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

Decision document recording our decision-making process

The Permit Number is:	EPR/PP3633FJ
The Applicant / Operator is:	Willows Power & Recycling Ltd
The Installation is located at:	Willows Business Park Saddlebow Industrial Estate King's Lynn Norfolk PE34 3HN

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 issue to the Applicant. It is our record of our decision-making process, to show how we have taken into account all relevant factors in reaching our position. Unless the document explains otherwise, we have accepted the Applicant's proposals.

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/PP3633FJ/A001. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we propose to give to the permit is EPR/PP3633FJ. We refer to the proposed permit as "the **Permit**" in this document.

The Application was duly made on 06/07/2011.

The Applicant is Willows Power & Recycling Ltd. We refer to Willows Power & Recycling Ltd 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 Willows Power & Recycling Ltd "the **Operator**".

Willows Power & Recycling Ltd's proposed facility is located at Saddlebow Industrial Estate, King's Lynn. We refer to this as "the **Installation**" in this document.

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Glossary of acronyms used in this document

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

APC	Air Pollution Control
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
COMEAP	Committee on the Medical Effects of Air Pollution
CROW	Countryside and rights of way Act 2000
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision document
EAL	Environmental assessment level
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission limit value
EMAS	EU Eco Management and Audit Scheme
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2010 (SI 2010 No. 675) as amended
EQS	Environmental quality standard
EU-EQS	European Union Environmental Quality Standard
EWC	European waste catalogue
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HMIP	Her Majesty's Inspectorate of Pollution
HPA	Health Protection Agency
HRA	Human Rights Act 1998
HW	Hazardous waste
HWI	Hazardous waste incinerator
IBA	Incinerator Bottom Ash

IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC)
I-TEF	Toxic Equivalent Factors set out in Annex I of WID
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCPD	Large Combustion Plant Directive (2001/80/EC)
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LHB	Local Health Board
LOI	Loss on Ignition
MBT	Mechanical biological treatment
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
Opra	Operator Performance Risk Appraisal
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PCT	Primary Care Trust
PEC	Predicted Environmental Concentration
POP(s)	Persistent organic pollutant(s)
PPS	Public participation statement
PR	Public register
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated byphenyls
PXDF	Poly-halogenated di-benzo furans
RDF	Refuse derived fuel
RGS	Regulatory Guidance Series
SAC	Special Area of Conservation
SED	Solvent Emissions Directive (1999/13/EC)
SCR	Selective catalytic reduction
SGN	Sector guidance note
SHPI(s)	Site(s) of High Public Interest
SNCR	Selective non-catalytic reduction
SPA(s)	Special Protection Area(s)

SS	Sewage sludge
SSSI(s)	Site(s) of Special Scientific Interest
SWMA	Specified waste management activity
TDI	Tolerable daily intake
TEF	Toxic Equivalent Factors
TGN	Technical guidance note
TOC	Total Organic Carbon
UHV	Upper heating value –also termed gross calorific value
UN_ECE	United Nations Environmental Commission for Europe
US EPA	United States Environmental Protection Agency
WFD	Waste Framework Directive (2008/98/EC)
WHO	World Health Organisation
WID	Waste Incineration Directive (2000/76/EC)

1 Our proposed 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 Integrated Pollution Prevention and Control Directive (IPPCD) and the Waste Incineration Directive (WID).

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

The Application was duly made on 06/07/2011. 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.

We carried out consultation on the Application in accordance with the EPR, our statutory PPS and our own 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 IPPCD, which applies to the Installation and the Application. We have also taken into account our obligations under the Local Democracy, Economic Development and Construction Act 2009 (particularly Section 23). This requires us, where we consider it appropriate, to take such steps as we consider appropriate to secure the involvement of representatives of interested persons in the exercise of our functions, by providing them with information, consulting them

or involving them in any other way. In this case, our consultation already satisfies the Act's requirements.

We advertised the Application by a notice placed on our website, which contained all the information required by the IPPCD, including telling people where and when they could see a copy of the Application. We also placed an advertisement in the Lynn News (22/07/2011).

We placed a paper copy of the Application and all other documents relevant to our determination (see below) on our Public Register at Kingfisher House, Orton Goldhay, Peterborough and also sent a copy to the Borough Council of King's Lynn & West Norfolk for its own Public Register. Anyone wishing to see these documents could do so and arrange for copies to be made. The Applicant also provided a number of copies of the Application on CD which were also made accessible from the Public Registers

Electronic versions of the application were hosted on our e-consultation website, and a dedicated web page was created by the area team.

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

- *Environmental Health Department*
- *Food Standards Agency*
- *Health and Safety Executive*
- *Local Planning Authority*
- *National Grid*
- *Primary Care Trust*
- *Harbour Authority*

These are bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly.

In addition to our advertising the Application, we undertook a programme of extended public consultation. Public surgeries were held on the 2nd and 3rd of August 2011 in King's Lynn, written comments were also accepted by the Environment Agency beyond the formal consultation period. Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 4. We have taken all relevant representations into consideration in reaching our determination.

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued an information notice on 16/11/2011. A copy of the information notice was placed on our public register and sent to the Borough Council of King's Lynn & West Norfolk local authority for inclusion on its register, as was the response when received.

Finally we have consulted on our draft decision from 16/04/12 to 16/05/12. We have considered all relevant representations which we received in response to this final consultation and have amended this explanatory document as appropriate to explain how this has been done. A summary of the consultation responses and how we have taken into account all relevant representations is shown in Annex 4B.

3 The legal framework

The Permit will be granted, if appropriate, 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 Installation is:

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

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

We consider that, if we grant the 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)(c) – incineration of non-hazardous waste in an incineration plant with a capacity of 1 tonne or more per hour.

The definition of a WID "incineration plant" includes:

> *"the site and the entire incineration plant including all incineration lines, waste reception, storage, on-site pre-treatment facilities, waste-fuel and air-supply systems, boiler, facilities for the treatment of exhaust gases, on-site facilities for treatment or storage of residues and waste water, stack, devices and systems for controlling incineration operations, recording and monitoring 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. IBA treatment and storage will be carried out by the Applicant at this installation and is covered by the definition of incineration plant.

An installation also comprise unlisted "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.

The applicant had applied to allow IBA from external sources to be processed in the IBA recovery facility but subsequently withdrew this option. The IBA processing is therefore dedicated to IBA generated from the adjoining incinerator.

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

4.1.2 The Site

The Installation combines two geographical areas with a section of public highway separating the two. The most Northerly area has the waste tipping hall, refuse bunker, incinerator equipment, steam turbine equipment, fuel oil tank, ammonia tank and bottom ash bunker as well as silos for activated carbon, lime and APC residues.
The most Southerly site comprises the IBA processing and storage areas.

The installation is located at grid reference 561102, 317249 which is to the South West of King's Lynn, adjacent to the Centrica power station and Palm Paper paper mill.

The installation is 6.4 Km from The Wash SAC/SPA and 8.1 Km from Roydon common SPA.

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 Energy from Waste. Our view is that for the purposes of WID and EPR, the installation is an incinerator because the primary purpose of the facility is the disposal of waste.

The installation will incinerate up to 275,000 tonnes of waste per year in a single incinerator line.

Waste will be delivered to the facility in covered vehicles or containers. Waste acceptance procedures will form part of the EMS. Paper work will be inspected to ensure that the waste is acceptable. Non conforming loads will not be accepted. Vehicles are weighed on entry and exit to determine the amount of waste being received.

The vehicles will move to the tipping hall where their load will be discharged into the waste storage bunker. A crane will be used to mix and move the waste to ensure a good consistency and to prevent the development of anaerobic conditions and minimise odour generation. In order to prevent odour escaping from the plant the tipping hall will be fitted with self closing doors, each of the tipping chutes leading to the refuse bunker will incorporate a bay chute door which will be closed when no waste is being tipped into the refuse bunker, and will be under negative air pressure as the combustion air for the incinerator line will be drawn from the hall and waste bunker. In this way any potentially odorous air will be incinerated.

The crane will also be used to load waste into the waste hopper, from where the waste is directed into the furnace via a feed chute. A hydraulic ram will be used to deliver the waste from the feed chute to the combustion grate. An automatic interlock will prevent waste feed to the furnace should the temperature fall below the 850°C. This interlock will also be activated at start-up until 850°C is reached. The connection between the feed hopper and chute will be as air tight as possible to prevent escape of fumes or excess air flows. Level detection will be provided in the chute and a low level alarm will sound if the level is too low.

The facility will use a moving grate system. Primary combustion air will be supplied to the furnace from under the grate. Secondary combustion air will be injected via a series of nozzles to achieve turbulence within the combustion chamber.

The combustion chamber is provided with a gas oil-fired auxiliary burner, which will be operated during times of start-up and shut-down, or automatically whenever the temperature falls below 850°C in order to maintain the required incineration temperature.

Hot gases from the furnace will pass to a boiler to raise steam, which will be used to drive a steam turbine and generate electricity. 3.1 MW of electricity will be used for internal demand. Heat from the steam turbine will be used to heat the boiler feed water and air. An air cooled condenser will be used for cooling.

The furnace will be fitted with an ammonia solution injection system in order to reduce emissions of oxides of nitrogen (NOx) to air through selective non-catalytic reduction (SNCR). A dry flue gas treatment system will be used to neutralise acid flue gases with the injection of hydrated lime into the reaction chamber. Activated carbon will also be injected into the flue gases in order to help reduce the concentrations of heavy metals and dioxins in the combustion gases emitted to air. Bag filters will be used to separate out the resulting particulate matter from the cooled and treated gases. The installation will have a 85m stack from which the abated combustion gases will be released to air. The stack will be equipped with a Continuous Emissions Monitoring System (CEMS). The CEMS will continuously monitor particulate matter, oxides of nitrogen (NOx), sulphur dioxide (SO_2), carbon monoxide (CO), TOC (total organic carbon in the form of volatile organic compounds), hydrogen chloride (HCl), nitrous oxide and ammonia (NH_3) in the combustion gases in order to ensure that the permit emission limits are complied with.

Residue from the bag filters (the flue gas treatment (FGT) or otherwise known as air pollution control (APC) residues) will be classified as hazardous waste. APC residues will be handled within an enclosed system. It will be stored in silos discharged via sealed connections to fully contained disposal vehicles. The sealed systems will prevent the release of these residues during storage and handling.

The furnace will be controlled in order to ensure sufficient burn out. Bottom ash will be generated from the furnace grate. The bottom ash will be collected at the end of the grate in the water filled bottom ash extractor located beneath

the grate, where this material is quenched. From here the ash will be moved via an inclined steel plate conveyor, which permits water to drain from the ash back into the quench bath for reuse. Larger ferrous metal items will be removed from the quench conveyor, prior to collection of the ash within the bottom ash bunker. Bottom ash will be transferred to the storage areas on the South IBA recycling facility prior to being transferred to a building for treatment. Further metals will be removed and sent for recovery. The bottom ash will then be screened and graded and then matured by further storage. It will then be used as aggregates. Bottom ash could alternatively be sent for third party treatment.

Rainwater run-off will be collected, stored and used in the process. Any water run-off from area with potential for oil contamination will pass via an interceptor. In the event of prolonged heavy rainfall and if testing proves it is uncontaminated, excess rain water will be routed from the sedimentation pond and the attenuation lagoon to the flood relief channel that feeds into the River Great Ouse.

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

Waste throughput, Tonnes/line	275000 /annum	34 tonnes/hour
Waste processed	MSW, Commercial & Industrial	
Number of lines	1,	
Furnace technology	Grate	
Auxiliary Fuel	Light Fuel Oil	
Acid gas abatement	Semi - Dry	Hydrated lime
NOx abatement	SNCR	Ammonia
Reagent consumption	Auxiliary Fuel 244 te/annum Ammonia/Urea : 395 te/annum Lime/Other : 4366 te/annum Activated carbon: 91 te/annum Process water: 70355 te/annum	
Flue gas recirculation	Yes	
Dioxin abatement	Activated carbon	
Stack	Height, 85 m	Diameter, 2.2 m
Flue gas	Flow, 48.17 Nm^3/s	Velocity 17.34, m/s
Electricity generated	24 MWe	193,000 MWh
Electricity exported	21.1 MWe	170,000 MWh
Steam conditions	Temperature, 427 °C	Pressure, 72 bar/MPa
Waste heat use	Potential use of steam and electricity at adjacent paper mill.	

4.1.4 Key Issues in the Determination

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

4.2 The site and its protection

4.2.1 Site setting, layout and history

The installation is to be located at the Willows Business Park, Saddlebow Industrial area which is located approximately 3 Km south of the centre of King's Lynn, Norfolk. The site location is at the edge of an existing industrial and business park, and adjacent to King's Lynn Household Waste Recycling Centre and Palm Paper Mill. King's Lynn Power Station is located to the West of the site.

The site area is underlain by Terrington Beds, a non-aquifer, overlying Peat lenses and Barroway Drove Beds which is also a non-aquifer. The installation will not be within a source protection zone.

The River Great Ouse and the Great Ouse Relief Channel are located approximately 700m and 400m west of the site respectively and the River Nar is located 600m East of the site.

The historical OS plans indicate that the site has been undeveloped and remained farmland for a significant period of time. The land surrounding the site has been subjected to various periods of development including the construction of Palm Paper Mill on the site of a former sugar beet factory, and the King's Lynn power station.

