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/CP3535CK
The Applicant / Operator is:	Urbaser Environmental Limited
The Installation is located at:	Javelin Park Energy Recovery Facility Javelin Park Haresfield Gloucestershire GL2 7NQ

What this document is about

This is a decision document, which accompanies a permit.

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

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

Preliminary information and use of terms

We gave the application the reference number **EPR/CP3535CK/A001**. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we have given to the permit is **EPR/CP3535CK**. We refer to this as "the **Permit**" in this document.

The Application was duly made on 12/04/12.

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

Urbaser Environmental Limited's proposed facility is located at Javelin Park near Haresfield in Gloucestershire. We refer to this as "the **Installation**" in this document.

How this document is structured

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Glossary of acronyms used in this document

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

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 Pollutants
CROW	Countryside and rights of way Act 2000
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision document
EAL	Environmental assessment level
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission limit value
EMAS	EU Eco Management and Audit Scheme
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 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
GCC	Gloucestershire County Council
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
IED	Industrial Emissions Directive (2010/75/EU
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)
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 biphenyls
PXDF	Poly-halogenated di-benzo furans
RDF	Refuse derived fuel
RGS	Regulatory Guidance Series
SAC	Special Area of Conservation
SCR	Selective catalytic reduction
SGN	Sector guidance note
SHPI(s)	Site(s) of High Public Interest
SNCR	Selective non-catalytic reduction
SPA(s)	Special Protection Area(s)
SS	Sewage sludge

SSSI(s)	Site(s) of Special Scientific Interest
SWMA	Specified waste management activity
TDI	Tolerable daily intake
TEF	Toxic Equivalent Factors
TGN	Technical guidance note
TOC	Total Organic Carbon
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) - now superseded by IED

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 Industrial Emissions Directive (IED).

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

2 How we reached our decision

2.1 Receipt of Application

The Application was duly made on 12/04/12. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below.

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

2.2 Consultation

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 were directly incorporated into the IPPCD (applicable through most of the determination period) and are carried through into the IED, and which applies to this 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/IED, including telling people where and when they could see a copy of the Application. We also placed an advertisement in the Gloucester Citizen on 18/05/12.

We placed a paper copy of the Application and all other documents relevant to our determination (see below) on our Public Register at The Environment Agency, Riversmeet House, Newtown Industrial Estate, Northway Lane, Tewkesbury, GL20 8JG and also sent a copy to Stroud District Council at Ebley Mill, Westward Road, Stroud, GL5 4UB 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.

In addition to the process described above, this application also formed part of a trial process to improve public access to EPR permit application documentation ('e-Consultation trial'). This involved placing copies of the application documentation on our website and providing a webpage link to this documentation in the webpage notification and newspaper advertisement described above.

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

- Stroud District Council
- Gloucestershire County Council
- Gloucester City Council
- Health Protection Agency
- Gloucestershire NHS
- Food Standards Agency
- Health and Safety Executive
- Severn Trent Water
- Highways Agency

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 at Quedgeley Village Hall on 30/05/12, Stroud District Council Offices on 14/06/12 and Hardwicke Village Hall on 22/06/12. Consultation comments could be submitted to us via the e-Consultation website trial in addition to the normal written representations procedure. Written comments were also accepted by us

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 made to us into consideration in reaching our determination.

2.3 Requests for Further Information

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued an information notice on 17/08/12. A copy of the information notice was placed on our public register and sent to Stroud District Council for inclusion on its register, as was the response when received. The information notice response was also placed on our e-Consultation webpage.

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

- 11/06/12 - An Errata Report associated with the Air Quality Report
- 02/07/12 - Previous RPS Background Air Quality Reports
- 08/11/12 - Revised Greenhouse Gas impact assessment data.

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

Finally we consulted on our draft decision from 20/02/13 to 12/04/13. 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 is being granted under Regulation 13 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the Installation is:

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

This is a new Installation for IED purposes. IED applies to such Installations from 7th January 2013 and so will apply to this Installation. The domestic regulations transposing IED into domestic legislation came into force in the period during which we consulted on our minded to decision for the application. This final decision has therefore been made on the basis that the requirements of IED are now fully applied through EPR.

We address some of the major legal requirements directly where relevant in the main body of this document. Other requirements are covered in Section 7 towards the end of this document.

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

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

Before the incinerator can be brought into operation, as well as an environmental permit, planning permission will be required. Planning permission is a separate decision to be made by the relevant planning authority. In this case the relevant planning authority is Gloucestershire County Council. At the time of notification of our draft decision for this environmental permit application Gloucestershire County Council had yet to conclude its decision in respect to the Planning application that was submitted to them for the development. However, during the intervening time of our draft decision consultation, the council Planning Committee concluded their decision, which was to refuse consent for the development. It is important to note that this document only considers those matters relevant to the grant of an environmental permit. However, the interaction between the planning and environmental permitting systems is considered in Section 7 of this document, and in response to some of the matters raised during public consultation in Annex 4.

4 The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

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

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

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

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

Many activities which would normally be categorised as "directly associated activities" for EPR purposes (see below), such as air pollution control plant, and the bottom ash processing and storage facilities, are therefore included in the listed activity description. The IBA processing plant will only take IBA from the on-site incineration activity and will be operated by the same operator.

An Installation may also comprise "directly associated activities", which at this Installation includes the generation of electricity using a steam turbine and a back up diesel generator to enable the plant to be shutdown safely in the event of a general power failure. These activities comprise one Installation, because the incineration plant and the steam turbine are successive steps in an integrated activity. .

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

4.1.2 The Site

The Installation is located on a 4.8 hectare site at grid reference 380040,210430, a short distance south of Junction 12 of the M5 motorway in Gloucestershire and forms the southern part of the Javelin Park development site, a disused former airfield. The village of Haresfield is located approximately 1.0 km to the east of the site and the Quedgeley Business Park areas are located approximately 1.5 km to the north of the site on either side of the motorway.

An existing retail garden centre development lies immediately to the north of the Javelin Park development site, and Gloucester city centre is located approximately 9 km to the north east. The main use of the land to the south of the site is for agricultural purposes.

The nearest point of the Severn Estuary SAC, SPA and Ramsar is located approximately 6.5 km to the south west and the Cotswold Beechwoods SAC lies approximately 7.1 km to the east. The Cotswold escarpment and western boundary of the Cotswolds AONB lies approximately 1.4 km to the east.

An small un-named and un-classified watercourse flows into the south east corner of the site and then flows along the southern and western site boundary.

The solid geology beneath the site is Blue Lias/Charmouth Mudstone Formation with no indicated superficial deposits and considered to have low permeability. There are no surface or groundwater abstractions within 1.0 km of the Installation.

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 an Energy Recovery Facility (ERF). Our view is that for the purposes of IED (in particular Chapter IV) and EPR, the Installation is an incinerator because its main purpose is the thermal treatment of waste and

- The plant only produces electricity (and potentially heat in the future) but no material output;
- The waste is the principal source of fuel;
- The waste being burned is mixed waste comprising different materials; and
- The waste has not been treated to improve its quality to a relevant standard.

The EfW facility has a total capacity of approximately 65.3 MW (thermal input) and is capable of generating up to approximately 17.4 MWe of electrical

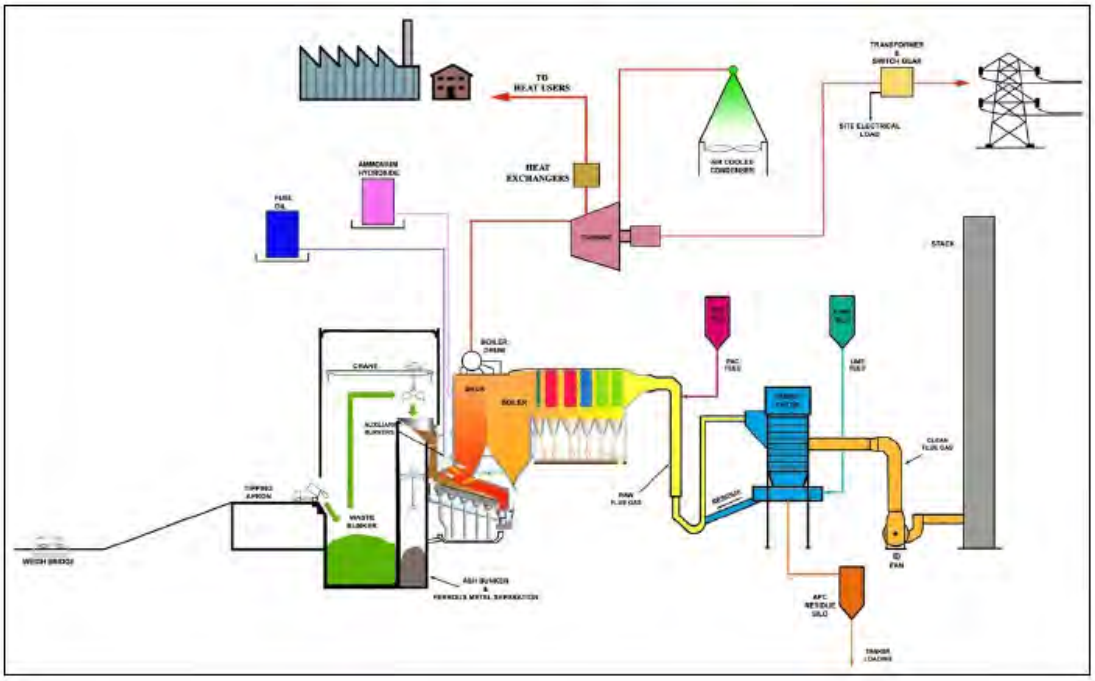
power, the majority of which is exported to the National Grid. Provision has been made to supply additional heat in the form of steam or hot water, of up to 10 MWth, should a commercial scheme becomes available to take the heat.

The facility consists of a single mass burn moving grate incineration line with a total annual throughput of up to 190,000 tonnes per year of waste materials (based on 23.75 tonnes per hour and 8000 operational hours per year) with a design average net calorific value (NCV) of 9.65 MJ/kg.

In outline the main features of the process is as follows:

1. Waste is delivered to the ERF facility by road and unloaded into the waste bunker located in the waste reception hall which is part of the main incinerator building. Waste within the waste bunker is mixed by a crane and then loaded into the feed chute for delivery to the combustion unit.
2. Residues from the combustion chamber are removed into a water bath to contain dust releases and provide a gas seal. The wet ash is transferred by conveyor to the Incinerator Bottom Ash (IBA) recovery facility which forms the eastern end of the main building. The IBA recovery process involves mechanical treatment, metal removal, batching and maturation to produce Incinerator Bottom Ash Aggregate (IBAA) for subsequent use as a secondary aggregate material in the construction industry.
3. Emissions of nitrogen oxides are controlled by the injection of ammonia solution into the combustion chamber.
4. Hot gases from the waste combustion are passed through a boiler to raise steam. The steam is then passed to a steam turbine to generate electricity for export to the National Grid.
5. The steam generation and turbine system is designed to enable provision of medium pressure steam off-take and connection when a suitable future heat energy consumer becomes available without significant modification to the installed steam cycle circuit.
6. The combustion gases are cleaned in a flue gas treatment plant. This includes the injection of carbon, primarily to control dioxin and metal emissions, the injection of hydrated lime to control acid gas emissions, and the use of a fabric filter to remove dust and collect the carbon and lime abatement reagents.
7. Residues collected in the bag filter system are collated and temporarily stored on site in a silo prior to being transferred off site for further treatment and/or disposal.
8. The cleaned exhaust gases are released to atmosphere via a 70 m stack.

The key features of the Installation are summarised in the schematic diagram and table below.



Waste throughput, Tonnes/line	190,000/annum	23.75 /hour
Waste processed	MSW, residual household waste, commercial and industrial waste similar in character.	
Number of lines	One	
Furnace technology	Moving Grate	
Auxiliary Fuel	Gas Oil	
Acid gas abatement	Dry	hydrated lime
NOx abatement	SNCR	Ammonium Hydroxide
Reagent consumption	Auxiliary Fuel 200 te/annum Ammonium Hydroxide : 800 te/annum Hydrated Lime : 2,400 te/annum Activated carbon: 70 te/annum Process water: (nominally) 32,000 te/annum	
Flue gas recirculation	No	
Dioxin abatement	Activated carbon	
Stack	Height, 70 m	Diameter, 1.81 m
Flue gas	Flow, 45.4 Nm^3/s	Velocity, 19.91 m/s
Electricity generated	17.4 MWe	139,200 MWh
Electricity exported	14.5 MWe	116,000 MWh
Steam conditions	Temperature, 425 °C	Pressure, 60 bar
Waste heat use	Design incorporates heat export capability of up to 10 MW as low pressure steam/ hot water.	

4.1.4 Key Issues in the Determination

The key issues arising during this determination were the environmental impact of emissions to air from the Installation, 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 site setting is described in section 4.1.2 above.

Historically, the land was undeveloped fields until after 1924. 1949 - 1950 maps show land to the south of the site as an airfield but with no building structures indicated on the land at the site. By 1971 a number of buildings are indicated at the site, and the 1986 map references these as Bilton Industrial Estate. By 2002 the buildings on the site are referenced as Javelin Park; however by 2011 the building structures are no longer indicated to be present at the site.

A number of intrusive investigation studies and desk based assessment reports have been undertaken in respect to the land at the site since 2002. The conclusion of these investigations and reports was that the only remedial action considered necessary for the site was the removal of cement bound asbestos building material resulting from previous building demolition and the removal of asbestos lagged pipes from ducts serving the previous buildings at the site. Remediation work to this effect was completed by Churngold Remediation Ltd in 2007 and Hydrock in 2009.

With the exception of ammonia solution and fuel oil storage, the site layout has been designed such that all process operations and material handling activities, including those associated with the IBA processing operations; take place within the enclosed building envelope.

Surface water from the building apron areas and access points is collated and routed back via the internal building drainage system to the waste water pit for use in the bottom ash quench system. Surface water from site roads, parking areas and building roofs is collated in a series of detention basins prior to discharge from the Installation via a single emission point into an unnamed watercourse at the southern boundary of the site. This watercourse subsequently flows beneath the M5 motorway via a double culvert and ultimately discharges into the Gloucester and Sharpness Canal approximately 2km to the west of the site.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

As recorded above, the site layout has been designed such that process operations and material handling activities will take place within the building

envelope. The building will be constructed with an impervious concrete floor and designed such that all waste process water and drainage is routed to the waste water pit.

Hydrated lime, activated carbon and APC residues will be stored in silos located within the building. Boiler water demineralisation chemicals (hydrochloric acid and sodium hydroxide solutions) and boiler treatment chemicals will be stored in containers in a bunded area within the building. Light fuel oil (100 m3) and ammonium hydroxide solution (50 m3) will be stored in bunded tanks with an impervious concrete containment unloading area on the building apron at the southern access to the Tipping Hall.

The waste storage bunker is the most significant sub surface structure of the building design; this will be constructed with reinforced impervious concrete and will be subject to integrity inspection and assessment during annual shutdown periods.

The IBA Recovery Hall will also be constructed with an impervious concrete floor with falls and drainage to an effluent sump tank. Net effluent accumulation from this part of the process is expected to be low and any excess will be pumped back to the main waste water pit for re-use in the quench system or directly tankered off-site for suitable treatment and disposal.

Fire fighting water will be collated by the internal building drainage system which routes back to the common waste water pit. The overflow from the waste water pit is to the waste storage bunker which will provide suitable containment volume in the event of a fire fighting requirement.

Given the materials used within the activities of the Installation, the management and physical measures available and the sensitivity of the land on which the site is located, we consider that the likelihood of incidents involving loss of containment is low and the overall risk to the environment is not significant. We also consider that the provisions for contaminated fire water retention are sufficient to meet the requirements of IED Article 46(5). We are therefore satisfied that the ground and groundwater can be protected from the activities of this Installation.

However, at the time of application the specific detail and final arrangements of the below ground drainage system was not able to be totally confirmed, we have therefore included pre-operational condition P07 which requires the operator to provide a detailed as-installed site drainage plan and the specific design detail of the site containment infrastructure, including all sub-surface structures and equipment. This condition also requires that a specific inspection and maintenance programme is to be provided for the site containment infrastructure, so that the ‘lifetime’ sections of the SCR can be implemented from the commencement of operations at the site.

Article 22(2) of the IED requires the Applicant to provide a baseline report containing at least the information set out in paragraphs (a) and (b) of the Article before starting operation.
The Applicant has not submitted a baseline report containing all of the necessary information. We have therefore set a pre-operational condition (PO9) requiring the Operator to provide this information prior to the commencement of operations.

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

The IED also requires that periodic monitoring of soil and groundwater beneath the site should be undertaken throughout the life of the permit such that the absence of pollution to these media from operations at the site can be demonstrated. Condition 3.2.4 and pre-operational condition PO10 of the permit secures and makes provision for this requirement.

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 Section 2.9 of the Supporting Information to the Application. Pre-operational condition PO1 requires the Operator to have an Environmental Management System in place before the Installation is operational, which will include a site closure plan.

At the definitive cessation of activities, the Operator has to satisfy us that the necessary measures have been taken so that the site ceases to pose a risk to soil or groundwater, taking into account both the baseline conditions and the site's current or approved future use. 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 met.

