

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

Decision document recording our decision-making process

The Permit Number is: EPR/UP3131DF
The Applicant / Operator is: Biomass UK No. 3 Limited
The Installation is located at: Boston Energy Production
Facility, Riverside Industrial Estate, Marsh Lane, Boston,
Lincolnshire, PE21 7TN.

What this document is about

This is a decision document, which accompanies a permit.

It explains how we have considered the Applicant's Application, and why we have included the specific conditions in the permit we are issuing to the Applicant. It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position. Unless the document explains otherwise, we have accepted the Applicant's proposals.

We try to explain our decision as accurately, comprehensively and plainly as possible. Achieving all three objectives is not always easy, and we would welcome any feedback as to how we might improve our decision documents in future. A lot of technical terms and acronyms are inevitable in a document of this nature: we provide a glossary of acronyms near the front of the document, for ease of reference.

Preliminary information and use of terms

We gave the application the reference number EPR/UP3131DF/A001. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we have given to the permit is EPR/UP3131DF. We refer to the permit as "the **Permit**" in this document.

The Application was duly made on 20/02/2017.

The Applicant is Biomass UK No. 3 Limited. We refer to Biomass UK No. 3 Limited as "the **Applicant**" in this document. Where we are talking about what would happen after the Permit is granted (if that is our final decision), we call Biomass UK No. 3 Limited "the **Operator**".

Biomass UK No. 3 Limited's proposed facility is located at Boston Energy Production Facility, Riverside Industrial Estate, Marsh Lane, Boston, Lincolnshire, PE21 7TN. We refer to this as "the **Installation**" in this document.

How this document is structured

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Glossary of acronyms used in this document

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

AAD	Ambient Air Directive (2008/50/EC)
ACC	Air Cooled Condenser
AONB	Area of Outstanding Natural Beauty
APC	Air Pollution Control
APIS	Air Pollution Inventory System
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
BaP	Benzo alpha Pyrene
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
CEM	Continuous emissions monitor
CFD	Computerised fluid dynamics
CHP	Combined heat and power
CHP-R	Combined Heat and Power Ready
COC	Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment
COMEAP	Committee on the Medical Effects of Air Pollutants
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
DD	Decision document
DEFRA	Department for 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
EMAS	EU Eco Management and Audit Scheme
EMS	Environmental Management System

EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154) as amended
EQS	Environmental Quality Standard
ES	Environmental standard
EU	European Union
EWC	European waste catalogue
FGT	Flue Gas Treatment
FPP	Fire Prevention Plan
FSA	Food Standards Agency
FSAI	Food Safety Authority of Ireland
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HPA	Health Protection Agency (now PHE – Public Health England)
HRA	Human Rights Act 1998
HW	Hazardous waste
HWI	Hazardous waste incinerator
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive (2010/75/EU)
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LOI	Loss on Ignition
MBT	Mechanical biological treatment
MCERTS	Monitoring Certification Scheme
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NO _x	Oxides of nitrogen (NO plus NO ₂ expressed as NO ₂)
Opra	Operator Performance Risk Appraisal
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
PHE	Public Health England

PM	Particulate Matter
POP(s)	Persistent organic pollutant(s)
PPS	Public participation statement
PR	Public register
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated biphenyls
PXDF	Poly-halogenated di-benzo furans
RGS	Regulatory Guidance Series
RHI	Renewable Heat Incentive
SAC	Special Area of Conservation
SCR	Selective catalytic reduction
SGN	Sector guidance note
SNCR	Selective non-catalytic reduction
SPA(s)	Special Protection Area(s)
SS	Sewage sludge
SSSI(s)	Site(s) of Special Scientific Interest
SWMA	Specified waste management activity
TDI	Tolerable daily intake
TEF	Toxic Equivalent Factors
TGN	Technical guidance note
TOC	Total Organic Carbon
UHV	Upper heating value –also termed gross calorific value
UN_ECE	United Nations Environmental Commission for Europe
US EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WFD	Waste Framework Directive (2008/98/EC)
WHO	World Health Organisation
WID	Waste Incineration Directive (2000/76/EC) – now superseded by IED

1 Our decision

We have decided to grant the Permit to the Applicant. This will allow it to operate the Installation, subject to the conditions in the Permit.

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

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

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

2 How we reached our decision

2.1 Receipt of Application

The Application was duly made on 20/02/2017. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below.

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

2.2 Consultation on the Application

We carried out consultation on the Application in accordance with the EPR, our statutory PPS and our own internal guidance RGS Note 6 for Determinations involving Sites of High Public Interest. We consider that this process satisfies, and frequently goes beyond the requirements of the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, which are directly incorporated into the IED, which applies to the Installation and the Application. We have also taken into account our obligations under the Local Democracy, Economic Development and Construction Act 2009 (particularly Section 23). This requires us, where we consider it appropriate, to take such steps as we consider appropriate to secure the involvement of representatives of interested persons in the exercise of our

functions, by providing them with information, consulting them or involving them in any other way. In this case, our consultation already satisfies the Act's requirements.

We advertised the Application by a notice placed on our website between 23/02/2017 and 23/03/2017, which contained all the information required by the IED, including telling people where and when they could see a copy of the Application.

We made a copy of the Application and all other documents relevant to our determination (see below) available to view on our Public Register at Environment Agency, Waterside House, Waterside North, Lincoln, LN2 5HA. Anyone wishing to see these documents could do so and arrange for copies to be made.

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

- Lincolnshire County Council
- Boston District Council
- Health and Safety Executive
- Food Standards Agency
- Lincolnshire Fire and Rescue Service
- Public Health England and the Director of Public Health

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

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

2.3 Requests for Further Information

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued information notices on 03/04/2017 and 11/04/2017. A copy of each information notice was placed on our public register.

3 The legal framework

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

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

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

We consider that, in granting the Permit, it will ensure that the operation of the Installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document.

4 The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

The Installation is subject to the EPR because it carries out an activity listed in Part 1 of Schedule 1 to the EPR:

- Section 5.1 Part A(1)(b) – incineration of non-hazardous waste in a waste incineration plant or waste co-incineration plant with a capacity of 3 tonnes or more per hour.

The IED definition of “waste incineration plants” and “waste co-incineration plants” says that it includes:

“all incineration lines or co-incineration lines, waste reception, storage, on-site pre-treatment facilities, waste, fuel and air supply systems, boilers, facilities for the treatment of waste gases, on-site facilities for treatment or storage of residues and waste water, stacks, devices for controlling incineration or co-incineration operations, recording and monitoring incineration or co-incineration conditions.”

Many activities which would normally be categorised as “directly associated activities” for EPR purposes (see below), such as air pollution control plant, and the ash storage bunker, are therefore included in the listed activity description.

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

Together, these listed and directly associated activities comprise the Installation.

4.1.2 The Site

The installation is located at Riverside Industrial Estate, Marsh Lane, Boston, PE21 7TN (grid ref TF 34078 42128). The site is located south of the Riverside Industrial Estate. The site occupies an area of approximately 2.06 hectares and comprises agricultural land.



Residential development is located beyond 'The Haven' approximately 430 m to the north-east of the site. There is also a small group of residential properties fronting onto Marsh Lane which lie approximately 490 m to the west of the site. Land to the north and west of the site forms part of the wider Riverside Industrial Estate and is currently being used for a mixture of industrial and commercial uses. To the south of the site lies the operational Boston Landfill site and the land immediately east of the site forms part of the landfill operational site (now restored). Access to the site would be gained via the Riverside Industrial Estates existing road network and a proposed extension to the internal access road known as Nursery Road.

The site lies within Flood Zone 3 (high risk). Flood Zone 3 is defined as an area that could be flooded from a river by a flood that has a 1% or greater chance of happening each year or an area that could be flooded from the sea by a flood that has a 0.5% or greater chance of happening each year.

The site is directly underlain by superficial deposits of Tidal Flat Deposits made up of clay and silt. The superficial deposits are further underlain by the Bedrock Geology of the Amptill Clay Formation. In hydrogeological terms, both the Tidal Flat Deposits and Amptill Clay Formation are considered unproductive Strata and have negligible significance for water supply or river base flow. The site is not located in a Groundwater Source Protection Zones (SPZs). There are no recorded groundwater abstractions within 2 km of the Site.

There are several local ecological sites within 2 km and The Wash & North Norfolk Coast SAC, SPA and Ramsar site lies within 10 km.

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

Further information on the site is addressed below at 4.3.

4.1.3 What the Installation does

The Applicant has described the facility as renewable energy generation facility. Our view is that for the purposes of IED (in particular Chapter IV) and EPR, the installation is a waste co-incineration plant. Notwithstanding the fact that waste will be thermally treated by the process, the process is never the less 'co-incineration' because it is considered that the main purpose of this plant is the generation of energy. This view is based on our guidance in RGN2 as follows:

- the plant recovers energy from the waste
- the waste is the principal source of fuel;
- the waste has consistent characteristics and can be compared to a virgin fuel; and
- energy greater than 0.8 MWh per tonne of waste is recovered.

The facility is designed to produce electricity using gasification. The feedstock comprises shredded waste wood that is prepared off-site and no further treatment is carried out on site. The expected throughput of the site is 86,400 tonnes per annum but this is based on a mean calorific value of 14.3 MJ/kg. The energy from the waste wood is recovered to produce steam in a boiler which is used to power a steam turbine with a gross electrical output of approximately 10 MWe. The generated electricity will be exported to the local distribution network.

Pre-treated (shredded) waste wood is accepted at the site and delivered to the Fuel Storage Building. The shredded wood is discharged onto the feedstock conveyor system which delivers the wood to the gasification building. The feeding system includes a material screen and metal separator to remove over-size material and metal before the wood is fed into the combustion chamber via fuel augers, which distribute the fuel across the fluidised bed to enhance the heat release. The syngas that is generated is then combusted in the secondary chamber and the resulting heat is transferred to the heat recovery boiler where steam is raised. The steam passes to the steam turbine for the generation of electricity.

The flue gasses that are generated are abated using a variety of standard methods and technologies. These include SNCR (urea injection) and SCR for NO_x reduction, anhydrous lime and activated carbon injection and baghouse filters. The above techniques are well established and will allow the operator to meet the ELVs specified by this permit and the Industrial Emissions Directive

(IED). Monitoring of all releases will be carried out in line with Chapter IV of the IED. A schematic of the process is provided below in Figure 2.

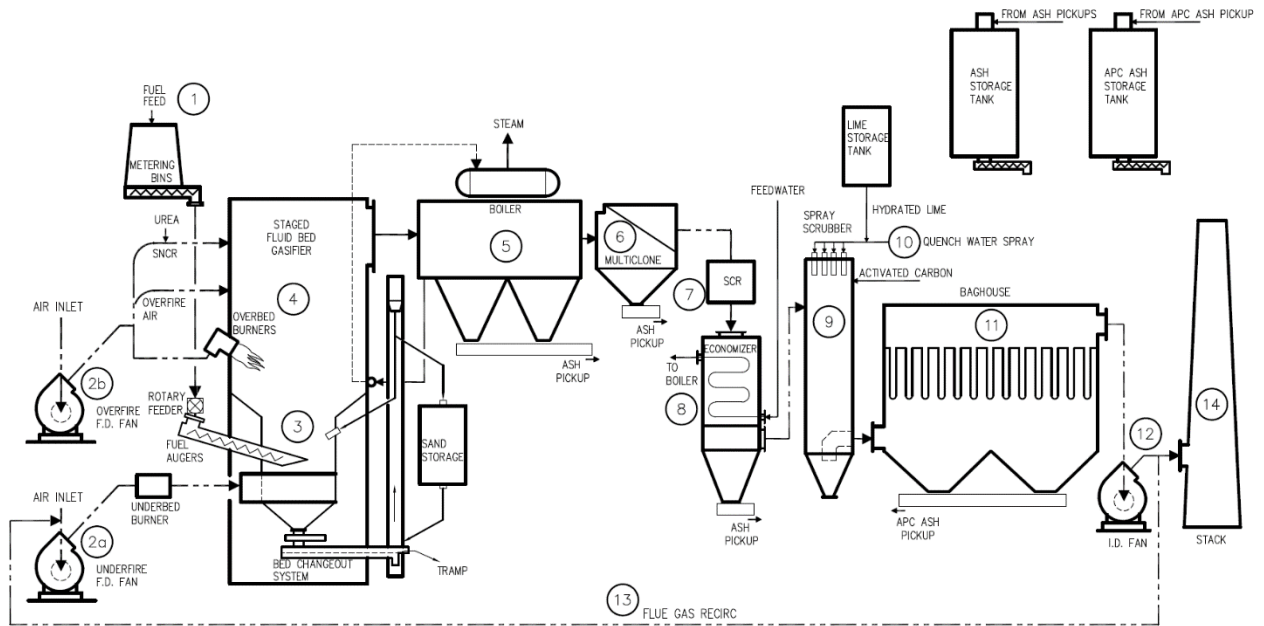


Figure 2. Schematic of the process

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

Waste throughput, Tonnes/line	86,400 t/annum	10.8 t/hour
Waste processed	Waste wood (grades A, B, C)	
Number of lines	1	
Furnace technology	Two stage gasification	
Auxiliary Fuel	Diesel	
Acid gas abatement	Dry	Lime
NOx abatement	SCR/SNCR	Urea
Reagent consumption	Auxiliary Fuel	130 (est) t/annum
	Urea (40% solution):	2,400 t/annum
	Limestone:	140 t/annum
	Hydrated Lime:	540 t/annum
	Activated carbon:	30 t/annum
	Process water:	39,360 t/annum
Flue gas recirculation	Yes	
Dioxin abatement	Activated carbon	
Stack	Grid Reference 513696,429202	
	Height, 44 m	Diameter, 1.60 m
Flue gas	Flow, 21.6 Nm ³ /s	Velocity, 17.8 m/s
	Temperature °C	146
Electricity generated	11.68 MWe	93,440 MWh
Electricity exported	10.23 MWe	81,840 MWh
Steam conditions	Temperature, 398°C	Pressure, 43 bar

Steam exported	None	
Waste heat use	No current use	

4.1.4 Key Issues in the Determination

The key issues arising during this determination were the impact of emissions to air on sensitive receptors near the site (including residential properties, air quality management areas (AQMA) and ecological sites and habitats) and we therefore describe how we determined these issues in most detail in this document.

4.2 The site and its protection

4.2.1 Site setting, layout and history

As described in section 4.1.2 above, the installation is located at Riverside Industrial Estate, Marsh Lane, Boston, Lincolnshire, PE21 7TN (National Grid Ref TF 34078 42128). The site is located south of the Riverside Industrial Estate. The site occupies an area of approximately 2.06 hectares and comprises agricultural land. Available historic maps show that the site has remained undeveloped apart from the development of a drainage ditch that dissects the centre of the site and runs east to west. Due to the site having no development history, the likelihood for contamination is very unlikely.