The analysis of previous site investigations where soil samples were taken have shown no raised levels of contamination.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

Auxiliary fuel for the proposed incinerator will be light fuel oil and will be stored in a 80m^3 double skinned bunded storage tank. Other reagents will be delivered by road and discharged into dedicated bulk storage tanks.

All process areas will be located on hard standing. All liquid tanks and drums will be bunded to 110% of the tank contents and have blind drains. Bunds will be visually inspected. APC residues will be handled in an enclosed system. The bottom ash bunker will be constructed of concrete and will be water tight. Bottom ash will be stored and treated in a building. Underground drains will be tested for integrity prior to start of operating and then periodically by CCTV.

The fuel bunker will be constructed of concrete and will be water tight. It will be visually inspected during shut downs.

Procedures will be in place to deal with any spillages. The operational phase of the site condition report will be maintained which will include inspection records of all pollution prevention measures.

The rainwater tank and firewater tank will be sub-surface.

We are satisfied that the risk of pollution to ground and groundwater from this Installation will be low.

At the time of application final detail of the precise routing for underground drains had not been established. We have set pre-operational condition PO8 for the final drainage plan to be completed. The condition also specifies that sub-surface drains carrying liquid from the ash bunker and sub-surface tanks must have secondary containment or continuous leakage detection.

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 non-technical summary of the Application. Pre-operational condition PO1 requires the Operator to have an Environmental Management System in place before the Installation is operational, which would include a site closure plan.

The Operator has to satisfy us, if it wants to surrender the Permit, that the necessary measures have been taken, both to avoid any pollution risk resulting from the operation of the Installation, and to return the site to a satisfactory state, having regard to the state of the site before the Installation was put into operation. To do this, the Operator has to apply to us for surrender, which we will not grant unless and until we are satisfied that these requirements have been complied with.

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 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) that will be certified under ISO14001. 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. The Environment Agency recognises that certification of the EMS cannot take place until the Installation is operational. An improvement condition (IC1) is included requiring the Operator to report progress towards gaining accreditation of its EMS.

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

4.3.3 Site security

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

4.3.4 Accident management

The Applicant has not submitted an Accident Management Plan. However, having considered the other information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that accidents that may cause pollution are prevented but that, if they should occur, their consequences are minimised. An Accident Management Plan will form part of the Environmental Management System and must be in place prior to commissioning as required by a pre-operational condition (PO1).

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	Application document: • Section 1.1 (paragraphs 1.1.2 to 1.1.3) • Section 1.2 (paragraphs 1.2.6 to 1.2.39) • Section 2.1 • Section 2.2 • Section 3.1 (paragraphs 3.1.1 to 3.1.20) • Section 3.1 (paragraphs 3.1.23 to 3.1.26) • Section 3.4 (paragraphs 3.4.1 to 3.4.15) • Section 3.8 • Section 3.11 • Section 4.5 (paragraphs 4.5.1 to 4.5.6) Appendix K of the application	These sections describe key operating techniques
Response to Schedule 5 Notice dated 16/11/11	Section 5	Detailing efficient use of water.

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

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

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

Article 4(4) of the WID requires that the Permit must list explicitly the categories of waste which may be treated. The Application contains a list of those wastes, coded by the European Waste Catalogue (EWC) number, which the Applicant will accept in the waste streams entering the plant and which the plant is capable of burning in an environmentally acceptable way. We have specified the permitted waste types, descriptions and where appropriate quantities which can be accepted at the installation in Table S2.2.

We did not include some wastes codes that were initially applied for as they are separately collected fractions and are therefore inappropriate to be processed through an incinerator. These are:

20 01 34 separately collected fractions of batteries and accumulators

20 01 40 separately collected fractions of metals.

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

(i) these wastes are categorised as municipal waste in the European Waste Catalogue or are non-hazardous wastes similar in character to municipal waste;
(ii) the wastes are all categorised as non-hazardous in the European Waste Catalogue and are capable of being safely burnt at the installation.
(iii) these wastes are likely to be within the design calorific value (CV) range for the plant;
(iv) these wastes are unlikely to contain harmful components that cannot be safely processed at the Installation.

The Installation will take residual waste, i.e. that which is not separately collected or otherwise recovered, recycled or composted. Waste codes for separately collected fractions of waste (with the exception of waste wood classified under EWC code 20 01 38) are not included in the list of permitted wastes, except that separately collected fractions which prove to be unsuitable for recovery may be included.

We have limited the capacity of the Installation to 275,000 tonnes per annum.

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 6(6) of the WID, which requires that heat "*shall be recovered as far as practicable*". This issue is covered in this section.

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

(ii) Use of energy within the Installation

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

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

1. Air pre-heat will be minimised by extracting secondary air from the highest (which is also the warmest) point in the building;
2. The furnace section will be effectively insulated and lined to ensure heat is retained;
3. Uncontrolled air ingress will be prevented through design;
4. The layout of the Installation will avoid excessive transfer of materials;
5. A plant maintenance regime to ensure energy efficiency is maintained;
6. Ion exchange will be used for boiler water treatment instead of high pressure membrane filtration
7. Insulation will be provided to avoid heat losses from relevant plant items such as the main furnace, steam systems. The main plant items will be housed within buildings and doors will be kept shut other than for access.
8. Energy efficient lighting will be employed where feasible and lights will be turned off in unoccupied buildings where they are not required for safety or security reasons.
9. Space heating will be limited to manned areas such as the control room and administration areas. Heating of other process buildings will not be required.

10. Energy use will be monitored and recorded. Usage will be reviewed to identify areas for improvement and ensure that any abnormal increase in energy use is investigated and appropriate action taken to resolve the issue.
11. An energy efficiency plan will be incorporated within the EMS.

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 104 kWh/tonne. The installation capacity is 275,000 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 9.2 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 6(6) of the WID

Article 6(6) of the WID requires that heat "*shall be recovered as far as practicable*". The Government's guidance on the WID (WID EPR Guidance, March 2010) lists the following hierarchy of heat recovery options, with (e) as the least preferred option and the optimum being a combination of the other four options:

a) use of waste heat from boiler water cooling system
b) use of a boiler for steam generation or electricity generation
c) use of exhaust steam for process heating or CHP schemes
d) internal heat exchange for primary air heating and/or flue gas reheating
e) no heat recovery.

The BREF says that where a plant generates electricity only, it is BAT to recover 0.4 – 0.65 MWh/ tonne of waste (based on LCV of 10.4 MJ/kg). 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 primarily generate electricity, but will potentially also provide heat in the form of steam for other processes and customers. The Application shows the electrical output of the plant will be 24 MW for an annual burn of 275,000 tonnes, which represents 8.7MW per 100,000 tonnes/yr of waste burned. The Agency's relevant technical guidance note, EPR S5.01, states that indicative BAT for municipal waste incineration, where electricity only is generated, will mean that 5-9 MW of electricity should be recoverable per 100,000 tonnes of waste burned. This Installation is therefore towards the top end of this range.

The SGN and the WID both require that, as well as maximising the primary use of heat to generate electricity, waste heat should be recovered as far as practicable, i.e. by identifying and utilising opportunities for Combined Heat and Power (CHP) and district heating. The applicant has identified the potential to supply both steam and electricity to the adjacent paper mill, commercial negotiations may bring further efficiencies.

The location of the Installation largely determines the extent to which waste heat can be utilised, and this is a matter for the planning authority. The Applicant carried out a feasibility study, which showed there was potential to provide district heating to local businesses; suitable opportunities are being explored, though there are no firm commitments at this stage. There is provision within the design of the steam turbine to extract low-grade steam for a district heating scheme. Establishing a district heating network to supply local users would involve significant technical, financial and planning challenges such that this is not seen as a practicable proposition at present.

The WID 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 6(6) are met.

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

Fresh water will be used for the boiler feed water. The amount will be minimised by collection of process waste water and rainwater for re-use. Collected process and rainwater will be used for bottom ash quenching and in the acid gas abatement system.

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 ferrous 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 S3.4 specify limits for loss on ignition (LOI) of <5% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being

achieved in the furnaces and waste generation is being avoided where practicable.

Most incinerator bottom ash (IBA) is likely to be classified as non-hazardous waste. However, IBA is classified on the European List of Wastes as a "mirror entry", which means IBA is a hazardous waste if it possesses a hazardous property relating to the content of dangerous substances. Monitoring of incinerator ash will be carried out in accordance with the requirements of WID. 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 and APC residues are adequately characterised, pre-operational condition PO3 requires the Operator to provide a written plan for approval detailing the ash sampling protocols. Table S3.4 requires the Operator to carry out an ongoing programme of monitoring.

The Application states that metal fractions will be recovered from the bottom ash and sent for recovery. Bottom ash will be transferred to a building for treatment. Further metals will be removed and sent for recovery. The bottom ash will then be screened and graded and then matured by storage. It will then be used as aggregates. Bottom ash could alternatively be sent for third party treatment.

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, including: odour, noise and vibration, accidents, fugitive emissions to air and water, releases to air, discharges to ground or groundwater, global warming potential and generation of waste. Consideration may also have to be given to Photochemical Ozone Creation Potential (POCP) and the effect of emissions being 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.

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

5.1 Assessment Methodology

5.1.1 Application of Environment Agency H1 Guidance

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 Horizontal Guidance Note H1 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 your emissions

The H1 methodology uses a concept of “process contribution (PC)”, which is the estimated concentration of emitted substances after dispersion into the receiving environmental media at the point where the magnitude of the concentration is greatest. The guidance provides a simple method of calculating PC primarily for screening purposes and for estimating process contributions where environmental consequences are relatively low. It is based on using dispersion factors. These factors assume worst case dispersion conditions with no allowance made for thermal or momentum plume rise and so the process contributions calculated are likely to be an overestimate of the actual maximum concentrations. More accurate calculation of process contributions can be achieved by mathematical dispersion models, which take into account relevant parameters of the release and surrounding conditions, including local meteorology – these techniques are expensive but normally lead to a lower prediction of PC. The Applicant has the choice to use either method.

Screen Out Insignificant Emissions

Once short-term and long-term PCs have been calculated (either by dispersion factors or modelling), they are compared with Environmental Quality Standards (EQS) referred to as “benchmarks” in the H1 Guidance.

Where an EU EQS exists, the relevant standard is the EU EQS. Where an EU EQS does not exist, our guidance sets out a National EQS (also referred to as Environmental Assessment Level - EAL) which has been derived to provide a similar level of protection to Human Health and the Environment as the EU EQS levels.

PCs are considered **Insignificant** if:

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

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

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

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

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

Decide Whether Detailed Modelling is Needed

Where an emission cannot be screened out as insignificant as a PC through applying the first stage of our H1 Guidance, it does not mean it will necessarily be significant.

In these circumstances, the H1 Guidance justifies the need for detailed modelling of emissions, long-term, short-term or both, taking into account the state of the environment before the Installation operates, where:

- local receptors may be sensitive to emissions;
- released substances fall under an Air Quality Management Plan;
- the long term Predicted Environmental Concentration (PEC) exceeds 70% of the appropriate long term standard, (where the PEC is equal to the sum of the background concentration in the absence of the Installation and the process contribution);
- the short term Process Contribution exceeds 20% of the headroom, (where the headroom is the appropriate short term standard minus twice the long term background concentration).

5.1.2 Applying the Guidance to the Application

We review the Applicant's detailed impact assessment to confirm whether or not we agree with the Applicant's conclusions with respect to H1 screening against the above criteria.

For those pollutants where the $PEC_{long\ term}$ exceeds 70% of an EQS or the $PC_{short\ term}$ exceeds 20% of the headroom between an EQS and the

background concentration, we determine whether exceedences of EQS are likely. This is done through detailed audit and review of the Applicant's impact assessment taking headroom and modelling uncertainties into account. Where an exceedence of an EQS is identified, we may require the Applicant to go beyond what would normally be considered BAT for the Installation or refuse the application. Whether or not exceedences are considered likely, the application is subject to the requirement to operate in accordance with BAT.

National EQSs do not have the same legal status as EU EQSs, and there is no explicit requirement to impose stricter conditions than BAT in order to comply with a national EQS. However, national EQSs are a standard for harm and any significant contribution to a breach is likely to be unacceptable.

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.

In this Application, the Applicant has carried out detailed air dispersion modelling. We are satisfied that the model proposed reflects the likely impact of the emissions from the activity. We have applied the H1 criteria above to the model outputs, and this is described in the following sections.

5.2 Air Quality Assessment

5.2.1 Assessment of Air Dispersion Modelling Outputs

The Applicant assessed the Installation's potential emissions to air against the relevant air quality standards, and potential impact upon local habitat sites and human health. These assessments predicted the potential effects on local air quality from the Installation's stack emissions using the ADMS 4.2 dispersion models, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years of meteorological data collected from RAF Marham. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling. The concentrations reported in the assessments were the maximum ground level concentrations predicted by the dispersion modelling packages over the 5 years of meteorological data.

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

- First, they assumed that the ELVs in the Permit would be those in the WID.

- Second, and conservatively, they assumed that the Installation operates continuously at the short-term and long-term WID emission limit values, i.e. the maximum permitted emissions under the WID.

