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

Decision document recording our decision-making process

The Permit Number is:	EPR/NP3333JA
The Applicant / Operator is:	Pedigree Power LLP
The Installation is located at:	Browns Road, Daventry, Northamptonshire, NN11 4NS

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/NP3333JA. 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/NP3333JA. We refer to the permit as "the **Permit**" in this document.

The Application was duly made on 22/12/2017.

The Applicant is Pedigree Power LLP. We refer to Pedigree Power LLP 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 Pedigree Power LLP "the **Operator**".

Pedigree Power LLP's proposed facility is located at Browns Road, Daventry, Northamptonshire, NN11 4NS. We refer to this as "the SWIP" in this document.

How this document is structured

Glossary of acronyms used in this document

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

AAD	Ambient Air Directive (2008/50/EC)
APC	Air Pollution Control
AQS	Air Quality Strategy
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
CEM	Continuous emissions monitor
CFD	Computerised fluid dynamics
CHP	Combined heat and power
CROW	Countryside and rights of way Act 2000
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision document
EAL	Environmental assessment level
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission limit value
EMAS	EU Eco Management and Audit Scheme
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154) as amended
ES	Environmental standard
EWC	European waste catalogue
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HPA	Health Protection Agency (now PHE – Public Health England)
HRA	Human Rights Act 1998
HW	Hazardous waste
HWI	Hazardous waste incinerator
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive (2010/75/EU)

I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LADPH	Local Authority Director(s) of Public Health
LOI	Loss on Ignition
MBT	Mechanical biological treatment
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
Opra	Operator Performance Risk Appraisal
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
PHE	Public Health England
POP(s)	Persistent organic pollutant(s)
PPS	Public participation statement
PR	Public register
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated biphenyls
PXDF	Poly-halogenated di-benzo furans
RGS	Regulatory Guidance Series
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 decision

We have decided to grant the Permit to the Applicant. This will allow it to operate the SWIP, 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 part of 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 22/12/2017. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below.

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

2.2 Consultation on the Application

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

This requires us, where we consider it appropriate, to take such steps as we consider appropriate to secure the involvement of representatives of interested persons in the exercise of our functions, by providing them with information, consulting them or involving them in any other way. In this case, our consultation already satisfies the Act's requirements.

We advertised the Application by a notice placed on our website, which contained all the information required by the IED, including telling people where and when they could see a copy of the Application. The Application was made available to view online using Citizen Space and was also available via email or mail from:
pscpublicresponse@environment-agency.gov.uk
Environment Agency
Permitting and Support Centre
Land Team
Quadrant 2
99 Parkway Avenue
Sheffield
S9 4WF

Anyone wishing to see these documents could do so and arrange for copies to be made.

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

- Food Standards Agency (FSA)
- Northamptonshire Fire Service
- Health & Safety Executive (HSE)
- Public Health England (PHE) and Director of Public Health
- National Grid
- Northamptonshire County Council
- Daventry District Council

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

In addition further targeted consultation on the draft was undertaken via direct communication with local interested parties
Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 4. We have taken all relevant representations into consideration in reaching our determination.

2.3 Requests for Further Information

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued an information notice on 16/3/2018. A copy of the information notice was placed on our public register.

3 The legal framework

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

- A *Small Waste Incineration Plant* (SWIP) and a *waste co-incineration plant* as described by the IED;
- an *operation* covered by the WFD, and
- subject to aspects of other relevant legislation which also have to be addressed.

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

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

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

4 The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

Incineration or co-incineration plants can be Small Waste Incineration Plants (SWIPs) to which IED Chapter IV applies. These will normally be regulated by local authorities. However there may also be circumstances in which they are directly associated activities on Part A(1) installations. This activity is subject to the EPR because it is directly associated to an activity listed in Part 1 of Schedule 1 to the EPR as part of a multi-operator installation.

The EPR defines a SWIP as follows:

> *"small waste incineration plant" means a waste incineration plant or waste co-incineration plant with a capacity less than or equal to 10 tonnes per day for hazardous waste or 3 tonnes per hour for non-hazardous waste;*

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

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

Many activities which would normally be categorised as "directly associated activities" for EPR purposes (see below), such as air pollution control plant, including storage of treatment chemicals, and the ash storage bunker, are therefore included in the SWIP activity description.

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 electricity generator for emergencies. These activities comprise one installation, because the incineration plant and the steam turbine are successive steps in an integrated activity.

Together, these activities comprise the SWIP.

4.1.2 The Site

The SWIP is located at Browns Road, Daventry, Northamptonshire, NN11 4NS (Grid Reference Easting: 455480 Northing: 262530).

The SWIP will use pre-treated (shredded and screened) mixed non-hazardous waste wood as a fuel. The plant has a maximum annual throughput of 24,780 tonnes. The waste wood is gassified and the resulting gas is burnt in a combustion facility which utilises a fluidised bed combustion plant (FBC) to create steam. The thermal energy within the steam will be recovered through screw expanders and used to produce approximately 565 kWe of electricity for use and export to the national grid. Waste thermal energy produced by the process will be exported to the rest of the installation (a waste treatment plant operated by Henley Biomass Limited) and utilised as the primary heat source for their evaporative treatment process for the processing of waste.

The Emissions Control Plant will consist of activated carbon injection for the removal of dioxins and heavy metals; sodium bicarbonate injection for the neutralisation of acid gases and urea injection for the selective non-catalytic reduction (SNCR) of oxides of nitrogen. A cylindrical filter will sit on top of the fluidised bed combustor and remove particulate matter generated. The remaining combustion products are emitted to air via the stack (release point A1).

Release point A1 will be fitted with MCERTS compliant continuous environmental monitoring system (CEMS). This will be used to continuously monitor the outgoing gas stream. Feedback from the CEMS will be used to control the feed rate for bicarbonate and urea injection.

There will be no direct process emissions to controlled water arising from the SWIP. All external clean surface water runoff will drain into an attenuation tank before being discharged to a surface water drain system (release point W1). There are no other point source releases from the SWIP.

There are a number of sensitive human and ecological receptors within the screening distances of the facility which have been considered by the operator in the risk assessments. The operator has demonstrated that the operation of the plant will not adversely affect these receptors.

The Applicant submitted a plan which we consider is satisfactory, showing the site of the SWIP 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 SWIP does

The Applicant has described the facility as a Biomass Energy Facility. Our view is that for the purposes of IED (in particular Chapter IV) and EPR, the SWIP is a waste co-incineration plant because:

Notwithstanding the fact that waste will be thermally treated by the process; the process is never the less 'co-incineration' because it is considered that main purpose of this plant is the generation of energy.

The facility will accept an annual maximum of 24,780 tonnes of pre-shredded Grade B and C mixed waste wood for the process. The waste will be delivered by road vehicle directly into the Fuel Storage Building. All waste wood will be loaded into one of a series of five concrete storage bays.

A fuel handling system is to be used comprising duplex chain feed bunkers fitted with feed hoppers, chain feed conveyor, day hopper and a fuel chute with integral rotary valve. The boiler feed bunkers discharge onto a chain feed conveyor that transports the waste wood to a day hopper located at high level on the fluidised bed combustor which is an external part of the equipment.

The fluidised bed combustor (FBC) uses two stages to process the waste wood. The first stage is gasification within the fluidised bed (comprising a bed of hot fluidised sand) to form a syngas. The second stage involves lean combustion of the syngas above the bed to release heat for the production of steam. The by-products of the process are fly ash, tramp material and combustion products (flue gases). All flue gases are abated through a dedicated air pollution control (APC) system. All emissions to atmosphere will be monitored through the use of MCERTS approved continuous emissions monitoring equipment (CEMS).

Fly ash is collected in a 1 tonne bag at the base of the combustor and exported off site for disposal. Tramp material is captured in a metal skip located under the combustor and exported off site for disposal.

The high pressure steam produced by the process is diverted through two screw expanders in order to produce electricity for export to the grid. Once passed through the screw expander the steam will advance to the adjacent waste water treatment plant.

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

Waste throughput, Tonnes/line	24,780/annum	2.95/hour
Waste processed	Wood	
Number of lines	1	
Furnace technology	Fluidised Bed Combustor	
Auxiliary Fuel	Gas Oil (diesel)	
Acid gas abatement	Dry	Sodium bicarbonate
NOx abatement	SNCR	Urea
Reagent consumption	Auxiliary Fuel: 12 te/annum Urea: 200 te/annum Sodium bicarbonate: 250 te/annum Activated carbon: 10 te/annum	
Flue gas recirculation	Yes	
Dioxin abatement	Activated carbon	
Stack	Grid Reference NGR 455472.3, 262573.0	
	Height, 17.03 m	Diameter, 0.662 m
Flue gas	Flow, 4.928 Nm^3/s	Velocity, 15.33 m/s
	Temperature	139°C
Electricity generated	0.565 MWe	4,746 MWh
Electricity exported	0.497 MWe	4,175 MWh
Steam conditions	Temperature, 225°C	Pressure, 22.5 bar (g)
Steam exported	12.2 tonnes/hour	8.96 MWh
	Temperature, 150°C	
Waste heat use	Utilised in the evaporative treatment process operated by Henley Biomass Limited under permit EPR/UP3536YX as part of this installation.	