The site is directly underlain by superficial deposits of Tidal Flat Deposits made up of clay and silt. The superficial deposits are further underlain by the Bedrock Geology of the Ampthill Clay Formation. In hydrogeological terms, both the Tidal Flat Deposits and Ampthill Clay Formation are considered unproductive Strata and have negligible significance for water supply or river base flow. The site is not located in a Groundwater Source Protection Zones (SPZs). There are no recorded groundwater abstractions within 2 km of the Site. There are three recorded surface water abstractions within 2 km of the Site. The closest of which is located 984 m to the north-west of the site. The nearest main river (The Haven) which is located approximately 100 m to the north-east of the site. The site lies within Flood Zone 3 (high risk).

An existing field drainage dyke/ditch currently bisects the centre of the site and runs east to west. The site’s northern and eastern boundaries are also denoted by existing field drainage dykes/ditches which follow the alignment of the adjacent ‘sea defence banks’. These ‘sea defence banks’ have been designed to reduce the potential flood risk from The Haven.

The nearest Environmental Agency river quality results to the site are located 912 m to the north-west. The Maud Foster Drain’s Chemical Quality was tested and achieved Grade D in 2009.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

The proposed development is a renewable energy generation facility which has been designed to recover energy from pre-prepared mixed waste wood feedstocks using gasification.

The proposed process building is constructed with impermeable concrete hardstanding. Typically, all non-structural concrete areas will comprise of a reinforced concrete hardstanding of at least 200 mm thickness. All structural load bearing elements are significantly thicker.

The proposed buildings on site are all provided with both secondary and tertiary containment. Any spillages, leaks or incidents arising within the buildings will be effectively contained and captured within the footprint of the main building.

There will be no process effluents discharged to controlled waters from site. All process effluents are discharged to the pumped foul drainage system, which discharges (S1) to Anglian Water's Scalp Road Sewage Treatment Works, which ultimately discharges to the Upper Estuarine region of The Haven. Foul drainage from the office/administration area will also be discharged via the pumped foul sewer.

Roof drainage will be collected through a Syphonic rainwater collection system. Any uncontaminated rainwater runoff collected in the rainwater collection system will be discharged to surface water drain (W1) to the north of the site. All discharges are via oil-water separator prior to discharge to the Anglian Water drainage system.

Above ground drainage shall be designed in accordance with BS EN 12056. All of the site drains have the ability to be isolated in the event of an emergency for the purposes of preventing any off site release of fire water or contamination.

All site surface water drainage systems are ultimately connected to the surface water drainage system and equipped with shut off valves to ensure the site can be isolated in the event of a major fire / incident.

The following has been designed in the event of a fire:

- An actuated penstock to isolate the surface water drainage system in the event of a fire;
- Fire water will enter the drainage system and overflow into the fire water tank;
- All fire water is to be pumped and tankered away to a suitable water treatment facility.

The storage and management of IBC's and drums will be in accordance with the following standards and guidance requirements;

- Environment Agency Pollution Prevention Guideline Note 11: Preventing Pollution on Industrial Sites (PPG11);
- Environment Agency Pollution Prevention Guideline Note 26: Pollution Prevention in the Storage and Handling Drums and Intermediate Bulk Containers (IBC's);

- CIRIA 738: Design of Containment Systems for the Prevention of Water Pollution from Industrial Sites;
- HSG 51: The storage of flammable liquids in containers.

The materials and substances used in the new activity are not considered to have significant potential to cause ground or groundwater contamination under general storage or operating procedures.

The following measures have been incorporated into the design of the new activity to protect groundwater and soil from installation substances;

- There will be no internal surface water drains located within the building interiors. Any spillages of waste, processed materials and feedstocks within the main building will be retained within the building and treated accordingly. In the event of a spillage, no materials will be able to escape the process;
- Emergency Spill kits (oils and chemical response) will be provided throughout the site and strategically placed in locations associated with bulk and temporary storage, sites drains and waste liquids;
- All fixed storage and mobile (small volume) tanks will be located away from vehicle manoeuvring areas and placed within secondary containment bunds;
- All storage tanks will be equipped with secondary containment bunds that have been designed to comply with Pollution Prevention Guideline Above Ground Oil Storage Tanks PPG 2;
- All storage tanks will be fitted with level gauges, alarms and hardwired into the plant online (SCADA) monitoring system;
- All aspects of the operational facility will be located on impermeable concrete slabs;
- There will be no subsurface infrastructure used for the storage or transfer of hazardous waste; and
- There will be no external storage.

The site will also operate a comprehensive maintenance and management system. Due to the protection measures mentioned above, the operator considers the risk to soil and groundwater from the development to be low.

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

The Applicant has submitted a site condition report which includes a report on the baseline conditions as required by Article 22. We have reviewed that report and consider that it adequately describes the condition of the soil and groundwater prior to the start of operations.

The baseline report is an important reference document in the assessment of contamination that might arise during the operational lifetime of the installation and at cessation of activities at the installation.

4.2.3 Closure and decommissioning

Having considered the information submitted in the Application, we are satisfied that the appropriate measures will be in place for the closure and decommissioning of the Installation, as referred to in the response dated 08/05/2017 to question 8 of our notice dated 03/04/2017 requesting further information. Pre-operational condition PO1 requires the Operator to have an Environmental Management System in place before the Installation is operational, and this will include a site closure plan.

At the definitive cessation of activities, the Operator has to satisfy us that the necessary measures have been taken so that the site ceases to pose a risk to soil or groundwater, taking into accounts both the baseline conditions and the site's current or approved future use. To do this, the Operator will apply to us for surrender of the permit, which we will not grant unless and until we are satisfied that these requirements have been met.

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

The Applicant is the sole Operator of the Installation.

We are satisfied that the Applicant is the person who will have control over the operation of the Installation after the granting of the Permit; and that the Applicant will be able to operate the Installation so as to comply with the conditions included in the Permit.

The co-incineration of waste is not a specified waste management activity (SWMA). The Environment Agency has considered whether any of the other activities taking place at the Installation are SWMAs and is satisfied that none are taking place.

We are satisfied that the Applicant's submitted Opra profile is accurate.

The Opra score will be used as the basis for subsistence and other charging, in accordance with our Charging Scheme. Opra is the Environment Agency's method of ensuring application and subsistence fees are appropriate and proportionate for the level of regulation required.

4.3.2 Management

The Applicant has stated in the Application that they will implement an Environmental Management System (EMS). A pre-operational condition (PO1) is included requiring the Operator to provide a summary of the EMS prior to commissioning of the plant and to make available for inspection all EMS documentation.

We are satisfied that appropriate management systems and management structures will be in place for this Installation, and that sufficient resources are available to the Operator to ensure compliance with all the Permit conditions.

4.3.3 Site security

Having considered the information submitted in the Application, we are satisfied that appropriate infrastructure and procedures will be in place to ensure that the site remains secure.

4.3.4 Accident management

The Applicant has submitted an Accident Management Plan. Having considered the Plan and other information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that accidents that may cause pollution are prevented but that, if they should occur, their consequences are minimised. An Accident Management Plan will form part of the Environmental Management System and must be in place prior to commissioning as required by a pre-operational condition (PO1).

The Applicant submitted a Fire Prevention Plan (FPP). We require that any new incinerator permit application where waste is being stored has a FPP.

We were not satisfied that the FPP included all information as required by our guidance and asked the Applicant to amend the FPP in our notice dated 11/04/2017 requesting further information. The Applicant submitted a revised FPP on 29/09/2017 and we are satisfied that this revised FPP includes all appropriate measures to ensure that fires are prevented and that if a fire should occur, the pollution of the environment is minimised.

4.3.5 Off-site conditions

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

4.3.6 Operating techniques

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

Description	Parts Included	Justification
The Application	Responses to question 3a and Appendix 6 in the Part B3 application form. The Support Document dated October 2016, excluding Table 3.3 (waste types).	The responses to these sections of the application form set out the technical standards to which the facility will be operated. The Support Document includes a description of the operations and equipment to be used

		at the site and the pollution prevention and minimisation measures to be used, including the abatement of flue gases.
Response to Schedule 5 Notice dated 03/04/2017	Response to the following questions: 2. Annual operational hours; 3. Waste type to be accepted; 4. Waste Storage; 5. Quarantine area description including drawing 6. Site drainage description and including drawings 7. Surface water and sewer emission points and including drawing 8. Site Closure Plan, dated May 2017; 9. Accident Management Plan (ref. BUK-E09, dated May 2017), 10. Emergency generator details. Responses regarding Energy efficiency (questions 16, 17, 18)	The responses to the requests for information include clarification and further detail regarding the techniques to be used to prevent and minimise pollution
Response to Schedule 5 Notice dated 11/04/2017	Responses to questions regarding FPP	
Additional information received 13/07/2017	Revised Site Plans.	Revised site plan suitable for inclusion within the permit.
Revised FPP submitted 29/9/2017	Revised updated FPP dated September 2017	Consolidated FPP response to schedule 5 information

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

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

Raw Material or Fuel	Specifications	Justification
Auxiliary fuel (diesel)	<0.1% sulphur content	As required by Sulphur Content of Liquid Fuels Regulations.
Shredded waste wood	Pre-treated wood only	The Applicant has stated that all waste wood for use as fuel in the process will be pre-treated prior to acceptance. The Permit does not allow any treatment of waste wood.

Article 45(1) of the IED requires that the Permit must include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2005/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate. The Application contains a list of those wastes, coded by the European Waste Catalogue (EWC) number, which the Applicant will accept in the waste streams entering the plant and which the plant is capable of burning in an environmentally acceptable way. We have specified the permitted waste types, descriptions and where appropriate quantities which can be accepted at the installation in Table S2.2.

The waste list is reduced compared to that applied for. In the response dated 08/05/2017 to our notice dated 03/04/2017 requiring further information, the Applicant confirmed that only waste wood that had already been treated would be accepted at the site and removed all but waste code 19 12 07 from the proposed list of wastes as the other proposed wastes could have required further treatment to make them suitable to be burnt at the Installation.

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

- (i) the wastes are all categorised as non-hazardous in the European Waste Catalogue and are capable of being safely burnt at the installation.
- (ii) these wastes are likely to be within the design calorific value (CV) range for the plant;
- (iii) these wastes are unlikely to contain harmful components that cannot be safely processed at the Installation.
- (iv) These wastes will not require any further treatment at the site.

We have limited the capacity of the Installation to 86,400 tonnes per annum. This is based on the installation operating 8,000 hours per year at a nominal capacity of 10.8 tonnes per hour. This is the design capacity of the installation applied for by the Applicant.

The Installation will be designed, constructed and operated using BAT for the incineration of the permitted wastes. We are satisfied that the operating and abatement techniques are BAT for incinerating these types of waste. Our assessment of BAT is set out later in this document.

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

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

1. The use of energy within, and generated by, the Installation which are normal aspects of all EPR permit determinations. This issue is dealt with in this section.
2. The extent to which the Installation meets the requirements of Article 50(5) of the IED, which requires “*the heat generated during the incineration and co-incineration process is recovered as far as practicable through the generation of heat, steam or power*”. This issue is covered in this section.
3. The combustion efficiency and energy utilisation of different design options for the Installation are relevant considerations in the determination of BAT for the Installation, including the Global Warming Potential of the different options. This aspect is covered in the BAT assessment in section 6 of this Decision Document.
4. The extent to which the Installation meets the requirement of Article 14(5) of the Energy Efficiency Directive which requires new thermal electricity generation installations with a total thermal input exceeding 20 MW to carry out a cost-benefit assessment to “*assess the cost and benefits of providing for the operation of the installation as a high-efficiency cogeneration installation*”.
Cogeneration means the simultaneous generation in one process of thermal energy and electrical or mechanical energy and is also known as combined heat and power (CHP).
High-efficiency co-generation is cogeneration which achieves at least 10% savings in primary energy usage compared to the separate generation of heat and power – see Annex II of the Energy Efficiency Directive for detail on how to calculate this.

(ii) Use of energy within the Installation

Having considered the information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that energy is used efficiently within the Installation.

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

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

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

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 130 kWh/tonne. The installation capacity is 86,400 t/a.

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 14.275 MJ/kg. Taking account of the difference in LCV, the specific energy consumption in the Application is in line with that set out above.

(iii) Generation of energy within the Installation - Compliance with Article 50(5) of the IED

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

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

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

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

The BREF says that 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 only and has been specified to maximise electrical output with little or no use of waste heat. The Sankey diagram in section B1 of the Application shows 11.68 MW of electricity produced for an annual burn of 86,400 tonnes, which represents 13.52 MW per 100,000 tonnes/yr of waste burned (1.08 MWh/tonne of waste). The Installation is therefore above the upper figure of the indicative BAT range.

The SGN and Chapter IV of the IED both require that, as well as maximising the primary use of heat to generate electricity; waste heat should be recovered as far as practicable. The operator has stated that there are no immediate high value heat neighbours which provide an economically viable heat export opportunity. The turbine has the capacity to be modified to operate in CHP mode and steam could be diverted to heat exchangers if required, but that the likely operating mode will be power only.

The location of the Installation largely determines the extent to which waste heat can be utilised, and this is a matter for the planning authority.

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

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

(iv) R1 calculation and the DEFRA Good Quality CHP Scheme

The R1 calculation 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.

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

(v) Choice of Steam Turbine

The Applicant has stated that the steam turbine will be a TGM Kanis CT32, with a steam inlet flow of 47.619 t/hr (398°C, 43 bar(a)).

The Applicant has chosen the steam cycle turbine as it can operate on low quality, low CV gas and the gas does not need further conditioning. There is up to 29% process efficiency which can be improved with the addition of low grade heat recovery. This system is highly flexible and steam can be raised by many gas combinations and or auxiliary firing if required. This is well proven technology and when maintained correctly gives good reliability.

(vi) Choice of Cooling System

The Applicant has chosen an Air Cooled Condenser (ACC) to condense the steam exiting the turbine. This will have a steam inlet flow of 40 t/hr (41.5°C at 0.08 bar(a)), minimum flow rate 17.2 t/hr. Low pressure steam from the turbine exhaust will flow towards the ACC through an exhaust duct which includes a hot well to prevent any condensate flowing back into the turbine. Condensate will be pumped to a condensate tank before being returned to the boiler de-aerator for reuse. There are no cooling towers, and therefore no use of biocides or releases to land.

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

The applicant has carried out an assessment of the potential for operating the installation as a high-efficiency cogeneration installation and has concluded that this will not be possible because there are no opportunities identified within 15 km of the installation and we agree with the applicant's assessment. Therefore no cost benefit assessment is required.

(viii) Permit conditions concerning energy efficiency

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

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

The Operator is required to report energy usage and energy generated under condition 4.2 and Schedule 5. The following parameters are required to be reported: total electrical energy generated; electrical energy exported; total energy usage and energy exported as heat (if any). Together with the total MSW burned per year, this will enable the Environment Agency to monitor energy recovery efficiency at the Installation and take action if at any stage the energy recovery efficiency is less than proposed.

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

4.3.8 Efficient use of raw materials

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

The Operator is required to report with respect to raw material usage under condition 4.2 and Schedule 4, including consumption of limestone, lime, activated carbon and urea used per tonne of waste burned. This will enable the Environment Agency to assess whether there have been any changes in the efficiency of the air pollution control plant, and the operation of the SNCR and SCR to abate NO_x. These are the most significant raw materials that will be used at the Installation, other than the waste feed itself (addressed elsewhere). The efficiency of the use of auxiliary fuel will be tracked separately as part of the energy reporting requirement under condition 4.2.2. Optimising reagent dosage for air abatement systems and minimising the use of auxiliary fuels is further considered in the section on BAT.