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

The Applicant is the sole Operator of the Installation.

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

The 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 certification 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 a detailed Accident Management Plan. However, having considered the 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 (PO01).

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	Parts B2 and B3 of the Application Form. The Supporting Information document including its associated Annex sections. Responses to questions 1, 4 and 5 of the Not Duly Made letter.	Together these sections describe key operating techniques and how the Installation will be operated to ensure that best available techniques are applied.
Response to Schedule 5 Notice dated 21/09/12	Responses to questions 4, 5, 6, 7, 8, 9,12, 14 and 15.	

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

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

(i) 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 incineration plant will take municipal 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 included pre-operational condition P05 that requires the Applicant to submit a report that details the waste acceptance procedure to be used at the site. This procedure will need to include the process and systems by which wastes unsuitable for incineration at the site will be controlled.

We have limited the capacity of the Installation to 190,000 tonnes per annum. This is based on the Installation operating 8,000 hours per year at a nominal capacity of 23.75 tonnes per hour.

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

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

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

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

2. The extent to which the Installation meets the requirements of Article 50(5) of the IED, which requires that heat generated "*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:

- The facility will be designed with careful attention being paid to all normal energy efficiency design features, such as high efficiency motors, high standards of cladding and insulation.
- The boilers will be equipped with economisers and super-heaters to optimise thermal cycle efficiency without prejudicing boiler tube life, having regard for the nature of the waste that is being burnt;
- Unnecessary releases of steam and hot water will be avoided, to avoid the loss of boiler water treatment chemicals and the heat contained within the steam and water;
- Low grade heat will be extracted from the turbine and used to preheat combustion air in order to improve the efficiency of the thermal cycle;
- Steady operation will be maintained where necessary by using auxiliary fuel firing;
- Boiler heat exchange surfaces will be cleaned on a regular basis to ensure efficient heat recovery; and
- Maintenance procedures including Plant Condition Monitoring will be deployed to optimise plant performance.

The Application indicates the following estimates of annual energy consumption for activities within the Installation.

- 152 MWh of imported electrical energy during periods when the incineration plant is not in operation.
- 23,200 MWh of parasitic load electrical energy during the 8000 hours when the incineration plant is operational.
- 6,494 MWh of auxiliary fuel usage during start-ups, shutdowns and combustion temperature support.

This equates to a total specific energy consumption (SEC -a measure of the total energy consumed per unit of waste processed) by the Installation of 157 kWh/tonne for the stated waste throughput of 190,000 tpa.

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. Considering the electrical demand alone, the figure for this Installation is 123 kWh/tonne of waste processed based on a LCV of 9.65 MJ/kg.

From the information provided in the Application, the specific energy consumption at the Installation will be in line with the indicative figures in the BREF as set out above.

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

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

Our draft CHP Ready Guidance (Dec 2012) considers that BAT for energy efficiency for Energy from Waste (EfW) plant is the use of CHP in circumstances where there are technically and economically viable opportunities for the supply of heat from the outset.

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

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

The BREF says that where a plant generates electricity only, it is BAT to recover 0.4 – 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 generate electricity only and has been specified to maximise electrical output with little or no use of waste heat. The Sankey diagram in section 2.6.2 of the Application shows 17.4 MWe of electricity produced for an annual burn of 190,000 tonnes, which represents 9.2 MWe per 100,000 tonnes/year of waste burned (0.73 MWh/tonne of waste). The predicted performance of the Installation is therefore at the more efficient end of the indicative BAT range.

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

The 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 and housing developments; suitable opportunities continue to be explored including those associated with future developments on other parts of the Javelin Park site; 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 district heating or similar heat demand. 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. However, we have included pre-operational condition P02 that requires the operator to provide an update on heat utilisation opportunities from the Installation prior to the commencement of commissioning.

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

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

(iv) Permit conditions concerning energy efficiency

Conditions 1.2.2 and 1.2.3 have 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.

v) R1 Calculation

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

The Applicant has presented a calculation of the R1 factor (as defined under the WFD 2008) for the plant in their application. The R1 formula is also a measure of the extent to which energy is recovered from incineration plant. The formula is:

$$R1 = (Ep – (Ef + Ei)) / (0.97 \times (Ew + Ef))$$

Where:

- Ep means annual energy produced as heat or electricity. It is calculated in the form of electricity being multiplied by 2.6 and heat for commercial use being multiplied by 1.1 (GJ/yr)
- Ef means annual energy input to the system from fuels contributing to the production of steam (GJ/yr)
- Ew means annual energy contained in the treated waste calculated using the net calorific value of the waste (GJ/yr)
- Ei means annual energy imported excluding Ew and Ef (GJ/yr)
- 0.97 is a factor accounting for energy losses due to bottom ash and radiation.

Where municipal waste incinerators can achieve an R1 factor of 0.65 or above, the plant will be considered to be a 'recovery activity' for the purposes of the Waste Framework Directive. Again whether or not an Installation achieves an R1 score of >0.65 is not a matter directly relevant to this determination. However by being classified as a 'recovery activity' rather than as a 'disposal activity', the Operator could draw financial and other benefits.

The R1 factor can only be finally determined after collection of operational data over a full year of plant operation. At application stage it is only possible to make a provisional assessment. Ep measures the energy recovered for use from the incinerator. This energy will have been recovered not just from the combustion of waste (Ew), but also from the combustion of the support fuel at start up and shut down and where required to maintain the 850 ºC combustion temperature (Ef). Ei is additional energy imported, which will primarily be electricity from the grid. These parameters will depend on the way in which the plant is operated, e.g. number of start ups and shut downs.

The Applicant states in their EPR application that the R1 factor for the Javelin Park ERF will be 0.72 when the plant is operating in electricity only mode (when heat is not recovered).

The Environment Agency has recently issued further guidance and a calculation spreadsheet for establishing the value of the R1 factor as part of a separate formal application process for R1 status assessment. Since submitting the EPR application, the Applicant has subsequently submitted a further separate detailed application for the R1 design stage status of the incinerator plant, and this will provide a more accurate figure for the design stage calculation of the R1 factor. During the 'minded to' consultation for this EPR Application we concluded our assessment of the R1 Application and decided that at the design stage, the plant satisfies the requirements of the R1 criteria for it to be considered as a 'recovery' operation, and we have therefore now issued formal confirmation of the plants R1 status to this effect.

However, from the information presented in the EPR Application we consider it likely that the proposed plant design will meet the R1 design stage criteria for the plant to be considered as a 'recovery' operation in the context of the WFD.

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 Installation will use treated mains water for boiler feed water replenishment as part of the steam cycle maintenance programme. However the application indicates that a number of water utilisation efficiency measures will be deployed including re-use of spent process water in the IBA quench system and harvesting of rainwater from building roofs for re-use in the process.

The Operator is required to report with respect to raw material usage under condition 4.2. and Schedule 5, including consumption of lime, activated carbon and ammonia used per tonne of waste burned. This will enable the Environment Agency to assess whether there have been any changes in the efficiency of the air pollution control plant, and the operation of the SNCR 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.

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 incinerator bottom ash (IBA), air pollution control (APC) 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 total organic carbon (TOC) of <3% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable.

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

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 their originally submitted application, the Applicant only identified disposal to landfill as an option for dealing with the APC residues generated by the plant. However, in their response to the Schedule 5 Notice further information request they confirmed that they are aware of investigations into other treatment and recovery options that may become available in the future. These investigations include treatment of the APC residues to form specialist construction materials and stabilisation of the leachable components such that the residues meet the specification for synthetic gypsum manufacture. In their further information response, they have committed to report to the Agency annually, on progress to identify options for other treatment solutions. Condition 1.4.2 of the permit also requires periodic reviews be undertaken to establish if more suitable measures for dealing with waste generated at the Installation should be implemented.

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 of the permit requires the Operator to carry out an ongoing programme of monitoring.

The Installation includes an IBA recovery facility as part of its activities. The bottom ash conveyed from the incinerator quench bath is screened via a magnetic separator to remove metal fractions for further recovery. The bottom ash is then further screened, graded and matured by extended storage in segregated bays of the IBA recovery facility. It is then transferred from the site for recovery by utilisation as secondary aggregate for the construction industry.

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

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

5. Minimising the Installation's environmental impact

Regulated activities can present different types of risk to the environment, these include odour, noise and vibration; accidents, fugitive emissions to air and water; as well as point source releases to air, discharges to ground or groundwater, global warming potential and generation of waste.

Consideration may also have to be given to the effect of emissions being subsequently deposited onto land (where there are ecological receptors). All these factors are discussed in this and other sections of this document.

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

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

5.1 Assessment Methodology

5.1.1 Application of Environment Agency 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.

5.1.2 Use of Air Dispersion Modelling

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

Once short-term and long-term PCs have been calculated in this way, they are compared with Environmental 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. In a very small number of cases, e.g. for emissions of Lead, the National EQS is more stringent that the EU EQS. In such cases, we use the National EQS standard for our assessment.

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.

PCs are considered **Insignificant** if:

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

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

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

For those pollutants which do not screen out as insignificant, we determine whether exceedences of the relevant EQS are likely. This is done through detailed audit and review of the Applicant's air dispersion modelling taking background concentrations and modelling uncertainties into account. Where

an excedance of an EU 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.

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

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

5.2 Assessment of Impact on Air Quality

The Applicant's assessment of the impact of air quality is set out in Annex 2 and Annex 3 of the 'Supporting Information' to the Application. The assessment comprises:

- An H1 screening assessment of emissions to air from the operation of the incinerator.
- Dispersion modelling of emissions to air from the operation of the incinerator.
- A study of the impact of emissions on nearby sensitive habitat / conservation sites.
- Dispersion modelling of the impact of additional road traffic arising from the operation of the incinerator.

Potential air quality impacts arising from additional road traffic have not been considered as these are essentially matters for the local planning authority when considering the parallel application for planning permission, and outside the scope of our determination under the Environmental Permitting Regulations.

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

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 4.2 dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years of meteorological data collected from the Bristol weather station between 2006 and 2010. The Applicant also considered utilising data from the Ross on Wye weather station as it is slightly closer to the site, but selected Bristol station data given that it more closely reflects the geography and topography of the

Severn Estuary which is a significant feature of the site location. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

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

- First, they assumed that the ELVs in the Permit would be the maximum permitted by Article 46(2) of the IED. These substances are:
    - Oxides of nitrogen (NO_x), expressed as NO_2
    - Particulate matter
    - Carbon Monoxide (CO)
    - Sulphur dioxide (SO_2)
    - Hydrogen chloride (HCl)
    - Hydrogen fluoride (HF)
    - Metals (Cadmium, Thallium, Mercury, Antimony, Arsenic, Lead, Chromium, Cobalt, Copper, Manganese, Nickel and Vanadium)
    - Polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans (referred to as dioxins and furans)
    - Volatile organic Compounds
- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term incinerator emission limit values, i.e. the maximum permitted emission rate. (except for emissions of arsenic, chromium and nickel, which are considered in section 5.2.3 of this decision document).
- Third, the model also considered emissions of pollutants not covered by Annex VI of the IED, specifically ammonia (NH_3) and Polycyclic Aromatic Hydrocarbons (PAH). Emission rates used in the modelling have been drawn from data in the Waste Incineration BREF and are considered further in section 5.2.5.

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

In their original modelling study and impact assessment the Applicant utilised the WID daily average ELV's for assessment of impact against relevant short term air quality standards. In order to provide a fully precautionary and conservative assessment of these impacts we required the Applicant to produce a further detailed assessment of these impacts using the WID half hourly ELV's in their modelling assessment. This information was requested and supplied as part of a Schedule 5 Further Information Notice. The re-submitted data from this further study of short term impacts has been included in the data summary and our consideration of the Applicant's impact assessment in the sections that follow below.

The Applicant has referenced recent local background air quality monitoring studies undertaken by the RPS consultancy on behalf of Gloucestershire County Council to augment the data available from local authority monitoring. This data is summarised in the Application and has been used by the Applicant to establish the background (or existing) air quality against which to

measure the potential impact of the incinerator. There are no Local Authority monitoring stations relevant to the location of the site and the available DEFRA modelled background data for the location indicates less conservative values than those provided in the RPS study report. The Environment Agency's air quality modelling specialists have reviewed the air quality assessment submitted with the application and we are satisfied that the background data used in the Applicant's impact study forms a reasonable basis for the assessment.

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

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

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

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

5.2.1 Assessment of Air Dispersion Modelling Outputs

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

Predicted Short Term Impacts

Pollutant [1]	EQS / EAL µg/m^3	Back-ground Conc. µg/m^3 [2]	Process Contribution (PC) µg/m^3	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) µg/m^3	PEC as % of EQS/EAL [3]
NO_2	200	41.6	28.7	14.4	70.3	35.2
PM_{10} (24 hr)	50	26.9	0.8	1.60	27.7	55.4
SO_2 (24 hr)	125	1.3	7.6	6.10	8.9	7.1
SO_2 (1 hr)	350	2.6	40.2	11.49	42.8	12.2

Pollutant [1]	EQS / EAL µg/m^3	Back-ground Conc. µg/m^3 [2]	Process Contribution (PC) µg/m^3	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) µg/m^3	PEC as % of EQS/EAL [3]
SO_2 (15 min)	266	2.6	47.3	17.80	49.9	18.8
CO (8 hr)	10000	500	80.7	0.81	581	5.8
HCl	750	4.7	18.9	2.52	23.6	3.15
HF	160	1.12	1.3	0.81	2.42	1.5
Mercury [4]	7.5	0.00006	0.0157	0.21	0.01576	0.21
Antimony [4]	150	0.0027	0.157	0.1	0.15970	0.106
Chromium [4]	150	0.00196	0.157	0.10	0.15896	0.106
Copper [4]	200	0.01236	0.157	0.08	0.16936	0.085
Manganese [4]	1500	0.00616	0.157	0.01	0.16316	0.0109
Vanadium [4]	1	0.0014	0.157	15.70	0.15840	15.84
Ammonia	2500	4.58	3.1	0.12	7.68	0.3

Note [1] Sampling periods I hour maximum unless otherwise indicated

Note [2] The background concentration is taken as twice the long term background level for Short Term EQS/EAL standards referenced to an hourly averaging value.

Note [3] Where the PC is demonstrated to be less than 10% of the short term EQS/EAL, a level below which we consider to indicate insignificant impact, further consideration of the PEC is not required.

Note [4] Where IED specifies aggregated limits for the group 3 (Sb, As, Cr, Co, Cu, Pb, Mn, Ni, V) metals, the emission rate for each metal has been assumed to be 100% of the aggregated limit.

Predicted Long Term Impacts

Pollutant	EQS / EAL µg/m^3	Background Conc. µg/m^3	Process Contribution (PC) µg/m^3	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) µg/m^3	PEC as % EQS / EAL [1] [2]
NO_2	40	20.8	3.4	8.5	24.2	60.5
PM_{10}	40	26.9	0.24	0.6	27.1	67.9
$PM_{2.5}$	25	16.5	0.24	0.96	16.74	67.0
VOCs [8]	2.25	0.11	0.24	10.67	0.35	15.56
HF	16	0.56	0.02	0.13	0.58	3.63
Cadmium [5]	0.005	0.00037	0.0012	24.0	0.00157	31.4
Mercury	0.25	0.00003	0.0012	0.48	0.00123	0.49
Antimony [3]	5	0.00135	0.01214	0.24	0.01349	0.27
Arsenic [4]	0.003	0.00079	0.001349	44.97	0.00214	71.3
Chromium [3]	5	0.00098	0.01214	0.24	0.01312	0.262
Chromium VI [7]	0.0002	0.00020	0.000002	1.0	0.00020	99.0
Copper [3]	10	0.00618	0.01214	0.12	0.01858	0.186

Pollutant	EQS / EAL µg/m^3	Background Conc. µg/m^3	Process Contribution (PC) µg/m^3	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) µg/m^3	PEC as % EQS / EAL [1] [2]
Lead [3]	0.5	0.006	0.01214	2.52	0.01230	4.92
Manganese [3]	0.15	0.00308	0.01214	8.09	0.01522	10.15
Nickel [3]	0.02	0.00159	0.01214	60.7	0.01373	68.7
Vanadium [3]	5	0.0007	0.01214	0.24	0.01284	0.26
PAHs [9]	0.00025	0.000021	0.0000049	1.96	0.000026	10.4
Ammonia	180	2.29	0.24	0.13	2.53	1.41

Note [1] Where the PC is demonstrated to be less than 1% of the long term EAL, a level below which we consider to indicate insignificant impact, further consideration of the PEC is not required.

Note [2] Where the PEC is demonstrated to be greater than 70% of the long term EAL, a level below which we consider to indicate as not being a significant impact, more detailed assessment is required.

Note [3] Where IED specifies aggregated limits for the selected group 3 metals Sb, Cr, Cu, Pb, Ni, V, the emission rate for each metal has been assumed to be 100% of the aggregated limit.

Note [4] Where IED specifies aggregated limits for the selected group 3 metal As, the emission rate for this metal has been assumed to be proportional to the number of metals in the group (ie. As being 1/9th of 0.5 mg/m^3).

Note [5] Where IED specifies aggregated limits for the selected group 2 metals Cadmium and Thallium the emission rate for each metal has been assumed to be 100% of the aggregated limit.

