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

Consultation on our decision document recording our decision-making process

The Permit Number is:	EPR/VP3997NK/V005
The Applicant / Operator is:	SITA Surrey Limited
The Installation is located at:	Charlton Lane Eco Park Charlton Lane Shepperton TW17 8AQ

Consultation commences on: 16 July 2014
Consultation ends on: 4 September 2014

What this document is about

This is a draft decision document, which accompanies a draft variation and consolidation notice incorporating a draft permit. Where subsequently we refer to the draft permit we are referring to the draft consolidated permit.

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

The document is in draft at this stage, because we have yet to make a final decision. Before we make this decision we want to explain our thinking to the public and other interested parties, to give them a chance to understand that thinking and, if they wish, to make relevant representations to us. We will make our final decision only after carefully taking into account any relevant matter raised in the responses we receive. Our mind remains open at this stage: although we believe we have covered all the relevant issues and reached a reasonable conclusion, our ultimate decision could yet be affected by any information that is relevant to the issues we have to consider. However, unless we receive information that leads us to alter the conditions in the draft Permit, or to reject the Application altogether, we will issue the Permit in its current form.

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In this document we frequently say "we have decided". That gives the impression that our mind is already made up; but as we have explained above, we have not yet done so. The language we use enables this document to become the final decision document in due course with no more re-drafting than is absolutely necessary.

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/VP3997NK/V005. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we propose to give to the permit is EPR/VP3997NK. We refer to the proposed permit as "the **Permit**" in this document.

The Application was duly made on 27 November 2013.

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

SITA Surrey Limited's Installation is located at Charlton Lane Eco Park, Charlton Lane, Shepperton, TW17 8QA. We refer to this as "the **Installation**" in this document.

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How this document is structured

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Glossary of acronyms used in this document

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

ABPR	Animal by-product Regulation
AD	Anaerobic Digestion
APC	Air Pollution Control
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
CEM	Continuous emissions monitor
CFD	Computerised fluid dynamics
CHP	Combined heat and power
COMEAP	Committee on the Medical Effects of Air Pollutants
COT	Committee on Toxicity
CRC	Community Recycling Centre
CROW	Countryside and rights of way Act 2000
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision document
EAL	Environmental assessment level
EIAD	Environmental Impact Assessment Directive (85/337/EEC)
ELV	Emission limit value
EMAS	EU Eco Management and Audit Scheme
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2010 (SI 2010 No. 675) as amended
EQS	Environmental quality standard
EU-EQS	European Union Environmental Quality Standard
EWC	European waste catalogue
FSA	Food Standards Agency
GWP	Global Warming Potential
HHRAP	Human Health Risk Assessment Protocol
HMIP	Her Majesty's Inspectorate of Pollution

HPA	Health Protection Agency (now called Health Protection England)
HRA	Human Rights Act 1998
HW	Hazardous waste
HWI	Hazardous waste incinerator
IBA	Incinerator Bottom Ash
IED	Industrial Emissions Directive (2010/75/EU)
IPPCD	Integrated Pollution Prevention and Control Directive (2008/1/EC) – now superseded by IED
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LCPD	Large Combustion Plant Directive (2001/80/EC) – now superseded by IED
LCV	Lower calorific value – also termed net calorific value
LfD	Landfill Directive (1999/31/EC)
LOI	Loss on Ignition
MBT	Mechanical biological treatment
MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
Opra	Operator Performance Risk Appraisal
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
POP(s)	Persistent organic pollutant(s)
PPS	Public participation statement
PR	Public register
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated biphenyls
PXDF	Poly-halogenated di-benzo furans
RBF	Recyclables Bulking Facility
RDF	Refuse derived fuel
RGS	Regulatory Guidance Series
SCADA	Supervisory Control and Data Acquisition
SAC	Special Area of Conservation

SED	Solvent Emissions Directive (1999/13/EC) – now superseded by IED
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

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1 Our proposed decision

We are minded to grant the varied and consolidated Permit to the Applicant. This will allow it to operate the Installation, subject to the conditions in the Permit.

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

This variation and consolidation is to operate an Installation which is subject principally to the Industrial Emissions Directive (IED).

The existing permit is for:

- an Anaerobic Digestion (AD) installation feeding a combined heat and power (CHP) plant;
- a Waste Gasification installation;
- a Recyclables Bulking facility (RBF); and
- a Community Recycling Centre (CRC).

The amendments to the existing activities and waste operations are summarised in section 4.1.1.