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

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

The first objective is to avoid producing waste at all. Waste production will be avoided by achieving a high degree of burnout of the ash in the furnace, which results in a material that is both reduced in volume and in chemical reactivity. Condition 3.1.3 and associated Table S3.5 specify limits for total organic carbon (TOC) of <3% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable.

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

Air pollution control (APC) residues from flue gas treatment are hazardous waste and therefore must be sent for disposal to a landfill site permitted to accept hazardous waste, or to an appropriately permitted facility for hazardous

waste treatment. The amount of APC residues is minimised through optimising the performance of the air emissions abatement plant.

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

The Application states that metal will be recovered from the bottom ash by the use of a magnetic separator and sent for recycling. The Application also proposes that, where possible, bottom ash will be transported to a suitable recycling facility, from where it could be re-used in the construction industry as an aggregate.

Having considered the information submitted in the Application, we are satisfied that the waste hierarchy referred to in Article 4 of the WFD will be applied to the generation of waste and that any waste generated will be treated in accordance with this Article.

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

5. Minimising the Installation’s environmental impact

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

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

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

5.1 Assessment Methodology

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

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

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

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

5.1.2 Use of Air Dispersion Modelling

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

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

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 than the AAD value. In such cases, we use the AQS objective for our assessment.

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

for harm and any significant contribution to a breach is likely to be unacceptable.

PCs are 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 threshold provides a substantial safety margin to protect health and the environment.

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

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

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

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

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

5.2 Assessment of Impact on Air Quality

The Applicant's assessment of the impact of air quality is set out in section 7 of the Application. The assessment comprises:

- A screening assessment using the Environment Agency screening tool of emissions to air from the operation of the incinerator.
- Dispersion modelling of emissions to air from the operation of the incinerator.
- A study of the impact of emissions on nearby sensitive habitat / conservation sites.

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

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the Breeze AERMOD 7 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 Wainfleet between 2010 and 2014. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

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

- First, they assumed that the ELVs in the Permit would be the maximum permitted by Article 46(2) and Annex VI of the IED. These substances are:
 - Oxides of nitrogen (NO_x), expressed as NO₂
 - Total dust
 - Carbon monoxide (CO)
 - Sulphur dioxide (SO₂)
 - Hydrogen chloride (HCl)
 - Hydrogen fluoride (HF)
 - Metals (Cadmium, Thallium, Mercury, Antimony, Arsenic, Lead, Chromium, Cobalt, Copper, Manganese, Nickel and Vanadium)
 - Polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans (referred to as dioxins and furans)
 - Gaseous and vaporous organic substances, expressed as Total Organic Carbon (TOC)
- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term ELVs, i.e. the maximum permitted emission rate (except for emissions of chromium, which is considered in section 5.2.3 of this decision document).
- Third, the model also considered emissions of pollutants not covered by Annex VI of IED, specifically ammonia (NH₃), polycyclic aromatic hydrocarbons (PAH) and Polychlorinated biphenyls (PCBs). Emission rates

used in the modelling have been drawn from data in the Waste Incineration BREF and are considered further in section 5.2 2 (iv).

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

The applicant has used the following data sources to establish the background (or existing) air quality against which to measure the potential impact of the incinerator. We have accepted the background data used by the Applicant in their assessment as reasonable.

Boston Borough Council (BBC) monitors ambient NO₂ concentrations in Boston via a network of passive diffusion tubes. The majority of the tubes are located within the designated AQMAs, however two tubes are situated well away from main roads to provide an indication of background concentrations in the town. A summary of annual mean NO₂ concentrations was obtained from BBC's 2015 Updating and Screening Assessment and has been adjusted for laboratory bias adjusted using national factors.

The data indicate that annual mean concentrations within the Haven Bridge AQMA continue to exceed the air quality objective of 40 µg/m³. At the background monitoring sites, the concentrations are substantially lower. The maximum concentration measured since 2011 is 22.4 µg/m³. This concentration is assumed to represent background at the site and the identified discrete sensitive receptors, except the AQMA. Within the AQMA, it is assumed that existing baseline concentration exceeds the air quality objective.

Background concentrations of CO, PM₁₀, PM_{2.5}, SO₂ and benzene have been obtained from the Defra UK Background Air Pollution maps for use in the assessment.

Monitoring of Hydrogen Chloride is carried out as part of the Defra Acid Gases and Aerosols Network (AGANET). The 2010 to 2012 UK average HCl concentration of 0.24 µg/m³ is used.

Monitoring of ambient levels of hydrogen fluoride is not currently carried out in the UK. The Expert Panel on Air Quality Standards (EPAQS) report on halogen and hydrogen halides in ambient air cites a modelling study which suggests that the typical natural background HF concentration is 0.5 µg/m³, with an elevated background of 3 µg/m³ where there are local anthropogenic emission sources. The UK Pollutant Release Transfer Register indicates that there are no significant sources of HF in the local area and since the site is in a relatively rural area, the concentration of 0.5 µg/m³ is applicable.

Trace metal concentrations that occur in the UK measured at rural and urban sites between 2008 and 2011 were considered. UK average urban concentrations were used as reasonably representative of the baseline trace metal concentrations. For screening purposes the Applicant assumed that Cr(VI) comprises 20% of the total background chromium. On this basis the

urban average Cr(VI) concentration substantially exceeds the EAL. Cr(VI) is discussed further below.

Monitoring of PCDD/Fs is currently carried out by Defra as part of the Toxic Organic Micropollutants (TOMPs) Network. The average urban background concentration measured from 2008 to 2010 is 28.8 fg/m³ and is assumed to be representative of the baseline dioxin and furan concentration.

Monitoring of benzo(a)pyrene (BaP) is currently carried out by DEFRA at a number of locations in the UK as part of the TOMPS and PAH monitoring and analysis network. The average urban background concentration of 0.062 ng/m³ is assumed to provide a reasonable estimate of the background concentration.

Monitoring of PCBs is currently carried out by DEFRA at six locations in the UK as part of the TOMPs Network. The average PCB concentration measured at the urban background monitoring sites from 2008 to 2010 is 0.00044 µg/m³ and is assumed to be reasonably representative of the back.

Monitoring of ammonia concentrations is carried out as part of the National Ammonia Monitoring Network (NAMN). The Air Pollution Information Service, (APIS) uses the measured concentrations to estimate UK concentrations at a 5 km grid resolution. The three year average (2012– 2014) concentration for the grid square containing the Site is 1.6 µg/m³.

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

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

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

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

5.2.1 Assessment of Air Dispersion Modelling Outputs

The Applicant's modelling predictions are summarised in the tables below.

The Applicant's modelling predicted peak ground level exposure to pollutants in ambient air and at discreet receptors. The tables below show the ground level concentrations at the most impacted receptor.

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

Assessment of Emissions to Air

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m ³			µg/m ³	µg/m ³	% of EAL	µg/m ³
NO ₂	40	1	22.4	0.45	1.13	22.9	57.1
	200	2	44.8	6.6	3.3	51.4	25.7
PM ₁₀	40	1	18.1	0.032	0.08	18.1	45.3
	50	3	21.4	0.1	0.20	21.5	43.0
PM _{2.5}	25	1	10.6	0.032	0.13	10.63	42.5
SO ₂	266	4	7	13	4.9	20	7.5
	350	5	5.2	9.1	2.60	14.3	4.1
	125	6	3.1	1.2	1.0	4.3	3.4
HCl	750	7	0.48	3.4	0.4533333	3.9	0.52
HF	16	8	0.5	0.0071	0.04	0.507	3.17
	160	7	1	0.23	0.14375	1.23	0.8
CO	10000	9	161	2.2	0.02	163	1.6
	30000	10	230	5.6	0.02	236	0.8
TOC	5	1	0.24	0.032	0.64	0.272	5.44
PAH	0.00025	1	0.00033	0.0000032	1.28	0.000333	133.3
NH ₃	180	1	1.6	0.016	0.01	1.62	0.90
	2500	10	3.2	0.28	0.01	3.48	0.1
PCBs	0.2	1	0.00044	0.000016	0.01	0.00046	0.23
	6	10	0.00088	0.00028	0.005	0.00116	0.02
Dioxins			2.88E-08	3.20E-07		3.49E-07	

TOC as benzene

PAH as benzo[a]pyrene

1 - Annual Mean

2 - 99.79th %ile of 1-hour means

3 - 90.41st %ile of 24-hour means

4 - 99.9th %ile of 15-min means

5 - 99.73rd %ile of 1-hour means

6 - 99.18th %ile of 24-hour means

7 - 1-hour average

8 - Monthly average

9 - Maximum daily running 8-hour mean

10 - 1-hour maximum

Assessment of Emissions to Air - Metals

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	$\mu\text{g}/\text{m}^3$			$\mu\text{g}/\text{m}^3$	% of EAL	$\mu\text{g}/\text{m}^3$	% of EAL
Cd	0.005	1	0.0003	0.00017	3.4	0.00047	9.4
Tl			No data	0.00017		-	
Hg	0.25	1	0.002	0.00017	0.07	0.00217	0.87
	7.5	2	0.004	0.003	0.04	0.00700	0.093
Sb	5	1	No data	0.0017	0.03	-	-
	150	2	No data	0.03	0.02	-	-
Pb	0.25	1	0.014	0.0017	0.68	0.01570	6.28
Co			0.0042	0.03		0.03420	
Cu	10	1	0.017	0.0017	0.02	0.0187	0.187
	200	2	0.034	0.03	0.02	0.06400	0.032
Mn	0.15	1	0.013	0.0017	1.13	0.0147	9.80
	1500	2	0.026	0.03	0.00	0.05600	0.0037
V	5	1	0.0017	0.0017	0.03	0.0034	0.07
	1	3	0.002	0.018	1.80	0.02000	2.00
As	0.003	1	0.00068	0.0017	56.67	0.00238	79.3
Cr (II)(III)	5	1	0.0034	0.0013	0.03	0.00470	0.094
	150	2	0.0068	0.006	0.00	0.01280	0.0085
Cr (VI)	0.0002	1	0.00085	0.00033	165.00	0.00118	590.0
Ni	0.02	1	0.0038	0.0017	8.50	0.00550	27.5

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

(i) Screening out emissions which are insignificant

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

- PM₁₀, PM_{2.5}, SO₂, HCl, HF, CO, NH₃, TOC, PCBs, Dioxins, Hg, Sb, Pb, Cu, V, Cr (II)(III).

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

(ii) Emissions unlikely to give rise to significant pollution

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

- NO₂, Cd, Mn, As, Ni.

For these emissions, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the Best Available Techniques to prevent and

minimise emissions of these substances. This is reported in section 6 of this document.

(iii) Emissions requiring further assessment

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

- PAH, Cr (VI).

There are considered further in 5.2.2 below. For these emissions, the Applicant has argued that the process contribution to the Predicted Environmental Concentration is negligible. As part of our detailed audit of the Applicant's modelling assessment, we agree with the Applicant's conclusions in this respect taking modelling uncertainties into account.

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

We have also carefully considered whether additional measures are required above what would normally be considered BAT in order to prevent significant pollution. Consideration of additional measures to address the pollution risk from these substances is set out in section 5.2.4.

5.2.2 Consideration of key pollutants

(i) Nitrogen dioxide (NO₂)

The impact on air quality from NO₂ emissions has been assessed against the ES of 40 µg/m³ as a long term annual average and a short term hourly average of 200 µg/m³. The model assumes a 70% NO_x to NO₂ conversion for the long term and 35% for the short term assessment in line with Environment Agency guidance on the use of air dispersion modelling.

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

(ii) Particulate matter PM₁₀ and PM_{2.5}

The impact on air quality from particulate emissions has been assessed against the ES for PM₁₀ (particles of 10 microns and smaller) and PM_{2.5} (particles of 2.5 microns and smaller). For PM₁₀, the ES are a long term annual average of 40 µg/m³ and a short term daily average of 50 µg/m³. For PM_{2.5} the ES of 25 µg/m³ as a long-term annual average to be achieved by 2010 as a Target Value and by 2015 as a Limit Value has been used.

The Applicant's predicted impact of the Installation against these ESs is shown in the tables above. The assessment assumes that **all** particulate emissions are present as PM₁₀ for the PM₁₀ assessment and that **all** particulate emissions are present as PM_{2.5} for the PM_{2.5} assessment.

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

- It assumes that the plant emits particulates continuously at the IED Annex VI limit for total dust, whereas actual emissions from similar plant are normally lower.
- It assumes all particulates emitted are below either 10 microns (PM₁₀) or 2.5 microns (PM_{2.5}), when some are expected to be larger.

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

The above assessment shows that the predicted process contribution for emissions of PM₁₀ is below 1% of the long term ES and below 10% of the short term ES and so can be screened out as insignificant. Therefore we consider the Applicant's proposals for preventing and minimising the emissions of particulates to be BAT for the Installation.

There is currently no emission limit prescribed nor any continuous emissions monitor for particulate matter specifically in the PM₁₀ or PM_{2.5} fraction. Whilst the Environment Agency is confident that current monitoring techniques will capture the fine particle fraction (PM_{2.5}) for inclusion in the measurement of total particulate matter, an improvement condition (IC1) has been included that will require a full analysis of particle size distribution in the flue gas, and hence determine the ratio of fine to coarse particles. In the light of current knowledge and available data however the Environment Agency is satisfied that the health of the public would not be put at risk by such emissions, as explained in section 5.3.3.

(iii) Acid gases, SO₂, HCl and HF

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

There is no long term EAL for SO₂ for the protection of human health. Protection of ecological receptors from SO₂ for which there is a long term ES is considered in section 5.4.

Emissions of SO₂ can also be screened out as insignificant in that the short term process contribution is also <10% of each of the three short term ES

values. Therefore we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the Installation.

(iv) Emissions to Air of CO, VOCs, PAHs, PCBs, Dioxins and NH₃

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

The Applicant has used the ES for benzene rather than 1,3 butadiene for their assessment of the impact of VOC. This is based on 1,3 butadiene having the lowest ES of organic species likely to be present in VOC (other than PAH, PCBs, dioxins and furans). However we are happy that the use of benzene is reasonably representative and is a precautionary approach. We checked the PC of TOC expressed as 1,3 butadiene and this also screens out as insignificant.

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

The Applicant has used the ES for benzo[a]pyrene (BaP) for their assessment of the impact of PAH. We agree that the use of the BaP ES is sufficiently precautionary. The above tables show that for PAH emissions, the peak long term PC is 1.3% of the ES and therefore cannot be screened out as insignificant. However the Applicant has made some conservative assumptions. PAHs have been assessed as BaP at an emission concentration of 0.001 mg/Nm³ from the Waste Incineration BREF document. The annual average measured at European municipal waste incinerators is <0.001 mg/Nm³, therefore the actual emission is likely to be less than the applicant's assumed emission concentration. Their assumed background concentration is 0.33 ng/m³, the UK average for urban areas between 2010 and 2012. The UK Air Quality Objective is 0.25 ng/m³, indicating the UK average background already exceeds in urban environments. The average rural background is 0.062 ng/m³ indicating some headroom. The main factor leading to elevated BaP emissions in urban areas is road traffic. There are no major road networks close to the site or the sensitive receptors, as a result the applicant's background is also likely to be conservative. The predicted maximum in the grid and at receptor is 1.3% of the objective. While this is not less than 1%, considering the conservative emission concentration and the modelling uncertainties this is not considered significant.

