. This will allow balancing of the steam water cycle. Neutralisation tanks will be used to neutralise any acid waters produced at the water treatment plant, prior to reuse. We are satisfied the details provided are appropriate.
Daily Figure: concerns over lack of evidence supporting the water consumption figure	The main use of water at the plant will be to make up the water for the boiler. Other water-consuming processes will include the blow-down cooling and the SNCR system.

	It is anticipated that the Facility will consume approximately 225 m3/day of mains water. The incoming water supplies and the boiler water makeup will be monitored
Comments about fugitive emissions	
Concern whether bag filters will be employed to prevent fugitive emissions from all ash storage locations	Dusty air from all silos will be extracted and vented to atmosphere via bag filters fitted to prevent the release of dusts.
Concerns whether bunker management procedures will be employed that will minimise the release of litter and dusts	The waste will be tipped into and stored within an enclosed bunker preventing the release of litter and dusts.
Fog sprays should be employed to control dust	Dust is not expected to be an issue onsite.
Concerns about the emissions arising from vents	Emissions from roof vents are not considered point source emissions. The building operates under negative pressure which prevents fugitive emissions. We have also included in the permit, the conditions under 3.3 to manage any potential fugitive emissions.
Comments about residues	
Concern over bottom ash drying and becoming dusty	A water ash quench system will be used to minimise the generation of dusts from ash handling activities.
Concerns regarding fugitive emissions of APC residue.	We are satisfied that the measures (as outlined in section 4.2.2 of this document) will ensure that fugitive emissions are prevented, and where not practicable, minimised. There measures include:- • APC unloading system consisting of using inner core and an outer 'bellow' system extracting displaced air from the silo (which is filtered and vented back into the silo). • Containers or vessels to be sealed or covered to prevent the release of dust. Section 6.5.3 of this document covers fugitive emissions.
Concerns over whether residues will be minimised	We have considered furnace optimum running conditions to minimise residues in our assessments. We are satisfied that they were appropriately considered. The Permit contains a limit on TOC in bottom ash which will ensure good burn-out and minimise residue quantity. We have set an improvement condition to ensure that abatement systems are optimised which will also help minimise APC residues.
Comments about Fire Prevention Plan (FPP)	

Concerns that the fire prevention measures do not meet those in the Environment Agency guidance including pile size requirement. Separation Distances concerns with lack of 6 m distance between piles of wasted and whether the applicant will use fire bays	Some of the measures in the FPP differ to those in our guidance including the pile size. However our guidance allows alternative measures to be used. In this case the Applicant proposed alternative measures in their FPP that we are satisfied with.
Concerns the Fire Prevention Plan (FPP) lacks information on location of equipment and details on site plans.	The FPP and subsequent Schedule 5 response covers these issues and we are satisfied with the measures proposed.
Concerns over lack of specific detail in the fire prevention plan	The Applicant submitted a fire prevention plan (FPP). We are satisfied with the level of detail provided and that the Installation will be able to control fire risk. We have set a pre-operational condition for the Operator to submit a revised FPP after the detailed design stage.
Concerns for sensitive receptors in relation to FPP and communication procedures	The FPP and subsequent Schedule 5 response provided an updated plan (Appendix A) showing the receptors within 1km of the Installation. We are satisfied with the measures proposed.
Requirement to provide details on the prevention, detection and control of fires in electrical control systems including the use of fireproofed cabling.	All fire detection systems shall be installed in accordance with BS 5839, Part 1 (2002) and subsequent amendments to give level P1 + M coverage in accordance with the requirements of the Loss Prevention Council ("LPC") guidance. In the boiler house the main cable trays and other fire sensitive areas will be protected with a sprinkler system. We are satisfied with the measures proposed.
Concerns over lack of detail on the of waste that will be quarantined/non-compliant including the waste stored in the skip.	Unacceptable waste (such as large, bulky non-combustible items) will be removed from the bunker for further inspection and quarantine, prior to transfer off-site to a suitable disposal/recovery facility A suitable area for the quarantine of unacceptable waste will be designated as part of the detailed design stage. Pre-operational condition PO10 requires the Operator to provide confirmation of the final design details of Installation prior to commissioning.
Concerns over whether industrial heaters will be used.	Industrial heaters will not be installed at the Facility
Comments about other issues	
Concerns regarding the identified risks and control measures in the Environmental risk assessment.	We assessed these issues when we conducted the risk assessment. We are satisfied that they were appropriately considered.
Concerns over groundwater contamination risk and the appropriateness of the boreholes used for site investigation.	We have considered these issues in our assessment. We are satisfied that it has been appropriately considered.