The variation also includes the addition of a waste operation for a road sweepings bulking facility.

The draft 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 draft decision

2.1 Receipt of Application

We received the application on 25/09/13. We issued requests for further information on 01/11/13 by letter and 20/11/13 by email.

The Application was duly made on 27/11/13. 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. The application, copies of the requests for information and the responses were placed on our Public Register and sent to Spelthorne Borough Council for its own Public Register, located at: the Environmental Health Services, Spelthorne Borough Council, Council Offices, Knowle Green, Staines, TW18 1XB. 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 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. We also placed an advertisement in the Staines Informer on 19/12/13.

The Application and all other documents relevant to our determination (see below) were made available to view on our Public Register. We also sent a copy to Spelthorne Borough Council for its own Public Register, located at: the Environmental Health Services, Spelthorne Borough Council, Council Offices, Knowle Green, Staines, TW18 1XB.

Anyone wishing to see these documents could do so and arrange for copies to be made. The Applicant also provided a number of copies of the Application which we placed in Shepperton Library, High Street, Shepperton, Middlesex, TW17 9AU and at The Environment Agency, Apollo Court, 2 Bishops Square Business Park, St Albans Road West, Hatfield, Herts, AL10 9EX. Copies of the Application were also made available on CD.

We produced a Factsheet which was distributed on 19/12/13 by email about the changes applied for by the applicant and explaining the role the Environment Agency plays in the determination process. The Factsheet was

sent to local residents who lead local resident groups or who we have previously had communication with about the Installation. We also sent it to local councillors, the local MP and the Charlton Lane Community Liaison Group (CLG).

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

- Spelthorne Borough Council
- Food Standards Agency (FSE)
- Thames Water
- Public Health England (PHE)
- Health and Safety Executive (HSE)
- Animal Health
- London Fire Brigade

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

In addition to our advertising the Application, we undertook a programme of extended public consultation to take account of the Christmas period. Written comments were also accepted by the Environment Agency beyond the formal consultation period. Further details along with a summary of consultation comments and our response to the representations we received can be found in Annex 4. We have taken all relevant representations into consideration in reaching our draft determination.

2.3 Requests for Further Information

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued information notices on 30/01/14 and 11/02/14. A copy of each information notice was placed on our public register and sent to Spelthorne Borough Council for inclusion on its register, as were the responses when received.

In addition to our information notices, we received additional information during the determination from the applicant. We made a copy of this information available to the public in the same way as the responses to our information notices.

Having carefully considered the Application and all other relevant information, we are now putting our draft decision before the public and other interested parties in the form of a draft Variation and Consolidation Notice including a draft Permit, together with this explanatory document. As a result of this stage in the process, the public has been provided with all the information that is relevant to our determination, including the original Application and

additional information obtained subsequently, and we have given the public two separate opportunities (including this one) to comment on the Application and its determination. Once again, we will consider all relevant representations we receive in response to this final consultation and will amend this explanatory document as appropriate to explain how we have done this, when we publish our final decision.

3 The legal framework

The Permit will be granted, if appropriate, under Regulation 20, Paragraph 19 of Part 1 of Schedule 5 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:

- an *Installation* and a *Waste Incineration Plant* as described by the IED;
- an *Operation* covered by the WFD, and
- subject to aspects of other relevant legislation which also have to be addressed.

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

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

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

4 The Installation

4.1 Description of the Installation and related issues

4.1.1 The permitted activities

The EPR allow multiple Waste Operations and Installations to be regulated under one Environmental Permit.

The Charlton Lane Eco Park is currently permitted for:

- an AD facility feeding a Combined Heat and Power (CHP) plant;
- a Waste Gasification Facility;
- a Community Recycling Centre; and
- a Recyclables Bulking Facility.

This variation makes changes to the existing facilities as set out below, and adds a new waste operation:

- a road sweeping bulking facility.

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

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

- Section 5.4 Part A(1)(b)(i) – recovery or a mix of recovery and disposal of non-hazardous waste in a facility with a capacity exceeding 100 tonnes per day.

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 and systems 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 and preparation of treatment chemicals e.g. lime slaking, and the ash storage bunker, are therefore included in the listed activity description. IBA handling, ferrous metal removal and the storage of IBA in a hopper are included within the Installation. Pre-treatment of waste for incineration is included in the listed activity as it serves only the incineration plant.

An Installation may also comprise "directly associated activities" (DAAs). For the existing Gasification activity this includes the generation of electricity using a steam turbine. These activities comprise one Installation, because the incineration plant and the steam turbine are successive steps in an integrated activity.