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

From the tables above all the other emissions can be screened out as insignificant in that the process contribution is <1% of the long term ES and <10% of the short term ES, except for benzo[a]pyrene (BaP) where the PC is 1.3% of the long term EAL. Even so, from the table above, the emission is not expected to result in the ES being exceeded.

The ammonia emission is based on a release concentration of 5 mg/m³. We are satisfied that this level of emission is consistent with the operation of a well controlled SNCR NO_x abatement system.

The ammonia emission is based on a release concentration of 5 mg/m³. The Applicant has justified the use of this release concentration as follows:

- NO_x control and reduction is achieved through a combination of SNCR and post combustion SCR.
- Urea is only used to control NO_x emissions within the primary NO_x control (SNCR) aspect of the plant.
- Further reduction is achieved through the use of SCR, which reduces the post combustion NO_x concentrations of the flue gas.
- The SNCR has been configured to the extent that a bulk of the NO_x reduction (approx. 50-60%) is achieved within the combustion stage.
- Operating the plant in this manner ensures that process chemistry is optimised to ensure a relatively low level of ammonia slip occurs and avoids wasting urea in an attempt to provide greater levels of NO_x reduction at this stage.
- The use of SCR catalyst to further treat the flue gas achieves a very high level of NO_x reduction 95%, without the need for further urea injection.
- The system operators have provided re-assurance that the configuration of the plant in this manner will reliably abate NO_x to below 200 mg/Nm³ and will ensure that ammonia slip is reduced to below 5 mg/Nm³.
- Single stage NO_x reduction using either SNCR or SCR would not be able to achieve either of the above requirements.

We are satisfied that this level of emission is consistent with the operation of a well-controlled SNCR and SCR NO_x abatement system.

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

(v) Summary

For the above emissions to air, for those emissions that do not screen out, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the BAT to prevent and minimise emissions of these substances. This is reported in section 6 of this document. Therefore we consider the Applicant's proposals for preventing and minimising emissions to be BAT for the Installation. Dioxins and furans are considered further in section 5.3.2.

5.2.3 Assessment of Emission of Metals

The Applicant has assessed the impact of metal emissions to air, as previously described.

Annex VI of IED sets three limits for metal emissions:

- An emission limit value of 0.05 mg/m³ for mercury and its compounds (formerly WID group 1 metals).
- An aggregate emission limit value of 0.05 mg/m³ for cadmium and thallium and their compounds (formerly WID group 2 metals).
- An aggregate emission limit of 0.5 mg/m³ for antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium and their compounds (formerly WID group 3 metals).

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

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

- Mercury, Antimony, Lead, Copper, Vanadium, Chromium (II)(III).

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

- Cadmium, Antimony, Manganese, Arsenic, Nickel.

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

Where Annex VI of the IED sets an aggregate limit, the Applicant's assessment assumes that each metal is emitted individually at the relevant aggregate emission limit value. This is something which can never actually occur in practice as it would inevitably result in a breach of the said limit, and so represents a very much worst case scenario.

For Chromium (VI) the Applicant Used representative emissions data from other municipal waste incinerators using our guidance note "Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – version 3". This guidance has been replaced by version 4, but our assessment using version 4 has shown the Applicant's assessment to be valid.

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

Chromium (VI) is not specifically referenced in Annex VI of IED, which includes only total Chromium as one of the nine Group 3 metals, the impact of which has been assessed above. The EPAQS guidelines refer only to that portion of the metal emissions contained within PM₁₀ in ambient air. The guideline for Chromium (VI) is 0.2 ng/m³.

- Measurement of Chromium (VI) at the levels anticipated at the stack emission points is expected to be difficult, with the likely levels being below the level of detection by the most advanced methods. We have considered the concentration of total chromium and chromium (VI) in the APC residues collected upstream of the emission point for existing Municipal Waste incinerators and have assumed these to be similar to the particulate matter released from the emission point. This data shows that the mean Cr(VI) emission concentration (based on the bag dust ratio) is $3.5 * 10^{-5}$ mg/m³ (max $1.3 * 10^{-4}$).

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

The Applicant has used the above data to model the predicted Cr(VI) impact. The maximum PC is predicted as 0.22% of the EAL.

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

5.2.4 Consideration of Local Factors

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

Boston Borough Council has declared 2 Air Quality Management Areas (AQMAs) with respect to NO₂. These are located as follows:

- Boston AQMA (called Haven Bridge in the application)
- Bargate Bridge AQMA

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

Assessment of Emissions to Air - NO₂ in AQMA

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m ³			µg/m ³	µg/m ³	% of EAL	µg/m ³
NO ₂	40	1	22.4	0.062	0.15	22.5	56.3
	200	2	44.8	3.2	1.6	48.0	22.4

1 - Annual Mean

2 - 99.79th %ile of 1-hour means

From the Applicants model, the process contribution at all points within Boston AQMA is predicted to be well below 1% or 10% of the relevant ES and can be considered insignificant. Bargate Bridge AQMA was not within the modelled domain, being further from the installation than the Boston AQMA, and impacts can therefore also be considered insignificant.

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

5.3 Human health risk assessment

5.3.1 Our role in preventing harm to human health

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

i) Applying Statutory Controls

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

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

ii) Environmental Impact Assessment

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

iii) Expert Scientific Opinion

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

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

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

HPA (now **PHE**) in 2009 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”. In January 2012 PHE confirmed they would be undertaking a study to look for evidence of any link between municipal waste incinerators and health outcomes including low birth weight, still births and infant deaths. Their current position that modern, well run municipal waste incinerators are not a significant risk to public health remains valid. The study will extend the evidence base and provide the public with further information.

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

The **British Society for Ecological Medicine (BSEM) published a report in 2005** on the health effects associated with incineration and concluded that “Large studies have shown higher rates of adult and childhood cancer and also birth defects around municipal waste incinerators: the results are consistent with the associations being causal. A number of smaller epidemiological studies support this interpretation and suggest that the range of illnesses produced by incinerators may be much wider. Incinerator emissions are a major source of fine particulates, of toxic metals and of more than 200 organic chemicals, including known carcinogens, mutagens, and hormone disrupters. Emissions also contain other unidentified compounds whose potential for harm is as yet unknown, as was once the case with dioxins. Abatement equipment in modern incinerators merely transfers the toxic load, notably that of dioxins and heavy metals, from airborne emissions to the fly ash. This fly ash is light, readily windborne and mostly of low particle size. It represents a considerable and poorly understood health hazard.”

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

material. In view of these shortcomings, the report's conclusions with regard to the health effects of incineration are not reliable.”

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

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

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

iv) Health Risk Models

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

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

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

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

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

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

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

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

Our recommended approach is therefore the use of the methodology set out in our guidance for comparison for most pollutants (including metals) and dioxin intake model using the HHRAP model as described above for dioxins, furans

and dioxin like PCBs. Where an alternative approach is adopted for dioxins, we check the predictions ourselves.

v) Consultations

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

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

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

The human health risk assessment calculates the dose of dioxins and furans that would be received by local receptors if their food and water were sourced from the locality where the deposition of dioxins, furans and dioxin like PCBs is predicted to be the highest. This is then assessed against the Tolerable Daily Intake (TDI) levels established by the COT of 2 picograms I-TEQ / Kg bodyweight/ day.

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

Receptor	adult	child
Farmer East 1	0.0017	0.0025
Farmer East 2	0.00068	0.0010
Farmer East 3	0.00067	0.0010
Farmer North 1	0.0023	0.0034
Farmer North 2	0.0023	0.0034
Farmer North 3	0.0022	0.0032
Farmer West 1	0.00080	0.0012
Farmer West 2	0.00081	0.0012
Resident Bladon	0.000052	0.00016
Resident Boston 1	0.000015	0.000044
Resident Boston 2	0.000013	0.000038
Resident Fishtoft 1	0.000032	0.000097
Resident Fishtoft 2	0.000031	0.000094
Resident Marsh Lane 1	0.000036	0.00011
Resident Marsh Lane 2	0.000036	0.00011
Resident Marsh Lane 3	0.000036	0.00011
Resident Skirbeck 1	0.00013	0.00040
Resident Skirbeck 2	0.000071	0.00022
Resident Skirbeck Quarter 1	0.000030	0.000090
Resident Skirbeck Quarter 2	0.000030	0.000090
Resident South End 1	0.000013	0.000040

Receptor	adult	child
Resident South End 2	0.000013	0.000038
Resident Wyberton 1	0.000019	0.000057
Resident Wyberton 2	0.0000084	0.000025
Resident Wyberton East	0.000014	0.000042

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

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

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

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

5.3.3 Particulates smaller than 2.5 microns

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

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

The HPA (now PHE) addresses the issue of the health effects of particulates in their September 2009 statement 'The Impact on Health of Emissions to Air from Municipal Incinerators'. It refers to the coefficients linking PM₁₀ and PM_{2.5} with effects on health derived by COMEAP and goes on to say that if these coefficients are applied to small increases in concentrations produced, locally, by incinerators; the estimated effects on health are likely to be small. PHE note that the coefficients that allow the use of number concentrations in impact calculations have not yet been defined because the national experts have not judged that the evidence is sufficient to do so. This is an area being kept under review by COMEAP.

In December 2010, COMEAP published a report on The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom. It says that "a policy which aims to reduce the annual average concentration of PM_{2.5} by 1 µg/m³ would result in an increase in life expectancy of 20 days for people born in 2008." However, "The Committee stresses the need for careful interpretation of these metrics to avoid incorrect inferences being drawn – they are valid representations of population aggregate or average effects, but they can be misleading when interpreted as reflecting the experience of individuals."

PHE also point out that in 2007 incinerators contributed 0.02% to ambient ground level PM₁₀ levels compared with 18% for road traffic and 22% for industry in general. PHE noted that in a sample collected in a day at a typical urban area the proportion of PM_{0.1} is around 5-10% of PM₁₀. It goes on to say that PM₁₀ includes and exceeds PM_{2.5} which in turn includes and exceeds PM_{0.1}.

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

We take the view, based on the foregoing evidence, that techniques which control the release of particulates to levels which will not cause harm to human health will also control the release of fine particulate matter to a level which will not cause harm to human health.

5.3.4 Assessment of Health Effects from the Installation

We have assessed the health effects from the operation of this installation in relation to the above (sections 5.3.1 to 5.3.3). We have applied the relevant

requirements of the national and European legislation in imposing the permit conditions. We are satisfied that compliance with these conditions will ensure protection of the environment and human health.

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

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

The Applicant’s assessment of the impact from Particulate Matter, Sulphur Dioxide, Hydrogen Chloride, Hydrogen Fluoride, Carbon Monoxide, Ammonia, Total Organic Carbon, PCBs, Dioxins, Mercury, Antimony, Lead, Copper, Vanadium and Chromium II/III have all indicated that the Installation emissions screen out as insignificant. Where the impact of emissions of Nitrogen Oxides, Cadmium, Manganese, Arsenic and Nickel have not been screened out as insignificant, the assessment still shows that the predicted environmental concentrations are well within air quality standards or environmental action levels. Further assessment of PAH and Chromium VI was required and this assessment indicates that the emission of these substances will not give rise to significant pollution.

The Environment Agency has reviewed the methodology employed by the Applicant to carry out the health impact assessment. The maximum predicted PC for dioxins and furans and dioxin-like PCBs is less than 1% of the Committee on Toxicity (COT) tolerable daily intake (TDI) and can therefore be concluded to not be significant.

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

Public Health England and the Local Authority Director of Public Health were consulted on the Application and concluded that they had no significant concerns regarding the risk to the health of humans from the installation. The Food Standards Agency was also consulted during the permit determination process and it concluded that it is unlikely that there will be any unacceptable effects on the human food chain as a result of the operations at the Installation. Details of the responses provided by Public Health England, the Local Authority Director of Public Health and the FSA to the consultation on this Application can be found in Annex 2.

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

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

5.4.1 Sites Considered

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

- The Wash & North Norfolk Coast SAC, Designation Reference: UK0017075;
- The Wash SPA, Designation Reference: UK9008021;
- The Wash Ramsar Site, Designation Reference: UK11072.

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

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

- Local Nature Reserve Name: Havenside
- Local Wildlife Site Name: Slippery Gowt Sea Bank
- Local Wildlife Site Name: Havenside
- Local Wildlife Site Name: South Forty Foot Drain

5.4.2 Habitats Assessment

The Applicant's Habitats assessment was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that there would be no likely significant effect on the interest features of the protected sites.

The predicted PCs at The Wash and North Norfolk Coast SAC and The Wash SPA and Ramsar are insignificant against site relevant critical levels and nutrient nitrogen and acid deposition critical loads. At other conservation sites, such as nearby local wildlife sites the PCs are well below the significant pollution threshold the critical levels and critical loads. Natural England were consulted on the assessment in line with our working together arrangements – see section 7.3.1.

Predicted impacts at The Wash and North Norfolk Coast SAC and The Wash SPA/Ramsar

Pollutant	ES / EAL (µg/m ³)	Back-ground (µg/m ³)	Process Contribution (PC) (µg/m ³)	PC as % of ES	Predicted Environmental Concentration (PEC) (µg/m ³)	PEC as % ES
Direct Impacts ⁽¹⁾						
NO _x Annual	30	14.4	0.059	0.20%	14.5	48.0%
NO _x	75		1.0	1.30%	18.0	23.9%

Pollutant	ES / EAL (µg/m ³)	Back-ground (µg/m ³)	Process Contribution (PC) (µg/m ³)	PC as % of ES	Predicted Environmental Concentration (PEC) (µg/m ³)	PEC as % ES
Daily Mean						
SO ₂	20	1.4	0.015	0.074%	1.4	6.9%
Ammonia	3	0.74	0.0015	0.049%	0.74	24.7%
HF Weekly Mean	0.5	0.5	0.00076	0.13%	0.5	100%
HF Daily Mean	5	0.5	0.0065	0.15%	0.6	11.9%
Deposition Impacts ⁽¹⁾						
N Deposition (kg N/ha/yr)	20	13.7	0.016	0.081%	13.8	68.8%
Acidification (Keq/ha/yr)	n/a ⁽²⁾	-	-	-	-	-

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

(2) The Applicant has stated that the primary sensitive habitat which are likely to be affected by emissions from the installation is coastal saltmarsh which are not sensitive to acidity. See discussion below.

