Determination of an Application for an Environmental Permit under the Environmental Permitting (England & Wales) Regulations 2010

Our decision document recording our decision-making process

The Permit Number is:	EPR/KP3035RY
The Applicant is:	Gent Fairhead & Co. Limited
The Installation is located at:	Rivenhall Airfield, Woodhouse Lane, Kelvedon Essex CO5 9DF

What this document is about

This is a refusal decision document.

It explains how we have considered the Applicant's Application. It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position.

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/KP3035RY/A001. We refer to the application as "the Application" in this document in order to be consistent.

The Application was duly made on 17 November 2015.

The Applicant is Gent Fairhead & Co. Limited. We refer to Gent Fairhead & Co. Limited as "the **Applicant**" in this document.

Gent Fairhead & Co. Limited's proposed facility is located at Rivenhall Airfield, Woodhouse Lane, Kelvedon, Essex, CO5 9DF. We refer to this as "the **Installation**" in this document.

Summary of the decision

We have decided to refuse the Application.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements.

The reason for refusal is that based on the information that has been provided to us, we are not satisfied that the Applicant has demonstrated that the proposals reduce emissions and their impact on the environment through the use of Best Available Techniques (BAT) and in particular that the proposed stack height is BAT.

How this document is structured

Glossary of acronyms used in this document

AAD	Ambient Air Directive
AD	Anaerobic digestion
AQS	Air Quality Strategy
BAT	Best Available Technique(s)
CHP	Combined heat and power
COMEAP	Committee on the Medical Effects of Air Pollution
COT	Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment
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
DAF	Dissolved air floatation
DD	Decision document
DEFRA	Department of Environment, Food and Rural Affairs
EAL	Environmental assessment level
EfW	Energy from Waste
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission limit value
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2010 (SI 2010 No. 675) as amended
EQS	Environmental quality standard
ES	Environmental standard
EWC	European waste catalogue
FPP	Fire prevention plan
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HMIP	Her Majesty's Inspectorate of Pollution
HPA	Health Protection Agency (now called Public Health England)
HRA	Human Rights Act 1998
IBA	Incinerator bottom ash

IED	Industrial Emissions Directive
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
IWMF	Integrated Waste Management Facility
MBT	Mechanical biological treatment
MRF	Materials recycling facility
MSW	Municipal solid waste
MWI	Municipal waste incinerator
NSR	Noise sensitive receptor
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
OMP	Odour management plan
Opra	Operator Performance Risk Appraisal
PAH	Polycyclic aromatic hydrocarbons
PC	Process contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
PHE	Public Health England
PPS	Public Participation Statement
PR	Public Register
RDF	Refuse derived fuel
RGS	Regulatory Guidance Series
SCR	Selective catalytic reduction
SGN	Sector guidance note
SHPI(s)	Site(s) of High Public Interest
SNCR	Selective non-catalytic reduction
SRF	Solid recovered fuel
SPA(s)	Special Protection Area(s)
SSSI(s)	Site(s) of Special Scientific Interest
TDI	Tolerable Daily Intake
TGN	Technical guidance note
TOC	Total Organic Carbon

USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WFD	Waste Framework Directive (2008/98/EC)
WHO	World Health Organisation
WWTP	Waste Water Treatment Plant

Section 1: Administration issues

1.1 Application history

This section includes administrative information relating to the Application and information about the Applicant and the Installation.

The Application was for the following activities listed in Part 2 of Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2010 (SI 2010 No. 675) as amended:

- Section 5.1 A(1) (b) – The incineration of non-hazardous waste in a waste incineration plant with a capacity exceeding 3 tonnes per hour;
- Section 6.1 A(1) (a) – Producing pulp from timber or other fibrous materials

The directly associated activities (DAAs) would have been:

- Materials Recycling Facility
- Mechanical & Biological Treatment Facility
- Waste Water Treatment Plant

The Applicant also submitted an application to operate a standard rules anaerobic digestion (AD) facility where R3 and R13 recovery operations would have been undertaken. Had a permit been granted, we would have regulated this facility as a stand-alone waste operation. Whilst we have used the term "Installation" for the Integrated Waste Management Facility, the AD facility would not have been part of the Installation.

1.2 Receipt of Application

The Application was duly made on 17 November 2015. 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.

1.3 Consultation on the Application

We carried out consultation on the Application in accordance with the EPR and our statutory PPS. 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 & Witham Times newspaper on 26 November 2015.

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 the Environment Agency, Rivers House, Threshelfords Business Park, Inworth Road, Feering, Kelvedon, Colchester, CO5 9SE. Anyone wishing to see these documents could do so and arrange for copies to be made. We also placed a copy of the Application at the Kelvedon Library and Coggeshall Library. We distributed a number of copies of the Application on CD to members of the public following requests.

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

- Essex County Council (Planning Authority)
- Braintree District Council (Environmental Protection)
- Public Health England
- Director of Public Health (Essex County Council)
- Health & Safety Executive
- Essex County Fire & Rescue Service
- Health & Safety Executive
- Food Standards Agency

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.

A summary of consultation comments and our response to the representations we received can be found in Annex 1. We have taken all relevant representations into consideration in reaching our determination.

1.4 **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 2 March 2016 and 4 July 2016. A copy of each information notice and the response was placed on our Public Register.

In addition to the information notices, we received additional information during the determination from the Applicant:

- Clarification of documents submitted for Environmental Permitting Regulations and Planning Appeal – received 9 February 2016;
- Clarification of CHP plant capacity – received 25 February 2016;
- Revised Environmental Statement and associated documents – received 27 February 2016; and
- Effect of change in waste throughput on thermal capacity of plant – received 4 July 2016

We made a copy of this information available to the public in the same way as the responses to our information notices.

We issued the first information notice on 2 March 2016 with a deadline for responses to reach us by 18 April 2016. The Applicant requested an extension of the deadline until 22 April 2016 which we agreed to.

We received the Applicant's response on 22 April 2016. Whilst the majority of the questions in the information notice were addressed, we were not satisfied with certain aspects, in particular the proposed stack height of the incinerator, the fire prevention plan and the odour management plan.

We wrote to the Applicant on 27 May 2016, stating that we were not satisfied with their response to the first information notice. The Applicant wrote to us on 3 June 2016 requesting a meeting to discuss the shortfall in the previous response and clarification on the additional information required. We held meetings with the Applicant via a teleconference on 23 June 2016 and 30 June 2016 to discuss the information we required and to allow the Applicant to ask us questions. At the meeting, it was emphasised to the Applicant that the second information notice would be the final opportunity to provide the information we needed in order to make a decision on the Application. We issued the second information notice on 4 July 2016. The final response to the second information notice was received on 4 August 2016.

1.5 **The legal framework**

The Application has been refused.

This decision has been made in accordance with the requirements set out in the Environmental Permitting Regulations (England and Wales) 2010 and subsequent amendments. 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;
- a *waste 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 legal requirements are covered in Section 6.

Section 2: Process description

2.1 **What the Installation does**

The Application is for an Integrated Waste Management Facility (IWMF) with the following activities:

- waste incineration plant (utilising CHP) processing non-hazardous solid recovered fuel (SRF) and refuse derived fuel (RDF);
- mechanical and biological treatment plant;
- materials recycling plant;
- paper pulp plant;
- waste water treatment plant; and
- anaerobic digestion facility (with combustion of resultant biogas).

The site for the proposed facility is approximately centred on National Grid Reference TL 82293 20519. The Rivenhall IWMF is to be located on the south-eastern edge of a World War II airfield known as Rivenhall Airfield between the villages of Bradwell (northwest 2.6 km), Silver End (southwest 1.1 km), Rivenhall (south 2.3 km), Coggeshall (northeast 2.8 km) and Kelvedon (southeast 3.4 km). Access to the site will be provided via a private access road from the existing A120. The former airfield and its immediate surroundings are on a plateau above the River Blackwater. The airfield was open and exposed and had been used predominantly for agricultural purposes, although extensive sand and gravel extraction and restoration has been undertaken at the site. There are 12 residential receptors within 1 km of the proposed facility.

There are no European habitat sites (Special Areas of Conservation, Special Protection Areas and Ramsar) within 10 km from the proposed Installation. There are no Sites of Special Scientific Interest (SSSIs) located within 2 km of the proposed Installation. There are seven non-statutory sites (local wildlife sites and ancient woodlands) located within 2 km of the proposed Installation.

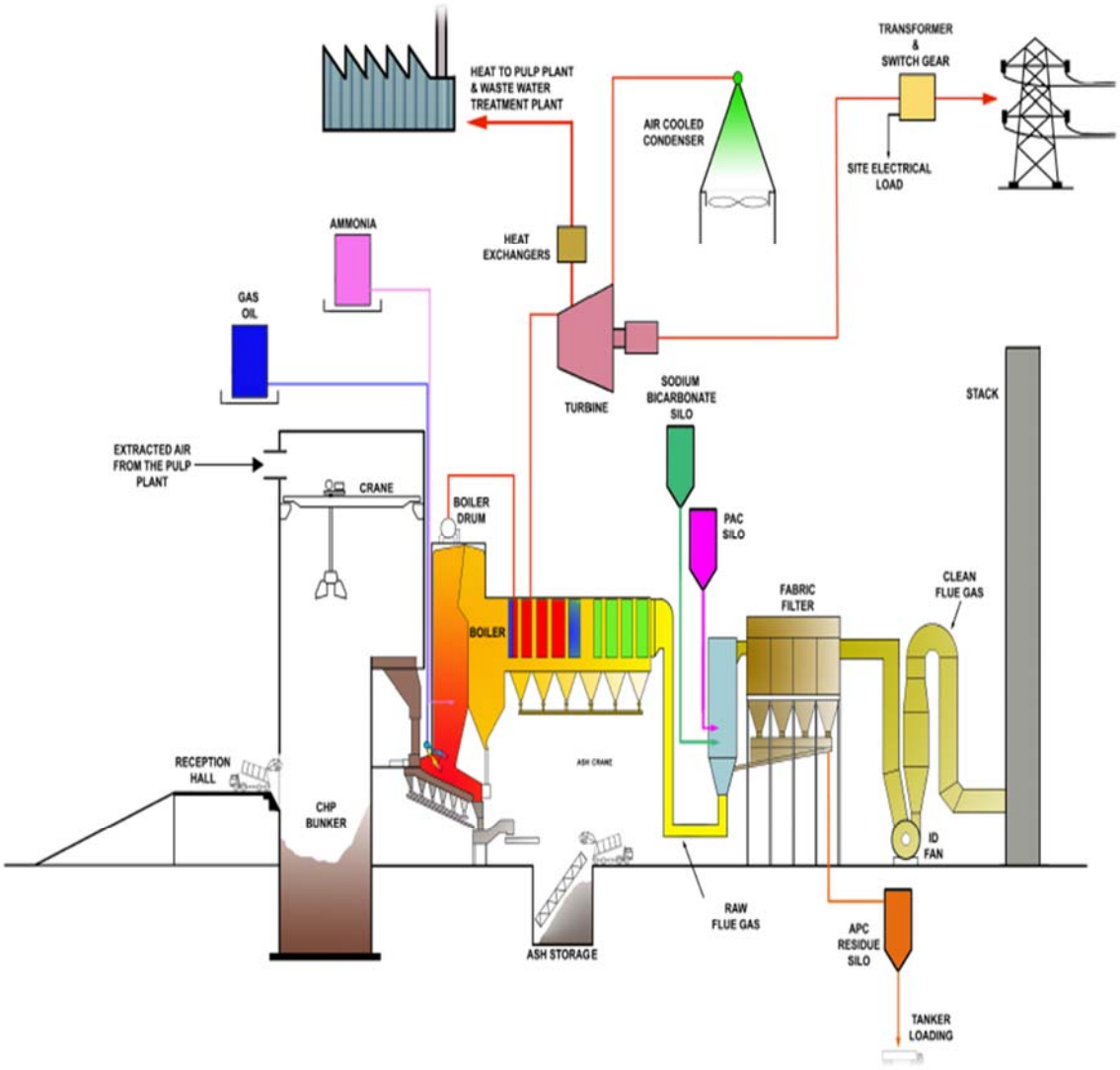
The Applicant has described the facility as an Integrated Waste Management Facility. Our view is that for the purposes of IED (in particular Chapter IV) and EPR, the installation comprises a waste incineration plant, a paper pulp plant and directly associated activities. As the main purpose of the CHP plant is the thermal treatment of waste notwithstanding the fact that energy will be recovered from the process, we consider the CHP plant as a waste incineration plant.

2.1.1 CHP plant (incinerator)

The incinerator was proposed to burn waste comprising predominantly SRF and RDF from off-site satellite waste treatment facilities, RDF produced by the on-site MRF and MBT and some biological residues from the WWTP. The incinerator will produce electrical power for use in the incineration process and other on-site processes with excess exported to the local distribution network.

Heat will be provided as steam and hot water to on-site processes and for space heating.

The incineration process is illustrated in the following simplified diagram:



The key features of the CHP plant are summarised below.

Waste throughput, Tonnes/line	595,000 tpa (Net calorific value of 9.07 MJ/Kg and 8,150 operating hours used in the design calculations to derive 595,210.8 tpa)	36.5 te/hour
Waste processed	SRF, RDF	
Number of lines	2	
Furnace technology	Moving Grate	
Auxiliary Fuel	Gas Oil	
Acid gas abatement	Dry	Sodium bicarbonate
NOx abatement	SNCR	Ammonia
Reagent consumption	Auxiliary Fuel: 600 te/annum Ammonia: 750 te/annum Sodium carbonate: 8,000 te/annum Activated carbon: 150 te/annum	
Flue gas recirculation	Yes	
Dioxin abatement	Activated carbon	
Stack	Height, 35 metres [note 1]	Diameter, 2.3 m
Flue gas	Flow (actual), 73.93 m^3/s Flow (normalised), 51.36 Nm^3/s	Velocity, 17.8 m/s
Electricity generated (assuming 8,150 hours operation per annum)	49 MWe	399,350 MWh
Electricity exported	28.4 MWe	231,460 MWh
Steam exported	35 MW	285,250 MWh
Steam conditions	Temperature, 440°C	Pressure, 75 bar
Waste heat use	Steam used at adjacent paper pulp plant – pulp drying machine: 184.1°C, 10 bar; disperger: 151.8°C, 4 bar	
Note 1 – Stack height is taken to mean the height relative to surrounding ground level. The proposed Installation will be located at the base of a quarry. The stack height is 55 metres when measured from the base of the quarry but only 35 metres above the level of the top of the quarry (surrounding ground level). This gives an equivalent stack height of 35 metres. The stack heights quoted below are all equivalent stack heights.		

The CHP plant will consist of two combustion lines. The thermal capacity of each boiler will be 92 MWth giving a total thermal capacity of 184 MWth. The CHP plant will be designed to accept RDF with a net calorific value (NCV) design range of circa 7-13 MJ/kg. Fluctuations in the delivered NCV will lead to variations in the mass throughput of waste. The maximum waste input capacity of the incinerator is 595,000 tonnes per annum. The incinerator will generate up to 49 MWe with the AD plant generating 1 MWe. Normal export is expected to be around 28 MW.

2.1.2 Mechanical Biological Treatment Facility

The purpose of the MBT Facility is to receive collected municipal or commercial wastes that require some pre-treatment in order to remove moisture and recyclates (in combination with the adjacent MRF) and to manufacture a RDF suitable for energy recovery in the CHP plant. The MBT may also be employed when appropriate to biologically dry and moisture-condition incoming RDF prior to energy recovery in the CHP plant.

The MBT process is designed to take in organic-rich materials that are treated in a series of enclosed vessels. The vessels include individual floor and roof systems that provide for air to be forced through the waste to facilitate the process of biological drying. The process is designed for the treatment of up to approximately 170,000 tonnes per annum of waste utilising eight lines with two vessels in each line. The waste will be loaded into each vessel by a front-end loading shovel.

The waste will remain in the vessels for a minimum of 7 days enabling the biological process to occur, during which time the waste will lose up to 12% moisture content. This enables easier extraction of recyclables, particularly plastics and metals, within the mechanical processes in the MRF.

2.1.3 Materials Recycling Facility

The purpose of the MRF is to identify and recover recyclates from the following streams:

- incoming untreated Municipal Solid Wastes (MSW) and Commercial & Industrial (C&I) wastes;
- the shredded and biologically dried MBT output; and
- untreated SRF and RDF from off-site sources.

The MRF is designed to both mechanically and manually sort recyclable materials from the waste. The identification and separation processes are achieved initially through a mechanical process and subsequently through a manual process for final quality control.

The MRF processing facility is divided into two lines:

- Line 1 is for processing the material that comes from the MBT bio-drying vessels.
- Line 2 is for processing material that generally comes directly into the facility having undergone no or minimal pre-treatment by way of recyclate removal.

Once all recyclable materials have been removed, the remaining waste materials (RDF) will be sent to the CHP plant for combustion.

2.1.4 Paper pulp plant

The Pulp plant would be capable of recycling up to 170,000 tpa of recovered printing and writing paper and card, to produce 85,500 tpa of recycled paper

pulp which will be transported off-site and used to predominantly manufacture printing and writing paper, white surface packaging and some tissue.

The Pulp plant has been designed and configured to produce recycled pulp suitable for use in the manufacture of writing or printing paper. To achieve this, the quality and purity of the paper and card feedstock imported to the site will comply with a recognised specification. This would provide the Pulp plant with raw materials suitable for the washing, cleaning, bleaching, mixing and drying operations required to produce the recycled pulp.

Grades (defined by EN643) within High Grade Recovered Paper (RCP), specifically sorted office papers and “white letter” which are largely post-consumer and uncoated papers and Multigrade (printer waste) which are largely pre-consumer will be sourced as a feedstock for the Pulp plant.

2.1.5 Waste water treatment plant

The waste water treatment plant (WWTP) will consist of the following treatment stages:

- course and fine screens;
- roughing and polishing dissolved air floatation (DAF);
- lime soda softening;
- sand filtration;
- membrane treatment – reverse osmosis;
- DAF and precipitator sludge collection; and
- dewatering.

The treated water from the waste water treatment plant will be transferred and stored in the on-site storage lagoon for reuse as process water within the Installation.

2.1.6 Anaerobic digestion plant

The stand-alone anaerobic digestion (AD) plant will comprise a wet pre-treatment and digestion system. This is considered to be a proven technology for the proposed waste feedstock, which will comprise separately collected municipal or commercial food wastes and/or other green wastes, referred to as mixed organic waste.

Section 3: Reason for refusal

3.1 How we reached our decision

The Application has been refused. The reason for refusal is that based on the information that has been provided to us, we are not satisfied that the Applicant has demonstrated that the proposals reduce emissions and their impact on the environment through the use of Best Available Techniques (BAT) and in particular that the proposed stack height is BAT.

This section of the document explains how we reached our decision regarding this facility. Any aspects of the Application not discussed in this decision document are considered acceptable.

3.2 Assessment of impact on air quality and BAT

3.2.1 How we assessed air quality impacts

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

3.2.2 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 on Risk Assessment and has the following steps:

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

3.2.3 Use of Air Dispersion Modelling

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

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

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

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

PCs are considered **Insignificant** if:

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

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

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

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

- spatial and temporal conditions mean that short term process contributions are transient and limited in comparison with long term process contributions;
- the proposed 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. Where emissions do not screen out, then even if they will not cause significant pollution, we still need to determine whether the proposals are BAT to minimise both the emissions and the impact of those emissions.