	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. See section 4.2.2 for further details.
Concerns over the precautionary principle.	The United Kingdom Interdepartmental Liaison Group on Risk Assessment (UK-ILGRA) state in their paper "The Precautionary Principle: Policy and Application" that the precautionary principle should be invoked when there is good reason to believe that harmful effects may occur and the level of scientific uncertainty about the consequences or likelihood of the risk is such that the best available scientific advice cannot assess the risk with sufficient confidence to inform decision making. The Health Protection Agency (as it was called then) stated in its response to the British Society for Ecological Medicine Report, "The Health Effects of Waste Incinerators that "as there is a body of scientific evidence strongly indicating that contemporary waste management practices, including incineration, have at most a minor effect on human health and the environment, there are no grounds for adopting the 'precautionary principle' to restrict the introduction of new incinerators". As explained in section 5.3 Public Health England maintain their view on impacts from incineration.
Concerns over Sustainable development, section 4 of the Environment Act 1995.	This is covered in section 7.2.1 of this document.
Technical Ability - Form Part B2 section 3b has not been completed.	This is only required for relevant waste operations and incineration is not a relevant waste operation.
Concerns over environmental incidents reported by Fortum, and compliance with licences issued by other Public Bodies.	We will regulate the site to ensure that the Operator operates the plant as described in the Application and complies with the conditions of any permit. If there are complaints / issues we will investigate them and take enforcement action if appropriate and/or require additional measures to be implemented to reduce any breaches of the permit. The Applicant confirmed that there have been no major or substantial emissions breaches at plants operated by Fortum that resulted in either formal or informal enforcement actions, such as fines or penalties. The Applicant implements a comprehensive reporting logbook system to record all deviations related to plant operation at its sites. The logbook

	includes detailed analysis of the root cause, a reflection on the lessons learnt, as well as any relevant closing protocols, to ensure (as well as improve) the compliant operation of the plant. The reporting and analysis of such incidents aims to prevent re-occurrence of the incident, and the system has proved successful on a number of occasions in preventing further deviations. Based on the details provided, we are satisfied with the operator's competence. This is covered in section 4.3.1 and 4.3.2 of this document.
Concern over emissions limit exceedances and other notifiable incidents occurred at energy from waste/incinerator plants in England	The incineration sector is generally a good sector in terms of compliance. If any Permit breaches occur at the Installation they will be dealt with in line with our enforcement and sanctions policy. We will investigate to determine the cause of the breach. If appropriate, we will require the Operator to put measures in place to prevent re-occurrence.
Pest Management Plan: concerns over lack of plan	We are satisfied that there will not be a significant problem with pests. Pests are not usually a problem at other municipal waste incinerators that we regulate. We can however request a pest management plan through the Permit condition if needed
Concerns over the Operator's financial competence.	The core EPR guidance states at 9.22 we should only consider financial solvency explicitly in cases where we have doubts as to the financial viability of the activity. We have no doubts as to the general financial viability of the activity. Based on this we have no reason to consider that the Applicant will not be financially competent. In any event, given the conditions in the permit if they cannot discharge the preoperational conditions they will not be able to commence activities and they can only get to that stage if they are financially competent
Concerns over the Operator competence	We are satisfied that the Applicant will be a competent operator because: · An EMS certified to ISO 14001 will be in place · A suitably qualified facility manager will be appointed who will have responsibility of Permit compliance · An environmental policy will require that the Installation operates in full compliance with legislative requirements · Additional information in section 4.3 of this decision document

Concerns site closure plan not in place	A pre-operational condition requires the Operator to have an Environmental Management System in place before the Installation is operational, and this will include a site closure plan. More details regarding site closure are presented in section 4.2.3.
Concern over whether NOx abatement will be optimised.	We have set an improvement condition for the SNCR system to be optimised.
Compressed Air: concerns over lack of detail what processes use compressed air and any environmental risks.	The Applicant has stated that cleaning of the fabric filter located at the top of the silo will be done automatically with compressed air after filling operations. We have no concerns over any environmental risk of using compressed air.
Concerns over what the Hauling Opening is and why it is 5.6m high.	These are the access points to the building for maintenance vehicles and mobile plant
It is not clear what the driers are used for. Concern over the energy consumption and what the monitoring and maintenance requirements are.	The applicant has confirmed within their response to the second schedule 5 notice: The driers remove moisture from the air that is fed into the compressor station to avoid damaging compressed air equipment (with moisture). Energy consumption of the driers will be low in comparison to other processes at the Facility. Notwithstanding this, the energy consumption of the driers is included within the overall Facility parasitic load and within the calculations. Monitoring and maintenance will be undertaken in accordance with the manufacturers recommendations. Preventative maintenance of all equipment at the Facility will be undertaken in accordance with the documented management systems for the site.
Comments about monitoring	
Stack emissions: Concerns over the sampling locations (CEMs and periodic monitoring) meeting requirements of Environment Agency monitoring guidance.	We have included a pre-operational condition whereby we require the Operator to submit a written report specifying arrangements for continuous and periodic monitoring of emissions to air to comply with Environment Agency guidance. The Operator will also be required via an IC to carry out tests to assess whether the air monitoring location(s) meet the requirements of BS EN 15259 and supporting Method Implementation Document (MID).