The Applicant has stated that the primary sensitive habitat which is likely to be affected by emissions from the installation is coastal saltmarsh which is not sensitive to acidity. There are no Critical Load Functions for coastal saltmarsh within APIS as inter-tidal habitats experience large influxes of nutrients and any acidifying effects are likely to be very small. Our check of APIS showed that Acidity critical loads are assigned for Eurasian Curlew for acid grassland. However our assessment is that the SAC features are not sensitive to acid according to APIS at the location of greatest impact. For the SPA our assessment shows the PC is well below 1%, using the applicant's acid concentration PC predictions and following AQTAG06 method to calculate the acid deposition. We have therefore concluded that any acid deposition PC will be insignificant.

The daily NO_x PC is >1%. However the PEC is well below ES, so the conclusion is that there is no likely significant effect.

5.4.3 Assessment of other conservation sites

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

conservation sites together and hence help to maintain the UK's biodiversity resilience.

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

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

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

Predicted impacts at other conservation sites

Pollutant	ES / EAL ($\mu\text{g}/\text{m}^3$)	Process Contribution (PC) ($\mu\text{g}/\text{m}^3$)	PC as % of ES
NO_x Annual			
Havenside LWS/LNR	30	0.66	2.20%
South Forty Foot Drain LWS		0.01	0.32%
Slippery Gowt Sea Bank LWS		0.66	2.20%
NO_x Daily Mean			
Havenside LWS/LNR	75	5.6	7.40%
South Forty Foot Drain LWS		2.8	3.80%
Slippery Gowt Sea Bank LWS		5.6	7.40%
SO₂			
Havenside LWS/LNR	20	0.17	0.83%
South Forty Foot Drain LWS		0.024	0.12%
Slippery Gowt Sea Bank LWS		0.17	0.83%
Ammonia			
Havenside LWS/LNR	3	0.017	0.55%
South Forty Foot Drain LWS		0.0024	0.08%
Slippery Gowt Sea Bank LWS		0.017	0.55%
HF Weekly Mean			
Havenside LWS/LNR	0.5	0.0072	0.70%
South Forty Foot Drain LWS		0.0016	0.30%
Slippery Gowt Sea Bank LWS		0.0072	0.70%
HF Daily Mean			
Havenside LWS/LNR	5	0.035	1.40%
South Forty Foot Drain LWS		0.015	0.31%
Slippery Gowt Sea Bank LWS		0.035	1.40%
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Predicted impacts at other sites – Eutrophication and Acidification

Pollutant	Critical Load	Process Contribution (PC)	PC as % of ES
N deposition (kg N/ha/yr)			
Havenside LWS/LNR	20	0.18	0.91%
South Forty Foot Drain LWS		0.026	0.13%
Slippery Gowt Sea Bank LWS		0.18	0.91%
Acid Deposition			
Havenside LWS/LNR	n/a ⁽¹⁾	-	-
South Forty Foot Drain LWS		-	-
Slippery Gowt Sea Bank LWS		-	-

(1) The primary sensitive habitat which are likely to be affected by emissions from the Proposed Development is coastal saltmarsh. There are no CLFs for coastal saltmarsh within APIS as inter-tidal habitats experience large influxes of nutrients and any acidifying effects are likely to be very small.

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

5.5 Impact of abnormal operations

Article 50(4)(c) of IED requires that waste incineration and co-incineration plants shall operate an automatic system to prevent waste feed whenever any of the continuous emission monitors show that an emission limit value (ELV) is exceeded due to disturbances or failures of the purification devices. Notwithstanding this, Article 46(6) allows for the continued incineration and co-incineration of waste under such conditions provided that this period does not (in any circumstances) exceed 4 hours uninterrupted continuous operation or the cumulative period of operation does not exceed 60 hours in a calendar year. This is a recognition that the emissions during transient states (e.g. start-up and shut-down) are higher than during steady-state operation, and the overall environmental impact of continued operation with a limited exceedance of an ELV may be less than that of a partial shut-down and re-start.

For incineration plant, IED sets backstop limits for particulates, CO and TOC which must continue to be met at all times. The CO and TOC limits are the same as for normal operation, and are intended to ensure that good combustion conditions are maintained. The backstop limit for particulates is 150 mg/m³ (as a half hourly average) which is five times the limit in normal operation.

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

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

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

- Dioxin emissions of 0.1 ng/m³.
- Mercury emissions of 0.03 mg/m³ (emission concentration is predicted value based on fuel type and expected concentration during normal operations).
- NO_x emissions of 305 mg/m³ (emission concentration is predicted value based on fuel type and expected concentration during normal operations).
- Particulate emissions of 150 mg/m³ (5 x normal).
- Metal emissions other than mercury are 10 times those of normal operation.
- SO₂ emissions of 79 mg/m³ (emission concentration is predicted value based on fuel type and expected concentration during normal operations).
- HCl emissions of 160 mg/m³ (2.67 x normal).
- PCBs 3.0x10⁻¹¹ mg/m³ (emission concentration is predicted value based on fuel type and expected concentration during normal operations).

Note: The above emission concentrations upon which the Applicant has based the assessment of abnormal operations are generally lower than those we would usually expect. The Applicant has based the concentrations on an increase above predicted concentrations for normal operations, rather than above the emission limits. We have carried out an assessment of the impact of abnormal operations based on the emission concentrations more usually used in these assessments (concentrations above the emission limits rather than above predicted concentrations) and agree with the conclusions made by the Applicant that there will be no unacceptable impact.

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

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

Impact of abnormal emissions

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	$\mu\text{g}/\text{m}^3$			$\mu\text{g}/\text{m}^3$	$\mu\text{g}/\text{m}^3$	% of EAL	$\mu\text{g}/\text{m}^3$
NO ₂	200	2	44.8	5.3	2.7	50.1	25.1
PM ₁₀	50	3	21.4	1.6	3.2	23.0	46.0
HCl	750	6	0.48	9.7	1.3	10.2	14.2
Sb	150	1	n/a	0.3	0.2	n/a	-
Cu	200	1	0.034	0.3	0.15	0.334	0.2
Mn	150	1	0.026	0.3	0.2	0.326	0.2
Cr (III)	150	2	0.0068	0.061	0.04	0.0678	<0.1
Cr (VI)	3		0.0017	0.24	8.1	0.2417	8.1
Co	30	1	0.00042	0.3	1.0	0.30042	1.0
V	1	4	0.002	0.18	17.8	0.182	18.2

- | | | | |
|---|---|---|----------------|
| 1 | 1-hr Maximum | 4 | 24-hr maximum |
| 2 | 99.79 th %ile of 1-hour means | 6 | 1-hour average |
| 3 | 90.41 st %ile of 24-hour means | | |

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

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

Vanadium

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

We have not assessed the impact of abnormal operations against long term ESs for the reasons set out above. Except that if dioxin emissions were at 10 ng/m³ for the maximum period of abnormal operation, this would result in an increase the predicted impact by a factor of approximately 1.5. The dioxin and furan and dioxin-like PCB PC is still likely to be well below 1% of the COT TDI with this factor applied.

6. Application of Best Available Techniques

6.1 Scope of Consideration

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

- The first issue we address is the fundamental choice of incineration technology. There are a number of alternatives, and the Applicant has explained why it has chosen one particular kind for this Installation.
- We then consider in particular control measures for the emissions which were not screened out as insignificant in the previous section on minimising the installation's environmental impact. They are: NO₂, Cadmium, Manganese, Arsenic, Nickel, Chromium (VI) and PAH.
- We also have to consider the combustion efficiency and energy utilisation of different design options for the Installation, which are relevant considerations in the determination of BAT for the Installation, including the Global Warming Potential of the different options.
- Finally, the prevention and minimisation of Persistent Organic Pollutants (POPs) must be considered, as we explain below.

Chapter IV of the IED specifies a set of maximum emission limit values. Although these limits are designed to be stringent, and to provide a high level of environmental protection, they do not necessarily reflect what can be achieved by new plant. Article 14(3) of the IED says that BAT Conclusions shall be the reference for setting the permit conditions, so it may be possible and desirable to achieve emissions below the limits referenced in Chapter IV. However BAT Conclusions and a revised BREF for Incineration have not yet been drafted or published, so the existing BREF and Chapter IV of the IED remain relevant.

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

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

6.1.1 Consideration of Furnace Type

The prime function of the furnace is to achieve maximum combustion of the waste. Chapter IV of the IED requires that the plant (furnace in this context)

should be designed to deliver its requirements. The main requirements of Chapter IV in relation to the choice of a furnace are compliance with air emission limits for CO and TOC and achieving a low TOC/LOI level in the bottom ash.

The Waste Incineration BREF elaborates the furnace selection criteria as:

- the use of a furnace (including secondary combustion chamber) dimensions that are large enough to provide for an effective combination of gas residence time and temperature such that combustion reactions may approach completion and result in low and stable CO and TOC emissions to air and low TOC in residues.
- use of a combination of furnace design, operation and waste throughput rate that provides sufficient agitation and residence time of the waste in the furnace at sufficiently high temperatures.
- The use of furnace design that, as far as possible, physically retain the waste within the combustion chamber (e.g. grate bar spacing) to allow its complete combustion.

The BREF also provides a comparison of combustion and thermal treatment technologies and factors affecting their applicability and operational suitability used in EU and for all types of wastes. There is also some information on the comparative costs. The table below has been extracted from the BREF tables. This table is also in line with the Guidance Note “The Incineration of Waste (EPR 5.01)). However, it should not be taken as an exhaustive list nor that all technologies listed have found equal application across Europe.

Overall, any of the furnace technologies listed below would be considered as BAT provided the Applicant has justified it in terms of:

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

Summary comparison of thermal treatment technologies (reproduced from the Waste Incineration BREF)

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

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Rotary Kiln	Can accept liquids and pastes solid feeds more limited than grate (owing to refractory damage) often applied to hazardous wastes	<10 t/h	Very well proven with broad range of wastes and good burn out even of HW	Throughputs lower than grates	TOC <3%	Higher specific cost due to reduced capacity
Fluid bed - bubbling	Only finely divided consistent wastes. Limited use for raw MSW Often applied to sludges	1 to 10 t/h	Good mixing Fly ashes of good leaching quality	Careful operation required to avoid clogging bed. Higher fly ash quantities.	TOC <3%	FGT cost may be lower. Costs of waste preparation
Fluid bed - circulating	Only finely divided consistent wastes. Limited use for raw MSW, often applied to sludges / RDF.	1 to 20 t/h most used above 10 t/h	Greater fuel flexibility than BFB Fly ashes of good leaching quality	Cyclone required to conserve bed material Higher fly ash quantities	TOC <3%	FGT cost may be lower. Costs of preparation.
Oscillating furnace	MSW / heterogeneous wastes	1 – 10 t/h	Robust Low maintenance Long history Low NOX level Low LOI of bottom ash	-higher thermal loss than with grate furnace - LCV under 15 GJ/t	TOC 0.5 – 3%	Similar to other technologies

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Pulsed hearth	Only higher CV waste (LCV >20 GJ/t) Mainly used for clinical wastes	<7 t/h	can deal with liquids and powders	bed agitation may be lower	Dependent on waste type	Higher specific cost due to reduced capacity
Stepped and static hearths	Only higher CV waste (LCV >20 GJ/t) Mainly used for clinical wastes	No information	Can deal with liquids and powders	Bed agitation may be lower	Dependent on waste type	Higher specific cost due to reduced capacity
Spreader – stoker combustor	- RDF and other particle feeds - poultry manure - wood wastes	No information	- simple grate construction - less sensitive to particle size than FB	only for well defined mono-streams	No information	No information
Gasification - fixed bed	- mixed plastic wastes - other similar consistent streams - gasification less widely used/proven than incineration	1 to 20 t/h	-low leaching residue -good burnout if oxygen blown - syngas available - Reduced oxidation of recyclable metals	- limited waste feed - not full combustion - high skill level - tar in raw gas - less widely proven	-Low leaching bottom ash -good burnout with oxygen	High operation/maintenance costs

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Gasification – entrained flow	<ul style="list-style-type: none"> - mixed plastic wastes - other similar consistent streams - not suited to untreated MSW - gasification less widely used/proven than incineration 	To 10 t/h	<ul style="list-style-type: none"> - low leaching slag - reduced oxidation of recyclable metals 	<ul style="list-style-type: none"> - limited waste feed - not full combustion - high skill level - less widely proven 	low leaching slag	High operation/maintenance costs pre-treatment costs high
Gasification - fluid bed	<ul style="list-style-type: none"> - mixed plastic wastes - shredded MSW - shredder residues - sludges - metal rich wastes - other similar consistent streams - less widely used/proven than incineration 	5 – 20 t/h	<ul style="list-style-type: none"> -temperatures e.g. for Al recovery - separation of non-combustibles -can be combined with ash melting - reduced oxidation of recyclable metals 	<ul style="list-style-type: none"> -limited waste size (<30 cm) - tar in raw gas - higher UHV raw gas - less widely proven 	If combined with ash melting chamber ash is vitrified	Lower than other gasifiers
Pyrolysis	<ul style="list-style-type: none"> - pre-treated MSW - high metal inert streams - shredder residues/plastics - pyrolysis is less widely used/proven than incineration 	~ 5 t/h (short drum) 5 – 10 t/h (medium drum)	<ul style="list-style-type: none"> - no oxidation of metals - no combustion energy for metals/inert - in reactor acid neutralisation possible - syngas available 	<ul style="list-style-type: none"> - limited wastes - process control and engineering critical - high skill req. - not widely proven - need market for syngas 	<ul style="list-style-type: none"> - dependent on process temperature - residue produced requires further processing e.g. combustion 	High pre-treatment, operation and capital costs

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

- Moving Grate Furnace
- Fluidised Bed
- Pyrolysis
- Gasification

The Applicant has proposed to use a furnace technology comprising gasification with fluidised bed and a secondary combustion chamber, which are identified in the tables above as being considered BAT in the BREF or TGN for this type of waste feed. The Applicant has proposed to use updraft fluidised bed by comparing the different gasification technologies and have determined that this is BAT for this site.

The Applicant proposes to use diesel as support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on there not being a supply of natural gas available.

Boiler Design

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

- ensuring that the steam/metal heat transfer surface temperature is a minimum where the exhaust gases are within the de-novo synthesis range;
- design of the boilers using CFD to ensure no pockets of stagnant or low velocity gas;
- boiler passes are progressively decreased in volume so that the gas velocity increases through the boiler; and
- Design of boiler surfaces to prevent boundary layers of slow moving gas.

Any of the options listed in the BREF and summarised in the table above can be BAT. The Applicant has chosen a furnace technique that is listed in the BREF and we are satisfied that the Applicant has provided sufficient justification to show that their technique is BAT. This is not to say that the other techniques could not also be BAT, but that the Applicant has shown that their chosen technique is at least comparable with the other BAT options. We believe that, based on the information gathered by the BREF process, the chosen technology will achieve the requirements of Chapter IV of the IED for the air emission of TOC/CO and the TOC on bottom ash.

6.2 BAT and emissions control

The prime function of flue gas treatment is to reduce the concentration of pollutants in the exhaust gas as far as practicable. The techniques which are described as BAT individually are targeted to remove specific pollutants, but the BREF notes that there is benefit from considering the FGT system as a whole unit. Individual units often interact, providing a primary abatement for some pollutants and an additional effect on others.

