



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/FP3335YU/V002. We refer to the application as “the Application” in this document in order to be consistent.

The number we propose to give to the Variation Notice is EPR/FP3335YU. We refer to the proposed Variation Notice as “the Variation Notice” in this document.

The Variation Application was duly made on 26 October 2018.

The Applicant is Gent Fairhead and Co. Limited. We refer to Gent Fairhead and Co. Limited as “the Applicant” in this document. Where we are talking about what would happen after the Variation Notice is granted (if that is our final decision), we call Gent Fairhead and Co. Limited “the Operator”.

Gent Fairhead and Co. Limited proposed facility is located at Rivenhall Integrated Waste Management Facility, Rivenhall Airfield, Woodhouse Lane, Kelvedon, Essex, CO5 9DF. 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 Strategy
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
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
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision document
EAL	Environmental assessment level
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission limit value
EMAS	EU Eco Management and Audit Scheme
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154) as amended
ES	Environmental standard
EWC	European waste catalogue
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HPA	Health Protection Agency (now PHE – Public Health England)
HRA	Human Rights Act 1998
HW	Hazardous waste
HWI	Hazardous waste incinerator
IBA	Incinerator Bottom Ash

IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LADPH	Local Authority Director(s) of Public Health
LOI	Loss on Ignition
MBT	Mechanical biological treatment
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NOx	Oxides of nitrogen (NO plus NO <sub>2</sub> expressed as NO <sub>2</sub> )
Opra	Operator Performance Risk Appraisal
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
RDF	Refuse derived fuel
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 Applicant. This will allow it to operate the Installation, subject to the conditions in the Permit.

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

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

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

## 2 How we reached our draft decision

### 2.1 Receipt of Application

The Application was duly made on 26 October 2018. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below.

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

### 2.2 Consultation on the Application

We carried out consultation on the Application in accordance with the EPR, our statutory 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 Braintree and Witham Times January 24 2019.

We made a copy of the Application and all other documents relevant to our determination (see below) available to view on our Public Register at *Environment Agency, Icen House, Cobham Road, Ipswich, IP3 9JD*. Anyone wishing to see these documents could do so and arrange for copies to be made. We issued a briefing note to local liaison groups and interested parties

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

- Food Standards Agency
- Local Planning Authority – Colchester, Essex
- Local Authority Environmental Health – Colchester, Essex
- Health and Safety Executive
- 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.

The consultation period ran from 24 January 2019 to 21 February 2019, however written comments were accepted by the Environment Agency beyond the formal consultation period. Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 4. We have taken all relevant representations into consideration in reaching our draft determination.

### 2.3 Requests for Further Information

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued information notices on the 29 March 2019, 19 June 2019 and 02 October 2019. A copy of each information notice was placed on our public register as were the responses when received.

In addition to our information notices, we received additional information during the determination in the form of a email from the Applicant. We made a copy of this information available to the public in the same way as the response to our information notice.

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.

### 2.4 Publishing of the revised waste incineration plant BREF

The consultation on our minded to decision was delayed due to a general election. During this period the revised waste incineration plant BREF was published. We have reviewed the requirements of the new waste incineration plant BREF and we are satisfied that the proposals under this application meet the standards outlined in the BREF. We therefore have not needed to make any changes to how the plant operates.

## **3 The legal framework**

The Variation Notice 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 activities listed in Part 1 of Schedule 1 to the EPR:

- Section 5.1 Part A(1)(b) – incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity of 3 tonnes or more per hour.
- Section 6.1 A(1)(a) Producing, in industrial plant, pulp from timber or other fibrous materials
- Section 5.4 A(1)(b)(i) Anaerobic Digestion Facility - Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day involving biological treatment.
- Section 5.4 A(1)(b)(i) Mechanical Biological Treatment Facility - Recovery or a mix of recovery and disposal of non-hazardous waste with a capacity exceeding 75 tonnes per day involving biological treatment.

This variation application only relates to an amendment in stack height, revised abatement techniques and revised emissions limit values permitted under the activity Section 5.1 Part A(1)(b) – incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity of 3 tonnes or more per hour.

#### **4.1.2 Key Issues in the Determination**

The key issues arising during this determination were:

- stack height;
- air quality;
- advanced abatement system; and
- revised emissions limits.

We describe how we determined these issues in more detail in this document.

## 5. Minimising the Installation's environmental impact

The proposed changes to the regulated activity can present different types of risk to the environment, these include point source releases to air and global warming potential. Consideration may also have to be given to the effect of emissions to 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 considered in the previous bespoke permit application 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

The key issues in this determination have been the assessment of BAT for stack height and the revision of air emissions limits. This is discussed in section 6 along with how impacts compare to the previous stack height. We have therefore focused in this document on the air quality impacts resulting from the proposed changes. For completeness in this section we have summarised the full air quality impact assessment before looking at the comparison later in this document.

#### 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'.

- 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.

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

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

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

PCs are screened out as insignificant if:

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

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

- It is unlikely that an emission at this level will make a significant contribution to air quality; and
- 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; and
- 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 AAD limit value is identified, we may require the Applicant to go beyond what would normally be considered BAT for the Installation or we may refuse the application if the applicant is unable to provide suitable proposals. Whether or not exceedences are considered likely, the application is subject to the requirement to operate in accordance with BAT.

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

If, as a result of reviewing 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 Environmental Permit Variation – Supporting Information (reference S1552-0740-0001SMO) document of the Application which is a revision of the results outlined in Dispersion Modelling Assessment version 8 (ref S1552-0700-0011RSF). The assessment comprises:

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

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

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 5.2 dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years of meteorological data collected from the weather station at Stansted Airport between 2009 and 2013. The Applicant carried out a sensitivity analysis using more recent weather data from Stansted Airport (2012 to 2016) and Andrewsfield (2012 to 2016). The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

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

- First, they assumed that the following emissions ELVs in the Permit would be the maximum permitted by Article 46(2) and Annex VI of the IED.
  - Total dust
  - Carbon monoxide (CO)
  - Hydrogen chloride (HCl)
  - Hydrogen fluoride (HF)
  - 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)

The following emissions ELVs were set by the Applicant which are lower/tighter than the maximum permitted by Article 46(2) and Annex VI of the IED.

- Oxides of nitrogen (NO<sub>x</sub>), expressed as NO<sub>2</sub>
- Sulphur dioxide (SO<sub>2</sub>)

- Metals (Cadmium, Thallium, Mercury, Antimony, Arsenic, Lead, Chromium, Cobalt, Copper, Manganese, Nickel and Vanadium)
- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term ELVs, i.e. the maximum permitted emission rate (except for emissions of arsenic, chromium and nickel, which are considered in section 5.2.3 of this decision document).
- Third, the model also considered emissions of pollutants not covered by Annex VI of IED, specifically ammonia (NH<sub>3</sub>), 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.

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

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

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

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

#### 5.2.1 Assessment of Air Dispersion Modelling Outputs

The Applicant's modelling predicted peak ground level exposure to pollutants in ambient air. We have conservatively assumed that the maximum concentrations occur at the location of receptors. Whilst we have used the Applicant's modelling predictions in the tables below, we have made our own simple verification and calculation of the percentage process contribution and predicted environmental concentration. Any minor discrepancies between the EA's numerical modelling predictions and those of the Applicant do not materially impact on our conclusions.

**Table 5.1 – Predicted long term impact to air from the Installation**

Pollutant	ES µg/m <sup>3</sup>	Background [1] µg/m <sup>3</sup>	PC µg/m <sup>3</sup>	PC % of ES	PEC [3] µg/m <sup>3</sup>	PEC [3] % of ES
NO <sub>2</sub>	40	18.6	1.31	3.27	19.91	49.77
PM <sub>10</sub>	40	--	0.18	0.45	--	--
PM <sub>2.5</sub>	25	--	0.18	0.72	--	--
HF	16	--	0.02	0.11	--	--
VOCs (1, 3-butadiene)	2.25	0.20	0.33	14.6	0.53	23.46
PAH	0.00025	--	1.8 x 10 <sup>-06</sup>	0.76	--	--
NH <sub>3</sub>	180	--	0.18	0.10	--	--
PCBs	0.2	--	9 x 10 <sup>-05</sup>	0.04	--	--
Dioxins			1.8 x 10 <sup>-12</sup>			
Cd	0.005	0.00015	3.6 x 10 <sup>-4</sup>	7.19	5.1 x 10 <sup>-4</sup>	10.19
Hg	0.25	--	9 X 10 <sup>-04</sup>	0.36	--	--
Sb	5	--	1.2 x 10 <sup>-04</sup>	0.002	--	--
Pb	0.25	--	5.4 x 10 <sup>-04</sup>	0.22	--	--
Co		--	6 x 10 <sup>-05</sup>		--	
Cu	10	--	3.1 x 10 <sup>-03</sup>	0.0031	--	--
Mn	0.15	--	6.5 x 10 <sup>-04</sup>	0.43	--	--
V	5	--	6 x 10 <sup>-05</sup>	0.0013	--	--
As	0.003	0.00047	2.7 x 10 <sup>-04</sup>	8.99	7.4 x 10 <sup>-04</sup>	24.53
Cr (II)(III)	5	--	9.9 x 10 <sup>-04</sup>	0.02	--	--
Cr (VI) [2]	0.0002	--	1.4 x 10 <sup>-06</sup>	0.70	--	--
Ni	0.02	0.00137	2.3 x 10 <sup>-03</sup>	11.86	3.74 x 10 <sup>-03</sup>	18.71

Note 1 – Background concentration is that used by the Applicant. There are no existing background concentrations for dioxins and cobalt.

Note 2 – Process contribution based on the Environment Agency’s “Guidance on assessing Group 3 metal stack emissions from incinerators, version 4”.

Note 3 – Where the process contribution is demonstrated to be less than 1% of the long term ES (a level below which we consider to indicate insignificant impact), we consider that examination of the PEC and background is not necessary.

**Table 5.2 – Predicted short term impact to air from the Installation**

Pollutant	ES µg/m <sup>3</sup>	Background [1] µg/m <sup>3</sup>	PC µg/m <sup>3</sup>	PC % of ES	PEC [2] µg/m <sup>3</sup>	PEC [2] % of ES
NO <sub>2</sub>	200	--	16.33	8.1	--	--
PM <sub>10</sub>	50	--	0.64	1.28	--	--
SO <sub>2</sub> (15-min mean)	266	--	23.48	8.83	--	--
SO <sub>2</sub> (1-hour mean)	350	--	20.83	5.95	--	--
SO <sub>2</sub> (24-hour mean)	125	--	7.81	6.24	--	--
HCl	750	--	17.30	2.31	--	--
HF	160	--	1.15	0.72	--	--
CO	10000	--	32.17	0.32	--	--
NH <sub>3</sub>	2500	--	2.89	0.12	--	--
PCBs	6	--	1.4 x 10 <sup>-03</sup>	0.02	--	--
Hg	7.5	--	0.01443	0.19	--	--
Sb	150	--	1.9 x 10 <sup>-03</sup>	0.0013	--	--
Co		--	9.7 x 10 <sup>-04</sup>		--	
Cu	200	--	5 x 10 <sup>-03</sup>	0.003	--	--
Mn	1500	--	0.0103	0.0007	--	--
V	1	--	0.00104	0.10	--	--
Cr (II)(III)	150	--	0.01593	0.011	--	--

Note 1 – Background concentration is that used by the Applicant. There are no existing background concentrations for dioxins and cobalt.

Note 2 – Where the process contribution is demonstrated to be less than 10% of the short term ES (a level below which we consider to indicate insignificant impact), we consider that examination of the PEC and background is not necessary. For the assessment of short term impacts, the PEC is determined by adding twice the long term background concentration to the short term process contribution.

(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:

- Long term emissions including:
  - Particulate Matter - PM<sub>10</sub>
  - Particulate Matter - PM<sub>2.5</sub>
  - Hydrogen Fluoride - HF
  - Polycyclic Aromatic Hydrocarbon PAH

- Ammonia - NH<sub>3</sub>
  - polychlorinated biphenyl - PCBs
  - Dioxins
  - Mercury - Hg
  - Antimony - Sb
  - Lead - Pb
  - Cobalt - Co
  - Copper - Cu
  - Manganese - Mn
  - Vanadium - V
  - Chromium Cr (II)(III)
  - Chromium Cr (VI)
- All short term emissions

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.

- Nitrogen Dioxide – NO<sub>2</sub> (Long term)
- VOCs (1, 3-butadiene) (Long term)
- Cadmium – Cd (Long term)
- Arsenic – As (Long term)
- Nickel – 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<sub>2</sub>)

The impact on air quality from NO<sub>2</sub> emissions has been assessed against the ES of 40 µg/m<sup>3</sup> as a long term annual average and a short term hourly average of 200 µg/m<sup>3</sup>. The model assumes a 70% NO<sub>x</sub> to NO<sub>2</sub> 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<sub>10</sub> and PM<sub>2.5</sub>

The impact on air quality from particulate emissions has been assessed against the ES for PM<sub>10</sub> (particles of 10 microns and smaller) and PM<sub>2.5</sub> (particles of 2.5 microns and smaller). For PM<sub>10</sub>, the ES are a long term annual average of 40 µg/m<sup>3</sup> and a short term daily average of 50 µg/m<sup>3</sup>. For PM<sub>2.5</sub> the ES of 25 µg/m<sup>3</sup> as a long-term annual average to be achieved by 2010 as a Target Value and by 2015 as a Limit Value has been used.

The Applicant's predicted impact of the Installation against these ESs is shown in the tables above. The assessment assumes that all particulate emissions are present as PM<sub>10</sub> for the PM<sub>10</sub> assessment and that all particulate emissions are present as PM<sub>2.5</sub> for the PM<sub>2.5</sub> 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; and
- it assumes all particulates emitted are below either 10 microns (PM<sub>10</sub>) or 2.5 microns (PM<sub>2.5</sub>), 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<sub>10</sub> 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<sub>2.5</sub> is also below 1% of the ES. Therefore the Environment

Agency concludes that particulate emissions from the installation, including emissions of PM<sub>10</sub> or PM<sub>2.5</sub>, will not give rise to significant pollution.

There is currently no emission limit prescribed nor any continuous emissions monitor for particulate matter specifically in the PM<sub>10</sub> or PM<sub>2.5</sub> fraction. Whilst the Environment Agency is confident that current monitoring techniques will capture the fine particle fraction (PM<sub>2.5</sub>) for inclusion in the measurement of total particulate matter, an improvement condition (IC2) has been included that will require a full analysis of particle size distribution in the flue gas, and hence determine the ratio of fine to coarse particles. In the light of current knowledge and available data however the Environment Agency is satisfied that the health of the public would not be put at risk by such emissions, as explained in section 5.3.3.

(iii) Acid gases, SO<sub>2</sub>, 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<sub>2</sub> for the protection of human health. Protection of ecological receptors from SO<sub>2</sub> for which there is a long term ES is considered in section 5.4. Emissions of SO<sub>2</sub> 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<sub>3</sub>

There is no long term ES for CO. The above tables show that for CO the peak short term PC is less than 10% of the ES and so can be screened out as insignificant. Therefore we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

The tables above show that for VOC emissions, the peak long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded. The Applicant has used the ES for 1,3 butadiene for their assessment of the impact of VOC. This is based on 1,3 butadiene having the lowest ES of organic species likely to be present in VOC (other than PAH, PCBs, dioxins and furans).

As the assessment of VOCs is based on the assumption that the Facility will operate at the emission limit of 10 mg/Nm<sup>3</sup> for VOCs for the entire time and

that the emissions of VOCs will consist of entirely benzene or entirely 1,3-butadiene, both of these assumptions are considered to be very conservative.

While there is limited data on the speciation of VOC emissions from energy-from-waste plants, the data which does exist suggests that benzene and 1,3-butadiene make up small percentages of the total VOC emissions and therefore emissions are likely to be significantly lower than projected.

The above tables show that for PAH and 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 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<sup>3</sup>. We are satisfied that this level of emission is consistent with the operation of a well controlled SNCR NO<sub>x</sub> 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.

Annex VI of IED sets three limits for metal emissions:

- An emission limit value of 0.05 mg/m<sup>3</sup> for mercury and its compounds (formerly WID group 1 metals);
- an aggregate emission limit value of 0.05 mg/m<sup>3</sup> for cadmium and thallium and their compounds (formerly WID group 2 metals); and
- an aggregate emission limit of 0.5 mg/m<sup>3</sup> 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 when each was considered to be emitted at 100% of the group ELV. In this case the operator has applied the proposed stricter limit of 0.3 mg/m<sup>3</sup> as worst case screening.

- Mercury - Hg
- Antimony - Sb
- Cobalt - Co
- Copper - Cu
- Vanadium - V
- Chromium - Cr (II)(III)

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

- Lead - Pb
- Manganese - Mn
- Nickel - Ni
- Cadmium - Cd

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

Where Annex VI of the IED sets an aggregate limit, the Applicant's assessment assumes that each metal is emitted individually at the relevant aggregate emission limit value. This is something which can never actually

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

For arsenic and chromium (VI), the Applicant used representative emissions data from other municipal waste incinerators using our guidance note ('Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases' – version 4).

Based on the above, chromium (VI) was screened out as insignificant. While emissions of arsenic did not screen out as insignificant, they were assessed as being unlikely to give rise to significant pollution.

Thallium and cobalt do not have an EAL. As shown above, the process contribution of these metals is similar to that of the other metals and we consider the emissions of these metals to be not significant.

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

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

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

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

The Applicant has used the above data to model the predicted Chromium(VI) impact. The PC is predicted as 0.7% of the EAL.

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

#### 5.2.4 Consideration of Local Factors

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

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

### **5.3 Human health risk assessment**

#### 5.3.1 Our role in preventing harm to human health

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

##### i) Applying Statutory Controls

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

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

ii) Environmental Impact Assessment

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

iii) Expert Scientific Opinion

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

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

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

HPA (now PHE) in 2009 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 Health 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 PM<sub>10</sub> 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 June 2019, 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<sup>-12</sup>) of a gram).

