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

Consultation on our decision document recording our decision-making process

The Permit Number is: EPR/BK0825IU/V009
The Applicant / Operator is: Riverside Resource Recovery Limited
The Installation is located at: Riverside Resource Recovery Facility, Norman Road, Belvedere, Bexley, Kent, DA17 6JY

Consultation commences on: DD Month 2022
Consultation ends on: 20 working days hence

What this document is about

This is a draft decision document, which accompanies a draft variation notice.

It explains how we have considered the Applicant's Application, and why we have included the specific conditions in the draft varied permit we are proposing to issue 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.

The document is in draft at this stage, because we have yet to make a final decision. Before we make this decision we want to explain our thinking to the public and other interested parties, to give them a chance to understand that thinking and, if they wish, to make relevant representations to us. We will make our final decision only after carefully taking into account any relevant matter raised in the responses we receive. Our mind remains open at this stage: although we believe we have covered all the relevant issues and reached a reasonable conclusion, our ultimate decision could yet be affected by any information that is relevant to the issues we have to consider. However, unless we receive information that leads us to alter the conditions in the draft Permit, or to reject the Application altogether, we will issue the Varied Permit in its current form.

In this document we frequently say "we have decided". That gives the impression that our mind is already made up; but as we have explained above, we have not yet done so. The language we use enables this document to become the final decision document in due course with no more re-drafting than is absolutely necessary.

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/BK0825IU/V009. 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/BK0825IU. We refer to the proposed varied permit as "the **Permit**" in this document.

The Application was duly made on 03/06/2021.

The Applicant is Riverside Resource Recovery Limited. We refer to Riverside Resource Recovery Limited as "the **Applicant**" in this document. Where we are talking about what would happen after the Permit is granted (if that is our final decision), we call Riverside Resource Recovery Limited "the **Operator**".

Riverside Resource Recovery Limited proposed facility is located at Riverside Resource Recovery Facility, Norman Road, Belvedere, Bexley, Kent, DA17 6JY. We refer to this as "the **Installation**" in this document.

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Glossary of acronyms used in this document

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

AAD	Ambient Air Directive (2008/50/EC)
APC	Air Pollution Control
AQS	Air Quality Stratergy
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
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
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 PHE – Public Health England)
HW	Hazardous waste
HWI	Hazardous waste incinerator
IBA	Incinerator Bottom Ash

IED	Industrial Emissions Directive (2010/75/EU)
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LOI	Loss on Ignition
MBT	Mechanical biological treatment
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
PHE	Public Health England
POP(s)	Persistent organic pollutant(s)
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
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
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
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 proposed decision

We are minded to grant the Variation to the Permit to the Applicant. This will allow it to operate the Installation as requested, subject to the conditions in the Varied Permit.

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

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

2 How we reached our draft decision

2.1 Receipt of Application

The Application was duly made on 03/06/2021. This means we considered it was in the correct form and contained sufficient information for us to begin our determination.
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 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 News Shopper Bromley - Bexley Edition, on the 8th December 2021.

We made a copy of the Application and all other documents relevant to our determination (see below) available to view on our Public Register on gov.uk, comments could be made at https://consult.environment-agency.gov.uk/psc/da17-6jy-riversideresource-recovery-limited or via email: pscpublicresponse@environment-agency.gov.uk.
Additionally, a phone number () was provided should anyone require advice about how to make a representation or if they were unable to make a representation via email. Anyone wishing to see these documents could do so and arrange for copies to be made.

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

- Food Standards Agency
- Local Authority – Planning
- Local Authority – Environmental Health
- Health & Safety Executive
- Fire & Rescue
- Director of Public Health & Public Health England

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

Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 2. We have taken all relevant representations into consideration in reaching our draft determination.

Having carefully considered the Application and all other relevant information, we are now putting our draft decision before the public and other interested parties in the form of a draft Variation Notice, together with this explanatory document. As a result of this stage in the process, the public has been provided with all the information that is relevant to our determination, including the original Application and additional information obtained subsequently, and we have given the public two separate opportunities (including this one) to comment on the Application and its determination. Once again, we will consider all relevant representations we receive in response to this final consultation and will amend this explanatory document as appropriate to explain how we have done this, when we publish our final decision.

3 The legal framework

The Variation will be granted, if appropriate, under Regulation 20 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

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

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

We consider that, if we grant the Variation, 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 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, (including storage of treatment chemicals), and the ash storage bunker, are therefore included in the listed activity description.

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

Therefore there are no directly associated activities.

4.1.2 The Site

There is no change to the site plan in Schedule 2 of the permit as a result of this variation.

Further information on the site is addressed below at 4.3.

4.1.3 What the Installation does

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

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

Riverside Resource Recovery Limited (RRRL) operates the River Resource Recovery Facility (RRRF), a three-stream Energy Recovery Facility (the Facility) is located at Belvedere in the London Borough of Bexley.

The incinerator RF includes a three-stream energy recovery process. This includes waste reception, storage and pre-treatment facilities, waste-fuel and air supply systems, boilers, electrical generators, facilities for treatment of exhaust gases, on-site facilities for treatment or storage of raw materials, residues and waste water, the stack and devices system for controlling, recording and monitoring incineration operations. Although most of the waste is imported by river, the installation does not cover jetty operations.

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

Waste throughput, Tonnes/line	283,333 /annum	32.3 /hour
Waste processed	Municipal Solid Waste and Commercial and Industrial Waste (Non-hazardous waste only)	
Number of lines	3	
Furnace technology	Grate	
Auxiliary Fuel	Gas Oil	
Acid gas abatement	Semi-dry	Lime
NOx abatement	SNCR	Aqueous Ammonia (Ammonium Hydroxide)
Reagent consumption	Auxiliary Fuel: 3000 tonnes per annum (no change as a result of this variation) Ammonia: 60 te/annum (extra) Lime : 500 te/annum (extra) Activated carbon: 20 te/annum (extra) Process water: no change as a result of this	

	variation	
Flue gas recirculation	No	
Dioxin abatement	Activated carbon	
Stack	Grid Reference: TQ4969680571	
	Height, 90 m	Diameter, 3.39[a] m
Flue gas	Flow, 160[b] Nm^3/s	Velocity, 18.7 m/s
	Temperature 129°C	
Electricity generated	83.9 MWe	0 MWh
Electricity exported	80.5 MWe	0 MWh
Steam conditions	Temperature, 424 °C	Pressure, 70 bar(g)

a) Combined stack diameter for 3 lines (2.27m individually)
b) Total flow rates for all 3 lines

4.2 The site and its protection

4.2.1 Site setting, layout and history

No change to the site setting, layout or history.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

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

There will be no change to the site footprint, waste and raw materials storage locations or volumes as a result of this variation and so there is no change to the Site Condition Report needed.