The BREF lists the general factors requiring consideration when selecting flue-gas treatment (FGT) systems as:

- type of waste, its composition and variation
- type of combustion process, and its size
- flue-gas flow and temperature
- flue-gas content, size and rate of fluctuations in composition
- target emission limit values
- restrictions on discharge of aqueous effluents
- plume visibility requirements
- land and space availability
- availability and cost of outlets for residues accumulated/recovered
- compatibility with any existing process components (existing plants)
- availability and cost of water and other reagents
- energy supply possibilities (e.g. supply of heat from condensing scrubbers)
- reduction of emissions by primary methods
- release of noise.

Taking these factors into account the Technical Guidance Note points to a range of technologies being BAT subject to circumstances of the Installation.

6.2.1 Particulate Matter

Particulate matter				
Technique	Advantages	Disadvantages	Optimisation	Defined as BAT in BREF or TGN for:
Bag / Fabric filters (BF)	Reliable abatement of particulate matter to below 5mg/m ³	Max temp 250°C	Multiple compartments Bag burst detectors	Most plants
Wet scrubbing	May reduce acid gases simultaneously.	Not normally BAT. Liquid effluent produced	Require reheat to prevent visible plume and dew point problems.	Where scrubbing required for other pollutants
Ceramic filters	High temperature applications Smaller plant.	May “blind” more than fabric filters		Small plant. High temperature gas cleaning required.

Particulate matter				
Electrostatic precipitators	Low pressure gradient. Use with BF may reduce the energy consumption of the induced draft fan.	Not normally BAT.		When used with other particulate abatement plant

The Applicant proposes to use fabric filters for the abatement of particulate matter. Fabric filters provide reliable abatement of particulate matter to below 5 mg/m³ and are BAT for most installations. The Applicant proposes to use multiple compartment filters with burst bag detection to minimise the risk of increased particulate emissions in the event of bag rupture.

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

6.2.2 Oxides of Nitrogen

Oxides of Nitrogen : Primary Measures				
Technique	Advantages	Disadvantages	Optimisation	Defined as BAT in BREF or TGN for:
Low NOx burners	Reduces NOx at source		Start-up, supplementary firing.	Where auxiliary burners required.
Starved air systems	Reduce CO simultaneously			Pyrolysis, Gasification systems.
Optimise primary and secondary air injection				All plant.
Flue Gas Recirculation (FGR)	Reduces the consumption of reagents used for secondary NOx control. May increase overall energy recovery	Some applications experience corrosion problems.		All plant unless impractical in design (needs to be demonstrated)

Oxides of Nitrogen : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	Advantages	Disadvantages	Optimisation	Defined as BAT in BREF or TGN for:

Selective catalytic reduction (SCR)	NO _x emissions <70 mg/m ³ Reduces CO, VOC, dioxins	Expensive. Re-heat required – reduces plant efficiency		All plant
Selective non-catalytic reduction (SNCR)	NO _x emissions typically 150 – 180 mg/m ³	Relies on an optimum temperature around 900°C, and sufficient retention time for reduction May lead to Ammonia slip	Port injection location	All plant unless lower NO _x release required for local environmental protection.
Reagent Type: Ammonia	Likely to be BAT Lower nitrous oxide formation	More difficult to handle Narrower temperature window		All plant
Reagent Type: Urea	Likely to be BAT			All plant

The Applicant proposes to implement the following primary measures:

- Low NO_x burners – this technique reduces NO_x at source and is defined as BAT where auxiliary burners are required.
- Starved air systems – this technique also simultaneously reduces CO and is defined as BAT for pyrolysis and gasification systems.
- Optimise primary and secondary air injection – this technique is BAT for all plant.
- Flue gas recirculation – this technique reduces the consumption of reagents for secondary NO_x control and can increase overall energy recovery, although in some applications there can be corrosion problems – the technique is considered BAT for all plant.

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

SCR can reduce NO_x levels to below 70 mg/m³ and can be applied to all plant, it is generally more expensive than SNCR and requires reheating of the waste gas stream which reduces energy efficiency, periodic replacement of the catalysts also produces a hazardous waste. SNCR can typically reduce NO_x levels to between 150 and 180 mg/m³, it relies on an optimum temperature of around 900°C and sufficient retention time for reduction. SNCR is more likely to have higher levels of ammonia slip. The technique can be applied to all plant unless lower NO_x releases are required for local environmental protection. Urea or ammonia can be used as the reagent with either technique, urea is somewhat easier to handle than ammonia and has a wider operating temperature window,

but tends to result in higher emissions of N₂O. Either reagent is BAT, and the use of one over the other is not normally significant in environmental terms.

The Applicant proposes to use SNCR and SCR with urea as the reagent. Emissions of NO_x cannot be screened out as insignificant. Normally we would require a cost/benefit analysis for the use of SCR over SNCR, but the operator is deploying both techniques to reduce NO_x so the assessment is not relevant. We therefore consider this is BAT for the installation.

The amount of urea used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH₃ slip. Improvement condition IC4 requires the Operator to report to the Environment Agency on optimising the performance of the NO_x abatement system. The Operator is also required to monitor and report on NH₃ and N₂O emissions every 6 months.

6.2.3 Acid Gases, SO_x, HCl and HF

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

Acid gases and halogens : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	Advantages	Disadvantages	Optimisation	Defined as BAT in BREF or TGN for:

Wet	<p>High reaction rates</p> <p>Low solid residues production</p> <p>Reagent delivery may be optimised by concentration and flow rate</p>	<p>Large effluent disposal and water consumption if not fully treated for re-cycle</p> <p>Effluent treatment plant required</p> <p>May result in wet plume</p> <p>Energy required for effluent treatment and plume reheat</p>		Plants with high acid gas and metal components in exhaust gas – HWIs
Dry	<p>Low water use</p> <p>Reagent consumption may be reduced by recycling in plant</p> <p>Lower energy use</p> <p>Higher reliability</p>	<p>Higher solid residue production</p> <p>Reagent consumption controlled only by input rate</p>		All plant
Semi-dry	<p>Medium reaction rates</p> <p>Reagent delivery may be varied by concentration and input rate</p>	<p>Higher solid waste residues</p>		All plant

Reagent Type: Sodium Hydroxide	Highest removal rates Low solid waste production	Corrosive material ETP sludge for disposal		HWIs
Reagent Type: Lime	Very good removal rates Low leaching solid residue Temperature of reaction well suited to use with bag filters	Corrosive material May give greater residue volume if no in-plant recycle	Wide range of uses	MWIs, CWIs
Reagent Type: Sodium Bicarbonate	Good removal rates Easiest to handle Dry recycle systems proven	Efficient temperature range may be at upper end for use with bag filters Leachable solid residues Bicarbonate more expensive	Not proven at large plant	CWIs

The Applicant proposes to implement the following primary measures:

- Use of low sulphur fuels for start up and auxiliary burners – gas should be used if available, where fuel oil is used, this will be low sulphur (i.e. <0.1%), this will reduce SO_x at source. The Applicant has justified its choice of diesel as the support fuel on the basis that there is no serviceable gas main that could be used to supply the combustion plant and we agree with that assessment.
- Management of heterogeneous wastes – only wood waste will be accepted, which has a low content of halogenated this will disperse problem wastes such as PVC by ensuring a homogeneous waste feed.

There are three recognised techniques for secondary measures to reduce acid gases. These are wet, dry and semi-dry. Wet scrubbing produces an effluent for treatment and disposal in compliance with Article 46(3) of IED. It will also require reheat of the exhaust to avoid a visible plume. Wet scrubbing is unlikely to be BAT except where there are high acid gas and metal components in the

exhaust gas as may be the case for some hazardous waste incinerators. In this case, the Applicant does not propose using wet scrubbing, and the Environment Agency agrees that wet scrubbing is not appropriate in this case.

The Applicant has therefore considered dry and semi-dry methods of secondary measures for acid gas abatement. Either can be BAT for this type of facility.

Both dry and semi-dry methods rely on the dosing of powdered materials into the exhaust gas stream. Semi-dry systems (i.e. hydrated reagent) offer reduced material consumption through faster reaction rates, but reagent recycling in dry systems can offset this.

In both dry and semi-dry systems, the injected powdered reagent reacts with the acid gases and is removed from the gas stream by the bag filter system. The powdered materials are either lime or sodium bicarbonate. Both are effective at reducing acid gases, and dosing rates can be controlled from continuously monitoring acid gas emissions. The decision on which reagent to use is normally economic. Lime produces a lower leaching solid residue in the APC residues than sodium bicarbonate and the reaction temperature is well suited to bag filters, it tends to be lower cost, but it is a corrosive material and can generate a greater volume of solid waste residues than sodium bicarbonate. Either reagent is BAT, and the use of one over the other is not significant in environmental terms in this case.

In this case, the Applicant proposes to use a dry scrubbing system utilising a lime based reagent. The Environment Agency is satisfied that this is BAT.

6.2.4 Carbon monoxide and volatile organic compounds (VOCs)

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

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

6.2.5 Dioxins and furans (and Other POPs)

Dioxins and furans				
Technique	Advantages	Disadvantages	Optimisation	Defined as BAT in BREF or TGN for:

Optimise combustion control	All measures will increase oxidation of these species.		Covered in section on furnace selection	All plants
Avoid de novo synthesis			Covered in boiler design	All plant
Effective Particulate matter removal			Covered in section on particulate matter	All plant
Activated Carbon injection	Can be combined with acid gas absorber or fed separately.	Combined feed rate usually controlled by acid gas content.		All plant. Separate feed normally BAT unless feed is constant and acid gas control also controls dioxin release.

The prevention and minimisation of emissions of dioxins and furans is achieved through:

- optimisation of combustion control including the maintenance of permit conditions on combustion temperature and residence time, which has been considered in 6.1.1 above;
- avoidance of de novo synthesis, which has been covered in the consideration of boiler design;
- the effective removal of particulate matter, which has been considered in 6.2.1 above;
- injection of activated carbon. This can be combined with the acid gas reagent or dosed separately. Where the feed is combined, the combined feed rate will be controlled by the acid gas concentration in the exhaust. Therefore, separate feed of activated carbon would normally be considered BAT unless the feed was relatively constant. Effective control of acid gas emissions also assists in the control of dioxin releases.

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

6.2.6 Metals

Metals				
Technique	Advantages	Disadvantages	Optimisation	Defined as BAT in BREF or TGN for:
Effective Particulate matter removal			Covered in section on particulate matter	All plant

Activated Carbon injection for mercury recovery	Can be combined with acid gas absorber or fed separately.	Combined feed rate usually controlled by acid gas content.		All plant. Separate feed normally BAT unless feed is constant and acid gas control also controls dioxin release.
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The prevention and minimisation of metal emissions is achieved through the effective removal of particulate matter, and this has been considered in 6.2.1 above.

Unlike other metals however, mercury if present will be in the vapour phase. BAT for mercury removal is also dosing of activated carbon into the exhaust gas stream. This can be combined with the acid gas reagent or dosed separately. Where the feed is combined, the combined feed rate will be controlled by the acid gas concentration in the exhaust. Therefore, separate feed of activated carbon would normally be considered BAT unless the feed was relatively constant.

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

6.3 BAT and global warming potential

This section summarises the assessment of greenhouse gas impacts which has been made in the determination of this Permit. Emissions of carbon dioxide (CO₂) and other greenhouse gases differ from those of other pollutants in that, except at gross levels, they have no localised environmental impact. Their impact is at a global level and in terms of climate change. Nonetheless, CO₂ is clearly a pollutant for IED purposes.

The principal greenhouse gas emitted is CO₂, but the plant also emits small amounts of N₂O arising from the operation of secondary NO_x abatement. N₂O has a global warming potential 310 times that of CO₂. The Applicant will therefore be required to optimise the performance of the secondary NO_x abatement system to ensure its GWP impact is minimised.

The major source of greenhouse gas emissions from the installation is however CO₂ from the combustion of waste. There will also be CO₂ emissions from the burning of support fuels at start up, shut down and should it be necessary to maintain combustion temperatures. BAT for greenhouse gas emissions is to maximise energy recovery and efficiency.

The electricity that is generated by the Installation will displace emissions of CO₂ elsewhere in the UK, as virgin fossil fuels will not be burnt to create the same electricity.

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

Factors influencing GWP and CO₂ emissions from the Installation are:

On the debit side

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

On the credit side

- CO₂ saved from the export of electricity to the public supply by displacement of burning of virgin fuels;

The GWP of the plant will be dominated by the emissions of carbon dioxide that are released as a result of waste combustion. This will constant for all options considered in the BAT assessment. Any differences in the GWP of the options in the BAT appraisal will therefore arise from small differences in energy recovery and in the amount of N₂O emitted.

The Applicant considered energy efficiency and compared SCR to SNCR in its BAT assessment. This is set out in sections 4.3.7, 6.1.1 and 6.2.2 of this decision document.

Note: avoidance of methane which would be formed if the waste was landfilled has not been included in this assessment. If it were included due to its avoidance it would be included on the credit side. Ammonia has no direct GWP effect.

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

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

6.4 BAT and POPs

International action on Persistent Organic pollutants (POPs) is required under the UN's Stockholm Convention, which entered into force in 2004. The EU implemented the Convention through the POPs Regulation (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 co-incinerator. The Stockholm Convention distinguishes between intentionally-produced and unintentionally-produced

POPs. Intentionally-produced POPs are those used deliberately (mainly in the past) in agriculture (primarily as pesticides) and industry. Those intentionally-produced POPs are not relevant where waste incineration is concerned, as in fact high-temperature incineration is one of the prescribed methods for destroying POPs.

The unintentionally-produced POPs addressed by the Convention are:

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

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

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

“Member States shall, when considering proposals to construct new facilities or 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 should be controlled by imposing emission limits (e.g. 0.1 ng/m³ for MWIs) and using BAT for incineration. UN Economic Commission for Europe (Executive Body for the Convention) (ECE-EB) produced BAT guidance for the parties to the Convention in 2009. This document considers various control techniques and concludes that primary measures involving management of feed material by reducing halogenated substances are not technically effective. This is not surprising because halogenated wastes still need to be disposed of and because POPs can be generated from relatively low concentrations of halogens. In summary, the successful control techniques for waste incinerators listed in the ECE-EB BAT are:

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

Using the methods listed above, the UN-ECE BAT document concludes that incinerators can achieve an emission concentration of 0.1 ng TEQ/m³.

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

The release of **dioxins and furans** to air is required by the IED to be assessed against the I-TEQ (International Toxic Equivalence) limit of 0.1 ng/m³. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK's independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. The Permit requires that, in addition to the requirements of the IED, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be monitored for reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. The Permit also requires monitoring of a range of PAHs and dioxin-like PCBs at the same frequency as dioxins are monitored. We have included a requirement to monitor and report against these WHO-TEQ values for dioxins and dioxin-like PCBs and the range of PAHs as listed in the Permit. We are confident that the measures taken to control the release of dioxins will also control the releases of dioxin-like PCBs and PAHs. Section 5.2.1 of this document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation.