For those pollutants which do not screen out as insignificant, we determine whether exceedences of the relevant ES are likely. This is done through a 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 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 **or that the techniques proposed were not BAT**, we would refuse the Application.

The Applicant's assessment of the impact of air quality is set out in the Dispersion Modelling Assessment Document of the Application. The assessment comprises:

- A screening assessment of emissions to air from the operation of the Installation;
- A detailed dispersion modelling of emissions to air from the operation of the Installation; 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 facility's chimney and its impact on local air quality.

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 5.1 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 (30 km from the proposed installation) between 2009 and 2013. The Applicant considered this weather station a suitable source of meteorological data due to its proximity. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

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

- First, they assumed that the ELVs in the permit would be those in Chapter IV of the IED. These substances are:
    - Oxides of nitrogen (NO_x), expressed as NO_2
    - Particulate matter
    - carbon monoxide (CO)
    - sulphur dioxide (SO_2)
    - hydrogen chloride (HCl)
    - hydrogen fluoride (HF)
    - Metals (cadmium, thallium, mercury, antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium)
    - polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans (referred to as dioxins and furans)
- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term IED emission limit values, i.e. the maximum permitted emissions under the IED.
- Third, the model also considered emissions of pollutants not covered by IED, specifically ammonia (NH_3) and polycyclic aromatic hydrocarbons (PAH).

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

The Applicant has carried out background air quality monitoring to augment the data available from local authority monitoring. This data is summarised in the Application and has been used by the Applicant to establish the background (or existing) air quality against which to measure the potential impact of the Installation.

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.

We audited the air quality and human health impact assessment during the determination. We agree that the facility is unlikely to contribute to exceedences

of any Environmental Standard (ES) for human health or result in any exceedance of the COT-TDI for dioxins, furans and dioxin-like PCBs.

The Applicant's modelling predictions are summarised in the following sections. The figures show the predicted peak ground level exposure to pollutants in ambient air. Whilst we have used the Applicant's modelling predictions in the tables below, we have also audited the Applicant's assessment and carried out our own modelling checks and sensitivity analysis to a range of parameters. Although we can replicate the Applicant's predictions, the impact may be slightly higher taking expected modelling uncertainties into account. However, such increases would not materially impact our conclusions.

Table 1 – Predicted long term impact to air from the Installation

Pollutant	ES µg/m³	Background [1] µg/m³	PC µg/m³	PC % of ES	PEC [3] µg/m³	PEC [3] % of ES
NO_2	40	14.89	2.71	6.78	17.6	44.0
PM_{10}	40	--	0.19	0.48	--	--
$PM_{2.5}$	25	--	0.19	0.76	--	--
HF	16	--	0.02	0.13	--	--
VOCs (as 1,3-butadiene)	2.25	0.14	0.35	15.56	0.490	21.78
VOCs (benzene)	5	0.35	0.35	7.0	0.7	14.0
PAH	0.00025	--	0.000002	0.80	--	--
NH_3	180	--	0.19	0.11	--	--
PCBs	0.2	--	0.0001	0.05	--	--
Dioxins			1.90×10^{-09}			
Cd	0.005	0.0002	0.00095	19.0	0.00115	23.0
Hg	0.25	--	0.00095	0.38	--	--
Sb	5	--	0.00951	0.19	--	--
Pb	0.25	0.00838	0.00951	3.80	0.01789	7.16
Co		--	0.00951		--	
Cu	10	--	0.00951	0.10	--	--
Mn	0.15	0.00349	0.00951	6.34	0.013	8.67
V	5	--	0.00951	0.19	--	--
As	0.003	0.00081	0.00106	35.33	0.00187	62.3
Cr (II)(III)	5	--	0.00951	0.19	--	--
Cr (VI) [2]	0.0002	--	0.00000124	0.62	--	--
Ni	0.02	0.00143	0.0095	47.55	0.01094	54.7

Note 1 – Background concentration is that used by the Applicant.

Note 2 – PC based on Environment Agency's "Guidance to applicants on impact assessment for group 3 metals stack, September 2012, version 3".

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), examination of the PEC and background is not required.

Table 2 – Predicted short term impact to air from the Installation

Pollutant	ES µg/m^3	Background [1] µg/m^3	PC µg/m^3	PC % of ES	PEC [2] µg/m^3	PEC [2] % of ES
NO_2	200	29.78	35.67	17.8	65.45	32.7
PM_{10}	50	--	0.68	1.36	--	--
SO_2 (15-min mean)	266	7.3	56.37	21.2	63.67	23.9
SO_2 (1-hour mean)	350	7.3	50.34	14.38	57.64	16.5
SO_2 (24-hour mean)	125	--	8.31	6.6	--	--
HCl	750	--	18.24	2.43	--	--
HF	160	--	1.22	0.76	--	--
CO	10000	--	19.1	0.19	--	--
PAH	0.00025	--	0.000002	0.80	--	--
NH_3	2500	--	3.11	0.12	--	--
PCBs	6	--	0.00156	0.03	--	--
Hg	7.5	--	0.01555	0.21	--	--
Sb	150	--	0.15552	0.10	--	--
Co		--	0.15552		--	
Cu	200	--	0.15552	0.08	--	--
Mn	1500	--	0.15552	0.01	--	--
V	1	0.0035	0.15552	15.55	0.15902	15.90
Cr (II)(III)	150	--	0.02853	0.02	--	--

Note 1 – Background concentration is that used by the Applicant.

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), examination of the PEC and background is not required. 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 tables above, the following emissions can be screened out as insignificant in that the PC is <1% of the long term ES and <10% of the short term ES.

These are:

- PM_{10}, $PM_{2.5}$, hydrogen fluoride, PaH[BaP], ammonia, PCBs, hydrogen chloride, mercury, antimony, copper, chromium (II)(III) and carbon monoxide

Therefore, generally, 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.

Also from the tables above, the following emissions were not screened out as insignificant:

- sulphur dioxide, Nitrogen oxides (expressed as NO_2), VOCs (as 1,3-butadiene), VOCs (as benzene), cadmium, lead, manganese, vanadium, chromium (VI), arsenic and nickel

We have assessed the above pollutants as being unlikely to give rise to significant pollution in that the predicted environmental concentration (PEC) is less than 100% (taking expected modelling uncertainties into account) of both the long term and short term ES.

The results in the tables above show that the grid maximum ground level annual PC of NO_2 is 6.8% of the ES and the grid maximum short term PC is 17.83% of the ES. In addition, the Applicant's modelling showed the ground level annual PC of NO_2 as 4.4% of the ES and the short term PC of NO_2 as 14.7% of the ES at the nearest sensitive receptor. Both the grid maximum and receptor ground level PCs are significantly higher than some of the incineration plants we have permitted of a similar or smaller size.

We therefore requested additional information from the Applicant to demonstrate how the proposed stack height was calculated in such a way as to safeguard human health and the environment. Given the level of the NO_2 PCs, we also requested that the Applicant review their proposals to further reduce the impact of pollutants from the stack including a detailed stack height assessment, a reduction of emissions at source and a BAT options appraisal. Both requests were included in the information notice served on 2 March 2016.

3.2.4 Applicant's stack height analysis

The Applicant claimed that a detailed stack height analysis was undertaken in 2009 for the original planning permission and Public Inquiry, which concluded that the proposed 35 metre-stack provided adequate dispersion. The Applicant provided an updated stack height analysis using one year of weather data (2011) for a range of heights from 25 metres to 100 metres. The analysis included long and short term impacts of NO_2, SO_2 and PM_{10}.

We have not discussed the impacts of SO_2 and PM_{10} any further in this decision document for the following reasons:

- Emissions of PM_{10} screened out as insignificant (i.e. PC <1% of the long term ES and <10% of the short term ES); and

- Although the PCs of SO_2 were greater than 10% of the short term ES and hence we are not satisfied that the proposals for these are BAT, our principal focus is with the long term impact of NO_2. We can use this as an indicator against which we carry out analyses of stack height, BAT and appropriate levels of dispersion. This is because annual NO_2 is the most sensitive to pollution taking into account the environmental impacts from likely emissions to atmosphere from this type of process.

3.2.4.1 Applicant's assessment of predicted long term impact of pollutants at varying stack heights

The Applicant carried out the stack height assessment based on the grid maximum. The Applicant then made predictions at discrete sensitive receptors, as well as at a 5.3 km x 7.3 km grid of receptors at a resolution of 53 metres. Based on the stack height, this approach is reasonable to identify the maximum ground level concentration. We noted in our audit, that the point of maximum impact was in close proximity to a residential receptor.

Figure 1 shows the grid maximum ground level PC as a percentage of the long term ES for NO_2 and PM_{10}, assuming both lines of the CHP plant operate at the daily ELVs concurrently. The Applicant considers that the daily ELV is a more realistic basis for assessment to reflect the proposed site operations compared to operating at half-hourly ELVs. The results show that the grid maximum ground level NO_2 PC is >1% for all the stack heights except at 100 metres. At a stack height of 100 metres, the grid maximum ground level NO_2 PC is about 1% of the long term ES.

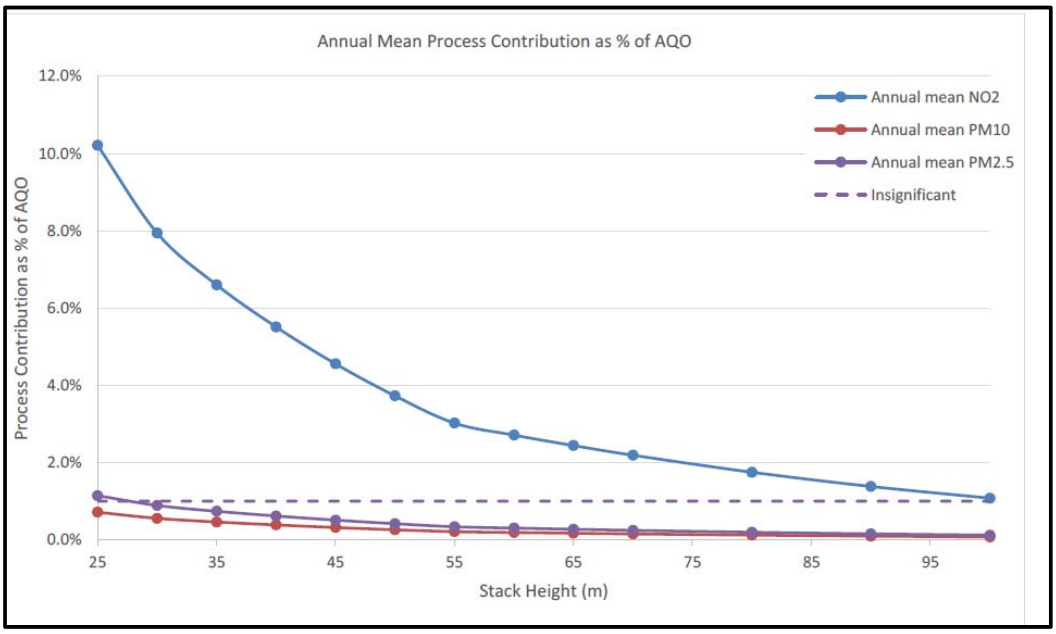


Figure 1 – Applicant's assessment of grid maximum ground level PC_{LT} (% of ES) of pollutants at varying stack heights (25 to 100 metres)

When assessed at the nearest sensitive receptor, the ground level NO_2 PC is >1% for all the stack heights except at 100 metres (see Figure 2). For the ground level NO_2 PC to be <1% of the long term ES and screen out as insignificant (and hence for us to accept the Applicant's proposals are BAT without any further assessment), the stack height would need to be more than 100 metres.

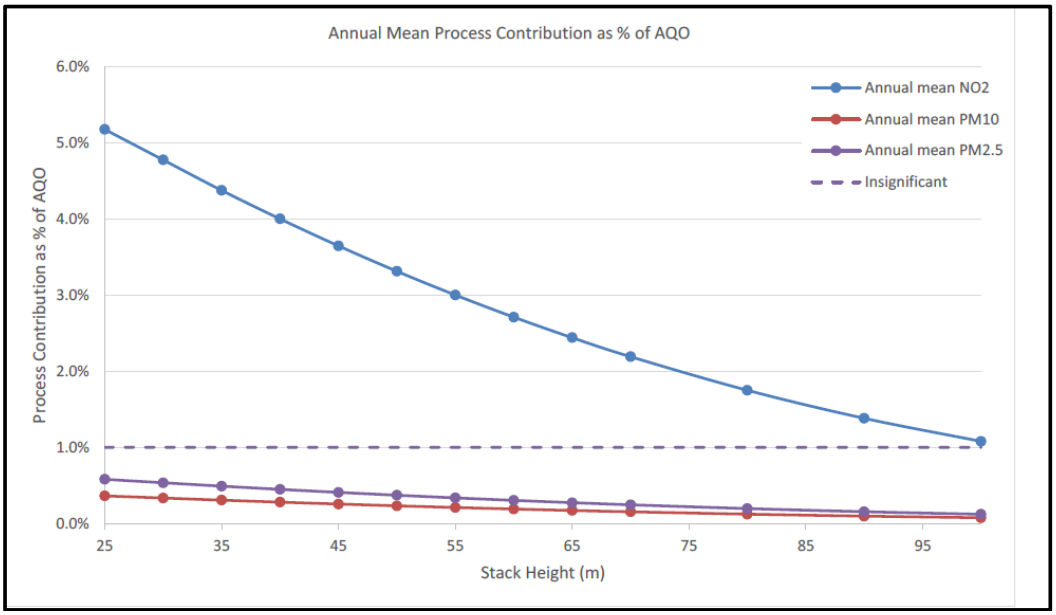


Figure 2 – Applicant's assessment of receptor ground level PC_{LT} (% of ES) of pollutants at varying stack heights (25 to 100 metres)

The Applicant reports that the PEC is less than 70% of the ES for all stack heights considered. The Applicant therefore claims that the conclusions of the assessment would remain the same at all stack heights – i.e. emissions from the facility are not significant either at the point of maximum impact or at any sensitive receptor. In particular, the Applicant claims that the impact of the facility would be not significant for a stack height of 35 metres and this conclusion would be unchanged at a stack height of, for example, 55 metres (or 75 metres from the base of the CHP building and the foundation level of the stack) on the basis of the PEC. The Applicant concluded that the long term impacts of nitrogen dioxide are not significant.

However, the Applicant has failed to make a proper assessment of emissions from the plant which we would expect them to include firstly, whether the proposals will cause significant pollution, and secondly, whether for those emissions that do not screen out (see page 17), they are using BAT to minimise emissions and their impact even if significant pollution is not caused.

3.2.4.2 Environment Agency assessment of Applicant's predicted long term impact of NO_2 at varying stack heights

We carried out additional sensitivity checks to validate the Applicant's stack height analysis using a range of heights from 35 metres to 95 metres and predicted the impact of NO_2 emissions. We assumed an emission release of 200 mg/Nm^3 (originally proposed by the Applicant) for long term predictions in accordance with the emissions limits specified in Annex VI of the IED. Modelling was carried out using a single set of representative meteorological data, selected as the worst-case year from the sensitivity analysis.

Process contributions of NO_2 were predicted for a Cartesian grid and polar grid of receptors extending 5 km from the stack. A Cartesian grid is where points are distributed evenly along an x-y access. A polar grid is where points extend in all directions radially from a central point. We ran sensitivity to both approaches in order to be satisfied that we identified the point of maximum impact. The maximum predictions at each radial distance (obtained from the polar grids) were plotted against distance from the stack.

The analysis we have made must be considered as indicative only to illustrate the relative reductions in impact that can be made by increasing stack heights. Our predictions do not necessarily take all modelling uncertainties into account.

Figure 3 shows the grid maximum ground level PC as a percentage of the long term ES for NO_2 at a range of distances from the stack, assuming an emission release of 200 mg/Nm^3.

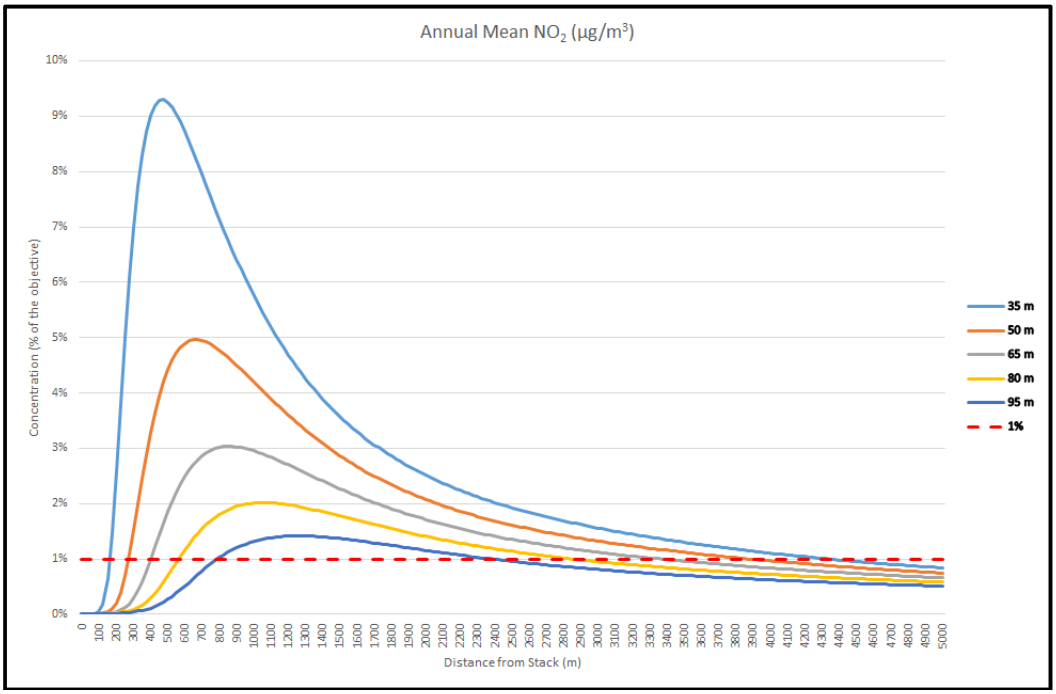


Figure 3 – Environment Agency assessment of indicative grid maximum ground level PC_{LT} (% of ES) of NO_2 at varying stack heights as a measure of distance from the stack (NO_2 ELV – 200 mg/Nm^3)

Our analysis of the Applicant's submission shows that at a stack height of 35 metres, ground level NO_2 PC is predicted to be >9% of the long term ES at 400 metres from the stack. Ground level NO_2 PC at this stack height declined to <1% of the long term ES at 4,300 metres from the stack. At a stack height of 95 metres, ground level NO_2 PC is just over 1% of the long term ES and falls to below 1% of the long term ES at 2,300 metres from the stack.

We do not agree with the Applicant's assessment of impact using the PEC criterion as a percentage of the ES (i.e. PEC <70% of ES). The PEC criterion is designed for screening purposes to determine whether detailed modelling of emissions is required using our guidance on risk assessment. Detailed modelling is required if the long term PEC is greater than 70% of the long term ES or where there is an Air Quality Management Area (AQMA) for a substance. This criterion is not relevant where detailed modelling has been undertaken (as in this case here), nor is it relevant in determining whether proposals are BAT.