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 still 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 already has an Environmental Management System (EMS) in place and have confirmed that this will be updated to include the changes made by this variation.
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

There is no change to the site security as a result of this variation.

4.3.4 Accident management

There is no change to the risk of accidents that may cause pollution as a result of this variation.

4.3.5 Off-site conditions

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

4.3.6 Operating techniques

We have specified that the Applicant must operate the Installation in accordance with the following documents contained in the Application:

Description	Parts Included	Justification
The Application	Sections 3.1	Proposed operating techniques for the changes.
Email dated 11/03/22	confirmation of proposed storage infrastructure and CHP readiness	Required to confirm there is no change to the storage infrastructure as a result of the increased throughput and the sites CHP readiness status
Email dated 09/04/22	Confirmation of steam conditions and auxiliary fuel consumption	Required in order to complete the table in section 4.1.3 of this Decision Document

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.

There has been no change to the limits and controls on the use of raw materials and fuels.

Article 45(1) of the IED requires that the Permit must include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2005/532/EC, EC, if possible, and containing information on the quantity of each type of waste, where appropriate. The Application contains a list of those wastes coded by the European Waste Catalogue (EWC) number, which the Applicant will accept in the waste streams entering the plant and which the plant is capable of burning

in an environmentally acceptable way. We have specified the permitted waste types, descriptions and where appropriate quantities which can be accepted at the installation in Table S2.2.

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

(i) There has been no change to the list of wastes accepted due to this variation application

The incineration plant will continue to take municipal waste, which has not been source-segregated or separately collected or otherwise recovered, recycled or composted. Waste codes for separately collected fractions of waste (with the exception of waste wood classified under EWC code 20 01 38) are not included in the list of permitted wastes, except that separately collected fractions which prove to be unsuitable for recovery may be included.

We have limited the capacity of the Installation to 850,000 tonnes per annum. This is based on the installation operating 8,760 (7,657) hours per year at a nominal capacity of 97 tonnes per hour.

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

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

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

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

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

(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, mostly linked to improved combustion controls, modifications to the steam circuit and adjustments to the generator and turbine software. All of which result in the facility being able to export up to 80.5 Mwe. These can be broken down further as follows:

- Improved feed rate control;
- Automated adjustment of the nominal calorific value (NCV) of the waste;
- Improved logic software for burn-out control;
- Improved logic for detection of waste layer thickness;
- Automated adjustment of the O2 setpoint; and
- Automated adjustment of the primary air distribution

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 70 kWh/tonne. The installation capacity is 850,000 t/a.

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

The LCV in this case is expected to be 9.6 MJ/kg. The specific energy consumption in the Application is in line with that set out above, at 70 KWh/t.

(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 facility will be capable of recovering 0.65 MWh/tonne of waste following the plant improvements, which is slightly higher than the current capability of 0.61 MWh/tonne of waste.

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 site is already designed as CHP ready and the Operator has recently received funding from the Heat Networks Investment Project (HNIP) for the development of a heat network which will export heat from RRRF and the adjacent facility – REP. Information on the funding and the heat export can be found here.
https://www.corygroup.co.uk/media/news-insights/hnip-funds-one-uks-largest-heat-networks-be-delivered-collaboration-between-cory-and-vattenfall/

(iv) R1 Calculation

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

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

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

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

Compliance with Article 14(5) of the Energy Efficiency Directive is not a relevant consideration because the installation is an existing plant which has not been *substantially refurbished.*

(viii) Permit conditions concerning energy efficiency

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 continue to 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 ammonia used per tonne of waste burned. This enables 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 continue to 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.

The only change as a result of this variation is a slight increase in the volumes of raw materials used.

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 produces are bottom ash and air pollution control residues and recovered metals.

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 3.1.5 and associated Table S4.5 specify limits for total organic carbon (TOC) of <3% / loss on ignition (LOI) of <5% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable.

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

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

Table S4.5 requires the Operator to carry out an ongoing programme of monitoring of IBA residues in order to ensure that they are adequately characterised.

Having considered the information submitted in the Application, we are satisfied that the waste hierarchy referred to in Article 4 of the WFD will continue to 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 1.5.1 will ensure that this position is maintained.

5. Minimising the Installation's environmental impact

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

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

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

5.1 Assessment Methodology

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

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

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

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

5.1.2 Use of Air Dispersion Modelling

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

Once short-term and long-term PCs have been calculated in this way, they are compared with Environmental Standards (ES). ES are described in our web guide ‘Air emissions risk assessment for your environmental permit’.

Our web guide sets out the relevant ES as:

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

Where an Air Quality Standards Regulations 2010 (AQSR) Limit Value exists, the relevant standard is the AQSR Limit Value. Where an AQSR Limit Value does not exist, AQS Regulations 2010 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 AQSR limit values, AQSR 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 AQSR value. In such cases, we use the AQS objective for our assessment.

AQSR target values, AQS objectives and EALs do not have the same legal status as AQSR 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 exceedences of the relevant ES are likely. This is done through detailed audit and review of the Applicant's air dispersion modelling taking background concentrations and modelling uncertainties into account. Where an exceedance of an AQSR limit value is identified, we may require the

Applicant to go beyond what would normally be considered BAT for the Installation or we may refuse the application if the Applicant is unable to provide suitable proposals. Whether or not exceedences are considered likely, the application is subject to the requirement to operate in accordance with BAT.

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

If, as a result of reviewing 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 Sections 5 & 6 of the Environmental Impact Assessment Report, Volume 1: Main Report 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 and 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 dispersion modelling software, 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 Leeds-Bradford airport between 2013 and 2017.

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 and the upper range emission concentrations mentioned in the Reference Document on the Best Available Techniques (BREF) 2006 for Waste Incineration, we have considered emission concentrations from the BREF published in 2019. These substances are:
    - Oxides of nitrogen (NO_x), expressed as NO_2
    - Particulate matter

    - Carbon monoxide (CO)
    - Sulphur dioxide (SO_2)
    - Hydrogen chloride (HCl)
    - Hydrogen fluoride (HF)
    - Metals (Cadmium, Mercury, Antimony, Arsenic, Lead, Chromium, 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)
- Oxides of nitrogen (NO_x), expressed as NO_2, the Long-Term (LT) assessment of pollutants from the incinerator facility are in agreement with the upper-end of the range of Best Available Techniques Associated Emission Levels (BAT-AELs) for existing waste incineration facilities published in table 6 of the BAT conclusions document. This is due to the incinerator facility operating Selective Non-catalytic Reduction (SNCR) for the abatement of NO_x
- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term ELVs/BAT-AELs, 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 5.2.5.