Note [6] Background concentration for CrVI assumed to be 20% of Total Chromium in accordance with EPAQS guidelines.

Note [7] For the assessment of CrVI, see 5.2.3 below.

Note [8] Total VOC emission assumed to be 1,3 - butadiene.

Note [9] Total PAH emission assumed to be benzo[a]pyrene (B[a]P).

(i) Screening out emissions which are insignificant

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

- PM_{10}, $PM_{2.5}$, CO, HCl, HF, Mercury, Antimony, Chromium (II)(III), Copper and Ammonia.

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.

(ii) Emissions unlikely to give rise to significant pollution

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

- NO_2, VOC's, Cadmium, Arsenic, Lead, Nickel, Chromium VI, Vanadium and PAH's.

For these emissions we have considered the headroom between their PEC's and the respective EQS/EAL standards relative to the predicted process contribution value for the emission. From this analysis we consider that there will not be any excedance of an EQS/EAL or any significant pollution caused by the operation of the Installation.

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

(iii) Emissions requiring further assessment

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

5.2.2 Consideration of key pollutants

(i) Nitrogen dioxide (NO_2)

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

The above tables show that the peak long term PC is greater than 1% of the EUEQS and therefore cannot be screened out as insignificant. The peak PC is calculated at 8.5% of the EUEQS, but the residential receptor with the highest calculated PC is Royston with a PC of 2.4% of the EUEQS. Even so, as can be seen from the table above, the PEC is well below 100% and the emission is not expected to result in the EUEQS being exceeded at any point. The peak short term PC is slightly above the level we would consider insignificant (>10% of the EUEQS). However, again it is not expected to result in the EUEQS being exceeded.

(ii) Particulate matter PM_{10} and $PM_{2.5}$

The impact on air quality from particulate emissions has been assessed against the 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 EUEQS are a long term

annual average of 40 μg/m^3 and a short term daily average of 50 μg/m^3. For $PM_{2.5}$ the EUEQS is 25 μg/m^3 as a long-term annual average to be achieved by 2010 as a Target Value and by 2015 as a Limit Value has been used.

The Applicant's predicted impact of $PM_{2.5}$ from the Installation against these EQSs is **not** recorded in the table above. **Our** assessment assumes that **all** particulate emissions are present as PM_{10} for the PM_{10} assessment and that **all** particulate emissions are present as $PM_{2.5}$ for the $PM_{2.5}$ assessment, and the $PM_{2.5}$ impact data recorded in the table above reflects this more conservative assumption.

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

- It assumes that the plant emits particulates continuously at the incineration plant IED 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.

The particulate impact assessment submitted by the Applicant made an assumption that $PM_{2.5}$ particulate emission release would be one third of the emission value attributed for PM_{10} release. The process contribution value for $PM_{2.5}$ impact recorded in their application Air Quality Report is therefore correspondingly lower than the values we have included in the table above. They made this assumption on the basis of publicly available monitoring data records from three currently operational municipal waste incineration plants in England.

Whilst this is currently a small data set to form the basis of such an assumption, given the factors outlined above we accept that actual emissions of $PM_{2.5}$ from this type of plant are likely to be of that order of magnitude. However, even when applying our more precautionary approach in the consideration of this emission as outlined above, we are satisfied that the impact of $PM_{2.5}$ emissions remains insignificant.

Therefore as a result of our review of the Applicant's particulate matter impact assessment we are satisfied that the Applicant's conclusions remain valid.

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. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of particulates to be BAT for the Installation.

The above assessment also shows that the predicted process contribution for emissions of $PM_{2.5}$ is also below 1% of the Environmental Quality Objective. 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.

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

(iii) Acid gases, SO_2, HCl and HF

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

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

Whilst SO_2 emissions cannot be screened out as insignificant, the Applicant's modelling shows that the Installation is unlikely to result in a breach of the EAL or EUEQS. The Applicant is required to prevent, minimise and control SO_2 emissions using the best available techniques, this is considered further in Section 6. We are satisfied that SO_2 emissions will not result in significant pollution.

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

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

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

The Applicant has used the EQS for 1,3 butadiene for their assessment of the impact of VOC. This is based on 1,3 butadiene having the lowest EQS of organic species likely to be present in VOC (other than PAH, dioxins and furans). The Applicant has also used the EQS for benzo[a]pyrene (BaP) for their assessment of the impact of PAH. We agree that the use of the BaP EQS is sufficiently precautionary.

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

From the tables above all the other emissions can be screened out as insignificant in that the process contribution is < 1% of the long term EQS/EAL and <10% of the short term EAQ/EAL, except for PAH's where the PC is 1.96% of the long term EAL. Even so, from the table above, the emission is not expected to result in the EAL being exceeded.

The ammonia emission is based on a release concentration of 10 mg/m^3. We are satisfied that this level of emission is consistent with the operation of a well controlled SNCR NO_x abatement system.

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

In summary for the above emissions to air, 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. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of CO, VOCs, NH_3 and PAHs to be BAT for the Installation. Dioxins and furans are considered further in section 5.3.2.

5.2.3 Assessment of Emission of Metals

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

IED sets three limits for metal emissions from incinerators:

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

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

Where IED sets an aggregate limit, the Applicant's first stage of assessment assumes that each metal is emitted individually at the relevant aggregate emission limit value. This is a something which can never actually occur in practice as it would result in a breach of the limit, and so represents a very much worst case scenario. However using this very conservative assessment approach it can be seen from the tables above that the impact from metals Mercury, Antimony, Chromium and Copper can be considered as insignificant, and the impact from metals Cadmium, Lead, Manganese, Vanadium and Nickel considered unlikely to cause an excedance of an EQS/EAL.

Where IED sets an aggregate limit, the Applicant's second stage of assessment assumes that each metal is emitted as the proportion of metals in its group (i.e. one ninth of the limit for each of the group 3 metals). Historical data for Municipal Waste Incinerators indicates that $1/9^{th}$ of the limit is an over estimate of actual emissions, and so we are satisfied that the Applicant's proposal is reasonable in this context. Using this precautionary approach to assessment it can be seen from the tables above that it is considered unlikely that the impact from Arsenic will cause an excedance of the EQS/EAL.

Thallium and Cobalt do not have an assigned EAL value. However, as the process contribution of these metals is similar to that of the other metals, we consider the emissions of these metals to be not significant.

In summary, from the data presented in the tables at section 5.2.1 above and the impact assessment criteria described subsequently, we are satisfied that the emissions of the following metals can be screened out as being insignificant:

- Mercury, Antimony, Chromium and Copper

and that the following metal emissions whilst not able to be screened out as insignificant, are assessed as being unlikely to give rise to an impact that will give rise to excedance of an EAL/EQS:

- Cadmium, Lead, Manganese, Vanadium, Nickel and Arsenic.

There are no metal emissions requiring further assessment. From their assessment, the Applicant has concluded that exceedences of the EAL for all metals is 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 IED. 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 nine Group 3 metals, the impact of which has been

assessed above. The EPAQS guidelines refer only to that portion of the metal emissions contained within PM_{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 have considered the concentration of total chromium and chromium (VI) in the APC residues collected upstream of the emission point for existing Municipal Waste incinerators and have assumed these to be similar to the particulate matter released from the emission point. This data shows that the mean Cr(VI) emission concentration (based on the bag dust ratio) is $3.5 * 10^{-5}$ mg/m^3 (max $1.3 * 10^{-4}$).

Based on this data, we consider it remains a conservative assumption for the Applicant to consider in their final stage assessment that the Cr(VI) emission concentration will be $8.2 * 10^{-5}$ mg/m^3.

In their impact assessment of Cr(VI) emissions the Applicant has made reference to the Agency guidance document "*Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – V.2 June 2011".* Although this guidance document was updated in September 2012 (*Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – V.3 September 2012")*, we are satisfied that the basis they have used to quantify likely Cr(VI) emission remains valid and in accordance with the updated guidance.

In their assessment the Applicant has presented Cr(VI) background data based on information obtained from the UK Emissions of Air Pollutants 1970 to 2008 records. However there is little data available on the background levels of Cr(VI); so we have assumed this to be 20% of the total Cr background level, 20% is the typical value of Cr(VI) in total Cr reported in the environment in the EPAQS Guidelines. The background data for Cr(VI) presented in the table above therefore reflects this assumption.

The Applicant has used the above data to model the predicted Cr(VI) impact. The PC is predicted as 1%, which we consider to be negligible as an additional impact, the PEC is predicted as 99% using the more precautionary background value assumption described above.

This assessment shows that emissions of Chromium (VI) are likely to be insignificant, and we agree with the Applicant's conclusions.

5.2.4 Consideration of Local Factors

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

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

(ii) Topography and meteorological data for modelling

The site is located in the Severn Vale and approximately 1.5 km from the Cotswold escarpment which characterise the main features of the site location. After detailed review of the Applicant's air dispersion modelling study by the Agency's air quality modelling specialists, we are satisfied that the assessment has used appropriate model inputs and representative meteorological data for the study. The Applicant has also undertaken a sensitivity analysis to establish an optimum height for the stack as part of their dispersion modelling study.

(ii) Potential in-combination effects with other developments

The Applicant has undertaken an assessment of potential in-combination effects of emissions from the proposed Installation with those from the proposed Moreton Valance Resource Recovery Centre which is located approximately 1 km south of the site. To date no Environmental Permit Application has been received for this development. This proposed development incorporates an Advanced Thermal Treatment (ATT) process for the disposal of residual waste, and would discharge the thermal treatment combustion emissions from the plant via a 25 m stack.

The predominant local impact of NO_2 is from the ATT plant, due to the more limited dispersion from its lower stack height. The maximum increase in long term NO_2 impact resulting from the combined impact of both plants would be approximately 1.3% of the air quality objective. The predicted environmental concentration of the combined impact when added to the existing background concentration is also unlikely to cause an excedance of the air quality objective. However, although we believe the Applicant's prediction of in-combination impact forms a reasonable assessment of the potential impact from both plants if they were to operate at the same time, the in-combination impact will be considered in more detail if an EPR permit application is subsequently submitted for the ATT plant.

5.3 Human health risk assessment

5.3.1 Our role in preventing harm to human health

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

i) Applying Statutory Controls

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

The main conditions in an EfW permit are based on the requirements of the IED. The aim of IED is to prevent or to limit as far as practicable negative effects on the environment, in particular pollution by emissions into air, soil, surface water and groundwater, and the resulting risks to human health, from the incineration and co-incineration of waste. IED achieves this aim by "setting stringent operational conditions, technical requirements and emission limit values" and through the use of BAT, which may in some circumstances dictate tighter emission limits and controls. 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), LHB (Wales), FSA and the HPA. In this case the PCT also consulted with the 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 Applicant's assessment of dioxin intake are detailed in the table below. (worst case results for each category are shown). The results show that the predicted daily intake of dioxins at all receptors, resulting from emissions from the proposed facility, are significantly below the recommended TDI levels. We therefore consider the intake of dioxins and furans resulting from operation of the proposed Installation to be insignificant, and believe it is unlikely that the COT TDI level of 2 picograms I-TEQ / Kg bodyweight/ day will be exceeded.

Receptor	Adult		Child	
Resident	0.000169	0.008%	0.000363	0.018%
Farmer	0.0146	0.73%	0.0208	1.04%

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

The FSA has reported that dietary studies have shown that estimated total dietary intakes of dioxins and dioxin-like PCBs from all sources by all age groups fell by around 50% between 1997 and 2001, and are expected to continue to fall. 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 $\mu g/m^3$ would result in an increase in life expectancy of 20 days for people born in 2008." However, "The Committee stresses the need for careful interpretation of these metrics to avoid incorrect inferences being drawn – they are valid representations of population aggregate or average effects, but they can be misleading when interpreted as reflecting the experience of individuals."

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_{10} 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}, $PM_{2.5}$, CO, HCl, HF, Hg, Sb, Cr, Cu, and NH_3 have all indicated that the Installation emissions screen out as insignificant; where the impact of emissions of NO_2, SO_2, VOC, Cd, As, Mn, Pb, Ni, Cr(VI), V and PAH 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. Generally, the Applicant's assessment methodology is acceptable. We did raise some queries regarding the Applicant's assessment, but the issues were minor, mainly for clarification and did not affect the impact assessment conclusions. Based on the WID limit values and the Applicant's assumptions, our check modelling indicates that the Applicant's conclusions are acceptable at the selected receptors.

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. The Health Protection Agency and 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 but did not make a consultation response. Details of the responses provided by the PCT(NHS) and the HPA to the consultation on this Application can be found in Annex 4.

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

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

5.4.1 Sites Considered

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

- Cotswold Beechwoods SAC
- Severn Estuary SAC/SPA/Ramsar
- Walmore Common SPA/Ramsar
- Rodborough Common SAC

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

There are no non-statutory or local wildlife conservation sites within 2Km of the proposed Installation.

5.4.2 Habitats Assessment

The Applicant's Habitats assessment was reviewed by the Environment Agency's technical specialists for modelling and air quality, 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 impact data presented in the table below relates to the Cotswold Beechwoods SAC. The location and orientation of this conservation site from the Application site results in it receiving the greatest predicted impact from the proposed Installation. Weekly mean data for Hydrogen Fluoride impact was not provided as part of the original application documentation. This information was requested and supplied as part of a Schedule 5 Further Information Notice, and the data is included in the table below.

Pollutant	EQS / EAL (µg/m³)	Back-ground (µg/m³)	Process Contribution (PC) (µg/m³)	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) (µg/m³)	PEC as % EQS / EAL
Direct Impacts[5]						
NO_2 Annual	30	16.65	0.163	054	16.81	56
NO_2 DailyMean	75	33.30 (3)	1.370	1.82	34.67	46
SO2	10 (1)	0.92	0.041	0.41	0.96	1
Ammonia	1 (1)	1.64	0.004	0.4	1.64	164
HF Weekly Mean	0.5	N/A	0.002	0.4	-	-
HF Daily Mean	5	N/A	0.007	0.14	-	-
Deposition Impacts[5]						
N Deposition (kg N/ha/yr)	10 - 20 (2)	36.35	0.094	0.94	36.35	363
Acidification - Nitrogen Dep (Keq/ha/yr) (4)	0.357	2.59	0.0025	0.7	2.59	725
Acidification Sulphur Dep (Keq/ha/yr) (4)	2.572	0.34	0.0097	0.38	0.34	13

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

(2) This more sensitive N Deposition Critical Load value is assigned for two sections of the overall site extent.

(3) Short term background value considered to be twice long term background value as H1 methodology.

(4) Given the low predicted process contribution values of both S and N acidification deposition impacts at these receptors, they have been compared to the respective S_{max} and N_{min} values of the Critical Load Function for the most sensitive features of each site, these criteria were obtained from the Site Based Critical Load data on apis.

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

From the table above all of the emissions can be screened out as insignificant and their impact considered not discernable, in that the process contribution is < 1% of the long term EQS/EAL and <10% of the short term EAQ/EAL (Critical Level or Critical Load).

More comprehensive details of our assessment of impact on the Habitat sites is recorded in our Appendix 11 assessment document. This assessment was sent to Natural England for their consultation review and approval. Their response confirmed acceptance of our conclusion that emissions from the proposed Installation will not have any likely significant effect on the features of the Habitat sites.

We are therefore satisfied that the Applicants assessment of impact on the relevant Habitat sites is satisfactory and consider that the operation of the proposed Installation will not have an adverse effect on the features of these Habitat sites.

5.5 Impact of abnormal operations

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

For incineration plant, IED sets backstop limits for particulates, CO and TOC which must continue to be met at all times. The CO and TOC limits are the same as for normal operation, and are intended to ensure that good combustion conditions are maintained. The backstop limit for particulates is 150 mg/m^3 (as a half hourly average) which is five times the limit in normal operation.

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

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

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 operation)
- Mercury emissions are 100 times those of normal operation
- NO_x emissions of 550 mg/m^3 (1.375 x normal half hour average limit)
- Particulate emissions of 150 mg/m^3 (5 x normal half hour average limit)
- SO_2 emissions of 480 mg/m^3 (2.4 x normal half hour average limit)
- HCl emissions of 900 mg/m^3 (15 x normal half hour average limit)
- HF emissions of 90 mg/m^3 (22 x normal half hour average limit)
- Metal emissions (other than Mercury) are (5 times normal operation levels as discussed in section 5.2.3 and proportionate with abnormal operation particulate release).

This is a worst case scenario in that 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 assessment for abnormal operation is summarised in the table below.

Pollutant	EQS / EAL µg/m^3	Maximum Emission level mg/m^3	Back-ground Conc. µg/m^3	Process Contribution (PC) µg/m^3	PC as % of EQS / EAL	Predicted Environmental Concentration (PEC) µg/m^3	PEC as % of EQS / EAL
NO_2	200	550	41.6	39.5	19.8	81.1	40.6
PM_{10}	50	150	26.9	4	8	30.9	61.8
SO_2	266	480	2.6	113.5	42.7	116.1	43.6
HCl	800	900	4.7	283.5	37.8	288.2	38.4
HF	250	90	1.12	28.6	17.9	29.7	18.6
Hg	7.5	5.00	0.00006	1.57	20.9	1.57	20.9
Sb	150	2.50	0.0027	0.785	0.52	0.7877	0.53
Cr (II)(III)	150	2.50	0.00196	0.785	0.52	0.7869	0.52
Cu	200	2.50	0.01236	0.785	0.39	0.7976	0.40
Mn	1500	0.055	0.00616	0.785	0.05	0.7912	0.05

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: PM_{10}, Sb, Cr, Cu and Mn.