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

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<sub>2</sub>, SO<sub>2</sub> 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<sub>x</sub>, SO<sub>2</sub> and particulates cannot be screened out as insignificant in the Environmental Impact assessment, there are high ambient background levels of these pollutants and we are advised that its use was appropriate by our public health consultees.

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

#### v) Consultations

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

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

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

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

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

The Applicant has utilised the existing human health risk assessment results and calculated the max change between the existing and proposed scenario. Using the maximum predicted contribution to dioxin intake at any receptor they have used the percentage change to factor up their predictions. Therefore, the assessment has not been repeated as it is clear that the conclusion would be unchanged. We are satisfied the Applicant’s conclusions can be used for the basis of permit determination.

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.

<b>Receptor</b>	<b>Maximum predicted daily intake (pg I-TEQ/kg-BW/day)[1]</b>
Receptor 18 (Adult resident)	0.018
Receptor 18 (Child resident)	0.025
Note 1 – Data shown is the calculated maximum daily intake of dioxins by local receptors resulting from the operation of the proposed facility (I-TEQ/kg-BW/day).	

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

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

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

### 5.3.3 Particulates smaller than 2.5 microns

The Operator will be required to monitor particulate emissions using the method set out in Table S3.1 of Schedule 3 of the Permit. This method requires that the filter efficiency must be at least 99.5 % on a test aerosol with a mean particle diameter of 0.3  $\mu\text{m}$ , 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  $\mu\text{m}$  and much of what is smaller. It is not expected that particles smaller than 0.3  $\mu\text{m}$  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  $\mu\text{m}$  in diameter ( $\text{PM}_{0.1}$ ). 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  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  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  $\text{PM}_{2.5}$  by 1  $\mu\text{g}/\text{m}^3$  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<sub>10</sub> 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<sub>0.1</sub> is around 5-10% of PM<sub>10</sub>. It goes on to say that PM<sub>10</sub> includes and exceeds PM<sub>2.5</sub> which in turn includes and exceeds PM<sub>0.1</sub>. The National Atmospheric Emissions Inventory (NAEI) figures show that in 2016 municipal waste incineration contributed 0.03% to ambient ground level PM<sub>10</sub> levels and 0.05% to ambient ground level PM<sub>2.5</sub> levels. The 2016 data also shows that road traffic contributed to 5.35% of PM<sub>10</sub> and 4.96% of PM<sub>2.5</sub> and that domestic wood burning contributed 22.4% to PM<sub>10</sub> and 34.3% of PM<sub>2.5</sub> levels.

This is consistent with the assessment of this application which shows emissions of PM<sub>10</sub> 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 PM<sub>10</sub>, PM<sub>2.5</sub>, HF, PAH, NH<sub>3</sub>, PCBs, Dioxins, Hg, Sb, Pb, Co, Cu, Mn, V, Cr (II)(III), Cr (VI) have all indicated that the Installation emissions screen out as insignificant; where the impact of emissions of NO<sub>2</sub>, VOCs, Cd, As, 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 audited the Applicant's submission and have made observations relating to the methodologies used and assumptions made.

- The Applicant has used abnormal emission rates which are not consistent with abnormal concentrations quoted in their report<sup>3</sup>. However, this does not affect conclusions.
- The Applicant has not completed a new HHRA assessment in this submission. The HHRA results from their permitted assessment have been factored up based on the increase in dioxin predictions at receptors.

We conclude that for air quality impacts at human receptors, whilst we do not agree with the Applicant's absolute numerical predictions, the Applicant's conclusions can be used for the basis of permit determination. We do not predict any exceedences of the ES under normal or abnormal conditions.

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.

PHE 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 FSA 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 PHE, 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. Please refer to section 6 for further information on air emissions from the proposed scenario and how they relate to the assessment of BAT.

Based on a paper by the European Food Safety Authority (EFSA) the COT have recently revised their advice on dioxin/dioxin like PCBs. This has resulted in a change from a tolerable daily intake (TDI) of 2pg I-TEQ/Kg-body weight to a tolerable weekly intake (TWI) of 2pg I-TEQ/Kg-body weight. We have checked the Applicant's assessment taking the revised tolerable intake into account and we are satisfied that the conclusions of the assessment are not affected and that impacts will not be significant

#### **5.4 Impact on Habitats sites, SSSIs, non-statutory conservation sites**

##### **5.4.1 Sites Considered**

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

There are no Sites of Special Scientific Interest within 2 km of the proposed Installation.

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

- Upney Wood
- Storey's Wood
- Link's Wood
- Blackwater Plantation
- Park House Meadow
- Blackwater Plantation
- Maxey's spring

##### **5.4.2 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 Applicant has assessed the dispersion of the relevant pollutants against critical level criteria for the protection of vegetation and ecosystems which is summarised in the following table. The values shown represent the highest concentrations predicted for any of the receptors for each pollutant.

**Table 5.4 – Maximum critical level concentrations on local wildlife sites within 2 km of the Installation**

Pollutant	Critical level ( $\mu\text{g}/\text{m}^3$ )	PC ( $\mu\text{g}/\text{m}^3$ ) [1]	PC as % of Critical level
SO <sub>2</sub>	20 (LT)	0.28	1.4
NOx (as NO <sub>2</sub> )	30 (LT)	0.55	1.8
	75 (ST)	12.54	16.7
HF	0.5 (LT)	0.03067	6.1
	5 (ST)	0.120	2.4
NH <sub>3</sub>	3 (LT)	0.05269	1.8
Note [1] – PC is given as the highest concentrations predicted for all non-statutory sites – Storey's Wood.			

The Applicant has assessed the critical loads for nitrogen and acid deposition against critical load criteria for sites as obtained from the UK Air Pollution Information System (APIS) which is summarised in the following table. The values shown represent the highest concentrations predicted for any of the receptors for each parameter.

**Table 5.5 – Maximum critical load concentrations on local wildlife sites within 2 km of the Installation**

Pollutant	Critical load (most severe criterion used to exemplify receptors)	PC [1]	PC as % of Critical load
Nitrogen deposition	10 kg N/ha/yr	0.521 kg N/ha/yr	2.61
Acid deposition	1.71 keq/ha/yr	0.03 keq/ha/yr	1.83
Note [1] – PC is given as the worst case of results for all non-statutory sites – Storey’s Wood.			

The tables above show that the PCs are below 100% of the critical levels or loads. We are satisfied that the Installation will not cause significant pollution at the sites. The Applicant is required to prevent, minimise and control emissions using BAT, this is considered further in Section 6.

**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<sup>3</sup> (as a half hourly average) which is five times the limit in normal operation.

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

These abnormal operations are limited to no more than a period of 4 hours continuous operation and no more than 60 hour aggregated operation in any

calendar year. This is less than 1% of total operating hours and so abnormal operating conditions are not expected to have any significant long term environmental impact unless the background conditions were already close to, or exceeding, an ES. For the most part therefore consideration of abnormal operations is limited to consideration of its impact on short term ESs.

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

- Dioxin emissions of 10 ng/Nm<sup>3</sup> (100 x normal)
- Metal emissions are 100 times those of normal operation
- NOx emissions of 550 mg/Nm<sup>3</sup> (1.375 x normal)
- Particulate emissions of 150 mg/Nm<sup>3</sup> (5 x normal)
- SO<sub>2</sub> emissions of 480 mg/Nm<sup>3</sup> (2.4 x normal)
- HCl emissions of 900 mg/Nm<sup>3</sup> (15 x normal)
- HF emissions of 90 mg/Nm<sup>3</sup> (22.5 x normal)
- PCBs emissions of 5 mg/Nm<sup>3</sup> (1,000 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.

**Table 5.6 – Predicted abnormal emissions impact to air from the Installation**

Pollutant	ES	Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC) [1]	
	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	% of ES	µg/m <sup>3</sup>	% of ES
NO <sub>2</sub>	200	37.2	44.5	22.23	81.7	40.8
PM <sub>10</sub>	50	20.2	8.6	17.13	28.8	57.5%
SO <sub>2</sub> (15 min mean)	266	12.4	114.5	43.03	126.9	47.7%
SO <sub>2</sub> (1 hour mean)	350	12.4	101.5	29.01	113.9	32.6%
SO <sub>2</sub> 24 hour mean	125	12.4	66.8	53.47	79.2	63.4%
HCl	750	1.44	259.8	34.64	261.2	34.8%
HF	160	4.7	17.3	10.82	22.0	13.8%
Hg	7.5	--	0.216	2.887	--	--
Sb	150	--	0.049	0.033	--	--
Cu	200	--	0.125	0.063	--	--
Mn	1,500	--	0.259	0.017	--	--
Cr (II)(III)	150	--	0.398	0.266	--	--
V	1	--	0.025	2.598	--	--
Dioxins			0.6 x 10 <sup>-06</sup>			

Note 1 – Where the PC is demonstrated to be less than 10% of the short term EAL, a level below which we consider to indicate insignificant impact, examination of the PEC and background is not considered necessary. For the assessment of short term impacts the PEC is determined by adding twice the long term background concentration to the short term process contribution.

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.

- Mercury (Hg)
- Antimony (Sb)
- Copper (Cu)
- Magnesium (Mn)
- Chromium Cr (II) (III)
- Vanadium (v)
- Dioxins

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.

- Nitrogen dioxide (NO<sub>2</sub>)
- Particulates
- Sulphur Dioxide (SO<sub>2</sub>)
- Hydrogen Chloride (HCL)
- Hydrogen Fluoride (HF)

The Applicant did not complete an abnormal emissions assessment for PCB's. However, we have completed check modelling based on the operator modelling parameters and an abnormal emission concentration of 0.5 µg/m<sup>3</sup> for PCB's which we consider to be conservative and have found that exceedences of the Environmental Standard would be unlikely. We are therefore satisfied that no further assessment is required.

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

We have not assessed the impact of abnormal operations against long term ESs for the reasons set out above. Except that if dioxin emissions were at 10 ng/m<sup>3</sup> for the maximum period of abnormal operation, this would result in an increase of approximately 70% in the TDI reported in section 5.3.3. In these circumstances the TDI would be 0.034 pg(I-TEQ/ kg-BW/day), which is 1.71% 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 Reduced stack height and demonstration of BAT

#### 6.1.1 Introduction

The Applicant was permitted in 2017 to operate an integrated waste facility including incineration plant which utilised a 58 metre high stack (above ground level) along with control measures for air emissions including conventional SNCR. As part of the determination, we assessed the associated air quality impact of different stack heights taking into account environmental impact and associated cost. We determined that all air emissions either screened out as insignificant or were not significant. Our view was that a 58 metre stack along with the proposed control measures was BAT.

As part of this Application, the Applicant proposed to reduce their permitted stack height from 58 metres to 35 metres. They argued that the proposal still represented BAT as it included the implementation of alternative measures which will provide an equivalent level of environmental protection to the stack height of 58 metres permitted at BAT. These alternative measures include reducing the amount of NO<sub>x</sub> released from the stack through implementing Advanced Selective Non-Catalytic Reduction (refer to section 6.2.2.1 for information on advanced SNCR) and through applying stricter emissions limit values (ELVs) for other substances.

We have not requested a revised BAT assessment of individual abatement techniques as we are satisfied the conclusions from the previous permit application (EPR/FP3335YU/A001) BAT assessment remain valid.

#### 6.1.2 Demonstrating an equivalent level of environmental protection

Environment Agency Web guidance states:

“If your alternative technique will provide a level of environmental protection that’s equivalent to the BAT, you need to explain how it will do so in the operating techniques section of the application form”.

The Industrial Emissions Directive (IED) states:

“Where the competent authority sets permit conditions on the basis of a best available technique not described in any of the relevant BAT conclusions, it shall ensure that; that technique is determined by giving special consideration to the criteria listed in Annex III; and the requirements of Article 15 are complied with.

Where the BAT conclusions referred to in the first subparagraph do not contain emission levels associated with the best available techniques, the competent authority shall ensure that the technique referred to in the first subparagraph ensures a level of environmental protection equivalent to the best available techniques described in the BAT conclusions.”

The IED therefore provides scope for techniques other than those explicitly stated to be BAT to be used, provided an applicant is able to demonstrate the techniques provide an equivalent level of environmental protection.

This approach is further reinforced by the final draft of the revised BREF which states, “The techniques listed and described as BAT in these conclusions are neither prescriptive nor exhaustive. Other techniques may be used that ensure at least an equivalent level of environmental protection”.

We had previously accepted a 58 stack with conventional SNCR and associated ELVs for NO<sub>x</sub> and other substances as BAT. The Applicant has proposed alternative techniques in line with the scope of the relevant legislation and guidance. We are therefore required to assess whether the Applicant’s proposals deliver an equivalent level of protection to the environment as a whole.

### 6.1.3 Proposed stricter emission limits and alternative measures

As summarised in section 5 above, the Applicant has undertaken air quality modelling to determine the potential impact of their amended proposals and identified where impacts could increase as a result of the proposals.

Considering these results, the Applicant proposed additional controls and lower emission limit values in order to demonstrate an equivalent level of environmental protection and therefore BAT.

#### 6.1.3.1 Revised NO<sub>x</sub> emission limit

The Applicant proposed to use an advanced SNCR system to reduce emissions of NO<sub>x</sub>, meaning that the daily emission limit for emission points A1 and A2 for oxides of nitrogen (NO<sub>x</sub>) can be reduced from 150 mg/Nm<sup>3</sup> to 100 mg/Nm<sup>3</sup> and the half-hourly emission limit for emission points A1 and A2 for oxides of nitrogen (NO<sub>x</sub>) from 400 mg/Nm<sup>3</sup> to 200 mg/Nm<sup>3</sup>.

Conventional SNCR is able to achieve a daily emissions limit of 150 mg/m<sup>3</sup> and is currently accepted as BAT for incineration plant in the UK. Advanced SNCR is employed at some plants within the EU to further reduce NO<sub>x</sub> limits, but is not currently applied within the UK at present.

##### 6.1.3.1.1 Advanced SNCR

The Applicant has proposed to install Advanced Selective Non-Catalytic Reduction. This advanced version of the NO<sub>x</sub> abatement technology measures the distribution of furnace temperature and uses multi-tier lances located at different positions within the furnace as opposed to singular injection at the top of the furnace. Each lance is controlled by its own acoustic thermometer to inject exactly the right amount of ammonia for the dynamic conditions in that particular part of the boiler, thereby maximising NO<sub>x</sub> reduction while minimising ammonia slip. As a result of implementing this

technology, the Applicant has proposed to reduce their NO<sub>x</sub> emission limit from 150 mg/Nm<sup>3</sup> to 100 mg/Nm<sup>3</sup>.

To demonstrate that this reduced emissions limit is achievable using this abatement technology, the Applicant identified data published in the final draft of the Waste Incineration BREF which displays the emissions range achievable with the different forms of SNCR as 80-180 mg/Nm<sup>3</sup> (Table 4.31 on page 39). The proposed emission limit of 100 mg/Nm<sup>3</sup> falls within the lower end of this range. To support this data, the Applicant also sought evidence from a number of leading abatement technology suppliers to identify plants across Europe which utilise the same technology and achieve the proposed emission limit. The Applicant confirmed that technology suppliers can offer a contractual guarantee that they can achieve the limits.

We are satisfied that the Applicant has provided sufficient evidence to demonstrate that the proposed emission limits can be achieved at a plant of this type, utilising this technology. This approach is consistent with the draft Waste Incineration BREF. We consider the proposals for advanced SNCR to deliver an equivalent level of environmental protection. The Applicant proposes to use Advanced SNCR with ammonia/ urea as the reagent.

#### 6.1.3.1.2 Impact of abatement and revised emission limit on modelled NO<sub>2</sub> emissions

The Applicant has revised their air quality modelling predictions taking into account the revised NO<sub>x</sub> emission limits. For the process contribution at the point of maximum impact, they predict an increase in short term NO<sub>x</sub> hourly process contributions from 8.11% to 8.19% of the Environmental Standard (ES) which is a change of approximately 0.08% in an area away from sensitive receptors. This is considered insignificant and therefore does not need to be considered any further. For long term NO<sub>x</sub>, annual process contributions are predicted to increase from 2.19% to 3.27% of the ES which is a change of approximately 1% in an area away from sensitive receptors.

For the greatest change in NO<sub>x</sub> process contributions at a receptor (All Shots Farm), the Applicant predicts an increase in NO<sub>2</sub> annual process contribution from 0.60% to 1.40% of the ES which is a change of less than 1% and therefore although the impact does not screen out, the change can be considered to be insignificant. Refer to section 5.2 for further information.

Due to the projected slight increase in NO<sub>x</sub> process contributions, using the modelling results, the Applicant compared the change in process contributions at sensitive receptors rather than just at the point of highest impact between the permitted 58 metre stack and the 35 metre stack proposal.

This indicates that there are increases at 11 receptors which are all less than 1%, and there are also reductions in process contributions at 13 of the receptors as displayed in the table below. From the results, we consider that the environmental impact of NO<sub>x</sub> emissions will not be significantly increased compared to the currently permitted installation.