The way in which the Applicant used dispersion models, its selection of input 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. Whilst we have expressed a number of reservations with the way in which the modelling work was done, we 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 tables below:

Long-term impact of emissions to air

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
PM_{10} (annual)	40	18.8	0.07	0.18	18.9	47.2
HCl	20	0.4	0.07	0.34	0.5	2.4
HF	16	2.5	0.16	1.0	2.6	16.25
SO_2	50	7.3	0.34	0.69	7.6	15.3
NO_2	40	24.7	0.96	2.41	25.7	64.2
CO	10,000	284	5.36	0.05	289.4	2.9
Cd	0.005	$2.2x10^{-4}$	$1.7x10^{-4}$	3.44	$3.9x10^{-4}$	7.8
Tl	1	$3.4x10^{-5}$	$1.7x10^{-4}$	0.02	$2.1x10^{-4}$	<0.05
Hg	0.25	$2.2x10^{-3}$	$3.4x10^{-4}$	0.14	$2.5x10^{-3}$	1.0
Sb	5	$8.3x10^{-1}$	$1.5x10^{-4}$	<0.05	$8.3x10^{-1}$	16.6
As	0.003	$9.5x10^{-4}$	$1.5x10^{-4}$	4.9	$1.1x10^{-3}$	36.6
Cr	5	$3.6x10^{-3}$	$1.5x10^{-3}$	0.03	$5.1x10^{-3}$	0.1
Co	0.2	$1.4x10^{-3}$	$1.5x10^{-4}$	0.07	$1.6x10^{-3}$	0.8
Cu	10	$2.1x10^{-1}$	$3.3x10^{-4}$	<0.05	$2.1x10^{-1}$	2.1
Pb	0.5	$1.3x10^{-2}$	$8.7x10^{-4}$	0.17	$1.4x10^{-2}$	2.8
Mn	0.15	$9.2x10^{-3}$	$1.5x10^{-4}$	0.1	$9.3x10^{-3}$	6.2
Ni	0.02	$3.1x10^{-3}$	$6.3x10^{-4}$	3.13	$3.8x10^{-3}$	18.8
V	5	$2.7x10^{-3}$	$1.5x10^{-4}$	<0.05	$2.8x10^{-3}$	0.1
Dioxins and furans	-	$1.1x10^{-8}$	$6.9x10^{-10}$	-	$1.2x10^{-8}$	
PAHs (B[a]P)	0.00025	$1.4x10^{-4}$	$6.9x10^{-6}$	2.75	$1.5x10^{-4}$	58.8
PCBs	0.2	$3.5x10^{-5}$	$3.4x10^{-5}$	0.02	$6.9x10^{-5}$	<0.05

Note 1 All the above concentration figures are in $\mu g/m^3$

Short-term impact of emissions to air

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
HCl	750	0.83	1.58	0.2	2.41	0.3
HF	160	2.46	0.16	0.1	2.62	1.6
SO_2	266 (15minute 99.9th%ile)	14.6	6.48	2.4	21.1	7.9
	350 (1 hour 99.73rd %ile)	14.6	5.8	1.7	20.4	5.8
NO_2	200 (1hr 99.79%ile)	49.4	7.93	4.0	57.3	28.6

Note 1 All the above concentration figures are in $\mu g/m^3$

From the tables above the following emissions can be screened out as insignificant in that the process contribution is < 1% of the long term EQS/EAL and <10% of the short term EAQ/EAL where relevant.

- Particulates, Hydrogen chloride, Hydrogen fluoride, Sulphur dioxide, Carbon monoxide, Tl, Hg, Sb, Co, Cu, Pb, Mn, V, PCBs.

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

The applicant predicts not insignificant concentrations Long-term NO_2, Cd, As, Cr(VI) and Ni.
The Applicant predicts a process contribution of annual Chromium VI (Cr(VI)) of 5% of the EAL. The applicant used the environment agency guidance on metals to derive the Cr(VI) concentration. They used the mean proportion of total chromium to Cr(VI) observed from the data set.

We have checked the applicant's cumulative impact assessment. Our audit and check modelling of the EfW proposal confirms that only long-term NO_2 and cadmium (Cd) have process contributions greater than 1% of their EQS. Therefore other pollutants can be screened out as insignificant and do not need to consider background pollution in a PEC calculation. We only considered therefore, the contribution from the Power Station and Paper Mill to NO_2 and cadmium background in our check modelling.

Our predictions are consistent with the applicant's in that the predicted impact from proposed installation with cumulative effects from the Power Station and Paper Mill emitting NO_2 and Cd respectively, combined with ambient background levels are not likely to result in an exceedences of their respective EQS.

Also from the table above the following emissions (which were not screened out as insignificant) cannot be considered to have the potential to give rise to significant pollution in that the predicted environmental concentration is less than 70% of the long term EQS/EAL and that the Process Contribution is less than 20% of the short term EQS/EAL headroom. Long-term NO_2, Cd, As, Cr(VI) and 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.

There are two AQMA's in the vicinity of the installation. one at King's Lynn Town Centre and the other at the Junction of Lynn Road/Wooton Road/ Gayton Road in Gaywood; due to high levels of nitrogen dioxide (NO2) relating to emissions from traffic. The Proposal Site is located approximately 2.2 km and 4 km to the south of the Railway Road and Gaywood AQMAs, respectively.

The Applicant predicts a maximum NO2 annual process contribution of 0.17µg/m3 at an AQMA.

We agree that the annual predicted process contribution of NO2 is not likely to be greater than 1% of the EQS at receptors in the AQMA's, and that any impact would be negligible.

5.2.2 Assessment of emissions of PM_{10} and $PM_{2.5}$

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

The Applicant's predicted impact of the Installation against these EQS is shown in the table below – all concentrations are shown as $\mu g/m^3$. The assessment assumes that **all** particulate emissions are present as PM_{10} for the PM_{10} assessment and as $PM_{2.5}$ for the $PM_{2.5}$ assessment.

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC)	PEC as % EQS / EAL
PM_{10}	40	18.8	0.07	0.18	18.87	47.2
	50	18.8	0.23	0.46	19.03	38.1
$PM_{2.5}$	25	10.7	0.07	0.28	10.77	43.1

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

- It assumes that the plant emits particulates continuously at the WID limit for total dust, whereas actual emissions from similar plant are normally in the range 1 to 5 mg/m^3.
- It assumes all particulates emitted are below either 10 microns (PM_{10}) or 2.5 microns ($PM_{2.5}$), when some are expected to be larger.

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

The above assessment shows that the predicted process contribution for emissions of PM_{10} is below 1% of the long term EQS and below 10% of the short term EQS and so can be considered insignificant.

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

5.2.3 Assessment of Emission of Metals

The Applicant has assessed the impact of metal emissions to air. However for these materials, the Applicant has used representative emission data from suitable reference plants; and then used air dispersion modelling comparing the impacts against the relevant EQS / EAL in the H1 guidance.

WID sets three limits for metal emissions:

- An emission limit value of 0.05 mg/m^3 for mercury and its compounds.
- An aggregate emission limit value of 0.05 mg/m^3 for cadmium and thallium and their compounds.
- An aggregate emission limit of 0.5 mg/m^3 for antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium and their compounds.

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 WID emission limits for metals along with the Application of BAT also ensures that these requirements are met.

The applicant used data from The National Atmospheric Emissions Inventory (NAEI) to proportion the WID limit for the Group 3 metals. Emissions data from the NAEI indicates that antimony, cobalt, manganese and vanadium are below reporting thresholds. On this basis, the WID limit has been divided by the relative proportion of the five metals for which emissions data are available. This results in a conservative emission rate of those five metals for which data are available. The lowest resultant emission rate has

been adopted for the metals for which no data are available. The resulting sum of mass emission rates for Group 3 metals will be greater than that allowed under WID and is likely to be an overestimation. However, this approach allows the effects of each individual metal to be assessed on a conservative basis.

Our check modelling used maximum concentrations taken from the Interim Guidance to Applicants on Metals Impact Assessment for Waste Incineration Plant and the stack parameters specific to this site.

The Applicant's assessment finds that emissions of Thallium, Mercury, Antimony, Lead, Chromium, Cobalt, Manganese, Vanadium would have a PC of less than 1% of the relevant EAL and so can be considered insignificant. For those metals not insignificant by this test, the Applicant's assessment finds that the PEC of *Cadmium, Arsenic and Nickel* would be below 70% of the relevant EAL.

From this assessment the Applicant has concluded that exceedences of the EAL for all metals are not likely to occur. The installation has been assessed as meeting BAT for control of metal emissions to air. See section 6 of this document. The Environment Agency's experience of regulating incineration plant is that emissions of metals are in any event below the limits set in WID We therefore agree with the Applicant's conclusions.

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 new ambient air quality guidelines for Arsenic, Nickel and Chromium (VI). These guidelines have been incorporated as EALs in the revised H1 Guidance issued by the Agency in 2010.

Chromium (VI) is not specifically referenced in WID, which includes only total Chromium as one of the 9 Group 3 metals, the impact of which has been assessed above. The EPAQS guidelines refer only to that portion of the metal emissions contained within PM_{10} in ambient air. The new guideline for Chromium (VI) is 0.2 ng/m^3.

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 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:

- The mean proportion of Cr(VI) to total Cr is less than 1%. There are two outliers at 2%.
- The mean total Cr emission from these plants is 0.006 mg/m^3 (max 0.03 mg/m^3).
- The mean Cr(VI) emission concentration (based on the bag dust ratio) is $3.5 * 10^{-5}$ mg/m^3 (max $1.3 * 10^{-4}$).

Based on this data, using the highest values found in practice, the applicant considered that the maximum Cr(VI) emission concentration would be $1.05x10^{-5}$ mg/m^3. They used this data to model the predicted Cr(VI) impact. The PC is predicted as 5.3%, the PEC is predicted as 67% (1.34×10^{-4} µg/m^3).

The applicants assessment shows that an exceedence of the EAL for Chromium (VI) is not likely. Our own check modelling confirms this conclusion. The installation has been assessed as meeting BAT for control of metal emissions to air. See section 6 of this document.

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 waste incineration directive (WID), the waste framework directive (WFD), integrated pollution prevention and control directive (IPPCD) and air quality directive (AQD)

The main conditions in an EfW permit are based on the requirements of the IPPCD. Further specific conditions have been introduced to ensure compliance with the requirements of the WID. The aim of WID is to prevent or to limit as far as practicable negative effects on the environment, in particular pollution by emissions into air, soil, surface water and groundwater, and the resulting risks to human health, from the incineration and co-incineration of waste. WID achieves this aim by "setting stringent operational conditions, technical requirements and emission limit values". The requirements of the IPPCD include the use of BAT, which may in some circumstances dictate tighter emission limits and controls than the WID. 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. Following is a summary of some of the publications which we have considered (in no particular order).

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

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

Policy Advice from Government also points out 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 H1 Environmental Impact assessment against European and national air quality standards effectively makes a health risk assessment for those pollutants for which a standard has been derived. These air quality standards have been developed primarily in order to protect human health via known intake mechanisms, such as inhalation and ingestion. Some pollutants, such as dioxins and furans, have human health impacts at lower ingestion levels than lend themselves to setting an air quality standard to control against. For these pollutants, a different human health risk model is required which better reflects the level of dioxin intake.

Dioxin Intake Models: Two models are available to predict the dioxin intake for comparison with the Tolerable Daily Intake (TDI) recommended by the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment, known as COT. These are HHRAP and the HMIP 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 HMIP model uses a similar approach to the HHRAP model, but does not attempt to predict probabilistic risk. Either model can however be used to make comparisons with the TDI.

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 and furans 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 and furans, the HHRAP model enables a risk assessment from human intake of a range of heavy metals. The HMIP report does not consider metals. In principle, the respective EQS 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 an H1 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 H1 assessment methodology comparison for most pollutants (including metals) and dioxin intake models using either the HHRA or HMIP models as described above for dioxins and furans. Where an alternative approach is adopted for dioxins, we check the predictions ourselves using the HMIP methodology.

v) Consultations

As part of our normal procedures for the determination of a permit application, we would consult PCT (England), FSA and in some cases HPA. 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 and Furans

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

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

The results of the applicants assessment showed that the predicted daily intake of dioxins at all receptors, resulting from emissions from the proposed facility, were significantly below the recommended TDI levels, with the maximum being 8% of the TDI.
We undertook our own HHRA check calculations using both US EPA HHRAP and HMIP methodology. We assessed the potential impact against the COT TDI. Our check modeling has used a more realistic deposition velocity than that used by the consultant.
We have completed out checks based upon conservative intake assumptions and worst case dispersion modelling, we predict that the COT TDI is not likely to be exceeded.

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. In 2001, the average daily intake by adults in the UK from diet was 0.9 pg WHO-TEQ/kg bodyweight. The additional daily intake predicted by the modelling as shown in the table above is substantially below this figure.

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

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

5.3.3 Particulates smaller than 2.5 microns

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

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

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

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

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

This is consistent with the assessment of this application which shows emissions of $PM_{2.5}$ 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 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."

In carrying out air dispersion modelling as part of the H1 Environmental Impact assessment and comparing the predicted environmental concentrations with European and national air quality standards, the Applicant has effectively made a health risk assessment for many pollutants. These air quality standards have been developed primarily in order to protect human health.