For the existing AD activity the DAAs include generation of electricity using gas engines and an auxiliary flare to burn biogas. These activities comprise one Installation, because they are successive steps in an integrated activity.

The existing facility also consists of two relevant Waste Operations:

- a Community Recycling Centre; and
- a Recyclables Bulking Facility.

Together, these listed and directly associated activities and the waste operations comprise the facility. The changes as a result of this variation are set out below.

The changes to the gasification plant are as follows:

- Change in gasification technology from a batch gasifier to a fluidised bed-gasifier.
- Deletion of conditions 2.3.13 and 2.3.14 (as numbered in EPR/VP3997NK/V003).
- Removal of emission points A2 and A3 to air.
- Removal of boiler protection vents.
- Deletion of pre-operational condition PO13 (as numbered in EPR/VP3997NK/V003).
- Reduction in the capacity of the gasification facility from 60,000 tonnes per annum to 55,460 tonnes per annum.
- Reduction in the number of air cooled condensers from nine to two.
- Change the acid gas reagent from sodium bicarbonate to lime.
- Amendment of the monitoring requirements for Carbon Monoxide (CO) to 10 minutes average.
- Addition of Selective Catalytic Reduction (SCR) for secondary Nitrogen Oxides (NO_x) reduction.
- The addition of waste codes 02 01 02, 02 01 06, 02 02 02 and 02 02 03.

The changes to the anaerobic digestion (AD) facility are as follows:

- Increase the electrical output of the CHP engines to 1.778MW.
- Change emission limit values for the gas engines: SO_2 to 350mg/m3, and CO to 1400 mg/m^3 to align the emission limits with those in the standard rules permit for AD. Emissions for NO_x and VOCs are unchanged.
- Change the emission limit value for SO_2 from the flare to 395 mg/m^3 to accommodate the change in SO_2 emission limit from the gas engines.
- Addition of a second waste dissolver to increase the resilience of the process.
- The addition of a wheelwash to comply with the Animal By-Product Regulations (ABPR).

Other changes are as follows:

- Addition of a new waste operation: a road sweepings bulking facility (activity A7).

- Change in the odour control system to activated carbon filters with release via a flue within a common windshield.
- Addition of two new pre-operational conditions, PO14 and PO15 relating to drainage and secondary containment.

This Permit controls the operation of a waste incineration plant. The relevant listed activity is 5.1A1(b). The Permit implements the requirements of the EU Directives on Industrial Emissions and Waste.

4.1.2 The Site

The Charlton Lane Eco Park is located on approximately 4.5 hectares of land to the south east of Charlton Village and west of Upper Halliford. A Scout Hut is located to the south west corner of the Installation. To the east and north is an area of unmanaged grassland and scrub. The grassland area extends to the north for approximately 500 m before reaching Upper Halliford railway station. Much of this grassland area historically comprised areas of mineral workings which were subsequently landfilled and restored in the late 1960s/early 1970s.

The Installation is bounded to the south by Charlton Lane and to the east by a railway line (Shepperton Branch Line) which runs in a north south orientation. To the east of the railway line is a residential housing estate.

A public footpath crosses the Installation from east to west, running to the immediate north of the existing Community Recycling Centre (CRC) and Recyclables Bulking Facility (RBF). The footpath is then routed along the western boundary before intersecting Charlton Road. The M3 motorway, which runs in a north south orientation, is located immediately to the west of the Installation.

At the time of determining variation EPR/VP3997NK/V003, the closest residential property was Ivydene located adjacent to the south east of the existing waste management facilities. This property is no longer occupied and is now owned by SITA. The property is served by a joint access onto Charlton Lane as is the Scout Hut. To the south of Charlton Lane is Sunbury Golf Club and driving range

There are the following Special Areas of Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites within 10km of the site:

- Thursley, Ash, Pirbright & Chobham
- South West London Waterbodies
- Thames Basin Heaths

There are no SSSI's within 2km of the Installation, but there are 13 non-statutory local wildlife and conservation sites within this distance.

The Applicant submitted a plan which we consider is satisfactory, showing the site of the Installation and its extent. A plan is included in Schedule 7 to the

Permit, and the Operator is required to carry on the permitted activities within the site boundary.

Further information on the site is addressed below at 4.3.