Also from the table above emissions of the following emissions (which were not screened out as insignificant) have been assessed as being unlikely to give rise to significant pollution in that the predicted environmental concentration is less than 100% of short term EQS/EAL: NO_2, SO_2, HCl, HF and Hg.

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

We have not assessed the impact of abnormal operations against long term EQSs for the reasons set out above. Except that if dioxin emissions were at 10 ng/m^3 (100 x normal operation) for the maximum period of abnormal operation (60 hours), this would result in an increase of approximately 59% in the TDI reported in section 5.3.3. In these circumstances the TDI would be 0.0232 pg(I-TEQ/ kg-BW/day)for a Farmer - Adult , which is 1.16% of the COT TDI and 0.0331 pg(I-TEQ/ kg-BW/day) for a Farmer - Child, which is 1.65% of the COT TDI. At this level, emissions of dioxins will still not pose a risk to human health.

6. Application of Best Available Techniques

6.1 Scope of Consideration

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

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

- We then consider in particular control measures for the emissions which were not screened out as insignificant in the previous section on minimising the Installation's environmental impact. They are: NO_2, SO_2, VOC's, Cd, As, Pb, Ni, Cr (VI), V and PAH's.

- We also have to consider the combustion efficiency and energy utilisation of different design options for the Installation, which are relevant considerations in the determination of BAT for the Installation, including the Global Warming Potential of the different options.

- Finally, the prevention and minimisation of Persistent Organic Pollutants (POPs) must be considered, as we explain below.

Chapter IV of the IED specifies a set of maximum emission limit values. Although these limits are designed to be stringent, and to provide a high level of environmental protection, they do not necessarily reflect what can be achieved by new plant. Article 14(3) of the IED says that BAT conclusions shall be the reference for setting the permit conditions. BAT conclusions are yet to be established at EU level but it may be possible and desirable to achieve emissions below the limits referenced in Chapter IV.

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

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

6.1.1 Consideration of Furnace Type

The prime function of the furnace is to achieve maximum combustion of the waste. The IED requires that the plant (furnace in this context) should be designed to deliver its requirements. The main requirements of the IED 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

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

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Moving grate (air-cooled)	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: 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) □□□ applied to hazardous Wastes	<10 t/h	Very well proven with □□ broad range of wastes and 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 / □ 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) □ 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 i 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	~ 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

	incineration					

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

- Fixed Hearth/Pulsed Hearth Furnace: Fixed hearth furnaces are not considered suitable for large volumes of waste and although pulsed hearth furnaces have been used for MWI there have been reliability problems
- Rotary Kiln: little used in UK for MWI; the energy conversion is not as good as for moving grate technology. In addition, the capital cost is likely to be higher for a kiln since more streams are required as capacity is typically limited to approx. 8 tonne per hour.
- Pyrolysis/Gasification: this technology is currently in development for MWI but is not yet considered to be proven. Systems that generate a syngas can take advantage of gas engines which are more efficient at generating electricity than steam turbines; however the losses incurred in the process of producing syngas means the overall efficiency may not be as high as that for combustion plant. Systems have a modular design and are likely to incur higher capital cost for the volume of waste to be treated in this proposal. The technology is currently commercially unproven in the UK and is likely to be more suited to waste that has been pre-treated or of a more homogeneous physical composition than raw MSW.
- Fluidised Bed: waste for this type of furnace needs pre-treatment before it can be introduced, thus incurring additional energy costs. Fluidised bed combustion can lead to lower NO_x generation but not so low as to avoid secondary NO_x abatement requirements. Experience in the UK of fluidised bed combustion of MSW has been limited. Two plants are operational, but both have had significant operational problems. One is operating well below its design capacity while the other is still being commissioned
- Moving Grate Furnace: designed to process large volumes of waste. This is a well proven technology and has been demonstrated to conform with the requirements of WID.

On the basis of the above, the Applicant has given more detailed consideration to Moving Grate, Fluidised Bed and Rotary Kiln technologies on the basis of GWP, NOx abatement reagent consumption and annual operating costs and has concluded that GWP performance is similar for each technology. Whilst Fluidised Bed technology can deliver better NOx performance, the two established plants in the UK have significant operational /reliability problems when treating MSW, and operating costs are substantially higher. Due to the requirement for multiple units to treat the volume of waste in the proposal and efficiency/maintenance issues associated solid wastes and the rotating refractory shell, operating costs for Rotary Kiln technology are also anticipated to be significantly higher.

The Applicant has therefore proposed to use a furnace technology comprising an inclined moving grate. Waste will be fed via a feed hopper and a set of feed rams onto the grate. Primary combustion air will be fed mainly from below the grate. A controlled supply of Secondary combustion air will be

admitted above the grate to improve combustion and NOx control. As the waste progresses along the grate, it will pass through drying combustion and burn out zones prior to the burned out ash from the end of the grate being deposited in a bottom ash quench bath. This technology 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 low sulphur gas oil as support fuel for start-up, shut down and for the auxiliary burners. The choice of support fuel is based on ensuring that auxiliary fuel is always available. The Applicant needs to be able to be sure that auxiliary fuel is always available at a sufficient capacity in case the auxiliary burners are required to maintain the combustion temperature above 850 ºC, or to safely shut down the plant. If natural gas was selected, this would require a non interruptible high pressure gas main supply which currently does not exist at the site. We agree that in this circumstance, low sulphur gas oil is the best support fuel type.

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 IED for the air emission of TOC/CO and the TOC on bottom ash.

However we have included pre-operational condition P06 that requires the Applicant to submit a report providing details and conclusions from the CFD modelling design study for the specified combustion unit and boiler system design that has been selected for the plant.

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, and has confirmed that no by-pass arrangement will be included in the design of the bag filter plant.

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	Port injection location	All plant unless lower NOx release required for local environmental protection.

		reduction May lead to Ammonia slip		
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.

The Applicant has not proposed to include flue gas recirculation (FGR) in the design of the combustion cell of the plant on the basis of their technical discussions and current assessment of technology providers for the moving grate and combustion cell element of the plant. Their preferred design includes a grate system with more detailed engineering volume and temperature control of primary and secondary combustion air supply across the grate area, where the benefits of reduced NOx generation through FGR have been assessed to be limited. Additional reagent consumption at the secondary NOx reduction stage is considered to be off-set by the increased parasitic energy consumption associated with the operation of FGR, and the increased maintenance issues anticipated if incorporated in the design. The BREF acknowledges both distributive combustion air control and FGR as acceptable methods for primary NOx control.

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 cannot be screened out as insignificant. Therefore the Applicant has carried out a cost / benefit study of the alternative techniques. The cost per tonne of NO_x abated over the projected life of the plant has been calculated and compared with the environmental impact as shown in the table below.

	Annual NOx abated (tonnes)	Cost of NO_x removal £/tonne	PC (long term) ($\mu g/m^3$)	PEC (long term) ($\mu g/m^3$)
SCR	370	£2443	1.19	33.39
SNCR	200	£945	3.40	35.60

Based on the figures above the Applicant considers that the additional cost of SCR over SNCR is not justified by the reduction in environmental impact. Thus SCR is not BAT in this case, and SNCR is BAT for the Installation. The Applicant has justified the use of ammonia rather than urea as the SNCR reagent on the basis of reduced nitrous oxide formation, which is a potent greenhouse gas. The Environment Agency agrees with this assessment.

The amount of 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 every 6 months.

6.2.3 Acid Gases, SO_x, HCl and HF

Acid gases and halogens : Primary Measures				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Low sulphur fuel, (< 0.1%S gasoil or natural gas)	Reduces 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 Lower energy use Higher reliability	Higher solid residue production Reagent consumption controlled only by input rate		All plant
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	Very good	Corrosive	Wide range	MWIs, CWIs

Type: Lime	removal rates Low leaching solid residue Temperature of reaction well suited to use with bag filters	material May give greater residue volume if no in-plant recycle	of uses	
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 that a non-interruptible gas supply at the required supply rate is not available at the site, 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 does not propose using wet scrubbing, and the Environment Agency agrees that wet scrubbing is not appropriate in this case.

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

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

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

In this case, the Applicant proposes to use a dry lime (calcium hydroxide - $Ca[OH]_2$) injection system for the abatement of acid gases. The Environment Agency is satisfied that this is BAT.

The amount of lime used for abatement will need to be optimised to maximise acid gas reduction and minimise lime waste. Improvement condition IC5 requires the Operator to report to the Environment Agency on optimising the performance of the lime injection abatement system.

6.2.4 Carbon monoxide and volatile organic compounds (VOCs)

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

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

6.2.5 Dioxins and furans (and Other POPs)

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

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

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

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

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

6.2.6 Metals

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

Activated Carbon injection for mercury recovery	Can be combined with acid gas absorber or fed separately.	Combined feed rate usually controlled by acid gas content.		All plant. Separate feed normally BAT unless feed is constant and acid gas control also controls dioxin release.

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 132,719 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 IED 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.

The plant will burn 190,000 tpa of waste and produce 45,000 tpa of bottom ash. The Applicant has assumed that the carbon content of the waste is 26%. The residual carbon content of the bottom ash can be up to 3%. This means the net carbon content consumed by combustion is 48,050 tonnes, resulting in a total CO_2 release of 176,183 tonnes per annum. Overall the emissions of CO_2 are estimated as follows:-

Burning of Waste	176,183
Burning of Auxiliary Fuel	1,600
Electricity Imported from the Grid	250
Nitrous Oxide (CO_2 equivalent)	900
Total	178,933

On the credit side

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

Electricity Exported	- 46,214

This value is based on 14.5 MW (116,000 MWh) of electricity being exported from the Installation with a CO_2 equivalence factor of 0.398 tonnes per MWh. In their Greenhouse Gas Assessment the Applicant has used a higher CO_2 equivalence factor for electricity export based on future energy generation predictions. However the factor utilised above is taken from our H1 Guidance document (Annex H - Global Warming Potential) and although more

conservative than the factor used by the Applicant, does not change the conclusions made in their assessment.

The net GWP is therefore 132,719 tonnes of CO_2, which is equivalent to 0.70 tonnes of CO_2 per tonne of waste incinerated.

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 biogenic carbon content of the waste has not been excluded from this assessment.

The Applicant's assessment shows that the GWP of the plant is dominated by the emissions of carbon dioxide that result from the combustion of the waste input to the plant, and this will be the same for all thermal treatment technologies. The BREF quotes a range of 0.7 to 1.7 tonnes of CO_2 per tonne of municipal waste. The performance of the plant is therefore comparable with the most CO2 efficient end of the BREF range, which is due to the level of energy recovery of the plant.

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.

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 the requirements of IED. That would include an examination of BAT, including potential alternative techniques, with a view to preventing or minimising harmful emissions. These have been applied as explained in this document, which explicitly addresses alternative techniques and BAT for the minimisation of emissions of dioxins.

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

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

The 1998 Protocol to the Convention recommended that unintentionally produced should be controlled by imposing emission limits (e.g 0.1 ng/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 IED and incorporate all the above requirements of the UN-ECE BAT guidance and deliver the requirements of the Stockholm Convention in relation to unintentionally produced POPs.

The release of **dioxins and furans** to air is required by the 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 5.3.2 of this document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation.

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

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

Pentachlorobenzene (PeCB) is another of the POPs list to be considered under incineration. PeCB has been used as a fungicide or flame retardant, there is no data available however on production, recent or past, outside the UN-ECE region. PeCBs can be emitted from the same sources as for PCDD/F: waste incineration, thermal metallurgic processes and combustion

plants providing energy. As discussed above, the control techniques described in the UN-ECE BAT guidance and included in the permit, are effective in controlling the emissions of all relevant POPs including PeCB.

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

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

6.5 Other Emissions to the Environment

6.5.1 Emissions to water

Emissions to water will be limited to uncontaminated surface water run off. This will discharge via a series of detention basins, oil interceptors and penstock valves into an unnamed watercourse at the southern boundary of the site. This watercourse subsequently flows beneath the M5 motorway via a double culvert and ultimately discharges into the Gloucester and Sharpness Canal approximately 2km to the west of the site.

The site will be a net consumer of water and the surface water drainage system includes some harvesting of rainwater for use within the process.

All processing operations take place within the building envelope which is equipped with a separate internal process water drainage system. In the event of a fire at the Installation the Applicant has confirmed that fire fighting water will be collated by the internal drainage system to the waste water pit with an overflow to the main waste bunker and that there is sufficient retention capacity for contaminated fire fighting water to ensure there is no uncontrolled release of the contaminated fire fighting water to the external watercourse.

In our consultation response to the local planning authority, we commented on the Applicants deployment of sustainable urban drainage system (SUDS) techniques and the estimation of storm water volumes that should be considered for the site, although this is not a directly relevant consideration for our permitting decision. We also made comments regarding general water course improvements, again these are not relevant to our considerations under the Environmental Permitting Regulations, and are matters for the local planning authority.

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

The Applicant has confirmed that there will be no process water release to sewer from the Installation; all process water will be reused within the plant.

Process water including boiler blow down water and boiler feed water demineralisation effluent will be collated by the internal drainage system to the waste water pit for use in the bottom ash quench system. Any larger abnormal accrual of waste water from annual boiler maintenance or similar operations will be tankered off-site for treatment and disposal.

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

6.5.3 Fugitive emissions

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

The Applicant has provided a risk assessment and management plan for fugitive emissions, which the Environment Agency considers to be satisfactory and should ensure compliance with permit conditions, specifically condition 3.2.

The facility includes a back up diesel generator to provide electrical power to safely shut down the incinerator in the event of the non availability of electrical power.

Local exhaust ventilation from the IBA processing building will be vented via a bag filter or cyclone abatement system.

Each storage silo used for hydrated lime, activated carbon and APC residues is fitted with filters to prevent fugitive releases from pneumatic conveyors. Other measures regarding the protection of land, surface water and groundwater at the site are recorded in section 4.2.2 above.

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

Odour emissions will be minimised by the following methods:

- rapid action roller shutter doors will be provided for vehicle access and egress to the building;
- 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.
- storage of all waste will be inside the ERF building to prevent odour release. The tipping hall and waste bunker will be maintained under negative pressure created by drawing of combustion air from this area and keeping external doors closed where possible;

- during shutdown, doors will limit odour spread while still allowing vehicle access;
- during periods of extended shutdown air from the tipping hall will be discharged via a carbon filter system;
- bunker management procedures (mixing and periodic emptying and cleaning) will be employed to avoid the development of anaerobic conditions;
- wastes will be removed from the bunker on a first in, first out basis; and
- procedures will be in place to divert waste away from the site during shut downs.

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

6.5.5 Noise and vibration

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

The noise impact assessment identifies that the majority of noise generating activities take place within the building envelope where plant design and internal sound attenuation measures will ensure that total internal reverberant noise levels within the building would be controlled so as not to exceed 80dB(A). The building structure itself will be designed and constructed with composite cladding panels to achieve further specified sound reduction values. The noise impact modelling study also considers door, window and ventilation louvers apertures, their likely opening frequency and noise attenuation capability.

The assessment also identified the steam cycle air cooled condenser (ACC) fan units, the flue stack and HGV transport vehicles as external noise sources for consideration in the noise impact modelling study. The ACC units are located at the southwest perimeter of the building (adjacent to the M5 motorway), and therefore screened from the nearest noise receptor by the main building envelope. As part of the Schedule 5 further information request the Applicant has also given further consideration to noise release from the IBA conveyor system which is also externally located on part of the southwest facade of the building.

The results of the noise impact study indicate that at the nearest and most sensitive receptor (a residential property 50m from the eastern boundary of the site) the noise impact from the Installation will not exceed the daytime and night time background levels by more than 3dB(A). This assessment included a +5dB correction factor for potential acoustic/tonal sensitivity. Guidance from

BS4142 indicates that changes of less than 5dB(A) are unlikely to result in complaints.

However, although we are satisfied with the methodology and conclusions of the Applicants noise impact study, the assessment was based on equipment that has not yet been installed in buildings that have not yet been constructed. A pre-operational condition PO8, has been included in the permit requiring the Applicant to design a noise survey programme and to carry out noise surveys in accordance with the programme during both plant commissioning and again within 6 months of the completion of commissioning, to verify the assessment included in the application.

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.

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

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

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

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

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

(i) Local factors

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

(ii) National and European EQSs

There are no additional National or European EQSs that indicate that WID limits are insufficient to protect the local environment.

(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 Annex II of IED, which lists the main polluting substances that are to be considered when setting emission limit values (ELVs) in Permits.

We have therefore considered setting equivalent parameters or technical measures for 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

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

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

- Calibration of CEMs in accordance with BS EN 14181 (a requirement in improvement condition IC6).
- Verification of furnace residence time, temperature and oxygen content (IC4).
- The plant in total conforms with the permit conditions and that satisfactory process control procedures for the plant have been developed (IC3).
- Abatement plant optimisation details (IC5).