4.1.4 Key Issues in the Determination

The key issues arising during this determination were emissions to air, and Fire prevention 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 location of the subject Site is shown on Figure A1, Annex A, centred at approximate National Grid Reference 455500 262500. The site is located at Browns Road, Daventry, Northamptonshire, NN11 4NS which is to the west of Daventry. The site is accessed off Browns Road.

Immediately adjacent to the south of the site is the Household Waste Recycling Centre on Brown's Road. To the west there is a track, which leads to fields beyond, along which runs a pubic footpath. West of the track the land has been filled and is barren, beyond which there is a farmhouse and buildings, at a distance of 140 m. To the north the land is now part of Kentle Wood, which has been planted as a community woodland, with public access via the footpath. To the south west there is a sports ground and football pitch. Further industrial units are present beyond the Household Waste Recycling Centre to the south. The site is located predominantly within an industrial setting. The closest residential property lies 140 m west of the site. The land lies at approximately 160 mAOD.

The site is directly underlain by the Bedrock Geology of the Marlstone Rock Formation. No superficial deposits have been recorded. There are no significant geological risks identified (e.g. historic mining, soluble rock, shrink swell etc.

The hydrogeological characteristics are summarised below:
• Marlstone Rock Formation – Secondary A – permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers. No overlying drift deposits are present on site.

The site is considered to be situated in an area of moderate sensitivity with respect to groundwater resources due to the underlying aquifer. This sensitivity is mitigated somewhat by the absence of any groundwater abstraction (sensitive or otherwise) within 1 km of the site (the closest groundwater abstraction being located 1.4 km south east) and the site not being directly located in a Groundwater Source Protection Zone (SPZ).

There are no surface water features within 250 m of the site. The site lies within Flood Zone 1 (low risk) and therefore is considered an area of low probability with regards to flooding (land assessed as having a less than 1 in 1,000 annual probability of flooding (<0.1%).

There are no SACs, SPAs or Ramsar sites within 10 km of the site. There are also no SSSIs, NNRs, LNRs, CWSs, PWSs or SINCs within 2 km of the site. However, there are six Local Wildlife Sites within 2 km of the site.

The site has predominantly remained undeveloped until the construction of an in-vessel composting plant which has now been decommissioned and removed off site. The site was previously used by Burnham Landscapes as its nursery which was relocated to facilitate the construction of the in-vessel composting plant.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

Main risks are: storage of biomass; delivery, storage and use of treatment chemicals associated with the SWIP (sodium bicarbonate, urea, water treatment chemicals, powdered activated carbon, diesel and oils); storage of residues from process (APC residues, tramp material, aqueous effluent (boiler bleed, waste oil) prior to off-site disposal.

The site is already constructed and was considered by the operator to be in very good condition and observed to have an impermeable concrete floor slab construction. The site will be operated on sealed impermeable floor slabs which as a minimum will comprise of reinforced concrete of at least 200 mm thickness.

The Fuel Storage Building has been constructed with measures to prevent water from escaping. Any spillage/washing down waters within the building will drain to a 4 m^3 below ground storage tank. The water collected within the tank will then be exported off site.

All chemicals and wastes are considered suitably contained. All aspects of the site will be operated in accordance to a strict maintenance schedule.

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

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

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

4.2.3 Closure and decommissioning

Having considered the information submitted in the Application, we are satisfied that the appropriate measures will be in place for the closure and decommissioning of the SWIP. Improvement condition IC8 requires the Operator to have an Environmental Management System in place and this will include a site closure plan.

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

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

This is a multi-Operator Installation.

The installation comprises a waste treatment plant (a listed activity under Section 5.4 A(1)(a)(ii) of Schedule 1, Part 2 of the EPR operated by Henley Biomass Limited), which is served by the SWIP operated by Pedigree Power LLP. This decision document deals with the permit for the SWIP activity only.

Pedigree Power LLP will be the legal operator of the Biomass Energy Plant (the SWIP). Pedigree Power will have control of all Biomass Energy Plant operations on site. Pedigree Power will have day-to-day control of the plant, ensuring that all permit conditions are complied with.

Silvertree Environmental Limited will be providing personnel to the Waste Treatment Plant and SWIP at Daventry under an O&M contract for Henley Biomass Limited and Pedigree Power LLP. The O&M contract will detail the operational requirements, reporting mechanisms, KPIs and management at the site. Under the terms of the O&M contract, Silvertree report up to the management team at Pedigree Power regarding all matters relating to operational or financial decisions making.

There are some joint operating issues for the installation:

A shared area for waste quarantine;
Shared drainage infrastructure for surface water and fire water containment;
Under the FPP, Pedigree will use the waste treatment plant tank bund for additional firewater containment;
All steam produced by the SWIP will, after use for electricity generation, be utilised by the waste treatment plant for evaporating waste in the 4 evaporator units. These also provide cooling of the stream from the SWIP prior to return for reuse in the boiler.

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

The co-incineration of waste is not a relevant waste operation. The Environment Agency has considered whether any of the other activities taking place at the SWIP are SWMAs and is satisfied that none are taking place.

4.3.2 Management

The Applicant has stated in the Application that they will implement an Environmental Management System (EMS). An improvement condition (IC7) is included requiring the Operator to provide a summary of the EMS and to make available for inspection all EMS documentation.

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

4.3.3 Site security

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

4.3.4 Accident management

The Applicant has submitted an Accident Management Plan. Having considered the Plan and other information submitted in the Application, we are satisfied that appropriate measures will be in place to ensure that accidents that may cause pollution are prevented but that, if they should occur, their consequences are minimised. An Accident Management Plan will form part of the Environmental Management System and must be in place as required by improvement condition (IC8).

The Applicant submitted a Fire Prevention Plan (FPP), as the SWIP will store combustible wastes (the waste wood).

The site will store only pre-shredded waste wood. This will be stored within the covered building, fitted with both fire detection and suppression systems. The building is sized to provide up to 3 day's storage of waste wood, and stock control processes will ensure that the waste wood is not allowed to accumulate on site (a contributory factor in self-combustion is extended periods of waste storage). Adequate water is provided for immediate firefighting via the suppression system, and a hydrant is located on Browns Rd for the Fire Service to use in an extended fire situation.

Control of fire water is via internal sump within the building, and external to the building water will enter the surface water drainage system and be stored within the underground tank. In a fire situation the surface water discharge will be closed off so as to contain the fire water. Additional fire water storage is available by pumping from the penstock chamber to the tank bund of the waste treatment plant (part of the multi-operator installation). The combination of the tank and part-use of the bund capacity has been shown to satisfy our capacity guidance.

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 SWIP in accordance with the following documents contained in the Application:

Description	Parts Included	Justification
The Application	Responses to question 3a and Appendix 6 in the Part B3 application form. The Support Document ref SOL1703PP01 dated December 2017, excluding the following: • Table 3.2 (waste types); • Figure 1.1 Site Location Plan • Waste Pre-Acceptance Procedure (PP-E01) • Waste Acceptance Procedure (PP-E02) • Waste Rejection Procedure (PP-E03). • Waste Reception and Storage (PP-E05).	The responses to these sections of the application form set out the technical standards to which the facility will be operated. The Support Document includes a description of the operations and equipment to be used at the site and the pollution prevention and minimisation measures to be used, including the abatement of flue gases.
Response to Schedule 5 Notice dated 19/03/2018	Responses to the following questions: 1, 2 regarding management; 3 regarding site location including drawing Site Location (ref PP01). 4a – 4j regarding Fire Prevention Plan; 9, 10, 11 regarding Boiler Blowdown; 12, 13, 14, 15 Regarding management of APC residues, reagents and tramp material; 16, 17, 18, 19, 20 regarding Raw materials; 21, 22 regarding Site drainage; 23 regarding spillage equipment; 24 regarding failure of air pollution control equipment; 25, 26, 27, 28 regarding Waste Types and Acceptance, including revised procedures: • Waste Pre-Acceptance Procedure (PP-E01); • Waste Acceptance Procedure (PP-E02); • Waste Rejection Procedure (PP-E03); • Waste Reception and Storage (PP-E05).	The responses to the requests for information include clarification and further detail regarding the techniques to be used to prevent and minimise pollution

The details set out above describe the techniques that will be used for the operation of the SWIP 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
Shredded waste wood	Pre-treated waste wood only.	To ensure only pre-treated wood is used.
Auxiliary fuel (diesel)	Low sulphur fuel <0.1% S gasoil.	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. The incoming waste will consist of Grades B and C shredded mixed waste wood. We have specified the permitted waste types, descriptions and where appropriate quantities which can be accepted at the SWIP in Table S2.2.

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

(i) the wastes are all categorised as non-hazardous in the European Waste Catalogue and are capable of being safely burnt at the SWIP.

(ii) these wastes are likely to be within the design calorific value (CV) range for the plant;

(iii) these wastes are unlikely to contain harmful components that cannot be safely processed at the SWIP.

We have limited the capacity of the SWIP to 24,780 tonnes per year. This is based on the SWIP operating 8,400 hours per year at a nominal capacity of 2.95 tonnes per hour.

The SWIP 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 SWIP which are normal aspects of all EPR permit determinations. This issue is dealt with in this section.