Although we consider NO_2 as being unlikely to give rise to significant pollution in that the PEC is less than 100% (taking expected modelling uncertainties into account) of both the long term and short term ES, our assessment of the Applicant's proposal shows that the extent and magnitude of NO_2 impacts would be reduced with a taller stack height.

3.2.5 Applicant's BAT justification of stack height and NOx control measures

Following our assessment of the response to the first information notice, we considered that the Applicant had not demonstrated that the proposed stack

height of 35 metres was BAT for a plant with the capacity of 595,000 tonnes per annum. This was based on a review of other incineration plants, of a smaller or similar size to the Rivenhall plant that we have permitted. We therefore requested the Applicant to provide a detailed BAT options appraisal to include a cost-benefit assessment of the proposed stack height compared to other stack heights considered and further measures to reduce nitrogen oxides emissions below those proposed in the application. These requests were included in the second information notice served on 4 July 2016.

3.2.5.1 Applicant's BAT options appraisal for proposed stack height

The Applicant did not provide a detailed BAT options appraisal nor a cost-benefit analysis as requested in the second information notice. The Applicant made the following claims:

- There would be an additional capital cost for a new stack, taking into account the additional materials and the foundations. This is estimated to be around £500,000 for the first 10 metres, and increasing for each additional 10 metres as the foundations and stack design become more expensive. The Applicant reports that while this is not an excessive cost, it is considerable.

- As a result of the landscape issues, a planning condition was imposed which limited the stack height to 35 metres above local surrounding ground level (85 metres above ordnance datum). The Applicant states that the local planning authority has confirmed that a new planning application would be required to increase the stack height due to the wider landscape and visual impact the plant would have on the surrounding environment.

- There would be additional costs for new planning and permit applications and potentially a second Planning Inquiry, which could be of the order of £2 million. In addition, the planning and permitting determination of a revised stack height would introduce a delay to the project. The project is supported by a Contract for Difference for the power that will be generated (one of only 2 in the UK for EfW/CHP plants), and this has a clear deadline by which the plant needs to be commissioned. The Applicant reports that it is highly likely that such a requirement for a revised stack height would cause further delays and would mean that the project would not proceed.

The Applicant argues that there would be an increased visual impact of the plant, as the stack would become more prominent in close view and would be visible from a greater distance. The impact of the plant on local landscape and on views from properties and other receptors was of significant concern at the Planning Inquiry into this plant. The Applicant states that at this site, the balance of wider environmental impacts supported a stack level ("height") that was considered to be shorter than other plants in the UK.

The Applicant reports that the facility will be located within a former quarry and as such the height of the stack and the building have been calculated based on the difference in the surrounding (undisturbed) ground levels outside the quarry to the top of the building. The landform around the site forms a flat plateau at about 50 metres AOD and the base of the quarry 30 metres AOD where the stack is founded. The Applicant claims that the effective building height is 10 metres (albeit the overall design and configuration of the buildings that lie below local ground level are similar to other plants) and is unique to this site.

The Applicant states that although increasing the stack height would lead to a reduction in the process contribution, this would not change the significance of the impact. In particular, a stack height of 55 metres, might increase the visual impact of the facility but would not change the conclusions of the air quality assessment reported above. The Applicant concludes that a stack height of more than 35 metres is not a feasible option due to planning constraints and is therefore not available.

We reviewed the response from the Applicant. No additional information was provided to substantiate the additional capital cost for a revised stack height, only that any increase in the stack height above 35 metres was not available due to planning constraints.

3.2.5.2 Applicant's BAT options appraisal for NOx secondary control measures

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

The Applicant provided additional information in relation to secondary measures to reduce NOx. The Applicant has called the proposed abatement an "Enhanced Selective Non-Catalytic Reduction System" (ESNCR) with ammonia as the reagent that is able to achieve guaranteed reduced nitrogen oxides emissions of 150 mg/Nm^3 as a daily average and 300 mg/Nm^3 as a half-hourly average. The Applicant reports that NOx abatement is achieved by installing an additional row of injection nozzles for ammonia and additional temperature measurement to improve control.

The Applicant carried out a BAT options appraisal of the alternative NOx abatement techniques.

The Applicant considered three options:

1. CHP plant with SNCR
2. CHP plant with "Enhanced SNCR"
3. CHP plant with SCR

The Applicant calculated the cost per tonne of NOx abated over the projected life of the plant compared with the environmental impact (see table 3 below).

Table 3 – BAT options appraisal for NOx abatement

Parameter	Unit	SNCR	ESNCR	SCR
PC% of EAL	%	6.8	5.1	2.4
Tonnes of NOx abated per annum	tpa	350	500	740
Ammonia solution consumed	tpa	750	1,444	620
Total annualised cost	£pa	£1,314,000	£1,526,000	£4,609,000

The Applicant reports that applying SCR to the plant increases the annualised costs by approximately £3.3 million, abates an additional 390 tonnes of NOx per annum, reduces the benefit of the facility in terms of the global warming potential by a minimum of 8,000 tonnes of CO_2 and reduces ammonia consumption by a minimum of approximately 130 tonnes per annum. This gives an effective additional annual cost of approximately £8,500 per additional tonne of NOx abated. Based on the figures above, the Applicant considers that the additional cost of SCR over ESNCR is not justified by the reduction in environmental impact, thus SCR is not BAT in this case.

The Applicant reports that the "Enhanced SNCR" is BAT, as this leads to the abatement of an additional 150 tonnes of NOx per annum at an annualised cost of £212,000. This gives an effective additional annual cost of approximately £1,413 per additional tonne of NOx abated. Furthermore, the reduction in NOx emissions and ammonia consumption associated with SCR is outweighed by the increase in capital costs and the increase in power consumption. The Applicant has justified the use of ammonia as the reagent on the basis of lower emissions of nitrous oxide than the use of urea and that the risks associated with ammonia emissions (or slip) can be controlled.

The Applicant claims that a daily emission limit of 150 mg/Nm^3 would be the most stringent emission limit in the UK at a conventional EfW plant. Furthermore, the approach of limiting NOx emissions at source, rather than increasing the height of the stack within a sensitive landscape, delivers the preferred solution to abatement and emissions.

We have considered the Applicant's response, in particular making reference to the BAT reference document for Waste Incineration[1]. SCR can reduce NOx levels to below 70 mg/Nm^3 and can be applied to all plant. It is generally more expensive than SNCR and requires reheating of the waste gas stream which reduces energy efficiency. Periodic replacement of the catalysts also produces a hazardous waste. SNCR can typically reduce NOx levels to a range between 120 and 180 mg/Nm^3; it relies on an optimum temperature of around 900°C and sufficient retention time for reduction. SNCR is more likely to have higher levels of ammonia slip. The technique can be applied to all plant unless lower NOx

[1] http://eippcb.jrc.ec.europa.eu/reference/BREF/wi_bref_0806.pdf

releases are required for local environmental protection. Urea or ammonia can be used as the reagent with either technique, urea is somewhat easier to handle than ammonia and has a wider operating temperature window, but tends to result in higher emissions of N_2O. Either reagent is BAT, or the use of one over the other is not normally significant in environmental terms.

We are not aware of the term "Enhanced Selective Non-Catalytic Reduction System" being a distinct BAT option for NOx abatement. As discussed above, SNCR can operate in the range of 120 – 180 mg/Nm^3 without the need to recover ammonia (and to control ammonia slip). Levels below 70 mg/Nm^3 have been achieved but are likely to require ammonia stripping. We have permitted another UK plant operating at the daily emission limit of 150 mg/Nm^3 using SNCR. We consider that what the Applicant is proposing as a secondary control measure for NOx is simply SNCR. We are not satisfied based on the current proposals that SNCR is BAT for this Installation. As the Applicant has not demonstrated in any way why even with the lower ELV of 150 mg/Nm^3, the use of SNCR would offset the increased impact from the low stack height.

3.2.5.3 Applicant's revised air quality impact assessment using proposed reduced emission limits

The Applicant submitted a revised air quality assessment incorporating the proposed NO_2 daily and half-hourly emission limit values. The tables below compare the process contributions in the original and revised air quality impact assessments. We have only discussed the long term impact of NO_2 for the same reasons outlined in section 3.2.4.

Table 4 – Assessment of NO_2 emissions using daily ELV of 200 mg/Nm^3 (November 2015)

Pollutant	ES	Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m^3	µg/m^3	µg/m^3	% of ES	µg/m^3	% of ES
Grid maximum						
NO_2 (long term)	40	14.89	2.71	6.8	17.6	44
Maximum at sensitive receptor						
NO_2 (long term)	40	14.89	1.75	4.4	16.64	41.6

Table 5 – Assessment of NO_2 emissions using daily ELV of 150 mg/Nm^3 (August 2016)

Pollutant	ES	Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m^3	µg/m^3	µg/m^3	% of ES	µg/m^3	% of ES
Grid maximum						
NO_2 (long term)	40	14.89	2.04	5.1	16.93	42.3
Maximum at sensitive receptor						
NO_2 (long term)	40	14.89	1.32	3.3	16.21	40.5

With the proposed NO_2 ELV, the grid maximum ground level PC reduces from 6.8% to 5.1% of the long term ES. At the nearest sensitive receptor, the ground level NO_2 PC reduces from 4.4% to 3.3% of the long term ES (See Table 4 and 5 above). The reduction in the PC could be further significantly reduced by the provision of a taller stack (see below).

3.2.5.4 Environment Agency's assessment of Applicant's proposed emission limits

We carried out additional sensitivity checks to validate the Applicant's revised air quality modelling using a range of heights from 35 metres to 95 metres and predicted the impact of NO_2 emissions. We used the Applicant's proposed emission release of 150 mg/Nm^3 for the long term prediction. Modelling was carried out as specified in the original assessment. Figure 4 shows the grid maximum ground level PC as a percentage of the long term ES for NO_2 at a range of distances from the stack, assuming an emission release of 150 mg/Nm^3.

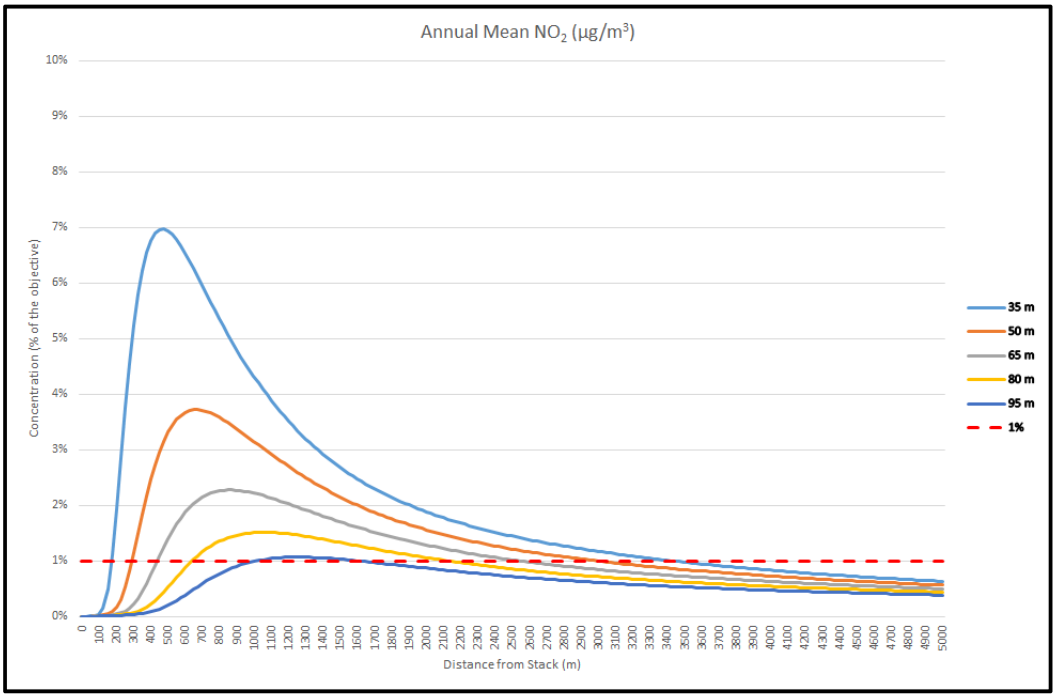


Figure 4 – Environment Agency assessment of indicative grid maximum ground level PC_{LT} (% of ES) of NO_2 at varying stack heights as a measure of distance from the stack (NO_2 ELV – 150 mg/Nm^3)

Our analysis of the Applicant's submission shows that at a stack height of 35 metres, the ground level NO_2 PC is predicted to be 7% of the long term ES at 400 metres from the stack. Ground level NO_2 PC at this stack height declined to <1% of the long term ES at 3,600 metres from the stack. At a stack height of 95 metres, maximum ground level NO_2 PC is predicted to be just over 1% of the long term ES and falls to below 1% of the long term ES at 1,700 metres from the stack.

The Applicant did not provide any BAT justification of cost-benefit analysis for proposing a reduced ELV of NO_2 over increasing the stack height. For example, our indicative assessment shows that at a stack height of 35 metres and NO_2 ELV of 150 mg/Nm^3, the PC would be 5.1% of the long term ES, but with a 75 metre stack and NO_2 ELV of 200 mg/Nm^3 the PC would be 2% of the long term ES (see Table 6 below).

Table 6 – Predicted ground level NO_2 PC at varying stack heights (original and proposed ELVs)

Stack height (metres)	ELV 200 mg/Nm^3	ELV 150 mg/Nm^3
	NO_2 (PC% of ES)	
35	6.8[1]	5.1[1]
45	4.2	3.2
55	3.1	2.3
65	2.3	1.7
75	2.0	1.5
85	1.5	1.1
95	1.1	0.8
Note 1 – PCs at 35 metres have been provided by the Applicant. The PCs at other stack heights have been derived from the Applicant's air quality assessment.		

Our assessment of the Applicant's original and revised air quality modelling shows that the extent and magnitude of NO_2 impacts decrease with increasing stack height.

3.3 Our conclusion

The 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. The original planning consent was granted in 2010 following an appeal to the Secretary of State for Communities and Local Government. While we did not object to the proposal, we raised our concerns to the Planning Inspectorate in 2009 and advised that the Applicant would need to demonstrate that the proposed stack height represented BAT when a permit application was made. We also emphasised our desire to avoid a situation whereby a future environmental permit might contradict the requirements of the planning consent.

We consulted with the local authority (Essex County Council) on 21 September 2016 to seek their views on the status of the current planning consent and any proposed changes to the proposal. The local authority confirms that any changes to the proposal would trigger a requirement for a variation application to the current planning consent. Following the consultation with the local authority on this issue, we considered whether planning constraints would be a consideration in the determination of what is "available" in terms of BAT for the stack height of the proposed Installation. Available techniques are defined in the IED as "those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into account costs and advantages, whether or not the techniques are used or produced in the member state in question as long as they are reasonably accessible to the operator". Techniques include both the technology used and the way in which the plant is designed and built. At this time, it is not clear that a taller stack would not be acceptable to the planning authority. Even

if it were not, that does not necessarily mean it would not be an available technique in the generic terms of the definition. It may just mean that this is the wrong location in land use terms. An objective approach needs to be adopted in assessing BAT. Where a particular technique (such as stack height) is BAT within a particular sector, then that should normally be required for all installations in that sector.

In this case, we understand that the Applicant's decision to remain with the proposed stack height of 35 metres is driven primarily by the delays that may be caused due to the determination of a revised stack height application under the planning regime. In terms of the additional costs of any new planning application and the funding for the proposed installation, it is not appropriate to authorise or lower standards of BAT on the basis of an Applicant's own financial position. We do not consider that the current planning condition means that a higher stack is 'not an available technique'. Whilst there would be additional cost, it is very difficult to quantify these costs at this time as it would depend on the outcome of any planning application.

Article 46(1) of the IED requires waste gases from waste incineration and waste co-incineration plants to be 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. Although the Applicant has demonstrated how the proposed stack height was calculated, we are not satisfied that the proposed stack height is BAT for the size of the plant.

Annex III of the IED identifies "comparable processes, facilities or methods of operation which have been tried with success on an industrial scale" as a criteria in determining BAT. In our determination of BAT for this plant, we have considered the stack heights of other waste incinerator plants of similar capacity to that proposed in this Application. Figure 5 shows the stack height of several incineration plants with an annual feedstock capacity of 100,000 tonnes and above. The stack height of plants of similar size are in the region of between 70 and 120 metres which we regard as the BAT range for plants in the UK. The proposed stack height is significantly less than the minimum height that we would consider to represent BAT for a plant of this size.

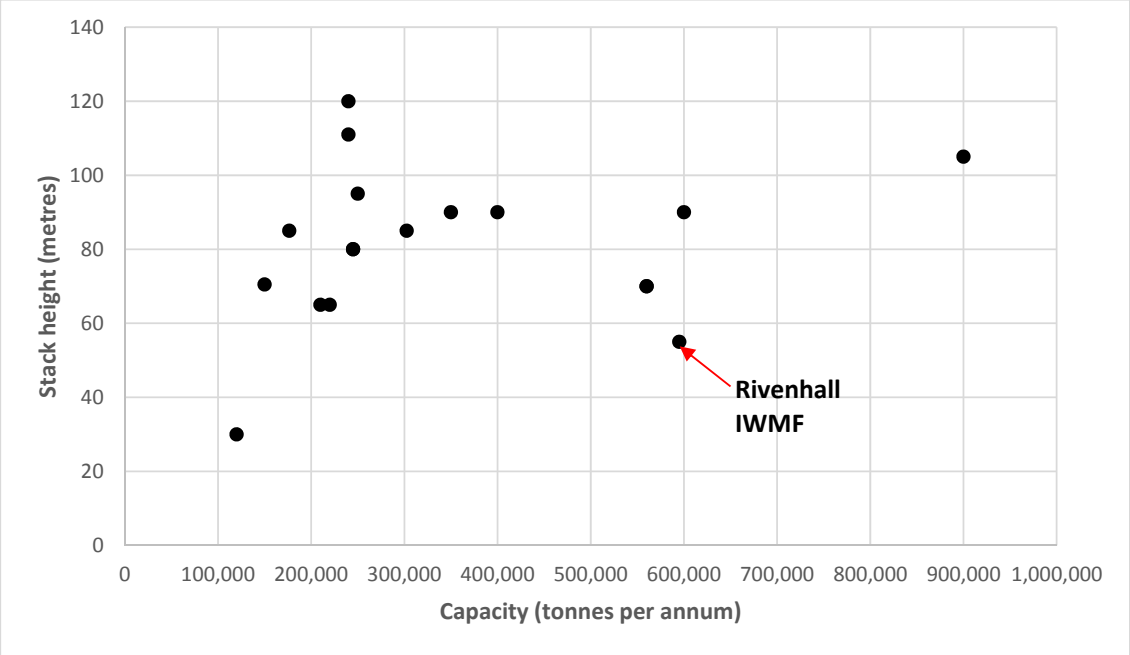


Figure 5 – Incineration plants' stack heights with an annual feedstock capacity of 100,000 tonnes and above (actual heights shown rather than equivalent)

Chapter 2 of the IED applies an integrated environmental approach to the regulation of certain industrial activities. This means that emissions to air, water (including discharges to sewer) and land, plus a range of other environmental effects, must be considered together. The competent authority (in this case, the Environment Agency) must set permit conditions so as to achieve a high level of protection for the environment as a whole, based on the use of BAT, which balances the costs to the operator against the benefits to the environment. BAT is not just about minimising emissions but as identified in Annex III of the IED, it is also about "the need to prevent or reduce to a minimum the overall impact of the emissions on the environment and the risks to it". Stack height is an important technique in minimising the impact of the emissions that do occur.