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

The whole of LBB, LBBD and RBG were designated as AQMAs with respect to NO2 and PM10, in 2007, 2008, and 2001 respectively. Where an AQMA is designated, LAs need to prepare Action Plans and work towards meeting the National Air Quality Strategy Objectives.

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.

Maximum Process Contributions (PCs) are presented from tables 5.22 and 5.23 submitted by the Applicant. The Applicant presents impacts at sensitive receptors when PCs are not insignificant at grid locations.

We note that:
- The overall long-term impact of RRRF following the implementation of ROP is <1% of the EAL for most pollutants.
- Where the maximum total long term PC from RRRF post ROP exceeds 0.5% of the EAL, further consideration of the long-term impacts at discrete receptors is presented for key pollutants (PM10, PM2.5, NO2, TOC, Cadmium, Arsenic, Chromium VI, Nickel and PAHs)

- The Applicant predictions indicate that PCs are either insignificant or PECs are below ES at both maximum grid concentrations and at discrete receptors.

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

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

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

5.2.1 Assessment of Air Dispersion Modelling Outputs

The Applicant's modelling 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 ground level concentrations at the most impacted receptor.

Assessment of Emissions to Air (1)

Pollutant	ES		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m^3	Reference period	µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
NO_2	40	Annual Mean	28	1.7	4.25	29.7	74.3
	200	99.79th %ile of 1-hour means	56	7.96	4.0	64.0	32.0
PM_{10}	40	Annual Mean	20	0.07	0.18	20.1	50.2
	50	90.41st %ile of 24-hour means	23.6	--	0.00	23.6	47.2
$PM_{2.5}$	20	Annual Mean	12	0.07	0.35	12.07	60.4

SO_2	266	99.9th %ile of 15-min means	2.7	23.4	8.8	26.1	9.8
	350	99.73rd %ile of 1-hour means	2.3	19.6	5.60	21.9	6.3
	125	99.18th %ile of 24-hour means	1.3	11.56	9.3	12.864	10.3
HCl	750	1-hour average	0.6	1.31	0.17	1.9	0.25
HF	16	Monthly mean	--	0.05	0.31	--	--
	160	1-hour average	1	0.16	0.1	1.16	0.7
CO	10000	Maximum daily running 8-hour mean	242	6.38	0.06	248	2.5
	30000	1-hour average	346	8.2	0.03	354	1.2
TOC	2.25	Annual Mean	0.13	0.13	5.78	0.26	11.56
	30	Daily average	0.96	1.64	5.47	2.60	8.67
PAH	0.00025	Annual Mean	0.00016	2.83E-06	1.13	0.00016	65.1
NH_3	180	Annual Mean	2.9	0.13	0.07	3.03	1.68
	2500	1-hour average	5.9	1.64	0.07	7.54	0.3
PCBs	0.2	Annual Mean	4.44E-07	6.73E-05	0.03	0.00007	0.03
	6	1-hour average	2.22E-07	8.20E-04	0.01	0.00082	0.01
Dioxins			9.00E-06	8.08E-10		0.00001	

TOC as 1,3 butadiene for long term and benzene for short term, PAH as benzo[a]pyrene

Assessment of Emissions to Air (2)

Pollutant	ES		Back-ground	Process Contribution		Predicted Environmental Concentration	
	ng/m³	Reference period	ng/m³	ng/m³	% of EAL	ng/m³	% of EAL
Cd	5	Annual mean	0.34	0.269	5.4	0.61	12.2
Hg	250	Annual mean	1.6	0.269	0.11	1.87	0.75
	7500	1-hour average	3.2	3.28	0.04	6.48	0.086
Sb	5000	Annual mean	1.3	0.155	0.00	1.46	0.03
	150000	1-hour average	2.6	1.89	0.00	4.49	0.003
Pb	250	Annual mean	10.6	0.677	0.27	11.28	4.51
Co			0.11			0.11	
Cu	10000	Annual mean	10.7	0.391	0.00	11.09	0.111
	200000	1-hour average	21.4	4.76	0.00	26.16	0.013
Mn	150	Annual mean	5.9	0.808	0.54	6.71	4.47
	1500000	1-hour average	11.8	9.84	0.001	21.64	0.00
V	5000	Annual mean	1.5	0.0808	0.00	1.58	0.03
	1000	24-hr average	2.9	0.984	0.10	3.88	0.39
As	6	Annual mean	0.92	0.337	5.62	1.26	21.0
Cr (II)(III)	5000	Annual mean	2.1	1.24	0.02	3.34	0.067
	150000	1-hour average	4.2	15.1	0.01	19.30	0.0129
Cr (VI)	0.25	Annual mean	0.42	0.00175	0.70	0.42	168.7

Ni	20	Annual mean	1.3	2.9600	14.80	4.26	21.3

(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:

- NO_2 (Short Term)
- PM_{10} (Long Term & Short Term)
- $PM_{2.5}$ (Long Term)
- SO_2 (Short Term)
- HCl (Short Term)
- HF (Short Term)
- CO (Short Term)
- TOC (Short Term)
- NH_3 (Long & Short Term)
- PCBs (Long & Short Term)
- Hg (Long & Short Term)
- Sb (Long & Short Term)
- Pb (Long Term)
- Cu (Long & Short Term)
- Mn (Long & Short Term)
- V (Long & Short Term)
- Cr (II)(III) (Long & Short Term)
- Cr (VI) (Long Term)

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 (Long Term)
- TOC (Long Term)
- PAH (Long Term)
- Cd (Long Term)
- As (Long Term)
- Ni (Long Term)

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

All emissions either screen out as insignificant or where they do not screen out as insignificant are considered unlikely to give rise to significant pollution.

5.2.2 Consideration of key pollutants

(i) Nitrogen dioxide (NO_2)

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

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

The peak short term PC is less than 10% of the ES and so can be screened out as insignificant.

(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 20 $\mu g/m^3$ as a long-term annual average was used, having changed from 25 $\mu g/m^3$ in 2020.