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

3. The combustion efficiency and energy utilisation of different design options for the SWIP are relevant considerations in the determination of BAT for the SWIP, 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 SWIP

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 SWIP.

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

• All plant and equipment will be individually monitored and controlled using a SCADA monitoring system and PLC controls, optimised for efficiency of operation;
• All aspects of the combustion plant are controlled in real time to ensure maximum thermal efficiency and operational control;
• All plant energy data will be monitored and recorded and targeted to ensure optimal plant performance;
• All parasitic loads of the plant will be provided by the generated electricity, and hence no net energy imports are required to power and operate the plant;
• All pipelines and thermal processes are lagged and insulated to ensure that heat loss is minimised and prevented;
• All ancillary plant (fans and motors) have been specified with high efficiency electrical motors and variable speed drives;
• As part of the company's environmental management system, targets will be set regarding the increased thermal efficiency of the plant and the potential export of heat to neighbouring facilities.

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 71 kWh/tonne. The SWIP capacity is 24,780 tonnes/year.

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/year)	**Process energy demand (kWh/t waste input)**
Up to 150,000	300 – 700
150,000 – 250,000	150 – 500
More than 250,000	60 – 200

The BREF says that it is BAT to reduce the average installation electrical demand to generally below 150 kWh/tonne of waste with an LCV of 10.4 MJ/kg. The LCV in this case is expected to be 14.5 MJ/kg. Taking account of the difference in LCV, the specific energy consumption in the Application is in line with that set out above.

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

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

Our CHP Ready Guidance - February 2013 considers that BAT for energy efficiency for Energy from Waste (EfW) plant is the use of CHP in

circumstances where there are technically and economically viable opportunities for the supply of heat from the outset.

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

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

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

The SWIP will generate electricity, but will also provide heat in the form of steam for use within the installation. The electrical output of the plant will be 0.57 MW with 8.97 MW used as heat.

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. As the intention of the operator is to provide their waste heat to the installation activity operated by Henley Biomass Limited, this is addressed.

(iv) Choice of Steam Turbine

Two screw expanders will be used for electrical generation. There will be a HP145 110 kWe Heliex Steam Expander Generator Set and a HP204 630 kWe Heliex Steam Expander Generator Set. The steam expander generator sets are fully integrated systems which convert energy in the form of wet steam into clean electrical power.

Screw expanders differ from turbines because they are open cycle, can process wet steam and do not require condensers. In this application, the operator asserts that steam screw expanders are beneficial as they eliminate timing gears and other costly components, generate at 50 / 60Hz and do not require the use of refrigerants.

(v) Choice of Cooling System

There is no dedicated cooling system. All steam is passed on to the waste treatment plant. If a situation arises where there is no or little waste water to provide this cooling the incinerator will be shut down. There will be no cooling towers required; therefore, there will be no use of biocides in any cooling water systems and no release to land.

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

Compliance with Article 14(5) of the Energy Efficiency Directive is not a relevant consideration because the SWIP's total net thermal input is 12.85 MW which is below the threshold specified in the directive.

(vii) Permit conditions concerning energy efficiency

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 SWIP 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 SWIP.

4.3.8 Efficient use of raw materials

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

The Operator is required to report with respect to raw material usage under condition 4.2 and Schedule 5, including consumption of activated carbon and urea used per tonne of waste burned. This will enable the Environment Agency to assess whether there have been any changes in the efficiency of the air pollution control plant, and the operation of the SNCR to abate NO_x. These are the most significant raw materials that will be used at the SWIP, 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 SWIP and does not apply to the waste being treated there. The principal waste streams the SWIP will produce are bottom ash and air pollution control residues.

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 S3.3 specify limits for total organic carbon (TOC) of <3% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable.

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

Air pollution control (APC) residues from flue gas treatment are hazardous waste and therefore must be sent for disposal to a landfill site permitted to accept hazardous waste, or to an appropriately permitted facility for hazardous waste treatment. The amount of APC residues is minimised through optimising the performance of the air emissions abatement plant.

In order to ensure that the IBA residues are adequately characterised, improvement condition IC9 requires the Operator to provide a written plan for approval detailing the ash sampling protocols. Table S3.4 requires the Operator to carry out an ongoing programme of monitoring.

The Application proposes, bottom ash (tramp material and bed sand) will be transported to a suitable waste facility.

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 SWIP that cannot be recovered will be disposed of using a method that minimises any impact on the environment. Standard condition 1.4.1 will ensure that this position is maintained.

5. Minimising the Installation’s environmental impact

Regulated activities can present different types of risk to the environment, these include odour, noise and vibration; accidents, fugitive emissions to air

and water; as well as point source releases to air, discharges to ground or groundwater, global warming potential and generation of waste and other environmental impacts. Consideration may also have to be given to the effect of emissions being subsequently deposited onto land (where there are ecological receptors). All these factors are discussed in this and other sections of this document.

For an SWIP 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 SWIP on human health and the environment and what measures we are requiring to ensure a high level of protection.

5.1 Assessment Methodology

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

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

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

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

5.1.2 Use of Air Dispersion Modelling

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

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

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

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

PCs are considered **Insignificant** if:

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

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

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

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

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

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

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

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

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

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

5.2 Assessment of Impact on Air Quality

The Applicant's assessment of the impact of air quality is set out in Appendix C2 Air Quality Assessment of the Application. The assessment comprises:

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

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

The Applicant has assessed the SWIP's potential emissions to air against the relevant ESs, and the potential impact upon local conservation sites and human health. These assessments predict the potential effects on local air quality from the SWIP's stack emissions using the ADMS 5.2 (v5.2.1) dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years of meteorological data collected from the weather station at Church Lawford between 2010 and 2014. This site is approximately 18 km from the SWIP. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

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

- First, they assumed that the ELVs in the Permit would be the maximum permitted by Article 46(2) and Annex VI of the IED. These substances are:
    - Oxides of nitrogen (NO_x), expressed as 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)
    - Gaseous and vaporous organic substances, expressed as Total Organic Carbon (TOC)
- Second, they assumed that the SWIP operates continuously at the relevant long-term or short-term ELVs, i.e. the maximum permitted emission rate (except for emissions of arsenic, chromium and nickel, which are considered in section 5.2.3 of this decision document).
- Third, the model also considered emissions of pollutants not covered by Annex VI of IED, specifically ammonia (NH_3), polycyclic aromatic hydrocarbons (PAH) and Polychlorinated biphenyls (PCBs). Emission rates used in the modelling have been drawn from data in the Waste Incineration BREF and are considered further in section 5.2.5.

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

The operator has drawn on existing sources of background data, as detailed in the Air Quality Assessment. We have assessed the background data and consider it a reasonable dataset for use in the assessment.

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.

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

5.2.1 Assessment of Air Dispersion Modelling Outputs

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

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

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

Non-metals

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m³		µg/m³	µg/m³	% of EAL	µg/m³	% of EAL
NO_2	40	1	12.08	2.15	**5.4**	14.23	35.6
	200	2	24.16	14.20	7.1	38.36	19.2
PM_{10}	40	1	15.14	0.15	0.4	15.29	38.2
	50	3	30.28	0.51	1.0	30.76	61.6
$PM_{2.5}$	25	1	10.49	0.15	0.6	10.64	42.6
SO_2	266	4	5.26	13.93	5.2	19.19	7.2
	350	5	5.26	10.08	2.9	15.34	4.4
	125	6	5.26	6.64	5.3	11.90	9.5
HCl	750	7	0.4	2.80	0.4	3.20	0.4
HF	16	8	2.35	0.02	0.1	2.37	14.8
	160	7	4.7	0.28	0.2	4.98	3.1
CO	10000	9	522	0.0015	0.02	522	5.2
	30000	10	-**	-**	-**	-**	-**
TOC	5	1	0.218	0.15	**3.0**	0.37	7.4
PAH	0.00025	1	0.0002	0.0000023	0.9	0.000	80.9
NH_3	180	1	-^^	-^^	-^^	-^^	-^^
	2500	10	-^^	-^^	-^^	-^^	-^^
PCBs	0.2	1	0.0000832	0.00008	0.04	0.00008	0.1
	6	10	0.0001664	0.0014	0.02	0.00157	0.03
Dioxins			1.545E-05	1.52E-06		1.697E-05	

TOC as Benzene
PAH as Benzo[a]pyrene
1. Annual Mean
2. 99.79th %ile of 1-hour means
3. 90.41st %ile of 24-hour means
4. 99.9th ile of 15-min means
5. 99.73rd %ile of 1-hour means
6. 99.18th %ile of 24-hour means
7. 1-hour average
8. Monthly average
9. Maximum daily running 8-hour mean
10. 1-hour maximum

** The operator did not consider the half hourly emission limits for CO - we have considered this in our check modelling.
^^ The operator has used an emission concentration of 0.5406 mg/m³ for ammonia (Table 18 of the AQA), they mention that this concentration is based on values from similar installations. We have tested sensitivity to a more conservative 10 mg/m³.