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

"due to comparatively low levels in emissions from most (combustion) processes special measures for HCB control are usually not proposed. HCB emissions can be controlled generally like other chlorinated organic compounds in emissions, for instance dioxins/furans and PCBs: regulation of time of combustion, combustion temperature, temperature in cleaning devices, sorbents application for waste gases

cleaning etc." [reference
http://www.eea.europa.eu/publications/EMEPCORINAIR4/sources_of_HCB.pdf]

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

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

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

6.5 Other Emissions to the Environment

6.5.1 Emissions to water

There are no process emissions to surface water. Uncontaminated site run-off (road surfaces and roof drainage) will be collected through a symphonic rainwater collection system and discharges to surface water drain (W1), which lies to the north of the site. This discharges to the Anglian water open swale system ultimately to The Haven.

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

6.5.2 Emissions to sewer

Process effluents from the installation are limited to the water treatment plant, boiler blowdown and internal floors in the fuel storage building. These will be discharged to sewer under the terms of a trade effluent consent.

The plant has been designed to release of approximately 3,921 l/h waste water to sewer per hour. The emission was assessed using our H1 methodology and all impacts of hazardous substances have been screened out as insignificant.

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

6.5.3 Fugitive emissions

The IED specifies that plants must be able to demonstrate that the plant is designed in such a way as to prevent the unauthorised and accidental release of polluting substances into soil, surface water and groundwater. In addition storage requirements for waste and for contaminated water of Article 46(5) must be arranged.

No materials will be stored outside. The waste wood is delivered to and stored within the fuel storage building. It is transferred to the combustion chamber using an automated handling system via a charging system comprising a series of fully enclosed conveyors. The conveyors are fitted with filters to trap dust prior to release of the transport air. The Applicant has a programme of inspection, housekeeping and maintenance in place to ensure containment is maintained and fugitive emissions of dust are prevented.

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

6.5.4 Odour

The gasification process and the proposed fuel comprising shredded waste wood are not inherently odorous. The Applicant has waste acceptance procedures in place to check that the waste delivered to the site conforms to the types of waste that are permitted to be accepted and this includes checking for any odorous properties. The fuel storage building is fully enclosed and entry is via electrically controlled roller shutter doors. Combustion air will also be drawn from above the waste storage bunker in order to prevent odours and airborne particulates from leaving the facility building.

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise odour and to prevent pollution from odour.

6.5.5 Noise and vibration

The operator has outlined the prevention and control measures for noise at the installation. The design of the Installation has taken into account the potential impacts on the environmental and neighbouring receptors in regards to noise.

The processing plant and associated equipment has been designed in accordance with best practice. The operator has stated that control techniques will be in line with BAT. The noisiest equipment is housed in acoustic enclosures. Appropriate preventative maintenance will be provided for the various elements of the installation. In the event that complaints are received measures described in the management system will be put in place.

The design of the Installation has taken into account the potential impacts on the environmental and neighbouring receptors in regards to noise. The processing plant and associated equipment has been designed in accordance with best practice

The application contained a noise impact assessment (SOL1605BUK301 Volume 2: Annex C3 – Environmental Noise Assessment) which identified local noise-sensitive receptors, potential sources of noise at the proposed plant and noise attenuation measures. Measurements were taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS 4142:2014 to compare the predicted plant rating noise levels with the established background levels.

We have assessed the noise impact and found that the impact is likely to be below adverse (in BS 4142 terminology). We consider the site will not be a significant source of noise and vibration. We have set our standard noise conditions in the permit.

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise noise and vibration and to prevent pollution from noise and vibration outside the site.

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

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

At the time of writing of this document, no BAT conclusions have been published for waste incineration or co-incineration.

The use of IED Chapter IV emission limits for air dispersion modelling sets the worst case scenario. If this shows emissions are insignificant then we have accepted that the Applicant's proposals are BAT, and that there is no justification to reduce ELVs below the Chapter IV limits in these circumstances.

Below we consider whether, for those emission not screened out as insignificant, different conditions are required as a result of consideration of local or other factors, so that no significant pollution is caused (Article 11(c)) or to comply with environmental quality standards (Article 18).

(i) Local factors

We have considered the impact on local receptors, habitat conservation sites and air quality management areas from those emissions not screened out as insignificant and do not consider it necessary to impose further conditions, or set more stringent emission limits than those specified.

(ii) National and European ESs

The national and European EQSs are not predicted to be exceeded through the use of BAT, so no additional conditions are required.

(iii) Global Warming

CO₂ is an inevitable product of the combustion of waste. The amount of CO₂ emitted will be essentially determined by the quantity and characteristics of waste being incinerated, which are already subject to conditions in the Permit. It is therefore inappropriate to set an emission limit value for CO₂, which could do no more than recognise what is going to be emitted. The gas is not therefore targeted as a key pollutant under Annex II of IED, which lists the main polluting substances that are to be considered when setting emission limit values (ELVs) in Permits.

We have therefore considered setting equivalent parameters or technical measures for CO₂. However, provided energy is recovered efficiently (see section 4.3.7 above), there are no additional equivalent technical measures (beyond those relating to the quantity and characteristics of the waste) that can be imposed that do not run counter to the primary purpose of the plant, which is the recovery of energy from waste. Controls in the form of restrictions on the volume and type of waste that can be accepted at the Installation and permit conditions relating to energy efficiency effectively apply equivalent technical measures to limit CO₂ emissions.

(iv) Commissioning

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

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

- Calibration of CEMs in accordance with BS EN 14181 (IC6).
- Verification of furnace residence time, temperature and oxygen content (IC3).
- The plant in total conforms to the permit conditions and that satisfactory process control procedures for the plant have been developed (IC2).
- Abatement plant optimisation details (IC4).

6.7 Monitoring

6.7.1 Monitoring during normal operations

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

For emissions to air, the methods for continuous and periodic monitoring are in accordance with the Environment Agency's Guidance M2 for monitoring of stack emissions to air.

Based on the information in the Application and the requirements set in the conditions of the permit we are satisfied that the Operator's techniques, personnel and equipment will have either MCERTS certification or MCERTS accreditation as appropriate.

6.7.2 Monitoring under abnormal operations arising from the failure of the installed CEMs

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

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

Chapter IV of IED specifies manual extractive sampling for heavy metals and dioxin monitoring. However, Article 48(5) of the IED enables The Commission to act through delegated, authority to set the date from which continuous measurements of the air emission limit values for heavy metals, dioxins and furans shall be carried out, as soon as appropriate measurement techniques are available within the Community. No such decision has yet been made by the Commission.

The Environment Agency has reviewed the applicability of continuous sampling and monitoring techniques to the installation.

Recent advances in mercury monitoring techniques have allowed standards to be developed for continuous mercury monitoring, including both vapour-phase and particulate mercury. There is a standard which can apply to CEMs which measure mercury (EN 15267-3) and standards to certify CEMs for mercury,

which are EN 15267-1 and EN 15267-3. Furthermore, there is an MCERTS-certified CEM which has been used in trials in the UK and which has been verified on-site using many parallel reference tests as specified using the steps outlined in EN 14181.

In the case of dioxins, equipment is available for taking a sample for an extended period (several weeks), but the sample must then be analysed in the conventional way. A CEN committee has agreed Technical Specifications (EN TS 1948-5) for continuous sampling of dioxins. This specification will lead to a CEN standard following a validation exercise which is currently underway. According to IED Article 48(5), "As soon as appropriate measurement techniques are available within the Union, the Commission shall, by means of delegated acts in accordance with Article 76 and subject to the conditions laid down in Articles 77 and 78, set the date from which continuous measurements of emissions into the air of heavy metals and dioxins and furans are to be carried out. This is yet to happen. However, our extant 'dioxin enforcement policy' recommends continuous sampling of dioxins where multiple emission exceedances occur and no clear root cause can be identified. Therefore should continuous sampling be required at a later date during the operation of the installation, then sampling and analysis shall comply with the requirements of EN TS 1948.

For either continuous monitoring of mercury or 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 mercury and dioxins have not been set by the European Commission. Use of a manual sample train is the only technique which fulfils the requirements of the IED. At the present time, it is considered that in view of the predicted low levels of mercury and dioxin emission it is not justifiable to require the Operator to install additionally continuous monitoring or sampling devices for these substances.

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. In particular the Environment Agency considers continuous sampling systems for dioxins to have promise as a potential means of improving process control and obtaining more accurate mass emission estimates.

6.8 Reporting

We have specified the reporting requirements in Schedule 5 of the Permit either to meet the reporting requirements set out in the IED, or to ensure data is reported to enable timely review by the Environment Agency to ensure compliance with permit conditions and to monitor the efficiency of material use and energy recovery at the installation.

7 Other legal requirements

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

7.1 The EPR 2016 and related Directives

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

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

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

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

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

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

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

- The decision of the Lincolnshire County Council to grant planning permission on 07/09/2010 (as amended 18/10/2014).
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

From consideration of all the documents above, the Environment Agency considers that no additional or different conditions are necessary.

The Environment Agency has also carried out its own consultation on the Environmental Permitting Application. The results of our consultation are described elsewhere in this decision document.

7.1.2 Schedule 9 to the EPR 2016 – Waste Framework Directive

As the Installation involves the treatment of waste, it is carrying out a *waste operation* for the purposes of the EPR 2016 and the requirements of Schedule 9 therefore apply. This means that we must exercise our functions so as to ensure implementation of certain articles of the WFD.

We must exercise our relevant functions for the purposes of ensuring that the waste hierarchy referred to in Article 4 of the Waste Framework Directive is applied to the generation of waste and that any waste generated is treated in accordance with Article 4 of the Waste Framework Directive (see also section 4.3.9).

The conditions of the permit ensure that waste generation from the facility is minimised. Where the production of waste cannot be prevented it will be recovered wherever possible or otherwise disposed of in a manner that minimises its impact on the environment. This is in accordance with Article 4.

We must also exercise our relevant functions for the purposes of implementing Article 13 of the Waste Framework Directive; ensuring that the requirements in the second paragraph of Article 23(1) of the Waste Framework Directive are met; and ensuring compliance with Articles 18(2)(b), 18(2)(c), 23(3), 23(4) and 35(1) of the Waste Framework Directive.

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

Article 23(1) requires the permit to specify:

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

These are all covered by permit conditions.

The permit does not allow the mixing of hazardous waste so Article 18(2) is not relevant.

We consider that the intended method of waste treatment is acceptable from the point of view of environmental protection so Article 23(3) does not apply.

Energy efficiency is dealt with elsewhere in this document but we consider the conditions of the permit ensure that the recovery of energy take place with a high level of energy efficiency in accordance with Article 23(4).

Article 35(1) relates to record keeping and its requirements are delivered through permit conditions.

7.1.3 Schedule 22 to the EPR 2016 – Water Framework and Groundwater Directives

To the extent that it might lead to a discharge of pollutants to groundwater (a “groundwater activity” under the EPR 2016), the Permit is subject to the requirements of Schedule 22, which delivers the requirements of EU Directives relating to pollution of groundwater. The Permit will require the taking of all necessary measures to prevent the input of any hazardous substances to groundwater, and to limit the input of non-hazardous pollutants into groundwater so as to ensure such pollutants do not cause pollution, and satisfies the requirements of Schedule 22.

No releases to groundwater from the Installation are permitted. The Permit also requires material storage areas to be designed and maintained to a high standard to prevent accidental releases.

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

Regulation 59 of the EPR 2016 requires the Environment Agency to prepare and publish a statement of its policies for complying with its public participation duties. We have published our public participation statement.

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

Our decision in this case has been reached following a programme of extended public consultation, on the original application. The way in which this has been done is set out in Section 2.2. A summary of the responses received to our consultations and our consideration of them is set out in Annex 2.

7.2 National primary legislation

7.2.1 **Environment Act 1995**

(i) Section 4 (Pursuit of Sustainable Development)

We are required to contribute towards achieving sustainable development, as considered appropriate by Ministers and set out in guidance issued to us. The Secretary of State for Environment, Food and Rural Affairs has issued *The*

Environment Agency's Objectives and Contribution to Sustainable Development: Statutory Guidance (December 2002). This document:

"provides guidance to the Agency on such matters as the formulation of approaches that the Agency should take to its work, decisions about priorities for the Agency and the allocation of resources. It is not directly applicable to individual regulatory decisions of the Agency".

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

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

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

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

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

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

(iv) Section 6(6) (Fisheries)

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

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

(v) Section 7 (Pursuit of Conservation Objectives)

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

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

(vi) Section 39 (Costs and Benefits)

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

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

(vii) Section 108 Deregulation Act 2015 – Growth duty

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

Paragraph 1.3 of the guidance says:

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

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

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

(viii) Section 81 (National Air Quality Strategy)

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

7.2.2 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.

7.2.3 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.

7.2.4 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.

There is no SSSI which could be affected by the Installation within our screening distance criteria (2 km).

7.2.5 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 have done so and consider that no different or additional conditions in the Permit are required.

7.2.6 Marine and Coastal Access Act 2009

Section 58 of this Act requires us to act in accordance with appropriate marine policy documents, unless relevant considerations indicate otherwise.

Section 125 of this Act requires that, so far as is consistent with their proper exercise, we exercise our functions in a manner that we consider best furthers the conservation objectives stated for Marine Conservation Zone(s) (MCZs) certain features of which are capable of being affected by our determination (to more than an insignificant degree) or else, where this is not possible, which least hinders the achievement of those objectives.

Section 126 of this Act requires that, before granting a Permit for an Installation capable of affecting certain features of a MCZ(s) (to more than an insignificant degree), we consult with Natural England and that we are satisfied that there is no significant risk of the operation of the Installation hindering the achievement of the conservation objectives stated for any relevant MCZ(s).

There are no MCZs which are affected by the installation.

7.3 National secondary legislation

7.3.1 **Conservation of 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 consulted Natural England by means of an Appendix 11 assessment, which concluded that the operation of the Installation would not have a likely significant effect on the interest features of protected sites.

The habitat assessment is summarised in greater detail in section 5.4 of this document. A copy of the full Appendix 11 Assessment can be found on the public register.

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

Consideration has been given to whether any additional requirements should be imposed in terms of the Environment Agency's duty under regulation 3 to secure compliance with the requirements of the Water Framework Directive and the EQS Directive through (inter alia) environmental permits, and its obligation in regulation 17 to have regard to the river basin management plan (RBMP) approved under regulation 14 and any supplementary plans prepared under regulation 16. However, it is felt that existing conditions are sufficient in this regard and no other appropriate requirements have been identified.

We are satisfied that granting this application with the conditions proposed would not cause the current status of the water body to deteriorate.

We consider that no additional or different conditions are appropriate for this Permit to achieve these shellfish water objectives.

7.3.3 **The Persistent Organic Pollutants Regulations 2007**

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

7.3.4 **Bathing Water Regulations 2013**

We have considered our duty, under regulation 5 of these Regulations, to exercise our relevant functions to ensure compliance with the Bathing Water Directive, and in particular to take realistic and proportionate measures with a view to increasing the number of bathing waters classified as "good" or "excellent".

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

7.3.5 Marine Strategy Regulations 2010

In relation to Regulation 9 of the Marine Strategy Regulations 2010 we have had regard to the marine strategy (in so far as it has been developed and published to date) and consider that there is nothing in it which would lead us to any different conclusions from those we have already reached through our other marine assessments.