The Applicant's assessment of the impact from PM_{10}, HCl, SO_2, HF, CO, Tl, Hg, Sb, Co, Cu, Pb, Mn, V and PCBs have all indicated that the Installation emissions screen out as insignificant; where the impact of emissions of *NO_2, Cd, As, Cr(VI), Ni* have not been screened out as insignificant, the assessment still shows that the predicted environmental concentrations are well within air quality standards or environmental action levels.

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

The check audit agrees with the consultant that it is unlikely there will be exceedences of human health Environmental Quality Standards (EQS) for air as a result of the proposed emissions.

It also agrees with the consultant's predictions in that the impact of dioxins is not likely to contribute significantly to an exceedence of the Tolerable Daily Intake (TDI).

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 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. Primary Care Trust 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 the PCT, and 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 sites are located within 10Km of the Installation:

- Roydon Common & Dersingham Bog SAC
- The Wash & North Norfolk Coast SAC
- The Wash SPA
- Roydon Common Ramsar
- The Wash Ramsar

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

- River Nar SSSI

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

- Saddlebow Reedbeds
- West Winch Common
- Meadow adj. A10
- Adj. River Nar

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 feature(s) of the protected site(s).

The modelling indicates that maximum modelled air concentrations of the pollutants are below 1% of the relevant EQS, a level at which we consider the likely effect to be insignificant, as summarised below:-

Maximum modelled concentration for nitrogen oxides		
Site Name	EQS µg/m^3	Max PC as % of EQS
Roydon Common (SAC)	30	0.24
The Wash (SAC)	30	0.25
The Wash (SPA)	30	0.25

Maximum modelled concentration for sulphur dioxide		
Site Name	EQS µg/m^3	Max PC as % of EQS
Roydon Common (SAC)	10	0.18
The Wash (SAC)	20	0.09
The Wash (SPA)	20	0.09

Maximum modelled concentration for ammonia		
Site Name	EQS µg/m^3	Max PC as % of EQS
Roydon Common (SAC)	1	0.36
The Wash (SAC)	3	0.12
The Wash (SPA)	3	0.12

The HCl was incorporated into the acid gas reporting.

Nitrogen deposition effects were assessed. The modelling indicates that maximum modelled deposition are below 1% of the relevant EQS, a level at which we consider the likely effect to be insignificant, as summarised below:-

Assessment of nitrogen deposition (kg eq.ha/yr)			
Site Name	Habitat type	Min CL	Max PC as % of EQS
Roydon Common (SAC)	Acid grassland	5.00	0.97
	Alkaline fen and reedbed	10.00	0.48
	Lowland heathland	10.00	0.48
	Oak woodland	10.00	0.29

	Raised bog and blanket bog	5.00	0.97
The Wash (SAC)	Grazing Marsh	20.00	0.25
	Saltmarsh	30.00	0.17
The Wash (SPA)	Grazing Marsh	20.00	0.25
	Saltmarsh	10.00	0.17

Acid deposition effects were assessed using revised Critical Load Function (CLF) methodology for acid deposition.

Method:
Where PEC > CLminN, acid deposition (PC% CLF) is assessed as follows:
((PC S+N)/CLmaxN)x100)
This method is applicable to Roydon Common and Dersingham Bog SAC

Where PEC <CLminN, acid deposition (PC% CLF) is assessed as follows:
(PC S/CLmaxS)x100

Roydon Common SAC

Interest Feature	PC N	PC S	minCLmaxN	PC% CLF
Northern Atlantic wet heathland	0.00225	0.00264	0.852	0.57
European dry heath	0.00225	0.00264	0.852	0.57
Depressions on peat substrates	0.00225	0.00264	0.501	0.97

It is therefore possible to conclude no likely significant effect from acid deposition at Roydon Common
The acid deposition predicted at the Wash SAC and SPA is less than the 1% of EQS based on critical loads and is therefore not likely to lead to any significant effect.

The Wash	Max PC	Min CL (EQS)	PC% of EQS
Grazing Marsh	0.01	0.75	0.91
Saltmarsh	0.01	0.75	0.91

5.4.3 SSSI Assessment

The Applicant's assessment of SSSIs was reviewed by the Environment Agency's technical specialists for modelling, air quality, conservation and ecology technical services, who agreed with the assessment's conclusions, that the proposal does not damage the special features of the SSSI(s).

5.4.4 Assessment of Non-Statutory Sites

The Applicant has assessed the impact of NO_x, SO_2, NH_3 and HF against critical levels for the protection of vegetation and ecosystems at the four non-statutory habitats sites. They have also assessed the impact against critical loads.
No exceedances of the critical levels for NO_x, SO_2, NH_3 or HF at the non-statutory sites are predicted. An insignificant nitrogen deposition process contribution is predicted except for Saddlebow Reedbeds and Adjacent River Nar, 1.9% and 2% respectively. The applicant predicts that the nitrogen and sulphur contributions to the acid critical load will be less than 1% of the critical load function.

Our assessment agrees with the Applicant that it is unlikely that the predicted process contribution of NO_x, SO_2, NH_3 and HF will exceed the relevant critical levels at all non-statutory habitats sites. We also agree that the predicted nitrogen deposition process contribution is not likely to be greater than 100% of the critical load, and that the predicted nitrogen and sulphur contributions to the acid critical load function are not likely to be greater than 100% of the minimum critical load function.

5.5 Impact of abnormal operations

WID (Article 6(3)(c)) requires that waste shall cease to be fed to the installation whenever any of the continuous emission monitors show that an emission limit value (ELV) is exceeded due to disturbances or failures of the purification devices. Not withstanding this, WID (Article 13(3)) allows for the continued feeding of waste under abnormal operating conditions – this is a recognition that the emissions during transient states (e.g. start-up, 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. WID Article 13 sets criteria for determining what is an abnormal operation and sets some limits regarding duration and extent of the abnormal operation which aim to ensure that the overall environmental impact is so minimised.

Abnormal operations are limited to no more than a period of 4 hours continuous operation and no more than 60 hour aggregated operation in any calendar year (<1% of total operating hours). As such, abnormal operating conditions are not expected to have any significant long term environmental impact unless the background conditions were already close to, or exceeding, an EQS. For the most part therefore consideration of abnormal operations is limited to consideration of its impact on short term EQSs.
WID abnormal operations are defined as any technically unavoidable stoppages, disturbances, or failures of the abatement plant or the measurement devices, during which the concentrations in the discharges into air may exceed the normal emission limit values.

For incineration plant, WID sets backstop limits for particulates, CO and TOC which must continue to be met. The CO and TOC limits are the same as for normal operation, and are intended to ensure that good combustion

conditions are maintained. The backstop limit for particulates is 150 mg/m^3 as a half hourly average, which is five times the limit in normal operation.

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

- Dioxin emissions of 10 ng/m^3 (100 x normal)
- NOx emissions of 400 mg/m^3
- Particulate emissions of 150 mg/m^3 (5 x normal)
- SO_2 emissions of 400mg/m^3 (1.5x normal)
- HCl emissions of 800mg/m^3 (13x normal)

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

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

Pollutant	EQS / EAL	Back-ground Conc	Process Contribution (PC)	PC as % of EQS / EAL	Predicted Headroom (EQS/EAL – 2 x background)	PC as a % of Head-room
NO_2	200	49.4	15.86	7.93	-	-
PM_{10}	50	18.8	1.16	2.31	-	-
Cd	1.5	$2.2x10^{-4}$	0.02	1.3	-	-
Tl	30	$3.4x10^{-5}$	0.02	0.07	-	-
Hg	7.5	$2.2x10^{-3}$	0.04	0.53	-	-
Sb	150	$8.3x10^{-3}$	0.02	0.01	-	-
As	15	$9.5x10^{-4}$	0.02	0.13	-	-
Cr	150	$3.6x10^{-3}$	0.17	0.11	-	-
Co	6	$1.4x10^{-3}$	0.02	0.28	-	-
Cu	60	$2.1x10^{-1}$	0.08	0.13	-	-
Mn	1500	$9.2x10^{-3}$	0.02	$1x10^{-3}$	-	-
Ni	30	$3.1x10^{-3}$	0.07	0.23	-	-
V	1	$2.7x10^{-3}$	0.02	1.71	-	-
HCl	750	0.83	21.1	2.81	-	-
HF	160	2.46	0.4	0.25	-	-
SO_2 (15min)	266	14.6	12.97	4.88	-	-
SO_2 (1 hr)	350	14.6	11.6	3.31	-	-

Note 1 All the above concentration figures are in µg/m^3

From the table above the emissions of the following substances can still be considered insignificant, in that the PC is still <10% of the short-term EQS/EAL. NO_2, PM_{10}, Cd, Tl, Hg, Sb, As, Cr, Co, Cu, Mn, Ni. V, HCl, HF, SO_2.

We have not assessed the impact of abnormal operations against long term EQSs for the reasons set out above. Except that if dioxin emissions were at 10 ng/m^3 for the maximum period of abnormal operation, this would result in a 70% increase in the TDI reported in section 5.3.3. In these circumstances the TDI would be 0.23 pg(I-TEQ/ kg-BW/day), which will still not pose a risk to human health.

6. Application of Best Available Techniques

6.1 Scope of Consideration

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

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

- 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.

WID on the other hand is based on setting mandatory emission limit values. Although the WID 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. As the WID itself states, its limits are "*a necessary but not sufficient condition*" for compliance with the requirements of the IPPCD, which also applies to this Installation. The IPPCD requires that emissions should be prevented or minimised, so it may be possible and desirable to achieve emissions below WID limits.

Even if the WID 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, WID limits is therefore a "worst-case" scenario.

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. The WID requires that the plant (furnace in this context) should be designed to deliver its requirements. The main requirements of the WID 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 NOx as the furnace choice could have an effect on the amount of unabated NOx produced
- energy consumption – whole plant, waste preparation, effect on GWP

- Need, if any, for further processing of residues to comply with TOC
- Costs

Comparison of thermal treatment technologies

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

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Rotary Kiln	Can accept liquids and pastes, 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	- mixed plastic wastes - other similar consistent streams not suited to untreated MSW gasification less widely used/proven than incineration	To 10 t/h	- low leaching slag reduced oxidation of recyclable metals	- limited waste feed not full combustion high skill level less widely proven	low leaching slag	High operation/ maintenance costs pre-treatment costs high
Gasification - fluid bed	- 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	-temperatures e.g. for Al recovery separation of non-combustibles -can be combined with ash melting - reduced oxidation of recyclable metals	-limited waste size (<30cm) - tar in raw gas - higher UHV raw gas - less widely proven	If Combined with ash melting chamber ash is vitrified	Lower than other gasifiers
Pyrolysis	pre-treated MSW high metal inert streams shredder residues/plastics pyrolysis is less widely used/proven than incineration	~ 5 t/h (short drum) 5 – 10 t/h (medium drum)	no oxidation of metals no combustion energy for metals/inert in reactor acid neutralisation possible syngas available	- limited wastes process control and engineering critical high skill req. not widely proven need market for syngas	- 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
- Plasma Arc Gasification

The Applicant concluded that only moving grate and fluidised bed were technically proven options at large scale. This is broadly in line with the BREF. The Applicant still considered the following options in more detail:

1. Moving Grate Furnace
2. Fluidised Bed
3. Pyrolysis
4. Gasification

- The fluidised bed technology requires a homogenous feedstock. In this respect fluidised bed would not be suited to the type of waste material proposed since further pre-treatment (sorting, crushing, shredding) prior to combustion taking place would be required.
- Emissions from each option would be similar. Although fluidised bed can achieve lower NOx emissions in practice secondary abatement would still be required. Abated emissions would be similar to moving grate with NOx emissions dependant on the abatement technique. But with higher reagent use for the moving grate abatement system.
- Raw material usage for option 1 is lower than option 2 due to sand being required for option 2. Options 3 and 4 are similar to option 1.
- Differences in GWP between each option are not significant. The energy requirements for each option are very similar. The amount of carbon dioxide emitted will be dependant on the carbon content of the waste and will therefore be essentially the same for each option. The amount of energy that can be recovered from the waste is a consideration for GWP in that if more energy is recovered less fossil fuel will be required to be combusted elsewhere. The energy conversion efficiencies for options 1 and 2 are similar. Options 3 can give a higher conversion if syngas is combusted in an engine or turbine, but syngas cleaning can impact on the overall efficiency and reduce it to lower than those for options 1 and 2.
- The overall amount of residues generated is similar for each option, although fluidised bed will generate more hazardous waste APC residues.
- There are no significant differences in odour, noise and accident risks between the options.
- Option 1 is the most cost effective
- There is limited operational experience of gasification or pyrolysis plant at the scale of this proposed Installation.

- Reliability of moving grate is proven at commercial scale with a large number of operational facilities.

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

The Applicant proposes to use gasoil as support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on the reliability of supply from on-site storage ensuring fuel availability for furnace auxiliary burner operation.

Boiler Design

In accordance with our Technical Guidance Note, S5.01, 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.

We have considered the assessments made by the Applicant and agree that the furnace technology chosen represents BAT. We believe that, based on the information gathered by the BREF process, the chosen technology will achieve the requirements of the WID 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.
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/m^3 and are BAT for most installations. The Applicant proposes to use

multiple compartment filters with burst bag detection to minimise the risk of increased particulate emissions in the event of bag rupture.