Metals

Pollutant	EQS / EAL		Background	PC		PEC	
	µg/m³		µg/m³	µg/m³	% of EAL	µg/m³	% of EAL
Cd	0.005	1	0.00087	0.00076	**15.2**	0.00163	32.7
Tl	-		-	-	-	0	-
Hg	0.25	1	0.0023	0.00076	0.3	0.00306	1.2
	7.5	2	0.0046	0.01399	0.2	0.01859	0.3
Sb	5	1	-	0.00577	0.1	-	-
	150	2	-	0.13993	0.1	-	-
Pb	0.25	1	0.02208	0.00577	**2.3**	-	11.1
Co	-		-	-	-	-	-
Cu	10	1	0.02336	0.00577	0.01	-	-
	200	2	0.046452	0.13993	0.07	-	-
Mn	0.15	1	0.00937	0.00577	**3.8**	-	10.1
	1500	2	0.01874	0.13993	0.01	-	-
V	5	1	0.00079	0.00577	0.1	-	-
	1	3	0.00158	0.13993	**14.0**	0.14152	14.2
As	0.003	1	0.00101	0.00577	**192.2**	0.00678	**225.9**
As*	0.003	1	0.00101	0.00029	**9.6**	0.0013	43.3
Cr(II)(III)	5	1	0.0028	0.00577	0.1	-	-
	150	2	0.0056	0.13993	0.1	-	-
Cr(VI)	0.0002	1	0.00560	0.00577	**2883.3**	0.00633	**3163.5**
Cr(VI)*	0.0002	1	0.00560	0.0000017	0.9	0.00560	281.1
Ni	0.02	1	0.0015	0.00577	**28.8**	0.00727	36.3

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

The ELV for Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V is stated as total Group 3 metals. Due to the low EQSs that have been designated for Cr (VI), As and Ni, we have issued guidance Waste incinerators: guidance on impact assessment for group 3 metals stack on the modelling of Group 3 metals in support of energy recovery plants. This was reviewed for the purpose of this assessment and the following staged approach adopted:

- Potential impacts on annual mean Cr(VI), As and Ni and 1-hour mean V concentrations were assessed as these represent the lowest EQSs;
- Stage 1 - The full metal emission was considered to consist of only one species. Any species with predicted exceedances of the EQSs or that could not be screened out were progressed to Stage 2;
- Stage 2 - The emission predictions were revised using the maximum emissions data provided in Appendix A of the guidance.

* Stage 2 Screening assessment carried out by the applicant following guidance. See section 5.2.3 below.

The ELV for Cd and Tl is stated as a total of both metals. However, for the purposes of dispersion modelling it was considered that the entire emission consisted of only Cd. Actual plant emissions of Cd and Tl are unlikely to consist of only one species, resulting in a worst-case assessment.

Emissions were assumed to be constant, with the plant in operation 24 hours/day, 365 days/year. This is considered to be a worst-case assessment scenario as plant shut-down or periods of reduced work load are not reflected in the modelled emissions.

(i) Screening out emissions which are insignificant

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

- 1-hour mean NO_2, PM_{10}, $PM_{2.5}$, SO_2, HCl, HF, CO, PAH, NH_3, PCBs, Hg, Sb, Co, Cu, Cr(II)(III).

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

(ii) Emissions unlikely to give rise to significant pollution

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

- Annual mean NO_2, TOC, Cd, Ni, Mn, Pb, V.

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

(iii) Emissions requiring further assessment

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

- As, and Cr(VI)

For these emissions, the Applicant has argued that the process contribution to the Predicted Environmental Concentration is negligible. We have considered the impact in more detail in section 5.2.3. As part of our detailed audit of the Applicant's modelling assessment, we agree with the Applicant's conclusions in this respect taking modelling uncertainties into account.

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

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

5.2.2 Consideration of key pollutants

(i) Nitrogen dioxide (NO_2)

The impact on air quality from NO_2 emissions has been assessed against the ES of 40 $\mu g/m^3$ as a long term annual average and a short term hourly

average of 200 μg/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 ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded. The peak short term PC is less than 10% of the ES and so can be screened out as insignificant.

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

The impact on air quality from particulate emissions has been assessed against the ES for PM_{10} (particles of 10 microns and smaller) and $PM_{2.5}$ (particles of 2.5 microns and smaller). For PM_{10}, the ES 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 ES of 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 the SWIP against these ESs is shown in the tables above. The 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.

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

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

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

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

The above assessment also shows that the predicted process contribution for emissions of $PM_{2.5}$ is also below 1% of the ES. Therefore the Environment Agency concludes that particulate emissions from the SWIP, 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 (IC1) has been included that will require a full analysis of particle size distribution in the flue gas, and hence determine the ratio of fine to coarse particles. In the light of current knowledge and available data however the Environment Agency is satisfied that the health of the public would not be put at risk by such emissions, as explained in section 5.3.3.

(iii) Acid gases, 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 ES. There is no long term ES for HCl. HF has two assessment criteria – a 1-hr ES and a monthly EAL – the process contribution is <1% of the monthly EAL and so the emission screens out as insignificant if the monthly ES is interpreted as representing a long term ES.

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

Emissions of SO_2 can also be screened out as insignificant in that the short term process contribution is also <10% of each of the three short term ES values. Therefore we consider the Applicant's proposals for preventing and minimising the emissions of these substances to be BAT for the SWIP.

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

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

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

The Applicant has used the ES for benzene for their assessment of the impact of VOC.

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

The Applicant has also used the ES for benzo[a]pyrene (BaP) for their assessment of the impact of PAH. We agree that the use of the BaP ES is sufficiently precautionary.

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

From the tables above all the other emissions can be screened out as insignificant in that the process contribution is <1% of the long term ES and <10% of the short term ES, except for VOC where the PC is 3% of the long term ES. Even so, from the table above, the emission is not expected to result in the ES being exceeded.

The Applicant has used an emission concentration of 0.5406 mg/m^3 for ammonia (Table 18 of the AQA), they justify this as a concentration based on values from similar installations. We have tested sensitivity to a more conservative 10 mg/m^3 in our check monitoring and consider the result insignificant. We are satisfied that this level of emission is consistent with the operation of a well controlled SNCR NOx abatement system.

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

(v) Summary

For the above emissions to air, for those emissions that do not screen out, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the BAT to prevent and minimise emissions of these substances. This is reported in section 6 of this document. Therefore we consider the Applicant's proposals for preventing and minimising emissions to be BAT for the SWIP. Dioxins and furans are considered further in section 5.3.

5.2.3 Assessment of Emission of Metals

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

Annex VI of IED sets three limits for metal emissions:

- An emission limit value of 0.05 mg/m^3 for mercury and its compounds (formerly WID group 1 metals).
- 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 Annex VI emission limits for metals along with the Application of BAT also ensures that these requirements are met.

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

- Hg, Sb, Co, Cu, Cr(II)(III).

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

- Cd, Mn, Ni, Pb, V.

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

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

For As and Cr(VI) the Applicant Used representative emissions data from other municipal waste incinerators using our guidance note Please refer to "Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – version 4".

The following emissions of metals whilst not screened out as insignificant were assessed as being unlikely to give rise to significant pollution:

- As.

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

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

Chromium (VI) is not specifically referenced in Annex VI of IED, which includes only total Chromium as one of the nine Group 3 metals, the impact of which has been assessed above. The EPAQS guidelines refer only to that portion of the metal emissions contained within PM_{10} in ambient air. The 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 $1.3 * 10^{-4}$).

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

The Applicant has used the above data to model the predicted Cr(VI) impact. The PC is predicted as 0.9% of the EAL.

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

5.2.4 Consideration of Local Factors

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

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

5.3 Human health risk assessment

A Human Health Risk Assessment was not considered necessary due to the small scale nature of the SWIP activity. This is considered proportionate to the scale of the activity and the likelihood of exceedances based on experience of operational incineration plant elsewhere. Monitoring of the substances considered (Dioxins, PCDD/DF), is undertaken as part of the routine monitoring of the site and compliance with the limits set will be at a level which will not cause harm to human health.

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

5.4.1 Sites Considered

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

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

The following non-statutory local wildlife sites (LWSs) and conservation sites are located within 2 km of the SWIP:

- Elderstubbs Farm Pasture LWS

- Oak Spinney LWS
- Pond Spinney LWS
- Staverton Clump LWS
- Staverton Wood LWS
- Stepnell Spinney LWS
- Elderstubbs Farm Pasture South Potential Wildlife Sites (PWSs)
- Staverton Golf Club PWS
- Other unnamed PWSs (8 points modelled – these have not been included in the section to keep the length of the document down – see note below).