Concerns over the monitoring of the stack and the technology used, whether there is adequate safe access to carry it out, and whether staff are appropriately trained to carry out monitoring.	Permit conditions are included to ensure that Permanent means of access shall be provided to enable sampling/monitoring to be carried out in relation to the emission points specified in schedule 3 tables S3.1, S3.1(a), S3.2 and S3.3. The Operator's monitoring will have either MCERTS certification or MCERTS accreditation as appropriate. MCERTS is the Environment Agency's Monitoring Certification Scheme. If monitoring complies with MCERTS we can have confidence in the monitoring of emissions. In addition we will carry out audits of the Operator's monitoring. If we found problems with the monitoring we would take action to put this right and could do our own monitoring if required.
Periodic Monitoring: Concerns that periodic monitoring will result in undetected exceedances.	The Permit requires continuous monitoring for emissions to air of particulates, oxides of nitrogen, sulphur dioxide, carbon monoxide, total organic carbon, hydrogen chloride and ammonia and for mercury and dioxins, if required. Others substances are required to be monitored quarterly or bi-annually. These requirements are in line with the IED and we consider these measures to be appropriate. The plant has to shut down if abatement is not operating outside of abnormal operation. The Permit also requires continuous monitoring of several process variables (e.g. combustion temperature) to ensure that the incinerator is running optimally and minimising emissions. We are satisfied that the monitoring requirements in the Permit are appropriate.
Concerns over how the consultation was carried out.	We are satisfied that consultation steps we took were appropriate. Section 2 has further details.
Comments about PHE response	
Concerns we are ignoring PHE in relation to the recommendation, that "action" on air pollution "is required at all levels", and "everyone has a role to play".	We have consulted with PHE and they have raised no concerns about the proposed installation. Furthermore, the conditions and restrictions included in the permit will ensure that the site activities will not cause significant pollution. We consider we have taken what action is appropriate in respect of this determination.

c) Representations from Individual Members of the Public

A total of 115 of responses were received from individual members of the public. Many of the issues raised were the same as those considered above. Only those issues additional to those already considered are listed below:

Brief summary of issues raised:	Summary of action taken / how this has been covered
Comments about public consultation	
Concerns how the EA publicised the permit application	We are satisfied that we took appropriate steps to inform people about the Application and to inform people about the consultation. This was proven by the large number of consultation responses that we received. Further details on how we consulted are in section 2.2 of this decision document.
Concerns that the newsletter / leaflet did not contain all the relevant information on what the local community could comment on	The newsletter was delivered to 12,000 residences in the local area. The purpose of the newsletter was to inform people about the Application and to provide information as to how they could view and comments on the Application. We are satisfied that the newsletter achieved these aims.
Comments about Emissions	
Concerns over emission of pollutants for which the IED does not require monitoring	IED chapter IV and the BAT C set limits for the most significant substances that will be emitted. This is discussed in more detail in section 5 of this decision document. The operating techniques and abatement plant will minimise emissions of these substances and also of other substances. Other substances will not be released in significant quantities.
Comments about other issues	
Concerns about that exposure to air pollutants increases the likelihood or severity of COVID-19 infection	The HHRA is very much a worst case assessment We audited the HHRA and we are satisfied that impacts will not be significant. A link between air pollution and severity of Covid-19 has been reported. The incinerator will not cause any significant air pollution, local air quality will continue to comply with air quality standards, and so will not have a significant impact on health including on the severity of Covid-19 symptoms for any age groups.

Concerns over Human rights act, article 1, 2 and 8	See section 7.2.3 for information on how we have considered the Human Rights Act.
Concerns over Section 108 Deregulation Act 2015	See section 7.2.2 for information on how we have considered growth duty.
Comment (s) received in support of the proposed Installation	No action required
Concerns no new jobs linked to the site	Creation of jobs does not form part of the Environmental Permit decision making process.
Concern over safety of syngas	The Applicant has proposed to use a furnace technology comprising moving grate which does not produce syngas Pyrolysis/Gasification lead to the production of a syngas these process will not be taking place at this site.
Concerns the sites proximity to Scotland would mean waste from Scotland destined for landfill would come to the installation.	The Permit does not control where the waste comes from because that falls outside the scope of this permit determination.
Concerns alternative power source not considered – seven windmills would produce the same power	This issue is outside the scope of this permit determination.
Concerns alternative transportation of waste not considered – such as trains	These may be matters for the planning authority and are not things we can consider in the permit determination which relates to the impact of emissions from the facility.
Comments about location	
Concerns change to wind will lead to impacts at from emissions and odour impacts near residential areas similar to other sites in the area	Weather data was included in the dispersion modelling and therefore the wind direction and its impacts has been taken into account. Measures to prevent odour emissions are set out in section 6.5.4 of this decision document, and change in wind direction will not affect conclusions. We have already considered impacts using conservative assessments (for worst case). The results are acceptable so any other receptors would not be significantly impacted. We are satisfied that odour impacts are unlikely to occur and Permit conditions will control this.
Comments about health impacts	
Concern over health impacts including asthma and other health conditions	Our view is that there will not be a significant effect on health. This is in line with Public Health England's position statement as discussed in section 5.3 of this decision document.
Concerns dioxins and furans will be reformed by the "de novo synthesis" process	The boiler will be designed to avoid de novo synthesis of dioxins and furans. Further information is in section 6.1.1 of this decision document