We gave the Applicant the opportunity to demonstrate through a robust BAT options appraisal (including a cost-benefit assessment) for selecting the proposed stack height compared to taller stack heights, given the level of NO_2 PCs for a plant of this size. The Applicant failed to do this. We therefore consider that the Applicant has not met the specific requirements of IED with regards to BAT for the stack height in this respect.

Air quality status should be maintained where it is already good, or improved. Article 12 of Directive 2008/50/EC on ambient air quality and cleaner air (as transposed by The Air Quality Standards Regulations 2010) requires that in zones and agglomerations where the levels of sulphur dioxide, nitrogen dioxide, PM_{10}, $PM_{2.5}$, lead, benzene and carbon monoxide in ambient air are below the respective limit values, member states shall maintain the levels of those pollutants below the limit values and shall endeavour to preserve the best ambient air quality, compatible with sustainable development. Given that the revised grid maximum PC of NO_2 is 5.1% of the long term ES, and that a higher

stack would give a lower PC (for example at a stack height of 75 metres, PC of NO_2 is 1.5% of the long term ES), we do not consider that the Applicant has demonstrated that the proposals preserve the best ambient air quality in the local environment.

We have refused this application on the following basis:

- Despite our initial concerns pointed out over 6 years ago that a 35-metre stack may not be BAT and two information notices during the permit determination, the Applicant has failed to provide an adequate BAT justification for the proposed 35 metre stack height;

- The proposed stack height is significantly less than the minimum height of other incinerators we have permitted of a similar capacity; and

- While the impact of NO_2 with a 35-metre stack will not cause air quality standards to be breached, the Application and our own modelling show that ground level concentrations of NO_2 from the installation would be significantly lower if emissions were via a stack of the normal height range for an incinerator of this size. Figure 5 above and graphs in this section of the decision document show that PC continues to drop considerably at stack heights above 35 metres and therefore 35 metres does not represent BAT for this installation. This still applies for the Applicant's proposed daily emission limit value for NO_2 of 150 mg/Nm^3.

Section 4: Issues still to be resolved

The Application has been refused, however the following issues remain unresolved and would also need to be addressed before a permit could be granted for this site in the future. As we have decided to refuse the Application, it was considered unreasonable to put the Applicant to the expense of trying to resolve these issues at this time. Based on the current information we have, none of these issues have been satisfactorily addressed.

4.1 **Prevention and management of fires**

Based upon the information in the Application, we are not satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise, detect and contain fires and to prevent pollution from fires. Following the assessment of the Applicant's revised fire prevention plan (FPP), we consider that the following aspects require further attention:

1. The Applicant is required to provide a detailed site plan (or plans) to scale showing:

- the layout of buildings and waste piles;
- any areas where hazardous materials are stored on site (location of gas cylinders, process areas, chemicals, piles of combustible materials, oil and fuel tanks);
- the main access routes for fire engines and any alternative access;
- the access points around the perimeter to assist fire-fighting;
- the hydrants and water supplies;
- any watercourse, borehole or well located within or near the site;
- areas of natural and unmade ground;
- the location of plant, protective clothing and pollution control equipment and materials;
- the drainage systems, foul and surface water drains, and their direction of flow and outfall points;
- the location of drain covers and any pollution control features such as drain closure valves and firewater containment systems;
- a compass rose showing north; and
- a quarantine area.

2. Confirmation is required of the maximum size of all waste piles, by stipulating the maximum height, width and depth of each pile. If any waste piles exceed the maximum dimensions detailed in the Environment Agency FPP guidance, the Applicant is required to justify why the method of storage would be acceptable to that specified in the guidance.

3. Confirmation of the minimum separation distances (fire breaks) distance between waste piles.

- Confirmation is required that a 'freeboard' space will be retained at the top and sides of the walls and that it will be clear at all times to prevent fire spreading over the walls;

- Confirmation is required that where fire walls are not being used, there will be a separation distance of at least 6 metres between waste piles and the site perimeter, any buildings, or other combustible or flammable materials. If fire walls or bays are being used as an alternative to separation distance fire breaks, the Applicant is required to demonstrate that they have considered the requirements outlined in the FPP guidance.

4. Details of contingency planning should be provided, detailing how the site will be managed in the event of a fire. We require the Applicant to include provisions for both incoming and outgoing wastes and the disposal of fire damaged waste. For example, would the site cease operations until the Environment Agency /Fire Service advise it is safe to do so? Would contracted wastes be diverted to another site? The Applicant needs to show that a plan will be in place for how those who may be affected by a fire, such as nearby residents and businesses will be notified. The plan needs to include details of how the Applicant will clear and decontaminate the site following a fire and the steps taken before the site can become operational again.

5. Additional information is required that demonstrates that sufficient water supplies are available on site to manage a worst case scenario incident (e.g. all piles are on fire). Calculations should be in accordance with the FPP guidance.

6. Additional information is required on how the Applicant would contain fire water on site during an incident and the pollution equipment on site to deal with such a situation. Containment methods and pollution equipment should be considered in accordance with the FPP guidance. The Applicant is required to demonstrate that there will be sufficient fire water holding capacity compared to the amount of waste storage.

7. The Applicant is required to provide details of any suppression systems installed or to be installed in the building.

8. The following would also be required:

    - Regular exercises on site – The FPP needs to set out the fire prevention measures and procedures and show that they will be put in place and used on site. The Applicant should provide details of regular exercises on site to test how well the plan works and to ensure that staff understand all the requirements of it.

    - The Applicant should provide details of the sampling and testing protocol that will be employed to ensure that a representative number of bales (minimum 10%) are assessed during monitoring.

In addition, confirmation is required that representative temperature readings from the centre of the bales and from bales within the centre of a pile will be obtained.

- The Applicant should confirm that the bales will be turned to ensure the waste stays cold.

- For waste in containers with a capacity greater than 1,100 litres, the Applicant should confirm that each container will be accessible (so that any fires inside it can be put out). The Applicant should provide details of the procedures that will be put in place to allow this to happen or confirm that this is not applicable to the site.

4.2 **Management of odour emissions**

The Environment Agency's approach to odour regulation requires applicants of potentially odorous sites such as this one to submit an Odour Management Plan (OMP) for review and approval by us. The submission of an acceptable OMP is a requirement of most environmental permits where odour could be an issue. We review OMPs against headings that reflect our Technical Guidance Note H4 – Odour Management, Section 4 (Control measures), Section 5 (Monitoring) and Appendix 4 (What we are looking for in an odour management plan). The review asks the following questions:

1. Is the inventory of odorous materials complete?

2. Have the nearest receptors been identified?

3. Does the plan describe appropriate measures for the management of odorous materials and the control of processes?

4. Does the plan describe appropriate measures for the containment and abatement of any odorous emissions?

5. Does the site rely on any measures for enhancing dispersion of odours (e.g. stack)?

6. Does the plan describe appropriate measures for minimising annoyance among neighbours who may be exposed to odorous emissions (e.g. community engagement)?

7. Does the plan consider how odorous emissions might be affected by emergencies or incidents (e.g. fire, staff illness, weather conditions etc.)?

The Applicant submitted an OMP with the Application. During the determination, we requested more information on the OMP from the Applicant. Consequently, the OMP has been revised a number of times in order to ensure it contains the technical information and operating techniques necessary to prevent odour pollution.

Based upon the information in the Application, we are not satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise odour and to prevent pollution from odour. Following the assessment of the Applicant's revised OMP, we consider that the following aspects require further attention:

1. Is the inventory of odorous materials complete?

There is a generic section 4.2.1 on the receipt and management of wastes. We require more information on:

a. Age of waste prior to arrival on site and controls to prevent waste being older than the stated maximum age. This is fundamental to the level of odour risk from waste inputs.

b. Storage volumes, maximum storage times, locations and details of maximum storage capacities and controls to prevent exceedances of those limits. Storage capacities have been updated for waste inputs in section 4.2.1 of the OMP. Storage times need to be stated as maximum times. It is unclear what specific controls are in place to prevent capacity/time exceedances.

c. A full list of final wastes, volumes and maximum storage times has not been provided nor details of site controls; there is some information on ash and sludges in sections 4.2.4.6 to 4.2.4.8 but this appears to be generic with no specific details. Sludge storage is potentially odorous and there is no detailed information about this in the OMP.

d. There is no clear waste acceptance criteria in the OMP. There is no itemising of waste types in relation to EWC codes, capacities, level of odour risk and management strategy to minimise risk of odour pollution beyond the installation boundary.

2. Have the nearest receptors been identified?

Table 1 of the OMP section 3.3.1 identifies receptors. However, the Applicant reports the distance of receptors from the incinerator stack. Distances with respect to receptors should be taken from the installation boundary.

3. Does the plan describe appropriate measures for the management of odorous materials and the control of processes?

Section 4.2 contains some details of appropriate measures. However the descriptions are generic. The controls for each part of the process need to be detailed with specific parameters and ranges to ensure effective odour control.

We would expect a list of control measures for each facility and process step, with critical parameters, ranges of normal operation and monitoring /triggers to indicate abnormal operation.

Section 2.3 of OMP goes through each process step in some detail but without highlighting the odour control measures.

Section 4.2 gives some control measures for each process step. But in the main, there is no definitive list of critical parameters/ranges/monitoring/triggers to ensure these parameters are maintained with defined normal operating ranges. For example, there is mention of negative pressure within the reception halls. However there is no mention of the design negative pressure level, means of monitoring and controlling negative pressure on a day-to-day basis and no clear design for minimising the risk of fugitive emissions when doors are opened.

The Applicant should provide details of ventilation systems to ensure effective fugitive controls, inherent process AD and MBT controls to minimise risk of odour pollution, abatement and stack critical parameters/ details to minimise risk of odour pollution.

The Applicant should provide supporting information to demonstrate that the abatement systems design flows are sized for any ventilation rates to ensure the negative pressure room criteria are met.

It is noted that in section 4.2.3.3 of the OMP that biofilter air flow capacity has been calculated based on 2.5 air changes per hour linked to the AD reception and digestate areas. It is unclear, without confidence of room containment measures as discussed above, that the biofilter design capacity is sufficient.

In addition, there is mention of usage of carbon filters for abating MRF/MBT reception hall general ventilation areas with potential for odorous emissions. There is no clarity on air flow volumes required and abatement system design to handle this air. This needs to be clarified.

4. Does the plan describe appropriate measures for the containment and abatement of any odorous emissions? Details of containment e.g. covering of skips/negative pressure criteria of rooms and contained storage tanks etc. need to be provided.

The Applicant should confirm via flow diagram and/or list which waste storage and process equipment are located external to the buildings and the containment features of such activities. It is not clear whether the waste water treatment plant and waste storage bays are located externally. There needs to be a reference to whether any temporary waste storage facilities exist and containment/control measures in place for such wastes.

The operation, maintenance and commissioning of facilities needs to be detailed with critical parameters for effective odour control and overall performance design criteria e.g. post abatement stack odour unit levels.

The monitoring of critical parameters needs to be detailed and the means of indication of outside optimum performance e.g. trigger alarms /regular manual monitoring checks etc.

This should then be linked to the contingency plan – see point 5 below. The commissioning should include what measures are to be taken to verify that abatement systems meet design criteria e.g. odour monitoring.

The use of carbon filter and biofilter abatement is mentioned with no details on level of operating techniques. It is not possible to assess whether the odour concentration of 3,000 ou_E/m^3 quoted in the modelling report can be achieved.

There is no detail or description of the proposed biofilter parameters such as depth, media and residence time. The management and maintenance of biofilters is critical to their overall odour abatement performance.

5. Does the plan consider how odorous emissions might be affected by emergencies or incidents? (e.g. fire, staff illness, weather conditions etc.)

There is a generic contingency plan under table 2 section 6 of the OMP. The plan needs to be more specific with what will happen in terms of remedial actions for each failure mode for each control system and timeframes to respond.

There needs to be information explaining what happens if initial remedial actions fail and the point at which operations must cease, waste removed and/or prevented to be accepted on site. This needs specific triggers for such actions based on elevated risk of odour pollution beyond the installation boundary.

There are some non-committal words stated, such as “if appropriate”. The actions should be more definitive i.e. if…. Then...

The Applicant should explain what operations would be suspended until the problem is rectified. The Applicant should explain what monitoring and /or trigger would highlight the development of anaerobic conditions in waste storage areas and maximum timeframes for completion of waste removal.

Section 5: Other considerations

We have reviewed the Applicant's assessment of the environmental risk from the facility.

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

The Applicant's assessment of non-statutory sites was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that the proposal will not damage the special features of the non-statutory sites.

As there are no specific regulations for the protection of these sites *(beyond our requirements to enhance biodiversity under the Natural Environment and Rural Communities Act 2006 and our wider conservation duties under the Environment Act*), we are required to ensure that the permitting of the Installation will not result in significant pollution.

The Applicant has assessed the dispersion of important pollutants against critical level criteria for the protection of vegetation and ecosystems which is summarised in the following table. The values shown represent the worst for any of the receptors for each pollutant.

Pollutant	Critical level (µg/m^3)	PC (µg/m^3)[1]	PC as % of Critical level
SO_2	20 (LT)	0.30	1.49
NOx (as NO_2)	75 (ST)	26.38	35.18
	30 (LT)	1.15	3.84
HF	5 (ST)	0.129	2.59
	0.5 (LT)	0.032	6.54
NH_3	3 (LT)	0.056	1.88
Note [1] – PC is given as the worst case of results 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 worst for any of the receptors for each parameter.

Pollutant	Critical load (most severe criterion used to exemplify receptors)	PC [1]	PC as % of Critical load
Nitrogen deposition	10 kg N/ha/yr	0.67 kg N/ha/yr	6.7
Acid deposition	1.71 keq/ha/yr	0.61 keq/ha/yr	35.61
Note [1] – PC is given as the worst case of results for all non-statutory sites – Storey's Wood.			

In accordance with Environment Agency guidance, we consider that given the size of the PC which is a small fraction of the critical level and critical load, the impact on the sites is not likely to cause significant pollution.

5.2 Human health risk assessment

5.2.1 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. Further specific conditions have been introduced to ensure compliance with the requirements of the IED. The aim of IED is to prevent or to limit as far as practicable negative effects on the environment, in particular pollution by emissions into air, soil, surface water and groundwater, and the resulting risks to human health, from the incineration and co-incineration of waste. The IED achieves this aim by "setting stringent operational conditions, technical requirements and emission limit values" and through the use of BAT, which may in some circumstances dictate tighter emission limits and controls.

(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 3.2 and 5.1 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. 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."

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

Policy Advice from Government also points out the minimal risk from modern incinerators. Paragraph 22 (Chapter 5) of WS2007 says that "research carried out to date has revealed no credible evidence of adverse health outcomes for those living near incinerators." It points out that "the relevant health effects, mainly cancers, have long incubation times. But the research that is available shows an absence of symptoms relating to exposures twenty or more years ago when emissions from incinerators were much greater than is now the case." **Paragraph 30 of PPS10** explains that "modern, appropriately located, well run and well regulated waste management facilities should pose little risk to public health."

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's 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 and furans, 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.

Dioxin Intake Models: Two models are available to predict the dioxin 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 are 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 sizes, such as for children of different ages. In the UK, the COT has set a TDI for dioxins, furans and dioxin like PCB's of 2 picograms I-TEQ/Kg-body weight/day (N.B. a picogram is a million millionths (10-12) of a gram).

In addition to an assessment of risk from dioxins, furans and dioxin-like 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_2, SO_2 and particulates) in terms of the numbers of "deaths brought forward" and the "number of hospital admissions for respiratory disease brought forward or additional". COMEAP has issued a statement expressing some reservations about the applicability of applying its methodology to small affected areas. Those concerns generally relate to the fact that the exposure-response coefficients used in the COMEAP report are derived 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 NOx, SO_2 and particulates cannot be screened out as insignificant in an Environmental Impact Assessment where 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, Food Standards Agency (FSA) and Public Health England (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 1 of this document.

5.2.1.1 Assessment of Intake of Dioxins and Furans

For dioxins and furans, 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 all their food and water were sourced from the locality where the deposition of dioxins and furans is predicted to be the highest. This is then assessed against the Tolerable Daily Intake (TDI) levels established by the COT of 2 picograms I-TEQ/Kg bodyweight/day.

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

Receptor	Maximum predicted daily intake (pg I-TEQ/kg-BW/day)[1]
Receptor 25 (Adult)	0.0094
Receptor 25 (Child)	0.0132
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 intake 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. 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 **Impact of abnormal operations**

Article 50(4)(c) of the IED requires that waste shall cease to be fed to the installation 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 feeding of waste under abnormal operating conditions – 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. The IED Chapter IV sets criteria for determining what is an abnormal operation and sets some limits regarding the extent and duration of the abnormal operation which aim to ensure that the overall environmental impact is so minimised.

Abnormal operations are limited to no more than a period of 4 hours continuous operation and no more than 60 hours aggregated operation in any calendar year which is less than 1% of total operating hours. As such, 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.

Article 45(1)(f) defines these as any technically unavoidable stoppages, disturbances, or failures of the abatement plant or the measurement devices, during which the concentrations in the discharges into air may exceed the normal emission limit values.

For incineration plant, Annex VI, Part 3(2) of IED sets backstop limits for particulates, CO and TOC which must continue to be met. 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/Nm^3 as a half hourly average, which is five times the limit in normal operation.

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

- Dioxin emissions of 10 ng/Nm^3 (100 x normal)
- Metal emissions are 100 times those of normal operation
- NOx emissions of 550 mg/Nm^3 (1.375 x normal)
- Particulate emissions of 150 mg/Nm^3 (5 x normal)
- SO_2 emissions of 480 mg/Nm^3 (2.4 x normal)
- HCl emissions of 900 mg/Nm^3 (15 x normal)
- HF emissions of 90 mg/Nm^3 (22.5 x normal)

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

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

Pollutant	ES	Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC) [1]	
	µg/m³	µg/m³	µg/m³	% of ES	µg/m³	% of ES
NO_2	200	29.78	48.1	24.1	77.88	38.9
PM_{10}	50	39.16	10.2	20.40	49.36	98.7
SO_2	266	7.3	123.3	46.4	130.6	49.1
	350	7.3	110.1	31.46	117.4	33.5
	125	7.3	70.7	56.56	88	70.4
HCl	750	0.72	279.9	37.32	280.6	37.42
HF	160	2.35	28	17.5	30.35	19.0
Hg	7.5	--	0.233	3.11	--	--
Sb	150	--	0.053	0.036	--	--
Cu	200	--	0.076	0.038	--	--
Mn	1,500	--	0.17	0.011	--	--
Cr (II)(III)	150	--	0.243	0.162	--	--
V	1	--	0.0047	0.47	--	--
Dioxins			3.2×10^{-06}			

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 required. 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 are considered insignificant, in that the PC is <10% of the short term ES for Hg, Sb, Cu, Mn, Cr and V.

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 PEC is less than 100% of the short term ES for NO_2, SO_2, PM_{10}, HCl and HF.