**Table 6.1 Percentage Change in Long-term Emissions**

Receptor	Permitted		Proposed		Changes as % AQAL
	µg/m <sup>3</sup>	As % of AQAL	µg/m <sup>3</sup>	As % of AQAL	
Sheepcotes Farm (Hanger No.1)	0.18	0.45%	0.21	0.54%	0.09%
Wayfarers Site	0.03	0.08%	0.16	0.41%	0.33%
Allshot's Farm (Scrap Yard)	0.24	0.60%	0.56	1.40%	0.80%
Haywards	0.81	2.03%	0.86	2.15%	0.12%
Hérons Farm	0.28	0.70%	0.33	0.82%	0.12%
Gosling's Farm	0.17	0.43%	0.17	0.42%	0.00%
Curd Hall Farm	0.44	1.10%	0.40	1.01%	- 0.09%
Church (adjacent to Bradwell Hall)	0.14	0.35%	0.13	0.33%	- 0.02%
Bradwell Hall	0.13	0.33%	0.12	0.31%	- 0.02%
Rolphs Farmhouse	0.11	0.28%	0.10	0.24%	- 0.03%
Silver End / Bower Hall / Fossil Hall	0.23	0.58%	0.22	0.55%	- 0.03%
Rivenhall PI/Hall	0.20	0.50%	0.19	0.48%	- 0.02%
Parkgate Farm / Watchpall Cottages	0.23	0.58%	0.23	0.57%	0.00%
Ford Farm / Rivenhall Cottage	0.16	0.40%	0.15	0.38%	- 0.02%
Porter's Farm	0.21	0.53%	0.20	0.50%	- 0.03%
Unknown Building 1	0.25	0.63%	0.26	0.66%	0.03%
Bumby Hall / The Lodge / Polish Site	0.24	0.60%	0.36	0.90%	0.30%
Elephant House (Street Sweepings)	0.02	0.05%	0.13	0.33%	0.28%
Green Pastures Bungalow	0.18	0.45%	0.18	0.46%	0.01%
Deeks Cottage	0.50	1.25%	0.56	1.41%	0.16%
Gosling Cottage / Barn	0.18	0.45%	0.18	0.46%	0.01%
Felix Hall / The Clock House / Park Farm	0.14	0.35%	0.12	0.31%	- 0.04%
Glazenwood House	0.10	0.25%	0.10	0.24%	- 0.01%
Bradwell Hall	0.08	0.20%	0.08	0.20%	0.00%
Perry Green Farm	0.11	0.28%	0.11	0.27%	0.00%
The Granary / Porter Farm / Rook Hall	0.14	0.35%	0.13	0.32%	- 0.03%
Grange Farm	0.31	0.78%	0.27	0.69%	- 0.09%
Coggeshall	0.27	0.68%	0.24	0.60%	- 0.07%

#### 6.1.3.1.3 Reduction in Total NOx

The introduction of the proposed Advanced NOx abatement system is projected to reduce the total NOx emissions from the plant by removing an additional 150 tonnes of NOx per annum from the stack emissions. This means that instead of solely relying on measures to increase dispersion to ensure emission process contributions do not result in a significant impact at the receptors, the site will reduce the total emissions released from the stack. This means overall, there will be a lower amount of NOx released into the environment than would be the case for the currently permitted installation.

#### 6.1.3.1.4 NOx Damage costing

As part of the Applicant's assessment, we requested that they undertake a damage cost assessment to provide an indication of the magnitude of the benefit to the environment which would be obtained from the reduction in total NOx released from the stack compared to the existing Installation's predicted NOx release. The Applicant took into account the average population density and stack height and calculated their new present value for the cost of NOx damage per tonne year.

<b>Case</b>	<b>Current Permit</b>	<b>Varied Permit</b>	<b>Benefit</b>	<b>% change</b>
Central	19,653,421	13,626,372	6,027,049	-30.6
Low	3,410,624	2,314,064	1,096,560	-32.15
High	61,911,299	43,338,312	18,572,986	- 29.9

The results show an approximate 30% decrease in environmental damage costs as a result of the proposed reduction in NOx emission from the stack. The Applicant also took into account the damage cost sensitivity analysis and highlighted that, based on population density and distance of receptors, the low figure is more likely to apply. The Applicant stated this low category would result to a £1.1 million reduction in damage costs over 25 years.

#### 6.1.3.1.5 NOx emissions conclusion

We have assessed the Applicant's alternative measures to manage NOx emissions. The Applicant has provided robust evidence to show that the alternative emissions control measures will be effective and the lower emissions limits will be achievable. The air quality modelling shows that the proposal will not result in a significant impact from NOx, and that there will not be a significant change in NOx process contributions at sensitive receptors. Furthermore, the overall annual tonnage of NOx emitted will be reduced, leading to a clear environmental benefit as illustrated by the reduction in environmental damage costs.

### 6.1.3.2 Revised sulphur dioxide limit and impact on emissions

The Applicant has proposed to reduce the sulphur dioxide half-hourly emission limit for emission points A1 and A2 from 200 mg/Nm<sup>3</sup> to 90 mg/Nm<sup>3</sup>.

The Applicant intends to achieve the stricter limit by committing to keeping the sulphur dioxide emissions under closer control than would otherwise be necessary for the existing limit. The incineration plant will include sulphur dioxide measurements in the raw flue gas and the clean flue gas, which will be used in the control system to inject lime at lower measured concentration and vary the lime injection rate, in order to keep the concentration below 50 mg/Nm<sup>3</sup>. The measurement are then reviewed and lime with a higher specific surface area can be applied if required. We are satisfied that the improvements proposed by the Applicant will be able to achieve the lower emissions levels.

The Applicant has revised their air quality predictions taking into account the amended emissions limit of 90 mg/Nm<sup>3</sup>. The Applicant predicts a decrease in SO<sub>2</sub> hourly process contributions from 6.48% to 5.95% of the Environmental Standard at the point of maximum impact.

As such, short term sulphur dioxide emissions remain insignificant as they are less than 10% of the short term environmental standard and there is a predicted decrease in the process contribution at the maximum point of impact (which will be reflected at sensitive receptors beyond this location). We therefore consider the emissions limit will provide an equivalent level of protection compared to the existing proposals.

### 6.1.3.3 Revised cadmium and thallium limits and impact on emissions

The Applicant has proposed to reduce the cadmium and thallium emission limit for emission points A1 and A2 from 0.05 mg/Nm<sup>3</sup> to 0.02 mg/Nm<sup>3</sup>. The Applicant intends to achieve the stricter limit by committing to monitoring the performance of the bag filter, focusing on the pressure drop over the bags, the pulse jet cleaning frequency and the total particulate concentration as well as the periodic monitoring results for metals, and would carry out maintenance accordingly. In comparison with a plant with the current emission limits for metals, it is anticipated that the condition of the bags would be monitored even more carefully and the bags would be replaced more frequently.

The Applicant has revised their air quality prediction taking into account the amended emissions limits. The Applicant predicts a decrease in cadmium annual process contribution from 8.14% to 7.19% of the Environmental Standard (ES) at the point of maximum impact. As such, cadmium emissions are not significant as emissions do not exceed the environmental standards and there is a predicted decrease in process contributions (PC) at the maximum point of impact (which will be reflected at sensitive receptors beyond this location). We therefore consider the emissions limit will provide an equivalent level of protection compared to the existing proposal.

#### 6.1.3.4 Revised Category 3 metals limits and impact on emissions

The Applicant has proposed to reduce the emission limit for category 3 metals from 0.5 mg/Nm<sup>3</sup> to 0.3 mg/Nm<sup>3</sup> for emissions point A1 and A2. As stated above, the Applicant intends to achieve the stricter limit by committing to monitoring the performance of the bag filter, focusing on the pressure drop over the bags, the pulse jet cleaning frequency and the total particulate concentration as well as the periodic monitoring results for metals, and would carry out maintenance accordingly. In comparison with a plant with the current emission limits for metals, it is anticipated that the condition of the bags would be monitored even more carefully and the bags would be replaced more frequently.

##### 6.1.3.4.1 Metals assessment in line with EA category 3 metal guidance

The Applicant repeated their air quality assessment for category 3 metals using a revised emission limit of 0.3 mg/Nm<sup>3</sup>. The emission of a single metal at the combined emission limit for the 9 metals is highly unlikely so the Applicant also undertook a category 3 screening assessment in line with Environment Agency category 3 metal guidance to determine how the proposed 35 metre stack would affect metal emissions (which calculates a value which is referred to as “Metals based on emissions from other permitted plants”). The results are shown in the tables below.

<b>Metal</b>	<b>Environmental Standard</b>	<b>Permitted</b>				<b>Proposed</b>			
		<b>Process contribution Metals at worst case combined metal limit (ng/m3)</b>	<b>Metals at combined metal limit as % of ES</b>	<b>Metals based on emissions from other permitted plants (ng/m<sup>3</sup>)</b>	<b>Metals based on emissions from other permitted plants PC as % of the ES</b>	<b>Process contribution Metals at worst case combined metal limit (ng/m<sup>3</sup>)</b>	<b>Metals at combined metal limit as % of ES</b>	<b>Metals based on emissions from other permitted plants (ng/m<sup>3</sup>)</b>	<b>Metals based on emissions from other permitted plants PC as % of the ES</b>
Arsenic	3	4.45	135.66%	0.20	6.78%	5.39	179.76%	0.27	8.99%
Antimony	5,000	4.45	0.08%	0.09	0.002%	5.39	0.11%	0.12	0.002%
Chromium	5,000	4.45	0.08%	0.75	0.01%	5.39	0.11%	0.99	0.02%
Chromium (VI)	0.2	4.45	2034.83%	0.0011	0.53%	5.39	2696.46%	0.0014	0.70%
Cobalt	-	4.45	-	0.05	-	5.39	-	0.06	-
Copper	10,000	4.45	0.04%	0.24	0.0024%	5.39	0.05%	0.31	0.0031%
Lead	250	4.45	1.63%	0.41	0.16%	5.39	2.16%	0.54	0.22%
Manganese	150	4.45	2.71%	0.49	0.33%	5.39	3.60%	0.65	0.43%
Nickel	20	4.45	20.35%	1.79	8.95%	5.39	26.96%	2.37	11.86%
Vanadium	5,000	4.45	0.08%	0.05	0.0010%	5.39	0.11%	0.06	0.0013%

<b>Table 6.3 Short term results</b>									
<b>Metal</b>	<b>Environmental Standard</b>	<b>Permitted</b>				<b>Proposed</b>			
		<b>Process contribution Metals at worst case combined metal limit (ng/m<sup>3</sup>)</b>	<b>Metals at combined metal limit as % of ES</b>	<b>Metals emitted no worse than a currently permitted Facility (ng/m<sup>3</sup>)</b>	<b>Metals emitted no worse than a currently permitted Facility as % of ES</b>	<b>Process contribution Metals at worst case combined metal limit (ng/m<sup>3</sup>)</b>	<b>Metals at combined metal limit as % of ES</b>	<b>Metals emitted no worse than a currently permitted Facility (ng/m<sup>3</sup>)</b>	<b>Metals emitted no worse than a currently permitted Facility As % of ES</b>
Arsenic	-	78.53	-	3.76	-	86.60	-	4.33	-
Antimony	150000	78.53	0.05%	1.73	0.0012%	86.60	0.06%	1.99	0.0013%
Chromium	150000	78.53	0.05%	13.84	0.009%	86.60	0.06%	15.93	0.011%
Chromium (VI)	-	78.53	-	0.02	-	86.60	-	0.02	-
Cobalt	-	78.53	-	0.84	-	86.60	-	0.97	-
Copper	200000	78.53	0.04%	4.36	0.002%	86.60	0.04%	5.02	0.003%
Lead	-	78.53	-	7.57	-	86.60	-	8.71	-
Manganese	1500000	78.53	0.01%	9.02	0.0006%		0.01%	10.39	0.0007%
Nickel	-	78.53	-	33.09	-		-	38.10	-
Vanadium	1000	78.53	7.52%	0.90	0.09%		8.66%	1.04	0.10%

The Applicant also predicted the PC for category 3 metals as whole at various receptors. For clarity, rather than present the PC as a percentage of the ES for each of the individual 9 metals, we have compared the PC for category 3 metals as whole to the ES for arsenic as a worst case. Arsenic has the second lowest ES of the 9 metals. We have not used the ES for chromium VI this metal forms a very small proportion of the total metal content and the value has to be measured as a proportion of total chromium content from the stack measurements. Chromium (VI) is also not specifically referenced in Annex VI of IED and the ES stated for Chromium (VI) is a guideline figure (refer to section 5.2.2). On this basis we have determine that the environmental standard for arsenic is a more appropriate worst case figure for comparison.

Using the same rationale set out above, we have also calculated the likely impact of arsenic based on emissions from other permitted plants using our category 3 metals guidance.

The results are shown in the table below.

Metal	Environmental Standard for Arsenic	Permitted				Proposed			
		Long term process contribution Arsenic at worst case combined metal limit (ng/m3)	Arsenic at combined metal limit as % of ES	Arsenic based on emissions from other permitted plants (ng/m <sup>3</sup> )	Arsenic based on emissions from other permitted plants PC as % of the ES	Long term process contribution Arsenic at worst case combined metal limit (ng/m <sup>3</sup> )	Arsenic at combined metal limit as % of ES	Arsenic based on emissions from other permitted plants (ng/m <sup>3</sup> )	Arsenic based on emissions from other permitted plants PC as % of the ES
Sheepcotes Farm (Hanger No.1)	3	0.86	28.6 %	0.043	1.43%	0.88	29.3 %	0.044	1.46%
Allshot's Farm (Scrap Yard)	3	1.12	37.3 %	0.056	1.86%	2.30	76.6 %	0.115	3.83%
Haywards	3	3.77	125.6 %	0.1885	6.28%	3.54	118 %	0.177	5.9%

Hérons Farm	3	1.32	44 %	0.66	22%	1.36	45.3 %	0.068	2.26%
Gosling's Farm	3	0.79	26 %	0.0395	1.31%	0.70	23.3 %	0.035	1.16%
Curd Hall Farm	3	2.02	67.3 %	0.101	3.36%	1.67	55.6 %	0.0835	2.78%
Church (adjacent to Bradwell Hall)	3	0.63	21 %	0.0315	1.05%	0.54	18 %	0.027	0.9%
Bradwell Hall	3	0.59	19.6 %	0.0295	0.98%	0.50	16.6 %	0.025	0.83%
Rolphs Farmhouse	3	0.50	16.6 %	0.025	0.83%	0.40	13.3 %	0.02	0.66%
Silver End / Bower Hall / Fossil Hall	3	1.07	35.6 %	0.0535	1.78%	0.90	30 %	0.045	1.5%
Rivenhall PI/Hall	3	0.95	31.6 %	0.0475	1.58%	0.80	26.6 %	0.04	1.3%
Parkgate Farm / Watchpall Cottages	3	1.05	35 %	0.0525	1.75%	0.94	31.3 %	0.047	1.56%
Ford Farm / Rivenhall Cottage	3	0.73	24.3 %	0.0365	1.21%	0.62	20.6 %	0.031	1.03%
Porter's Farm	3	0.96	32 %	0.048	1.6%	0.82	27.3 %	0.041	1.36%
Unknown Building 1	3	1.17	39 %	0.0585	1.9%	1.08	36 %	0.054	1.8%
Bumby Hall / The Lodge / Polish Site	3	1.12	37.3 %	0.056	1.86%	1.48	49.3 %	0.074	2.46%

Green Pastures Bungalow	3	0.86	28.6 %	0.043	1.43%	0.76	25.3 %	0.038	1.26%
Deeks Cottage	3	2.33	77.6 %	0.1165	3.88%	2.32	77.3 %	0.116	3.86%
Gosling Cottage / Barn	3	0.83	27.6 %	0.0415	1.38%	0.76	25.3 %	0.038	1.26%
Felix Hall / The Clock House / Park Farm	3	0.67	22.3 %	0.0335	1.11%	0.51	17 %	0.025	0.83%
Glazenwood House	3	0.46	15.3 %	0.023	0.76%	0.40	13.3 %	0.02	0.66%
Bradwell Hall	3	0.37	12.3 %	0.0185	0.61%	0.33	11 %	0.016	0.53%
Perry Green Farm	3	0.52	17.3 %	0.026	0.86%	0.44	14.6 %	0.022	0.73%
The Granary / Porter Farm / Rook Hall	3	0.63	21 %	0.0315	1.05%	0.52	17.3 %	0.026	0.86%
Grange Farm	3	1.43	47.6 %	0.0715	2.38%	1.13	37.6 %	0.056	1.86%
Coggeshall	3	1.26	42 %	0.063	2.1%	0.99	33 %	0.049	1.63%

The above table shows that the PC increases or is the same at a small number of receptors but is reduced at all of the others. The largest increase is at Allshot's Farm but when the impact is predicted based on likely emissions (based on our guidance) the PC is still considered not significant as it is less than the environmental standard under a conservative worst case scenario.

#### 6.1.3.4.5 Metals conclusion

As outlined above and in section 5 of this document:

- the category 3 metals screen out as not significant in line with the requirements of our Category 3 metals guidance.
- The process contributions are reduced at a majority of receptors. Where process contributions have increased, there is no predicted significant pollution.
- We consider the change in category 3 metal impacts to be not significant

For these reasons we consider that the new emissions limit will provide an equivalent level of protection compared to the existing proposal.

#### 6.1.4 Comparison of the air quality modelling predictions for the currently permitted 58 m stack and the proposed 35 m stack (including alternative measures)

To assess the change in process contributions for the 58 metre stack and 35 metre stack proposals, the Applicant has compared the air quality modelling predictions for both scenarios. See Table 6.5 below.