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

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

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

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

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

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

(iii) Acid gases, SO_2, HCl and HF

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

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

Emissions of SO_2 can also be screened out as insignificant in that the short term process contribution is also <10% of each of the three short term ES values. Therefore we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

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

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

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

The Applicant has used the ES for 1,3 butadiene for their assessment of the impact of VOC. This is based on 1,3 butadiene having the lowest ES of

organic species likely to be present in TOC (other than PAH, PCBs, dioxins and furans).

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

The above tables show that for PAH emissions, the peak long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant.

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

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

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

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 (Long & Short Term)
- Sb (Long & Short Term)
- Pb (Long Term)
- Cu (Long & Short Term)
- Mn (Long & Short Term)
- V (Long & Short Term)
- Cr (II)(III) (Long & Short Term)
- Cr (VI) (Long Term)

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 (Long Term)
- As (Long Term)
- Ni (Long Term)

There were no metal emissions requiring further assessment. The Applicant has concluded that exceedences of the EAL for all metals are not likely to occur. The installation has been assessed as meeting BAT for control of metal emissions to air. See section 6 of this document. The Environment Agency's experience of regulating incineration plant is that emissions of metals are in any event below the BAT AELs which are lower than the Annex VI limits set in IED, and that the above assessment is an over prediction of the likely impact We therefore agree with the Applicant's conclusions.

Where the BREF sets an aggregate limit, the Applicant's assessment assumes that each metal is emitted individually at the relevant aggregate emission limit value. This is a something which can never actually occur in

practice as it would inevitably result in a breach of the said limit, and so represents a very much worst case scenario.

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

- Hg (Long & Short Term)
- Sb (Long & Short Term)
- Pb (Long Term)
- Cu (Long & Short Term)
- Mn (Long & Short Term)
- V (Long & Short Term)
- Cr (II)(III) (Long & Short Term)
- Cr (VI) (Long Term)

The following emissions of metals whilst not screened out as insignificant were assessed as being unlikely to give rise to significant pollution:

- Cd (Long Term)
- As (Long Term)
- Ni (Long Term)

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)

The entire London Borough of Bexley, as well as the neighbouring local authorities (London Borough of Barking and Dagenham, London Borough of Havering and Royal Borough of Greenwich) has declared two Air Quality Management Areas (AQMAs) with respect to annual mean NO_2 and 24-hour mean PM_{10} National Air Quality Strategy (AQS) objectives. In addition, the London Borough of Barking and Dagenham and the London Borough of Bexley AQMAs have also been declared due to exceedances of annual mean PM_{10} AQS objective.

These are located as follows:

- Bexley AQMA (London Borough of Bexley)
- Havering AQMA (London Borough of Havering)
- Barking and Dagenham AQMA (London Borough of Barking and Dagenham)

From the Applicants model, the process contribution at all points within each of the AQMAs is predicted to be well below 1% of the ES for PM10 (annual mean and 24-hour) and can be considered insignificant.

For emissions of NO_2, the Applicant's modelling predictions for the pollutants in the AQMA are summarised in the tables below. The figures shown indicate the predicted peak ground level impact on pollutant concentrations in ambient air within the AQMA.

Table A-1 Point of Maximum Impact – Long-term Results

Pollutant	Long-term EAL	Averaging Period	RRRF (Current)		RRRF Post-ROP				Cumulative – ROP + REP			
			PC (µg/m³)	PC as % EAL	PC (µg/m³)	PC as % EAL	PEC (µg/m³)	PEC as % EAL	PC (µg/m³)	PC as % EAL	PEC (µg/m³)	PEC as % EAL
PM_{10}	40	annual	0.13	0.3%	0.07	0.2%	20.07	50.2%	0.12	0.3%	20.12	50.3%
$PM_{2.5}$	20	annual	0.13	0.7%	0.07	0.3%	12.07	60.3%	0.12	0.6%	12.12	60.6%
NO_2	40	annual	1.86	**4.7%**	1.70	**4.2%**	29.70	**74.2%**	2.18	**5.5%**	30.18	**75.5%**

Table A-2 Point of Maximum Impact – Short-term Results

Pollutant	Short-term-term EAL	Averaging Period	RRRF (Current)		RRRF Post-ROP				Cumulative – ROP + REP			
			PC (µg/m³)	PC as % EAL	PC (µg/m³)	PC as % EAL	PEC (µg/m³)	PEC as % EAL	PC (µg/m³)	PC as % EAL	PEC (µg/m³)	PEC as % EAL
PM_{10}	50	24-hr 90.41%ile	0.41	0.8%	0.21	0.4%	23.81	47.6%	0.34	0.7%	23.94	47.9%
NO_2	200	1-hour, 99.79%ile	8.81	4.4%	7.96	4.0%	63.96	32.0%	9.93	5.0%	65.93	33.0%

Overall, whilst 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 within the AQMA.

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

5.3.1 Our role in preventing harm to human health

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

i) Applying Statutory Controls

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

The main conditions in an EfW permit are based on the requirements of the IED. Specific conditions have been introduced to specifically ensure compliance with the requirements of Chapter IV. The aim of the IED is to prevent or, where that is not practicable, to reduce emissions to air, water and land and prevent the generation of waste, in order to achieve a high level of protection of the environment taken as a whole. IED achieves this aim by setting operational conditions, technical requirements and emission limit values to meet the requirements set out in Articles 11 and 18 of the IED. These requirements 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 (now PHE) 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 variation 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 2 of this document.

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

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

The human health risk assessment calculates the dose of dioxins and furans that would be received by local receptors if their food and water were sourced from the locality where the deposition of dioxins, furans and dioxin like PCBs

is predicted to be the highest. This is then assessed against the Tolerable Daily Intake (TDI) levels established by the COT of 2 picograms I-TEQ / Kg bodyweight/ day.

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

The overall maximum impacted receptor (R30 – Rainham Marshes) has been classified as an agricultural receptor, which is conservative as it assumes that a significant proportion of the diet of the receptor is sourced from the receptor point assessed, including milk and milk products. In reality, this location is only intermittently grazed by sheep and cattle. Given that people in the UK tend to source their diet from a wide geographical area, very little intake will occur due to any accumulation of dioxins at this receptor location.