We have not assessed the impact of abnormal operations against long term ES for the reasons set out above. If dioxin emissions were at 10 ng/m³ for the maximum period of abnormal operation, 60 hours per year for every year for the duration of the incinerator operation, there would be an increase in the TDI reported above. We consider that this represents the worst case situation and is in practice a highly unlikely scenario. In these circumstances, the TDI would be 0.85% of the COT-TDI limit of 2 pg (I-TEQ)/ kg-bw/day for a resident

(calculated as a human lifespan of 70 years with appropriate proportions as a child and adult) and would still not pose a risk to human health.

5.4 **BAT and global warming potential**

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

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

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

The electricity that is generated by the Installation would have displaced emissions of CO_2 elsewhere in the UK, as virgin fossil fuels would not have been burnt to create the same electricity.

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

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

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

On the credit side

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

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

The Applicant considered energy efficiency and compared SCR to SNCR in its BAT assessment. We do not accept that SNCR is BAT for this Installation as set out in Section 3 of this decision document.

5.5 **BAT and POPs**

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

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

The unintentionally-produced POPs addressed by the Convention are:

- dioxins and furans;
- HCB (hexachlorobenzene)
- PCBs (polychlorobiphenyls) and
- PeCB (pentachlorobenzene)

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

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

> "Member States shall, when considering proposals to construct new facilities or significantly to modify existing facilities using processes that release chemicals listed in Annex III, without prejudice to Council Directive 1996/61/EC, give priority consideration to alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of substances listed in Annex III."

The 1998 Protocol to the Convention recommended that unintentionally-produced POPs should be controlled by imposing emission limits (e.g. 0.1

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

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

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

Had a permit been granted, it would have ensured that the formation and release of POPs would be prevented or minimised. As we explain above, high-temperature incineration is one of the prescribed methods for destroying POPs. Permit conditions are based on the use of BAT and IED and incorporate all the above requirements of the UN-ECE BAT guidance and deliver the requirements of the Stockholm Convention in relation to unintentionally-produced POPs.

The release of **dioxins and furans** to air is required by Chapter IV of the IED to be assessed against the I-TEQ (International Toxic Equivalence) limit of 0.1 ng/m^3. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK's independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. Therefore, in addition to the requirements of the IED, the WHO-TEQ values for both dioxins and dioxin-like PCBs have been specified for monitoring and reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. Had a permit been granted, we would have included a requirement to monitor and report against these WHO-TEQ values for dioxins and dioxin-like PCBs and the measurement of a range of PAHs. We are confident that the measures that would have been taken to control the release of dioxins would also have controlled the releases of dioxin-like PCBs and PAHs. This document details the assessment of emissions to

air, which includes dioxins and concludes that there would be no adverse effect on human health from either normal or abnormal operation.

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

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

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

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

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

5.6 **Other emissions to the environment**

5.6.1 Emissions to water

There would have been no discharges to controlled waters from this Installation. Based upon the information in the Application, we are satisfied that appropriate measures would be in place to prevent and/or minimise emissions to water, had we granted a permit.

5.6.2 Emissions to sewer

There would have been no emissions to sewer from this Installation. Boiler blow down, leachate and cleaning waters from process areas are proposed to be collected and treated at the waste water treatment plant. Following treatment, the treated water would have been stored and re-used within the Installation. Based upon the information in the Application we are satisfied that appropriate measures would be in place to prevent and/or minimise emissions to sewer, had we granted a permit.

5.6.3 Fugitive emissions (excluding odour)

The IED specifies that plants must be able to demonstrate that they are designed in such a way as to prevent the unauthorised and accidental release of polluting substances into soil, surface water and groundwater. In addition, storage requirements for waste and for contaminated water of Article 46(5) must be arranged. The following measures have been proposed by the Applicant:

- Air from refilling of raw material storage tanks such as ammonia will be vented to the tanker during refilling. Storage tanks will be fitted with high level controls and alarms.

- Storage silos will be fitted with filters to mitigate fugitive emissions of dusts during filling activities. The silos will be filled by bulk tanker and offloaded pneumatically into the silos with displaced air vented through a reverse pulse jet filter. Silos will be fitted with high level control and alarm. Silos will be equipped with a vent fitted at the top with a fabric filter. Filter residues will be returned to the silo. Cleaning of the filter will be done automatically with compressed air after the filing operation. The filter will be inspected regularly for leaks.

- All waste handling operations will be undertaken within enclosed buildings to minimise fugitive emissions of dust from the installation. Air from the MRF and MBT process areas will be extracted via the building ventilation system and treated via dust and carbon filter system prior to release to atmosphere via the building louvres.

- All chemicals will be stored in an appropriate manner incorporating the use of suitable secondary and other measures (such as acid and alkali resistant coatings) to ensure appropriate containment and tertiary abatement measures.

- All storage facilities for chemicals will be appropriately designed to ensure that the potential for accidents and associated environmental impacts is limited.

- Areas designated for storage of chemicals and liquid hazardous materials will be situated within secondary containment with provision for isolation and independent drainage.

- Deliveries of all chemicals will be unloaded and transferred to suitable storage facilities which will incorporate secondary containment measures prior to its use. Secondary containment facilities will have capacity to contain 110% of the largest tank capacity in case of failure of the storage systems.

Based upon the information in the Application we are satisfied that appropriate measures would be in place to prevent and/or minimise fugitive emissions, had we granted a permit.

5.6.4 Noise and vibration

The Application has been refused. However, had we granted a permit, we would have been satisfied that the appropriate measures would be in place to prevent or where that is not practicable to minimise noise and vibration and to prevent pollution from noise and vibration.

The Application contained a noise impact assessment which identified local noise-sensitive receptors (NSRs), potential sources of noise at the proposed plant and noise attenuation measures. Measurements were taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS4142 to compare the predicted plant rating noise levels with the established background levels.

The Applicant's noise impact assessment was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that the proposal will not have a significant impact on nearby human receptors. This is based on the plant operating at the parameters quoted in the modelling report. Had a permit been granted, we would have inserted a pre-operational condition requiring the submission of a programme of monitoring at the Installation and in the surrounding environment to establish noise levels during plant commissioning and operation as specified in the Application. This would have ensured that any impact could be identified and rectified at the earliest opportunity.

The Application did not contain a noise management plan. Had we granted a permit, we would have included a condition which would have required the Operator to, if notified by the Environment Agency that the activities were giving rise to pollution outside the site due to noise and vibration, submit for approval within the period specified, a noise and vibration management plan which identifies and minimises the risks of pollution from noise and vibration.

5.6.5 Odour

We have discussed odour issues in Section 4 of this decision document.

5.6.6 Accidents that may cause pollution

The Application has been refused. However, had it been granted, we would have included a pre-operational condition in the permit which required the Operator to submit an accident management plan for approval by the Environment Agency. This is because the Applicant has not submitted an accident management plan. However, having considered the other information submitted in the Application, we are satisfied that appropriate measures would have been in place to ensure that accidents that may cause pollution were prevented but that, if they should occur, their consequences were minimised. An accident management plan would form part of the Environmental Management System and would have been in place prior to commissioning as required by the pre-operational condition.

5.6.7 Energy efficiency

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

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

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

3. The combustion efficiency and energy utilisation of different design options for the Installation are relevant considerations in the determination of BAT for the Installation, including the global warming potential of the different options. This aspect is covered in Section 5.4 of this decision document.

4. The extent to which the Installation meets the requirement of Article 14(5) of the Energy Efficiency Directive which requires new thermal electricity generation installations with a total thermal input exceeding 20 MW to carry out a cost-benefit assessment to "*assess the cost and benefits of providing for the operation of the installation as a high-efficiency cogeneration installation*".

(i) Use of energy within the Installation

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

1. Maintenance and housekeeping procedures to ensure efficient operation.
2. Insulation to avoid heat losses from relevant plant items such as the main furnace and steam systems.

3. Energy use would have been monitored and recorded. Usage would have been reviewed to identify areas for improvement and ensure that any abnormal increase in energy use was investigated and appropriate action taken to resolve the issue.
4. An energy efficiency plan would have been incorporated within the Operating and Maintenance (O&M) procedures.
5. Plant maintenance regime to ensure energy efficiency was maintained.

We queried the proposed stack exit temperature of 182.3°C and how the fabric filters would work under this temperature. We asked the Applicant to provide additional information to demonstrate BAT for the proposed stack exit temperature including the effect on energy recovery.

The Applicant claims that due to the sensitivity of the site within the wider landscape and the desire to reduce the visual impact of the installation, a condition of "no visible plume from the stack" was set in the planning consent. The Applicant considered two options to achieve this condition – the removal of water vapour from the plume or dilution of the plume from the CHP plant with the exhaust air from another process. The Applicant considered that the option of removing water vapour from the plume was not practical.

The second option considered was to dilute the plume from the CHP plant with the exhaust air from the pulp plant, as this has a lower moisture content. Dispersion modelling was carried out to predict the number of visible plumes which would occur in a year. The Applicant reports that operating with a temperature of 182.3°C ensured that there were no visible plumes predicted between June and September, but a very small number of visible plumes were predicted for the rest of the year.

The exhaust temperature from the pulp plant is 30°C. In order to increase the average temperature of the releases from the stack without affecting the efficiency of the CHP plant, the exhaust gases from the pulp plant would be heated up to a number of different temperatures depending on the ambient conditions.

The Applicant provided a CHP plume management regime which is summarised as follows:

- June to September – no additional heating – release at 30°C
- October to May – heating using low pressure steam – release at 130°C
- October to May – additional heating using high pressure steam – release at 210°C when the ambient temperatures is less than 4°C, wind speed is less than 9 m/s and the relative humidity is greater than 70%.
- October to May – additional heating using high pressure steam – release at 260°C when the ambient temperature is less than -1°C, wind speed is less than 8 m/s and the relative humidity is greater than 83%.

The Applicant states that the proposed regime results in only four visible plumes being predicted each year, but these plumes only occur if the ambient temperature is very low. Therefore, in order to avoid these visible plumes, the

final step of the plume management plan is that over the months of October to May, the Applicant proposes to analyse the 5-day weather forecast on a daily basis to determine if temperatures are predicted to fall below -7°C between the hours of 1am and 1pm. In the event that these conditions are forecast, the Applicant will put in place the measures needed to bring dry fuel into the bunker. The dry fuel will then be fed into the bunker when the forecast predicts ambient temperatures are predicted to fall below -7°C.

The Applicant reports that the need to implement the plume management plan limits the benefit which would be achieved by reducing the stack exit temperature from the CHP plant. This is because it would only give a benefit between June and September, as at other times of the year, the plume is being heated by mixing with heated exhaust air from the pulp plant and a lower stack exit temperature would simply mean that more heat would be required to further increase the temperature of the pulp exhaust air.

The Applicant acknowledges that the energy efficiency of the CHP plant may be reduced due to the need to avoid a visible plume as set by the planning consent. However, the Applicant has proposed to implement further measures to ensure that the CHP plant has a high energy efficiency, which are:

- The boilers will be equipped with economisers and super-heaters to optimise thermal cycle efficiency without prejudicing boiler tube life, having regard for the nature of the waste that is being burnt;

- Unnecessary releases of steam and hot water will be avoided, to avoid the loss of boiler water treatment chemicals and the heat contained within the steam and water;

- Medium Pressure and Low Pressure steam from pass outs on the turbine will be used to pre-heat combustion air;

- Steady operation will be maintained where necessary by using auxiliary fuel firing; and

- Boiler heat exchange surfaces will be cleaned on a regular basis to ensure efficient heat recovery.

We consider that energy efficiency could be increased by means of a taller stack (see Section 3 of this decision document).

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 73.9 kWh/tonne. The installation capacity is 595,000 tonnes per annum.

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

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

The BREF says that it is BAT to reduce the average installation electrical demand to generally below 150 kWh/tonne of waste with an LCV of 10.4 MJ/kg. The LCV in this case is expected to be 7 – 13 MJ/kg (9.07 MJ/kg used in design calculations). Taking account of the difference in LCV, the specific energy consumption in the Application is in line with that set out above.

(ii) Generation of energy within the Installation – Compliance with Article 50(5) of the IED

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

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

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

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

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

The Installation will generate electricity for export to the national grid, but will also provide heat in the form of steam to the on-site paper pulp plant and waste water treatment plant. When the Installation is running at full capacity, the electrical output of the CHP plant will be 49 MWe. This is equivalent to 8.23 MW per 100,000 tonnes of waste (which equates to 0.67 MWh/tonne of waste burned).

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

Our CHP-R guidance also states that opportunities to maximise the potential for heat recovery should be considered at the early planning stage, when sites are being identified for incineration facilities. In our role as a statutory consultee on the planning application, we ensured that the issue of energy utilisation was brought to the planning authority's attention. We have made comments about this to Essex County Council (the planning authority) in our role as a statutory consultee for the planning application.

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

(iii) R1 Calculation and the DEFRA Good Quality CHP Scheme

The R1 calculation and /or gaining accreditation under the DEFRA Good Quality CHP Scheme does not form part of the matters relevant to our determination. They are however general indicators that the installation is achieving a high level of energy recovery.

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

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

Compliance with Article 14(5) of the Energy Efficiency Directive is not a relevant consideration because the CHP plant is designed to produce electricity and provide steam to the paper pulp plant and waste water treatment plant. Therefore, as the CHP plant would not be an electricity-only installation or an installation without heat recovery, it is concluded that a cost-benefit analysis for opportunities for co-generation is not required.

(v) Permit conditions concerning energy efficiency

Had a permit been granted, we would have required reporting of total electrical energy generated, electrical energy exported, total energy usage and energy exported as heat. Together with the total MSW burned per year, this would have enabled the Environment Agency to monitor energy recovery efficiency at the Installation and take action if at any stage the energy recovery efficiency was less than proposed. The permit would have included a condition requiring the Operator to review and record every 4 years whether there were suitable opportunities to improve the energy efficiency of the activities on site.

5.6.8 Raw materials

The Application has been refused. However, we are satisfied that the appropriate measures would have been in place to ensure the efficient use of raw materials and water.

The Operator would have been required to report with respect to raw material usage, including consumption of sodium bicarbonate, activated carbon and ammonia used per tonne of waste burned. This would have enabled the Environment Agency to assess whether there have been any changes in the efficiency of the air pollution control plant, and the operation of the abatement plant to abate NOx. These are the most significant raw materials that would have been used at the Installation, other than the waste feed itself. The efficiency of the use of auxiliary fuel would have been tracked separately as part of the energy reporting requirement.

The permit would have included a condition requiring the Operator to review and record every 4 years whether there were suitable opportunities to improve the efficiency of raw material and water use on site.

5.6.9 Operating techniques

We have reviewed the techniques proposed by the Applicant and compared these with the relevant guidance notes. The proposed techniques/ emission levels for priorities for control are in line with the benchmark levels contained in the technical guidance notes and we consider them to represent appropriate techniques for the facility, with the exception of those relating to the proposed stack height and other aspects that have not been resolved as discussed in this decision document.

5.6.10 Waste types

The Application has been refused. However, had it been granted, we would have specified the waste types that were applied for. We are satisfied that the proposed waste types were appropriate and capable of being processed at the Installation.

5.6.11 Pre-operational conditions

The Application has been refused. However, had it been granted, we would have imposed the following pre-operational conditions. These conditions would have required the Operator to confirm that the details and measures proposed in the Application had been adopted or implemented prior to the operation of the Installation.

Reference	Pre-operational measures
POC1	The operator shall submit the written protocol referenced in condition 3.2.4 for the monitoring of soil and groundwater for approval by the Environment Agency. The protocol shall demonstrate how the operator will meet the requirements of Articles 14(1)(b), 14(1)(e) and 16(2) of the IED. The procedure shall be implemented in accordance with the written approval from the Environment Agency.
POC2	Prior to the commencement of commissioning, the operator shall send a summary of the site Environment Management System (EMS) to the Environment Agency and make available for inspection all documents and procedures which form part of the EMS. The EMS shall be developed in line with the requirements set out in the Environment Agency Guidance – *How to develop a management system: environmental permits*. The documents and procedures set out in the EMS shall form the written management system referenced in condition 1.1.1 (a) of the permit.
POC3	Prior to the commencement of commissioning, the operator shall submit to the Environment Agency a written protocol for the sampling and testing of incinerator bottom ash for the purposes of assessing its hazard status and obtain the Environment Agency's written approval to it. Sampling and testing shall be carried out in accordance with the protocol as approved.
POC4	Prior to the commencement of commissioning, the operator shall provide the Environment Agency with a written report describing the detailed programme of noise and vibration monitoring that will be carried out at the site at the commissioning stage and also when the plant is fully operational as proposed in the Application and obtain the Environment Agency's written approval to it. The report shall include confirmation of locations, time, frequency and methods of monitoring.
POC5	Prior to the commencement of commissioning, the operator shall provide a written commissioning plan, including timelines for completion and obtain the Environment Agency's written approval to it. The commissioning plan shall include the expected emissions to the environment during the different stages of commissioning, the expected durations of commissioning activities and the actions to be taken to protect the environment and report to the Environment Agency in the event that actual emissions exceed expected emissions. Commissioning shall be carried out in accordance with the commissioning plan as approved.
POC6	After completion of furnace design and at least three calendar months before any furnace operation, the operator shall submit a written report to the Environment Agency of the details of the computational fluid dynamic (CFD) modelling. The report shall demonstrate whether the design combustion conditions comply with the residence time and temperature requirements as defined by the Industrial Emissions Directive.

POC7	Prior to the commencement of commissioning, the operator shall submit written waste pre-acceptance and acceptance procedures and obtain the Environment Agency's written approval of them. The waste acceptance procedures shall include the process and systems by which wastes unsuitable for incineration and biological treatment at the site will be controlled. The procedures shall be implemented in accordance with the written approval from the Environment Agency.

5.6.12 Improvement conditions

The Application has been refused. However, had it been granted, we would have imposed the following improvement conditions. These conditions would have required the Operator to provide the Environment Agency with details that need to be established or confirmed during and/or after commissioning with specified timescales for completion.

Reference	Improvement measure
IC1	The operator shall submit a written report to the Environment Agency on the implementation of its Environmental Management System (EMS) and the progress made in the accreditation of the system by an external body or if appropriate submit a schedule by which the EMS will be subject to accreditation.
IC2	The operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission points A1 and A2, identifying the fractions within the PM_{10} and $PM_{2.5}$ ranges. The proposal shall include a timetable for approval by the Environment Agency to carry out such tests and produce a report on the results. On receipt of written approval by the Environment Agency to the proposal and the timetable, the operator shall carry out the tests and submit to the Environment Agency a report on the results.
IC3	The operator shall carry out an assessment of the impact of emissions to air of As, Pb, Mn, Ni and Chromium VI subject to emission limit values. A report on the assessment shall be made to the Environment Agency. Emissions monitoring data obtained during the first year of operation shall be used to compare the actual emissions with those assumed in the impact assessment submitted with the Application. An assessment shall be made of the impact of each metal against the relevant environmental standard (ES). In the event that the assessment shows that an ES can be exceeded, the report shall include proposals for further investigative work.
IC4	The operator shall submit a written report to the Environment Agency on the commissioning of the Installation. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions.