Emissions of particulate matter have been previously assessed 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)	NOx emissions < 70mg/ m^3 Reduces CO, VOC, dioxins	Expensive. Re-heat required – reduces plant efficiency		All plant
Selective non-catalytic reduction (SNCR)	NOx emissions typically 150 - 180mg/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 NOx 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.
- 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/m^3 and can be applied to all plant, it is generally more expensive than SNCR and requires reheating of the waste gas stream which reduces energy efficiency, periodic replacement of the catalysts also produces a hazardous waste. SNCR can typically reduce NO_x levels to between 150 and 180 mg/m^3, it relies on an optimum temperature of around 900 deg C and sufficient retention time for reduction. SNCR is more likely to have higher levels of ammonia slip. The technique can be applied to all plant unless lower NO_x releases are required for local environmental protection. Urea or ammonia can be used as the reagent with either technique, urea is somewhat easier to handle than ammonia and has a wider operating temperature window, but tends to result in higher emissions of N_2O. 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 with ammonia as the reagent.

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

The amount of urea / ammonia used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH_3 slip. Improvement condition IC5 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 NH_3 and N_2O emissions quarterly.

6.2.3 Acid Gases, SO_x, HCl and HF

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

Acid gases and halogens : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Wet	High reaction rates Low solid residues production Reagent delivery may be optimised by concentration and flow rate	Large effluent disposal and water consumption if not fully treated for re-cycle Effluent treatment plant required May result in wet plume Energy required for effluent treatment and plume reheat		Plants with high acid gas and metal components in exhaust gas – HWIs
Dry	Low water use Reagent consumption may be reduced by recycling in plant	Higher solid residue production Reagent consumption controlled only by input rate		All plant

	Lower energy use Higher reliability			
Semi-dry	Medium reaction rates Reagent delivery may be varied by concentration and input rate	Higher solid waste residues		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 gasoil as the support fuel on the basis of the reliability of supply from on-site storage ensuring fuel availability for furnace auxiliary burner operation and we agree with that assessment.

- Management of heterogeneous wastes – this will disperse problem wastes such as PVC by ensuring a homogeneous waste feed.

There are 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 8 of WID. 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 included wet scrubbing in their assessment.

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 the semi-dry method . 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 WID combustion conditions on 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.

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

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

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

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

The electricity that is generated by the Installation will displace emissions of CO_2 elsewhere in the UK, as virgin fossil fuels will not be burnt to create the same electricity. The Applicant has therefore included within its GWP calculations a CO_2 offset for the net amount of electricity exported from the Installation.

Taking this into account, the net emissions of CO_2 from the installation are estimated at 116,000 tonnes per annum. At this level emissions cannot be characterised as insignificant. The Installation is not subject to the Greenhouse Gas Emissions Trading Scheme Regulations 2003; therefore it is a requirement of IPPCD to investigate how emissions of greenhouse gases emitted from the installation might be prevented or minimised.

The Applicant has considered GWP as part of its BAT options appraisal. There are a number of areas in which a difference can be made to the GWP of the Installation, e.g. The Applicant's BAT options appraisal compared SCR and SNCR methods of secondary NO_x abatement. In summary: the following factors influence the GWP of the facility:-

On the debit side

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

On the credit side

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

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.

The Applicant's assessment shows that the GWP of the plant is dominated by the emissions of carbon dioxide that are released as a result of waste combustion. This is constant for all options considered in the BAT assessment.

The differences in the GWP of the options in the BAT appraisal arise from small differences in energy recovery and in the amount of N_2O emitted.

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

- maintaining furnace temperature of 850^oC 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^oC
- use of bag filters and the injection of activated carbon or coke to adsorb residual POPs components.

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

We believe that the Permit ensures that the formation and release of POPs will be prevented or minimised. As we explain above, high-temperature incineration is one of the prescribed methods for destroying POPs. Permit conditions are based on the use of BAT and WID 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 WID to be assessed against the I-TEQ (International Toxic Equivalence) limit of 0.1 ng/m^3. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK's independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ

values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. EPR requires that, in addition to the requirements of the WID, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be specified for monitoring and reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. EPR requires monitoring of a range of PAHs and dioxin-like PCBs in waste incineration Permits 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 identified by Defra in the Environmental Permitting Guidance on the WID. 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 5.3 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]

Pentchlorobenzene (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

Under normal operation there will be no process discharges to surface water. Rainwater run-off will be collected, stored and used in the process. Any water run-off from area with potential for oil contamination will pass via an interceptor.

Rainwater will be emitted via a flood channel to The Ouse in the event of prolonged heavy rainfall, if the discharges approved by the Environment Agency..

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

There will be no process discharges to sewer from the Installation.

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 WID 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 contaminated water of Article 8(7) must be arranged.

All liquid tanks and drums will be bunded to 110% of the tank contents or 25% of the total, whichever is the largest, and have blind drains.

Rainwater and firewater will be stored in underground tanks. Underground drains will be tested for integrity prior to start of operating and then periodically by CCTV. The precise routing of drains will be established at the detailed design stage.

APC residues will be handled within an enclosed system. It will be stored in silos and discharged via sealed connections to fully contained disposal vehicles. There will be a filter on the silo vent fitted with a differential pressure alarm.
Bottom ash will be treated in a building. When not being processed the IBA will be stored outside. It will be dampened with ash run-off to minimise dust.

Process water will be collected for re-use.

Activated carbon, and hydrated lime will be used within the flue gas treatment plant. These reagents are potentially dusty. Sealed connections will be used for deliveries. Air displaced during deliveries will vent via a filter unit installed on the storage vessel. The filter unit will be visually inspected during unloading operations to ensure that it is operating effectively. In the event of a dust emission the filter will be replaced.

During a delivery of ammonium displaced air will be vented back to the delivery vehicle. In the event of a spillage, any spilt material will be cleaned up immediately and disposed of appropriately. The ammonia storage tank vent will be fitted with a scrubber to prevent emissions during filling.

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

6.5.4 Odour

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

Waste accepted at the installation will be delivered in covered vehicles or within containers and bulk storage of waste will only occur in the installation's waste bunker. A roller shutter door will be used to close the entrance to the tipping hall outside of the waste delivery periods and combustion air will be drawn from above the waste storage bunker in order to prevent odours and airborne particulates from leaving the facility building during normal operation. The applicant also proposes to reduce the volume of waste in the bunker prior to planned shutdowns.

6.5.5 Noise and vibration

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.

Waste delivery vehicles would manoeuvre and deposit waste within an enclosed waste reception building that would include fast-acting self-closing roller shutter doors. The operator's vehicles within the IBA facility would be fitted with broadband, directional, white-noise reversing signals. The process plant and equipment will be designed such that the average, internal, diffuse, ambient noise levels do not exceed 85 dB(A). The façade and roof cladding elements of the significant noise generating areas would be selected to control noise emissions such that significant adverse effects would not be expected to occur. The air cooled condensers would be designed to control noise emissions such that significant adverse effects would not be expected to occur.

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

BS4142 was used to predict the likelihood of complaints at nearby receptors. A rating level was calculated and compared to the existing background.

BS4142 states that a rating level of 10dB above background is an indication that complaints are likely, a rating level of around 5dB above background is of marginal significance and a rating level of 10dB below the background is positive indication that complaints are unlikely.

The results of the assessment indicate that, at the closest residential noise sensitive receptors, the noise immissions levels are predicted to be approximately 36-50 dB daytime and 27-42 dB night which are below the levels of 50 dB (day) and 45 dB night at which EPR 1.00 gives guidance that annoyance becomes more likely.
An increase of 1 dB day and night is predicted to occur at some receptors.

Even though we are satisfied that there is unlikely to be an issue with noise, because the activities on site have the potential to cause noise we have included condition 3.5.2 which will require the operator to submit and implement a noise management plan in the event of there being an issue.

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

The use of WID limits for air dispersion modelling sets the worst case scenario. If this shows emissions are insignificant then we accept that the Applicant's proposals are BAT, and that there is no justification to reduce ELVs below WID levels 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.

(i) Local factors

We have considered the following information:

The impact in local receptors including ecological receptors.

(ii) National and European EQSs

We have considered mandatory emission limits specified in WID as well as UK and European air quality standards and EQSs. Not conditions beyond BAT are required as a result.

(iii) Global Warming

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

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

(iv) Commissioning

A pre-operational condition (POO3) has been set for the Operator to agree a commissioning plan with us. IC 3 requires the Applicant to report on this plan.

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 deliver the EPR requirement that dioxin-like PCBs and PAHs should be monitored and to deliver the requirements of WID 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 permit requires that the burning of waste shall cease if CEMS fail except under WID abnormal operation.

6.7.3 Continuous emissions monitoring for dioxins and mercury

The WID specifies manual extractive sampling for mercury and dioxin monitoring. However, Article 11(13) of the WID requires that "The Commission, acting in accordance with the procedure laid down in Article 17, shall decide, as soon as appropriate measurement techniques are available within the Community, the date from which continuous measurements of the air emission limit values for heavy metals, dioxins and furans shall be carried out in accordance with Annex III". 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. However, the continuous sampling systems do not meet the requirements of BS EN 1948 which is the standard for dioxin analysis. BS EN 1948 requires traversing the sampler across the duct and collecting parts of the sample at various points across the duct to ensure that all of the gas phase is sampled proportionately, in case there are variations in gas flow rate or composition resulting in a non-homogeneous gas flow. This requirement is particularly important where suspended solids are present in the gas, and dioxins are often associated with suspended solid particles. Continuous samplers are currently designed for operation at one or two fixed sampling points within the duct, and traverses are not carried out automatically. Using such samplers, more information could be obtained about the variation with time of the dioxin measurement, but the measured results could be systematically higher or lower than those obtained by the approved standard

method which is the reference technique required to demonstrate compliance with the limit specified in the WID. The lack of a primary reference method (e.g. involving a reference gas of known concentration of dioxin) prohibits any one approach being considered more accurate than another. Because compliance with the WID's requirements is an essential element of EPR regulation, we have set emission limits for dioxins in the permit based on the use of BS EN 1948 and the manual sampling method remains the only acceptable way to monitor dioxins for the purpose of regulation.

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 WID. 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 WID, 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 2010 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 2010 – **IPPC Directive**

We address the requirements of the IPPCD in the body of this document above.

There is one requirement not addressed above, which is that contained in Article 9(2) IPPCD. Article 9(2) of the IPPC Directive requires that "In the case of a new installation or a substantial change where Article 4 of Directive 85/337/EC applies, any relevant information obtained or conclusion arrived at pursuant to articles 5, 6 and 7 of that Directive shall be taken into account for the purposes of granting an environmental 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 take into consideration any relevant information obtained or conclusion arrived at by the local planning authorities pursuant to those EIA Directive articles.

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

- The Environmental Statement submitted with the planning application (which also formed part of the Environmental Permit Application).
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

We have complied with our obligation under Article 9(2). From consideration of the Environmental Statement and our response as consultee to the

planning process we are satisfied that no additional or different permit conditions are necessary.

The Environment Agency has also carried out its own consultation on the Environmental Permitting Application which includes the Environmental Statement submitted to the local planning authority. The results of our consultation are described elsewhere in this decision document.

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

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

We must exercise our relevant functions for the purposes of ensuring that the waste hierarchy referred to in Article 4 of the Waste Framework Directive is applied to the generation of waste and that any waste generated is treated in accordance with Article 4 of the Waste Framework Directive. (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 13 to the EPR 2010 – **Waste Incineration Directive**

We address the WID in detail in Annex 1 to this document.

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

To the extent that it might lead to a discharge of pollutants to groundwater (a "groundwater activity" under the EPR 2010), the Permit 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.

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

Regulation 59 of the EPR 2007 requires the Environment Agency to prepare and publish a statement of its policies for complying with its public participation duties. We have published our public participation statement.

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

Our draft decision in this case has been reached following a programme of extended public consultation, both on the original application and later, separately, on the draft permit and a draft decision document. The way in which this has been done is set out in Section 2. A summary of the responses received to our consultations and our consideration of them is set out in Annex 4.

7.2 National primary legislation

7.2.1 **Environment Act 1995**

(i) Section 4 (Pursuit of Sustainable Development)

We are required to contribute towards achieving sustainable development, as considered appropriate by Ministers and set out in guidance issued to us. The Secretary of State for Environment, Food and Rural Affairs has issued *The Environment Agency's Objectives and Contribution to Sustainable Development: Statutory Guidance (December 2002)*. This document:

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

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

(ii) Section 7 (Pursuit of Conservation Objectives)

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.

We have considered the impact of the installation on local wildlife sites within 2 Km which are not designated as either European Sites or SSSIs. We are satisfied that no additional conditions are required.

(iii) 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.

We assessed the Application and concluded that the Installation will not damage the special features of any SSSI. This was recorded on a CROW Appendix 4 form.

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

7.2.5 **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.

7.3 National secondary legislation

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

We have assessed the Application in accordance with guidance agreed jointly with Natural England and concluded that there will be no likely significant effect on any European Site.

We consulted Natural England by means of an Appendix 11 assessment, and they agreed with our conclusion, 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 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 the requirements of the Water Framework Directive through (inter alia) EP permits, but it is felt that existing conditions are sufficient in this regard and no other appropriate requirements have been identified.