5.4.2 Assessment of other conservation sites

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

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

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

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

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
Elderstubbs Farm Pasture LWS - Direct Impacts[2]			
NO_x Annual Mean	30	1.02	3.41
NO_x Daily Mean	75	12.89	17.18
SO_2 Annual Mean	20	0.26	1.30

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
NH_3 Annual Mean	3	0.0027	0.09
HF Weekly Mean	0.5	0.03	6.95
HF Daily Mean	5	0.06	1.29
Elderstubbs Farm Pasture LWS - Deposition Impacts[2]			
N Deposition (kg N/ha/yr)	20-30	0.16	0.54
Acidification (keq/ha/yr)	From APIS[3]	0.04	0.8

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
Oak Spinney LWS - Direct Impacts[2]			
NO_x Annual Mean	30	0.13	0.42
NO_x Daily Mean	75	1.91	2.55
SO_2 Annual Mean	20	0.03	0.16
NH_3 Annual Mean	3	0.0003	0.01
HF Weekly Mean	0.5	0.00	0.84
HF Daily Mean	5	0.01	0.19
Oak Spinney LWS - Deposition Impacts[2]			
N Deposition (kg N/ha/yr)	10-20	0.04	0.19
Acidification (keq/ha/yr)	From APIS[3]	0.01	0.3

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
Pond Spinney LWS - Direct Impacts[2]			
NO_x Annual Mean	30	0.11	0.37
NO_x Daily Mean	75	1.91	2.55
SO_2 Annual Mean	20	0.03	0.16
NH_3 Annual Mean	3	0.0003	0.01
HF Weekly Mean	0.5	0.01	2.44
HF Daily Mean	5	0.03	0.59
Pond Spinney LWS - Deposition Impacts[2]			
N Deposition (kg N/ha/yr)	10-20	0.03	0.17
Acidification (keq/ha/yr)	From APIS[3]	0.01	0.3

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
Staverton Clump LWS - Direct Impacts[2]			
NO_x Annual Mean	30	0.13	0.42
NO_x Daily Mean	75	2.02	2.69
SO_2 Annual Mean	20	0.03	0.16
NH_3 Annual Mean	3	0.0003	0.01
HF Weekly Mean	0.5	0.00	0.85
HF Daily Mean	5	0.01	0.20
Staverton Clump LWS - Deposition Impacts[2]			
N Deposition (kg N/ha/yr)	10-20	0.04	0.20
Acidification (keq/ha/yr)	From APIS[3]	0.01	0.9

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
Staverton Wood LWS - Direct Impacts[2]			
NO_x Annual Mean	30	0.16	0.53
NO_x Daily Mean	75	2.49	3.31
SO_2 Annual Mean	20	0.04	0.20
NH_3 Annual Mean	3	0.0004	0.01
HF Weekly Mean	0.5	0.01	1.14
HF Daily Mean	5	0.01	0.25
Staverton Wood LWS - Deposition Impacts[2]			
N Deposition (kg N/ha/yr)	10-20	0.05	0.25
Acidification (keq/ha/yr)	From APIS[3]	0.01	0.3

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
Stepnell Spinney LWS - Direct Impacts[2]			
NO_x Annual Mean	30	0.16	0.54
NO_x Daily Mean	75	2.44	3.25
SO_2 Annual Mean	20	0.04	0.20
NH_3 Annual Mean	3	0.0004	0.01
HF Weekly Mean	0.5	0.00	0.95

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
HF Daily Mean	5	0.04	0.72
Stepnell Spinney LWS - Deposition Impacts[2]			
N Deposition (kg N/ha/yr)	10-20	0.05	0.25
Acidification (keq/ha/yr)	From APIS[3]	0.01	0.3

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
Elderstubbs Farm Pasture South PWS - Direct Impacts[2]			
NO_x Annual Mean	30	1.68	5.60
NO_x Daily Mean	75	19.75	26.33
SO_2 Annual Mean	20	0.43	2.13
NH_3 Annual Mean	3	0.0045	0.15
HF Weekly Mean	0.5	0.05	10.62
HF Daily Mean	5	0.1	1.97
Elderstubbs Farm Pasture South PWS - Deposition Impacts[2]			
N Deposition (kg N/ha/yr)	10-20	0.27	1.33
Acidification (keq/ha/yr)	From APIS[3]	0.07	1.4

Pollutant	ES/EAL (µg/m³)	PC (µg/m³)	PC as % of ES
Staverton Golf Club PWS - Direct Impacts[2]			
NO_x Annual Mean	30	0.19	0.63
NO_x Daily Mean	75	2.56	3.41
SO_2 Annual Mean	20	0.05	0.24
NH_3 Annual Mean	3	0.0005	0.02
HF Weekly Mean	0.5	0.01	1.79
HF Daily Mean	5	0.01	0.26
Staverton Golf Club PWS - Deposition Impacts[2]			
N Deposition (kg N/ha/yr)	10-20	0.06	0.29
Acidification (keq/ha/yr)	From APIS[3]	0.01	0.9

Notes

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

(3) Based on Critical Load Function Tool of APIS website. Deposition of sulphur (S) and nitrogen (N) compounds can contribute towards acidification. Therefore, both should be taken into account when assessing potential acidification impacts. The critical loads function has been developed to account for both S and N inputs. The function is defined by three quantities:

- $CL_{max}S$ – the maximum critical load of sulphur, above which the deposition of sulphur alone would be considered to lead to an exceedance;
- $CL_{min}N$ – this is a measure of the ability of a system to "consume" deposited nitrogen (e.g. via immobilisation and uptake of the deposited nitrogen);
- $CL_{max}N$ – the maximum critical load of acidifying nitrogen, above which the deposition of nitrogen alone would be considered to lead to an exceedance.

The area under the critical load function represents no exceedance of the critical load. Deposition above the critical load function would represent an exceedance of the critical load and action would be required to reduce deposition of N and/or S.

For Example Elderstubbs Farm Pasture:

Data for grid ref. of site, neutral grassland. Deposition data taken from the Air Quality Assessment provided by the Applicant:

Critical Load Function Deposition data

CLmaxS:	4
CLminN:	0.856
CLmaxN:	4.856

Source	keq/ha/yr		
	Sulphur Deposition	Nitrogen Deposition	Total Acid Deposition (S+N)
Process Contribution (PC)	0.0307	0.0126	0.04
Background	0.23	1.76	1.99
Predicted Environmental Concentration (PEC)	0.26	1.77	2.03

Results - exceedance and deposition as a proportion of the CL function

Source	Exceedance (keq/ha/yr)	% of CL function*
Process Contribution (PC)	no exceedance of CL function	0.8

There are also several unnamed PWS (numbered in the Application as receptors ER15 to ER23 (excluding ER20 - Staverton Golf Club PWS) as listed in the Air Quality Assessment). The PCs are below 100% of the critical level and loads at all of these sites.

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

5.5 Impact of abnormal operations

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

exceedance of an ELV may be less than that of a partial shut-down and re-start.

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

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

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

- NO_x emissions of 400 mg/m^3 (2x normal)
- Particulate emissions of 30 mg/m^3 (3x normal)
- SO_2 emissions of 200 mg/m^3 (4x normal)
- HCl emissions of 60 mg/m^3 (6x normal)

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

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

Pollutant	EQS / EAL		Background	PC		PEC	
	µg/m^3		µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
NO_2	200	2	24.16	33.64	**16.8**	57.8	28.9
PM_{10}	50	3	30.28	2.16	4.32	32.44	64.9
SO_2	266	4	5.26	53.81	**20.2**	59.07	22.2
	350	5	5.26	46.63	**13.32**	51.89	14.8
HCl	750	6	0.4	19.9	2.65	20.3	2.71
HF	160	6	4.7	1.33	0.83	6.03	3.8
Hg	7.5	1	-	-^^	-	-	-

Sb	150	1	-	-^^	-	-	-
Cu	200	1	-	-^^	-	-	-
Mn	1500	1	-	-^^	-	-	-
PCBs	6	1	-	-^^	-	-	-
Cr (II)(III)	150	1	-	-^^	-	-	-
Dioxins	-		-	-	-	0.00E+00	-

1. 1-hr Maximum
2. 99.79th %ile of 1-hour means
3. 90.41st %ile of 24-hour means
4. 99.9th ile of 15-min means
5. 99.73rd %ile of 1-hour means
6. 1-hour average

^^ Metals were not included in the abnormal emissions assessment. This was addressed in our check monitoring.

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

- PM_{10}, HCl, HF

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

- NO_2, SO_2

Our check modelling and sensitivity analysis also included short term impacts at receptors due to emissions at abnormal conditions. Our check modelling and sensitivity analysis indicate that, although our numerical values do not exactly match the Applicant's, we agree with the findings that it is unlikely the proposed plant will result in an exceedence of the ES for any pollutant when operating at abnormal conditions.

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

We have not assessed the impact of abnormal operations against long term ESs for the reasons set out above.

A Human Health Risk Assessment for Dioxins, PCDD/DF was not considered necessary due to the small scale nature of the SWIP activity. This is considered proportionate to the scale of the activity and the likelihood of exceedances based on experience of operational incineration plant elsewhere. This includes the periods of abnormal operation allowed in accordance with the IED.

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 SWIP.

- 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 SWIP.

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

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

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

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

Even if the Chapter IV limits are appropriate, operational controls complement the emission limits and should generally result in emissions below the maximum allowed; whilst the limits themselves provide headroom to allow for unavoidable process fluctuations. Actual emissions are therefore almost certain to be below emission limits in practice, because any Operator who sought to operate its SWIP 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 SWIP, once in operation, emit at rates significantly below the limits included in the Permit, we will consider tightening ELVs appropriately. We are, however, satisfied that emissions at the permitted limits would ensure a high level of protection for human health and the environment in any event.

6.1.1 Consideration of Furnace Type

The prime function of the furnace is to achieve maximum combustion of the waste. Chapter IV of the IED requires that the plant (furnace in this context) should be designed to deliver its requirements. The main requirements of Chapter IV in relation to the choice of a furnace are compliance with air

emission limits for CO and TOC and achieving a low TOC/LOI level in the bottom ash.