Dioxins and Dioxin-like PCBs Impact – Maximum Impacted Receptors

Receptor	Adult (pg)	Child (pg)
Agricultural (R30 – Rainham Marshes)	0.0726	0.1026
Allotment (R04) – Jubilee Primary School)	0.0006	0.0018
Residential (R26 – Wallace Close)	0.0006	0.0018

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

For the maximum impacted receptor of each receptor type the overall impact (including the contribution from existing dietary intakes) is less than the TDI for dioxins and dioxin-like PCBs. Therefore, there would not be an appreciable health risk based on the emission of these pollutants.

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

In 2010, FSA studied the levels of chlorinated, brominated and mixed (chlorinated-brominated) dioxins and dioxin-like PCBs in fish, shellfish, meat and eggs consumed in UK. It asked COT to consider the results and to advise on whether the measured levels of these PXDDs, PXDFs and PXBs indicated a health concern ('X' means a halogen). COT issued a statement in December 2010 and concluded that " The major contribution to the total dioxin toxic activity in the foods measured came from chlorinated compounds. Brominated compounds made a much smaller contribution, and mixed halogenated compounds contributed even less (1% or less of TDI). Measured levels of PXDDs, PXDFs and dioxin-like PXBs do not indicate a health concern". COT recognised the lack of quantified TEFs for these compounds

but said that “even if the TEFs for PXDDs, PXDFs and dioxin-like PXBs were up to four fold higher than assumed, their contribution to the total TEQ in the diet would still be small. Thus, further research on PXDDs, PXDFs and dioxin-like PXBs is not considered a priority.”

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

5.3.3 Particulates smaller than 2.5 microns

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

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

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

In December 2010, COMEAP published a report on The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom. It says that “a policy which aims to reduce the annual average concentration of $PM_{2.5}$ by 1 $\mu g/m^3$ would result in an increase in life expectancy of 20 days for people born in 2008.” However, “The Committee stresses the need for careful

interpretation of these metrics to avoid incorrect inferences being drawn – they are valid representations of population aggregate or average effects, but they can be misleading when interpreted as reflecting the experience of individuals."

PHE also point out that in 2007 incinerators contributed 0.02% to ambient ground level PM_{10} levels compared with 18% for road traffic and 22% for industry in general. PHE noted that in a sample collected in a day at a typical urban area the proportion of $PM_{0.1}$ is around 5-10% of PM_{10}. It goes on to say that PM_{10} includes and exceeds $PM_{2.5}$ which in turn includes and exceeds $PM_{0.1}$. 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 from NO_2 (Short Term), PM_{10}, $PM_{2.5}$, SO2, HCl, HF, CO, TOC (Short Term), NH_3, PCBs, Hg, Sb, Pb, Cu, Mn, V, Cr (II)(III) and Cr (VI) have all indicated that the Installation emissions screen out as insignificant; where the impact of emissions of NO_2 (Long Term), TOC (Long Term), PAH, Cd, As and Ni have not been screened out as insignificant, the assessment still shows that the predicted environmental concentrations are well within air quality standards or environmental action levels.

The Environment Agency has reviewed the methodology employed by the Applicant to carry out the health impact assessment.

We have reviewed the Applicant's assessment focusing on evaluating the difference in predicted concentrations as a result of the permit variation. As a result of our audit, we conclude that Applicant's conclusions can be used for permit determination.

- In our comparison of Process Contributions (PCs) between the proposed ROP and the existing RRRF, we found that the degree of change in predictions is either insignificant or representing reduced impacts due to lower emission concentrations for particulate matter, dioxins and furans and metals.

Evidence for conclusions

- In our evaluation of the degree of change between the proposed ROP and the existing RRRF, we observe that:
    - Impacts of the variation are insignificant (i.e. below the insignificance criteria 1% long-term and 10% short-term environmental standards).
    - There are systematic reductions for a number of pollutants due to their decreased emission concentrations, however, the variability in NOx PCs is likely to be within modelling uncertainties.
- The Applicant did not present impacts of peak operations at the half-hourly Emission Limit Values (ELVs) from the Industrial Emissions Directive (IED). We have included these in our checks.
- We were able to replicate Applicant's emission rates for the pollutant emission concentrations presented in table 5.6. The emission concentrations are significantly reduced to half or more than half from the original RRRF for particulate matter, dioxins and furans and metals. Our results indicate that these reductions in pollutant emissions drive the reduction of PCs at locations of exposure.
- Since the degree of change in PCs as a result of the variation is insignificant, the following aspects are unlikely to change conclusions:
    - The Applicant modelled the cumulative impacts of the ROP and the planned Riverside Energy Project (REP), an additional ERF that will be located approximately 250 m east. However, this is likely to be conservative for most pollutants because the facility is already in operation and PC differences between ROP and RRRF are either similar or reduced. We considered our audit observations of the REP.

- The site is located within a number of Air Quality Management Areas (AQMAs) declared for PM and NO_2, where there is high temporal and spatial variability in pollutant concentrations at locations of exposure.
- The Applicant has not mentioned the three wind turbines located northeast the facility that might interfere with the plume. They seem to have been installed when the RRRF was in operation. We consider the inclusion of the wind turbines is unlikely to change conclusions on the degree of change in PCs between the ROP and the RRRF.

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 2.

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

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

5.4.1 Sites Considered

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

- Epping Forest (SAC)

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

- Abbey Wood, and
- Inner Thames Marshes

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

- Lesnes Abbey Woods (LNR)
- Crossness (LNR)
- Rainham Marshes (LNR)
- Goresbrook and the Ship & Shovel Sewer (LWS)
- Belvedere Dykes (LWS)
- Franks Park, Belvedere (LWS)
- Lower River Beam and Ford Works Ditches (LWS)
- Erith Quarry and Fraser Road (LWS)
- Rainham Railsides (LWS)
- St John the Baptist Churchyard, Erith (LWS)
- Mudlands (LWS)
- Riverside Sewage Treatment Works (LWS)
- Wennington, Aveley and Rainham Marshes (LWS)
- Ridgeway in Greenwich (LWS)
- Lesnes Abbey Woods and Bostoll Woods (LWS)
- Crossways Park and Tump 52 (LWS)
- The Ridgeway (LWS)
- Crossways Lake Nature Reserve and Thameside Walk Scrub (LWS)
- Southmere Park & Yarnton Way/Viridon Way (LWS)
- Erith Marshes (LWS)
- Thamesview Golf Course (LWS)
- Crossness Sewage Treatment Works Pond (LWS)
- Streamway, Chapman's Land and Erith Cemetery (LWS)
- Dagenham Breach and the lower Beam River in Dagenham (LWS)
- Hollyhill Open Space (LWS)
- River Thames and tribal tributaries (LWS)
- Lesnes Abbey Woods (AW)

5.4.2 Habitats Assessment

Epping Forest (SAC)

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.