Comments about fire risk	
Concerns installation poses a fire risk	The Applicant submitted a fire prevention plan (FPP). We are satisfied that the Installation will be able to control fire risk.
Comments about heat loss	
Concerns over Energy recovery	The BAT-AEL gross electrical efficiency should be between 25-35%. The gross electrical efficiency of the plant is calculated to be 33.75% which is at the top end of the BAT AEL requirement.
Comments about planning	
Several concerns were expressed over how the planning process had been carried out	The planning application and this environmental permitting Application are separate processes. We have assessed the application based on technology that was submitted in the application. It is not for us to comment on how the planning process has been carried out. Any changes relating to the planning decision are a matter for the planning authority. It is the Operator's responsibility to comply with all relevant statutory regimes and to ensure that any necessary authorisations are not in conflict. .
This proposed installation goes against the County Council's own Clean Air Policy	We do not agree that the plant will contravene local authority air quality policy. We are satisfied that the plant will not have a significant effect on air quality.
Concerns the application fails Chapter 8 of the Carlisle District Local Plan (2015 - 2030) It also appears to fail the Cumbria Minerals and Waste Local Plan Sept 2015.	The planning process and EPR permitting process are different processes. We have assessed the Application submitted to us. The Permit will require the Installation to be operated as described in the Application.
Comments about odour	
Concern over odour during waste transport to the site. Concerns at another similar site at West Point, Runcorn revealed a foul smell coming from 23 HGVs and containers waiting to be unloaded	The Permit can only control emissions that occur from inside the site. We are satisfied these will be adequately controlled. Waste will be delivered in enclosed or covered vehicles that will minimise odour emissions and prevent significant impacts.

d) Representations on issues that do not fall within the scope of this permit determination

Brief summary of issues raised:	Environment Agency comment
View expressed that this is not the right location for the Installation.	Location is primarily a land use planning issue. We have a legal duty to determine any application made to us for an environmental permit. Our role is to determine whether appropriate measures are used to prevent and minimise emissions and whether any impacts on the environment and health are acceptable. We have considered the location of receptors in making our decision.
Concern over the effects of increased traffic on the local roads. Waste should be delivered by rail.	How waste is delivered to an Installation may be a relevant consideration for the grant of planning permission, but does not form part of the Environmental Permit decision making process which relates to the impact of emissions from the process.
Concern over impacts during construction.	Impacts from construction cannot be considered through environmental permitting. Our remit is to look at the impacts from operation of the Installation.
Concern over the visual impact of the site.	Visual impacts are a consideration for the planning process. The Environmental Permit decision making process is concerned with missions from the process.
Concern over damage general downgrading of the area including damage to the economy and house prices and tourism.	The permitting process is concerned with the impact of emissions from the process and we are satisfied these will not cause significant pollution of the environment or harm to human health
The incinerator will have a negative effect on recycling.	This is primarily outside the scope of this determination. Recycling initiatives are a matter for the local authority. The Permit does not allow wastes that have been separately collected for recycling to be burned, unless they are subsequently found to be unsuitable for recovery by recycling. Any waste generated will be recycled where possible.
The site should be used to generate renewable energy such as from wind or solar.	These issues are outside the scope of this permit determination.
There is a lot of public opposition to the incinerator.	We have considered the issues raised from the consultation responses that we received as set out in this decision document. However the number of responses and strength of opposition is not something we can take account of in this permit determination.
Question about whether a revised planning application will be required.	This is a matter for the planning authority.

Concern that during plant shut-down HGVs may queue on local roads. No details on the CCTV system mentioned in the planning application.	Traffic issues external to the Installation do not form part of the permitting process. However the Operator will have measures to divert waste away from the Installation during shut-downs.

B) Advertising and Consultation on the Draft Decision

This section reports on the outcome of the public consultation on our draft decision carried out between 02/12/2022 and 27/01/2023.

In some cases, the issues raised in the consultation were the same as those raised previously and already reported in section A of this Annex. They have not necessarily been repeated in this section, unless we felt it was useful to provide further clarity or explanation.

Also some of the consultation responses received were on matters which are outside the scope of the Environment Agency's powers under the Environmental Permitting Regulations. Our position on these matters is as described previously.