7.3.3 **The Persistent Organic Pollutants Regulations 2007**

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

7.4 Other relevant legal requirements

7.4.1 Duty to Involve

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

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

ANNEX 1 : APPLICATION OF THE WASTE INCINERATION DIRECTIVE

WID Article	Requirement	Delivered by
4(3)	measurement techniques for emissions into the air comply with Annex III	See below on compliance with Article 11
4(4)	compliance with any applicable requirement of directives on: Urban Waste Water Treatment, the IPPC, Air Quality Framework, Dangerous Substances, Landfill.	Landfill Directive is not relevant to this installation. Relevant requirements of all other directives are delivered via EPR.
4(4)(a)	list explicitly the categories of waste that may be treated; using the European Waste Catalogue ("EWC") including information on the quantity of waste where appropriate.	Condition 2.3.3 and Table S2.2 in Schedule 3 of the Permit
4(4)(b)	Permit shall include the total waste incinerating capacity of the plant	Condition 2.3.3 and Table S2.2 in Schedule
4(4)(c)	specify the sampling and measurement procedures used to satisfy the obligations imposed for periodic measurements of each air and water pollutant.	Conditions 3.3.1 and Tables S3.1, S3.1(a), S3.2, S3.3 and S3.4. also compliance with Articles 10 and 11
5(1)	Take all necessary precautions concerning delivery and reception of wastes, to prevent or minimise pollution.	- EPR require prevent or minimise pollution. –Section 1 of the Application defines how this will be carried out. - conditions 2.3.1, 2.3.3, 3.2, 3.3 and 3.4
5(2)	determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Section 1 of the application describes procedures for the reception and monitoring of incoming waste

WID Article	Requirement	Delivered by
6(1)	(a). Slag and bottom ash to have Total Organic Carbon (TOC) is < 3% or loss on ignition (LOI) is < 5%. (b) flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber. (c) 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	(a) Conditions 3.3.1 and Table S3.4 (b) - Pre-operational condition PO6. The application specifies measurement point (c) Condition 2.3.7
6(2)	Relates to co-incineration plants	Not relevant
6(3)	automatic waste feed prevention: (a) at start up until the specified temperature has been reached or if this temperature is not maintained (b) when the CEMs show that ELVs are exceeded due to disturbances or failure of abatement.	Condition 2.3.6
6(4)	Different conditions than those in 6(1) may be authorised	No such conditions Have been allowed
6(5)	emissions to air do not give rise to significant ground level pollution, in particular, through exhaust of gases through a stack	Emissions and their ground-level impacts are discussed in the body of this document,
6(6)	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 (Condition 1.2.3)
6(7)	Relates to the feeding of infectious clinical waste into the furnace	No infectious clinical waste will be burnt
6(8)	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 fulfil this requirement
7(1)	incineration plants to comply with the ELVs in Annex V.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1a

WID Article	Requirement	Delivered by
7(2)	Relates to co-incineration	Not relevant
7(3)	measured ELVs to be standardised in accordance with Article 11.	Schedule 6 details this standardisation requirement
7(4)	Relates to co-incineration	Not relevant
8(1) – 8(6)	All relate to conditions for water discharges from the cleaning of exhaust gases	There are no such discharges as condition 3.1.1 prohibits this.
8(7)	(a) prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. (b) 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
9	(a) residues to be minimised in their amount and harmfulness, and recycled where appropriate (b) prevent dispersal of dry residues and dust during transport and storage (c) test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction)	(a)conditions 3.3.1 and 1.4.1 (b) conditions 1.4.1 2.3.1 and 3.2.1 (c) . Condition 3.3.1 and pre-operational condition PO3.
10(1) and 10(2)	measurement equipment shall be installed and techniques used to monitor the incineration process, and that the measurement requirements shall be laid down in Permits	condition 3.3.1, and tables S3.1 and S3.1(a), emissions to air, and table S3.4, process monitoring requirements
10(3)	Installation and functioning of CEMs for emissions to air and water to be subjected to regular control, testing and calibration	condition 3.3.3, and tables S3.1, S3.1(a), and S3.4
10(4)	Sampling points to be specified in Permits	tables S3.1 and S3.1(a), and S3.4
10(5)	periodic measurements to air and water to comply with Annex III, points 1 and 2	tables S3.1 and S3.1(a), and S3.4 specify the standards to be used. Condition PO3 requires a report from the Operator

WID Article	Requirement	Delivered by
11(2)	Continuous measurement of NO_x, CO, total dust, TOC, HCl, and SO_2 and periodic measurement of HF, heavy metals, dioxins and furans plus the measurement of combustion chamber temperature and concentration of O_2, pressure, temperature and water content of the exhaust gases	condition 3.3.1 and tables S3.1, S3.1(a) and S3.3.
11(3)	verify the residence time and minimum temperature as well as oxygen content of exhaust gases	improvement condition IC4 in table S1.3.
11(4)	Periodic rather than Continuous measurement of HF if HCl is abated and limit values not exceeded	Condition 3.1.2 and table S3.1
11(6)	Conditional option of periodic measurement for HCl, HF and SO_2 instead of CEMs	Option not applied except for HF as per Article 11(4) above
11(7)	reduction in the monitoring frequency for heavy metals, dioxins and furans under certain conditions, provided the criteria in article 17 of WID are available	Not applied as no such criteria available
11(8)	sets out reference conditions for standardisation of measurements	Schedule 6 sets the same reference conditions
11(9)	recording and reporting requirements	Section 4 and Schedules 4 and 5
11(10)	Sets out criteria for compliance with ELVs in Annex V	conditions 3.1.2 and tables S3.1, S3.1(a) and S3.4
11(11)	Specifies when ELVs apply, how averages are calculated (including the use of Annex III) and how many values can be discarded	table S3.1, S3.1(a) and condition 3.3.5
11(12)	Average values for HCl, SO_2 and HF to be determined as per Articles 10(2), 10(4) and Annex III	See Articles 10(2), 10(4) and 11(11) above
11(14) to 11(16)	addresses the monitoring of waste water from the cleaning of exhaust gases	There are no such releases from the Installation.
11(17)	Competent authorities to be informed if ELVs are exceeded	Condition 4.3.1
12(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2

WID Article	Requirement	Delivered by
13(1)	specify maximum period of unavoidable stoppages, disturbances or failures of purification or CEMs, during which air or water ELVs may be exceeded	Conditions 2.3.6 to 2.3.9
13(2)	cease the feed of waste in the event of a breakdown	condition 2.3.10
13(3)	Limits the maximum period under 13(1) above to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year	condition 2.3.10.
13(4)	Limits on dust (150 mg/m3), CO and TOC not to be exceeded	Condition 2.3.6 and Table S3.1(a)

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 Section 1 of How to comply with your environmental permit – Getting the basics right. 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 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 waste 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	Prior to the commencement of commissioning, the Operator shall submit a written report to the Agency detailing the waste acceptance procedure to be used at the site. The waste acceptance procedure shall include the process and systems by which wastes unsuitable for incineration at the site will be controlled. The procedure shall be implemented in accordance with the written approval from the Agency.
PO6	After completion of furnace design and at least three calendar months before any furnace operation; 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 the Waste Incineration Directive.

PO7	Prior to the commencement of commissioning, the Operator shall submit a written report to the Agency detailing the dust management plan for IBA processing to be used at the site. The dust management plan shall include the process and systems by which dusts will be controlled. The procedure shall be implemented in accordance with the written approval from the Agency.
PO8	At least 3 months before groundworks for construction start, the Operator shall submit the final drainage plan to the Environment Agency for approval. The drainage plan shall include details of secondary containment for any drains that could carry contaminated liquid and also details of secondary containment for underground rainwater and firewater tanks.

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 report to the Environment Agency on the implementation of its Environmental Management System and the progress made in the accreditation of the system by an external body or if appropriate submit a schedule by which the EMS will be subject to accreditation.	Within 12 months of the date on which waste is first burnt.
IC2	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point A1, identifying the fractions within the PM_{10}, $PM_{2.5}$ and $PM_{1.0}$ ranges. The proposal shall include a timetable for approval by the Environment Agency to carry out such tests and produce a report on the results. On receipt of written agreement by the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	Within 6 months of the completion of commissioning.
IC3	The Operator shall submit a written report to the Environment Agency on the commissioning of the installation. 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.	Within 4 months of the completion of commissioning.
IC4	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.	Within 4 months of the completion of commissioning.

Reference	Improvement measure	Completion date
IC5	The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of the Selective Non Catalytic Reduction (SNCR) system and combustion settings to minimise oxides of nitrogen (NO_x) emissions within the emission limit values described in this permit with the minimisation of nitrous oxide emissions. The report shall include an assessment of the level of NO_x and N_2O emissions that can be achieved under optimum operating conditions. The report shall also provide details of the optimisation (including dosing rates) for the control of acid gases and dioxins	Within 4 months of the completion of commissioning.
IC6	The Operator shall carry out an assessment of the impact of emissions to air of all the component metals subject to emission limit values, i.e. Cd, As, Pb, Cr 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 EQS/EAL. In the event that the assessment shows that an EQS/EAL can be exceeded, the report shall include proposals for further investigative work.	15 months from commencement of operations
IC7	The Operator shall submit a written summary report to the Agency to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.	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 commissioning.

ANNEX 4: Consultation Reponses

A) Advertising and Consultation on the Application

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

We advertised the Application by a notice placed on our website, which contained all the information required by the IPPCD, including telling people where and when they could see a copy of the Application. We also placed an advertisement in the Lynn News (22/07/2011).

We placed a paper copy of the Application and all other documents relevant to our determination (see below) on our Public Register at Kingfisher House, Orton Goldhay, Peterborough and also sent a copy to the Borough Council of King's Lynn & West Norfolk for its own Public Register. Anyone wishing to see these documents could do so and arrange for copies to be made. The Applicant also provided a number of copies of the Application on CD which were also made accessible from the Public Registers

Electronic versions of the application were hosted on our e-consultation website, and a dedicated web page was created by the area team.

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

- *Environmental Health Dept.*
- *Food Standards Agency*
- *Health and Safety Executive*
- *Local Planning Authority*
- *National Grid*
- *Primary Care Trust*
- *Harbour Authority*

These are bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly.

In addition to our advertising the Application, we undertook a programme of extended public consultation. Public surgeries were held on the 2nd and 3rd of August 2011 in King's Lynn, written comments were also accepted by the Environment Agency beyond the formal consultation period.

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from NHS Norfolk	
Brief summary of issues raised:	Summary of action taken / how this has been covered
5.1 Regulator to ensures that incident and COMAH plans are fully encompassing, including on and off site impacts	Accident Management Plan is required as part of PO1
5.2 Regulator to confirms the operating hours of the plant and any relevant impact discrepancies in applications	Operating hours are detailed as part of required operating techniques – condition 2.3.1
5.3 Regulator to ensures that suitable environmental monitoring will be undertaken of emissions to air, once the plant is in operation, to ascertain the impact of emissions on surrounding receptors and validate the modelling data.	Section 3.3 of the permit specifies the required monitoring of the installation. Improvement conditions IC3 and IC6 require the validation of actual performance vs. modelled data.
5.4 Regulator to confirms that any significant emission exceedances or any other information about any breach of permit conditions which could resulting adverse health effects will be reported to them in a prompt manner.	Sections 4.2 and 4.3 require routine and abnormal reporting of emissions.
5.5 Regulator to clarifies the potential impact of dust, PM_{10} and heavy metal contaminated water from the IBA Recycling Facility.	A dust management plan is required from the operator before operation is allowed. Measures to prevent pollution to water are included in Section 3.1 and 3.2 of the permit. Extensive water recycling is proposed and no discharges of water are expected routinely. The permit requires prior testing and Environment Agency Area agreement of any proposed water discharges.
5.6 Regulator to confirms the safe management of process water, in particular that from quenching of IBA.	Measures to prevent pollution to water are included in Section 3.1 and 3.2 of the permit.
5.7 Regulator to seek comments from the local authority regarding noise, and the potential impact of nitrogen dioxide from the facilities on the two Air Quality Management Areas.	The local authority were formally consulted on this application and reiterated the comments of potential noise and AQMA impact. The applicant has undertaken an assessment of noise which demonstrates an insignificant noise impact at the nearest sensitive receptors. The permit requires performance checks on commissioning and that emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site . The impact of process emissions on the nearby AQMA's was assessed by the applicant and reviewed by the agency and conclude that the operation will not have a significant effect .
Obtains comments from the Food Standards Agency, as the expert authority, for matters relating to impact on human health of pollutants deposited on land used for the growing of food crops on animal rearing to confirm the validity of the human health risk assessment.	The FSA were formally consulted on this application – no response was received either on initial approach or follow-up reminder..