The Waste Incineration BREF elaborates the furnace selection criteria as:

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

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

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

- nature/physical state of the waste and its variability;
- proposed plant throughput which may affect the number of incineration lines;
- preference and experience of chosen technology including plant availability;
- nature and quantity/quality of residues produced;
- emissions to air – usually 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% - 3%	High capacity reduces specific cost per tonne of waste
Moving grate (liquid cooled)	Same as air-cooled grates except: LCV 10 – 20 GJ/t	Same as air-cooled grates	As air-cooled grates but: higher heat value waste is treatable better combustion control possible.	As air-cooled grates but: risk of grate damage/leaks higher complexity	TOC 0.5% - 3%	Slightly higher capital cost than air-cooled

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

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

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Gasification - entrained flow	- mixed plastic wastes - other similar consistent streams - not suited to untreated MSW - gasification less widely used/proven than incineration	To 10 t/h	- low leaching slag - reduced oxidation of recyclable metals	- limited waste feed - not full combustion - high skill level - less widely proven	low leaching slag	High operation/ maintenance costs pre-treatment costs high
Gasification - fluid bed	- mixed plastic wastes - shredded MSW - shredder residues - sludges - metal rich wastes - other similar consistent streams - less widely used/proven than incineration	5 – 20 t/h	- temperatures e.g. for Al recovery - separation of non-combustibles -can be combined with ash melting - reduced oxidation of recyclable metals	-limited waste size (<30 cm) - tar in raw gas - higher UHV raw gas - less widely proven	If Combined with ash melting chamber ash is vitrified	Lower than other gasifiers
Pyrolysis	- pre-treated MSW - high metal inert streams - shredder residues/plastics - pyrolysis is less widely used/proven than incineration	~ 5 t/h (short drum) 5 – 10 t/h (medium drum)	- no oxidation of metals - no combustion energy for metals/inert - in reactor acid neutralisation possible - syngas available	- limited wastes - process control and engineering critical - high skill req. - not widely proven - need market for syngas	- dependent on process temperature - residue produced requires further processing e.g. combustion	High pre-treatment, operation and capital costs

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

- Moving Grate Furnace
- Fluidised Bed
- Advanced Thermal Treatment (gasification)

The applicant considers that Fluidised Bed Combustion (FBC) has a number of advantages over traditional incineration processes due to many factors:

- High thermal efficiency;
- Easy ash removal system;
- Low temperatures and fast throughput give good reliability;
- Fast process so not so sensitive to large particles;
- Fully automated and thus ensuring safe operation even at extreme temperatures;
- The system can respond rapidly to changes in load demand due to quick establishment of thermal equilibrium between air and fuel particles in the bed;
- The operation of fluidised bed at lower temperatures helps in reducing air pollution;
- There is much less visual impact as FBC facilities tend to be smaller and require shorter exhaust stacks;
- FBC is more suited to pre-sorted or processed waste. Wood fuel will be highly homogeneous and will not contain plastics. As a consequence of this, less flue gas treatment is required.

The Applicant has proposed to use a furnace technology comprising fluidised bed gasification which is identified as being considered BAT in the BREF or TGN for this type of waste feed.

The Applicant proposes to use gas oil as support fuel for start-up, shut down and for the auxiliary burner which is considered to be BAT.

Boiler Design

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

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

Any of the options listed in the BREF and summarised in the table above can be BAT. The Applicant has chosen a furnace technique that is listed in the BREF and we are satisfied that the Applicant has provided sufficient

justification to show that their technique is BAT. This is not to say that the other techniques could not also be BAT, but that the Applicant has shown that their chosen technique is at least comparable with the other BAT options. We believe that, based on the information gathered by the BREF process, the chosen technology will achieve the requirements of Chapter IV of the IED for the air emission of TOC/CO and the TOC on bottom ash.

6.2 BAT and emissions control

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

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

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

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

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 5 mg/m^3	Max temp 250°C	Multiple compartments Bag burst detectors	Most plants

Wet scrubbing	May reduce acid gases simultaneously.	Not normally BAT. Liquid effluent produced	Require reheat to prevent visible plume and dew point problems.	Where scrubbing required for other pollutants
Ceramic filters	High temperature applications Smaller plant.	May "blind" more than fabric filters		Small plant. High temperature gas cleaning required.
Electrostatic precipitators	Low pressure gradient. Use with BF may reduce the energy consumption of the induced draft fan.	Not normally BAT.		When used with other particulate abatement plant

The Applicant proposes to use fabric filters for the abatement of particulate matter. Fabric filters provide reliable abatement of particulate matter to below 5 mg/m^3 and are BAT for most installations. The Applicant proposes to use multiple compartment filters with burst bag detection to minimise the risk of increased particulate emissions in the event of bag rupture.

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

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 <70 mg/m^3 Reduces CO, VOC, dioxins	Expensive. Re-heat required – reduces plant efficiency		All plant
Selective non-catalytic reduction (SNCR)	NOx emissions typically 150 – 180 mg/m^3	Relies on an optimum temperature around 900°C, and sufficient retention time for reduction May lead to Ammonia slip	Port injection location	All plant unless lower NOx release required for local environmental protection.
Reagent Type: Ammonia	Likely to be BAT Lower nitrous oxide formation	More difficult to handle Narrower temperature window		All plant
Reagent Type: Urea	Likely to be BAT			All plant

The Applicant proposes to implement the following primary measures:

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

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

SCR can reduce NO_x levels to below 70 mg/m^3 and can be applied to all plant, it is generally more expensive than SNCR and requires reheating of the waste gas stream which reduces energy efficiency, periodic replacement of the catalysts also produces a hazardous waste. SNCR can typically reduce NO_x levels to between 150 and 180 mg/m^3, it relies on an optimum temperature of around 900°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.

Emissions of NOx cannot be screened out as insignificant. However, we are satisfied that the use of SNCR is BAT for the abatement of NOx emissions resulting from the operation of the incinerator plant. This is on the basis of the higher energy consumption associated with SCR abatement plant relative to SNCR plant (8 kW/tonne of waste compared to 2 kW/tonne), which would reduce the energy efficiency of the facility, the production of additional hazardous wastes resulting from the use of the SCR catalyst, and the higher capital and operating costs associated with SCR abatement systems.

The Applicant proposes to use SNCR with urea as the reagent. Urea has been selected on the basis that it will be safer to handle at the facility than Ammonia, which is corrosive in nature.

The amount of urea used for NOx abatement will need to be optimised to maximise NOx reduction and minimise NH_3 slip. All emissions from the incinerator flue (release points A1) will be monitored using a fully compliant MCERTS accredited Continuous Emissions Monitoring System (CEMS) on the exhaust stack. The NOx measurements will be used to optimise the consumption of reagent by means of a feedback control loop.

Improvement condition IC4 requires the Operator to report to the Environment Agency on optimising the performance of the NO_x abatement system. The Operator is also required to monitor and report on 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 Type: Lime	Very good removal rates Low leaching solid residue Temperature of reaction well suited to use with bag filters	Corrosive material May give greater residue volume if no in-plant recycle	Wide range of uses	MWIs, CWIs

Reagent Type: Sodium Bicarbonate	Good removal rates Easiest to handle Dry recycle systems proven	Efficient temperature range may be at upper end for use with bag filters – Leachable solid residues Bicarbonate more expensive	Not proven at large plant	CWIs

The Applicant proposes to implement the following primary measures:

- Use of low sulphur fuels for start up and auxiliary burners – gas should be used if available, where fuel oil is used, this will be low sulphur (i.e. <0.1%), this will reduce SO_x at source. The Applicant has justified its choice of gasoil as the support fuel 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 46(3) of IED. It will also require reheat of the exhaust to avoid a visible plume. Wet scrubbing is unlikely to be BAT except where there are high acid gas and metal components in the exhaust gas as may be the case for some hazardous waste incinerators. In this case, the Applicant does not propose using wet scrubbing, and we agree that wet scrubbing is not appropriate in this case.

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

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

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

In this case, the Applicant proposes to use a dry scrubbing system utilising sodium bicarbonate. We are satisfied that this is BAT.

6.2.4 Carbon monoxide and volatile organic compounds (VOCs)

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

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

6.2.5 Dioxins and furans (and Other POPs)

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

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

- optimisation of combustion control including the maintenance of permit conditions on combustion temperature and residence time, which has been considered in 6.1.1 above;
- avoidance of de novo synthesis, which has been covered in the consideration of boiler design;
- the effective removal of particulate matter, which has been considered in 6.2.1 above;

- injection of activated carbon. This can be combined with the acid gas reagent or dosed separately. Where the feed is combined, the combined feed rate will be controlled by the acid gas concentration in the exhaust. Therefore, separate feed of activated carbon would normally be considered BAT unless the feed was relatively constant. Effective control of acid gas emissions also assists in the control of dioxin releases.

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

6.2.6 Metals

Metals				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Effective Particulate matter removal			Covered in section on particulate matter	All plant
Activated Carbon injection for mercury recovery	Can be combined with acid gas absorber or fed separately.	Combined feed rate usually controlled by acid gas content.		All plant. Separate feed normally BAT unless feed is constant and acid gas control also controls dioxin release.