4.1.3 What the Installation does

4.1.3.1 Gasification facility

The Applicant has described the incineration facility as a gasification facility. Our view is that for the purposes of IED (in particular Chapter IV) and EPR, the facility is a waste incineration plant because notwithstanding the fact that energy will be recovered from the process, the process is never the less 'incineration' because it is considered that its main purpose is the thermal treatment of waste.

Although the process used to thermally treat the waste is gasification, for the process not to be considered to be a waste incineration plant in terms of IED/EPR, the resultant gases from the gasification process must be purified to such an extent that they are no longer a waste prior to their combustion and will not cause emissions higher than those from the burning of natural gas. The Applicant has not claimed that the gases have passed an 'end of waste' test as referred to in the Waste Framework Directive (WFD); therefore the whole process is considered to be a waste incineration plant and therefore subject to the requirements of Chapter IV of the IED.

The Applicant has applied to change the gasification technology from a batch gasifier to a fluidised bed gasifier.

The gasification facility will receive up to a total of 55,460 tonnes per annum of:

- residual household waste;
- residual waste from Household Waste Recycling Centres;
- residual waste from Material Recovery Facilities;
- commercial and industrial waste; and
- Animal By-Product Regulation (ABPR) Waste.

The main purpose of the gasification facility will be to gasify the above wastes, and to recover energy from syngas in the form of steam, which will be used to produce electricity for export to the National Grid and potentially supply heat to users nearby.

There will be a single gasification line. In outline, the gasification process will be as follows:

- Waste will be delivered to site and stored in the reception hall.
- The waste will undergo pre-treatment (figure 1) prior to gasification (figure 2).

- Waste will be fed by a grab into the primary shredder of the pre-treatment line which will separate the waste and reduce it to a workable size.
- A trommel screen will split the waste into size fractions of <80mm and 80-300mm.
- Ferrous metals will be removed by electro-magnet and conveyed to a collection skip for further recycling.
- Non ferrous metals will be removed by an eddy current separator and conveyed to a collection skip for further recycling.
- For fractions <80mm the ballistic separator will separate out solid waste, depending on its size, density and shape into an aggregates fraction and a fine Refuse Derived Fuel (RDF) fraction.
- For fractions 80-300mm the air belt separator will separate the different fractions into lightweight and heavyweight fractions. The secondary shredder provides further granulating of the lightweight fraction so that it is suitable for gasification. The heavyweight fraction is returned to the start of the pre-treatment line via conveyer to pass through the separation and shredding process again.
- Oversize material will be returned via conveyer to pass through the shredder and separation process again.
- This pre-treatment line has been designed to operate at a rate of up to 28 tonnes per hour, delivering the refined fuel at a rate of 21 tonnes per hour.
- RDF output from the pre-treatment will be deposited onto a ‘walking floor’ which in turn will feed conveyors to transfer RDF from the bunker to the gasification metering bin in the gasification hall.
- The Gasification plant will be a staged process comprising RDF metering, an in-feed system, a fluidized bed region, a gasification zone above the fluidized bed, and a secondary combustion zone which includes a secondary air injection zone and a combustion zone.
- A “bed” of solid sand-like particles is contained within the bottom region of the vessel. This is comprised of durable, high temperature sand, of approximately 2-3mm average particle diameter.
- The fuel introduced onto the fluidised bed is heated as it comes into contact with the hot sand. Above the fluidised bed, the syngas is contained in the gasification zone for sampling.
- The waste is thermally decomposed in conditions where only a fraction of the total combustion air is supplied to the system, preventing complete oxidation of the fuel.
- Above the fluidised bed, the syngas is sampled in the gasification zone.
- Above the gasification and sampling zone, the secondary air injection, referred to as overfire air flow, is introduced at multiple levels. This is followed by an additional combustion zone wherein sufficient residence time is provided to ensure stoichiometric complete combustion of the syngas.

- Emissions of nitrogen dioxide will be controlled by the injection of urea into the gasifier.
- The hot combustion gases will pass through a boiler to recover energy in the form of steam. The steam will then be used to generate electricity in a steam turbine, before being condensed in an air-cooled condenser.
- The combustion gases which exit the boiler will be cleaned in a multi cyclone to reduce particulate levels.
- Further nitrogen dioxide reduction will be achieved using selective catalytic reduction (SCR).
- Acid gases will be neutralised by the injection of hydrated lime into the flue gas stream.
- Heavy metals will be removed from flue gases by the injection of powdered activated carbon into the flue gas.
- Particle removal will be by bag filters.
- The combustion gases will be released to atmosphere via a 49m high stack.
- The ash residues (incinerator bottom ash or IBA) will be removed. The IBA will then be transferred offsite for treatment or be disposed of to landfill.