1) Consultation Responses from Statutory and Non-Statutory Bodies

Further representations were received from UKHSA, Director of Public Health (Cumbria County Council), Carlisle City Council and Natural England who raised the following.

Brief summary of issues raised:	Summary of action taken / how this has been covered
UKHSA stated no further comments to make and repeated their statement: based on the information contained in the documentation application supplied to us, UKHSA has no significant concerns regarding the risk to the health of the local population from the installation.	No action required
Carlisle City Council raised concern over the impacts at nature reserves but did not raise any new issues	No further action required as this has already been covered in section A of this annex above and section 5.4 of this document.
Natural England had no further comments to make	No further action required
Director of public health expressed concern as to whether BAT was being used to reduce emissions as far as possible.	Our view is that BAT will be used to minimise emissions. This is explained in detail in this decision document.
Permit does not comply with IED article 45(1): 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	The Permit does comply with this article of IED. The Permit specifies waste types and quantities and places restrictions on burning of separately collected fractions. Our view is that it is neither reasonable, practical or

established by Decision 2000/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate.	necessary to put specific limits on any of the individual waste types and therefore no further restrictions are appropriate.

2) Representations from Local MP, Assembly Member (AM), Councillors and Parish / Town / Community Councils

Representations were received from local a MP and a local councillor who raised the following issues:

Brief summary of issues raised:	Summary of action taken / how this has been covered
Several issues were raised expressing concern over the draft decision.	The issues raised were also covered in detail by other organisations, in particular by the response from CRAIN. The key issues raised and our response to them are therefore covered in section C below and not repeated in this section
Concern over light pollution.	Pollution from light is primarily a concern for considering visual impacts and as such covered by the planning process. In any event light pollution is not likely to have a significant effect on health or the environment.
Concern over how the Environment Agency will regulate the site.	We will regulate the site carrying out a continual assessment of plant operations and its environmental performance. This will include: We will regularly inspect the Installation (inspections can be announced or unannounced), review monitoring techniques and assess monitoring results to measure the performance of the plant, review operating techniques and review management systems and plans. We will carry out on-site audits of operator monitoring. The operator must inform us within 24 hours of any breach of the emissions limits, followed by a fuller report of the size of the release, its impact and how they propose to avoid this happening in the future. We will do our own monitoring if we consider it is appropriate. The operator's monitoring results will be placed on the public registers. If there is a breach then we will take appropriate enforcement action. The legislation provides sufficient mechanisms for effective regulation.
Consultation period was not long enough	Our consultation period is usually 4 calendar weeks, but we extended it to 6 calendar weeks. Our view is that the consultation period was appropriate to allow people time to comment on the draft decision.

3) Representations from Community and Other Organisations

Representations were received from CRAIN, the Laurie Brewis Trust, Carlisle and District Green Party, Eden Rivers Trust, Sustainable Carlisle Network, Cumbria Wildlife Trust who raised the following issues:

Brief summary of issues raised:	Summary of action taken / how this has been covered
Comments about air quality and health	
Concern over the way the Environment Agency has consulted with the UKHSA about health issues.	We consulted with the UKHSA on the Application and also on our draft decision. In both cases the UKHSA were satisfied that the Installation would not have a significant impact on health. The UKHSA have also confirmed that they are satisfied with the way the Environment Agency assess health impacts from incineration plants.
Concern over the Environment Agency's reliance on its own modelling results for air and noise assessments.	We used our own modelling to audit the Applicant's assessment and our view was that the Applicant's assessments could be used to determine the Permit.
Concern over the impact of emission to air of unknown pollutants or those where no limit is set.	The BAT conclusions and IED chapter IV sets limits for the most significant substances that will be emitted, and that no other substances are likely to be emitted in significant quantities. This is discussed in more detail in section 5 of this decision document. The operating techniques and abatement plant will minimise emissions of these substances and also of other substances. We are satisfied that no further ELVs are required.
Planning application showed significant impacts from the diesel generator plus the permitted generator is larger and will operate for longer than was proposed in the planning	We are satisfied that dispersion modelling is not required for emissions from the generator which will only be used for limited circumstances – emergency use and for testing. For context, if the generator was a standalone plant it would meet the screening distance criteria of the standard rules SR2018 No7 and not require further assessment.
Concern over lack of sensitivity analysis to stack emission parameters.	This was done and done appropriately. The parameters used are typical for this type of facility. In addition the parameters were included in the Applicant's sensitivity analysis comparing