Table 6.5 Comparison of the air quality modelling predictions for the currently permitted 58 m stack and the proposed 35 m stack													
Pollutant	Quantity	Units	AQAL	Bg Conc.	Permitted				Proposed scenario				Difference in PC Max as % of AQO /EAL
					PC Max	PC Max as % of AQO /EAL	PEC (PC +Bg)	PEC as % of AQO /EAL	PC Max	PC Max as % of AQO /EAL	PEC (PC +Bg)	PEC as % of AQO /EAL	
Nitrogen dioxide	Annual mean	µg/m <sup>3</sup>	40	18.60	0.88	2.19%	19.48	48.69%	1.31	3.27%	19.91	49.77%	<b>+1.08</b>
	99.79th%ile of hourly means(1)	µg/m <sup>3</sup>	200	37.20	16.21	8.11%	53.41	26.71%	16.38	8.19%	53.58	26.79%	<b>+0.08</b>
Sulphur dioxide	99.18th%ile of daily means	µg/m <sup>3</sup>	125	12.40	3.41	2.72%	15.81	12.64%	7.81	6.24%	20.21	16.16%	<b>+3.52</b>
	99.73rd%ile of hourly means(1)	µg/m <sup>3</sup>	350	12.40	22.69	6.48%	35.09	10.03%	20.83	5.95%	33.23	9.49%	<b>- 0.53</b>
	99.9th%ile of 15 min. means(1)	µg/m <sup>3</sup>	266	12.40	26.37	9.9%	38.77	14.57%	23.48	8.83%	35.88	13.49%	<b>- 1.07</b>
PM10s	Annual mean	µg/m <sup>3</sup>	40	20.20	0.08	0.20%	20.28	50.70%	0.18	0.45%	20.38	50.95%	<b>- 0.25</b>
	90.41th%ile of daily means	µg/m <sup>3</sup>	50	40.40	0.29	0.57%	40.69	81.37%	0.64	1.28%	41.04	82.08%	<b>+ 0.71</b>
PM2.5s	Annual mean	µg/m <sup>3</sup>	25	13.80	0.08	0.33%	13.88	55.53%	0.18	0.72%	13.98	55.92%	<b>+ 0.38</b>
Carbon monoxide	8 hour running mean(1)	µg/m <sup>3</sup>	10,000	602.00	15.07	0.15%	617.07	6.17%	32.17	0.32%	634.17	6.34%	<b>+0.17</b>

Hydrogen chloride	Hourly mean(1)	µg/m <sup>3</sup>	750	1.44	9.02	1.20%	10.46	1.39%	17.30	2.31%	18.74	2.50%	<b>+1.11</b>
Hydrogen fluoride	Annual mean	µg/m <sup>3</sup>	16	2.35	0.01	0.05%	2.36	14.74%	0.02	0.11%	2.37	14.80%	<b>+ 0.06</b>
	Hourly mean(1)	µg/m <sup>3</sup>	160	4.70	0.60	0.38%	5.30	3.31%	1.15	0.72%	5.85	3.66%	<b>+ 0.34</b>
Ammonia	Annual mean	µg/m <sup>3</sup>	180	1.80	0.08	0.05%	1.88	1.05%	0.18	0.10%	1.98	1.10%	<b>+0.05</b>
	Hourly mean	µg/m <sup>3</sup>	2,500	3.60	1.50	0.06%	5.10	0.20%	2.89	0.12%	6.49	0.26%	<b>+0.06</b>
VOCs (as benzene)	Annual mean	µg/m <sup>3</sup>	5	0.40	0.15	2.97%	0.55	10.97%	0.33	6.56%	0.73	14.56%	<b>+ 3.59</b>
	Hourly mean(1)	µg/m <sup>3</sup>	195	0.80	5.49	2.81%	6.29	3.22%	8.09	4.15%	8.89	4.56%	<b>+1.34</b>
VOCs (as 1,3-butadiene)	Annual mean	µg/m <sup>3</sup>	2.25	0.20	0.15	6.60%	0.35	15.49%	0.33	14.57%	0.53	23.46%	<b>+ 7.97</b>
Mercury	Annual mean	ng/m <sup>3</sup>	250	1.51	0.41	0.16%	1.92	0.77%	0.90	0.36%	2.41	0.96%	<b>+ 0.20</b>
	Hourly mean	ng/m <sup>3</sup>	7,500	3.02	7.52	0.10%	10.54	0.14%	14.43	0.19%	17.45	0.23%	<b>+ 0.09</b>
Cadmium	Annual mean	ng/m <sup>3</sup>	5	0.15	0.41	8.14%	0.56	11.14%	0.36	7.19%	0.51	10.19%	<b>- 0.95</b>
	Hourly mean	ng/m <sup>3</sup>	-	0.30	0.41	8.14%	0.56	11.14%	5.77	-	6.08	-	-
Thallium	Annual mean	ng/m <sup>3</sup>	-	-	0.41	-	-	-	0.36	-	-	-	
	Hourly mean	ng/m <sup>3</sup>	-	-	7.52	-	-	-	5.77	-	-	5.77	
Dioxins	Annual mean	fg/m <sup>3</sup>	-	22.82	0.81	-	23.63	-	1.80	-	24.62	-	
PCBs	Annual mean	ng/m <sup>3</sup>	200	0.14	0.04	0.02%	0.18	0.09%	0.09	0.04%	0.23	0.12%	<b>+ 0.02</b>
	Hourly mean	ng/m <sup>3</sup>	6,000	0.28	0.75	0.01%	1.03	0.02%	1.44	0.02%	1.73	0.03%	<b>+ 0.01</b>

PAHs	Annual mean	pg/m <sup>3</sup>	250	140.00	0.85	0.34%	140.85	56.34%	1.89	0.76%	141.89	56.76%	<b>+ 0.42</b>
Other metals	Annual mean	ng/m <sup>3</sup>	-	-	4.07	See metals assessment section 6.2.2.5			1.31	See metals assessment section 6.2.2.5			
	Hourly mean	ng/m <sup>3</sup>	-	-	75.20				8.36				

#### 6.1.4.1 Air quality modelling conclusion

The comparison of the process contribution in table 6.5 shows that using the worst case meteorological data, there is potential for some minor increases in process contributions at the maximum point of impact. Despite these increases, considering the PECs of the existing and proposed scenario, we consider the increases to be not significant. Where long term increases do not screen out as insignificant, we have reviewed those emissions in more detail.

Sections 5.2 (iv) demonstrates that actual VOC emissions will actually make up a small percentage of the projected emissions. Section 6.1.2.1.2 shows that the maximum point of impact is not near receptors and the VOC process contributions at the actual receptors are less than 1% and therefore insignificant.

Section 6.2.2.5 shows that metal emissions at actual receptors mostly decrease and that the category 3 metal assessment determines that emissions will not result in a significant impact. We are satisfied the changes in metal emissions can be considered not to result in a significant impact.

The increase in emissions is based on a worst case scenario and process contributions either screened out as insignificant, or on further assessment were determined as not likely to have a significant impact. The results also show that emissions are not significantly different to those under the previous scenario. We are therefore satisfied that the emissions from the 35 metre stack proposal can be considered to be comparable to that of the permitted 58 metre stack and that the conclusions of the 2018 air quality modelling report and supporting information reflects the conclusions made in the 2017 air quality modelling report for the permitted 58 metre stack scenario.

#### 6.1.5 Equivalent level of Environmental Protection

We have reviewed the Applicant's proposals for providing alternative measures to those previously determined to be BAT and the Applicant's justification as to why their alternative proposals can be considered to deliver an equivalent level of environmental protection. Sections 6.1.2.1 and 6.1.2.1.1 conclude that robust evidence has been provided to demonstrate the alternative measures including advanced SNCR and revised emissions limits will be effective in practice.

For emissions of sulphur dioxide (hourly and 15 min mean), cadmium (annual mean) and PM<sub>10</sub> (annual mean), Section 6.2.3 shows that process contributions are decreasing, and so the level of environmental protection can be considered to be equivalent.

For emissions of NO<sub>x</sub> (short term), sulphur dioxide (daily), PM<sub>10</sub> (short term), PM<sub>2.5</sub>, carbon monoxide, hydrogen chloride, hydrogen fluoride, ammonia, mercury, thallium, dioxins, PCBs and PAHs, section 6.2.3 shows that although there is a slight increase in emissions, the emissions are considered insignificant in that the process contributions are still <1% for long term

emissions and <10% for short term emissions. Emissions can therefore be considered insignificant and so the level of environmental protection can be considered to be equivalent.

For emissions of nitrogen dioxide (long term), VOCs (as benzene), VOCs (as 1,3-butadiene), cadmium (annual), section 6.2.3 shows that there are some slight increases in emissions. Sections 5.2 (iv), 6.1.2.1 and 6.2.2.5 demonstrate that emissions will not result in a significant impact at receptors and section 6.2.3 demonstrates that the conclusions of the air quality modelling report for the proposed 35 metre stack can be considered to be representative of the air quality modelling conclusions for the 58 metre scenario in that the predicted environment concentrations as a percentage of the environmental standard are not significantly different. We are therefore satisfied the proposal will deliver an equivalent level of environmental protection in respect to these pollutants.

Sections 6.1.2.1.1 and 6.1.2.2.3 demonstrate that the proposals in this Application will reduce total NOx emissions released from the stack. This will reduce NOx process contributions at the most sensitive receptors without relying solely on measures for increased dispersion to reduce process contributions. The resulting reduction in environmental damage cost is outlined in section 6.1.2.2.4. The reduction in total NOx emissions that will be released from the stack further reinforces our view that that the proposals will deliver an equivalent level of environmental protection.

Lower emission limits in the Permit will ensure that an equivalent level of environmental protection will be maintained. The Operator will operate the plant to ensure that the ELVs are met at all times. The fact that the ELVs are lower will require the Operator to take measures to ensure that the ELVs are achieved.

On the basis that:

- the air quality impact assessment conclusions are similar and emissions are not predicted to be significantly different;
- the operator will apply emissions control measures in addition to those normally considered to be BAT in order to meet the lower emissions limits for certain pollutants; and
- the overall NOx emissions to the environment are reduced.

we are satisfied that the Applicant's proposals will not result in any significant impact to human or ecological receptors, and that overall, the proposals will deliver an equivalent level of environmental protection to the standards previously accepted. The proposal can therefore be considered to be BAT and there is no requirement or evidence to justify the Applicant going beyond BAT.

## 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 so far as they relate to this variation 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 reviewed the reasons given for the refusal of planning permission and specifically whether this conclusion is based on information given in the Environmental Statement. We are satisfied that these matters are entirely matters of planning policy and not relevant to our determination. The pollution control and planning regimes are intended to be complementary and should avoid duplication.

From our 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 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 Variation Notice and a draft decision document. The way in which this has been done is set out in Section 2.2. 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 6(1) (Conservation Duties with Regard to Water)

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

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

(iv) Section 6(6) (Fisheries)

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

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

(v) Section 7 (Pursuit of Conservation Objectives)

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

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

(vi) Section 39 (Costs and Benefits)

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

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

#### 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.

#### (viii) Section 81 (National Air Quality Strategy)

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

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

#### (ix) National Emissions Ceiling Regulations 2018

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

#### 7.2.3 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. There is no SSSI which could be affected by the proposed Installation.

#### 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.

#### 7.2.8 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.

#### 7.2.9 National Parks and Access to the Countryside Act 1949

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

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

### 7.3 National secondary legislation

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

We have assessed the Application in accordance with guidance agreed jointly with Natural England and concluded that there will be no likely significant effect on any European Site. There is no European Site which could be affected by the proposed Installation.

#### 7.3.2 The Persistent Organic Pollutants Regulations 2007

We explained our approach to these Regulations, which give effect to the Stockholm Convention on POPs and the EU's POPs Regulation in our previous permit decision document and this approach has not changed as a result of this variation.

### 7.4 Other relevant legal requirements

#### 7.4.1 Duty to Involve

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

The way in which the Environment Agency has consulted with the public and other interested parties is set out in section 2.2 of this document. The way in which we have taken account of the representations we have received is set out in Annex 4. Our public consultation duties are also set out in the EP Regulations, and our statutory Public Participation Statement, which implement the requirements of the Public Participation Directive. In addition to meeting our consultation responsibilities, we have also taken account of our guidance in Environment Agency Guidance Note RGS 6 and the Environment Agency's Building Trust with Communities toolkit.

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

<b>IED Article</b>	<b>Requirement</b>	<b>Delivered by</b>
45(1)(a)	The permit shall include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2000/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate.	Condition 2.3.3(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(b)	The permit shall include the total waste incinerating or co-incinerating capacity of the plant.	Condition 2.3.3(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(c)	The permit shall include the limit values for emissions into air and water.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1(a) in Schedule 3 of the Permit.
45(1)(d)	The permit shall include the requirements for pH, temperature and flow of waste water discharges.	Not Applicable. There are no point source emission to surface water.
45(1)(e)	The permit shall include the sampling and measurement procedures and frequencies to be used to comply with the conditions set for emissions monitoring.	Conditions 3.5.1 to 3.5.5 and Tables S3.1, S3.1(a), S3.3 and S3.4 in Schedule 3 of the Permit.
45(1)(f)	The permit shall include the maximum permissible period of unavoidable stoppages, disturbances or failures of the purification devices or the measurement devices, during which the emissions into the air and the discharges of waste water may exceed the prescribed emission limit values.	Conditions 2.3.10 and 2.3.11.
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Stack height was calculated as part of the previous permit application EPR/FP3335YU/A001 and this variation delivers an equivalent

IED Article	Requirement	Delivered by
		level of protection so we consider the article is still satisfied Condition 2.3.1(a) and Table S1.2 of Schedule 1 of the Permit.
46(2)	Emission into air shall not exceed the emission limit values set out in parts 4 or determined in accordance with part 4 of Annex VI.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1a.
46(5)	Prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. Adequate storage capacity for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting.	The previous permit application EPR/FP3335YU/A00 1 explains the measures to be in place for achieving the directive requirements. The permit requires that these measures are used. Various permit conditions address this and when taken as a whole they ensure compliance with this requirement.
46(6)	Limits the maximum period of operation when an ELV is exceeded to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year. Limits on dust (150 mg/m <sup>3</sup> ), CO and TOC not to be exceeded during this period.	Conditions 2.3.10 and 2.3.11
47	In the event of breakdown, reduce or close down operations as soon as practicable. Limits on dust (150 mg/m <sup>3</sup> ), CO and TOC not to be exceeded during this period.	Condition 2.3.10
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Conditions 3.5.1 to 3.5.5. Reference conditions are defined in Schedule 6 of the Permit.

<b>IED Article</b>	<b>Requirement</b>	<b>Delivered by</b>
48(2)	Installation and functioning of the automated measurement systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	Condition 3.5.3; Tables S3.1, S3.1(a), and S3.2
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	conditions 3.5.3 and 3.5.4
48(4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Conditions 4.1.1 and 4.1.2, and Tables S4.1 and S4.4
49	The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	conditions 3.1.1 and 3.1.2 and 3.5.5
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) < 3% or loss on ignition (LOI) < 5%.	Conditions 3.5.1 and Table S3.5
50(2)	Flue gas to be raised to a temperature of 850°C for two seconds, as measured at representative point of the combustion chamber.	Condition 2.3.7, Pre-operational condition 5, Improvement condition 4 and Table S3.2.
50(3)	At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas.	Condition 2.3.8
50(4)(a)	Automatic shut to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.7
50(4)(b)	Automatic shut to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.7
50(4)(c)	Automatic shut to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.7
50(5)	Any heat generated from the process shall be recovered as far as	The plant will generate electricity

<b>IED Article</b>	<b>Requirement</b>	<b>Delivered by</b>
	practicable.	and heat in the form of steam and supply it to the paper pulp plant and waste water treatment plant.
50(6)	Relates to the feeding of infectious clinical waste into the furnace.	No infectious clinical waste will be burnt
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit.
51(1)	Different conditions than those laid down in Article 50(1), (2) and (3) and, as regards the temperature Article 50(4) may be authorised, provided the other requirements of this chapter are met.	No such conditions Have been allowed
51(2)	Changes in operating conditions do not cause more residues or residues with a higher content of organic polluting substances compared to those residues which could be expected under the conditions laid down in Articles 50(1), (2) and (3).	No such conditions Have been allowed
51(3)	Changes in operating conditions shall include emission limit values for CO and TOC set out in Part 3 of Annex VI.	No such conditions Have been allowed
52(1)	Take all necessary precautions concerning delivery and reception of Wastes, to prevent or minimise pollution.	Conditions 2.3.1, 2.3.3, 3.2, 3.3, 3.4 and 3.6.
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Condition 2.3.3(a) and Table S2.2 in Schedule 3 of the Permit.
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 1.4.1, 1.4.2 and 3.5.1 with Table S3.3
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	Conditions 1.4.1 2.3.1, 2.3.2 and 3.2.1.
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.5.1, Table S3.3 and Pre-operational condition 2.
55(1)	Application, decision and permit to be publicly available.	All documents are accessible from the

IED Article	Requirement	Delivered by
		Environment Agency Public Register.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2 and 4.2.3.

**ANNEX 2: Pre-Operational Conditions**

No changes have been made to pre-op conditions.

**ANNEX 3: Improvement Conditions**

No changes have been made to improvement conditions.

## **ANNEX 4: Consultation Responses**

### **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 *24th January 2019 to 21st February 2019* and in the Braintree and Witham Times on January 24<sup>th</sup> 2019. The Application was made available to view at the Environment Public Register at Environment Agency, Icen House, Cobham Road, Ipswich, IP3 9JD

The following statutory and non-statutory bodies were consulted:

- Food Standards Agency
- Local Planning Authority – Colchester, Essex
- Local Authority Environmental Health – Colchester, Essex
- Health and Safety Executive
- Director of Public Health
- Public Health England

### **1) Consultation Responses from Statutory and Non-Statutory Bodies**

Response Received from Public Health England	
Brief summary of issues raised:	Summary of action taken / how this has been covered
<p>The main emissions of potential concern are on air quality</p> <p>Based on the information contained in the application supplied to us, Public Health England has no significant concerns regarding the risk to the health of the local population from the installation.</p> <p>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.</p>	<p>We have reviewed the Applicant's air quality modelling and we are satisfied emissions will not breach the environmental standards in place and therefore will not result in a significant impact on sensitive receptors.</p> <p>We have assessed the Applicant's revised emission controls, air quality modelling and justification for a 35 metre stack and we are satisfied these measures can be considered BAT and will provide an equivalent level of environmental protection in comparison to a 58 metre stack.</p> <p>Tables S3.1 and S3.1(a) in the permit specifies the emission limits set for the main stack in accordance with IED limits.</p>

### **Response Received from Development Management Colchester Borough**

Council	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Colchester Borough Council has no objection to the scheme. They state: We are not aware of any complaints regarding the current operation. The facility is a considerable distance from residential receptors within the borough and the accompanying information predicts an insignificant increase in pollutants.	No concerns were raised by the consultee no further action is required.