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

6.7.3 Continuous emissions monitoring for dioxins and mercury

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

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

Recent advances in mercury monitoring techniques have allowed standards to be developed for continuous mercury monitoring, including both vapour-phase and particulate mercury. There is a standard which can apply to CEMs which measure mercury (EN 15267-3) and standards to certify CEMs for mercury, which are EN 15267-1 and EN 15267-3. Furthermore, there is an MCERTS-certified CEM which has been used in trials in the UK and which has been verified on-site using many parallel reference tests as specified using the steps outlined in EN 14181.

In the case of dioxins, equipment is available for taking a sample for an extended period (several weeks), but the sample must then be analysed in the conventional way. 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 IED. 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 IED'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 IED. At the present time, it is considered that in view of the predicted low levels of mercury and dioxin emission it is not justifiable to require the Operator to install additionally continuous monitoring or sampling devices for these substances.

In accordance with its legal requirement to do so, the Environment Agency reviews the development of new methods and standards and their performance in industrial applications. In particular the Environment Agency considers continuous sampling systems for dioxins to have promise as a potential means of improving process control and obtaining more accurate mass emission estimates.

6.8 Reporting

We have specified the reporting requirements in Schedule 5 of the Permit either to meet the reporting requirements set out in the 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 7A to the EPR 2010 – **IED Directive**

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

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

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

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.

We have reviewed the reasons given for the refusal of planning permission and specifically whether this conclusion is based on information given in the Environmental Statement. We are satisfied that these matters are entirely matters of planning policy and not relevant to our determination. The Government's Planning Policy Statements Nos. 10 and 23 make it clear that the pollution control and planning regimes are intended to be complementary and should avoid duplication.

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

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 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.

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

Our decision in this case has been reached following a programme of extended public consultation 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.

(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).

Although the Installation site is not within an area of outstanding natural beauty, it is located approximately 1.4 km from the nearest boundary of the Cotswolds AONB. However, having considered the Applicants air quality impact assessment and noise, odour and fugitive emission risk assessments, we are satisfied that the operational impacts and emissions from the Installation are unlikely to have any detrimental impact on the features and integrity of the Cotswold AONB. The size, scale and form of the site and its building infrastructure in the context of the local landscape is a matter for consideration by the relevant Planning Authority.

7.2.4 **Wildlife and Countryside Act 1981**

Under section 28G of the Wildlife and Countryside Act 1981 the Environment Agency has a duty to take reasonable steps to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which a site is of special scientific interest. Under section 28I the Environment Agency has a duty to consult Natural England in relation to any permit that is likely to damage SSSIs.

There are no SSSI's within the relevant screening distance from the Installation, or at a location where operation of the Installation might give rise to a likelihood of damage to their features. The nearest SSSI to the Installation is Haresfield Beacon, approximately 2.3 km to the east. However, this site is designated for geological rather than ecological features (Jurassic rock outcrops), and operation of the Installation is unlikely to have any effect on these features.

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 / CCW 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 Chapter IV of the Industrial Emissions Directive

IED Article	Requirement	Delivered by
45(1)(a)	The permit shall include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2000/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate.	Condition 2.3.3(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(b)	The permit shall include the total waste incinerating or co-incinerating capacity of the plant.	Condition 2.3.3(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(c)	The permit shall include the limit values for emissions into air and water.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1(a) in Schedule 3 of the Permit.
45(1)(e)	The permit shall include the sampling and measurement procedures and frequencies to be used to comply with the conditions set for emissions monitoring.	Conditions 3.5.1 to 3.5.5 and Tables S3.1, S3.1(a), S3.3 and S3.4 in Schedule 3 of the Permit.
45(1)(f)	The permit shall include the maximum permissible period of unavoidable stoppages, disturbances or failures of the purification devices or the measurement devices, during which the emissions into the air and the discharges of waste water may exceed the prescribed emission limit values.	Conditions 2.3.10 and 2.3.11.
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Condition 2.3.1(a) and Table S1.2 of Schedule 1 of the Permit.
46(2)	Emission into air shall not exceed the emission limit values set out in part of Annex VI.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1a.
46(5)	Prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. Adequate storage capacity for contaminated rainwater	Condition 2.3.1(a) and Table S1.2 of Schedule 1 of the Permit.

IED Article	Requirement	Delivered by
	run-off from the site or for contaminated water from spillage or fire-fighting.	
46(6)	Limits the maximum period of operation when an ELV is exceeded to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year. Limits on dust (150 mg/m^3), CO and TOC not to be exceeded during this period.	Conditions 2.3.10 and 2.3.11
47	In the event of breakdown, reduce or close down operations as soon as practicable. Limits on dust (150 mg/m^3), CO and TOC not to be exceeded during this period.	Condition 2.3.10
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Conditions 3.5.1 to 3.5.5. Reference conditions are defined in Schedule 7 of the Permit.
48(2)	Installation and functioning of the automated measurement systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	Conditions 3.5.2 and 3.5.3.
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	Tables S3.1, S3.1(a) and S3.3
48(4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Conditions 4.1.1 and 4.1.2
49	The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	Condition 3.3.5 (b) to (e)
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) < 3% or loss on ignition (LOI) < 5%.	Condition 3.3.1 and Table S3.4 of Schedule 3 of the Permit.
50(2)	Flue gas to be raised to a	Condition 2.3.6 (a)

IED Article	Requirement	Delivered by
	temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber.	and pre-operational condition PO6.
50(3)	At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas.	Condition 2.3.7
50(4)(a)	Automatic shut off to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.6(a)
50(4)(b)	Automatic shut off to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.6(a)
50(4)(c)	Automatic shut to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.6(b), (c) and (d)
50(5)	Any heat generated from the process shall be recovered as far as practicable.	Conditions 1.2.1 to 1.2.3 and pre-operation condition PO2.
50(6)	Relates to the feeding of infectious clinical waste into the furnace.	No infectious clinical waste will be burnt
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3.
51(1)	Different conditions than those laid down in Article 50(1), (2) and (3) and, as regards the temperature Article 50(4) may be authorised, provided the other requirements of this chapter are me.	No such conditions Have been included.
51(2)	Changes in operating conditions do not cause more residues or residues with a higher content of organic polluting substances compared to those residues which could be expected under the conditions laid down in Articles 50(1), (2) and (3).	No such conditions Have been included.
52(1)	Take all necessary precautions concerning delivery and reception of Wastes, to prevent or minimise pollution.	Conditions 2.3.1, 2.3.3, 3.2, 3.3, 3.4 and 3.6.
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Condition 2.3.3(a) and Table S2.2 in Schedule 3 of the Permit.

IED Article	Requirement	Delivered by
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 1.4.1 and 1.4.2
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	conditions 1.4.1 2.3.1(a) and 3.2.1.
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.5.1, Table S3.4 and pre-operational condition PO3.
55(1)	Application, decision and permit to be publicly available.	All documents are accessible from the Environment Agency Public Register.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Conditions 4.2.2 and 4.2.3

ANNEX 2: Pre-Operational Conditions

Based on the information on the Application, we consider that we 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 for approval that includes 'as built' detailed site drainage plans (internal process water and external surface water) and the specific design detail of the containment infrastructure at the site, including all sub-surface structures and equipment. The report shall also include an inspection and maintenance programme for the containment infrastructure and

Reference	Pre-operational measures
	equipment at the site.
P08	Prior to the commencement of commissioning the operator shall provide the Environment Agency with a written report for approval describing a detailed programme of noise and vibration monitoring that will be carried out at the site both during the commissioning stage and also when the plant is fully operational. The report shall include confirmation of locations, time, frequency and methods of monitoring.
PO9	Prior to the commencement of commissioning, the Operator shall submit a report on the baseline conditions of soil and groundwater at the Installation. The report shall contain the information necessary to determine the state of soil and groundwater contamination so as to make a quantified comparison with the state upon definitive cessation of activities provided for in Article 22(3) of the IED. The report shall contain information, supplementary to that already provided in application Site Condition Report, needed to meet the information requirements of Article 22(2) of the IED.
PO10	Prior to the commencement of commissioning the Operator shall submit the written protocol referenced in condition 3.2.4 for the monitoring of soil and groundwater for approval by the Environment Agency. The protocol shall demonstrate how the Operator will meet the requirements of Articles 14(1)(b), 14(1)(e) and 16(2) of the IED.

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 are 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 certification of the system by an external body or if appropriate submit a schedule by which the EMS will be certified.	Within 15 months of the completion of commissioning.
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} and $PM_{2.5}$ ranges. The proposal shall include a timetable for approval by the Environment Agency to carry out such tests and produce a report on the results. On receipt of written 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, metals and dioxins.	Within 4 months of the completion of commissioning.
IC6	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.
IC7	The Operator shall carry out an assessment of the impact of emissions to air of the following component metals subject to emission limit values, Cd, As 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.
IC8	The Operator shall carry out the monitoring approved under pre-operational condition PO8 and provide the Environment Agency with a written report of the impact of noise from the Installation. In the event that the report shows that noise could have a significant impact, the report shall include proposals for the further attenuation and/or management of noise.	6 months from commencement of operations.

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.

The Application was advertised on the Environment Agency website from 18/05/12 to 06/07/12 and in the Gloucester Citizen on 18/05/12. Copies of the Application were placed in the Environment Agency Public Register at Riversmeet House, Newtown Industrial Estate, Northway Lane, Tewkesbury, GL20 8JG and the Stroud District Council Public Register at Ebley Mill, Westward Road, Stroud, GL5 4UB.

In addition to our normal procedures, this application also formed part of a trial process to further improve public access to EPR permit application documentation ('e-Consultation trial'). This involved placing copies of the application documentation on our website and providing a webpage link to this documentation in the webpage notification and newspaper advertisement described above.

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

- Stroud District Council
- Gloucestershire County Council
- Gloucester City Council
- Health Protection Agency
- Gloucestershire NHS
- Food Standards Agency
- Health and Safety Executive
- Severn Trent Water
- Highways Agency
- Natural England

Note: under our Working Together Agreement with Natural England, we only consult with Natural England on the results of our assessment of the impact of the Installation on designated Habitats sites.

Public drop in surgeries were held at Quedgeley Village Hall on 30/05/12, Stroud District Council Offices on 14/06/12 and Hardwicke Village Hall on 22/06/12. A total of 98 people attended the sessions across the three events.

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from **Stroud District Council**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
The Council response did not include any specific comments relating to the EPR Application documentation, but forwarded four documents that had previously been submitted to Gloucestershire County Council (GCC) in their response to the Planning Application. These documents are listed below and predominantly relate to planning issues. Where an issue relevant to EPR permit consideration has been referenced in the documents, this is identified as a summarised bullet below.	
Letter to GCC identifying the Council's reasons for objection to the application. • Clarification on the acceptability of noise levels. • Clarification of the EA's view on the modelling process and the model used for human health determinant.	Our noise and vibration impact assessment is recorded at Section 6.5.5 of this document. We are satisfied that the Operator has satisfactorily carried out the health impact assessment. Our review of their predictions including those for human health is given in Sections 5.1 to 5.5 of this document.
The draft Minutes of the Development Control Committee	All matters relate to the Planning Application process.
A section of the Draft Minutes from Full Council where a resolution regarding the incinerator was passed. This is separate to the response from the Development Control Committee decision but useful that you aware.	Conclusions confirm those contained in the letter sent to GCC as described above.
A letter from Axis (agents planning representative) following the reading of the DCC report	This is a response from the Applicants planning consultant in response to issues raised in relation to the planning process and does not raise any questions in relation to the EPR Application.

Response Received from **Gloucestershire County Council**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Asks the Environment Agency - How will the list of waste materials proposed for treatment in the application comply with the objectives of Art.11(2) of EU Directive 'COD(2005)0281	The document referenced relates to comments submitted by an EU Health and Food Safety Committee in respect to consultation on the draft Waste Framework Directive. Article 11(2) of the WFD relates to re-use and recycling of waste materials and in

Response Received from **Gloucestershire County Council**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
	respect to municipal waste is primarily the responsibility of relevant Waste Planning Authority through development of systems to meet the requirements of Planning Policy Guidance for residual waste arisings. The Installation will take residual waste, i.e. that which is not separately collected or otherwise recovered, recycled or composted, except that separately collected fractions which prove to be unsuitable for recovery may also be included.
Asks the Environment Agency - How are enclosed vehicles to be inspected (e.g., 'Enclosed Waste Lorries')? - What will be identified as 'Recyclable' and 'Non-Recyclable' - the following statement is made: 'Procedures will be in place to divert waste away from the Javelin Park ERF during shutdowns'. What procedures and where will the waste be diverted to?	Initial assessment is undertaken at the weighbridge and by validation of waste transfer notes. The bunker crane operator will make a visible assessment of the delivery as each load is discharged into the bunker, and remove to quarantine any materials considered unsuitable for burning. The Applicant has considered provisional arrangements with the operators of other appropriate landfill and incineration facilities. However, through Pre - Operational Condition P05, we have required the Applicant to submit a report detailing the waste acceptance procedures that will be used at the site.
Asks the Environment Agency in relation to emissions to Water - Is there sufficient capacity to accommodate storm water and the surface water run-off?	As part of our Consultation input to the Planning Application the Environment Agency has provided extensive input and advice to the Planning Authority in relation to the design of the site storm water drainage arrangements. As a result of these extensive exchanges we are now satisfied that with appropriate planning conditions, site drainage arrangements can be constructed to achieve satisfactory disposal of surface water from the site. Environment Agency correspondence to GCC on 19/12/12 confirms.

Response Received from **Health Protection Agency**	
Brief summary of issues raised:	Summary of action taken / how this has been covered

Response Received from **Health Protection Agency**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Recommends that the Environment Agency utilises actual stack emission data to verify the data used in the modelled impact scenarios contained in the application once the plant is operational and that a monitoring programme is implemented to validate the predicted emissions beyond the site boundary.	The modelling study and our assessment of impact from the Installation is based on the ELV's now included in the permit, and therefore compliance with those monitored limits will ensure that impacts are within the values predicted in the impact assessment. However, through IC3 of the permit we have required a report on the environmental performance of the plant to be submitted to us within 4 months of completion of commissioning. We have also included IC7 which requires the operator to undertake a further assessment of the impact of metals emissions using actual emission data collected during the first year f operation. The Environment Agency's approach is to monitor emissions at source and use computer modelling to predict the impact of emissions on the environment. Ambient air quality monitoring is an important tool to provide data on the overall levels of pollutants in the atmosphere. However ambient air quality monitoring measures pollution from all sources, and the impact of the incinerator would be so low relative to background levels for this to be an appropriate technique to monitor its impact. This is particularly the case given the variable impact of other sources of pollution in proximity to the site, primarily road traffic.
Recommends that the Environment Agency should be satisfied that the installation utilises BAT for all aspects of the process including the abatement plant technology and its design.	Our consideration of BAT in relation to the design and operation of the Installation is recorded at Section 6 of this document and includes assessment of the abatement plant and technology. We are satisfied that the Installation will utilise BAT in its operation.
Recommends that the Environment Agency give further consideration to issues relating to the background level Cadmium stated in the Applicants Human Health Risk assessment.	There has been some misconception in relation to the term 'background' as referenced to cadmium in the HHRA provided in the application. The data in this context relates to MDI (mean daily intake) values based on national studies of dietary intake from foodstuffs and drinking water, and as such has no relationship to local site conditions or the wider local environment. The Applicant

Response Received from **Health Protection Agency**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
	obtained this data from an Environment Agency guidance publication intended for use in establishing criteria for contaminated land assessment, and this data was in turn originally provided by the Food Standards Agency. We are not aware of any evidence of elevated levels of cadmium in the local environment and the Agency considers that compliance with the air quality guideline for metals is sufficiently precautionary when considering health risk assessment for these emissions. However we have included IC7 in the permit, which requires the operator to review their assessment of the impact of metal emissions from the Installation using actual emission data collected during the first year of operation.
Recommends that the Environment Agency needs to be satisfied that the management of waste stream operations and subsequent control of odour arising from such processing will be suitably controlled.	Our assessment of odour emissions from the Installation is recorded at Section 6.5.4 of this document and we are satisfied that suitable control of the incoming waste will be achieved. Additionally conditions 3.4.1 and 3.4.2 of the permit impose further requirements in relation to odour.
The application does not contain any detail relating to the control of fugitive emissions during the construction phase of the development.	Issues relating to the development and construction of the site are matters for consideration by the Planning Authority and should be controlled through planning conditions.
Recommends that the Environment Agency be satisfied with the intended management systems for noise control, and that once the plant is operational a survey of actual noise impacts is undertaken to validate the predicted noise assessment levels included in the application.	Our assessment of noise control and emissions from the Installation is recorded at Section 6.5.5 of this document and we are satisfied that suitable noise controls will be in place. We have included pre-operational condition PO8 and improvement condition IC8 in the permit that requires the operator to undertake further noise studies during commissioning and when in operation to compare actual levels with those predicted.
Recommends that the Environment Agency considers making an agreement with the Operator such that live emissions monitoring data can be made available on request.	We encourage the development and will actively participate in any Liaison Group established for the site, such that wider and more readily available information relating to emissions monitoring data might be made available. All monitoring data and reporting information required

Response Received from **Health Protection Agency**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
	by the permit will be made available by placing on the Public Registers.