An explanation of how we have assessed the potential impact of the installation on the European Site is further explained in section 7.3.1. A summary table is shown below.

Pollutant	ES / EAL (µg/m³)	Back-ground (µg/m³)	Process Contribution (PC) (µg/m³)	PC as % of ES	Predicted Environmental Concentration (PEC) (µg/m³)	PEC as % ES

Pollutant	ES / EAL (µg/m³)	Back-ground (µg/m³)	Process Contribution (PC) (µg/m³)	PC as % of ES	Predicted Environmental Concentration (PEC) (µg/m³)	PEC as % ES
Direct Impacts[2]						
NO_x Annual	30	42.2	0.03	0.1%	-	-
NO_x Daily Mean	75	49.8	1.2	1.6%	-	-
SO_2	20 (1)	1.7	0.01	0.05%	-	-
Ammonia	3 (1)	2.7	<0.01	<0.1%	-	-
HF Weekly Mean	0.5	0.3	<0.01	<0.1%	-	-
HF Daily Mean	5	0.3	0.01	0.1%	-	-
Deposition Impacts[2]						
N Deposition (kg N/ha/yr)	8	21.4	0.01	0.1%	-	-
Acidification (Keq/ha/yr)	1.103	1.7	<0.01	<0.2%	-	-

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

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

5.4.3 SSSI Assessment

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 does not damage the special features of the SSSI(s).

An explanation of how we have assessed the potential impact of the installation on the identified Sites of Special Scientific Interest is further explained in section 7.2.4.

The site is already in operation and in some cases, due to an improvement in operation of the installation the Process Contribution is less than before the variation. A summary of the changes to the process contributions following the variation and the potential impact to each identified SSSI is presented in the following tables.

Inner Thames Marshes – ER3

Pollutant	ES (µg/m³)	Back-ground (µg/m³)	Process Contribution (PC) (µg/m³)	PC as % of ES	Predicted Environmental Concentration (PEC) (µg/m³)	PEC as % ES
Direct Impacts[2]						
NO_x Annual	30	39.1	-0.07	-0.23%		
NO_x Daily Mean	75	46.1	-0.23	-0.3%		
SO2	20 (1)	2.2	-0.065	-0.3%		
Ammonia	3 (1)	2.2	0.01	0.21%		
HF Weekly Mean	0.5	0.3	<0.01	0.50%		
HF Daily Mean	5	0.3	<0.01	<0.09%		
Deposition Impacts[2]						
N Deposition (kg N/ha/yr)	20	18.3	0.03	0.13%		
Acidification (Keq/ha/yr)	Habitat not sensitive to acid deposition					

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

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

Abbey Wood – ER2

Pollutant	ES (µg/m³)	Back-ground (µg/m³)	Process Contribution (PC) (µg/m³)	PC as % of ES	Predicted Environmental Concentration (PEC) (µg/m³)	PEC as % ES
Direct Impacts[2]						
NO_x Annual	30	29	-0.01	-0.05%		
NO_x Daily Mean	75	34.2	-0.18	-0.2%		
SO2	20 (1)	1.7	-0.009	-0.045%		
Ammonia	3 (1)	1.9	<0.01	<0.02%		
HF Weekly Mean	0.5	0.3	<0.01	<0.14%		
HF Daily Mean	5	0.3	<0.01	<0.04%		
Deposition Impacts[2]						
N Deposition (kg N/ha/yr)	10	30.8	0.001	0.01%		
Acidification (Keq/ha/yr)	1.034	2.4	<0.01	-0.35%		

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.

The site is already in operation and in some cases, due to an improvement in operation of the installation the Process Contribution is less than before the variation. A summary of the changes to the process contributions following the variation and the potential impact to each identified other nature conservation sites is presented in the following table.

The table shows that the change to the PCs as a result of the variation are <1% and we can conclude that impacts are insignificant.

Lesnes Abbey Woods – ER2 – covered in SSSI assessment above

Crossness (LNR) – ER1 (0m away)

Pollutant	ES (µg/m³)	Back-ground (µg/m³)	Process Contribution (PC) (µg/m³)	PC as % of ES	Predicted Environmental Concentration (PEC) (µg/m³)	PEC as % ES
Direct Impacts[2]						
NO_x Annual	30	34.4	-0.03	-0.1%	--	--
NO_x Daily Mean	75	40.6	-1.14	-1.5%		
SO2	20 (1)	1.7	-0.013	-0.1%		
Ammonia	3 (1)	1.9	<0.01	<0.02%		
HF Weekly Mean	0.5	0.3	<0.01	-0.16%		
HF Daily Mean	5	0.3	<0.01	-0.03%		
Deposition Impacts[2]						
N Deposition (kg N/ha/yr)	20	17.5	-0.01	-0.05%		
Acidification (Keq/ha/yr)	5.071	1.4	-0.01	-0.11%		

as all other conservation sites are further away from the installation than the Crossness LNR, there is unlikely to be a negative impact.

No further assessment required for:

- Rainham Marshes (LNR)
- Goresbrook and the Ship & Shovel Sewer (LWS)
- Belvedere Dykes (LWS)
- Franks Park, Belvedere (LWS)
- Lower River Beam and Ford Works Ditches (LWS)
- Erith Quarry and Fraser Road (LWS)
- St John the Baptist Churchyard, Erith (LWS)
- Mudlands (LWS)
- Riverside Sewage Treatment Works (LWS)
- Wennington, Aveley and Rainham Marshes (LWS)
- Ridgeway in Greenwich (LWS)
- Lesnes Abbey Woods and Bostoll Woods (LWS)
- Crossways Park and Tump 52 (LWS)
- The Ridgeway (LWS)
- Crossways Lake Nature Reserve and Thameside Walk Scrub (LWS)
- Southmere Park & Yarnton Way/Viridon Way (LWS)
- Erith Marshes (LWS)
- Thamesview Golf Course (LWS)
- Crossness Sewage Treatment Works Pond (LWS)
- Streamway, Chapman's Land and Erith Cemetery (LWS)

- Dagenham Breach and the lower Beam River in Dagenham (LWS)
- Hollyhill Open Space (LWS)
- River Thames and tribal tributaries (LWS)
- Lesnes Abbey Woods (AW)

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. There has been no change to this as a result of this variation.