	the 'nominal capacity' to the 'maximum capacity'. The results in Section 8.2 of the submitted AQA are based on the 'maximum capacity'. The sensitivity analysis indicates that the 'maximum capacity leads to higher predictions and the results are therefore more conservative. The applicant will be required to meet relevant emission limit values.
AQMAU audit trail document showed a large exceedance of the dioxin tolerable weekly intake.	As part of our audit we carried out a wide range of sensitivity analysis and figures in the audit trail should be read in that context. Our conclusion from our audit is that exceedance is not a credible scenario and that the impact from the Installation would not be significant based on either the TDI or TWI.
Concern over the impact on food at local allotments or animals kept at residential properties.	The HHRA included impacts from dioxin intake from locally grown food. The HHRA is based on very conservative criteria and impacts were shown to be insignificant. Further details are in section 5.3 of this decision document
HHRA does not include intake via sheep.	The assessment carried out by the Applicant used the USEPA HHRAP which does not include the consumption of sheep/lamb meat. We have undertaken check modelling using HHRAP utilising UK consumption of foods by UK adults and toddlers (g/kg bw/day) provided to us by the FSA in 2016 which does not include sheep. We have also undertaken check modelling using the 1996 HMIP Risk Assessment of Dioxin Releases from Municipal Waste Incineration Processes document (HMIP 1996) which also provides dose estimation methods for dioxins and furans (PCDD/Fs) which includes a wider range of meat categories including lamb and offal. Our checks confirm that exceedance of the assessment threshold (10% of the COT-TDI) is not likely as a result of emissions from the plant.
Concerns the lifetime of the Facility is taken as 30 years: but the operational lifetime could be 40 or even 50 years so applicant should determine if an extended operational lifetime of the facility would significantly increase the intake of dioxins	The exposure duration is assumed to be 30 years to represent the useful life of the facility. The averaging time for dioxins and furans lifetime exposure is assumed to be 70 years. These two values are recommended by US EPA for risk assessment purposes. It is worth noting that as technology evolves (i.e. new BAT conclusions), it is highly unlikely that facilities will operate for longer than 30 years without an equipment upgrade. Furthermore, the assumptions made for exposure are highly conservative as can be used as a screening assessment to understand the risks from these types of emissions.
List of fisheries provided previously by Ricardo have not been considered	The closest of the sites is about 10 km from the Installation and we are satisfied that not further assessment of impact is therefore required.

Permit does not limit abnormal operation periods.	This is not correct. Permit conditions 2.3.9 to 2.3.14 restrict it.
Errors in abnormal emissions section: • Dioxins based on 6ng/m3 not 10 ng/m3 Errors in the table in section 5.5	We have corrected the section. The changes do not affect the conclusions.
Permit would not be in accordance with the Clean Air Strategy 2019 or National Emissions Ceiling Regulations 2018	We do not agree with this. The Permit ensure no significant effects on air quality.
Comments about ecological assessment	
Concern that the Environment Agency has not addressed Natural England's concerns.	We consulted with Natural England and took their comments into account. We are satisfied that we have made the correct decision.
Detailed comments were received about impacts at ecological sites, in particular about why they did not agree with our assessment.	We are satisfied that our assessment is appropriate and that we have explained it in sufficient detail both in this decision document and the HRA.
Concern over the approach used to assess impacts at 'other' conservation sites.	The way we have assessed impacts at these sites is set in out in section 5.4.4. Our view is that this is an appropriate approach.
The ES for NOx of 30 µg/m^3 should be used to assess the wider area, not just at conservation sites.	We apply the NOx critical level to designated ecological sites, given their recognised ecological value, as a suitably conservative judgement. Whereas the critical level is not applied to vegetation outside of designated sites due to the recognised uncertainties in derivation and application of the critical level. In this case we are satisfied that we way we have applied it is appropriate.
Concern about impact on habitat sites from emissions during periods of abnormal operation.	As discussed in section 5.5 abnormal operation will only affect short term impacts. Critical levels for assessment of habitat sites are generally long term standards and so will not be affected. The only exception to this is the daily NOx critical level of 75 µg/m^3. A single event of abnormal operation is limited to 4 hours. It is very unlikely that there would be more than 4 hours of abnormal operation where there is complete failure of the NOx abatement system in a 24 hour period. This means that any increase in the NOx impacts would be small. If the plant operated with unabated NOx emissions for a whole day it would be in breach of the permit, but even in this scenario the daily NOx critical level would not be exceeded.