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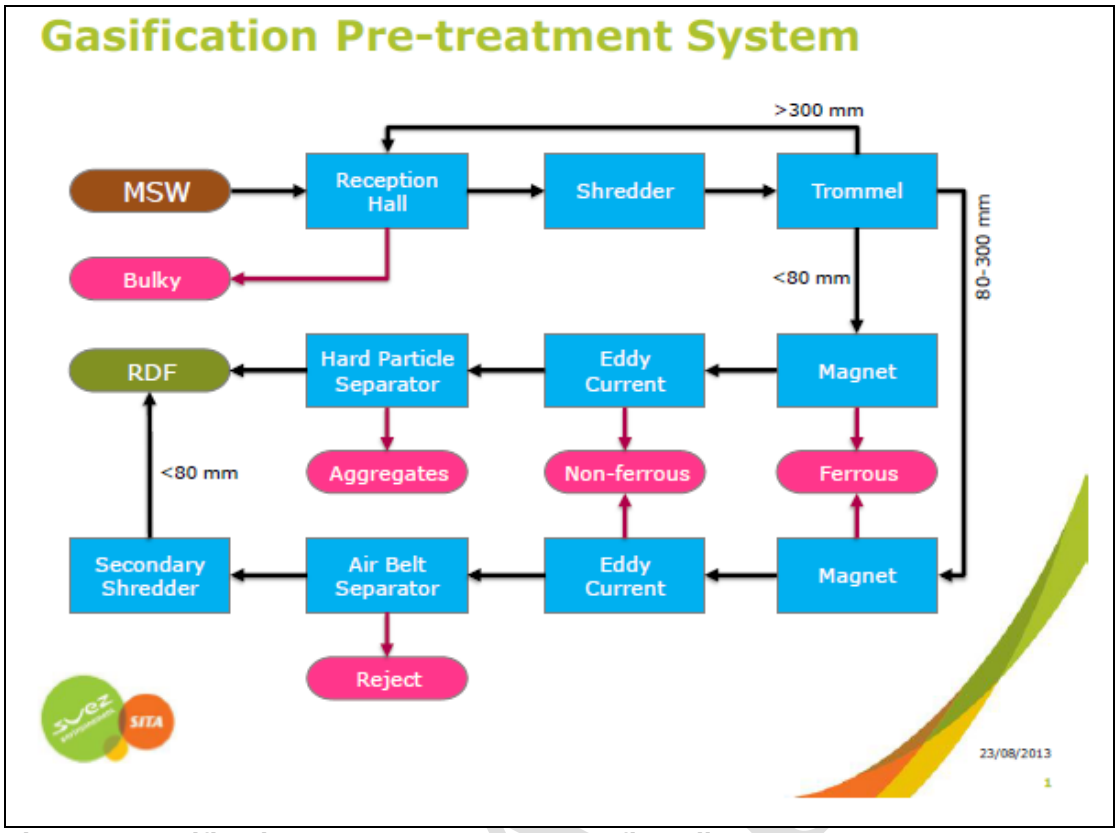