Reference	Improvement measure
IC5	The operator shall submit a written report to the Environment Agency describing the performance and optimisation of the Selective Non-Catalytic Reduction (SNCR) system and combustion settings to minimise oxides of nitrogen (NOx) emissions within the emission limit values described in this permit with the minimisation of nitrous oxide emissions. The report shall include an assessment of the level of NOx and N_2O emissions that can be achieved under optimum operating conditions. The report shall also provide details of the optimisation (including dosing rates) for the control of acid gases and dioxins.
IC6	The operator shall submit written summary reports to the Environment Agency to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.
IC7	The operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the exhaust gases in the furnace whilst operating under the anticipated most unfavourable operating conditions. The results shall be submitted in writing to the Environment Agency.

5.6.13 Incorporating the Application

The Application has been refused. However, had it been granted, we would have specified within any permit those parts of the application, including additional information received as part of the determination process that we would have required the Applicant to operate in accordance with. Where we were not satisfied with the Applicant's proposals we would have had to impose prescriptive controls in place of incorporating parts of the application into a permit.

5.6.14 Emission limits and monitoring requirements

The Application has been refused. However, had it been granted, emission limits and/or monitoring requirements would have been set for the following parameters listed below:

These are:

- Particulate matter, TOC, hydrogen chloride, hydrogen fluoride, carbon monoxide, sulphur dioxide, nitrogen oxides (as NO_2), cadmium, thallium, mercury, ammonia, PCBs, antimony, arsenic, lead, chromium(II)(III), copper, cobalt, manganese, nickel and vanadium

5.6.15 Control of the facility

The Application has been refused. However, we are satisfied that the Applicant is the person who would have had control over the operation of the facility after the grant of the permit.

5.6.16 Environment management system & technical competence

The Application has been refused. However, we are satisfied that appropriate management systems and management structures would have been in place at the Installation to ensure compliance with any permit condition, subject to any outstanding issues yet to be resolved. We are satisfied that sufficient financial, technical and manpower resource would have been available to the Applicant to ensure compliance with any permit condition.

5.6.17 Relevant convictions

The Environment Agency National Enforcement Database has been checked and there are no relevant convictions.

Section 6: 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.

6.1 The EPR 2010 and related Directives

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

6.1.1 Schedules 1 and 7 to the EPR 2010 – **IED Directive**

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

There is one requirement not addressed above, which is that contained in Article 5(3) IED. Article 5(3) requires that "In the case of a new installation or a substantial change where Article 4 of Directive 85/337/EC (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 trans-boundary effects and consequential obligations to consult with affected Member States.

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

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

- The Environmental Statement submitted with the planning application (which also formed part of the Environmental Permit Application).
- The decision of Essex County Council to grant a variation to the original 2010 planning permission on 26 February 2016.
- The report and decision notice of the local planning authority accompanying the grant of planning permission.
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

From consideration of all the documents above, the Environment Agency considers that no additional or different conditions from those contained in our standard permit template would have been necessary, had we granted a permit.

The Environment Agency have 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 (Annex 1).

6.1.2 Schedule 9 to the EPR 2010 – **Waste Framework Directive**

As the Installation involves the treatment of waste, it is carrying out a *waste operation* for the purposes of the EPR 2010, and the requirements of Schedule 9 therefore apply. This means that we must exercise our functions so as to ensure implementation of certain articles of the WFD.

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

Had we granted a permit, the conditions would have ensured that waste generation from the facility was minimised. Where the production of waste cannot be prevented it will be recovered wherever possible or otherwise disposed of in a manner that minimises its impact on the environment. This is in accordance with Article 4.

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

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

Article 23(1) requires the permit to specify:

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

Had we granted a permit, these would have been covered by permit conditions.

We consider that the decision to refuse the permit application satisfies Article 23(3). Energy efficiency is dealt with elsewhere in this document. Had we granted the permit, the conditions of the permit would have ensured that the

recovery of energy would take place with a high level of energy efficiency in accordance with Article 23(4).

Article 35(1) relates to record keeping and its requirements would have been delivered through permit conditions, had we granted a permit.

6.1.3 Schedule 22 to the EPR 2010 – **Groundwater, Water Framework and Groundwater Daughter Directives**

To the extent that it might lead to a discharge of pollutants to groundwater (a "groundwater activity" under the EPR 2010), the permit would have been subject to the requirements of Schedule 22, which delivers the requirements of EU Directives relating to pollution of groundwater. The permit would have required the taking of all necessary measures to prevent the input of any hazardous substances to groundwater, and to limit the input of non-hazardous pollutants into groundwater so as to ensure such pollutants do not cause pollution, and satisfies the requirements of Schedule 22.

No releases to groundwater from the Installation would have been permitted. Had we granted a permit, it would have also required material storage areas to be designed and maintained to a high standard to prevent accidental releases.

6.1.4 Directive 2003/35/EC – The Public Participation Directive

Regulation 59 of the EPR 2010 requires the Environment Agency to prepare and publish a statement of its policies for complying with its public participation duties. We have published our public participation statement.

This Application has been consulted upon in line with this statement, as well as with our internal guidance RGS6 on Sites of High Public Interest, which addresses specifically extended consultation arrangements for determinations where public interest is particularly high. This satisfies the requirements of the Public Participation Directive.

Our decision in this case has been reached following a programme of extended public consultation on the original application. The way in which this has been done is set out in Section 1 of this document. A summary of the responses received to our consultations and our consideration of them is set out in Annex 1.

6.2 **National primary legislation**

6.2.1 **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 would have been included in any permit had one been granted to take account of the Section 4 duty.

(ii) Section 7 (Pursuit of Conservation Objectives)

We have considered the impact of the installation on local wildlife sites within 2 km which are not designated as either European Sites or SSSIs. We are satisfied that no additional conditions are required. We consider that our decision to refuse the permit application complies with the Conservation Objectives.

(iii) Section 81 (National Air Quality Strategy)

We have had regard to the National Air Quality Strategy and consider that our decision to refuse the permit application complies with the Strategy.

6.2.2 **Human Rights Act 1998**

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

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

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

6.2.4 **Wildlife and Countryside Act 1981**

Under section 28G of the Wildlife and Countryside Act 1981, the Environment Agency has a duty to take reasonable steps to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which a site is of special scientific interest. Under section 28I, the

Environment Agency has a duty to consult Natural England in relation to any permit that is likely to damage SSSIs.

We have assessed the Application in accordance with guidance agreed jointly with Natural England. There are no SSSIs within 2 km of the proposed Installation. We have not formally consulted on the application.

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

Section 40 of this Act requires us to have regard, so far as is consistent with the proper exercise of our functions, to the purpose of conserving biodiversity. We consider that our decision to refuse the permit application complies with the Act.

6.3 **National secondary legislation**

6.3.1 **The Conservation of Natural Habitats and Species Regulations 2010**

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

6.3.2 **Water Framework Directive Regulations 2003**

Consideration has been given to whether any additional requirements would have been imposed in terms of the Environment Agency's duty under regulation 3 to secure the requirements of the Water Framework Directive through (inter alia) EP permits. Had a permit been granted, it is felt that existing template conditions would have been sufficient in this regard and no other appropriate requirements have been identified.

6.3.3 **The Persistent Organic Pollutants Regulations 2007**

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

6.4 **Other relevant legal requirements**

6.4.1 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 1 of this document. The way in which we have taken account of the representations we have received is set

out in Annex 1. Our public consultation duties are also set out in the EP Regulations, and our statutory Public Participation Statement, which implement the requirements of the Public Participation Directive. In addition to meeting our consultation responsibilities, we have also taken account of our guidance in Environment Agency Guidance Note RGS6 and the Environment Agency's Building Trust with Communities toolkit.

ANNEX 1: 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 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 26 November 2015 to 24 December 2015 and in the Braintree & Witham Times on 26 November 2015. The Application was made available to view at the Environment Agency Public Register at Rivers House, Threshelfords Business Park, Inworth Road, Feering, Colchester, CO 9SE. Anyone wishing to see these documents could do so and arrange for copies to be made. We also placed a copy of the Application at the Kelvedon Library and Coggeshall Library. We distributed a number of copies of the Application on CD to members of the public following requests.

The following statutory and non-statutory bodies were consulted:

- Essex County Council (Planning Authority);
- Braintree District Council (Environmental Protection);
- Director of Public Health, Essex County Council;
- Public Health England;
- Health & Safety Executive;
- Essex County Fire & Rescue Service; and
- Food Standards Agency

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response received from Public Health England dated 21/12/15 and 06/05/16	
Brief summary of issues raised	Summary of action taken / how this has been covered
PHE recommend that any environmental permit issued for this site should contain conditions to ensure that the following potential emissions do not impact upon public health: emissions to air from the main stack and odour arising from the storage and treatment of waste material.	The permit application has been refused. Had we granted a permit, we would have included permit conditions to address these concerns.
In relation to potential risk to public health, PHE recommend that the Environment Agency also consult the following relevant organisations in relation to their areas of expertise: • the local authority for matters relating to impact upon human health of contaminated land;	The following organisations were consulted during the determination: • Essex County Council (Planning Authority); • Braintree District Council (Environmental Protection); • Director of Public Health, Essex County Council; and

noise, odour, dust and other nuisance emissions; • the Food Standards Agency, where there is the potential for deposition on land used for the growing of food crops or animal rearing; and • the Director of Public Health for matters relating to wider public health impacts.	• Food Standards Agency. Responses from Essex County Council and Braintree District Council are shown in this Annex. No response was received from the Director of Public Health (Essex County Council) and the Food Standards Agency.
Based solely on the information contained in the application provided, PHE has no significant concerns regarding risk to health of the local population from this proposed activity, providing that the applicant takes all appropriate measures to prevent or control pollution, in accordance with the relevant sector technical guidance or industry best practice.	No further action.

Response received from Essex County Council dated 08/01/16.	
Brief summary of issues raised	Summary of action taken / how this has been covered
Would the use of waste paper sludge on land be subject to regulatory controls?	The paper pulp plant will produce a sludge (EWC 030305) which can be spread to land as an alternative to liming for pH stabilisation. We are aware that this activity is undertaken at another UK site. This activity is undertaken where there is a benefit to liming soils on a chalk substrate. Re-pulping and further processing may produce a sludge which may be appropriate for land spreading depending on the source material and technology used. To spread on land, the Operator will require a separate environmental permit.
What makes up the un-useable element of the 170,000 tpa of waste paper, as only 85,000 tpa of recycled paper is created? How much is managed on site and how much is exported from the site?	The Applicant reports that processing rejects and sludge make up the unusable element from the paper pulping process. Processing rejects consist of clips, metals, plastics, stickies (i.e. staples and metal bindings used in the production of publications, and plastic

	films and glues that are used as paper coatings in the production of high grade brochures or journals which will collectively make up approximately 50% of the rejects) and fibres (i.e. fibres that drop out of the pulping process which will make up the remaining 50% of the rejects). The processing rejects have an approximate calorific value of 40 MJ/kg. The mixed nature of the processing rejects means that, in their raw state, they are unusable as secondary products and are not suitable for recycling. Therefore, the rejects produced by the pulp plant are transferred to the CHP plant to recover energy. The clips and metals within the processing will subsequently be recovered from the IBA following incineration. Up to 6,800 tonnes per annum of rejects will be produced by the pulping process and it is estimated that approximately 1,000 to 2,000 tonnes of metals will be recovered from the rejects through the processing of the IBA. Sludge consists largely of organics of broken fibre, clay and fillers that produces a soil conditioning material that will be transferred off-site to be used as a soil conditioner. Typically, the sludge comprises: 60% Calcium Carbonate (or China Clay); 35% small reject paper fibre and organics and 5% printing ink. A maximum of 78,200 tonnes per annum of sludge will be produced.
What is the residence time of wastes in the bio-drying vessels?	The residence time of wastes in the bio-drying vessels will be between 7 and 14 days.
Drainage within each bio-drying vessels is not specified.	The leachate collection and air control systems to be employed will be based on the successful systems installed at two UK MBT sites. The building floor beneath each vessel is sloped lengthwise from the waste access/entrance door towards the central aisle between the two banks of vessels. At the end of each floor, a 150

	mm wide by 150 mm deep leachate collection drain that runs transversely across the vessel floor will collect any leachate and feed it into the collection drains. The leachate drain is a prefabricated drain.
Are the bio-drying vessels designed to heat the air drawn into the vessels?	There will be no external heat supplied or drawn into the vessels. The effective self-composting process ensures that the material in the vessels warms up naturally without requiring any external heating sources to provide heat into the vessels.
How is leachate prevented from entering the air rails at the base of the vessels?	The Applicants reports that the technology provider has developed a unique system of air circulation that ensures leachate is efficiently collected without entering the air rails at the base of the vessels. This system has been well-proven at several UK sites. The air rails run lengthwise on the building floor beneath the vessels between the access door and the central separation aisle (where the leachate is collected and the air blowers are located). There will be at least 4 rails per vessel. Due to the positive fall of the bio-drying floor, this allows leachate to run freely towards the leachate collection drain while the continuous positive air pressure inside the air circulation duct essentially “squeezes” through the tight fitting of one “U” section clamped over another. This system has proven to be effective in passing air though the waste in the vessels while never becoming clogged with leachate or debris.
There is no mention of fly management for the MBT and AD activities in the application. While the air within the building would be drawn through carbon filters, there is potential for odours and flies to leave the building when the doors are opened.	The Applicant provided a fly management plan in response to our second information notice dated 4 July 2016. We have reviewed the plan and consider that it meets the requirements of our technical guidance note – Fly management: how to comply with your environmental permit, Version 1 April 2013.
Within the text it refers to slurry being sent to the wastewater treatment plant for further treatment, but it is unclear as	The sludge from the paper pulping operation (principally china clay and small pulp fibre) will be fed through a

to what this further treatment is, as later it only refers to drying. Is this all the treatment that is required before being used as a soil conditioner?	screw press and dried to reduce its moisture content from 50% to 35%. The dried sludge will be despatched off-site to be used as a soil improvement material. Water arising from the sludge drying process will be fed to the waste water treatment plant for treatment, recirculation and re-use for site activities.
General query regarding the consultation procedure during the determination of an environmental permit.	No further action.

Response received from Braintree District Council Environmental Health dated 26/05/16.	
Brief summary of issues raised	Summary of action taken / how this has been covered
Is there any proposal from the Applicant to seek to validate the conclusions of the air quality report with real time or passive quantitative monitoring beyond the boundary of the site once the plant is in operation?	The Applicant has not proposed to validate the conclusions of the modelling with actual results beyond the installation boundary. The Applicant is required to provide evidence of stack emissions monitoring as specified by the IED. Monitoring of stack emissions gives a more accurate prediction of impact than monitoring beyond the installations boundary. As long as the actual (real-time) results do not exceed the predicted results and the IED emission limits, this would not have been an issue. The predicted results are taken from emissions set at IED limits, so if the real-time results exceed this, this would have been a compliance issue. If we had granted a permit, the Applicant's stack emissions monitoring results would have been made available on our public register.
The council recommends that the applicant should have a robust system of odour control and monitoring. Odour reporting systems should be widely publicised to the local community.	We are not satisfied with the Applicant's odour management plan. This is discussed in Section 4 of this decision document.
The noise conditions set by Essex County Council do not protect residents against statutory noise nuisance.	The noise conditions in the planning permission were set by the local authority. If we had granted a permit, we would have included conditions dealing

	with pollution from site activities and the requirement for the Operator to submit a noise management plan for approval in the event that site activities were causing pollution. We have audited the Applicant's noise impact assessment. Based on our sensitivity analysis, check modelling and our BS4142 assessment, the Applicant's assessment is acceptable. Had we granted a permit, we would have included an improvement condition which would have required verification of the modelling results during plant operation.
The applicant should confirm how they will ensure that no visible plume is released from the stack.	This is discussed in Section 5 of this decision document. The Applicant reports that they will dilute the plume from the CHP plant with the exhaust air from the pulp plant, as this has a lower moisture content. Operating with a stack temperature of 182.29°C will ensure that there are no visible plumes predicted between June and September, but a very small number of visible plumes are predicted for the rest of the year. The Applicant has submitted a CHP plume management plan which would have been included as part of the site operating techniques, had we granted a permit.
The applicant should make the reporting of abnormal emissions widely available to the local community.	We have refused the permit application. If we had granted a permit, the Applicant's stack emissions monitoring results (including abnormal emissions) would have been made available on our public register.
The applicant should explain why BS4142:1997 is not appropriate for the noise assessment.	BS4142:1997 has been revised and replaced by BS4142:2014. The Applicant used the current BS4142:2014 in their noise impact assessment. We have also used BS4142:2014 in our audit of the Applicant's noise impact assessment. Had we granted a permit, we would have included an improvement condition which would have required verification of the modelling results during plant operation.

There will be pumping of water from the River Blackwater. Will the noise source be within the installation boundary and be regulated by the Environment Agency?	The abstraction of water is regulated under a separate environmental permit and does not fall within this application. The abstraction of water will be regulated by the Environment Agency.
The applicant should develop a noise monitoring plan which will adequately assess all plant, in particular air handling equipment.	We have refused the application. Had we granted a permit, we would have included a permit condition which would have required the Operator to submit a noise management plan (including monitoring) in the event that the activities were giving rise to pollution outside the site due to noise and vibration.
Membership of the IWMF site liaison group should be confirmed.	It is up to the Applicant and the local community to form a liaison group. The Environment Agency encourages such initiatives. The membership of any liaison group is not a relevant consideration in this determination.

No comments or response received from the following organisations

- Director of Public Health (Essex County Council)
- Health & Safety Executive
- Essex County Fire & Rescue Service; and
- Food Standards Agency

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 Councillors and Parish / Town / Community Councils

Representations were received from Local MP, Local Councillors from the Rivenhall, Cressing and Bradwell Parish Councils, who raised the following issues:

Response received from the Rt. Hon. Priti Patel MP for Witham Constituency	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Letter and attachment document received from Local MP containing comments from constituents relating to the Draft Local Waste Plan consultation.	We have taken relevant comments into account in the determination (see comments from individual members of the public below).