Concern over impact of emissions to water on Great Crested Newts including in the attenuation pond.	The Permit limits the discharge to uncontaminated surface water run-off. We are satisfied there will not be a significant impact.
Impacts at ecological sites up to 25 km away should have been considered in particular several peatland sites with Sphagnum mosses were listed	The sites that were listed in the response are considerably further away than the ecological sites that we have already considered. We are therefore satisfied that no further assessment is required as any impact on them would be even less than at the closer sites where the impact is acceptable.
Concern over impact on areas of outstanding natural beauty (AONB) and National Parks.	There are no such sites that could be damaged by emissions from the Installation.
Comments about noise	
Concern over low frequency noise.	There is a high level of uncertainty involved and a lack of reliable sound source data or prediction methods that deal with low frequency sound. The existing guidance for low frequency noise "NANR45", provides a method to evaluate existing low frequency noise issues, but this is limited to the assessment of existing impacts and is not applicable for predicting situations where low frequency noise disturbance may occur. In any event we have not identified low frequency noise as a risk as part of the proposed operations under the environmental permit, add so do not consider this will be an issue.
Noise impacts at commercial receptors have not been considered.	Residential properties will be the most sensitive to noise impacts. The Applicant used BS4142 to assess the impact which included impacts at the nearest residential receptor. Our view is that the measures to reduce noise will also mean no unacceptable impact at commercial receptors. We are satisfied that there would not be a significant impact from noise.
Multiple locations for receptor R2 are shown so the location used for predicting noise levels is unknown	The prediction noise model selected different receptors off Lowry Hill Road to show the variation in predicted noise impacts at a variety of receptors all of which were acceptable.
Noise weather station: Applicant statement about not having means of calibration is not correct.	The Vantage Vue weather station manual states "Your Vantage Vue weather station is factory-calibrated and tested to be highly accurate. You should not need to calibrate it." Wind direction doesn't need to be calibrated

	unless the solar panel of the weather station isn't facing due south when used in a northern hemisphere location. However, it is standard practice for the solar panel to be installed facing due south in-situ, as such we are satisfied that there was no need to calibrate and we can rely on the data.
Noise impacts from diesel generator – not included in noise assessment.	Due to size and limited operating times, we are satisfied that it will not cause a significant impact.
Concern over uncertainty of noise assessment predictions.	We have performed check modelling (including uncertainty checks) and are satisfied that the conclusions do not depart from the noise assessment provided with the Application.
Only waste delivery HGV movements have been considered in the noise assessment. Other movements such as ash removal were not included.	HGVs associated with the removal of incinerator bottom ash tend to be significantly less frequent than the HGVs associated with waste delivery. Other sites have ash collection at ~ 15% of the HGV flows predicted for deliveries of waste. If this were added to predictions of specific sound emissions from the Installation the overall predicted rating sound level at nearby residences wouldn't even increase by 1 dB.
Noise assessment does not include reversing alarms for HGVs.	A sound power level of LwA 103 dB without any on time corrections (i.e. 100% ontime) has been used to model 20 HGV trips within the site per hour during the daytime. This is considered to be representative and inclusive of the level associated with broadband reversing alarms, which would only be operational for a minimal period of time within any given hour. Also given the fact that contributions from this sound source are predicted to be below the existing background sound levels and residual sound levels (from non-site activity) at nearby residences when considered in isolation, HGV reversing alarms would not stand out against the underlying sound climate or change the predicted BS 4142 noise impacts. If the HGVs were to have tonal reversing alarms, we consider that an acoustic feature correction of +2 dB (for a tone which is just perceptible at the noise receptor in line with BS4142) could be applicable. This is considered a worst case assessment, as the contributions from HGV sound

	sources are predicted to below both background sound levels and residual sound levels and are generally unlikely to be perceptible at nearby receptors. When factoring in this worst case acoustic feature correction the predicted rating levels would increase by +2 dB, but the predicted BS4142 impact would remain unchanged from the previously predicted low impacts
Concern over on-site road maintenance and the effect on noise levels if not maintained.	This is something we will check when we inspect the site and require to be rectified if required.
Concern over which noise attenuation measures were included in the noise modelling.	Our audit report states that our conclusions are based on the measures described in section 5.1.1 of appendix 3 of the noise impact assessment. These measures are incorporated into the permit as operating techniques.
Comments about the consultation	
Concern over how the consultation has been carried out.	We carried out two consultations, firstly on the Application and then on our draft decision. In both cases we informed people about the consultation and how they could provide comments. We provided interested parties with sufficient information to comment on the Application and then also to comment on our draft decision. We have taken the issues raised from both consultations into account in making our final decision.
Claim that consultation comments were not considered in the draft decision document.	For incineration applications we often receive a very large number of consultation responses. It is not possible or necessary to include word for word every comment that we receive. All consultation comments are considered and the decision document includes a brief summary of the key issues raised from the consultation.
Concern over information not provided to the public as part of the consultation including an emissions 071019 spreadsheet referred to in the Environment Agency air quality audit trail.	We include all appropriate information in the consultation. We believe that this reference in the AQMAU audit template may either be a copy and paste error or a typographical error. The data which has been used to populate the source parameters table in the AQMAU audit template can be found in the permit application in table 17 of Appendix E - Air Quality Assessment.