Figure 1: Gasification pre-treatment system flow diagram

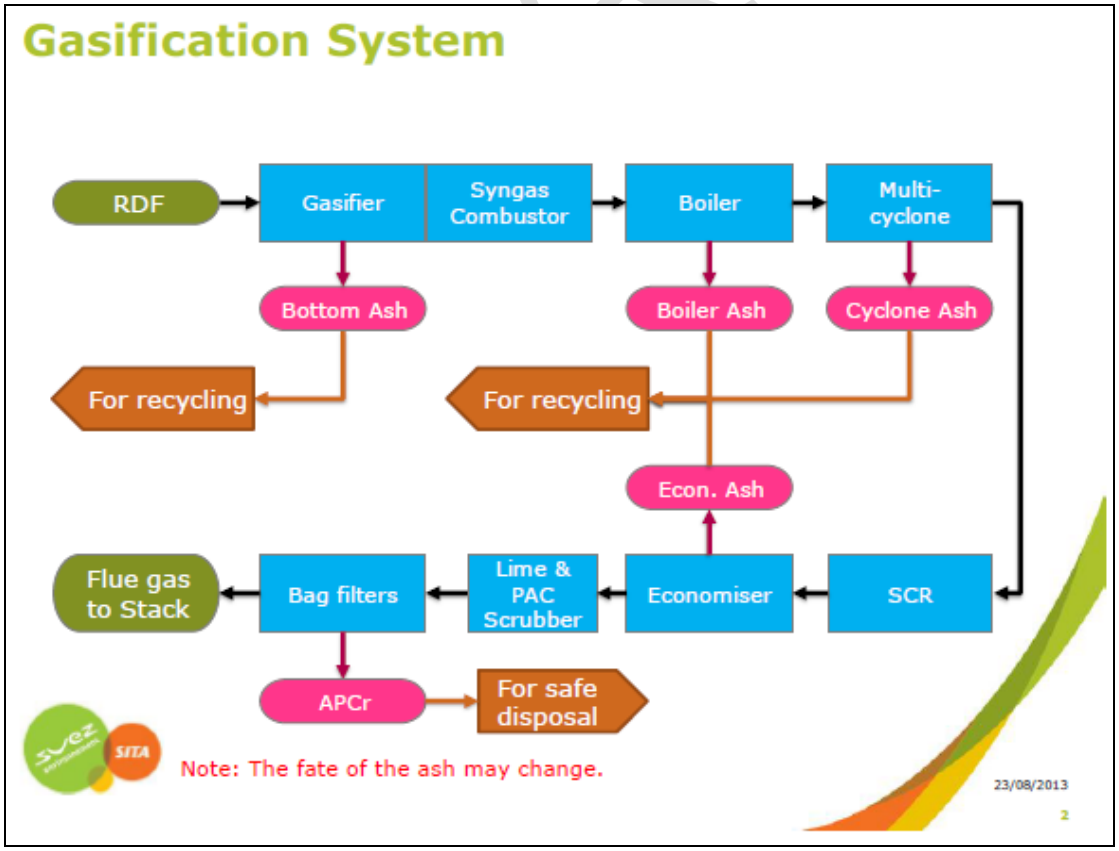

Figure 2: Gasification system flow diagram

The key features of the gasification facility can be summarised in table 1 below.

Table 1: Key features of the gasification facility.

Waste throughput, Tonnes/line	55,460 tonnes per annum which is converted to 44,710 tonnes per annum of RDF.	5.59 tonnes per hour (based on 8000 hours of operation)
Waste processed	MSW, Commercial and Industrial wastes, ABPR waste and residual waste from RBF and CRC.	
Number of lines	1	
Furnace technology	Fluidised bed gasifier	
Auxiliary Fuel	Low sulphur Gas Oil	
Acid gas abatement	Dry	hydrated lime
NOx abatement	SCR and SNCR	urea
Reagent consumption	Auxiliary Fuel: 18 m^3 per annum Ammonia/Urea: 500 te/annum Hydrated lime: 850 te/annum Limestone: 600 te/annum Activated carbon: 30 te/annum Process water: 16,000 m^3/annum	
Flue gas recirculation	Yes	
Dioxin abatement	Activated carbon	
Stack	Height, 49 metres	Diameter of windshield 3.8m, diameter of flue from gasification facility 1.2m
Flue gas exit velocity	16.15 m/s	
Electricity generated	3.65 MWe	29,200 MWh
Electricity exported	2.9 MW	23,200 MWh
Steam exported	None	

In a Schedule 5 notice dated 21/02/14, we requested further information on the proposed design and why it represents gasification. The key conclusions provided in the response on 29/05/14 are as follows:

- For the same heat input, the fuel feed rate and energy release per unit bed area is at least 3-4 times greater for the gasifer than for a conventional combustion system.
- The fuel to air ratio within the bed is only 25-35% of the similar ratio in a combustor which translates to stoichiometric air levels within the bed of only 25-40% whereas a combustor is typically 100-125%.
- There is a disengagement zone of about 2 m above the fluidised bed, where the syngas is contained in the gasification zone and where it can be sampled for energy content to verify the quality of the syngas, in accordance with the requirements of the Renewables Obligation Order.
- The Renewables Obligation Order requires sampling and analysis of the syngas to demonstrate that the syngas produced from gasification is in accordance with specified requirements. The proposed staged-gasification technology has been granted pre-accreditation by Ofgem

for a different project using the same Outotec staged gasification technology. SITA is in on-going discussions with the Ofgem for the development of an application for pre-accreditation.

We are satisfied that the above conclusions demonstrate the technology is gasification, however, the terminology used by the applicant does not change the section of the Regulations we permit the activity as or any standards we will impose.