Response received from Local Councillors (Essex County Council) and Parish Councils (Rivenhall, Cressing, Bradwell).	
Brief summary of issues raised:	Summary of action taken / how this has been covered
The height of the stack (35 metres) is too short for an incineration plant with a capacity of 595,000 tonnes. The Environment Agency has permitted incineration plants with stack heights ranging from 70 metres and above.	Stack height is discussed in Section 3 of this decision document.
The Applicant has changed the proposals of the current planning consent (as determined from the Planning Inquiry) in the application for an environmental permit – such as increased volume of wastes to be incinerated, building layout changes, function of the MRF.	The planning permission process considers the need, scope and scale of proposed developments in the context of local and regional plans and local infrastructure requirements. The environmental permitting process considers the design and operational techniques associated with the plant in the context of its on-going operation against its stated purpose. The planning permission process is completely independent to our process for determining an environmental permit. The Environment Agency has a duty to determine the application made to us and that is what we have done.
The proposed change to the proposals mean that the balance has shifted towards incineration and away from recycling.	The Applicant has submitted an application for an environmental permit to operate an integrated waste management system which includes a waste incinerator with a capacity of 595,000 tonnes per annum. This is the application we have determined.
The Planning Inspector has requested that the Applicant submit revised site baseline information in relation to the planning appeal lodged by the Applicant. The Environment Agency should request this new information and re-start the consultation or wait for the	The information requested by the Planning Inspector in November 2015 under the planning regime was for an environmental baseline information of the original Environmental Statement, a cumulative impact assessment of the proposed development with other reasonably foreseeable developments and a revised

Planning Inspector to assess the new information.	non-technical summary incorporating the above information. The Applicant provided this information to the Planning Inspector and to the Environment Agency during the determination of this application. We have reviewed the information provided and we consider that it does not change the Applicant's proposals and so we did not need to re-consult the public and other organisations. We have put these documents on our public register.
Application site plans and drawings are out of date and therefore inaccurate.	We consider that the drawings submitted in this application are acceptable. Had we granted a permit, the Environment Agency would have ensured that all drawings were finalised prior to the issue of the permit.
Concern regarding the use of recyclables once they are shredded twice in the MRF building.	The Applicant reports that the mobile shredder will shred only selected wastes. In addition, it will "cut" wastes to a size of 300 mm. The Applicant states that at this size, wastes will be presented to the picking line in a more uniform manner, reducing risk of blockages and jams. All key recyclables that the facility is seeking to recover will remain intact, namely plastic bottles, cans and office papers that will be destined for the on-site MRF and paper pulp plant.
The Applicant should re-visit the assessment of the HGV movement as the annual throughput of the incineration plant has been increased.	Associated traffic issues from the delivery of waste to the incinerator are within the remit of the local planning authority and outside the scope of environmental permitting.
Application form Part B3 has not been completed – treatment of batteries, raw material throughput and description, Appendix 1 – fuels.	Although some parts of the Application form Part B3 were not completed, the Applicant provided the necessary information as part of the Application.
Concern regarding the accuracy of the Opra spreadsheet.	We consider that the details given in the Opra spreadsheet are accurate.
Where will the Applicant import municipal waste from? Is there an intention to import wastes from outside Essex?	It is argued that diminishing supplies of residual waste from the surrounding area over the lifetime of the installation will result in the importation of waste from outside the area or sub-region. The source of the wastes for the facility may be a matter for the local planning authority in determining whether there is a need for the facility. It is not a relevant

	consideration in this determination which relates to assessing the impacts of emissions from it.
The Applicant should clarify whether or not batteries will be received for treatment.	The treatment of batteries is not proposed in the Application. It is possible that batteries may be found in the waste streams that are received on site. Had we granted a permit, we would have specified the wastes authorised for treatment. The permit would have required the Applicant to have waste pre-acceptance and acceptance procedures in place prior to operation of the Installation.
What mechanism is in place to prevent the acceptance of radioactive materials from entering the site and being burnt resulting in plume fall-out onto farm land.	The Applicant proposes to install a radioactive waste detection system at the weighbridge which will indicate (via an alarm) if radioactive material is present within the waste deliveries to the facility. If the alarm is activated, the procedures for preventing non-conforming wastes being accepted at the facility will be implemented.
The global warming potential calculation is incorrect as the UK electricity mix by source, the electricity generated on site and exported are incorrect.	We requested (via an information notice) that the Applicant provide a more recent figure for the electricity mix by source. The Applicant provided the revised figure and calculation. We consider that the revised figure and calculation are acceptable.
There is no district heating under the new proposal, therefore the plant will be far less efficient compared to other alternatives. Not all the heat generated from the facility will be fed to the grid.	The Applicant reports that the incinerator will be operating to produce both steam and power generating 49 MWe as well as exporting 35 MW of heat to the adjacent paper pulp plant and the waste water treatment plant. We consider this proposal acceptable.
The Applicant's water abstraction license is due to expire soon.	The Applicant has renewed the water abstraction license which now expires on 31 March 2028. The abstraction license was issued on 9 March 2016.
Water use calculations are not stated in the application. Water abstraction from River Blackwater and from the mains is unclear.	The Applicant provided water calculations in response to an information notice. We have reviewed the information and consider that it is acceptable.
The number of lagoons proposed in the application is unclear. Reference made to two lagoons. Site plan shows one lagoon.	The Applicant owns two lagoons – Upper Lagoon and New Field Lagoon. The Upper and New Field lagoons will be used to manage and control the water required by the facility. The Upper lagoon will provide the day-to-day water required by the facility and the

	larger New Field lagoon will provide additional storage of water resulting from permitted abstraction of water from the River Blackwater or from water returned from the facility's process. The Upper Lagoon is the only lagoon proposed within this application.
Impact of water abstraction from River Blackwater. What would happen in drought conditions when restrictions are applied by the water undertaker?	The determination for a water abstraction license application includes assessment of the impact of abstraction from multiple users on the water course. The water abstraction license for the facility was issued on 9 March 2016. The Applicant has proposed a closed loop system which ensures that waste water is recycled, stored and re-used. In the event water abstraction from the River Blackwater was restricted, the Applicant would have to reduce site operations and/or make contingency plans for the supply of water from off-site sources.
The Applicant should specify the waste types under EWC Chapter 20.	The Applicant provided specific EWC codes under Chapter 20 in response to an information notice dated 2 March 2016. We have reviewed the waste types and consider them to be acceptable.
The destination of incinerator bottom ash (IBA) should be stated. The landfilling of IBA is not acceptable.	Specifying the particular processing facility where specific wastes from the facility will be sent to may be difficult due to confidentiality issues and the ever-changing nature of industry particularly where a facility is not yet operational. Had we granted a permit, it would have required any waste produced (including IBA) to be recovered if practicable.
Given the low stack height proposed, the Applicant should undertake real-life monitoring of emissions outside the installation boundary – within the immediate vicinity of the plant and within 1 km envelope.	We have discussed the issue of the stack height in Section 3 of this decision document. Had we granted a permit, the Applicant would have been required to comply with the requirements of Chapter IV of the IED. We consider that the IED stack monitoring requirements are sufficient. Monitoring of emissions outside the installation boundary would not add any benefit.
Can paper sludge be used as a soil conditioner? What residual contaminants would it contain? What examples are there of such practices taking place in the UK?	Paper sludge is used as a soil conditioner provided that all contaminants have been removed. If the paper sludge meets all the criteria in an end of waste application, it will be considered as a product rather than waste. If not, the paper sludge will still be waste. If it is waste, spreading of the paper sludge on

	land will require a separate environmental permit.
The assessment of pollutants provided in the air quality modelling is based on estimates (not actual emissions) which will vary depending on many factors.	The facility is a new Installation, therefore there are no actual emissions data to use in modelling. The air dispersion modelling is based on ELVs which will be the maximum level that the plant could operate. The Applicant has assessed the Installation's potential emissions to air against the relevant environmental standards, and the potential impact upon human health and ecological receptors. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 5.1 dispersion model, which is a commonly used computer model for regulatory dispersion modelling. If we had granted a permit, the Applicant would have undertaken monitoring of actual emissions from the stack. This would be used to verify the predictions made in the Application. This is the approach we take in the determination of permit applications.
Sensitive receptors have not been taken into account in the air quality assessment, such as the Polish Camp, footpath and the site visitor centre. Some receptors do not exist.	We have carried out sensitivity checks in our auditing of the air quality assessment provided by the Applicant. We consider that all relevant sensitive receptors have been taken into account.
There is no need for the plant as there is over-capacity in Essex, thus the proximity principle should be applied. The change to the proposals now moves the facility down the waste hierarchy as recycling rate is reduced.	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 requirement to minimise waste and recycle it are placed on the waste producer. The existence of the installation would not affect this and it would be the Applicant's financial risk as to whether there would be sufficient waste in future to make this profitable. The proposed facility forms part of an integrated waste management strategy; any material arriving at the facility will be residual waste arisings following upstream waste segregation, recovery and recycling initiatives. The shape and content of this strategy is a matter for the local authority. The

	IWMF is one element in that strategy, and a permit will ensure that it can be operated without giving rise to significant pollution or harm to human health. In any event, permit conditions would prohibit the burning of any separately collected or recovered waste streams, unless contaminated and recovery is not practicable.
The abnormal emissions impact assessment indicates that the impact on human health will be significant. The human health risk impact assessment is incorrect in relation to local fish consumption, human population of the area and location of human receptors.	The impact of emissions on human health is discussed in Sections 3 and 5 of this decision document. We audited the air quality and human health impact assessment during the determination including running sensitivity checks. We agree that the facility is unlikely to contribute to exceedences of the air quality standards for human health or result in any exceedance of the COT-TDI for dioxins and dioxin-like PCBs.
The dispersion model used by the Applicant is seriously flawed in relation to background concentrations, building and terrain dimensions. Emissions data is large and technical. It should undergo an independent analysis by Environment Agency specialist team.	The way in which the Applicant used dispersion models, its selection of input data, use of background data and the assumptions made have been reviewed by the Environment Agency's modelling specialists. We are satisfied that the Applicant's air impact assessment is appropriate. The output from the model has then been used to inform further assessment of health impacts.
Concern regarding the impact of odours from the proposed facility on human receptors.	We have addressed the management of odour in Section 4 of this decision document.
Impact of facility on ecological receptors – UK protected species (bats, Great Crested Newts, brown hares, birds etc.)	The Applicant carried out a habitats survey at the proposed site as part of the planning application. We have reviewed the details of the survey report during this determination and agree with the Applicant's conclusion. We carried out an audit of the Applicant's air quality impact assessment (including impact on ecological receptors). Our assessment shows that site emissions will not have a significant effect on any ecological site, protected species or interest features of the habitat sites.
Concern regarding the lack of other waste treatment alternatives.	It is argued that incineration is not an environmentally sustainable technology and therefore almost by definition cannot be considered to be BAT. The Environment Agency is aware that a number of proposals

	are coming forward for other ways of dealing with waste streams such as pyrolysis and mechanical / biological treatment. At this time however, mass burn incineration at this scale can still be considered BAT, subject to the appropriate assessments being made. Anaerobic digestion is most suitable for high moisture content biodegradable wastes such as food and agricultural wastes, and can be applied where there is separate collection of these waste streams. Anaerobic digestion is not however appropriate for mixed municipal waste. Some technologies such as plasma arc gasification are currently considered not to meet the definition of 'availability' due to their very limited application worldwide. We have assessed the proposals submitted to us in this determination. The Applicant submitted a BAT options appraisal in the Application supporting documents. Other types of incineration were considered including gasification. The Applicant considered that the proposed incineration technology (moving grate) is BAT for the installation. We have reviewed the assessment and we consider it acceptable.
Statement regarding the location of parish council from the proposed facility is incorrect.	The statement regarding the location of the parish council does not change our final decision on this application. We have considered all relevant receptors in this determination.
Concern regarding the impact of the proposed facility on road infrastructure (A120), the increased risks of road accidents /collisions and impact of emissions from increased traffic on human health.	The Environmental Permitting Regulations are concerned with control of emissions from site operations. Vehicle movements and access are not relevant to this determination. We have considered the impact of emissions from the site on local air quality. Associated traffic issues (from the delivery of waste to the facility) are within the remit of the local planning authority. Emissions from traffic are not part of the environmental permitting process other than considering whether they could affect the background air quality. We are satisfied that the small increase in background air quality from vehicle emissions would not change our conclusions on the impact assessment.
Concern regarding the inadequacy of the Applicant's non-technical summary.	The Applicant submitted a non-technical summary with the Application which we consider appropriate. The main part of the

	Application describes the proposals in more detail.
Concern regarding the impact of noise from the proposed facility on human and ecological receptors.	The impact of noise and vibration is discussed in Section 5 of this decision document. The Applicant submitted a noise impact assessment during the determination. The noise impact assessment was reviewed by the Environment Agency noise specialists and we are satisfied that emissions of noise and vibration would not give rise to complaints. The permit application has been refused. Had we granted a permit, we would have included permit conditions that would have ensured that emissions of noise and vibration did not cause pollution off-site.
The Environment Agency public consultation and drop-in session was inadequate as it was not widely publicised, display material was largely generic and no detail on the variation of the planning permission was provided.	The Application was advertised on the Environment Agency website on 26 November 2015 to 24 December 2015 and in the Braintree and Witham Times on 26 November 2015. Details of the permit application and supporting documents were made available to the public via the Environment Agency's website and on our public register. Copies of the Application were placed at the Kelvedon and Coggeshall libraries. Copies of the Application on CD were also posted to individual members of the public on request. A public drop-in event was also organised on 2 December 2015. This was undertaken in order for the public to come and ask questions about the Application and the environmental permitting process and also how to make representations on the Application before the consultation closing date (24 December 2015). Hard copies of the Application were made available at the event for members of the public to peruse and ask questions. Over 60 people attended the event. We also received public representations after the closing date. The Environment Agency is satisfied that the consultation of the Application is in accordance with its Public Participation Statement (PPS) and was adequate and effective.

Concern regarding the details of the nature and chemical composition of the output gases and whether these gases will be adequately dispersed.	The pollutants from the proposed stack are described in the Application. The pollutants will be those derived from the incineration of waste, combustion of biogas and emissions from the biofilter. Emissions to air and our assessment is discussed in Section 3 of this decision document.

b) Representations from Community and Other Organisations

Representations were received from Kelvedon & Feering Heritage Society, a number of these issues are the same as those raised by the Local MP / County Councillors/ Parish Councils. Only those issues additional to those already considered are listed below:

Response received from Kelvedon & Feering Heritage Society dated 19/12/15	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Concern regarding whether the plant design was of the highest level to operate efficiently and to utilise heat or use it locally.	We have considered the boiler design and proposed incineration technology. We are satisfied with the Applicant's proposal. In cases where there are no immediate opportunities for the supply of heat from the outset, the Environment Agency considers that BAT is to build the plant to be CHP Ready (CHP-R) to a degree which is dictated by the likely future opportunities which are technically viable and which may, in time, also become economically viable. The Installation would have generated electricity and would have also provided heat in the form of steam to the paper pulp plant, waste water treatment plant and other site processes. We consider that the Installation would have complied with our CHP-R requirements.
The plant should have strict monitoring procedures to control the entire process and report any breaches. Ad hoc visits should be part of this procedure.	The permit application has been refused. Had we granted the permit, the Applicant would have undertaken continuous monitoring of the main pollutants for which limits are set and periodic monitoring for the other substances. We would have carried out audits of the operator's procedures and methods for emissions monitoring. We would also have undertaken regular announced and unannounced inspections, investigating non-compliance with any condition of the permit and taking enforcement action as appropriate.

The Applicant should clarify water abstraction and discharge proposals from /to the River Blackwater and the impact on the current Coggeshall, Feering and Kelvedon Flood Alleviation proposals.	The Applicant provided additional information in relation to the use of water at the proposed facility in response to an information notice dated 2 March 2016. We have reviewed the information and consider that it adequately addresses the use of water at the facility. This Application does not relate to any abstraction from or discharge into River Blackwater or impact on any flood alleviation proposal. The abstraction of water for use at the facility is covered under a separate abstraction license issued on 9 March 2016. Had we granted a permit, it would not have authorised discharges into River Blackwater.

c) Representations from Individual Members of the Public

A total of 38 responses were received from individual members of the public. A drop-in event was attended by about 60 persons, who were a mixture of local residents and business community potentially impacted by the proposed facility. A number of these responses came from people attending the drop-in event. Many of the issues raised were the same as those considered above. Only those issues additional to those already considered are listed below:

Response received from individual members of the Public	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Concern regarding the incinerator being in the wrong place.	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.

Impact of light pollution from proposed operations at the facility.	The impact of light pollution is a matter for the planning regime.
The Environment Agency does not have the capacity and resources to inspect the site. The current system of regulation of incinerator bottom ash does not give confidence for technical specifications for incinerators coming on stream “along the way”.	The Environment Agency has adequate resources and capability to ensure that the requirements of the permit are met and those activities at the site are suitably controlled. The regulation of treatment of incinerator bottom ash in England is delivered by the Environmental Permitting Regulations 2010 and is considered effective.
The proposed fabric filters are incapable of emissions abatement.	The Applicant provided further information on the proposed fabric filters in response to an information notice dated 2 March 2016. We have reviewed the measures for the abatement of particulate matter and metals from incineration of waste at the Installation and consider them appropriate. The use of fabric filters is described in the BAT reference notes.
Modelling was reviewed by a third-party consultant using the Applicant’s data. The modelling provided by the Applicant is inaccurate. The impact of NO_2 is much higher than that stated by the Applicant.	We have reviewed the modelling representation as part of our determination. We are satisfied that our assessment of the Applicant’s modelling is robust and we have taken all details including modelling uncertainties into account in making our final decision on the application.
Off-site plants where wastes will be sourced from should be made more efficient, rather than bringing wastes to the facility.	Had a permit been granted, the source of the wastes for treatment at the Installation would have been managed by the Operator. It is not the Operator’s responsibility to undertake waste reduction strategies at the source of the wastes. This is the responsibility of the waste producer.
Concern regarding loss of property value as a result of proposed facility.	The loss of property value is not a relevant consideration for the environmental permit decision making process.
Concern regarding visual impact of chimney stack.	Visual impact is a matter for the local planning authority (Essex County Council).

Impact of proposed facility and emissions on local footpaths used by the public, arable farmland (local food production), century-old / listed buildings, schools, churches, pubs and village houses nearby.	The impact of the facility's emissions on human receptors is discussed in Section 3 of this decision document. We audited the air quality and human health impact assessment during the determination including running sensitivity checks. We agree that the facility is unlikely to contribute to exceedences of any air quality environmental standard (ES) for human health and result in any exceedance of the COT-TDI for dioxins and dioxin-like PCBs. Possible physical impact of emissions on buildings could be through acid rain (wet deposition) resulting from acid gases. Acid rain can be caused by emission of acidic gases from large combustion plants, such as large coal-fired power stations that do not have methods for removal of sulphur dioxide from the exhaust gases. For this installation, acid gases will be abated by injection of sodium carbonate into the exhaust gases. Wet deposition is a long range effect and we consider that the amount of acid gases emitted from the Installation would not have been high enough to contribute to acid rain and impact on buildings.
Question regarding the source of funding for the proposed facility.	The source of funding for the facility is not a relevant consideration in this determination other than to consider whether the Applicant would have been financially able to comply with the conditions of any permit. There was no reason that they would not have been able to do so.
Concern regarding Operator competence /management structure and whether any permit would be compiled with.	We were satisfied that the Applicant is the person who would have had control over the operation of the facility. The Applicant has provided evidence of waste qualification and a summary of the site EMS which shows the management structure, as part of the Application. We are satisfied that the Applicant would have compiled with any permit had one been granted.

Concern regarding the accuracy of the site condition report.	The Applicant has provided a description of the condition of the site as part of the application. We consider this description is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under IED – guidance and templates (H5).
Concern regarding whether the Applicant would have meetings with the public during operation of the plant.	We do encourage Operators to engage with members of the local community during the operation of the plant. This is not mandatory via a permit condition.
Question regarding location of incoming power cables.	The information regarding power cables are not available to the Applicant at this stage. These details would have been finalised prior to the commissioning of the Installation had a permit been granted.
The planning permission requested a habitat management plan. Has this condition been met? Have all the conditions been discharged? Are the documents available to view by the public?	The condition to provide a habitat management plan is covered by the planning permission and is the responsibility of the local planning authority (Essex County Council).
Concern regarding the impact of accidents and provisions in place to alert the public of potential disaster.	The Applicant provided an Environmental Risk Assessment which considered the risks of potential accidents and the measures which will be implemented to limit accidents at the facility in accordance with the Environment Agency Guidance on Risk Assessment. The Applicant reports that a final accident management plan, based upon this initial risk assessment, would have been developed as part of the EMS prior to the commencement of operations, and would have become part of the accredited EMS when fully certified. The EMS would have identified the actions to be undertaken in the event of an incident, including any reporting to the relevant regulatory authorities (Local Planning Authority, Environment Agency, Animal and Plant Health Agency, etc.), and any follow-up measures following an incident.