7.4 Other relevant legal requirements

7.4.1 Duty to Involve

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

The way in which the Environment Agency has consulted with the public and other interested parties is set out in section 2.2 of this document. The way in which we have taken account of the representations we have received is set out in Annex 4. Our public consultation duties are also set out in the EP Regulations, and our statutory Public Participation Statement, which implement the requirements of the Public Participation Directive. In addition to meeting our consultation responsibilities, we have also taken account of our guidance in Environment Agency Guidance Note RGS6 and the Environment Agency's Building Trust with Communities toolkit.

7.4.2 Duty to Consider Economic Growth

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

Paragraph 1.3 of the guidance says:

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

We have addressed the legislative requirements and environmental standards to be set for this operation in this decision document. The guidance is clear at

paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.

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

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

IED Article	Requirement	Delivered by
45(1)(a)	The permit shall include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2000/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate.	Condition 2.3.4(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(b)	The permit shall include the total waste incinerating or co-incinerating capacity of the plant.	Condition 2.3.4(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(c)	The permit shall include the limit values for emissions into air and water.	Conditions 3.1.1 and 3.1.2 and Tables S3.1, S3.1(a), S3.2 and S3.3 in Schedule 3 of the Permit.
45(1)(d)	The permit shall include the requirements for pH, temperature and flow of waste water discharges.	Not Applicable
45(1)(e)	The permit shall include the sampling and measurement procedures and frequencies to be used to comply with the conditions set for emissions monitoring.	Conditions 3.5.1 to 3.5.5 and Tables S3.1, S3.1(a), S3.3 and S3.4 in Schedule 3 of the Permit.
45(1)(f)	The permit shall include the maximum permissible period of unavoidable stoppages, disturbances or failures of the purification devices or the measurement devices, during which the emissions into the air and the discharges of waste water may exceed the prescribed emission limit values.	Conditions 2.3.10 and 2.3.11.
45(2)(a)	The permit shall include a list of the quantities of the different categories of hazardous waste which may be treated.	Not Applicable

IED Article	Requirement	Delivered by			
45(2)(b)	The permit shall include the minimum and maximum mass flows of those hazardous waste, their lowest and maximum calorific values and the maximum contents of polychlorinated biphenyls, pentachlorophenol, chlorine, fluorine, sulphur, heavy metals and other polluting substances.	Not Applicable			
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Condition 2.3.1(a) and Table S1.2 of Schedule 1 of the Permit.			
46(2)	Emission into air shall not exceed the emission limit values set out in parts 4 or determined in accordance with part 4 of Annex VI.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1a.			
46(3)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.			
46(4)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.			
46(5)	Prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. Adequate storage capacity for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting.	The application explains the measures to be in place for achieving the directive requirements			
46(6)	Limits the maximum period of operation when an ELV is exceeded to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year. Limits on dust (150 mg/m ³), CO and TOC not to be exceeded during this period.	Conditions 2.3.10 and 2.3.11			
47	In the event of breakdown, reduce or close down operations as soon as practicable. Limits on dust (150 mg/m ³), CO and TOC not to be exceeded during this period.	condition 2.3.10			
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IED Article	Requirement	Delivered by
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Conditions 3.5.1 to 3.5.5. Reference conditions are defined in Schedule 6 of the Permit.
48(2)	Installation and functioning of the automated measurement systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	Condition 3.5.3, and tables S3.1, S3.1(a), and S3.4
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	Conditions 3.5.3 and 3.5.4
48(4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Conditions 4.1.1 and 4.1.2, and Tables S4.1 and S4.4
49	The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	conditions 3.1.1 and 3.1.2 and 3.5.5
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) <3% or loss on ignition (LOI) <5%.	Conditions 3.5.1 and Table S3.5
50(2)	Flue gas to be raised to a temperature of 850°C for two seconds, as measured at representative point of the combustion chamber.	Condition 2.3.9, Pre-operational condition PO5 and Improvement condition IC3 and Table S3.4
50(3)	At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas.	Condition 2.3.10
50(4)(a)	Automatic shut to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.9
50(4)(b)	Automatic shut to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.9

IED Article	Requirement	Delivered by
50(4)(c)	Automatic shut to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.9
50(5)	Any heat generated from the process shall be recovered as far as practicable.	(a) The plant will generate electricity (b) Operator to review the available heat recovery options prior to commissioning (Condition PO2) and then every 2 years (Conditions 1.2. 1 to 1.2.3)
50(6)	Relates to the feeding of infectious clinical waste into the furnace.	No infectious clinical waste will be burnt
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit.
51(1)	Different conditions than those laid down in Article 50(1), (2) and (3) and, as regards the temperature Article 50(4) may be authorised, provided the other requirements of this chapter are met.	No such conditions have been allowed
51(2)	Changes in operating conditions do not cause more residues or residues with a higher content of organic polluting substances compared to those residues which could be expected under the conditions laid down in Articles 50(1), (2) and (3).	No such conditions have been allowed
51(3)	Changes in operating conditions shall include emission limit values for CO and TOC set out in Part 3 of Annex VI.	No such conditions have been allowed
52(1)	Take all necessary precautions concerning delivery and reception of wastes, to prevent or minimise pollution.	Conditions 2.3.1, 2.3.3, 3.2, 3.3, 3.4 and 3.6.
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Condition 2.3.3(a) and Table S2.2 in Schedule 3 of the Permit.

IED Article	Requirement	Delivered by
52(3)	Prior to accepting hazardous waste, the operator shall collect available information about the waste for the purpose of compliance with the permit requirements specified in Article 45(2).	Not Applicable
52(4)	Prior to accepting hazardous waste, the operator shall carry out the procedures set out in Article 52(4).	Not Applicable
52(5)	Granting of exemptions from Article 52(2), (3) and (4).	Not Applicable
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 1.4.1, 1.4.2 and 3.5.1 with Table S3.5.
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	Conditions 1.4.1 2.3.1, 2.3.2 and 3.2.1.
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.5.1 and Table S3.5 and pre-operational condition PO3.
55(1)	Application, decision and permit to be publicly available.	All documents are accessible from the Environment Agency Public Register.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2 and 4.2.3.

ANNEX 2: Pre-Operational Conditions

Based on the information on the Application, we consider that we do need to impose pre-operational conditions. These conditions are set out below and referred to, where applicable, in the text of the decision document. We are using these conditions to require the Operator to confirm that the details and measures proposed in the Application have been adopted or implemented prior to the operation of the Installation.

Reference	Pre-operational measures
PO1	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 Environment Agency web guide on developing a management system for environmental permits (found on www.gov.uk). The documents and procedures set out in the EMS shall form the written management system referenced in condition 1.1.1 (a) of the permit.
PO2	Prior to the commencement of commissioning, the Operator shall send a report to the Environment Agency which will contain a comprehensive review of the options available for utilising the heat generated, including operating as CHP or supplying district heating, by the waste incineration process in order to ensure that it is recovered as far as practicable. The review shall detail any identified proposals for improving the recovery and utilisation of heat and shall provide a timetable for their implementation.
PO3	Prior to the commencement of commissioning, the Operator shall submit to the Environment Agency for approval a protocol for the sampling and testing of incinerator bottom ash for the purposes of assessing its hazard status. Sampling and testing shall be carried out in accordance with the protocol as approved.
PO4	Prior to the commencement of commissioning, the Operator shall provide a written commissioning plan, including timelines for completion, for approval by the Environment Agency. The commissioning plan shall include the expected emissions to the environment during the different stages of commissioning, the expected durations of commissioning activities and the actions to be taken to protect the environment and report to the Environment Agency in the event that actual emissions exceed expected emissions. Commissioning shall be carried out in accordance with the commissioning plan as approved.
PO5	After completion of furnace design and at least three calendar months before commencement of commissioning; the operator shall submit a written report to the 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 Chapter IV and Annex VI of the IED.
PO6	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 Agency.
PO7	At least three months before the commencement of commissioning, the Operator shall submit a written report to the Environment Agency specifying arrangements for continuous and periodic monitoring of emissions to air to comply with Environment Agency guidance notes M1 and M2. The report shall include the following: <ul style="list-style-type: none"> • Plant and equipment details, including accreditation to MCERTS • Methods and standards for sampling and analysis • Details of monitoring locations, access and working platforms

ANNEX 3: Improvement Conditions

Based in the information in the Application we consider that we need to set improvement conditions. These conditions are set out below - justifications for these is provided at the relevant section of the decision document. We are using these conditions to require the Operator to provide the Environment Agency with details that need to be established or confirmed during and/or after commissioning.

Reference	Improvement measure	Completion date
IC1	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point A1, identifying the fractions within the PM ₁₀ , and PM _{2.5} ranges. On receipt of written approval from the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	Within 6 months of the completion of commissioning.
IC2	The Operator shall submit a written report to the Environment Agency on the commissioning of the installation. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions and confirm that the Environmental Management System (EMS) has been updated accordingly.	Within 4 months of the completion of commissioning.
IC3	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 and include a comparison with the CFD modelling submitted with PO5.	Within 4 months of the completion of commissioning.
IC4	The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of: <ul style="list-style-type: none"> • The Selective Non Catalytic Reduction (SNCR) system and combustion settings to minimise oxides of nitrogen (NO_x).The report shall include an assessment of the level of NO_x, N₂O and NH₃ emissions that can be achieved under optimum operating conditions. • The lime injection system for minimisation of acid gas emissions • The carbon injection system for minimisation of dioxin and heavy metal emissions. 	Within 4 months of the completion of commissioning.
IC5	The Operator shall carry out an assessment of the impact of emissions to air of the following component metals subject to emission limit values, i.e. Cd, Tl, Sb, As, Cr, Co, Mn and Ni. A report on the assessment shall be made to the Environment Agency. Emissions monitoring data obtained during the first year of operation shall be used to compare the actual emissions with those assumed in the impact assessment submitted with the Application. An assessment shall be made of the impact of each metal against the relevant environmental standard (ES). In the event that the assessment shows that an ES can be exceeded, the report shall include proposals for further investigative work.	15 months from the completion of commissioning

Reference	Improvement measure	Completion date
IC6	The Operator shall submit a written summary report to the Environment Agency to confirm 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.	Initial calibration report to be submitted to the Agency within 3 months of completion of commissioning. Full summary evidence compliance report to be submitted within 18 months of completion of commissioning.

ANNEX 4: Consultation Responses

A) Advertising and Consultation on the Application

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

The Application was advertised on the Environment Agency website from 23/02/2017 to 23/03/2017. The Application was made available to view at the Environment Public Register at Environment Agency, Waterside House, Waterside North, Lincoln LN2 5HA.

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

- *Lincolnshire County Council*
- *Boston District Council*
- *Health and Safety Executive*
- *Food Standards Agency*
- *Lincolnshire Fire and Rescue Service*
- *Public Health England and Director of Public Health*

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from Public Health England		
Brief summary of issues raised:	Summary of action taken / how this has been covered:	
<p>The applicant has undertaken air dispersion modelling of emissions to air of products of combustion under worst case conditions and abnormal operations. The assessment concludes that predicted environmental concentrations are within short and long-term health-based standards.</p> <p>For potential noise impacts the applicant has described mitigation and control measures, and as long and these measures are adhered to it is unlikely that there will be any impact on public health.</p> <p>The proposed operator's current assessment indicates a 'low' risk of fire and proposes control measures. The Environment Agency should ensure that the fire prevention plan is regularly reviewed and updated.</p>	<p>See section 5.2 above regarding our review of the air emissions from the facility. Our conclusion supports this comment.</p> <p>See section 6.5.5 above regarding our review of noise impacts from the facility. We consider the facility will not be a significant source of noise.</p> <p>See section 4.3.4 above regarding Accidents and the Fire Prevention Plan.</p>	
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<p>Given the nature of the material stored on site it would be useful for the operator to consider potential impacts on nearby receptors and actions on-site to mitigate these impacts, as well as the prompt alerting of responding agencies and communication with the public in the event of a prolonged fire at the site. It should be noted that the Proposed Feedstock EWC Codes and Types detailed in Table 3.3 of the application documents are not all waste woods. We would therefore recommend that the Environment Agency clarify the accepted waste codes.</p>	<p>We requested further information about waste types from the operator via a Notice for Information dated 03/04/2017. See section 4.3.6 above regarding waste types acceptable at the facility.</p>
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Response Received from Lincolnshire Fire and Rescue	
Brief summary of issues raised:	Summary of action taken / how this has been covered:
Provide details of location and flow rates of the proposed private hydrant(s).	Requested on Notice for Information dated 11/04/2017.

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

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

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

None received.

b) Representations from Community and Other Organisations

None received.

c) Representations from Individual Members of the Public

A total of 2 responses were received from individual members of the public. Many of the issues raised were the same as those considered above. Only those issues additional to those already considered are listed below:

Brief summary of issues raised:	Summary of action taken/how this has been covered:
<p>Concern regarding the acceptance of creosoted telegraph poles as part of the 'waste wood' waste stream. Concerns regarding the creosote being carcinogenic, as well as producing other damaging health effects.</p>	<p>The operator has provided a waste list and specification for the wastes they want to accept as the installation. Hazardous waste is not proposed - the installation will take only waste wood, grades A, B and C as set out in <i>PAS 111:2012 Specification for the requirements and test methods for processing waste wood</i>. Hazardous waste such as treated railway sleepers, wood treated with Copper/chrome/arsenic (CCA) preservation treatments and creosote are considered hazardous waste and fall into the grade D waste wood specification. The Applicant's waste pre-acceptance and acceptance procedures will ensure that only wood of the correct specification will be accepted at the site.</p>
<p>Concern regarding no documentary evidence that adequate precautions have been taken to use adequate equipment to prevent pollution, environmental damage, or health hazards for the level of use of hazardous waste.</p>	<p>As discussed above, the waste wood to be gassified is not classified as hazardous waste. Notwithstanding that, the installation has been assessed and it is considered to comply with the IED requirements for incineration for this type of waste. The characteristics of the proposed plant are set out in this decision document. We consider that the applicant has proposed adequate precautions to prevent pollution and harm to human health and the environment.</p>
<p>Concern regarding the plant producing electricity-only, (efficiency of about 20-30%, which is no better than mass-burn-incineration) which is considered inefficient.</p>	<p>The energy efficiency of the installation is described above in section 4.3.7 and is considered BAT for this particular plant. The permit requires the operator to periodically review options for recovery or re-use of waste heat from the installation.</p>
<p>The plant will in all probability not achieve R1 efficiency status.</p>	<p>R1 status is only relevant to incinerators burning municipal waste – this is a co-incinerator and so R1 does not apply.</p>

Brief summary of issues raised:	Summary of action taken/how this has been covered:
Please do not grant an EP.	We can only refuse a permit if the operator does not able to prevent and minimise pollution of the environment and harm to human health by using BAT. We are satisfied that the operator has demonstrated that they meet the necessary standards as set out in this decision document.

Brief summary of issues raised:	Summary of action taken/how this has been covered:
Concerns regarding the Environment Agency	There is no clear comment. Our decision document details how we have assessed the applicant's permit application in accordance with the relevant legislation and standards so as to prevent and minimise pollution of the environment and harm to human health by using BAT.