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 IED 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 SWIP 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 SWIP will displace emissions of CO_2 elsewhere in the UK, as virgin fossil fuels will not be burnt to create the same electricity.

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

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

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

On the credit side

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

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

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

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

Taking all these factors into account, the Operator's assessment shows their preferred option is best in terms of GWP. We agree with this assessment and that the chosen option is BAT for the SWIP.

6.4 BAT and POPs

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

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

The unintentionally-produced POPs addressed by the Convention are:

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

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

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

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

The 1998 Protocol to the Convention recommended that unintentionally produced should be controlled by imposing emission limits (e.g. 0.1 ng/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°C and a combustion gas residence time of at least 2 seconds
- rapid cooling of flue gases to avoid the *de novo* reformation temperature range of 250-450°C
- use of bag filters and the injection of activated carbon or coke to adsorb residual POPs components.

Using the methods listed above, the UN-ECE BAT document concludes that incinerators can achieve an emission concentration of 0.1 ng TEQ/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 Chapter IV of IED and incorporate all the above requirements of the UN-ECE BAT guidance and deliver the requirements of the Stockholm Convention in relation to unintentionally produced POPs.

The release of **dioxins and furans** to air is required by the IED to be assessed against the I-TEQ (International Toxic Equivalence) limit of 0.1 ng/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. The Permit requires that, in addition to the requirements of the IED, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be monitored for reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. The Permit also requires monitoring of a range of PAHs and dioxin-like PCBs at the same frequency as dioxins are monitored. We have included a requirement to monitor and report against these WHO-TEQ values for dioxins and dioxin-like

PCBs and the range of PAHs as listed in the Permit. We are confident that the measures taken to control the release of dioxins will also control the releases of dioxin-like PCBs and PAHs. Section 5.2.1 of this document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation.

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

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

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

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

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

6.5 Other Emissions to the Environment

6.5.1 Emissions to water

There are no process emissions to surface water. Uncontaminated site run-off (road surfaces and roof drainage) will be collected through a drainage system which passes to the control of Henley Biomass Limited as described in section 4.3.1 above.

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

6.5.2 Emissions to sewer

There are emissions to sewer.

6.5.3 Fugitive emissions

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

The waste wood is delivered to and stored within the fuel storage building. It is transferred to the combustion chamber using an automated handling system via a charging system comprising a series of fully enclosed conveyors. The Applicant has a programme of inspection, housekeeping and maintenance in place to ensure containment is maintained and fugitive emissions of dust are prevented. All APC reagents are appropriately stored on site. All waste residues are appropriately contained

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

6.5.4 Odour

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

The SWIP process and the proposed fuel comprising shredded waste wood do not pose a high risk of odour. The Applicant has waste acceptance procedures in place to check that the waste delivered to the site conforms to the types of waste that are permitted to be accepted and this includes checking for any odorous properties. Waste wood accepted at the SWIP will be delivered in covered vehicles or within containers and bulk storage of waste will only occur in the Fuel Storage Building. A roller shutter door will be used to close the entrance to the building outside of the waste delivery periods and combustion air will be drawn from the building in order to prevent odours and airborne particulates from leaving the facility building. Waste turnaround time before combustion in the SWIP is a maximum of 7 days, so the wood should not have time to degrade in a way which would cause significant odour prior to being burnt.

6.5.5 Noise and vibration

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not

practicable to minimise noise and vibration and to prevent pollution from noise and vibration outside the site.

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. The report dealt with both the biomass energy plant and the adjacent waste water treatment plant as a whole installation.

Measurements were taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS 4142:2014 to compare the predicted plant rating noise levels with the established background levels. We have reviewed the assessment.

Acoustic sound power levels in linear octave bands are presented in Appendix E of the report. They modelled a number of external sources from both facilities:

- A feed conveyor to supply fuel for the biomass boiler, which includes attenuation;
- A number of boiler fans for air intake, recirculation and exhaust, some of them with acoustic enclosures and silencers;
- Four water pumps for the evaporators and one for the boiler;
- Filter pulse valve before the feed water pump for the boiler;
- Fluidised bed boiler walls;
- Four evaporator flues, which include silencers in the exhaust;
- Forklift truck, Heavy Good Vehicles (HGV) and HGV on weighbridge for reception, transportation and movement of waste water and biomass (only in daytime);
- Transformer.

Our assessment shows that provided the plant and equipment achieve the sound levels proposed with the level of attenuation specified in appendix E of the report we find rating levels slightly higher than those of the consultant but below adverse impacts. These results are dependent on the attenuation scheme being implemented as described in appendix E. If the attenuation is not carried out impacts may be over significant adverse.

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 from those emissions not screened out as insignificant and do not consider it necessary to impose further conditions, or set more stringent emission limits than those specified.

(ii) National and European ESs

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

(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 recovery of energy from waste. Controls in the form of restrictions on the volume and type of waste that can be accepted at the SWIP 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. It is usual that before commissioning can commence the Operator is required by pre-operational condition to submit a commissioning plan to the Agency for approval. In this case commissioning has been allowed

to commence under a local enforcement position. We have therefore set the requirement for a commissioning plan as an improvement condition (IC7).

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

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

6.7 Monitoring

6.7.1 Monitoring during normal operations

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

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

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

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

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

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

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

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

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

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

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

In accordance with its legal requirement to do so, the Environment Agency reviews the development of new methods and standards and their

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

6.8 Reporting

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

7 Other legal requirements

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

7.1 The EPR 2016 and related Directives

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

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

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

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

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

The grant or refusal of development consent is a matter for the relevant local planning authority. The Environment Agency's obligation is therefore to

examine and use any relevant information obtained or conclusion arrived at by the local planning authorities pursuant to those EIA Directive articles.

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

- The decision of the Northamptonshire County Council to grant planning permission on 3/3/2016.
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

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

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

7.1.2 Schedule 9 to the EPR 2016 – **Waste Framework Directive**

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

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

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

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

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

Article 23(1) requires the permit to specify:

(a) the types and quantities of waste that may be treated;
(b) for each type of operation permitted, the technical and any other requirements relevant to the site concerned;
(c) the safety and precautionary measures to be taken;

(d) the method to be used for each type of operation;
(e) such monitoring and control operations as may be necessary;
(f) such closure and after-care provisions as may be necessary.

These are all covered by permit conditions.

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

We consider that the intended method of waste treatment is acceptable from the point of view of environmental protection so Article 23(3) does not apply. Energy efficiency is dealt with elsewhere in this document but we consider the conditions of the permit ensure that the recovery of energy take place with a high level of energy efficiency in accordance with Article 23(4).

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

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

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

No releases to groundwater from the SWIP 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 60 of the EPR 2016 requires the Environment Agency to prepare and publish a statement of its policies for complying with its public participation duties. We have published our public participation statement.

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

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

7.2 National primary legislation

7.2.1 **Environment Act 1995**

(i) Section 4 (Pursuit of Sustainable Development)

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

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

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

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

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

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

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

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

(iv) Section 6(6) (Fisheries)

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

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

(v) Section 7 (Pursuit of Conservation Objectives)

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

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

(vi) Section 39 (Costs and Benefits)

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

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

(vii) Section 108 Deregulation Act 2015 – Growth duty

We have considered our duty to have regard to the desirability of promoting economic growth set out in section 108(1) of the Deregulation Act 2015 and the guidance issued under section 110 of that Act in deciding whether to grant this permit.
Paragraph 1.3 of the guidance says:
"The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation."
We have addressed the legislative requirements and environmental standards to be set for this operation in the body of the decision document above. The guidance is clear at paragraph 1.5 that the growth duty does not legitimise non-compliance and its purpose is not to achieve or pursue economic growth at the expense of necessary protections.
We consider the requirements and standards we have set in this permit are reasonable and necessary to avoid a risk of an unacceptable level of pollution. This also promotes growth amongst legitimate operators because the

standards applied to the operator are consistent across businesses in this sector and have been set to achieve the required legislative standards.

(viii) Section 81 (National Air Quality Strategy)

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

7.2.2 **Human Rights Act 1998**

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

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

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

7.2.4 **Wildlife and Countryside Act 1981**

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

There is no SSSIs which could be affected by the SWIP.

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

Section 40 of this Act requires us to have regard, so far as is consistent with the proper exercise of our functions, to the purpose of conserving biodiversity. We have done so and consider that no different or additional conditions in the Permit are required.

7.2.6 **Marine and Coastal Access Act 2009**

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

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

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

We have considered the Application and are satisfied that it would not affect, to more than an insignificant degree, the protected features of MCZs or the ecological or geomorphological process on which the conservation of such features are dependent.