	In addition, during the detailed design of the facility, a HAZOP assessment would have been undertaken of the different waste treatment processes. The purpose of the HAZOP would have been to identify potential equipment at risk and the measures to take to prevent/mitigate any risks associated with the operation of the plant, during both normal and abnormal (accident) scenarios. The HAZOP for each of the waste treatment processes would have been made available to the Environment Agency following completion of the detailed design process.
Concern regarding the failure of secondary containment which may lead to surface water pollution.	The Applicant reports that secondary containment would have been provided for all tanks containing liquids whose spillage could be harmful to the environment. The proposed site secondary containment would have been designed to hold a minimum of 110% of the capacity of the largest tank or 25% of total tank volume, whichever is the greater. The Applicant confirms that all secondary containment structures would have been designed and built in accordance with the relevant standards, including CIRIA C736 – Containment Systems for the Prevention of Pollution - secondary, tertiary and other measures for industrial and commercial premises. Based upon the information provided in the Application, we are satisfied that appropriate measures would have been in place to prevent fugitive emissions to air, land and water had a permit been granted.
Why is the Applicant allowed to commence work when an environmental permit has not been granted?	The Applicant does not require an environmental permit in order to commence construction of the plant as this is covered by the planning permission. The Applicant requires an environmental permit in order to commission and operate the plant following construction. If the Applicant commences construction work before they are granted a permit, they would do so at their own risk.

The Applicant should comply with all regulations on noise, odour, water, vermin, traffic and light levels.	We have taken into account the impact of noise emissions, odour emissions, water use and vermin under the Environmental Permitting Regulations and would have included appropriate controls in any permit.
Impact of pests, flies, rodents and germs on human receptors.	The Applicant submitted a pest management plan as part of the Application. Had we granted a permit, we would have required the implementation of the pest management plan in the event of site activities causing pollution, hazard or annoyance outside the boundary of the site. The Applicant provided a bioaerosols risk assessment as part of the application. We consider that the impact of bioaerosols at the nearest sensitive receptors would have been low.
Concern regarding site security and susceptibility to hostile acts (terrorism, illegal dumping) have not been addressed in the application. What are the Applicant's security arrangements to be put in place at the facility?	Had we granted a permit, it would have included a condition which requires the Operator to have an Environmental Management System (EMS). Prevention of unauthorized access is part of an Operator's Environmental Management System (EMS).
No pre-acceptance or acceptance of waste procedures have been provided to limit the introduction of radioactive materials, batteries, mercury, energy-efficient bulbs etc.	The Applicant proposed to submit details of the waste pre-acceptance and acceptance procedures prior to the commissioning of the Installation. Had a permit been granted, we would have included pre-operational conditions to address this aspect.
The Applicant should pay for and monitor air and soil etc. outside their land and to make this information publicly available 24/7 online. The Applicant should place additional off-site monitoring stations. The Environment Agency should appoint an independent company to monitor air quality up to 20 km from the proposed facility at the Applicant's cost (with independent oversight).	We do not consider that any off-site monitoring is required or necessary. The criteria for monitoring and controlling emissions from the incineration of waste is specified in European Union legislation. These requirements are reproduced in UK legislation under the Environmental Permitting Regulations. The IED requires Operators to undertake continuous and periodic monitoring of emissions to air and surface water at specific points of entry into the environment. This is what the Applicant is proposing to do and would

	have been required to do so had a permit been granted.
Concern regarding the impact of particulates especially $PM_{2.5}$ as a result of the short stack. The Applicant should describe the methods of dealing with the ultrafine particles at the stack. The Applicant should monitor the ultrafine particulate matter ahead of any UK/EU legal requirements – "jump the gap" into the future with their proposed facility. The Environment Agency should ask the Applicant to provide "future proofing" plans /development of new monitoring equipment technology. Will there be a monitor on top of the stack which assess the final mix that comes out of the stack i.e. the ultrafine particles/secondary particulates?	Stack height is discussed in Section 3 of this decision document. The Applicant has proposed the use of fabric filters for the abatement of particulates including ultrafine particles via the stack prior to exit into the atmosphere. We consider that this abatement method is acceptable. Had a permit been granted, the Applicant would have been required to monitor particulate emissions using a specified method. Monitoring frequency of all parameters (including particulates and dioxins) and abatement methods proposed by the Applicant are considered BAT (see Technical Guidance EPR 5.01 – *The Incineration of Waste*) and in accordance with the requirements of Annex VI of the Industrial Emissions Directive. The BAT reference notes are revised once every four years and we are required to review environmental permits to reflect advances in technology. At the moment, the methods of monitoring particulate matter (including ultra-fine particles) have not changed. In accordance with its legal requirement to do so, the Environment Agency reviews the development of new methods and standards and their performance in industrial applications. If there was a change in BAT or legal requirements, the Applicant would be required to comply with these changes and any permit varied if necessary. Consequently we do not consider that additional monitoring or "future proofing" is necessary. The Application does not contain any proposal to install a monitor at the stack nor do we require one to be installed at the stack.

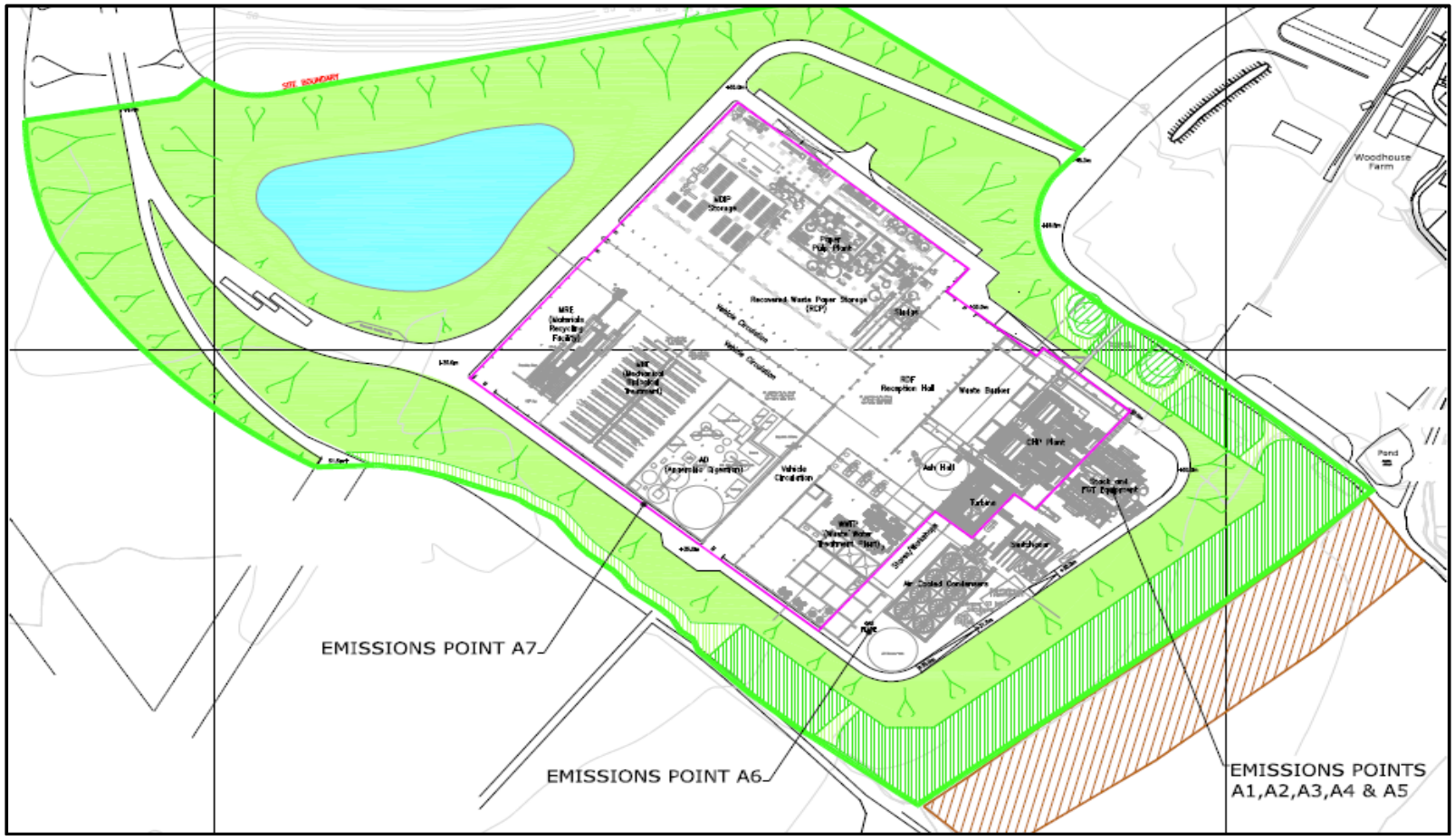
The Applicant should consider the latest equipment for monitoring especially dioxins and furans monitoring.	Had we granted a permit, we would have set emission limits for dioxins based on the use of BS EN 1948 as the manual sampling method remains the only acceptable way to monitor dioxins for the purpose of regulation. For continuous sampling of dioxins to be used for regulatory purposes, an emission limit value would need to be devised which is applicable to continuous monitoring. Such limits for dioxins have not been set by the European Commission. The use of a manual sample train is the only technique which fulfils the requirements of Chapter IV of the IED. At the present time, it is considered that in view of the predicted low levels of dioxin emissions, it is not justifiable to require the Operator to install additional continuous monitoring or sampling devices for this pollutant.
The Environment Agency should make it a priority for the Applicant to install CEM with robust back-up systems in case of failure.	The Applicant reports that the incinerator would have included a dedicated duty CEMS for each line and a stand-by CEMS which would have ensured that there is continuous monitoring data available even if there is a problem with a duty CEMS system.
The Applicant should monitor the safety of food crops grown in the area both commercially and domestically indefinitely to ensure public safety.	The IED does not require the Applicant to undertake additional monitoring of food crops as a result of emissions released through the stack. Had a permit been granted, we would have included the monitoring requirements specified in Annex VI of the IED which we consider are sufficient in this case. We consulted Public Health England, the Director of Public Health (Essex County Council) and the Food Standards Agency during the determination. No concerns were raised in relation to safety of food crops grown in the area.
The Applicant should provide two air quality models or better for assessment by the Environment Agency to increase confidence in the model predictions.	Applicants are not required to submit two or more air quality models for permit applications. The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon human health and local

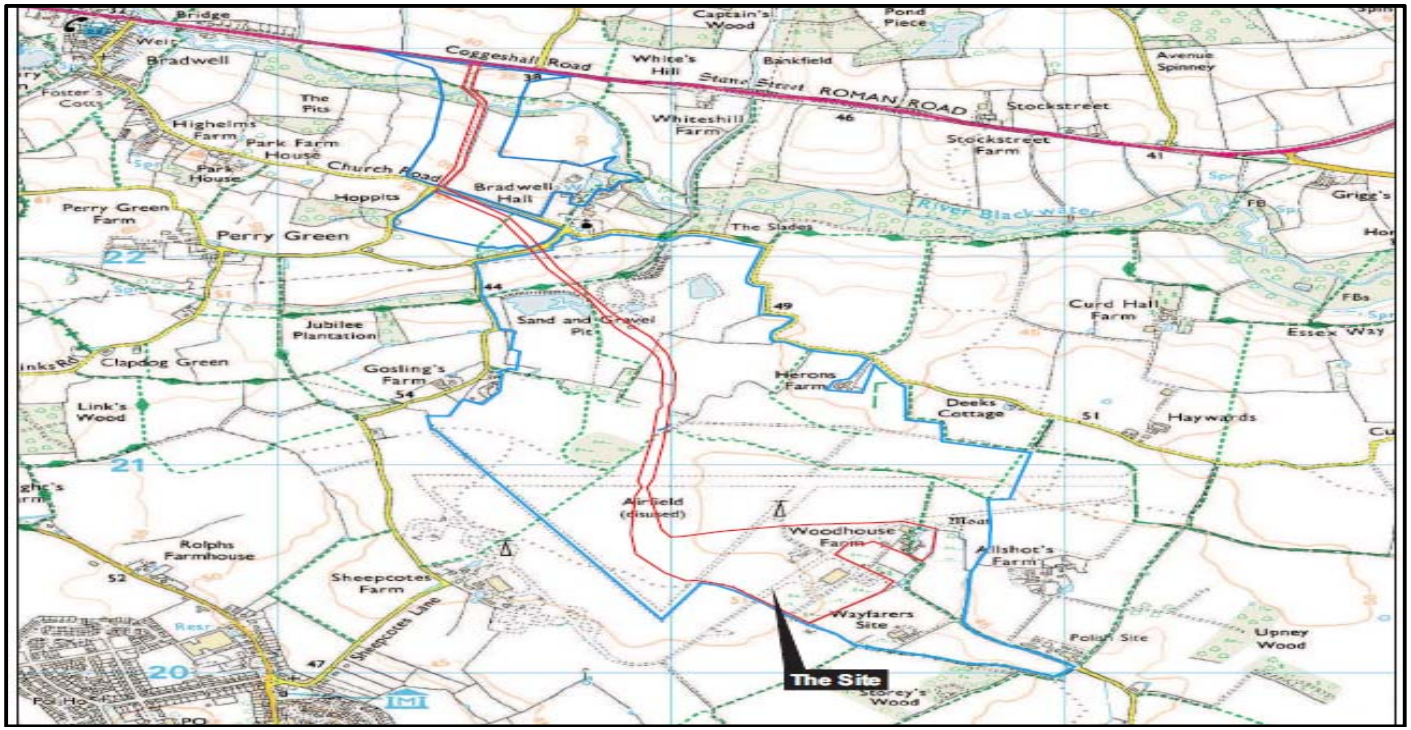
	conservation and habitat sites. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 5.1 dispersion model, which is a commonly used computer model for regulatory dispersion modelling. Consequently we consider the submission of two or more air quality models disproportionate and unnecessary.
The Environment Agency should make it a pre-operational condition for the Applicant to undertake monitoring of current background levels prior to operation.	The background concentration of pollutants were obtained by the Applicant and used in the air dispersion modelling report. It is not considered that additional monitoring prior to the commencement of site operations would have been required.
Is it possible that parts of Mid Essex would fail the expected new system of Clean Air Zones? What is the EA's view of Clean Air Zones as related to this mid Essex site/local towns and villages?	Clean Air Zones have been proposed by the Government to improve air quality in cities. Under the plans, the most polluting vehicles will be discouraged to enter these Zones through charges. It is anticipated that these measures will be introduced by 2020. The designation of Clean Air Zones is the responsibility of the Government, working together with the local planning authority. Emissions from the site would not have breached any environmental standards.
Impact of fugitive emissions (dust) could be a hazard at this plant.	It is not considered that dust would have a significant impact on human receptors from this facility. Waste activities are proposed to be undertaken in enclosed buildings. Had a permit been granted, we would have included permit conditions to address the impact of emissions not controlled by limits (or fugitive emissions).
The Environment Agency should include a condition in relation to alternative fuels.	Had a permit been granted, the Operator would be required to use diesel as fuel for the auxiliary boilers (start-up purposes). The feedstock or fuel for the incinerator is the waste processed by the MBT plant. We are satisfied with the fuels proposed by the Applicant.

Is the Environment Agency aware of the commercial arrangement between the Applicant and other associated companies and any implications, weaknesses, viability of this relationship?	These are generally matters that are outside of our remit although we would have issued a permit if satisfied that the Applicant would have been the Operator and would have had sufficient resources to comply with any permit condition.
What is the eventual planned plant decommissioning arrangements considered by the Applicant?	The site closure plan is part of an Operator's EMS. Had a permit been granted, a condition would have been included which required the Operator to have an EMS (including a site closure plan) available for inspection prior to site commissioning.
What assessment does the Environment Agency make of existing and future facilities in the UK i.e. the strategic need for a huge incinerators as at 2016 and into the future?	It is not the role of the Environment Agency to assess the current and future need of incineration facilities in England. This is a matter for the Government's waste strategy and waste planning authorities.
Will the Environment Agency insert a permit condition that prohibits the Applicant from burning their planned much reduced tonnage of dry recycling – i.e. to stop it being diverted into the incinerator?	Had a permit been granted, we would have inserted a pre-operational condition requiring the submission of waste pre-acceptance and acceptance procedures to limit the burning of dry recyclables.
The Environment Agency should obtain continuous monitoring statistics – soil testing, air testing upwind and downwind of the plume and consult the Clinical Commissioning Groups regarding local health statistics prior to the grant of a permit.	We have audited the Applicant's air quality dispersion modelling as part of our assessment including undertaking sensitivity checks. Consequently obtaining continuous monitoring data of soils and air upwind and downwind of the plume is not necessary. Prior to obtaining a permit, the Applicant must demonstrate that the proposed Installation meets all the legal requirements including environmental, technological and health requirements. Part of our assessment includes consultation with the relevant health professionals, in this instance Public Health England and the Director of Public Health, Essex County Council. PHE's comments are specified in this Annex.
Can the Environment Agency assess whether the concept of expedient or precautionary modelling approach best	We use a precautionary approach in modelling, ensuring the maximum potential prediction is assessed rather

describes the Applicant's model and its appropriateness?	than the expedient approach. We consider how modelling uncertainties could impact the conclusions in all our audits. We reviewed the Applicant's modelling to consider whether the facility could result in higher predictions than those presented. We predicted the emissions impact from 5 years meteorological data, assuming the plant releases at the maximum allowable ELVs under the Industrial Emissions Directive. We consider how model input parameters such as flow rates, buildings, terrain and surface characteristics could change the results. We consider that the Applicant's approach to modelling is precautionary and is appropriate.
Concerns regarding the hazardous nature of incinerator bottom ash.	Most 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. Had we granted a permit, the Operator would have been required to monitor the residue quality of the IBA under the monitoring requirements to ensure that the IBA produced was dealt with in an appropriate manner.
Does the Environment Agency endorse the disclaimer as shown in the document published by the Environmental Services Association (*A Sampling and Testing Protocol for the Assessment of hazard status of IBA)* for dealing with such hazardous residues as IBA?	The Environment Agency does not approve or disapprove the disclaimer in the document. This issue is not a relevant consideration in the determination of this application. The Environmental Services Association (ESA) Protocol for the assessment of the hazard status of IBA is widely recognised to be the standard process /protocol across the IBA processing industry sector. Before any IBA treatment facility can designate the IBA from the incinerator as non-hazardous, an Operator will have to undertake additional testing using the ESA Protocol.

ANNEX 2: Maps showing the site and the surrounding area




Coggeshall Road
ROMAN ROAD
Stane Street
Bradwell
Bradwell Hall
Church Road
Perry Green
Perry Green Farm
Park Farm House
Highelms Farm
Hoppits
Jubilee Plantation
Clapdog Green
Gosling's Farm
Link's Wood
Sand and Gravel Pit
Whitehill Farm
White's Hill
Bankfield
Stockstreet
Stockstreet Farm
Curd Hall Farm
Herons Farm
Deeks Cottage
Haywards
Essex Way
River Blackwater
The Slades
Airfield (disused)
Woodhouse Farm
Ailshot's Farm
Wayfarers Site
Upney Wood
Rolphs Farmhouse
Sheepcotes Farm
Sheepcotes Lane
The Site