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 8 ng/m^3 (100 x normal)
- Mercury emissions are 100 times those of normal operation
- NO_x emissions of 500 mg/m^3 (2.77 x normal)
- Particulate emissions of 150 mg/m^3 (5 x normal)

- Metal emissions other than mercury are 30 times those of normal operation
- SO_2 emissions of 450 mg/m^3 (11.25 x normal)
- HCl emissions of 900 mg/m^3 (112.5 x normal)
- PCBs (100 x normal)

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

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

Pollutant	**ES**		**Back-ground**	**Process Contribution (PC)**		**Predicted Environmental Concentration (PEC)**	
	µg/m³		**µg/m³**	**µg/m³**	**% of EAL**	**µg/m³**	**% of EAL**
NO_2	200	99.79th %ile of 1-hour means	56	22.11	11.1	78.11	39.1
PM_{10}	50	90.41st %ile of 24-hour means	23.6	6.22	12.44	29.82	59.6
SO_2	266	99.9th ile of 15-min means	2.7	65.8	24.7	68.5	25.8
	350	99.73rd %ile of 1-hour means	2.3	55	15.71	57.3	16.4
	125	99.18th %ile of 24-hour means	1.3	37.62	30.10	38.92	31.1
HCl	750	1-hr average	0.6	147.6	19.68	148.2	19.76
HF	160	1-hr average	1	3.3	2.0625	4.30	2.7

Pollutant	ng/m3		ng/m^3	ng/m^3	% of EAL	ng/m^3	% of EAL
Hg	7500	1-hr average	3.2	327.94	4.37	331.14	4.415
Sb	150000	1-hr average	2.6	43.59	0.03	46.19	0.031
Cu	200000	1-hr average	21.4	109.91	0.05	131.31	0.066
Mn	1500000	1-hr average	11.8	227.41	0.02	239.21	0.0159
PCBs	6000	1-hr average	2.22	81.99	1.37	84.21	1.4035
Cr (II)(III)	150000	1-hr average	4.2	348.7	0.23	352.90	0.2353

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

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

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

- NO_2
- PM_{10}
- SO2
- HCl

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

We have not assessed the impact of abnormal operations against long term ESs for the reasons set out above. Except that if dioxin emissions were at 8 ng/m^3 for the maximum period of abnormal operation, this would result in an increase of approximately 67.81% in the TDI reported in section 5.3.2. In these circumstances the TDI would be 0.00181 pg(I-TEQ/ kg-BW/day), which is 0.20% of the COT TDI. At this level, emissions of dioxins will still not pose a risk to human health.

6. Application of Best Available Techniques

6.1 Scope of Consideration

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

- The first issue we address is the fundamental choice of incineration technology.

- 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 12/11/19.

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

There is no change to the furnace type of the facility proposed in this variation application.

6.1.2 Boiler Design

There is no change to the boiler design as a result of this variation.

6.2 BAT and emissions control

There is no change to the emissions control as a result of this variation.

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 has already considered energy efficiency and BAT for the de-NOx process in its original BAT assessment.

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.

Additionally, a carbon assessment was included in the application which includes a detailed analysis of the carbon benefits of the development compared to disposal of waste in a landfill, it also considers other indirect carbon emissions (from transport etc). The carbon assessment concludes that, for the base case, operating at the proposed capacity is predicted to lead to a net reduction in greenhouse gas emissions of approximately 29,150 tonnes of CO2-equivalent (CO2e) per annum compared to the landfill counterfactual.

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

6.4 BAT and POPs

There is no change to the control of emissions of Persistent Organic Pollutants (POPs) as a result of this variation.

6.5 Other Emissions to the Environment

6.5.1 Emissions to water

There is no change to the emissions to water from the installation as a result of this variation.

6.5.2 Emissions to sewer

There is no change to the emissions to sewer from the installation as a result of this variation.

6.5.3 Fugitive emissions

There is no change to the control of fugitive emissions as a result of this variation.

6.5.4 Odour

There is no change to the control of odour as a result of this variation.

6.5.5 Noise and vibration

There is no change to the control of noise and vibration as a result of this variation.

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 on 12/11/19.

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.

The consolidated permit includes new emission limits for emissions to air. These limits ensure that the installation will comply with the relevant BAT-

AELs, as specified in the BAT conclusions, and the relevant limits from IED Annex VI.

A number of general principles were applied during the inclusion of the BAT-AELs, including those set out in the UK Waste Incineration BAT Conclusions Interpretation Document. These included:

- The upper value of the BAT-AELs ranges specified were used unless use of the tighter limit was justified.
- The principle of no backsliding where if existing limits in the permit were already tighter than the upper end of the BAT-AEL ranges, the existing permit limits were retained.
- Where a limit was specified in both IED Annex VI and the BAT Conclusions for a particular reference period, the tighter limit was applied and in the majority of cases this was from the BAT Conclusions.

We have set the emissions limit values at the top end of the BAT-AEL range in line with section 4.35 of Defra's Industrial emissions Directive EPR Guidance on Part A installations which states: *Where the BAT AELs are expressed as a range, the ELV should be set on the basis of the top of the relevant BAT-AEL range – that is to say, at the highest associated emission level - unless the installation is demonstrably capable of compliance with a substantially lower ELV, based on the BAT proposed by the operator, or exceptional environmental considerations compel a tighter ELV.*

We are satisfied that environmental considerations do not require tighter ELVs to be set, and the operator has not proposed any lower ELVs, and so we have set the ELVs at the top end of the BAT-AEL ranges.

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: techniques and standards for CEMS and automated batch samplers & techniques and standards for periodic monitoring 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

There is no change to the monitoring under abnormal operations as a result of this variation.

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

There is no change to the monitoring for dioxins and heavy metals as a result of this variation.

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 London Borough of Bexley to grant planning permission on 17th December 2021.
- 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 already requires 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 already 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 draft decision in this case has been reached following a programme of extended public consultation, both on the original application and later, separately, on the draft permit and a draft decision document. The way in which this has been done is set out in Section 5.3.1 (v). A summary of the responses received to our consultations and our consideration of them is set out in Annex 2.

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.

(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 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.

(iv) 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.

(v) 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.

This was recorded on a CROW Appendix 4 form, this variation to this permit is not likely to result in damage to SSSIs.

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

7.2.6 **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.

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**

The habitat assessment is summarised in greater detail in section 5.4.2 of this document. A copy of the full Appendix 11 Assessment can be found on the public register.