Air and soil monitoring should be carried out at nearby receptors.	Ambient air or soil monitoring around operating incinerators are not reliable methods of establishing the impact as it does not identify the source of the emissions. We consider it is better to use air dispersion modelling to predict the impact based on the highest allowed emissions (emission limit values). We have audited the modelling and we are satisfied that it is suitable for assessing the impact from the Installation. The Permit requires monitoring to be carried out to ensure that the emission limits values that were used in the modelling are met
Other comments	
Concern over ammonia leak detection.	Ammonia gas is flammable. Risk associated with the ammonia storage facilities will be managed through a Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) assessment during the design and construction of the ammonia storage facilities. The assessment(s) will take into account explosion risks as a result of gas leaks and how to reduce risks associated with this The accident management plan that will form part of the EMS will require the Operator to prevent accidents/minimise their consequences.
Concern over storage of gas cylinders.	Measures are set out in the FPP and we are satisfied they are appropriate.
Concern that final design may change and affect risk assessments.	The operating techniques in the Permit are such that any significant departures from them, which could affect risk, would require a variation.
A revised FPP should be required after detailed design stage.	We have stated in Part A above that 'we have set a pre-operational condition for the Operator to submit a revised FPP after the detailed design stage'. the draft permit did not reflect this statement but we have now rectified this and added pre-operational condition PO11.
Concern over fire risk from electrical cabling.	The site will be constructed and operated in accordance with recognised standards for fire prevention, detection and control within electrical control systems. We are satisfied that appropriate cabling will be used
Concern over whether the interlock system is appropriate.	The information proposed in the Application along with Permit conditions deliver the relevant requirements of IED.

Concern over pollution in the event of flooding.	We are satisfied that measures proposed to prevent pollution in the event of an accident, including bunding, waste storage in the building, would prevent significant pollution in the event of a flood.
Several comments expressing an opinion that permit conditions will not prevent significant pollution and ensure BAT is used.	We do not agree with this. The permit will ensure that a high level of protection is provided for the environment and human health and that the techniques they will be required to use are BAT
Concern over operating techniques part of the permit.	We have incorporated the sections of the Application that we consider are key operating techniques. This is done by listing those sections in table S1.2 of the Permit. It is important to note that it is only operating techniques within those listed sections that are incorporated, rather than all text some of which may not be specifically about a technique. For example, where a waste code is listed in an application document that would not be an operating technique incorporated under table S1.2, instead waste types would be regulated through table S2.2 of the Permit where permitted wastes are listed.
Concern that the ammonia tank will not have a high level alarm.	The Applicant confirmed that the tank will have a high level alarm.
Concern over notification of residents and businesses in the event of a fire.	The FPP states that such procedures will be in place.
BAT assessments should have included damage costs	This is only required if applicant requires a derogation from a BAT AEL, which is not the case for this Application
Annex 1B states dust management plan is in in place but other sections of the decision document state that a dust management plan not required	The mention of a dust management plan in Annex 1B is in relation to BAT 26. BAT 26 refers to treatment of slags and bottom ash which is not proposed at this Installation. We have amended the text in Annex 1B.
Concern that baseline land condition has not been established	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. See section 4.2.2 for further details.
Concern that Environment Agency did not receive the full Environmental Statement.	The Applicant submitted the main body document of the Environmental Statement. The full statement also comprised of technical appendices and figures/drawings. The full statement was available to view on the website of Cumbria County Council. However as explained in section 7.1.1 our duty is to have regards to the information obtained or conclusions arrived at. Section 7.1.1 explains that as well as the Environmental Statement we also

	considered the decision of the Cumbria County Council to grant planning permission on 24 October 2016 and the report and decision notice of the local planning authority accompanying the grant of planning permission. We are satisfied we had sufficient information to determine the Application.
Metals not recovered from bottom ash.	Some plants carry out an initial screen to remove larger pieces of metals from the quenched ash before it is removed from site for treatment. However, the main treatment usually takes place at an IBA recovery site where it is screened for size and metals removed at that point. In this case the Applicant proposes for the treatment to be carried out off-site and we are satisfied with their proposals as metals will still be recovered off site.
Several responses were received stating that they did not agree with various aspects of our decision including air quality, health, ecological sites assessments and global warming.	As explained in detail in this decision document we are satisfied 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.

d) Representations from Individual Members of the Public

Over 40 responses were received from individual members of the public. Many of the issues raised were the same as those considered above. Only those issues additional to those already considered are listed below:

Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Concern over new housing at Crindledyke and Harker.	If new housing was proposed in the future they would require planning permission and the incinerator should be taken into account in assessing those proposals. However, we have the ability to review the Permit and vary the conditions if required. In any event the housing mentioned in this response is further away than receptors that we have already assessed and so would have lower impacts.

Dispersion modelling using AERMOD predicts higher impacts at ecological sites.	AERMOD predictions can be conservative in certain circumstances. Both ADMS and AERMOD predictions are fully validated against monitored pollution values. Validation documents are publicly available. As such, the performance of both models are well understood. We have evaluated predictions in the context of model validation documents and have taken uncertainties into account in our decision-making. We are satisfied there will be no unacceptable impacts at any ecological site.