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

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

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

a) **Representations from Local Councillor and Parish Councils**

Representations were received from County Councillor, Rivenhall Parish Council and Coggleshall Parish Council, who raised the following issues.

Response Received from County Councillor	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Concern that existing permit was granted by the EA for a 58 metre high stack but a previous application for a 35 metre stack was refused by the EA in 2016 as it did not represent BAT. Concern that impacts are either the same or increasing.	Under this Application the Applicant has outlined proposals to address the emissions from a 35 metre stack to ensure they do not result in a significant impact and will provide an equivalent level of environmental protection to a 58 metre stack. Measures include an advanced abatement system and revised emissions limits. We have assessed the Applicant's

	<p>revised emission controls and air quality modelling and we are satisfied these measures will deliver an equivalent level of environmental protection to that of a 58 metre stack and therefore can be considered to represent BAT.</p> <p>Please refer to section 6 for further details.</p>
<p>Concerns regarding the Applicant's claim that by using more advanced abatement equipment, lower emissions can be achieved with a 35 metre stack.</p> <p>Question whether the system will work as proposed and whether the NOx emission limit of 100mg/Nm3 is achievable via abatement.</p>	<p>The Applicant has provided evidence of providers of the technology who would contractually commit to achieving the 100mg/m3 limit and have referenced a number of plants equipped with grates and advanced SNCR which achieve an emissions limit of 100 mg/m3.</p> <p>The Applicant has undertaken a review of their plant and emissions control measure against operational data from incineration plant with a similar set up (technology, emissions management, scale and waste type) which is published in the draft waste incineration BREF. They have demonstrated that the proposed limits are within the range of what can be achieved in practice. Refer to section 6 for further information</p> <p>Based on the data and evidence provided, we are satisfied the Applicant has demonstrated their abatement proposals will be capable of achieving and maintaining the revised NOx limits.</p> <p>To ensure that this limit is consistently achieved the Operator will be required to undertake continuous or periodic monitoring as applicable to confirm this. In the unlikely event of an exceedance they must report to the Environment Agency any breaches in the emission limit. If the breaches are not addressed the Environment Agency will take enforcement action.</p>
<p>Questions why the Applicant has not implemented the proposed advanced abatement technologies with the existing consented stack at 58</p>	<p>NOX emissions from previous 58 m stack proposal screened out from significant impact. Therefore the proposal for advanced abatement to</p>

metres.	<p>reduce NOx process contributions is only required as a result of the height reduction proposal.</p> <p>As the abatement measures outlined in section 6 are considered to provide an equivalent level of environmental protection to a 58 metre stack and air emissions are shown to not result in a significant impact, we are satisfied that the proposals are equivalent to BAT and requiring the Applicant to go further than BAT in this case is not justified.</p> <p>See section 6 of this document for further information.</p>
Concerns that there are changes in site operations and operating techniques under this variation which could impact on aspects such as emissions energy balance of the plant, the materials used, treatment of waste, the waste tonnage received, recycling elements of the site and operating capacity.	This Application solely addresses the change in stack height and associated changes to ensure an equivalent level of environmental protection. No other changes were proposed.
Concern the Applicant has yet to satisfy condition 19 of the planning consent, requiring a detailed internal plant layout to be agreed with Essex County Council.	Conditions and requirements of the planning consent are matters for the Planning Authority to address.
Concerns that the Applicant will build the waste incinerator first and not guarantee that other elements of the integrated facility would be delivered.	If the Operator does not intend to implement all the activities they are permitted for, or intends to significantly alter their operating techniques in a way which results in changes to the activities that could impact on their energy efficiency and production they will be required to vary their permit so this can be assessed.
Concern over changes if a CHP scheme is introduced.	The Applicant has not applied to amend their process or CHP arrangements under this Application. This Application focuses solely on amendments to the stack height and the emissions limits.

<p>Concerns that material will not be recycled at the site.</p>	<p>The need for a facility be it a recycling facility or incineration facility is the responsibility of the Planning Authority.</p> <p>The obligation is on waste producers is to apply the waste hierarchy and for local authorities to have their own waste strategy dealing with kerbside collections. Our role in this determination is to assess whether any residual waste that may be sent for incineration can be dealt with in an environmentally acceptable manner. In addition to this we have set permit condition 2.3.4 (c) that does not allow separately collected fractions to be incinerated unless they are unsuitable for recycling</p>
<p>Concern that there are no other similar plants in the UK.</p>	<p>When the Applicant refers to similar plants they are referring to the way the plant operates, the waste types and capacity and the combustion technology applied at the plant. There are plants in the UK with broadly similar combustion technologies and waste types.</p>
<p>Concerns that the Applicant discussed Abnormal Emissions.</p>	<p>Abnormal emissions are allowed under the Industrial Emissions Directive. The impact of abnormal emissions is discussed in section 5.5 of this decision document. This section also includes the reasons why we allow periods of abnormal operation.</p> <p>We have audited the Applicant's air quality modelling and we do not predict any exceedences of the relevant Environmental Standards under normal or abnormal conditions. We are there for satisfied abnormal conditions will not result in an adverse impact under this proposal.</p>
<p>Concern the worst case weather conditions has not been considered</p>	<p>The Applicant used 5 years of weather data in line with our guidance. We audited the modelling and are satisfied that appropriate weather data was used.</p>

<p>Concern that stack is not high enough to avoid turbulence from nearby trees</p>	<p>We have audited the Application air quality modelling and undertaken checks in regard to the sensitivity of results to changes in terrain data and the worst case surface roughness and meteorological data from that in the original permit application air modelling assessment.</p> <p>As a result of our checks, we are satisfied that the nearby trees will not impact on our conclusions and the Applicant's predictions at human receptors can be used for determination as a reasonable worst-case</p>
<p>Concerns around the impact on the nearest significant population centre of Silver End and the area around the incinerator which is now subject to several development applications for housing expansion.</p>	<p>The Applicant's modelling and our sensitivity checks assessed against the maximum on the grid. We are satisfied that the magnitude of any impacts at the worst-case receptor location are broadly similar to impacts at the maximum point of impact on the grid. As such, the addition of receptors would not change the overall conclusions of the assessment.</p> <p>Refer to section 5.2.1 for further information</p>
<p>Concerns that there are repeated errors in the location and descriptions of Sensitive Receptors.</p>	<p>We have reviewed the Applicant's air quality modelling and considered the type and number of receptors included. We are satisfied all relevant receptors have been taken into account.</p>
<p>Question why waste minimisation and recycling is not being prioritised.</p>	<p>The obligation is on waste producers to apply the waste hierarchy and for local authorities to have their own waste strategy dealing with kerbside collections. Our role in this determination is to assess whether any residual waste that may be sent for incineration can be dealt with in an environmentally acceptable manner. We have therefore set permit condition 2.3.4 (c) that does not allow separately collected fractions to be incinerated unless they are unsuitable for recycling.</p>

Brief summary of issues raised:	Summary of action taken / how this has been covered
<p>Query Applicant's reference to "similar plants" in the UK and that no waste incinerators of the scale proposed at Rivenhall Airfield have been granted a permit by the EA in modern times with a stack as low as 35 metres.</p>	<p>When the Applicant refers to similar plants they are referring to the way the plant operates, the waste types and capacity and the combustion technology applied at the plant. There are plants in the UK with broadly similar combustion technologies and waste types.</p> <p>The stack heights of plants of similar size we have permitted are in the region of between 70 and 120 metres above surrounding ground levels which we regard as the "indicative BAT" for plants in the UK. However this range is only "indicative" and it is based on plants we have permitted and not based on any specific legislation, national or EU policy. The IED allows for Applicants to demonstrate that BAT is being applied at a particular location using other alternative measures taking local environmental conditions into account. This may mean looking at emissions reduction at source compared to changing the height of a stack.</p> <p>Please refer to section 6 for further information.</p>

Response Received from Coggleshall Parish Council	
Brief summary of issues raised:	Summary of action taken / how this has been covered
<p>Concern that the Applicant has failed to provide an adequate BAT justification for the proposed 35 metre stack height.</p>	<p>Under the current Application the Applicant has outlined proposals to address the emissions from a 35 metre stack to ensure they do not result in a significant impact and will provide an equivalent level of environmental protection to a 58 metre stack. Measures include advanced abatement systems and revised emissions limits.</p> <p>We have assessed the Applicant's</p>

	<p>revised emission controls and air quality modelling and we are satisfied these measures will ensure an equivalent level of environmental protection to that of a 58 metre stack and therefore can be considered to represent BAT.</p> <p>Please see section 6 for further details.</p>
<p>Concern that the proposed stack height is significantly less than the minimum height of other permitted incinerators of a similar capacity.</p>	<p>The stack height of plants of a similar size we have permitted are in the region of between 70 and 120 metres above surrounding ground levels we regard this as the “indicative BAT” for plants in the UK. However this range is only “indicative” and it is based on plants we have permitted and not based on any specific legislation, national or EU policy.</p> <p>The reason for this is that there is no “recommended” or “mandatory” stack height specified in any BAT reference documents (BREFs) or BAT Conclusions for any industrial sector. Reference to stack height is found in Article 46(1) of the IED for waste incineration and co-incineration plants which requires an Applicant to demonstrate that waste gases are discharged in a controlled way by means of a stack height which is calculated in such a way as to safeguard human health and the environment. We consider that has been done in this case.</p> <p>The IED allows for Applicants to demonstrate that BAT is being applied at a particular location using alternative measures. This may mean looking at emissions reduction at source compared to changing the height of a stack.</p> <p>In the previous permit determination a 58 metre stack was determined to represent BAT. In line with the requirement for alternative BAT proposals the Applicant has submitted proposals to demonstrate how they will achieve an equivalent level of environmental protection to a</p>

	<p>58 metre stack.</p> <p>We have reviewed the Applicant's proposed measures to manage emissions alongside their air quality modelling and we are satisfied that the proposals will achieve an equivalent level of environmental protection. We are there satisfied in line with the IED that BAT will be applied at this location taking environmental conditions in account.</p>
<p>State that ground level concentrations of NO2 from the installation would be significantly lower if emissions were via a stack of the normal height range for an incinerator of this size.</p>	<p>The Applicant has demonstrated through air quality modelling that with a stack of 35 metres and Advanced SNCR (which would not be present for the currently permitted 58 m stack) they will reduce emissions released from the stack to a point where the proposals can be considered to provide a level of environmental protection equivalent to the permitted 58 metre stack with conventional SNCR. So we do not agree that concentrations would be significantly lower.</p> <p>See section 6 of this document for further information.</p>
<p>State that graphs in the previous decision document show that the PC continues to drop considerably at stack heights above 35 metres and therefore 35 metres does not represent BAT for this installation.</p>	<p>Graphs in the previous application focused on a fixed emissions rate and how different stack heights could effectively disperse emissions at that rate to minimise the process contribution at sensitive receptors.</p> <p>In this Application the Applicant has focused on reducing the emissions rate in order to minimise the total emissions released in order to minimise process contribution at the receptor. Therefore stack height is only one element of the overall assessment.</p> <p>The Applicant has demonstrated that they will implement additional measures to reduce the emissions from the stack in order to deliver a process contribution at the receptors which can be considered to deliver an equivalent level of environmental protection to the 58 metre stack</p>

	<p>currently permitted.</p> <p>We have reviewed the Applicant's proposals and their air quality modelling and we are satisfied that proposal will reduce emissions released to a level which will deliver an equivalent level of environmental protection to that currently permitted. We are therefore satisfied that the revised proposals represent BAT.</p> <p>Please refer to section 6 for further information on demonstration of equivalence.</p>
Concerns that there are significant increases in pollution when comparing the new application with the extant EA permit.	We have assessed the Applicant's proposals and are satisfied they represent an equivalent level of environmental protection to that of the existing permitted scenario. See section 6 for further information.
Concerns regarding the impact of the water needs	Water use at the plant was assessed under the previous application and is not affected by the permit amendments proposed under this variation.
Concern to how the heat, steam and electricity is being used when compared to the original 2010 consent.	Steam and heat use was assessed under the previous application and is not affected by the permit amendments proposed under this variation.
Concerns as to the energy balance within the plant and to what extent energy not be used or wasted.	Energy production was assessed under the previous application and is not affected by the permit amendments proposed under this variation.
Concern regarding the practicality and viability of "Garden Communities" as a realistic user of heat.	<p>The Applicant has not applied to amend their process or CHP arrangements under this Application. This Application focuses solely on amendments to the stack height and the emissions limits.</p> <p>In the event revised operating techniques are required and revised CHP proposals, the Applicant would be required to demonstrate via new variation Application that they comply with the all the relevant standard and requirements.</p>

b) Representations from Community and Other Organisations

Representations were received from Kelvedon and Feering Heritage Society, Parishes Against Incinerator (PAIN), United Kingdom Without Incineration Network (UKWIN) and Trustees of Marks Hall Estate a number of these issues are the same as those raised by the Local Councillor. The additional issues raised are address below.

Brief summary of issues raised:	Summary of action taken / how this has been covered
<p>Seek firm assurance that tighter limits and stricter emissions will give the surrounding population a greater safeguard.</p>	<p>We have audited the Applicant's modelling and we are satisfied that the limits and controls proposed in the permit will deliver an equivalent level of environmental protection and ensure that emissions do not result in a breach of the environment standards that are in place to prevent impact on human health.</p> <p>We will ensure the limits and controls are maintained through continuous monitoring of the main pollutants for which limits are set, in addition we have set periodic monitoring for the other substances and we will carry out audits of the Operator's procedures and methods for emissions monitoring.</p>

Response Received from Parishes Against Incinerator (PAIN) and all copies of PAIN letters submitted by individuals	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Concerns that the ongoing changes, repeated applications will take the plant even further from the original approval and conditions set out. The site will no longer reflect the original intention for an integrated waste management facility.	<p>The Applicant is within their rights to apply for changes to their existing permit.</p> <p>This Application solely addresses the change in stack height and associated changes to ensure an equivalent level of environmental protection. No other changes were proposed.</p>
Concern regarding conflicting specialist advice received by the County Council may undermine the soundness of any local decision.	This is a consideration for the Planning Authority.
Concerns that the information provided by the Applicant is misleading and ambiguous and they are complicating the issue by re-applying for a 35 metre stack.	We have reviewed the permit Application and audited the Applicant's air quality modelling. We are satisfied the information provided is accurate.
Concern that the Applicant is not applying best available techniques to the currently permitted scenario to further improve/reduce the emission level as per BREF BAT 1208/38 establishing best available techniques (BAT) conclusions for waste treatment, under Directive 2010/75/EU of the European Parliament and the Council 10 August 2019.	<p>Improvement/reduction of emissions in line with the BREF on the currently permitted scenario is outside the scope of this determination and will be addressed in the sector reviews which is normal practice.</p> <p>In regards to applying BAT to the site under the proposals in this application, the Applicant has demonstrated through implementing advanced SNCR, in comparison to the currently permitted scenario, they will reduce the total NOx emissions to the environment.</p>

<p>Concerns that the revised stack height will only be 15 metres above the proposed trees adjacent to the building and will suffer from backwash, eddy currents and other meteorological conditions, that will impair the overall performance of the stack and allow the plume to ground locally.</p>	<p>We have audited the Applicant's modelling in relation to stack height and have performed sensitivity checks on terrain data, building height, previous sensitivities related to surface roughness and meteorological data which were previously considered worst case.</p> <p>As a result of our checks, we are satisfied that the nearby terrain, building and trees will not impact on our conclusions and that the Applicant's predictions at human receptors can be used for determination as a reasonable worst-case.</p>
<p>Concern that the Applicant's report shows the number of properties impacted with a stack below 40 metres increases to 26 from 3, an 8 fold increase.</p>	<p>The change in the number of receptors is in relation to those where emissions no longer screen out as insignificant (PC&lt;1%). This does not mean that they will be impacted significantly.</p> <p>We have audited the Applicant's air quality modelling report and with the additional measures in place we agree with the conclusions that there will not be a risk of significant impact. We are therefore satisfied that the proposals will not have a significant impact on sensitive receptors.</p> <p>Refer to section 5.2.1 for further information.</p>
<p>Concern over visual impact</p>	<p>Visual impact in relation to other structures in the area is a consideration for the Planning Authority (Essex County Council).</p>
<p>Concerns regarding inconsistencies in stack height and whether the overall height will comply with the issued permit</p>	<p>A stack height of 35 metres is now proposed by the Applicant. The equivalent ordnance datum height is 85 metres above ordnance datum (AOD).</p> <p>We are satisfied that the stack height stated in the Application is correct. The Operator will be required to demonstrate in line with the procedures in the permit operating techniques that the correct stack height is applied in practice to prevent breach of their permit.</p>