Response Received from **Gloucestershire NHS**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Asks the Environment Agency if it is satisfied that that sufficient detail has been provided on measures to abate odour and if consideration should be given to the need for an odour modelling study to be undertaken.	Our assessment of odour emissions from the Installation is recorded at Section 6.5.4 of this document and we are satisfied that suitable measures will be implemented to achieve control. We do not believe that odour dispersion modelling is necessary given the controls identified, conditions 3.4.1 and 3.4.2 of the permit will provide the necessary levels of protection.
Asks the Environment Agency to consider including a requirement for real time monitoring of emission data to be included in the permit and to make such data readily available to the public - for example via a website.	See response to the same issue raised by HPA above.
Asks the Environment Agency if it is satisfied that issues relating to noise emissions during commissioning and from the diesel back up generator are covered by permit conditions.	We are satisfied that noise emissions can be suitably controlled during commissioning. Pre-op condition PO4 requires the operator to submit a commissioning plan prior to the commencement of commissioning at the site and PO8 and IC8 requires that a programme for further noise monitoring and assessment is undertaken during commissioning. The diesel back up generator will only be required to run if there is a total failure in the external power supply to the site. However it will be required to run for short periods at regular intervals on a testing/contingency check basis, but this will take place during day hours and we are satisfied that it is unlikely to add significantly to the normal noise profile from the site in this situation.
Asks the Environment Agency to give consideration to the establishment of a Community Liaison Forum for the site as this approach has proved beneficial in other similar situations in Gloucestershire.	We will support the establishment of a Community Liaison Forum group for the site and welcome the opportunity to participate in it.

Response Received from **Health and Safety Executive**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
We do not have any comments on the proposal documents provided with the application.	No further action required.

Response Received from **Severn Trent Water**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
- The applicant does not hold a Trade Effluent Consent/Agreement with Severn Trent Water Ltd; - If, as declared in application documents (Form EPB, Part B2, point 4a) installation/ waste operation will not involve releasing any substance into a sewer managed by sewerage undertaker (Severn Trent Water Ltd), we can see no problems to the sewer network that need concern us; - Facility does not impose risk to Severn Trent's water resources, as is not located within groundwater Source Protection Zones.	The application proposals do not include any arrangements for discharge of process effluent to sewer and no release to sewer is authorised by the draft permit. Any abnormal accumulation of spent process water that can not be utilised within the process will be tankered off-site for appropriate treatment and disposal. No further action required.

The Food Standards Agency, The Highways Agency and Gloucester City Council did not provide any responses to our Consultation.

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

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

Guidance on the interaction between planning and pollution control is given in the National Planning Policy Framework at paragraph 122. 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 out in section below.

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

Representations were received from the following.

Response Received from **Bishops Cleeve Parish Council**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
1	Object to the proposal on the basis that it does not represent the Best Practicable Environmental Option as we understand that about 25% of the waste will remain in the form of ash which will potentially have to be disposed of as hazardous waste to landfill.	The Installation includes an onsite processing facility for the bottom ash produced from the incineration process. This will enable the majority of the IBA to be recovered as incinerator bottom ash aggregate (IBAA) that can be subsequently used as a secondary aggregate in the construction industry. We therefore expect that the quantity of material sent to landfill will be minimal.
2	The facility is too large and does not take account of the downward trend in non-recyclable waste. Overcapacity will lead to either waste having to be imported or recyclable waste being incinerated to keep the plant going.	The need for, and treatment capacity of the plant are primarily matters for the Applicant and the Planning Authority as part of the planning process and delivery of the local waste planning strategy.

Response Received from **Councillor Ian Bickerton - Cheltenham Borough Council.**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
3	Highlights the motion previously carried from a meeting of Cheltenham Borough Council requesting that Gloucestershire County Council considers alternative UK waste technologies along with the existing incinerator schemes being put forward; as part of its Waste Management Strategy in reducing landfill. The MBT plant in Avonmouth is sited as an example of a plant having reduced effects relative to incineration.	These are matters for the Planning Authority to consider in the context of delivering the local waste planning strategy.
4	Concerns relating to Economics, Health and the Environment in relation to Gloucestershire County Council's (GCC) selection of incineration as the selected waste treatment technology to deal with the county's residual waste arising.	The economics and selection of waste treatment options to meet the needs of the local waste planning strategy are matters for the local Waste Disposal Authority. Our consideration of the environmental and health impacts are recorded at Section 5 of this document.
5	Highlights issues raised in the	The Habitats Regs Assessment (HRA)

Response Received from **Councillor Ian Bickerton - Cheltenham Borough Council.**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
	GCC - Waste Core Strategy - Habitats Regs Assessment - December 2010, identifying the potential for impact on relevant Habitat sites - particularly the Cotswold Beechwoods SAC.	undertaken during development of Gloucestershire's Waste Core Strategy was a higher level scoping study to assist in assessing the relative merits of different treatment options and site location. The Applicant has supplied a more detailed site specific assessment of impact on Habitat sites as part of their EPR Application. Our evaluation of this assessment is recorded at Section 5.4.2 of this document.

Response Received from **Councillor Anthony Blackburn - Gloucestershire County Council**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
6	How do Urbaser's proposals to prevent or minimise emissions from the facility compare with other EfW plants approved by the Agency?	We are satisfied that the proposals for the design and operation of the emission control systems of the Installation represent BAT for this type of activity. The proposed systems are very similar to those incorporated in equivalent plants that have been authorised in the previous 1 to 2 years.
7	Has the Agency knowledge of any failure of such equipment as proposed to be installed, in any other plants?	We are satisfied that the proposed abatement systems for this type of plant are BAT and have a demonstrated capability to deliver compliance with permit conditions at similar Installations.
8	Will the Agency prescribe that any new checks/systems that are discovered and introduced into other plants within the 25 lifetime of the plant, will also be installed at Javelin Park?	The permit is a living document and subject to periodic reviews on an individual and industry sector basis. This review process will accommodate revisions resulting from regulatory changes or BAT standards revision, and this could result in conditions and requirements in the permit being changed by a formal Variation Notice.
	The monitoring devices all seem to be within the plant. I think there should be some monitoring devices put out to check the area downwind of the plant. In particular, dairy farmers downwind of the plant will want to know that the grassland on which their animals feed will not	The Environment Agency's approach is to monitor emissions at source and use computer modelling to predict the impact of emissions on the environment. Ambient air quality monitoring is an important tool to provide data on the overall levels of pollutants in the atmosphere. However ambient air quality monitoring measures pollution

Response Received from **Councillor Anthony Blackburn - Gloucestershire County Council**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
	be contaminated such that their milk yield will be reduced.	from all sources. The impact of the incinerator should be so low relative to background levels for this to be an appropriate technique to monitor its impact. The impact assessment has given consideration to ecological features and we do not believe there will be any significant impact on agricultural grassland. We are also satisfied that the potential impact of dioxins and furans that might be ingested through the local food chain will not be significant.
9	What arrangements are there within the plant for automatic switch off and trigger of warning signals to protect the neighbourhood if harmful emission tolerances are exceeded?	The process control system of the plant includes a number of automatic controls, alarm and interlock systems to prevent waste being fed to the incinerator if emissions exceed the permitted limits. The permit includes several reporting requirements and requires that the plant is shut down if permitted limits are exceeded and for the Environment Agency to be informed without delay.
10	The site is in the Severn Valley which has a prevailing south west wind, but the land rises steeply to the Cotswold Escarpment to the east which creates localised weather conditions at certain times of the year. When combined with the potential emissions from the proposed Moreton Valence plant and those from the M5 motorway, might this result in emissions exceeding the safety limit in the 'hollow' around Harescombe/Edge?	The dispersion modelling study undertaken by the Applicant and used as the basis for their air quality impact assessment has been audited and evaluated by the Environment Agency's modelling specialists and we are satisfied that it appropriately represents local terrain and weather patterns. This impact assessment also took account of existing local background air quality conditions. The Applicant also undertook an in-combination assessment study with the predicted emissions from the proposed Moreton Valence plant, and our modelling specialists confirmed that the combined impact from the two plants was unlikely to cause an excedance of any air quality standards. See Section 5.2.4 (i) of this document.
11	Will the chimney of the plant at 70m, be tall enough to carry the emissions high enough to clear Haresfield Beacon and the Cotswold ridge?	The Applicant undertook a sensitivity analysis study to establish an optimum height for the flue gas discharge stack and we are satisfied that this is a reasonable basis for stack height determination. The dispersion modelling study was undertaken with this stack height parameter and takes into account

Response Received from **Councillor Anthony Blackburn - Gloucestershire County Council**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
		the terrain/topography surrounding site. The resulting maximum ground level impact values within the model study grid are presented in the application. Our assessment of these impact predictions are recorded in Section 5 of this document, and we are satisfied that the emissions from the Installation will not cause an excedance of any air quality standard.
12	Can the Agency prescribe that Urbaser have to appoint a local representative to stay in touch with named representatives of the local community so that liaison can be established with regard to monitoring results and equipment and other changes in activities at the plant that would be of concern?	We encourage the development and will actively participate in any Liaison Group established for the site, such that wider and more readily available information relating to emissions monitoring data and changes at the site might be made available to the public and local communities.

b) Representations from Community and Other Organisations

A representation was received from Gloucestershire Friends of the Earth Network (GFOEN).

Representations were also received from GlosVAIN, a local community campaign group formed from an alliance of town and parish councils, individuals and other organisations within the Severn Vale. Representations comments from GlosVAIN were made over four separate submissions.

Response Received from **Gloucestershire Friends of the Earth Network (GFOEN)**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
13	GFOEN believe that an Appropriate Assessment (AA) is required because the planning application and the application for an environmental permit is not directly connected with or necessary to the management of the Cotswold Beechwoods SAC, and as potentially significant effects were identified in the HRA produced for the Draft Waste Core Strategy.	We have reviewed the predicted impacts on relevant conservation sites covered by the Conservation of Natural Habitats and Species Regulations 2010 (including the Cotswold Beechwoods SAC) and summarised our findings in an Appendix 11 assessment document that was sent to Natural England for consultation. Natural England responded with confirmation and agreement with our conclusion in the Appendix 11 document, that emissions from the Installation were not likely to have a

Response Received from **Gloucestershire Friends of the Earth Network (GFOEN)**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
		significant effect on the Habitat sites and therefore that a further Appropriate Assessment evaluation was not required. See Section 5.4.2 of this document.
14	GFOEN also believe that consideration should be given to the in-combination effect of planning permission for the 30,000 tpa gasification plant at Moreton Valence.	The Applicant has undertaken an in-combination impact assessment study with emissions from the proposed Moreton Valence plant, and our evaluation of this study is recorded at Section 5.2.4 (iii) of this document.

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
15	Spot sampling of substances known to be highly harmful is considered inadequate and particular consideration should be given to the continuous monitoring of PM 2.5 particulate emissions from the plant.	Our consideration of particulate emissions is recorded at Sections 5.2.2 and 5.3.3 of this document. Article 48(5) of IED empowers the European Commission to make provision for the introduction of continuous monitoring of these parameters as soon as appropriate techniques are available. The Environment Agency would ensure that any such decision was carried out within the timeframe that the Commission would set. There is no continuous method available for monitoring particulate emissions within specific size ranges. The Environment Agency's experience of seeking particle size information from periodic monitoring of particulate emissions is that there is technical difficulty in collecting sufficient sample to carry out meaningful analysis because of the low rate of stack emissions.
16	Contend that the introduction of any additional heavy metals, dioxins or furans into the environment is unacceptable. The World Health Organisation has stated that reducing dioxin exposure is an important public health goal for disease reduction.	The potential impact of metals and dioxins is considered in detail in sections 5.2.3 and 5.3.2 of this document. For dioxins this includes an assessment of the impact from deposition on land and food chain. The results showed that the predicted daily intake of dioxins at all receptors, resulting from emissions from the

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
		proposed facility is significantly below the COT TDI levels. The result of the assessment of metals release also demonstrates that there is no excedance of any environmental quality standard, target or objective. However we have included IC7 in the permit, which requires the operator to review their assessment of the impact of metal emissions from the Installation using data collected during the first year of operation.
17	No evaluation has been made in the application of not meeting WID during Start-Up and Shut-Down.	The IED (WID) emission limit values do not apply during Start-Up and Shutdown periods. During Start-Up auxiliary fuel is used to bring the furnace up to the required temperature before waste can be introduced. Similarly, auxiliary fuel is used to maintain temperature during Shut-Down until all waste has been cleared from the grate. However the emission control, abatement and monitoring systems must be in operation during start-up and shutdown periods when waste is being burnt. With the abatement systems in continuous operation during these periods, it is unlikely that there will be any extended periods during start-up/shutdown when emissions will be significantly above the limits set in the permit. Our consideration of impacts from the Installation resulting from periods of abnormal operation is recorded at Section 5.5 of this document.
18	Other reports have identified that light emissions from the facility may impact on the behaviour of greater horseshoe bats that may forage in the vicinity of the site. A more detailed lux plan is needed so that the degree of light spill across the site under all scenarios can be quantified so that this potential impact can be assessed.	The lighting design and lux plan for the site is a matter for the Planning Authority to consider in its assessment of the planning application. We understand that as part of this process a further study of potential impact on bat behaviour as a result of construction of the buildings at the site has been undertaken and that the lux plan and some aspects of window design for the buildings has been amended to mitigate this concern.
19	No evaluation has been made of the combined noise effect during construction or operation of the plant with the attendant HGV's entering the site.	Noise impact evaluation during the construction stage of the development is a matter for the Planning Authority to consider. The noise impact modelling study for the operational phase of the development includes consideration of

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
		HGV's manoeuvring at the site during delivery and collection of waste and raw materials.
20	Pollution impact on ecological sites and features - - The Waste Core Strategy Habs Screening Report indicates there could be an impact on Cotswold Beechwoods SAC from plants burning over 200,000 tonnes per annum. - It has not been demonstrated that no harm will be caused to Haresfield Beacon SSSI which is just beyond the 2 km screening distance from the site. - GlosVAIN are concerned with dioxin release given that there are a number of organic farms and food producers in Gloucestershire.	- Our consideration of the impact on relevant ecological receptors (including Cotswold Beechwoods SAC) is recorded at Section 5.4 of this document. In accordance with our working together arrangements with Natural England we completed an Appendix 11 assessment, which was forwarded to them for consultation. Their response confirmed our conclusion that there would be no likely significant effect on Cotswold Beechwoods SAC or any of the other Habitats Directive sites. - Haresfield Beacon SSSI is designated for geological rather than ecological features (Jurassic rock outcrops), and operation of the Installation is unlikely to cause damage to these features. - Our consideration of the impact of dioxin release from the Installation is recorded at Section 5.3.2 of this document, and includes assessment of intake and impact via the food chain. The Applicants assessment has concluded that dioxin intake will be insignificant relative to the COT TDI level for dioxins.
21	Promoting inefficient use of scarce resources - - No plans for the export of heat from the facility which will result in poor energy efficiency. - Quote from EU Directive 'New electricity generation Installations or those that are substantially refurbished should be equipped with high-efficient CHP units to recover waste heat from the electricity production. Member states should adopt authorisation criteria to ensure location of Installations is close to heat demand points'.	The Applicant has considered options for the export of heat from the Installation in their application but currently no firm plans or contracts have been made. Provision has been made in the plant design for the subsequent export of heat once a suitable consumer is identified, and Conditions 1.2.2 and 1.2.3 of the permit require that options are continually kept under review. Location is primarily a planning consideration. The location of the Installation is a relevant consideration for Environmental Permitting, but only in so far as its potential to have an adverse environmental impact on communities or sensitive environmental receptors. Based on this location we are satisfied that heat will be recovered as far as practicable. Further details are

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
		recorded in Section 4.3.7 of this document
22	The facility will contribute significantly to climate change via greenhouse gas emissions and goes against Government policy to decarbonise electricity generation and supply.	Our consideration of the Installation's global warming potential is recorded at Section 6.3 of this document.
23	The Applicants proposals to transport APC residues to Peterborough is not BAT and will generate significant amounts of CO2 which has not been considered in the Planning Application.	We are satisfied that the Applicant recognises that the APC residues produced at the plant will be classified as hazardous, and that appropriate handling, storage, transport and treatment or disposal arrangements will be put in place. As with sourcing of raw materials, it is for the Applicant to decide on the most suitable arrangements for treatment or disposal of their waste materials, so long as this is at an appropriately permitted facility. However, Condition 1.4.1 of the permit also requires that the operator has regard to the waste hierarchy as defined in Article 4 of the WFD when considering treatment and disposal options for the waste materials produced from their operations.
24	Comments on sustainability, energy and climate as referenced in Appendix 13.5 of the Environmental statement of the Planning Application - The scope of the analysis , as carried out using WRATE , was restricted to the proposed solution and landfill, and it is unfortunate that the opportunity was not taken to evaluate the GWP of more sustainable options.	WRATE is an appraisal tool for waste planning authorities to evaluate the overall sustainability of different options when considering different strategies to meet national and regional waste planning policy and objectives. As such it is not appropriate for use in assessment of Environmental Permit applications where BAT assessment technical appraisal is undertaken to ensure that the best techniques are used for the waste treatment proposal that results from the appraisal of waste strategy options.
25	GlosVAIN believes that the Applicants proposals do not demonstrate that the operation of the incinerator will not cause harm to human health and in support of this view present an extract from a paper submitted as evidence to the Welsh Assembly Petitions Committee in May 2012. The extract covers general references to the	Our consideration of the impact of emissions from the Installation is recorded at Section 5 of this document. The subsequent impact assessment uses environmental quality standards, objectives and targets that are drawn from a range of sources including EU and UK legislation and guidance and WHO guidance to be protective of public health. The modelling study and impact