Our view is that for the purposes of IED and EPR, the gasification plant is an incinerator because it has no output other than the generation of electricity from the burning of waste. The gasification plant is an activity listed in Part 1 of Schedule 1 to the Environmental Permitting Regulations:

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

The pre-treatment line is included in the listed activity as it serves only the incinerator. Pre-treatment separates out wastes for recycling and wastes that cannot be incinerated. This is considered to be part of the activity.

The pre-treatment line should only operate if the incinerator is operating. During periods of downtime for maintenance the Operator will continue to pre-treat the incoming waste and store the RDF in the gasification facility until the incinerator is operational again. The RDF bunker has been designed to store approximately 4 days worth of RDF. When the storage capacity has been reached the Operator will need to consider whether to bulk the incoming waste and take it to another suitable site, or whether to divert it before it arrives at the site. Pre-operational condition PO10 has been amended to require the Operator to confirm arrangements for the handling of incoming waste to Activity A1 during periods when the gasifier is not operating.

4.1.3.2 Anaerobic Digestion (AD) facility

The general design of the AD facility will largely remain as described in variation EPR/VP3997NK/V003. Changes to the AD plant are described below.

Deliveries of food waste will unload onto a flat floor with push walls prior to being fed onto the shredder by a wheeled loading shovel. The reception apron below the canopy, the reception hall, and the process hall will all fall within the requirements of ABPR with segregated drainage and a wheel wash.

The number of waste dissolvers is increased from one to two. The dissolvers blend the shredded food waste with recycled liquor from the subsequent drying process and water for 10-20 minutes which makes organic slurry of 10% solids by weight and reduces particle size to approximately 2mm. The mixture is then discharged to a fine screen to remove contamination.

The height of the AD bund will be increased as part of this variation. The Applicant has stated that the bund will be designed in accordance with BS EN1992-3 Liquid Retaining and Containment Structures. We are not yet satisfied that the bund design is in accordance with BS1992-3. The Applicant proposed to install an access door in the bund wall, and also to include a penstock valve to the outlet to the storm water system from the AD bund sump. It is our view that these penetrations into the bund wall will compromise the integrity of the containment and therefore they have not been agreed as part of this variation.

We have included pre-operational condition PO15 requiring the Operator to ensure a qualified structural engineer carries out a review of the design, method of construction, and integrity of all bunds surrounding above-ground tanks. The review should compare against the standards set out in Section 2.2.5 of the Sector Guidance Note IPPC S5.06 – *Guidance for the Recovery and Disposal of Hazardous and Non Hazardous Waste* and CIRIA Report C736 – *Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises.* This is further discussed in section 4.2.2 of this document.

The ammonia in the dewatered liquor from the centrifuge will require treatment prior to discharge from the site. A sequential batch reactor (SBR) treats the centrate to remove ammonia, chemical oxygen demand (COD), total suspended solids and provide a treated effluent for use in the front end separation plant and AD plant. Caustic soda will be dosed into the SBR to maintain pH at 7.0 to 7.5. A buffer tank to permit the controlled release of the SBR batch quantity (circa 500m^3) to foul sewer will be required to meet the site's Trade Effluent Consent from Thames Water.

About 16,000 tonnes per annum of digestate cake will be transferred offsite to be spread to agricultural land as a soil enhancer. The liquor from the de watering process will be collected for reuse in the dissolvers and cleaned. Part of the cleaned liquor will be discharged to foul sewer.

The biogas produced by the plant has increased to 880m^3 per hour with a net calorific value of 22.2 MJ/Nm^3. The biogas from the AD tanks will be piped to a gas holder.

To meet the NO_x and SO_x emission limits for the CHP flue gases, a biogas scrubbing plant will be installed in the gas pipe from the gasholder to the CHP units. The scrubber will reduce hydrogen sulphide and ammonia levels within the biogas to the required level for the optimal operation of the CHP engines. Sulphuric acid will be used for the removal of ammonia and sodium hydroxide used for the removal of hydrogen sulphide.

4.1.3.3 CHP plant and flare

The CHP and flare will largely remain as described in variation EPR/VP3997NK/V003. The electrical output of the CHP engines is increased to 1.778MW.

4.1.3.4 Community Recycling Centre (CRC)

The CRC will be maintained as described in variation EPR/VP3997NK/V003. In the consolidated permit this waste operation is referred to as activity A6.

4.1.3.5 Recyclables Bulking Facility (RBF)

The RBF will be maintained as described in variation EPR/VP3997NK/V003. In the consolidated permit this waste operation is referred to as activity A7.