<p>Concerns that the stack height and potential change in the effective height of the stack will not provide adequate dispersion and will concentrate pollution into a smaller area.</p>	<p>We carried out an audit of the Applicant's air quality impact assessment and we are satisfied that the appropriate parameters have been adjusted in the modelling to account for the amendment in stack height. We are satisfied that under the new proposal emissions from the site. Will not have a significant effect on any sensitive receptors and that the measures in place will deliver an equivalent level of environmental protection. See section 5.2.1 and 6 for further information.</p>
<p>Concerns that of the overall 78 metre stack length there will be 43 metre of it below the ground which will not be practical from a design perspective as it could flood and limit accessibility.</p>	<p>The structural design of the facility, stack location and accessibility is not assessed as part of the permit application process. This is a concern for the Planning Authority. In regards to the risk of flooding, this was assessed under the previous application and is not considered as part of this Application which solely focuses on stack height and air emissions.</p>
<p>Concerns that the Applicant's drawings and presentation material at the recent public meeting were inaccurate and misleading including the stated stack heights. Concerns that the EA or ECC don't actually know what they are getting.</p>	<p>We are satisfied that the stack height stated in the application is correct and the Operator will be required to demonstrate that the correct stack height is applied in practice to prevent a breach of their permit.</p>
<p>Concerns that the 35 metre stack will concentrate pollutants more onto arable crop land with a great possibility that it will enter the food chain.</p>	<p>The Human Health Risk Assessment (HHRA) considers the location where the maximum deposition of pollutants which can result in bioaccumulation (dioxins and metals) at ground level. It then makes the assumption that a farmer and his family manage the land at this location and produce sufficient food from that land to satisfy their dietary needs throughout the year. This worst case prediction of intake of these pollutants via this route by members of the theoretical 'farmer family' is then compared against a 'daily recommended maximum dose' standard. We audited the Applicant's HHRA and</p>

	<p>we confirm that there is no likelihood of dioxin and heavy metals intake exceeding the daily recommended maximum dose standard even in this worst case scenario.</p> <p>We consulted the Food Standards Agency, Public Health England and the Director of Public Health during the determination of this Application. They have not raised any concerns with respect to contamination of the food chain from locally grown crops, soil or animals.</p> <p>Refer to section 5.3 for further information.</p>
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<p>Concern that while the impact of NO<sub>2</sub> with a 35 metre stack will not cause air quality standard to be breached, modelling show that ground level concentrations of NO<sub>2</sub> from the 58m stack would be significantly lower</p>	<p>We have audited the Applicant's air quality modelling report and with the additional measures in place we agree with the conclusions the new proposals will provide an equivalent level of environmental protection. See section 6 for further details.</p>
<p>Concerns that the dispersion modelling does not accurately reflect what is a complex situation.</p>	<p>Through running our own check modelling and applying sensitivity scenarios on the Applicant's air quality modelling we are satisfied the methods and data inputs used are appropriate and conservative. We therefore are satisfied that the Applicant's predictions can be used for determination as a reasonable worst-case.</p>
<p>Concerns that the modelling undertaken by the Applicant excludes the effects of building downwash, assumes effects of terrain are negligible and that the height of the buildings and stack has been reduced because of the surrounding terrain elevations.</p>	<p>In order to check the validity of the Applicant's predictions, we have undertaken our own detailed check modelling based on the Applicant's modelling files using ADMS 5 version 5.2. We carried out check on the sensitivity of results to changes in inputs e.g. terrain data, building height and as a result of our checks, we are satisfied that the Applicant's predictions at receptors can be used for determination as a reasonable worst-case.</p>
<p>Concern over whether an appropriate version of modelling software was used'</p>	<p>We have audited the Applicant's air quality modelling and we are satisfied that the Applicant has used the appropriate modelling software in the form of ADMS 5 version 5.2 As a result of our checks, we are satisfied that the Applicant's predictions at receptors can be used for determination as a reasonable worst-case.</p>

<p>Concern the proposed reduction in stack height from 58 metre to 35 metre above the surrounding ground level will double the long and short term impacts of the pollutants which is inconsistent with the principles of BAT.</p>	<p>We disagree that the impact of emissions will double. We have reviewed the Applicant's air quality modelling and though there are minor increases in a some emissions at receptors they are not significantly different and will not result in a significant impact. In addition this, the Applicant has demonstrated their proposals will reduce total emissions released to the environment therefore improving the overall impact of the site. We are therefore satisfied the proposals can be considered to provide an equivalent level of environmental protection.</p> <p>Refer to section 6 for further information.</p>
<p>Concerns that the demonstration of insignificance or not significant in line with environmental standards would show compliance with Article 47 of the Industrial Emissions Directive (IED) but does not in itself demonstrate BAT.</p>	<p>Our guidance and the Industrial Emissions Directive outline that proposals for alternative techniques must deliver an equivalent level of environmental protection as the standard currently determined to be BAT.</p> <p>We have reviewed the Applicant's proposals and air quality modelling and we are satisfied that the Applicant's 35 metre stack with advanced SNCR proposals will achieve an equivalent level of environmental protection to the 58 metre stack currently permitted.</p> <p>Considering this and that the air quality modelling shows no significant risk of impact, we are satisfied the revised proposals can be consider to be BAT.</p> <p>Please refer to section 5.2.1 and 6 for further information.</p>
<p>Query why if the Operator can achieve lower limits for the oxides of nitrogen (NOx) then why were they not applied to the exiting permit.</p>	<p>Lower emissions limits were not applied to the existing permitted scenario as we were satisfied that the 58 metre stack with conventional SNCR was BAT.</p> <p>As a result there was no justification for requiring the Applicant to go</p>

	beyond this.
Concerns regarding an increase in emissions of ammonia (NH <sub>3</sub> ) as a result of advanced SNCR and that the impacts on vegetation have not been fully assessed.	<p>The Applicant has not applied to change the ammonia emission limit. The Applicant has demonstrated the advanced SNCR system will use ammonia more effectively, through careful control of the injection rate of the reagent through the various nozzles. Therefore the excess ammonia which does not react will not increase and the proposed emission limit will remain the same.</p> <p>We have reviewed the Applicant's justification and we are satisfied there is no need to review ammonia emissions limits. We have also audited the Applicant's air quality modelling and we agree that there are unlikely to be any exceedences of the relevant critical levels or loads at any sensitive ecological receptors.</p>
Query why the application does not include a BAT assessment for the stack height considering the marginal costs and benefits for a range of plausible stack heights.	<p>The Applicant undertook a stack height assessment under the previous application proposal and determined that without additional advanced SNCR abatement dispersion via a 58 metre stack height was considered BAT.</p> <p>Under this Application the Applicant intends to propose alternative techniques to implement BAT in the form an additional abatement technique and emissions limits with a lower stack height. This focuses on reducing emissions from the stack instead of aiding dispersion in order to achieve an equivalent level of environmental protection to the existing BAT standard.</p> <p>We have reviewed the Applicant's proposals and we are satisfied that the measures will reduce emissions to the environment and provide an equivalent level of environmental protection.</p> <p>Please refer to section 6 for further information.</p>

Response Received from United Kingdom Without Incineration Network (UKWIN)	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Concern there is no guarantee that the Applicant will be able to achieve the proposed tighter Emission Limit Values (ELVs).	We are satisfied that the measures proposed by the Applicant will ensure that the ELVs can be achieved. The Permit requires that emissions are monitored and if ELVs were to be exceeded then we would take action in line with our enforcement and sanctions policy
Query what will the EA do if the Applicant fails to achieve one or more emissions limit value and what action the EA would then pursue?	The EA will regulate the proposed Installation through investigating non-compliance and making sure that the Operator complies with the conditions of the Permit. We will take enforcement action if appropriate in accordance with our enforcement and sanctions policy. This could include issuing notices, prosecuting or potentially revoking the Permit. We will undertake a combination of announced and unannounced compliance visits as we do for other plants. There is no reason to believe that the Operator is unable to comply with the conditions of the Permit.
Query how the EA propose to ensure the integrity of the reporting arrangements by requiring electronic access to the CMS data?	We will ensure integrity of the reporting arrangements by carrying out a continual assessment of plant operations and its environmental performance. This will be achieved in the following ways: <ul style="list-style-type: none"> <li>• The Operator must monitor emissions and report the results to us.</li> <li>• We will regularly inspect the Installation (both announced and unannounced at a frequency that we consider appropriate), review monitoring techniques and assess monitoring results to measure the performance of the plant.</li> <li>• We require CEMs and test labs to be accredited to MCERTS and all the applicable standards</li> </ul>

	<ul style="list-style-type: none"> <li>The Operator's monitoring results are placed on the public registers.</li> </ul>
<p>Concern the Applicant is choosing to apply tighter standards for problematic pollutants</p>	<p>The Applicant has identified those emissions concentrations which have the potential to increase at a stack height of 35 metres and have reviewed the associated emissions limits to determine whether stricter limits are required to ensure an equivalent level of environmental protection is achieved</p> <p>We have reviewed the Applicant's revised emission limits and the additional measures proposed to ensure these are achieved and are satisfied the proposals will ensure an equivalent level of environmental protection.</p>
<p>Query why the Applicant is considering a lower short-term limit for emissions of Sulphur Dioxide but there are no proposed changes in the sulphur dioxide abatement technique.</p>	<p>The Applicant has outlined how they will measure emissions and vary the lime injection rate to keep the emissions in line with the reduced half-hourly emission limit. See section 6 for further details.</p>
<p>Concerns that where tighter limits are applied there is still a percentage increase in process contributions when comparing the new application with the extant EA permit</p> <p>Query as to why the Environment Agency would allow a significant increase in pollution levels above those that they have previously approved.</p>	<p>We have reviewed the Applicant's air quality modelling and though there are some increases in process contribution, the change in emissions will not result in a significant impact. All receptors still either screen out as insignificant or it has been assessed that there will be no significant impact. Emissions will not exceed environmental standards.</p> <p>In addition, the abatement and emissions limit reduction will lead to a reduction in overall emissions from the stack.</p> <p>We are therefore satisfied that the Applicant's proposals will achieve an equivalent level of environmental protect in comparison to the existing permitted scenario.</p> <p>See section 6 for further information.</p>

<p>The Applicant has only used a tighter standard for the sulphur dioxide short-term value but not changed the limit value for the long-term standard.</p>	<p>The applicant has sought to only change the short term limits. During the incineration process, on some occasions the sulphur content of waste can vary quickly and the sulphur dioxide concentration can fluctuate.</p> <p>By applying for a reduced half-hourly emission limit, the Applicant is committing to keeping the sulphur dioxide emissions under even closer control, this will go further to preventing exceedances.</p> <p>In addition, we have reviewed the Applicant's air quality modelling and we are satisfied that sulphur emissions continue to screen out as not significant. Therefore a tighter limit is not justified.</p>
<p>Concern regarding capability of Advanced SNCR, NOx limit of 100mg/m<sup>3</sup>, with a 35 metre stack to achieve a similar dispersal pattern to that previously modelled with a 58metre stack and 150mg/m<sup>3</sup>.</p>	<p>The aim of implementing the advanced abatement techniques alongside tighter emissions limits is to reduce the overall emissions from the stack in order to reduce process contributions.</p> <p>Therefore the modelled 35 metre stack dispersal pattern predictions may differ from that of a 58 metre stack, however the overall emissions released will be reduced and there is less reliance on emission dispersal to ensure emissions are insignificant.</p> <p>We are satisfied that the technique of reducing total emissions to the environment alongside a 35 metre stack can be considered be BAT as it is able to reduce the site's overall impact and achieve a level of environmental protection equivalent to dispersion via a 58 m stack previously considered to be BAT.</p>

<p>Query how the EA will validate the performance of the revised technology in terms of reduction of emitted NOx levels and how BAT compliance was assessed.</p>	<p>To ensure the Applicant's proposals performs as projected the EA will:</p> <ul style="list-style-type: none"> <li>• Require continuous monitoring of the main pollutants for which limits are set and periodic monitoring for the other substances.</li> <li>• Carry out audits of the Operator's procedures and methods for emissions monitoring.</li> <li>• Undertake regular announced and occasional unannounced inspections.</li> <li>• Add or change conditions in the Permit if required.</li> <li>• Require the Operator to inform us if they exceed any of the emission limits in the Permit, or if they fail to comply with any operating conditions.</li> <li>• Investigate non-compliance with any condition of the Permit.</li> <li>• Take enforcement action if needed, including issuing notices, prosecuting serious breaches or potentially revoking the Permit.</li> </ul> <p>There is no reason to believe that the Operator will be unable to comply with the conditions of the Permit. In the event there are breaches of the Permit conditions, we will take appropriate action.</p>
<p>Question why the use of Selective Catalytic Reduction has not been considered as the best technology to use in order to achieve lower NOx levels.</p>	<p>The Applicant demonstrated in their previous application that the implementation of SCR only achieved a minimal additional environmental benefit for a significantly higher capital and operational cost when compared to SNCR, therefore it was not deemed to be BAT for the installation.</p> <p>The capital and operational cost of implementing advanced SNCR is not significantly different to the capital of operational cost of standard SNCR. In addition advanced SNCR provides additional NOx emissions reduction. Therefore we are satisfied that the conclusion of the previous cost benefit assessment will remain valid</p>

	in that SCR is not BAT.
Concerns that the Applicant refers to the Industrial Emissions Directive as support for 150mg/m <sup>3</sup> abnormal particulate emission level.	<p>Abnormal emissions are allowed under the Industrial Emissions Directive. The impact of abnormal emissions is discussed in section 5.5 of this decision document. This section also includes the reasons we allow periods of abnormal operation. See Table S3.1(a) of the Permit for the applicable emission limits during abnormal operation. The emission limits are based on the IED which states “the total dust concentration in the emissions into the air of a waste incineration plant shall under no circumstances exceed 150 mg/Nm<sup>3</sup> expressed as a half-hourly average”. These limits are protective of human health and the environment.</p> <p>We have audited the Applicant’s air quality modelling and we do not predict any exceedences of the ES under normal or abnormal conditions. We are therefore satisfied abnormal conditions will not result in an adverse impact.</p> <p>In the event the Applicant exceeds their abnormal condition emission limits they will be in breach of the permit and we will take appropriate action.</p>
Concern over the impact in the event of bag filter failure	<p>The Applicant will implement a bag filter which was deemed to represent BAT for managing particulate emissions under the previous application in line with the BAT techniques outlined in the incineration BREF. We are satisfied this techniques can appropriately manage emissions under different operating scenarios.</p> <p>Failure of the bag filter can be identified and prevented through operational maintenance checks and emissions monitoring. To compliment this, emissions limits are in place in the event of an abnormal operating scenario. These measures will prevent significant impact at sensitive</p>

	<p>receptors.</p> <p>We have audited the Applicant's air quality modelling and we do not predict any exceedences of the ES under normal or abnormal conditions. We are therefore satisfied abnormal conditions will not result in an adverse impact. Periods of abnormal emissions are allowed under the Industrial Emissions Directive. The impact of abnormal emissions is discussed in section 5.5</p>
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Brief summary of issues raised:	Summary of action taken / how this has been covered
<p>Concern over emissions of carbon dioxide and climate change.</p>	<p>The Global Warming Potential (GWP) impact of the Installation and the steps taken to address GWP were assessed under the previous application EPR/FP3335YU/A001 and are unaffected by this variation. The change in stack height will not significantly impact the GWP, therefore we are satisfied that the conclusions of the previous assessment remain valid.</p>
<p>Concern that a lot of incinerator feedstock could be recycled or composted.</p>	<p>Waste acceptance at the site was assessed under the previous Application neither these nor the waste types to be accepted are being varied. This Application focuses solely on the changes applied for which are a revised stack height and revised emissions limits.</p> <p>The obligation is on waste producers is to apply the waste hierarchy and for local authorities to have their own waste strategy dealing with kerbside collections. Our role in this determination is to assess whether any residual waste that may be sent for incineration can be dealt with in an environmentally acceptable manner. In addition to this we have set permit condition 2.3.4 (c) that does not allow separately collected fractions to be incinerated unless they are unsuitable for recycling.</p>

Brief summary of issues raised:	Summary of action taken / how this has been covered
<p>State the special status of the ancient woodland at Marks Hall should warrant more rigorous modelling and that the air quality assessment has only considered the impact on non-statutory designated sites within 2 km of the installation.</p> <p>State that the Ancient woodlands at Marks Hall even though they do not have SSSI status that should be considered worthy of SSSI status.</p>	<p>The Applicant has modelled sensitive receptors in line with the requirements of our guidance taking into account ancient woodlands within 2km. As the Marks Hall site is not designated as a SSSI and is an ancient woodland which does not fall within 2km of the site it has not been specifically considered. We are satisfied that there will be no significant pollution at any receptor and that the new proposals will provide an equivalent level of environmental protection. See section 6 for further details.</p>
<p>Concerned the long term impact of pollutants, particularly nitrogen dioxide, on tree health, ecology and the cropped farmland at Marks Hall</p>	<p>In line with the screening criteria ancient woodlands within 2km have been assessed in the Applicant's air quality modelling under a worst case scenario and they screened out as no significant impact. As this ancient woodland is located beyond 2 km we are satisfied the air emissions conclusions of no significant impact will apply.</p> <p>In regards to cropped farmland, we audited the Applicant's HHRA and there is no likelihood of dioxin and heavy metals intake exceeding the daily recommended maximum dose standard even in this worst case scenario.</p> <p>We consulted the Food Standards Agency, Public Health England and the Director of Public Health during the determination of this Application. They have not raised any concerns with respect to contamination of the food chain from locally grown crops, soil or animals.</p>
<p>State that the modelling should be cognisant of the latest science of the Nitrogen sensitivity and beneficial role of mutualistic (mycorrhizal) fungal ecology on tree health.</p>	<p>As above, this site screens out of the assessment criteria in that emission process contributions are considered to be insignificant at this site due to site designation and distance. We are satisfied this will provide sufficient</p>

	protection for the site as emissions concentration are predicted to be <1% of the environment standards put in place to protect ecological features such as those stated.
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c) Representations from Individual Members of the Public

A total of 137 of responses were received from individual members of the public. Many of the issues raised were the same as those considered above. Only those issues additional to those already considered are listed below. We have also included and responded to additional concerns outside the scope of this determination to clarify matters for the public.