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
	potential linkage of particulate releases from incinerators and their effect on human health.	assessment does not predict the excedance of any of these standards. We have considered the extract from this paper but it has not changed our view given the specific impact assessment we have undertaken as described above.
26	We also highlight the uncertainty regarding the prevailing background level of PM10 in the local area according to the information presented by the Applicant in the application.	There are no Local Authority monitoring stations within near proximity of the site. The Applicant has therefore utilised background data collected during a site monitoring study undertaken by the RPS Consultancy in 2010/11. The location of the monitoring study equipment (at the application site - approx. 80 m from the M5 motorway) is potentially influenced by traffic emissions from the motorway and the nearby Junction 12 which provides access to it. The RPS Study Report also identifies other local and transboundary effects that may have been prelevant at the time of the study. The DEFRA network predictive data for the site location is significantly lower than the values established from the RPS study. We are therefore satisfied that the data from the RPS report forms an appropriate and precautionary basis for establishing background air quality in the wider local environment. Our consideration of the impact of particulate emissions is recorded at Sections 5.2.2 and 5.3.3 of this document. We have concluded that the impact of both PM10 and PM2.5 emissions from the Installation will be insignificant, and will not therefore make any significant contribution to local background air quality.
27	The Applicant has not demonstrated that harm to human health will not be caused by the facility due to its emission of cadmium into the environment.	Our consideration of the impact of metals from the Installation is recorded at Section 5.2.3 of this document. It should be noted that the impact data for cadmium recorded in the earlier emissions table is based on cadmium being emitted at 100% of the WID Group 1 Metal emission limit value, and is therefore a conservative prediction. By taking reference from actual monitored cadmium emission data at similar plants, the expected emission impact is likely to

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
		be significantly less than the conservative value recorded in the table. Although even this conservative assumption does not give rise to any likelihood that the EQS for cadmium will be exceeded, we have included an improvement condition (IC7) that requires the operator to undertake a further assessment with actual metals emission monitoring data collected during the first year of operation.
28	The health impacts from increased traffic flows in the vicinity of the site have not been fully assessed, particularly in light of the recently published study on the negative impact on health from diesel exhaust fumes.	Issues relating to increased emissions from off-site traffic on local roads and highways are a matter for the Planning Authority to consider in its assessment of the planning application.
29	The Landscape and Visual impact is unacceptable, particularly looking out from and into the AONB.	Issues relating to the size and scale of the development in the context of impact on the local landscape are matters for the Planning Authority to consider.
30	GlosVAIN is concerned about the vulnerability of the proposed facility to terrorist attack and the risk that this presents. Nuclear power generation facilities are protected by an armed Civil Nuclear Constabulary which has provided a successful record of security. Unvetted material entering the incinerator via black bags will provide a further opportunity for terrorists or others to inflict damage to the facility.	Appropriate security measures for the site are a consideration for permit determination in so far as they relate to control of access to the Installation. Security fencing, 24 hour staff presence and the management procedures for the site are considered appropriate to achieve this. The site will not hold any fissile material and it is not considered to be a nationally strategic element of the electricity supply network. We consider the waste acceptance criteria (WAC) and associated procedure required by PO5 will be appropriate for all reasonably foreseeable possibilities.
31	GlosVAIN are concerned by the risk of spillages of hazardous substances into the local environment when in transit to and from the facility.	Issues relating to the off site transportation of materials beyond the Installation on public roads and highways are not matters for consideration under the EPR process although they are subject to regulatory controls in their own right.
32	Section 2.4 of the Supporting Information document is a comparison of combustion technology with other technologies such as pyrolysis and gasification with regard to	Our consideration of BAT in relation to the combustion technology selected by the Applicant is recorded at Section 6.1.1 of this document. The Applicant has considered a number of options in arriving at their preferred combustion

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	Brief summary of issues raised:	Summary of action taken / how this has been covered
	climate change impact. We contend that this is inaccurate and the findings are refuted by other reports.	technology selection. Green house gas emission is one of the factors considered in their technology assessment, but it is not appropriate for this to be the sole criteria for combustion technology selection. The Environment Agency is aware that a number of proposals are coming forward for other ways of dealing with waste streams such as pyrolysis and mechanical / biological treatment. At this time however, mass burn incineration at this scale can still be considered BAT, subject to the appropriate assessments being made.
33	With reference to EU Directive 2010/75/EU 24 November 2010 on industrial emissions, we point out that the Directive includes energy efficiency among the criteria for determining the Best Available Techniques that should serve as a reference for setting permit conditions. We seek confirmation that the EA do not take BAT to apply to incinerators alone. Please confirm whether or not the EA's assessment of BAT will relate to / be restricted to thermal recovery technologies in the form of incineration and gasification.	Our consideration of BAT in relation to energy efficiency is recorded at Section 4.3.7 of this document, and in this context the implementation of IED does not introduce any additional requirements to those under IPPC. The Applicant has made an application to operate an Installation, the purpose of which is the incineration of non-hazardous waste in an incineration plant as described by the listed activity in Section 5.1 Part A(1)(b) of the EPR. Our consideration of BAT relates to the processes and technology that are subject to that activity description. As recorded previously, we are satisfied that the proposed plant is BAT in respect to energy efficiency.
34	Please clarify the position with regard to the R1 calculation. We understand it is the EA's responsibility to confirm what R1 ratio will be achieved and whether it is 0.65 or greater.	The Environment Agency is the designated authority for the assessment of a municipal waste incineration plant's energy efficiency capability relative to the R1 Efficiency Calculation. This process is discrete and separate from the EPR permit application process, and consists of three separate stages with final stage qualification only being assessed after a full twelve months operational performance data is available from the plant. The Applicant has now submitted a separate R1 Assessment Application for the initial design stage of this assessment process, however we have yet to conclude our detailed determination of this application, although we expect to do so within in a further

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
		short period of time. However, from the information presented in the EPR Application we consider it likely that the proposed plant design will meet the R1 design stage criteria for the plant to be considered as a 'recovery' operation in the context of the WFD.
35	In a submission previously made to the Planning Authority, GlosVAIN identify that they have commissioned Professor Vyvyan Howard to produce an analysis of the Applicants Human Health Risk Assessment within the Environmental Statement of the Planning Application. GlosVAIN summarise the main issues resulting from this analysis as follows:	See below
36	The modelling used by the Applicant is flawed as levels of uncertainty have not been presented and there is no statistical confidence envelope defined for assessment of the results.	Although some consideration of uncertainty is available from the commercial developer of the modelling software tool, the Agency makes a more practical assessment of model output uncertainty by undertaking check modelling by its own modelling specialists. This involves review of the model input files used by the Applicant in their study and an assessment of sensitivity when combined with other modelling software tools, meteorological data, terrain data and our own preferred modelling input parameters. From this assessment we have concluded that the Applicants modelling study forms a reasonable basis for the impact assessment included in their application. However as a result of the examination of the Applicants modelling study by our own modelling specialists, we did require them to provide additional information, and this is recorded at Section 5.2 of this document.
37	The applicant has significantly underestimated the level of PM 2.5 particulates that will be emitted from the proposed plant. This assertion is made on the basis of the apportionment of PM 2.5 to PM 10 that the applicant	We **did not** accept the methodology adopted by the Applicant for their assessment of PM2.5 emissions as presented in the application, and this is recorded at Section 52.2 (ii) of this document. The PM2.5 data presented in the table at Section 5.2.1 of this

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	Brief summary of issues raised:	Summary of action taken / how this has been covered
	has used in their assessment presented in the application and on the findings of a study undertaken in Sweden in 2007.	document represents our more precautionary approach when considering the impact of this emission, in that we assume 100% of the 'total particulate' emission will be PM2.5. (Prof. Howard's report proposes 67%). Even with this more conservative approach, both PM10 and PM2.5 emissions remain insignificant when compared with their respective AQS or objective. However IC2 has been included in the permit, which requires the Applicant to undertake a study to assess the size fraction of particulate matter in the exhaust stream.
38	The applicants modelling does not take account of the existing toxic body burdens of bio accumulative toxins within the people who will be affected by the incinerator.	Our consideration of human health risk assessment is recorded at Section 5.3 of this document. We believe that the HHRAP and HMIP models as recommended by the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) form an appropriate basis for the evaluation of health impacts resulting from dioxin/furan uptake. These models and this approach to assessing the potential impact from dioxin intake are recognised and supported by Health Authorities and the HPA.
39	In 2008 Cotswold District Council declared an AQMA around the Air Balloon roundabout at Birdlip due to elevated levels of nitrogen dioxide. Surprisingly, monitoring of PM 10 and PM 2.5 does not take place at this location or at any other site in Gloucestershire by Gloucestershire Local Authorities. What will be the impact of this proposal on already high pollution levels at Birdlip?	The Air Balloon roundabout at Birdlip is over 13 km from the site and we are satisfied from our assessment of the modelling study undertaken by the Applicant that the impact of nitrogen dioxide from the Installation will be insignificant at this location and therefore not make any significant contribution to the air quality at this AQMA. Identification of the need for, and the establishment of AQMA's in respect to meeting air quality standards is the responsibility of relevant Local Authorities.
40	GlosVAIN submitted a series of documents that had previously been submitted to the Planning Authority as part of their objection to the planning application and in making suggestions for further information that should be	See below

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
	requested from the Applicant under Regulation 22 of the Planning Regulations. Issues identified in these documents are considered in turn below	
41	*GlosVAIN note on Health* GlosVAIN make reference to and provide extracts from documents submitted by the Health Protection Agency as consultation responses to the Planning Application and to a further document submitted by Axis Consultants in support of the Planning Application made by the Applicant and identify the following - • the background level of cadmium in the area is already above the recommended level and the real potential impact of an increase in cadmium exposure needs to be evaluated. Has the Planning Authority consulted with the Contaminated Land Department of the local authority as advised by the HPA to determine if the elevated background levels of cadmium are naturally occurring or due to contaminated land from an historic source. • the Applicant should supply clarification of the precise effect that all emissions (in particular PM 2.5) will have on the health of local residents and if this information can not be sourced from the HPA then the Applicant should obtain from a source of equal standing.	The issue relating to 'background' cadmium level has been acknowledged previously in our response to the consultation input from the HPA, but is repeated here for clarity. There has been some misconception in relation to the term 'background' as referenced to cadmium in the HHRA provided in the application. The data in this context relates to MDI (mean daily intake) values based on national studies of dietary intake from foodstuffs and drinking water, and as such has no relationship to local site conditions or the wider local environment. The Applicant obtained this data from an Environment Agency guidance publication intended for use in establishing criteria for contaminated land assessment, and this data was in turn originally provided by the Food Standards Agency. We are not aware of any evidence of elevated levels of cadmium in the local environment and the Agency considers that compliance with the air quality standards for metals is sufficiently precautionary when considering health risk assessment. However we have included IC7 in the permit, which requires the operator to review their assessment of the impact of metal emissions from the Installation using actual emission data collected during the first year of operation. Our consideration of health impacts resulting from operation of the Installation is recorded at Section 5.3 of this document, and our assessment of PM2.5 emissions is recorded at Section 5.2.2(ii).

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	Brief summary of issues raised:	Summary of action taken / how this has been covered
	• The Applicant should provide substantial proof that the findings and conclusions of the paper by Javier Garcia-Perez on the health impacts of incineration are incorrect.	We take advice from the Health Protection Agency in relation to the consideration of overall health issues associated with the operation of municipal waste incineration plant. Their 2009 Position Statement concluded - 'After reviewing the latest literature the Agency's general position remains unchanged: Modern, well managed incinerators make only a small contribution to local concentrations of air pollutants. It is possible that such small additions could have an impact on health but such effects, if they exist, are likely to be very small and not detectable'. And this has been re-affirmed in their most recent update - 'The HPA will review its advice in light of new substantial research on the health effects of incinerators published in peer reviewed journals. To date, the HPA is not aware of any evidence that requires a change in the HPA's position statement'. We are aware of this paper amongst others relating to this issue, however it has not changed our view, given the specific impact assessments we have undertaken as described within Section 5 of this document.
	• Provide a risk assessment of the effects that an increase in acid rain will have.	Acid rain resulting from sulphur dioxide emission is essentially a long range pollutant impact. We are satisfied that emissions of SO2 from the Installation is unlikely to make any significant contribution to this impact.
	• the Applicant should calculate a cost burden that additional admissions will have on the NHS.	Cost burden calculation of operational requirements controlled by the NHS is not a matter for consideration in assessment of the EPR Application. The Consultation responses from Gloucestershire NHS and the HPA did not indicate that a COMEAP assessment should be undertaken. Our impact assessments have concluded that we do not consider that there will be any impact on health and therefore we do not consider this necessary.
42	*Part 4 of GlosVAIN's Planning*	Issues relating to risks associated with

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	Brief summary of issues raised:	Summary of action taken / how this has been covered
	Objections - groundwater, flooding and pollution GlosVAIN make reference to and provide extracts from various consultation responses that have been made to the planning application and identify the following - • Concerns relating to the nature of the geology and hydrogeology at the site that if disturbed during construction may result in an increased risk of flooding. • Concerns regarding historic contamination of land at the site due to its previous use as part of a WW2 airfield. • Previous ground works at the site to construct an access road may have resulted in drainage problems and historic pollutant migration at some local farms. Any further large scale works at the site could cause additional problems at local farms.	construction activities during development of the site are matters for the Planning Authority to consider. Any further land remediation required as a result of additional contamination discovered during construction will be subject to control through the planning authorisation process. However, we have included pre-operational condition PO9 which requires the Applicant to provide soil and groundwater contamination reference data such that the condition of the ground and groundwater at the site can be characterised before any operational activities commence. As recorded above, issues relating to construction activities at the site are matters for consideration by the Planning Authority.
43	*Recent flooding at the site* GlosVAIN have provided details of the recent flooding and extent of standing water at the site which has resulted from the recent severe weather, have made reference to several planning application documents, and identify the following - • There is inadequate capacity in the drainage ditches and watercourses to take surface water from the site. • Further consideration should be given to flood risk at the site, particularly below ground level infrastructure and the containment of raw waste in the Bunker and the IBA waste water collection sump. • The raw waste in the Bunker could become wet with consequences for subsequent	The Environment Agency have provided extensive consultation input in our role as a Consultee to the planning process, in respect to the site drainage arrangements and consideration of associated flood risk issues. As a result of this consultation process, we are now satisfied that through appropriate planning conditions the site drainage arrangements can be designed such that minimal fluvial flood risk will result. An investigation of the circumstances associated with the recent flooding at the site during the November/December storm period concluded that this incident resulted from pluvial accumulation. In this context we have commented to the Planning Authority that further development of the site presents an opportunity to reduce the risk of similar future events at the site. When making permitting decisions, flood

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	Brief summary of issues raised:	Summary of action taken / how this has been covered
	processing. • A flooding event may compromise the ability to safely shut down the plant due to the ability to deliver raw materials to the site and access by key staff.	risk is still a relevant consideration, but only in so far as it is taken into account in the accident management plan and that appropriate measures are in place to prevent pollution in the event of a credible flooding incident. An Accident Management Plan will be an essential item of the site EMS, a summary of which is required prior to the commencement of commissioning through pre-operational condition PO1. We are satisfied that appropriate measures can be provided, and we will assess the plan to ensure that those measures can be implemented.
GlosVAIN submitted a report prepared by Ynys Resources Ltd on 06/02/13. The Executive Summary to the Ynys report indicates it was commissioned by GlosVAIN in respect to the proposed Javelin Park EfW development with planning application reference 12/0008/STMAJW. It claims that it has been undertaken as an independent and objective review of the current situation in regard to the imminent planning Determination. The short cover email accompanying the document states that the report shows that the incinerator would not meet R1, and therefore be classified as a disposal facility and not as recovery.		
	Section 4.4 of the report highlights the R1 formula detailed in Annex II of the WFD 2008/98/EC, and identifies that this formula does not calculate conventional efficiency but the efficiency at which the produced energy is utilised. Section 4.7 of the report presents an estimate for the energy factor calculation based on assumptions for the relevant factors in the R1 formula calculation. This estimate concludes that the R1 factor calculated for the proposed plant is 0.588; which is below the threshold of 0.65, and therefore the plant should be considered as a D10 disposal operation rather than a recovery operation in the context of WFD.	The Environment Agency is the designated authority for the assessment of a municipal waste incineration plant's energy efficiency capability relative to the R1 Efficiency Calculation. This process is discrete and separate from the EPR permit application process, and consists of three separate stages with final stage qualification only being assessed after a full twelve months operational performance data is available from the plant. The applicant has now submitted a separate R1 Assessment Application for the initial design stage of this assessment process, however we have yet to conclude our detailed determination of this application, although we expect to do so within in a further short period of time. However, from the information presented in the EPR Application we believe at this stage the proposed plant design is capable of achieving the R1 criteria for the plant to be considered as a 'recovery' operation in the context of the WFD. We note from the calculation presented in the Ynys report that the figure used for the annual energy produced is based on the