7.3 National secondary legislation

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

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

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

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

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

7.3.3 **The Persistent Organic Pollutants Regulations 2007**

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

7.3.4 **Bathing Water Regulations 2013**

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

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

7.3.5 **Marine Strategy Regulations 2010**

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

7.4 Other relevant legal requirements

7.4.1 Duty to Involve

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

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

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

IED Article	Requirement	Delivered by
45(1)(a)	The permit shall include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2000/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate.	Condition 2.3.4(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(b)	The permit shall include the total waste incinerating or co-incinerating capacity of the plant.	Condition 2.3.4(a) and Table S2.2 in Schedule 2 of the Permit.
45(1)(c)	The permit shall include the limit values for emissions into air and water.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1(a) in Schedule 3 of the Permit.
45(1)(d)	The permit shall include the requirements for pH, temperature and flow of waste water discharges.	Not Applicable
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), S3.2 and S3.3 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, 2.3.11 and 2.3.12
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Condition 2.3.1(a) and Table S1.2 of Schedule 1 of the Permit.
46(2)	Emission into air shall not exceed the emission limit values set out in parts 4 or determined in accordance with part 4 of Annex VI.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.1(a).
46(3)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(4)	Relates to conditions for water discharges from the cleaning of exhaust gases.	There are no such discharges as condition 3.1.1 prohibits this.
46(5)	Prevention of unauthorised and accidental release of any polluting substances into soil, surface water or groundwater. Adequate storage capacity for contaminated rainwater run-off from the site or for contaminated water from spillage or fire-fighting.	The application explains the measures to be in place for achieving the directive requirements
46(6)	Limits the maximum period of operation when an ELV is exceeded to 4 hours uninterrupted duration in any one instance, and with a maximum cumulative limit of 60 hours per year. Limits on dust (150 mg/m^3), CO and TOC not to be exceeded during this period.	Conditions 2.3.11 and 2.3.12

IED Article	Requirement	Delivered by
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.	Conditions 2.3.10, 2.3.11 and table S3.1(a)
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Conditions 3.5.1 to 3.5.5. Reference conditions are defined in Schedule 6 of the Permit.
48(2)	Installation and functioning of the automated measurement systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	Condition 3.5.3, and tables S3.1, S3.1(a), and S3.2
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	Conditions 3.5.3 and 3.5.4
48(4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Conditions 4.1.1 and 4.1.2, and Tables S4.1 and S4.4
49	The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	conditions 3.1.1 and 3.1.2 and 3.5.5
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) <3% or loss on ignition (LOI) <5%.	Conditions 3.5.1 and Table S3.3
50(2)	Flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber.	Condition 2.3.7, Improvement condition IC3, IC10 and Table S3.2
50(3)	At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas.	Condition 2.3.8
50(4)(a)	Automatic shut to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.7
50(4)(b)	Automatic shut to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.7
50(4)(c)	Automatic shut to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.7
50(5)	Any heat generated from the process shall be recovered as far as practicable.	The plant will generate electricity and use waste heat within the installation.
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3 and 2.3.1
51(1)	Different conditions than those laid down in Article 50(1), (2) and (3) and, as regards the temperature Article 50(4) may be authorised, provided the other requirements of this chapter are met.	No such conditions have been allowed

IED Article	Requirement	Delivered by
51(2)	Changes in operating conditions do not cause more residues or residues with a higher content of organic polluting substances compared to those residues which could be expected under the conditions laid down in Articles 50(1), (2) and (3).	No such conditions have been allowed
51(3)	Changes in operating conditions shall include emission limit values for CO and TOC set out in Part 3 of Annex VI.	No such conditions have been allowed
52(1)	Take all necessary precautions concerning delivery and reception of Wastes, to prevent or minimise pollution.	Conditions 2.3.1, 2.3.4, 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 2.3.4(a) and Table S2.2 in Schedule 3 of the Permit.
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 1.4.1, 1.4.2 and 3.5.1 with Table S3.3
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	Conditions 1.4.1, 2.3.1, 2.3.2 and 3.2.1.
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.5.1 and Table S3.3 and improvement condition IC9.
55(1)	Application, decision and permit to be publicly available.	All documents are accessible from the Environment Agency Public Register.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2 and 4.2.3.

ANNEX 2: Pre-Operational Conditions

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

Reference	Pre-operational measures
PO1	The Operator shall submit the written protocol referenced in condition 3.2.4 for the monitoring of soil and groundwater for approval by the Environment Agency. The protocol shall demonstrate how the Operator will meet the requirements of Articles 14(1)(b), 14(1)(e) and 16(2) of the IED. The procedure shall be implemented in accordance with the written approval from the Environment Agency.

ANNEX 3: Improvement Conditions

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

Reference	Improvement measure	Completion date
IC1	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point A1, identifying the fractions within the PM_{10}, and $PM_{2.5}$ ranges. On receipt of written approval from the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	Within 6 months of the completion of commissioning.
IC2	The Operator shall submit a written report to the Environment Agency on the commissioning of the installation. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions and confirm that the Environmental Management System (EMS) has been updated accordingly.	Within 4 months of the completion of commissioning.
IC3	The Operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the exhaust gases in the furnace whilst operating under the anticipated most unfavourable operating conditions. The results shall be submitted in writing to the Environment Agency and include a comparison with the CFD modelling submitted with IC9.	Within 4 months of the completion of commissioning.
IC4	The Operator shall submit a written report to the Environment Agency describing the performance and optimisation of: • The Selective Non Catalytic Reduction (SNCR) system and combustion settings to minimise oxides of nitrogen (NOx).The report shall include an assessment of the level of NOx, N_2O and NH_3 emissions that can be achieved under optimum operating conditions. • The sodium bicarbonate injection system for minimisation of acid gas emissions. • The carbon injection system for minimisation of dioxin and heavy metal emissions.	Within 4 months of the completion of commissioning.
IC5	The Operator shall carry out an assessment of the impact of emissions to air of the following component metals subject to emission limit values: As and Cr. 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 the completion of commissioning

IC6	The Operator shall submit a written summary report to the Environment Agency to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.	Initial calibration report to be submitted to the Agency within 3 months of completion of commissioning. Full summary evidence compliance report to be submitted within 18 months of completion of commissioning.
IC7	The Operator shall provide a full 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.	31/12/2018
IC8	The Operator shall send a summary of the site Environment Management System (EMS) to the Environment Agency and make available for inspection all documents and procedures which form part of the EMS. The EMS shall be developed in line with the requirements set out in Environment Agency web guide on developing a management system for environmental permits (found on www.gov.uk). The documents and procedures set out in the EMS shall form the written management system referenced in condition 1.1.1 (a) of the permit.	31/12/2018
IC9	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.	31/12/2018
IC10	The Operator shall submit a written report to the Environment Agency of the details of the computational fluid dynamic (CFD) modelling. The report shall demonstrate whether the design combustion conditions comply with the residence time and temperature requirements as defined by Chapter IV and Annex VI of the IED.	31/12/2018
IC11	The Operator shall submit a written report to the Environment Agency specifying arrangements for continuous and periodic monitoring of emissions to air to comply with Environment Agency guidance notes M1 and M2. The report shall include the following: • Plant and equipment details, including accreditation to MCERTS; • Methods and standards for sampling and analysis; • Details of monitoring locations, access and working platforms.	31/12/2018

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 public register.

The Application was advertised on the Environment Agency website from 25/1/2018 to 22/2/2018. The Application was made available to view online and was also available via email: pscpublicresponse@environment-agency.gov.uk

Or mail from:
Environment Agency
Permitting and Support Centre
Land Team
Quadrant 2
99 Parkway Avenue
Sheffield
S9 4WF

Anyone wishing to see these documents could do so and arrange for copies to be made.

The following statutory and non-statutory bodies were consulted:

- Food Standards Agency (FSA)
- Northamptonshire Fire Service
- Health & Safety Executive (HSE)
- Public Health England (PHE) and Director of Public Health
- National Grid
- Northamptonshire County Council
- Daventry District Council

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from PHE	
Brief summary of issues raised:	Summary of action taken / how this has been covered
The main emissions of potential concern are products of combustion arising from the combustion of mixed waste wood, however the applicant has supplied detailed air quality modelling data which indicates that nearby residential receptors will not	We have audited the Air Quality Assessment and consider that the SWIP will not significantly impact the nearby residential receptors

be significant impacted by emissions to air from the proposed Small Waste Incineration Plant (SWIP).	
The regulator states that the SWIP is part of a multi-operator installation – the other part of the installation is a waste treatment plant applied for by Henley Biomass Limited (EPR/AP3536YX/A001). The permit application for the SWIP and its supporting assessments do not incorporate the waste treatment plant that is operated by Henley Biomass Limited and neither is there clear cross-referencing of the 2 processes in the documentation. It is therefore not possible to fully appraise the potential impacts of both processes in this response.	The waste treatment plant is covered by a separate application was subject of a separate consultation process so issues relating to the waste treatment plant are dealt with under that application and are not covered by this document.
PHE also note that the applicant has not fully considered the risks of fugitive emissions to air from the unloading of waste, handling and transport of fly ash off site. PHE recommends that all fugitive emissions are accounted for along with suitable control and mitigation measures.	Further details were requested from the applicant via schedule 5 Notice regarding fugitive emissions from waste handling, including, APCR and bottom ash. The applicant responded with details we consider to be BAT, including handling and containment measures, spillage procedures and clean-up equipment, including the use of dry vacuuming.
Based on the information contained in the application supplied to us, Public Health England has no significant concerns regarding the risk to the health of the local population from the SWIP.	Noted.

Response Received from Cadent Gas Ltd (for National Grid)	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Request for the location of the location plan in the application.	Directed to the correct section of the application.

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

None received.