Brief summary of issues raised	Summary of action taken / how this has been covered
Application	
Concern that the Application is incomplete and inaccurate. It does not contain all of the required information on human receptors.	We have audited the Applicant's air quality modelling and we are satisfied that all relevant receptors have been included in the assessment.
Concern that the Applicant has applied for two different stack heights.	The Application is not for two different heights, it is to change from the permitted 58 metre stack to a 35 metre stack.
Concern that abnormal operation for CEMS failure will be allowed	Abnormal emissions are allowed under the Industrial Emissions Directive. The impact of abnormal emissions is discussed in section 5.5 of this decision document. This section also includes the reasons we allow periods of abnormal operation.
Question whether permits can be transferred?	Permits can be transferred to other operators under section 21 of the Environmental Permitting Regulations. This would require a joint application from the current permit holder and any proposed transferee. There has been no such application.
Query why the Applicant refers to the Combined Heat and Power status of the incinerator when the EA application form asks about the issue of co-use of heat and energy.	The combined heat and power status of the incinerator was assessed under the previous Application. This Application focuses solely in the proposal to amend stack height and emission limits. The Applicant has ticked yes to some of the questions on CHP/ heat and energy

	generation and provision in the Application forms but has stated there are no changes to any of these aspects. This is just to acknowledge that agreed measures are already in place and they are not affected by this variation
<p>Query whether the EA will address the following in the decision document:</p> <ul style="list-style-type: none"> <li>• The selective use of lower emission limits.</li> <li>• The increased pollution levels in the latest Application compared with the permitted Application.</li> <li>• The ability of the control system to control emissions of Sulphur Dioxide.</li> <li>• Full validation of the performance of the revised technology in terms of reduction of emitted NOx levels and how BAT compliance was assessed.</li> </ul>	This decision document includes a summary of all relevant public comments received and will address each topic raised. Each of the topic highlighted have been covered within section 1- 7 or Annex 5 of this document.
<b>Applicant consultations meetings</b>	
Concerns over the Applicant's consultation meetings	<p>Consultation meetings were held by the Applicant based on their own prerogative and any concerns about them are outside of our remit and control.</p> <p>We have reviewed the Applicant's Application content and have no reason to believe that the Applicant has submitted misleading information during the determination of this Application. We have undertaken appropriate consultation on the Application content and addressed concerns raised in this document.</p>
<b>Operator competence</b>	
Concern regarding the competence and track record of the Operator and their contractors.	Operator competence was assessed under the previous Application. We are satisfied that Gent Fairhead & Co. Limited will be able to operate the proposed Installation so as to comply with the conditions we have included in the Permit. Gent Fairhead & Co. Limited have sufficient resources and expertise

	<p>to operate the proposed Installation. The decision was taken in accordance with our guidance on what a competent operator is. Nothing has changed since that assessment was made.</p>
<p><b>Regulation</b></p>	
<p>Concern that the proposed additional environmental measures will not be enforced.</p>	<p>We will ensure than additional environmental measures are enforced. We will regulate the site carrying out a continual assessment of plant operations and its environmental performance. This will be achieved in the following ways:</p> <ul style="list-style-type: none"> <li>• We will regularly inspect the Installations (both announced and unannounced at a frequency that we consider appropriate), review monitoring techniques and assess monitoring results to measure the performance of the plant.</li> <li>• We will carry out on-site audits of Operator monitoring.</li> <li>• The Operator's monitoring results are placed on the public registers.</li> <li>• In the event of any breach, we will take appropriate enforcement action in accordance with our Enforcement and Sanctions policy.</li> </ul>
<p><b>EA Consultation</b></p>	
<p>Concern that Application documents were difficult to find</p>	<p>We consider that the Application documents were accessible. This is supported by the number of representations received. 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 Braintree and Witham Times January on 24<sup>th</sup> 2019.</p> <p>We made a copy of the Application and all other documents relevant to our determination available to view on our website (Citizen Space) and Public Register <i>Environment Agency, Icen House, Cobham Road, Ipswich, IP3 9JD</i>. Anyone wishing to see these documents could do so and arrange for copies to be made. We issued a briefing note to local</p>

	liaison groups and interested parties.
<b>Impact on air quality</b>	
Concern regarding air pollution and that there are no guarantees air quality will not be impacted.	We have assessed the Applicant's air quality assessment and are satisfied that it is based on a satisfactory worst case. The air quality modelling shows that there are no emissions which exceed the environmental standards set to prevent impact on sensitive receptors. Considering the assessment is worst case and even then the environmental standards are not exceeded, it is not considered that air emissions will have an unacceptable impact.

<b>Best Available Techniques (BAT)</b>	
Concerns the Applicant has not provided an adequate BAT justification, a Best Practicable Environmental Option assessment and a demonstration that best available techniques (BAT) are being employed to reduce toxic emissions for 35 metre stack.	<p>The best practicable environmental options were assessed within the Best Available Techniques assessment under the previous permit Application. This accounted for cost implications and the minimisation of emissions. A permit was issued on the basis of a 58 metre stack with conventional SNCR being BAT.</p> <p>As part of this Application the Applicant has proposed to implement alternative measures in order to achieve an equivalent level of environmental protection to that of the BAT standard previously permitted.</p> <p>We have reviewed the Applicant's alternative proposals and we are satisfied that the Applicant has submitted sufficient information to demonstrate their measures will provide an equivalent level of environmental protection and therefore can be considered BAT.</p> <p>See section 6 of this document for further information.</p>
<b>Stack Height</b>	
Concern that other plants have higher stacks.	<p>Stack height is only one of a number of techniques that can be applied in combination to protect the environment. We are satisfied the Applicant has demonstrated that their proposed stack height and additional emissions reduction measures will deliver an equivalent level of environmental protection and therefore can be considered BAT. Refer to section 6 of this document for further information.</p>
<b>Advanced Abatement system</b>	
Concern that there have been no significant technological advances since the refusal in 2016 to warrant a 35 metre stack.	<p>The Applicant has demonstrated that they will implement additional techniques in the form of an advanced version of their SNCR abatement system and reduce emissions limits to those proposed in 2016. This Application has been assessed based on these additional measures.</p>

<b>Health</b>	
<p>Concerns over health impacts due to emissions to air from the incinerator including the effect on existing health conditions’.</p>	<p>As part of our decision making process, we have thoroughly checked the air quality and human health impact modelling assessments provided within the Application. We have also undertaken a rigorous sensitivity analysis of these assessments including the effect of local topography and the proximity of buildings on the dispersion of pollutants (i.e. using a range of different input parameters within the modelling). Our conclusion is that the proposed Installation would not have a significant impact on human health and the environment.</p> <p>When assessing an Application, our priority is to ensure that the proposed Installation will be designed and operated without posing a significant risk to the health of local people and the environment. Before we consider issuing a permit, the Applicant must</p>

	<p>demonstrate that the proposed Installation meets all the legal requirements, including environmental, technological and health requirements. In this instance, having considered all the relevant factors including comments received from our consultation, we have reached the decision that the proposals would not give rise to any significant pollution of the environment or harm to human health.</p> <p>This is in line with the advice from Public Health England PHE's current position remains that modern, well run municipal waste incinerators are not a significant risk to public health.</p> <p>We consulted PHE during the determination of this Application. Their comments are summarised in this Annex.</p> <p>Please refer to section 5 of this decision document which discusses the impact of pollutants on human receptors including expert scientific opinion.</p>
<p>Quote a report from The Royal College of Physicians which states that small particles can cause Dementia, Parkinson, cancers and have a damaging effect on people with respiratory diseases and that air pollution may be associated with a wider range of health conditions such as diabetes and neurological disease, and could also lead to low birth weights and pre-term birth.</p>	<p>The Royal College of Physicians report discusses general air pollution including outdoor and indoor sources. It makes no mention of particulates released by modern waste incineration plants. Sections 5.3.3 and 5.3.4 of this decision document discuss the health impact of emissions released from the proposed Installation and abatement of particulates.</p> <p>The Applicant proposes to use bag or fabric filters for the abatement of particulate matter at the proposed installation. Bag filters are the Best Available Technique (BAT) used across Europe for controlling particulate emissions from Energy from Waste plants.</p> <p>There has been much research on the use and effectiveness of bag filters over a number of years. For example, some detailed investigations in the USA looked at the collection efficiency of</p>

	<p>fabric filters for particle sizes from 10 microns down to 0.2 microns (i.e. 200 nm). The efficiency of fabric filters ranged from 99.2% to over 99.9%. More recent research in Finland provided similar results, showing collection efficiencies from 99% to well over 99.99% for fabric filters. Additionally, a research team in Italy examined the emissions of nanoparticles from several energy from waste plants and found that fabric filters were effective at collecting well over 99.99% of nanoparticles (measured by weight). At their smallest, nanoparticles behave rather like 'sticky' gas molecules. The mechanism by which they are collected on the dust cakes which form on filter bags means that these filters are particularly effective on the finest of particles. Thus, applying the research data conservatively, fabric filters are effective at removing at least 99% of all particle sizes. At this level of performance, the key measure is the concentration of particulates remaining in the gases after the filter and therefore emitted from the stack and at the levels that will be emitted, there will be no significant impact on human health. Please refer to section 5.3.3 and 5.3.4 for further information.</p>
<p><b>Impact on environment, agriculture and local flora, fauna</b></p>	
<p>Concerns that the Applicant has not considered people/nature/flora.</p>	<p>We have reviewed the Applicant's proposals and air quality modelling and we are satisfied that air emissions will not result in a significant impact on sensitive human or ecological receptors. Refer to section 5.2 of the document for further information.</p>

<b>Levels and amount of emissions</b>	
Concern over the impact from emissions to air.	We have reviewed the Applicant's proposals and air quality modelling and we are satisfied that emissions will not lead to a breach environmental standards, will not result in a significant impact on human or ecological receptors and that the proposals can be considered to result in an equivalent level of environmental protection to the stack height previously determined as BAT. Refer to section 5.2 and 6 for further information.
Question whether the gases emitted could be capped and stopped from entering the atmosphere.	To stop emissions entirely is not practicable but based on our assessment of the Applicant's proposals we are satisfied that emissions have been sufficiently minimised through use of BAT.
<b>Particulate matter</b>	
Concerns over the impact due to emissions of Particulate Matter (PM) including PM <sub>2.5</sub> .  Draw EA attention to Chief medical officer health report 2018 which states that small particles (PM <sub>10</sub> and PM <sub>2.5</sub> ) have become significant health issue and not just an environment issue.	We have assessed the risk of impact from PM <sub>2.5</sub> taking into account the quoted health risk of PM <sub>10</sub> and PM <sub>2.5</sub> which is stated to be from the Chief medical officer health report and addressed this as follows. The Permit specifies the continuous monitoring of total particulate matter in accordance with Part VI of the IED. The Incineration BREF states that fabric filters utilised by the Applicant generally provide effective abatement down to below 5 mg/m <sup>3</sup> of particulate material. A European Commission's science alert report issued on 2 February 2012, reported actual measurement of ultrafine particles on a waste to energy plant where the bag filters were shown to capture more than 99.99% of such particles. We have assessed the Applicant's proposals alongside their air quality modelling and we are satisfied that the particulate matter process contribution (PM <sub>10</sub> and PM <sub>2.5</sub> ) from the proposed Installation is predicted to be less than 1% of the long term ES at the point of

	<p>maximum impact.-The Permit will be kept under review throughout the operational life of the Installation and will be varied whenever it is necessary or appropriate to do so.</p> <p>Refer to section 5.2.2 and 5.3.3 for further information on PM<sub>2.5</sub></p>
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<b>NOx and NO<sub>2</sub> emissions</b>	
<p>Concern that incinerators produce nitric oxide and nitrogen dioxide - both pollutants.</p> <p>Question whether the Environment Agency have considered the impact of nitrogen dioxide gas?</p>	<p>The impact on air quality from relevant oxides of nitrogen emissions has been assessed against the relevant Environmental Standard (ES)</p> <p>Please refer to sections 5.2.1 and 5.2.2 of this decision document for an assessment of emissions.</p>
<b>Dioxins</b>	
<p>Draw the Environment Agency's attention to a case study entitled 'Hidden emissions: A story from the Netherlands' - dioxin emissions from the 'state of art' incinerators are underestimated and frequently go far beyond stated limits.</p>	<p>This relates to a report by Zero Waste Europe on the Reststoffen Energie Centrale plant in Harlingen, Holland. The report has not been peer reviewed or published.</p> <p>The report claims that the plant has a by-pass that operates so that emissions can by-pass the bag filter plant. The proposed Installation will only have an emergency by-pass. Operation of such a by-pass would be very rare and as such the Dutch report is not relevant to our decision on this Installation. We are satisfied that it will not have a significant impact on local food.</p>
<p>Concern that table A2, A3 and A4 show that the annual mean for Dioxin will increase which could cause harm to humans and the environment either long term or short term.</p>	<p>Section 5.2.1 of this decision document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation.</p>
<b>Volatile Organic Compounds</b>	
<p>Concerns over VOCs emission impacts.</p>	<p>The Applicant's assessment is based on the assumption that the Facility will operate at the emission limit of 10 mg/Nm<sup>3</sup> for VOCs for the entire time and that the emissions of VOCs will consist of entirely benzene or entirely 1,3-butadiene. Both of these assumptions are considered to be very conservative.</p> <p>To demonstrate the actual VOC emissions are likely to be lower than predicted, the Applicant has reviewed the operational data for existing similar incineration plant as published in the draft waste incineration BREF and they have demonstrated that the actual</p>

	<p>concentrations in operating plants are significantly less than that those projected in the worst case assessment.</p> <p>The Applicant concluded that actual process contributions from VOC emissions could be screened out as insignificant and that there is no significant risk of exceeding the ES. Hence, as before, the proposed stack height “safeguards human health”, as required by Article 46(1) of the IED. We have reviewed the justification for actual VOC emissions from incineration plants and acknowledge the fact the assessment in the Application is significantly conservative.</p> <p>We are satisfied that the justification provided shows actual VOC concentrations will be significantly less than the worst case scenario modelling so will not breach the ES, will not have a significant impact on the Environment and therefore the proposals will deliver an equivalent level of environmental protection.</p> <p>Refer to section 5.2.2 part (iv) for further information.</p>
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**Compliance with legislation and Drive to reduce pollution**

<p>Query whether the incinerator will comply with the Government's 'Clean Air Strategy' and whether this is contradictory to the Governments plans to reduce air pollution.</p> <p>Concern that the particulates dispersed through the incinerator contradicts the new direction of national policy.</p>	<p>The Government's air quality targets consider the release of pollutants from all sources including traffic, industrial activities, agriculture etc. The meeting of the set air quality targets and limits is the responsibility of the Government, working together with local planning authorities.</p> <p>When assessing an Application for an environmental permit, our priority is to ensure that the proposed Installation will be designed and operated without posing a significant risk to the environment and the health of local people. Before we consider issuing a permit, the Applicant must demonstrate that the proposed Installation will meet all the legal requirements, including environmental, technological and health requirements. In this instance, we have considered all the relevant factors including representations received from our consultation (see list of consultees in Annex 4) and that emissions from the site are well below the air quality standards and will not cause any exceedance, we have reached the decision that the proposals would not give rise to any significant pollution of the environment or harm to human health.</p> <p>Based on this we are satisfied we have had appropriate regard for the strategy and national policy and that the variation does not conflict with it.</p>
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<p>Concern that the incinerator has the same emission output as a coal fired power station and that coal fired power stations being decommissioned due to climate issues.</p>	<p>Comparison to coal fired power station is not considered relevant because the processing of coal has the primary purpose of producing energy which is different to the role incinerators play in managing the disposal of waste and recovering energy from it.</p> <p>Also in regards to decommissioning, these power stations could not comply with the relevant legislation limits. The proposed incinerator can comply with the relevant legislation limits.</p>
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<b>Increase number of receptors</b>	
Concern that the air modelling results show that the number of receptors effected significantly increases.	We have reviewed the Applicant's air quality modelling and the process contributions. For some emissions there is an increase in the number of receptors where small increases in process contributions mean they can no longer be considered insignificant. All receptors however can be considered to screen out as no significant impact. On top of this the overall emissions to the environment have been reduced by the proposals. We are therefore satisfied proposals will deliver an equivalent level of environmental protection. Refer to section 6 for further information.
<b>Air Quality modelling</b>	
Concerns that there are plans for housing developments that have not been considered in the Applicant's modelling.	The Applicant's modelling and our sensitivity checks assessed against the maximum on the grid. We are satisfied that the magnitude of any impacts at the worst-case receptor location are broadly similar to impacts at the maximum point of impact on the grid. As such, no additional receptors identified and assessed (such as new housing developments) would change the overall conclusions of the assessment. Therefore we are satisfied new housing developments have been considered.
Concern that Coggeshall Hamlet is in the path of the prevailing wind from the direction of the incinerator site.	We have taken meteorological conditions into account in our audit of the Applicant's air dispersion modelling. The Applicant provided 5 years meteorological data which takes into account any variations. We agree with the conclusions of the report that there will be no significant impact at receptors including those sites in the path of the prevailing wind and are satisfied that the new proposals will provide an equivalent level of environmental protection. See section 6 for further details. (Please refer to chapter 5 and 6 of this decision document).