Response Received from Borough Council of King's Lynn & West Norfolk Environmental Health and Housing	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Impact of Nitrogen Dioxide and particulates on EQS of the two declared Air Quality Management Areas.	Existing background and potential emissions from proposed projects have been assessed by the applicant and reviewed by our Air Quality Monitoring and Assessment Unit and conclude that the operation will not cause exceedances of the EQS's due to this installation.
Concerns over public perception of the health impact of stack emissions.	Emissions from the installation have been modelled under a number of scenarios, including long term operation at WID limit levels and short term operations above WID limits. The models were generated by the applicant and have been scrutinised by the agency. The models included historical meteorological data. They show that the facility can be operated without having any likely effect on human health. Practical operation of incinerators demonstrate emissions lower than those allowed under WID. Emissions monitoring as required by WID include continuous monitoring of many entities including particulates. Both the impact of air pollutants and ingestion of pollutants through the food chain have been assessed and we are satisfied that there will be no significant impact on human health as a result of the operations of this incinerator.
Waste codes to be accepted, waste reception management and options to incorporate waste sorting alternatives.	A management plan is required that will include details of the waste acceptance procedure. No hazardous waste as defined is included in the permitted waste codes specified and all of the waste codes specified are suitable for incineration. The proposed facility forms part of an integrated waste management strategy, any material arriving at the facility will be residual waste arising following upstream waste segregation, recovery and recycling initiatives. The shape and content of this stategy is a matter for the local authority..
Impact of fugitive dust from IBA processing.	A dust management plan is required from the operator before operation is allowed.

Response Received from Natural England	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Acid deposition on Roydon Common, and the potential impact on acid sensitive species.	The issue was raised prior to our formal consultation. Our formal consultation addressed the likely magnitude of acid deposition , and Natuaral England agreed with our conclusion that there was no likely

	significant effect from acid deposition. Section 5.4 of this document.
Effects on The Wash and North Norfolk Coast SAC	The issue was raised prior to our formal consultation. Our formal consultation addressed the likely effects on the Wash and North Norfolk Coast and Natuaral England agreed with our conclusion that there was no likely significant effect . Section 5.4 of this document.
Potential liquid effluent to flood relief channel and Great Ouse	No routine liquid effluent expected. Non-routine discharge to be reviewed with Environment Agency prior to discharge as detailed in Table S3.2 of the permit.

Response Received from Food Standards Agency	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No comments received	The FSA were given a further opportunity to comment on the application as a follow up reminder was sent. Findings from studies by the FSA have been incorporated into the basis for our human health assessment (Section 5.3 of this document)

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

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

Guidance on the interaction between planning and pollution control is given in PPS23 / Planning Policy Wales 2002. 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. The way in which we have done that is set below.

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

Representations were received from Middleton Parish Council, who raised the following issues.

- Flood risk to the location proposed.
- Impact of Nitrogen Dioxide on Air Quality Management Areas.
- Impact of fine particle emissions on residents' health.

- Potential damage to ecological sites particularly Roydon Common and the marine environment of the Wash.

- The flood risk to the site has been comprehensively considered using up to date information. The flood risk assessment, which accompanied the planning application, shows that in an event with a 1 in 200 chance of occurring each year, the site would not flood. Not withstanding this the applicant has detailed materials management methodologies that would ensure that in the unlikely event of a flood, the site will not give rise to a pollution incident from materials stored on the site coming into contact with flood waters. This is further augmented by the requirement under Pre-operational condition PO1 which requires an Environment Management System to be available prior to commissioning.
- Both the applicants air quality assessment and our internal audit of that assessment have concluded that neither Nitrogen Dioxide nor particulate emissions should have a significant impact on ambient concentrations and that an exceedance of air quality standards, which have been established to protect public health is unlikely..
- Our assessment of the emissions from the proposed facility as consulted upon with Natural England conclude that it not likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects).

b) Representations from Individual Members of the Public

A total of approximately 700 responses were received from 200 individual members of the public. These raised many of the same issues as previously addressed including the impact of air pollution on the natural environment and human health, the use of continuous sampling techniques for monitoring dioxins, the level of traffic on the roads near the installation, public opinion against the siting of the installation, noise and odour concerns, concern over waste categories to be accepted, visual impact and concerns about IBA dust.

Only those issues additional to those already considered are listed below:

It has been indicated that a third party organisation; Ballast Phoenix, will be operating the IBA facility. The application has stated that Willows Power & Recycling Limited will be operating the facility, any change of management responsibility would involve a formal application to transfer the facility with commensurate checking process.

Wheelabrator's US conviction record has been raised as a concern. A statement from the applicant has been received in relation to overseas convictions. The company has denied any convictions and to give false information in support of an application would itself be an offence so we accept their response. However, in any event we are satisfied that the

rigorous conditions in our permits and our approach to enforcement will mean any permit is complied with.
A search was carried out via the Agency's National Enforcement Database in respect of the enforcement history of Cory Environmental Limited. No relevant convictions were identified.
Based on the processes and procedures stated within the permit application we are satisfied Willows Power and Recycling limited will have the required expertise available to them to operate the Willows Power and Recycling Centre in line with the requirements of all relevant EU legislation.

Flood risk has been raised as a concern – the Environment Agency remit is to comment at planning stage. The flood risk to the site has been comprehensively considered using up to date information. The flood risk assessment, which accompanied the planning application, shows that in an event with a 1 in 200 chance of occurring each year, the site would not flood. Preoperational condition PO1 requires a Environment Management System to be drawn up which will include a suitable analysis of risks. The applicant has detailed materials management methodologies that would ensure that in the unlikely event of a flood, the site will not give rise to a pollution incident from materials stored on the site coming into contact with flood waters. This is further augmented by the requirement under Pre-operational condition PO1 which requires an Environment Management System to be available prior to commissioning.

Concerns have been raised about water discharges to the River Ouse. The operator will be required to manage water collection and usage efficiently. Conditions 2.3.1, 3.1 and 3.2 detail the required operating standards and put conditions on any surface water discharges.

Issues over the amount of water usage required by the installation have been raised. The mains water supply is a consideration for the planning process and a commercial interest. We require the operator to make best use of the water and condition 1.3 of the permit requires this.

c) Representations Made at The Drop-In Event

The drop-in event was attended by approximately 100 persons, who were a mixture of local residents and business community potentially impacted by the proposed facility. Many of the issues raised were the same as those considered above.

Only those issues additional to those already considered are listed below:

- Concern was raised that the Health Protection Agency guidance on the health effects of incineration installations was out of date.
- A question was asked whether we were going to undertake our own air dispersion modelling.

Of these,

The references to our analysis of the likely health effects of the air emissions is set out in section 5.3 of this document.

Our Air Quality Modelling and Assessment Unit have assessed the applicants modelling data and undertaken check modelling independently. The conclusions to which are in the body of this decision document but is summary are:-

- We agree with the applicant that it is unlikely there will be exceedences of human health Environmental Quality Standards (EQS) for air as a result of the proposed emissions.

- We agree with the applicant's predictions in that the impact of dioxins is not likely to contribute significantly to the Tolerable Daily Intake (TDI).

B) Advertising and Consultation on the Draft Decision

This section reports on the outcome of the public consultation on our draft decision carried out between 16th April 2012 and 16th May 2012 and the public drop-in event held on 23rd April at South Lynn Community Centre.

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

a) Consultation Responses from Statutory and Non-Statutory Bodies

Further representations were received from Norfolk Wildlife Trust and the Food Standards Agency

The Food Standards Agency commented as follows:-

"From my experience of scrutinising other incinerator applications and based on the scale of this operation, as long as it is operated in such a way as to remain WID-compliant any incremental contribution to background levels of metal and dioxin contamination should be insignificant.

In making these comments and taking into account the relatively rural setting, I am assuming that the existing background levels of contamination are low. In areas where the background is high there may be an increased risk of non-compliance with regulatory limits in certain foods such as meat, milk and eggs owing to the cumulative impact of small increments of highly persistent chemicals over a significant length of time."

Our assessment of the applicants Human Health Risk assessment (discussed in Section 5.3) remains valid. We have no evidence that suggests that background levels are at a level that give rise to concerns over regulatory limits in the food specified.

Norfolk Wildlife Trust commented that they "believe that the emission figures and pollutant concentrations for the incinerator are unreliable due to:

1. The air quality modelling that does not take into account the new site orientation for Centrica B power station.
2. ADMS is unable to model for the impact of the large quantity of warm air emitted from Centrica B in the vicinity of the incinerator.
3. In the absence of full modelling that was expected from the Environment Agency, their 'check modelling' is unable to provide the level of precision necessary to make an accurate assessment of the risks to Roydon Common from SO_2.

As a result of these concerns a decision should not be made on this permit until further modelling of emissions has been presented and made subject to further consultation."

Both of the applications for Centrica B and the incinerator were audited separately. The in-combination assessment was checked for both applications. The audit sensitivity checks included using the building configuration for the power plant as stated in Centrica's modelling.

It is not possible to determine the exact effect of the cooler units on the plume as there is no site specific method of doing so. However from applying sensitivity analysis to some worst case assumptions we have concluded that the presence of the air cooler units will not have a significant negative impact on dispersion. Therefore it is unlikely there will be any significant change to any short or long-term predicted concentrations at sensitive receptors and the applicants conclusions remain valid.

We do not normally undertake our own modelling of emissions from a proposed installation. The Air Quality Monitoring and Assessment Unit receive the data input files that the applicants have used for their modelling, they check that the values used in the model input files are valid and that the reported results are consistent with the model inputs. A sensitivity analysis is undertaken to check that reasonable changes to input parameters do not have a significant effect on the conclusions from the model output. The validity of the assumptions and conclusions in the risk assessments are checked. As a result of this work, we are satisfied that the modelling is soundly based and can be used as an appropriate tool for assessing the environmental impact of the installation.

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

Representations were received from Leziate Parish Council and Wiggenhall St.Germans Parish Council, who raised the following issues:-

- Water usage
- Centrica B position and effect on air modelling
- Effect of IBA on Centrica air cooled condensers
- German incinerator moratorium
- Wheelabrator US legal convictions
- IBA handling process with regards to open air storage
- Increase in IBA processing capacity
- Water abstraction from the river Ouse
- Flood risk
- Status of CHP – no contracts in place to use heat
- Water discharge parameters
- Waste acceptance – monitoring of incoming waste
- Hazardous waste – including batteries

As these points are similar to ones raised by members of the general public and so they are discussed in the section below.

c) Representations from Individual Members of the Public

A total of 38 of responses were received from individual members of the public. The issues raised are listed below:

- Wheelabrator's US Environmental conviction record.

Objections were received concerning the lack of disclosure of Wheelabrator's US environmental conviction record. Two examples were commonly cited, one relating to an out of court settlement and the other relating to a financial fraud case.
A statement from the applicant has been received in relation to overseas convictions. The company has denied any relevant convictions. It should be noted that giving false information in support of a permit application would itself be an offence and so we accept their response. In any event we are satisfied that the rigorous conditions in our permits and our approach to enforcement will mean any permit is complied with.

- Flood Risk

The risk of a flood event entraining hazardous materials was raised as a concern.
The flood risk that the permitting process is concerned with is whether in the event of a flood occurring there is a risk of a loss of containment from potentially polluting materials. Hazardous materials and some non-hazardous materials will be contained in the event of a flood event (APC residues, waste feedstock in waste bunker, chemical reagents etc..). Some mitigation of unprocessed IBA entrainment in the event of flooding has been proposed. Further flood risk controls will be detailed in the Environmental Management System.

- Modelling of terrain

A comment was received that the terrain around the proposed plant changes very abruptly from virtually uninterrupted smooth fen land to

industrial structures and then the built-up area of King's Lynn. The validity of the air dispersion modelling was questioned.
The Air Quality Monitoring and Assessment Unit carry out audit checks on the applicants air quality modelling. Within those audit checks sensitivity to varying values of surface roughness and the inclusion/exclusion of terrain data was tested. The applicants conclusions were not found to be sensitive to changes surface roughness/ terrain data.

- King's Lynn climate

An objection was received relating to the reported difference in weather data between King's Lynn and RAF Marham (the source of the meteorological data used in the dispersion modelling).
The applicant has used meteorological data from RAF Marham. RAF Marham is approximately 14km from the proposed installation, we are satisfied that this meteorological data is appropriate for use within the dispersion model. Additionally, the applicant used 5 years of meteorological data and took the worst-case predictions. There may be short-term meteorological events in the King's Lynn area that differ slightly to conditions in Marham, but these short-term events are unlikely to have a significant effect on the overall impact from the proposed installation.

- Waste bunker construction

An objection was received relating to the ability to inspect the waste bunker for water tightness and the potential for groundwater contamination. It was also questioned whether this large sunken concrete structure could be removed during the decommissioning and the land returned to the current state.
The operator has undertaken to periodically inspect the waste bunker. The bunker by its size and nature will be of a robust construction and will be inspected during commissioning. The facility is not located on an aquifer will not be receiving hazardous waste and therefore the risk to groundwater is deemed to be sufficiently low as to be acceptable. The accident management plan will address the actions to take in the event of a fire, and this will include the steps required to empty the waste bunker of fire water. The removal of the underground concrete structures will be a significant activity, it would be technically possible as part of any decommissioning.

- Slab/lagoon construction.

An objection was received relating to the control of leachate from the IBA treatment facility. The ability to construct suitable impermeable areas with the correct falls to fulfil the duty of storage areas and the proposed lagoon was questioned.
The operator is required to construct and maintain the infrastructure in such a way as to provide a fit for purpose facility. We are satisfied that suitable areas can be provided. Area Environment Agency staff will make site visits to assess the construction, commissioning and the operators ability to maintain the facility.