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
		electricity exported (116,000 MWh), whereas the value to be used in the formula should be the total electricity produced (139,200 MWh) as recorded in the EPR Application.
	The Executive Summary of the Ynys report also records that hazardous waste at the site will be converted from 0.5% to 4% due the concentration of metals and other substances during the EfW process. Section 5 of the report expands on this observation by concluding that approximately 8,000 tonnes per annum of APC residues will be produced by the plant, which is indicated to be an 8 fold increase on the amount of hazardous waste entering the plant. The report also indicates that facilities exist for the recycling of APC residues which the proposal has not considered, and identifies that the policy document "Strategy for Hazardous Waste Management in England" 2010 requires that hazardous waste is treated in accordance with the waste hierarchy. The report also identifies in an extract from Annex 2 of this policy document that "*There is a need therefore for at least five facilities that can recycle APC residues to other materials that can be re-used, each with a capacity of 33,000 tonnes per annum, and a significant number of additional facilities may be needed if further EfW plant are developed."*	Our consideration of the arrangements for the waste to be treated at the plant is recorded at Section 4.2.6 of this document. Pre-Operational Condition PO5 and Condition 2.3.3 are included in the Permit in relation to control of the waste that can be accepted for treatment at the plant. As a result of these conditions, the Permit does not allow, the treatment of <u>any</u> hazardous waste at the site, as defined by the EWC waste codes included in Table S2.2 of Schedule 2. However, the classification of municipal solid waste (MSW) as non-hazardous waste is made in the full knowledge that some elements within the MSW would, if separately collected, be considered hazardous. In making that classification of MSW, account is already taken that these components may be present and dispersed within it, and the minimum furnace combustion conditions included in the IED are specified to address the mixed nature of MSW. The APC residues arise from the necessary treatment of combustion flue gasses as specified by IED for incineration plant, not from any concentration of metals or other substances in the incineration combustion process. The generation of APC residue will be essentially proportional to the waste throughput for a given waste stream and abatement technique. The applicant has selected a dry reagent system for acid gas emission control (spent reagent from this abatement process are the predominant component of the final APC residue), and during the course of our determination has confirmed that a

Response Received from **GlosVAIN**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
		proportion of the reagent will be recycled as part of the process to improve its utilisation and minimise waste generation. Improvement condition IC5 also requires the Applicant to report on the optimisation of the flue gas abatement systems of the plant. We are therefore satisfied that generation of APC residues will be minimised and that the arrangements represent BAT for the plant. The Applicant recognises that the APC residues generated at the plant will be classified as hazardous and that appropriate storage, transfer, treatment or disposal arrangements will be required. Although the original Application identified direct disposal as the proposed fate for APC residues generated at the plant, the applicant has identified in a further information request response, that they are aware of investigations into other treatment and recovery options that may become available in the future. Condition 1.4.1 of the permit requires the operator to apply waste hierarchy consideration to APC residues throughout the life of the permit according to technology options available at the time. Condition 1.4.2 of the permit also requires techniques for improving the avoidance, recovery or disposal of waste to be reviewed every 4 years, and in their further information response, the Applicant has committed to report on this to the Environment Agency on an annual basis.

c) <u>Representations from Individual Members of the Public</u>

A total of 20 responses were received from individual members of the public which includes those responses made at the public surgery drop-in events. These raised many of the same issues as previously identified and addressed above. Only those issues additional to those already considered are listed below:

Response Received from **Individual Members of the Public**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
44	The proposed Management System will only be a 'model' - not a 'regulation' that will have to be complied with.	The Agency recognises that the Environmental Management System (EMS) is a key factor for good control of the operation of the plant. The Applicant has committed to achieving external certification of their management system as soon as practical after the commencement of operations at the site. We have included IC1 in the permit to secure this, and conditions 1.1.1 - 1.1.3 of the permit requires the operator to manage and operate the plant in accordance with the documented management system.
45	The proposal assumes south west winds and does not make any consideration for calm days.	The modelling tool utilises five separate years of meteorological data and makes worst case predictions for hourly average and annual average impacts to compare against relative air quality standards. A comprehensive range of weather conditions are therefore utilised in the assessment.
46	The number of people exposed to emissions from the incinerator will increase as housing developments in the local area expand.	It is inevitable that the number of people exposed to potential impact from the plant will increase if the local residential population in the vicinity of the Installation increases. However the impact assessment recorded in Section 5 of this document represents the maximum impact prediction value within the model grid range and is therefore protective of any new residential settlement
47	Concern that not all hazardous materials can be removed from the incoming waste stream	It is likely that small quantities of some hazardous waste items will be contained in the kerbside collected municipal waste from households. The expected number and dispersed distribution of such items within the bulk waste feed, together with the controlled combustion within the furnace and the subsequent flue gas abatement systems will enable such items to be processed safely. Larger items of any problematic material can be screened and removed as part of the unloading inspection and waste bunker mixing operation conducted by the feed crane operators.
48	No mention of filter failure in the	The bag filter arrangement of the

Response Received from **Individual Members of the Public**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
	abatement system	particulate abatement system is a multi component design with a pressure differential monitoring system to identify any potential leaks, the multi component design also enables exchange and replacement of components without interrupting overall operation.
49	The amount of emission cannot be guaranteed, it's just a calculation.	The majority of emissions are monitored continuously via Continuous Emission Monitoring Systems (CEMS) which are designed and operated to a MCERTs standard and supported by quality assurance standard BS EN 14181. The impact assessment predictions are based on worst case presumptions that the plant will operate continuously at the maximum emission limits included in the permit.
50	In view of the report by Prof. V Howard - Particle Emissions and Health, we should adopt the Precautionary Principle until further studies are available to consider the impact on health, and until then no more incinerators should be built.	The United Kingdom Interdepartmental Liaison Group on Risk Assessment (UK-ILGRA) state in their paper "The Precautionary Principle: Policy and Application" that the precautionary principle should be invoked when there is good reason to believe that harmful effects may occur and the level of scientific uncertainty about the consequences or likelihood of the risk is such that the best available scientific advice cannot assess the risk with sufficient confidence to inform decision making. The Health Protection Agency, (Response to British Society for Ecological Medicine Report, "The Health Effects of Waste Incinerators) say that "as there is a body of scientific evidence strongly indicating that contemporary waste management practices, including incineration, have at most a minor effect on human health and the environment, there are no grounds for adopting the 'precautionary principle' to restrict the introduction of new incinerators".
51	The proposals completely fail to show that this is an extremely inefficient technology in relation	Our consideration of energy efficiency is recorded at Section 4.3.7 of this document, and we are satisfied that the

Response Received from **Individual Members of the Public**		
	Brief summary of issues raised:	Summary of action taken / how this has been covered
	to energy efficiency and CO2. The proposals are based on predictions of waste availability that have already been proven to be wrong	Installation is BAT in respect to energy efficiency.
52	**Traffic** A number of issues were raised in relation to problems associated with additional traffic flows, increased risk of road accidents and additional pollution from road vehicles.	These are matters for consideration by the Planning Authority.
53	**Location** A number of issues were raised in relation to the site being located further away from centres of population, its location being chosen due to the benefit of the developer and the view that multiple smaller facilities spread across the County would be a better solution.	
54	**Visual Impact** A number of comments were made regarding the shape and size of the building, its visual impact, including on the AONB.	
55	**Need for the development and consideration of waste strategy** The availability of sufficient waste, its impact on recycling rates and the likelihood that waste from outside the county will need to be imported.	

d) Representations Made at the Drop-In Event

The drop-in events were attended by a total of 98 persons, who were a mixture of local residents and other local people with an interest in the proposed facility. Written comments and representations made by attendees at these drop-in events are included in the above.

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 20 February 2013 and 12 April 2013 and the public drop-in event held on 12 March 2013 at Stonehouse Town Hall, Stonehouse, Gloucestershire.

In some cases the issues raised in the consultation were the same as those raised previously and already reported in section A of this Annex. Where this is the case, the Environment Agency response has not been repeated and reference should be made to section A for an explanation of the particular concerns or issues.

Also 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

No further representations were received from these organisations.

b) Representations from Local MP, Assembly Member (AM), Councillors and Parish / Town / Community Councils

Representations were received from Councillor Anthony Blackburn (North Stroud), who raised the following issues:-

i) *Do you not think that the Agency should prescribe that the operator of the plant should place monitors outside the plant eg. On Haresfield Beacon to check on air quality and regularly report findings to the Agency?*

As recorded in our acknowledgement of comments made by the Health Protection Agency and at Item 8 in Part A of this Annex above, ambient air quality monitoring measures pollution from all sources, and the impact of the incinerator would be so low relative to background levels for this to be an appropriate technique to monitor its impact. This is particularly the case given the variable impact of other sources of pollution in proximity to the site, primarily road traffic.

ii) *Will the Agency agree to recommend that Urbaser UBB should co-operate with the local community by setting up and participating in a Liaison Group to pass on to public the monitoring figures and deal with queries from local residents as to the information and activities at the plant.*

As recorded in our acknowledgement of comments made by the Gloucestershire NHS and at Item 12 in Part A of this Annex above, we recognise that establishing a Community Liaison Group forms a helpful and practical mechanism to share information for developments of this nature and

we will recommend that Urbaser follows this approach if the development proceeds.

c) Representations from Community and Other Organisations

No representations were received from these organisations.

d) Representations from Individual Members of the Public

A total of 17 responses were received from individual members of the public which includes those representations submitted at the Drop-In event, and some individuals submitting more than one response. These raised many of the same issues as previously addressed. Only those issues additional to those already considered are listed below:

Responses received from **individual members of the public**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Following our announcement of the draft decision consultation arrangements on 15 February 2013 a small number of respondents expressed concerns regarding the current availability of the draft documents for review at the time this announcement was made.	Our announcement recorded that the consultation period would run from 20/02/13 to 12/04/13 and provided details of where the documents could be accessed for review. The draft decision documents were made available for access via the 'Consultations' page of our website, the specific e-Consultation portal on our website and at our own and Stroud District Council Office Public Registers from 20/02/13.
One respondent asked if the Applicant had submitted an application for R1 Energy Efficiency status evaluation and if any permit for this status had been issued.	The Applicant applied for R1 Status validation during the determination of this EPR Application. We reviewed this R1 application (which is separate to this EPR Application) and following submission of further information by the applicant subsequently provided authorisation of R1 Status (Design Stage) on 07/03/13, for the proposed activities at the site.
One respondent raised several issues regarding the assessment of the Planning Application, the approach taken by the planning authority in undertaking this assessment and the behaviour and conduct of local councils, councillors and politicians. The overall need for the development and potential capacity in adjacent authorities was also raised.	The conduct of the process for determining planning permission is that of the local planning authority, in this case Gloucestershire County Council. The assessment of 'need' for particular types of development is also the responsibility of the Local Planning Authority in accordance with National, Regional and Local waste strategies and policies.
One respondent expressed concern to discover that the Planning Committee	The Planning Application and Environmental Permitting application

Responses received from **individual members of the public**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Meeting to consider the planning application was still planned to go ahead despite only being only part way through the Environment Agency's draft decision consultation period.	processes are discrete and not interdependent on each other insofar as determination of one application is not dependent on a conclusion to the other.
A number of respondents raised concerns regarding the potential for future problems associated with flooding given the recent conditions and incident in December 2012.	The Environment Agency have provided extensive consultation input in our role as a Consultee to the planning process, in respect to the site drainage arrangements and consideration of associated flood risk issues. As a result of this consultation process, we are now satisfied that through appropriate planning conditions the site drainage arrangements can be designed such that minimal fluvial flood risk will result. This issue is considered in more detail at Item 43 in Part A of this Annex above.
One respondent requested that consideration be given to the health of local gardeners, growers and farmers (particularly in respect to dioxins) who eat their own food on a daily basis.	Health risks associated with the dietary intake of dioxins via the food chain are recorded at Section 5.3.2 of this document. We are satisfied that even for a farmer existing on a total diet of locally produced food intake the health risk impact prediction remains insignificant when compared with the COT TDI level for dioxin intake.
A small number of respondents registered their objection to the proposal on the basis of its visual impact from the nearby AONB, its overall height relative to previous planning guidance for the site, the potential commercial impact on local businesses and the relative need for the development considering the existing capacity in the Region.	These are all matters for consideration as part of the planning process.
Some respondents expressed concern regarding the impact on the health of local residents and on wildlife and conservation sites in the vicinity of the installation.	Our consideration of the installation's environmental impact, health impacts and ecology conservation sites is recorded at Sections 5.1 – 5.4 of this document. Further considerations of specific health and conservation issues are also recorded in Part A of this Annex. We are satisfied that operation of the installation will not result in the excedance of any human or ecological air quality or health standards.
Concern was expressed regarding the subsequent enforcement of conditions at the site and what happens off-site –	Consideration of the disposal arrangements for the APC residues produced by the installation are recorded

Responses received from **individual members of the public**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
specifically the arrangements for disposal of flyash.	at Section 4.3.9 of this document, with further consideration recorded at the end of Item 43 of Part A of this Annex.
The EA should be able to comment on the waste treatment process chosen by the Council and be able to suggest other processes such as MBT and other new waste treatment technologies.	This is a matter for the Local Planning Authority, having regard to National, Regional and Local residual waste strategies and policy.
A number of respondents expressed concern regarding increased traffic and its associated pollution impact resulting from the increase in vehicle movements going to and from the site, including those bringing in waste from other areas.	Issues relating to increased traffic flows on the road network surrounding the site are matters for consideration by the planning process.
One respondent expressed concern about the amount of energy required to operate the facility.	Our consideration of energy efficiency and utilisation of energy at the installation is recorded at Section 4.3.7 of this document. Since publishing our draft decision for this EPR Application we have completed our assessment of the Applicants associated application for R1 Energy Efficiency Status validation. We are satisfied that the proposed plant meets the requirement to be a 'Recovery Operation' in accordance with the R1 Formula described by the Waste Framework Directive.
A recent press report indicated that a leaked GCC document shows that over 65% of the waste that is to be sent to the plant could be recycled.	Arrangements and approaches for the kerbside collection of household and municipal wastes are matters for consideration by the Local Authority. Conditions in the permit require that any separately collected fractions of waste shall only be accepted at the installation if they are unsuitable for recovery.
It is misleading, particularly in respect to nano particles and number concentrations, to quote extracts out of context from the HPA Position Statement. Section 5.3.3 should include the totality of the particles section from the HPA statement or include it as an appendix to the document.	We have included this section and reference to the HPA statement in the document to provide some context to the overall consideration of particulate emissions, beyond those for which environmental quality standards or objectives currently exist. We do not feel our summary of this situation or the included reference to the HPA Statement is misleading. We feel it is more appropriate for people to access the totality of the HPA Statement directly, given that it may change or be updated over time.
IC2 – This Condition is welcomed but lacks clarity regarding the fractions. It is	The improvement condition specifically requires a speciation assessment of the

Responses received from **individual members of the public**	
Brief summary of issues raised:	Summary of action taken / how this has been covered
important that the tests are capable of producing relevant results relating to the numbers and sizes of particles down to and within the PM0.1 category.	PM10 and PM2.5 fractions within the total particulate release profile – for which the permit emission limit value applies. PM10 and PM2.5 are the particulate size fractions for which environmental quality standards are currently established.
IC7- Further to the existing condition, the applicant should undertake tests during the 12 months following commissioning to validate, or otherwise, the results of the dispersion model used by the applicant with particular reference to the impacts on sensitive human receptors (as Table 4.6 of the application Air Quality Assessment). This is particularly pertinent given that the application relates to a location adjacent to an area (ie the Cotswolds) with low background pollution levels.	IC7 relates to further investigation of emissions of CD, Ni and As given that the predicted impact of these metals could not be described as insignificant based on the conservative release values for them used in the original application impact assessment. The condition requires the operator to collect specific actual release data for these metals so that an actual site specific review of their impacts can be considered. Our consideration of the relevance of ambient air monitoring in such situations is recorded in our acknowledgement of comments made by the Health Protection Agency and at Item 8 in Part A of this Annex above.
In respect to potential POP release, the Stockholm Convention and Regulation 4(b) and Article 6(3) of the POPs Regulations, the EA should either, in line with the Convention and as part of the process of issuing this Permit, give priority consideration to all alternative processes, techniques or practices that have similar usefulness but which avoid the formation and release of substances listed in Annex III or make it clear that this is the responsibility of the Planning Authorities.	We are satisfied that through our assessment of BAT for the activities described and applied for in the application and through conditions in the permit that will deliver the requirements of the IED (which replaces the requirements of IPPCD and WID), the formation and release of unintentionally produced POPs will be prevented or minimised. It is for the Planning Authority to decide on their appropriate consideration of the requirements of the POP Regulations in respect to their consideration of other residual waste treatment options as part of the planning application process.

e) Representations Made at the Drop-In Event

The drop-in event was attended by 42 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.

Issues raised and submitted during the course of this event are included in the record of representations made by members of the public as detailed above.