<b>Accounting for Impact on Houses which are not built yet</b>	
<p>Query whether the EA can provide details of their calculations as compared to any provided by the Applicants?</p>	<p>We have audited the Applicant's submission checking and cross referencing emission data, meteorological data and receptor locations and have made observations relating to the methodologies used and assumptions made. This is to test the Applicant's data and methods are reliable. We have not produced any detailed calculations of our own.</p>
<p>Query whether EA can confirm that plume plotter modelling is accurate, relevant and of concern or not</p>	<p>Plume Plotter appears to be a tool which uses air quality modelling software to predict the ground level concentrations of nitrogen oxides and other pollutants that may arise from the incinerator based on a number of factors.</p> <p>The information on the website indicates that the results may be based on expected modelling methods. However, there is no information on the website as to how the model was validated and we have not seen the model input parameters, and so cannot comment on the validity of the predictions.</p> <p>We have audited the dispersion modelling submitted with this Application and we are satisfied that there will not be any significant impacts.</p>

<b>Monitoring and reporting</b>	
<p>Question whether monitoring of pollutants will be done by a third party.</p>	<p>Monitoring is not required to be performed by a third party because</p> <ul style="list-style-type: none"> <li>• There is now a wide variety of standards for monitoring, covering CEMs, periodic monitoring, and quality assurance.</li> <li>• We have MCERTS for CEMs and test labs.</li> <li>• We have BS EN 14181 for quality assurance of CEMs.</li> <li>• We require CEMs and test labs to be accredited to MCERTS and all the applicable standards.</li> <li>• We carry out audits of Operators' provisions for monitoring and audit the monitoring results.</li> <li>• We do check monitoring where it is considered appropriate.</li> <li>• Furthermore, as well as auditing Operators' provisions for monitoring, and how they apply the monitoring requirements of the permit, we also regularly audit test laboratories.</li> </ul> <p>On this basis we are satisfied there are appropriate standards and controls in place to ensure monitoring is robust and reliable.</p>
<p>Ask whether the EA will insist on state of the art monitoring as advised in the study done in the Netherlands i.e. continuous.</p>	<p>The waste incineration plant will include a dedicated duty continuous emission monitoring system (CEMS) for each line and a stand-by CEMS which will ensure that there is continuous monitoring data available even if there is a problem with a duty CEMS system. The Permit requires continuous monitoring for emissions to air of particulates, oxides of nitrogen, sulphur dioxide, carbon monoxide, total organic carbon, hydrogen chloride and ammonia. The Permit also requires continuous monitoring of several process variables (e.g. combustion temperature) to ensure that the incinerator is running optimally and minimising emissions. Some pollutants are not monitored continuously they are required to be</p>

	<p>monitored quarterly or bi-annually. These requirements are in line with the IED, current BREF and the final draft of the revised BREF and we consider these measures to be appropriate. The plant has to shut down if not operating to required standards. We are satisfied that the monitoring requirements in the Permit are appropriate.</p>
<p>Concern over impact of dioxins at start-up and shut-down</p>	<p>For dioxins and furans, the principle exposure route is through ingestion, usually through the food chain, and the main risk to health is through accumulation in the body over a period of time. Elevated levels of dioxins at start-up and shut-down will therefore not significantly impact on exposure. A report by the company AEA for the Environment Agency at a municipal waste incinerator showed that the mass of dioxins emitted during shutdown and start-up for a four day planned outage was similar to the emission which would have occurred during normal operation in the same period.</p> <p>The emissions limits set by IED chapter IV do not apply at start-up and shut-down. To ensure the process remains optimum to minimise emissions such as dioxin formation the combustion units will be fired on a support fuel (gas oil), to ensure that the temperature meets the required levels before waste is permitted to be fed for incineration. This support fuel is automatically fed if the temperature of the furnace falls below a permitted level. The impact at start-up and shutdown, when emission limits do not apply, is not likely to be significant and there we are satisfied there is no change in impacts.</p>
<p><b>Human health impact assessment</b></p>	
<p>Concern the Environmental Statement does not include any assessment of the impact of the development on health and request the developer to produce a Health Impact Statement relating to the</p>	<p>The Environmental Statement does not form part of the environmental permit Application it is a planning Application requirement. We are satisfied that the permit Application contained sufficient information for us to assess the impacts</p>

<p>proposed decrease in height the stack and the variation of conditions.</p>	<p>on health. We consulted the Food Standards Agency, Public Health England and the Director of Public Health during the determination of this Application. They have not raised any concerns with respect to contamination of the food chain from locally grown crops, soil or animals.</p>
<p><b>Energy efficiency</b></p>	
<p>Concern the net energy production proposed from this facility is actually in deficit if you include the methods of transport that will be used to ship the material to be incinerated.</p>	<p>The energy production was assessed under the previous Application and is not effected by the permit amendments proposed under this variation.</p>
<p><b>Combine heat and power and energy use</b></p>	
<p>Concern there are no local facilities to take this net power output, operations are in a rural landscape and the energy balance within the plant has changed so to what extent will energy not be used and wasted.</p>	<p>The energy production was assessed under the previous Application and is not effected by the permit amendments proposed under this variation. The Application solely focuses on the changes applied for which include amendment in stack height and changes to emissions limits.</p>
<p><b>Recycling</b></p>	
<p>Question why the current drive to recycle resources is not being prioritised over incineration of waste and loss of resources.</p> <p>Query why the Operator has not demonstrated that the waste cannot be managed through measures to promote avoidance, re-use, recycling and composting.</p> <p>Draw EA to Friends of the Earth who state 'incinerators hamper efforts to reduce, reuse and recycle by forcing Councils to supply rubbish.</p>	<p>The Application is limited to a change in stack height and changes to emissions limits which is what has been assessed.</p> <p>However, it is argued that as the quantity of residual waste reduces over the lifetime of the installation, the need to maximise efficiency by maintaining the incinerator at full capacity will suppress waste recovery and recycling initiatives, which are higher up the waste hierarchy. The capacity of the incinerator is primarily a matter for the Applicant and the need to design it to meet the waste disposal needs of the local authority. The proposed facility forms part of an integrated waste management strategy; any material arriving at the facility will be residual waste arising following upstream waste segregation, recovery and recycling initiatives. The shape and content of this strategy is a matter for the local</p>

	<p>authority. The incinerator is one element in that strategy, and the Permit will ensure that it can be operated without giving rise to significant pollution or harm to human health. In any event Permit conditions will prohibit the burning of any separately collected or recovered waste streams, unless contaminated and recovery is not practicable.</p> <p>The obligation is on waste producers is to apply the waste hierarchy and for local authorities to have their own waste strategy dealing with kerbside collections. Our role in this determination is to assess whether any residual waste that may be sent for incineration can be dealt with in an environmentally acceptable manner.</p> <p>To support this we have permit condition 2.3.4 (c) that does not allow separately collected fractions to be incinerated unless they are unsuitable for recycling.</p>
<p><b>General concept of incinerators</b></p>	
<p>State that incinerators do not provide a renewable source of energy through capturing the energy produced by burning waste. The incineration of recyclable material actually results in even more fossil fuel energy being consumed because more of the same materials will need to be used to replace them.</p>	<p>Again this is not relevant to the variation under consideration however, the proposed facility forms part of an integrated waste management strategy; any material arriving at the facility will be residual waste arising following upstream waste segregation, recovery and recycling initiatives. Permit condition 2.3.4 (c) does not allow separately collected fractions to be incinerated unless they are unsuitable for recycling.</p> <p>In addition, the electricity that is generated by the incineration of waste will displace emissions of CO<sub>2</sub> released elsewhere in the UK, as virgin fossil fuels will not be burnt to create the same electricity.</p>
<p>Concern that the Environment Agency are unable to state categorically that incineration is safe.</p>	<p>Incineration is accepted as safe at a European wide level. Environmental Standards for air emissions are established to protect Human Health. We have audited the Applicant's proposals and air quality modelling and we are satisfied that these standards</p>

	will not be exceeded. Refer to section 5.2 of this document regarding air quality.
<b>Preventing the company abandoning the project</b>	
<p>Concerns about what happens if the company goes into administration</p> <p>Query why a financial safeguard (e.g. a bond) is not provided to the relevant authority in the event the Applicant goes into liquidation or fails in any part its environmental obligations.</p>	<p>This variation does not alter this risk which was assessed as part of the original application.</p> <p>We have no reason to doubt the financial competence of the operator. There is currently no legal requirement for operators of incineration sites to provide a cash bond in the event the company abandon this site.</p> <p>It is considered unlikely the company would abandoned this site as it is a large, expensive asset. In the event the company liquidated we would pursue the liquidators. The final responsibility to address the abandoned activities would also fall to the landowner and we would pursue the land owner to address the abandoned facility and waste onsite. They are likely to deal with this to utilise the assets.</p>

<b>Incinerator ash</b>	
<p>Concern that the ash from the plant is to be used for road construction. Query whether this ash toxic and whether the ash will actually be useable for road construction?</p>	<p>This would have been assessed as part of the previous Application. This Application is limited to the amendment in stack height, abatement and emissions limits which will not change the content of the IBA.</p> <p>Most incinerator bottom ash (IBA) is likely to 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. The Operator is required to monitor the residue quality of the IBA under the monitoring requirements to ensure that the IBA produced is dealt with in an appropriate manner (see condition 3.5.1 and Table S3.3 in the Permit). Incinerator bottom ash and air pollution control residues will not be processed at the facility. Residual ash will be despatched to off-site re-processing facilities for recovery or to landfill for disposal.</p>
<p>Concern that additional ‘bottom’ and ‘fly’ ash increases Essex’s waste load and there are no means for disposal identified.</p>	<p>The increase in Essex’s ‘waste load’ is for consideration of the local authority. Management of fly and bottom ash was assessed under the previous Application. This variation solely focuses on stack height, NOx abatement and air emissions therefore this aspect will not change as a result of this variation.</p>
<b>Noise and odour</b>	
<p>Concern that the Applicant and contractors have a history of dealing with noise and odour only after complaints from residents</p> <p>Question whether the EA will confirm that conditions will be more protective of the immediate environment compared to the Applicant’s and contractors other plants.</p>	<p>Odour and noise risks specific to this site were assessed under the previous permit Application and we are satisfied the existing conditions are protective. The amendments under this Application will not change the odour and noise risks.</p>

<b>Waste amount, acceptance and pre-acceptance</b>	
<p>Query whether there is a better way for the Applicant to prevent harmful substances from ending up in the Incinerator other than just relying on waste producing companies doing it for them.</p>	<p>The Operator is required to undertake pre-acceptance checks to ensure that the waste being sent to the site matches the description and that unsuitable waste is excluded. When waste is received at the site the Operator will also undergo acceptance checks to ensure it meets the appropriate criteria for the incinerator. We are satisfied that this is an established and effective way of ensuring appropriate wastes are received at the site and non-conformances are identified and rejected.</p>
<p>Concerns that there is no control over what is in the waste and that this could result in dangerous pollution into the atmosphere.</p>	<p>We have specified in the Permit the types of wastes that may be accepted at the proposed Installation for processing (see condition 2.3.3 and Tables S2.2 to S2.6 in the Permit). The Applicant will have pre-acceptance and waste acceptance procedures in place prior to the commencement of commissioning of activities as required by pre-operational condition 4. The pollution prevention measures will be suitable for the types of waste that will be processed at the proposed Installation and any non-conforming waste which may be received.</p>
<p>Concerns that an increase in the amount of waste and waste types incinerated will result in an increase in pollution.</p>	<p>The Applicant has not applied to change the amount of waste and types of wastes incinerated as part of this Application.</p>

<b>Planning Visual issues</b>	
<p>Concern that a chimney of 35 metres height would be out of place on the predominantly flat rural landscape and result in a significant negative visual impact.</p> <p>Concern that the artificial grass on the roof will discolor over time.</p>	<p>Visual impact of the site was considered by the planning authority (Essex County Council).</p>
<p>Concern that the plume from the stack will have a significant visual impact. The Applicant has told the planning authority the predicted number of days when the plume will be visible however Planning condition 17 states there should be no visible plume.</p>	<p>Primarily plume visual impact is a planning issue. In any case, we are satisfied the impact is not likely to be significant.</p>

<b>Planning issues - Traffic</b>	
<p>Concern that additional traffic and lorry movements have been underestimated and will exceed the local road network capacity.</p> <p>Concern that the emissions risk assessments do not take into account the lorry diesel traffic.</p> <p>Concern that the proposed road routes are very close to the Rivenhall Incinerator this along with the increased amount of cars, lorries and traffic from Stansted airport will increase pollution in the area.</p>	<p>Traffic and vehicle movements are not affected by the proposals in this variation.</p> <p>Vehicle access to the installation and traffic movements are relevant considerations for the grant of planning permission, but do not form part of the Environmental Permit decision making process. The exception is where there are established high background concentrations contributing to poor air quality and the increased level of traffic might be significant in these limited circumstances.</p> <p>The air quality assessment considered existing background pollution levels which includes emissions from traffic. Movement of traffic to and from the Installation is outside of our remit but will normally be an issue for the planning authority to consider. Our consideration is whether the emissions from traffic could affect the prevailing pollutant background levels which could be a consideration where there are established high background concentrations contributing to poor air quality. In this case the small increase in pollutants from traffic would not affect the background levels to the point where it would affect the conclusions of the air quality assessment.</p> <p>Vehicle movements within the Installation boundary are considered within the remit of the Environmental Permit. However the emissions from this limited area are highly unlikely to be significant and will not affect the conclusions of the air quality impact assessment.</p>

<p><b>Planning permissions and Applications</b></p> <p>These issues are not impacted by the proposals in this application they are specifically to provided clarity to the public.</p>	
<p>Draw EA attention to the 2010 planning consent for a 360,000 tonnes per annum (tpa) EfW/CHP plant matched with a 360,000 tpa paper pulp unit (the main user of heat on site) compared to the current proposal for a 595,000 tpa EfW/CHP and only a 130,000 tpa paper pulp unit.</p>	<p>The details of the planning Application are for consideration by the Planning Authority</p> <p>The Applicant has not applied to amend their site activities or tonnages under this Application. This Application focuses solely on amendments to the stack height and the emissions limits. In the event revised activities and operating techniques are proposed, the Applicant will be required to demonstrate via a new variation Application that they comply with the all the relevant standards and requirements.</p>
<p>State that Planning policies and decisions should take into account</p> <ul style="list-style-type: none"> <li>• Whether the new development is appropriate for its location and take into account the effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the effects from pollution.</li> <li>• Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner.</li> </ul>	<p>Whether a site is appropriate for its location and the state of the land is a consideration for the planning authority.</p>
<p>Query why the Operator stated at their public meeting that the planning is not significant</p>	<p>The permit process is independent of the planning process, however we do consult the local authority as part of the Application process.</p>

<b>Planning location</b>	
Concern regarding the location considering the population density and number and type of sensitive receptors.	Decisions over land use are matters for the planning system. The location of the installation is a relevant consideration for Environmental Permitting, but only in so far as its potential to have an adverse environmental impact on communities or sensitive environmental receptors. The environmental impact is assessed as part of the determination process and has been reported upon in the main body of this document. The location of the installation can have an impact on the ability to recover waste heat for use in nearby residential, commercial or industrial premises and we commented on this in our consultation response to the local planning authority.
State that just because the Europeans are building incinerators that it is right for England to do so, this is not justification.	The need for an incinerator in this location is a consideration for the Planning Authority.
<b>Other planning issues</b>	
Concern that house prices reduce and no one can sell up and move.	The impact on house prices due to location of the incinerator is a consideration for the Planning Authority and is not addressed as part of the permit Application process.
Concern that the incinerator and garden villages will ruin rural north east Essex.	The location of the incinerator is a consideration for the planning authority and is not addressed as part of the permit Application process.
Considering the site will create so much energy question why the Operator cannot offer free energy to the local population who are impacted by the permission.	Conditions of how the site contributes to the local area is a consideration for the planning authority and is not addressed as part of the permit Application process.
Concern that the Planning Authority has already included this incinerator as part of the replacement level waste plan when permission has not yet being formally granted.	The planning authority waste plan is not considered as part of the EA permit Application process.
Draw attention to the Green Party statement 'burning rubbish marks a failure of policy and imagination on	Council waste management is not considered as part of the EA permit Application process.

the part of the Government and local councils.	
Concern the increase in the number of flights at Stansted airport, means increased flights over Silver end and Rivenhall which in turn will increase the pollutants in the air.	The location of the site in relation to Stansted airport and the pollution from the potential airport expansion is a consideration for the Planning Authority and not assessed as part of the environmental permit Application.
Concern that planning condition 56 states a stack height of 35 metre in line with Secretary of State and Planning Inspectorate recommendations. An Application to increase stack height contradicts this and sets a precedent for ignoring Planning Inspectorate and Secretary of State decisions.	The current planning consent specifies a stack height of 35 metres above the surrounding ground levels (85 metres AOD). Any variation of the existing stack height will require approval by the Planning Authority. The granting of a Permit does not override the planning permission and the Operator will be required to comply with both regimes.
Concern that Essex County Council are making a decision on an Application that is has a pecuniary interest in.	The interests of the Country Council are not considered as part of the permit Application process.
Concern that the incinerator is not a sustainable development.	The proposed facility forms part of an integrated waste management strategy; any material arriving at the facility will be residual waste arising following upstream waste segregation, recovery and recycling initiatives. The incinerator is one element in that strategy.
Concern that the Applicant refers to the EA Permit as clearance for aspects of the proposal when they are a planning matter for the County Council and must form part of the planning Application.	This is a concern for the Planning Authority.
<b>Source of waste for the incinerator</b>	
Concern that importing waste from other parts of the country to supply the incinerator will turn Essex into a net importer of waste.	The export/import of waste is not an issue controlled under the Environmental Permitting Regulations and is not affected by this variation. It is a consideration of the local planning authority in accordance with its Local Waste Strategy/Plan.
Proposed incinerator location does not reduce the distance waste is required to be transported.	

<b>Drainage and water quality</b>	
Concern that any contamination in the drainage and runoff will end up in the River Blackwater and have knock on effects on the food chain and natural ecosystem.	No discharges to the River Blackwater are proposed either in the original Application or this variation to it. The permit does not allow any discharges from the proposed Installation into the River Blackwater (see Schedule 3 to the Permit). If the Applicant were to propose a discharge to the River Blackwater in future, they would need to vary the permit to do so. Any such Application will be subject to the same scrutiny as this one and will be determined on its own merit if and when it is submitted to us.
<b>Water extraction</b>	
Query why the Operator has said that the facility uses a closed loop system and water needs are minimal and yet their Application to extract water from the River Blackwater does not seem minimal.	Water use was assessed in the previous Application and has not changed as a result of this Application. The abstraction of water for use at the Installation is covered under a separate abstraction licence issued on 9 March 2016 (AN/037/0031/001/R01).