- IBA sampling

A request was submitted to require more frequent sampling of IBA due to the reported variable nature of the incoming waste.
The nature of the waste being received is regulated by the specification of allowed waste codes, as the incineration conditions are regulated the frequency of the ash sampling is deemed to be suitable.

- Additional temperature monitoring in furnace and flue gas.

A representation was made to require additional temperature monitoring in a number of locations in the furnace for assurance and redundancy, and monitoring of flue gas temperature to prevent damage to the bag filters.
The WID legislation requires certain temperatures and residence times to be met, and monitoring of stack emissions for a number of parameters including particulate matter, the Environment Agency does not consider any additional measures are necessary. The permit requires that the furnace and exhaust gas temperatures are continuously monitored. Compliance with emission limits for TOC and CO ensures complete combustion. In practise the operator will likely use thermal imaging techniques to allow the optimisation of the process and to ensure compliance with the requirements of WID without having to shut down. They will also have techniques and monitoring to ensure the bag filters remain effective.

- Statistics of increased health effects downwind of UK incinerators

A respondent has made a statement to the effect that statistics show an increased incidence of health related deaths downwind of UK incinerators. There is currently no scientifically accepted published studies to support this. A study has been commissioned by the HPA to investigate any statistical link between incinerator emissions and health outcomes. In announcing this study, HPA said “The HPA’s current position that well run and regulated modern Municipal Waste Incinerators (MWIs) are not a significant risk to public health remains valid, but the study is being carried out to extend the evidence base and to provide further information to the public on this subject”. Current guidance has been used to form the basis of this determination as set out in section 5.3.

- Dioxin formation / monitoring

It has been reported as a concern that there will be many items that when burnt under the proposed conditions a large quantity of dioxins will be formed, and also that AMESA continuous sampling for dioxins has been developed but not required under the permit conditions.
The operating conditions as specified in the WID take into account the types of waste that can be accepted and the nature of domestic municipal waste collected from the public. They ensure that incinerators can be operated without causing harm to human health. The monitoring regime as required by the legislation demonstrates the performance of the installation.
The review of continuous sampling methods for dioxins is discussed in section 6.7.3.

- Defra pressure

A respondent quoted that pressure from DEFRA was being applied to get the permit issued. This is not the case, the EA has received no representations on this application from DEFRA. A permit is issued after due determination according to the legislation currently in force.

- Nano particles

A representation was made stating that the stack emissions of nanoparticles, stated as PM2.5 or below, is not measured or considered. Whilst it is true that the smallest dust fraction is not continuously measured discretely, this is because it is currently not a robust and repeatable technique and current legislation does not require it. It is total particulates that are continuously measured. The impact of PM2.5 particles or below has been considered in the determination as detailed in sections 5.2.2 and 5.3.3 of this document.

- Waste codes

Clarification of types of wastes that are allowed to be incinerated was sought especially with regard to hazardous and non-hazardous wastes. The applicant has applied to operate an incinerator for the burning of non-hazardous waste. The definition of hazardous and non-hazardous waste and the specific waste codes for different materials can be found in the European Waste Catalogue. All of the waste codes specified in the permit are non-hazardous according to that classification system. The Waste Batteries and Accumulators Regulations 2009 ban the incineration of industrial and automotive batteries.

The nature of the emissions from the stack was questioned in relation to the nature of the waste that was being fed into the incinerator.
WID standards are set to take into account the materials normally found in mixed municipal waste
The permit requires the operator to only accept waste types as specified in Table S2.2 of the permit. Wastes not listed in the table are not permitted. It also requires the operator to operate the incinerator within certain parameters, with specified monitoring of stack emissions. In conjunction these operating practices and regulation allow the facility to operate within the requirements of WID.

- Paper and cardboard

A concern has been raised about the potential incineration of otherwise recyclable paper and cardboard. The permit only allows the incineration of separately collected if it is contaminated and otherwise destined for landfill.

- R1 status

A correspondent referred to R1 status and the assumption that the applicant had failed to convince the agency of R1 applicability. The R1 calculation allows an operator to claim a higher waste hierarchy activity due to efficiency of energy conversion. There is no requirement for a MWI to achieve R1 status or have their performance assessed against the R1

formula in the Environmental Permitting Regulations 2010 (EPR). Therefore the R1 formula is only relevant for those MWI wishing to qualify as a recovery operation. The applicant, in this case, has not currently applied for R1 status. Energy efficiency is addressed in Section 4.3.7 above.

- Monitoring

Dissatisfaction has been raised at the level of monitoring proposed for the facility in terms of the limited number of entities that are continuously monitored. The nature of the monitoring is in line with that required under current legislation and is described in Section 6.7. Existing environmental permits will be reviewed against changes in legislation and best practice as and when they occur.

- Combined Heat and Power

The requirement for heat recovery from Energy from Waste facilities was raised as an objection to granting the Environmental permit. We recognise the benefits of utilising the lower grade heat generated by incineration facilities and the permit requires operators to seek outlets for it. We also recognise that the scope for such utilisation is dependent on the location chosen – which is a factor in the planning process. The permit requires that the installation as built to be CHP ready. The immediate availability of an outlet for the heat generated is not deemed to be a reasonable grounds for permit refusal.

- Set parameters for water discharge

A query was raised over the quality of water that would be allowed to be discharged. No set parameters for water discharge have been detailed as the applicant has stated that no routine discharges of water will occur. Non-routine discharges of water will be dealt with in consultation with the Environment Agency area representatives.

- Centrica B orientation

A representation was made querying the in-combination modelling of the installation and the neighbouring application to expand the Centrica power station in relation to the orientation of the major items of equipment on the power station site.
Each application was audited separately. The in-combination assessment was checked for both applications. The audit sensitivity checks included using the building configuration for the power plant as stated in Centrica's modelling.

- Large volume of warm air – air modelling

The validity of the air dispersion modelling was questioned in regard to the effect of warm air being expelled from the Centrica B power station air cooled cooling towers in relatively close proximity to the incinerator stack. It is not possible to determine the exact effect of the cooler units on the plume as there is no site specific method of doing so. However from applying sensitivity analysis to some worst case assumptions we have concluded that the presence of the air cooler units will not have a

significant negative impact on dispersion. Therefore it is unlikely there will be any significant change to any short or long-term predicted concentrations at sensitive receptors and the applicants conclusions remain valid.

- IBA storage

An error in the draft decision document was highlighted in relation to IBA storage. A paragraph read “Bottom ash will be treated and stored in a building. It will be dampened with ash run-off to minimise dust.” This has been amended to:- “Bottom ash will be treated in a building. When not being processed the IBA will be stored outside. It will be dampened with ash run-off to minimise dust.”
IBA as removed from the incinerator facility has been quenched with water. It is stored in external areas constrained by concrete walls on three sides. IBA that has been treated is stored for a period of time as a maturation step. The material before and after treatment is not expected to be dusty, measures are stipulated to use a water spray system if dust producing activities/ conditions are found. If dust is found to be an issue in practice, a dust management plan would be required to be developed and acted upon.

- Odour during shutdowns.

An objection was raised in relation to potential odour pollution during shutdown periods. Odour is discussed in section 6.5.4. The permit conditions require the operator to operate the plant without causing an odour nuisance. If odour is found to be an issue in practice, an odour management plan would be required to be developed and acted upon.

- Health Assessment Audit

A question was raised as to why the EA have only carried out a check audit of the applicants air modelling and risk assessments rather than undertaking our own modelling.
The agency do not normally undertake our own modelling of emissions from a proposed installation. The Air Quality Monitoring and Assessment Unit receive the data input files that the applicants have used for their modelling, they check that the values used in the model input files are valid and that the reported results are consistent with the model inputs. A sensitivity analysis is undertaken to check that reasonable changes to input parameters do not have a significant effect on the conclusions of the model output. The validity of the assumptions and conclusions in the risk assessments are checked. In the event that we were not satisfied, we would ask the applicant to redo or amend their work as required.

- State of the river and flood risk

Attention has been drawn to a reported lack of maintenance on the Denver sluice and lock and the build up of silt and shoals in the river leading to an increased risk of flooding. The flood risk of the site has been

assessed through the planning process as being acceptable for the proposed development.

- Toxic silt in the Ouse

A submission referred to a current situation of where the silt in the Ouse is "toxic" and the impact of the emissions from the installation and the human health effect from the food chain.
The applicant submitted both an environmental impact assessment and a human health risk assessment associated with the emissions from the installation that has been audited by the Environment Agency and found to be satisfactory.

- German/ USA incinerator building

A representation was made commenting that both Germany and the USA have stopped building incinerators as a point of principle.
Germany has a large number of EfW facilities, many of which power local district heating schemes through combined heat and power systems and that were built some years ago. In contrast with, for example, the United Kingdom the EfW sector in Germany is a mature component of the country's waste management system and has played a significant part in helping the country to met its mandatory landfill diversion targets well ahead of the deadlines. It does not have a policy banning the building of new incinerators.
Currently there are 86 facilities in the United States for combustion of municipal solid waste (MSW), with energy recovery. These facilities are located in 25 states. Incineration is not banned in the USA, but no new plants have been built in the US since 1995. Some plants have however been expanded to handle additional waste and create more energy. The 86 US facilities have the capacity to produce 2,720 megawatts of power per year by processing more than 28 million tons of waste per year. The availability of cheap landfill sites and the removal of tax credits from plants producing energy from waste has contributed to the state of US new build projects.

- A correspondent highlighted the risk of a major disaster associated with gas pipelines and the combustion associated with the incinerator, other mention was made concerning the possible knock-on effects of an incident from one installation causing a major deflagration at the Centrica power station, Palm Paper Mill or both. The incineration process takes place within an enclosure. Maintenance activities and process operating controls keep the operation tightly controlled. The separation distances between different activities are controlled through the planning process and this takes into account emergency service access requirements. The operator will be required to have an accident management plan before they begin operating to ensure that the risk of accidents and their consequences are minimised.

- Risk from shale gas fracking

A submission was made noting a potential risk to infrastructure (incinerator chimney) from earth tremors and land slip as a result of possible shale gas fracking activities that might be undertaken in the area. No such activities have been authorised in the vicinity of the installation. Exploratory drilling operations are controlled by the local authority and the Department of Energy and Climate Change. They would have to be satisfied that there was negligible risk to existing infrastructure including this installation prior to allowing any such activities.

- Imported IBA

The applicant in the original application asked for the capability of receiving IBA from off-site sources for processing at the IBA processing facility. This was included in the draft permit and decision. Subsequently the applicant has asked for the provision to be removed. The allowance for externally sourced IBA processing has been removed.

- Accident Management Plan

A comment was submitted questioning how the EA can be satisfied that appropriate measures will be in place when there is no (Accident Management) plan.
We require an Accident Management Plan (as part of an Environment Management System) to be in place after the permit has been issued but prior to commissioning. This will be assessed by the area enforcement staff prior to commissioning and on an on-going basis. An accident risk assessment was submitted with the application and was assessed as part of the determination.

- Sole Operator of the plant

Comments have been made that the applicant has plans to pass the IBA facility on to a third party.
The application has been made on behalf of Willows Power and Recycling Ltd as the operator of the installation including the IBA facility. If the operator does plan on transferring the control of the IBA facility to a third party then an application for a partial transfer of the permit would have to be sought. This would entail due process of the determination of that partial transfer.

- Incoming waste checking

Load checking of incoming waste will be detailed in the management systems documents and will be assessed by the area enforcement staff prior to commissioning and on an on-going basis. Waste acceptance procedures will include weight checks, documentation checks, visual checks on load tipping and periodic spot checks.

- Fishing Report

The King's Lynn Fishing Cooperative submitted a report into the planning process expressing a view on the applicants assessment of contamination of The Wash. This was also submitted to the Environment Agency for consideration. The applicant had responded to the King's Lynn Fishing Cooperative report through the planning process. This response to the

report was assessed and found to satisfactorily address all of the concerns raised.

- Police Investigation Centre and Norfolk Arena as receptors.

The location of the Police Investigation Centre and Norfolk Arena were raised as potentially worse case receptors for the effects on human health studies, these would not normally be expected to fulfil the worst case criteria as individuals are unlikely to spend long periods at these locations continuously . The modelling of concentrations is not only done at individual receptors but also the maximum ground level concentrations are identified wherever they may occur therefore we are satisfied that the assessment of risks to human health is satisfactory.

- Use of water

Concern has been raised about the volumes of water that will be used during the operation of the installation in respect to national water shortages and the absolute figures quoted in the application.
The responsibility for ensuring the availability of the water for the facility is a commercial contract between the operator and its supply company.
The Environment Agency is concerned with the efficient use of water within the process and whether the process represents BAT in relation to water usage.
The applicant has provided a water balance showing effective reuse and recycling of water, and moving grate incineration technology is recognised as a form of BAT for the incineration process.

- Water abstraction from the River Ouse

Concern was raised that the facility would require water to be abstracted from the River Ouse.
No requirement for water abstraction was received as part of the application for the environmental permit. If an application were received in the future it would be determined on its merits.

e) <u>Representations Made at The Drop-In Event</u>

The drop-in event was attended by approximately 40 persons, who were a mixture of local residents and business community potentially impacted by the proposed facility. The issues raised were the same as those considered above.