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

There is no change to any emissions to surface water or sewer from the installation as a result of this variation.

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

ANNEX 1: COMPLIANCE WITH BAT CONCLUSIONS

BAT conclusion	Criteria	Delivered by
4	Monitoring emissions to air	Condition 3.5.1 and table S3.1
15	Procedures to adjust plant settings to control performance	Measures described in the Application condition 2.3.1 and table S1.2
25	Compliance with dust and metal emission BAT AELs	Permit conditions 3.1.1 and 3.1.2 and table S4.1
28	Compliance with HCl, HF and SO_2 BAT AELs	Permit conditions 3.1.1 and 3.1.2 and table S4.1
29	Compliance with NO_2, N_2O, CO and NH_3 BAT AELs	Permit conditions 3.1.1 and 3.1.2 and table S4.1
30	Compliance with dioxins/furans and PCB BAT AELs	Permit conditions 3.1.1 and 3.1.2 and table S4.1
31	Compliance with mercury BAT AEL	Permit conditions 3.1.1 and 3.1.2 and table S4.1

ANNEX 2: Consultation Reponses

A) Advertising and Consultation on the Application

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

The Application was advertised on the Environment Agency website from 8th December 2021 to 11th January 2022 and in the News Shopper Bromley – Bexley Edition on 8th December 2021.

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

- Food Standards Agency
- Local Authority – Planning
- Local Authority – Environmental Health
- Health & Safety Executive
- Fire & Rescue
- UK Health Security Agency

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from UK Health Security Agency	
Brief summary of issues raised:	Summary of action taken / how this has been covered
We note that this application is to vary the extant permit following the upgrading of equipment and have assessed the documentation in the light of the existing use. We consider the main emissions of potential concern to be oxides of nitrogen, particulates, hydrogen fluoride, carbon monoxide, hydrogen chloride, group 1, 2 and 3 metals, dioxins and furans. UK Health Security Agency (UKHSA) has reviewed research undertaken to examine the suggested links between emissions from municipal waste incinerators and effects on health (https://www.gov.uk/government/publications/municipal-waste-incinerators-emissions-impact-on-health). UKHSAs risk assessment is that modern, well run and regulated municipal waste incinerators are not a significant risk to public health. While it is not possible	Appropriate measures are in place as discussed in section 6 of this document. No action required,

to rule out adverse health effects from these incinerators completely, any potential effect for people living close by is likely to be very small. This view is based on detailed assessments of the effects of air pollutants on health and on the fact that these incinerators make only a very small contribution to local concentrations of air pollutants. Having reviewed the information contained in the application, we note that there is a reduction in most modelled emissions and that all emissions will be below the thresholds set by the Industrial emissions Directive. On this basis, UKHSA has 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.	

2) <u>Consultation Responses from Members of the Public and Community Organisations</u>

There were no consultation responses received from Members of Public and Community Organisations.

a) <u>Representations from Local MP, Councillors and Parish / Town / Councils</u>

Representations were received from Greater London Authority (GLA), who raised the following issues.

1. Air Quality

a. In respect of NOx emissions, the applicant should be required to investigate the feasibility of additional SCR abatement equipment. If space is available the equipment should be required and the appropriate, lower, BAT-AEL applied as an emissions limit.
b. For all emissions limits the technical feasibility of achieving the lower end of the BAT-AEL range should be assessed by the Applicant. Where lower emissions are feasible, they should be applied as an emission limit.
c. Subject to points a and b above the lower emission limits should be applied in a varied permit.

	BAT-AEL for existing plant (mg/m^3)	Higher end of BAT-AEL where SCR is not applicable (mg/m^3)	Proposed emission limit in variation application (mg/m^3)
NO_x emissions	50 – 150	180	180

d. Even at the lower emission limits the increase in throughput leads to a permanent increase in total pollutant emissions.

- **Our responses:**

a – c. We have set the emissions limit values at the top end of the BAT-AEL range in line with section 4.35 of Defra's Industrial emissions Directive EPR Guidance on Part A installations which states: *Where the BAT AELs are expressed as a range, the ELV should be set on the basis of the top of the relevant BAT-AEL range – that is to say, at the highest associated emission level - unless the installation is demonstrably capable of compliance with a substantially lower ELV, based on the BAT proposed by the operator, or exceptional environmental considerations compel a tighter ELV.*

The site already employs SNCR (selective non-catalytic reduction) abatement equipment for the reduction of NOx, and thus the higher end of the BAT-AEL range (180 mg/m^3) is applicable.
The changes to the process contributions from the site, as a result of this variation, are classed as either reduced, insignificant or 'unlikely to give rise to significant pollution' against the NO_x ELVs, habitat critical levels and nutrient nitrogen deposition critical loads.

We are satisfied that environmental considerations do not require tighter ELVs to be set, and the operator has not proposed any lower ELVs, and so we have set the ELVs at the top end of the BAT-AEL ranges. See section 6.6.1 of this document for further details.

d. The increased throughput results in Process Contributions that are classed as either reduced, insignificant or 'unlikely to give rise to significant pollution', see section 5.2 of this document for further details.

Carbon Dioxide and Energy Efficiency

The proposed increase in throughput would increase Carbon Dioxide emissions and it would not use renewable energy sources, which is contrary to the Government's net zero targets for 2050, including a net zero electricity network by 2035 and the accelerated 78% reduction by 2035 target, as well as the Mayor's ambitions for an accelerated pathway in London to net zero carbon by 2030. We are already seeing the impacts of climate change across the globe and those impacts are also being increasingly felt here in London, for example with the recent flash flooding

events we have experienced. This makes the need to reduce the carbon impact of planning proposals in light of national and London-level net zero targets ever more pressing.

- **Our response:**
  Global Warming potential is discussed in section 6.3 of this document. A carbon assessment was included in the application which includes a detailed analysis of the carbon benefits of the development compared to disposal of waste in a landfill, it also considers other indirect carbon emissions (from transport etc). The carbon assessment concludes that, for the base case, operating at the proposed capacity is predicted to lead to a net reduction in greenhouse gas emissions of approximately 29,150 tonnes of CO2-equivalent (CO2e) per annum compared to the landfill counterfactual. It is also worth noting that a percentage of the waste burnt will be from biogenic sources (roughly 60%) and so will be a partial renewable energy source.

b) Representations from Community and Other Organisations

No representations were received from any community or other organisations.

c) Representations from Individual Members of the Public

No responses were received from individual members of the public.