4.1.3.6 Road sweepings bulking facility

Road sweeping vehicles will discharge their contents onto a concrete floor. The area will be a bulking bay with push-walls and a concrete floor sloping slightly to a drainage system and below ground tank. Grit and small particles will be prevented from falling into the catch pit and the below ground tank by a grating cover. Run-off from the road sweepings will be collected in a below ground $10m^3$ tank and will be transferred into a vacuum tanker ready to be transferred off site for treatment. The grit remaining on the concrete slab will then be bulked up for transfer off-site to a suitably permitted facility.

In the consolidated permit this waste operation is referred to as activity A8.

4.1.4 Key Issues in the Determination

The key issues arising during this determination were the emissions to air and the impact on human health 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

There is no change to the site setting, layout and history since variation EPR/VP3997NK/V003.

In variation EPR/VP3997NK/V003, as a condition of the Planning Permission, historical land contamination should be remediated to a level that does not pose an unacceptable risk to groundwater, prior to the construction of the new parts of the proposed Facility. After this remediation, the Site Condition Report will need to be reviewed and re-submitted to the Environment Agency as the baseline contamination levels will be reduced prior to the site becoming operational.

To address this issue we have retained pre-operational condition PO7 requiring the Operator to resubmit the Site Condition Report once the historic land contamination has been remediated.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

All chemicals should be stored in an appropriate manner incorporating the use of bunding and other measures (such as acid and alkali resistant coatings) to ensure appropriate containment. The potential for accidents, and associated environmental impacts, is therefore minimised.

We are not yet satisfied with the applicant's proposed designs in terms of bunding and drainage. We have therefore included pre-operational condition PO15 requiring the Operator to ensure a qualified structural engineer carries out a review of the design, method of construction, and integrity of all bunds surrounding above-ground tanks. The review should compare against the standards set out in Section 2.2.5 of the Sector Guidance Note IPPC S5.06 – *Guidance for the Recovery and Disposal of Hazardous and Non Hazardous Waste* and CIRIA Report C736 – *Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises.*

We are not yet satisfied with the proposed secondary containment for the following reasons:

- We are not satisfied with the applicant's proposed AD bund design. The Applicant proposed to increase the height of the AD bund and design the bund in accordance with BS EN 1992-3. The applicant proposed to install an access door in the bund wall, and also to include a penstock valve to the outlet to the storm water system from the AD bund sump. It is our view that these penetrations into the bund wall will compromise the integrity of the containment and do not represent BAT. The bund design has therefore not been approved and the Operator is required to review the design in accordance with pre-operational condition PO15.

- We are not satisfied with the design of tank farm 2 (AD facility) as no secondary containment appears to have been proposed in the application. We have questioned the Applicant about this and agreed that the design should be reviewed. Secondary containment is required for these tanks in order to comply with BAT.

- The application states that the diesel storage tank will be located in a bunded area and will include an interceptor pit and inspection facility. An interceptor should not be located within a bund. We have asked the applicant to review this design aspect.

We are satisfied that the above issues will be addressed by pre-operational condition PO15.

The proposals for secondary containment have an impact on the drainage plan therefore we have also set pre-operational condition PO14 requiring the Operator to submit the final site drainage plan for approval.

Impervious surfaces will be maintained inside the buildings and there will be separate drainage for process water. Adequate quantities of spillage absorbent materials will be made available onsite, where liquids are stored. This will minimise pollution from spillages.

In the event of a fire, all fire water will be collected in the site drainage system. The drainage system will be fitted with an emergency shut-off which will automatically shutdown the drainage pumping system in the event of a fire alarm. The Applicant will ensure that the total capacity of drainage systems and kerbed areas of hard standing will correspond to approximately the volume of water from 2 fire hydrants operating at full capacity for 2 hours. This will prevent any water discharges from leaving the Installation.

All spillages, no matter how minor, will be reported to site management and a record of the incident will be made.

The environmental risk assessment in the Application for fugitive emissions and accidents demonstrates the use of appropriate measures to ensure that the residual risks to land, groundwater and surface water, will not be significant

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 not submitted a baseline report. We have therefore set pre-operational condition PO7 requiring the Operator to provide this information prior to the commencement of operations.

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

4.2.3 Closure and decommissioning

Having considered the information submitted in the Application, we are satisfied that the appropriate measures will be in place for the closure and decommissioning of the Installation, as referred to in Section 2.9 of the Application.

At the definitive cessation of activities, if the Operator wants to surrender the permit, or part of the permit, they must satisfy us that the necessary measures

have been taken so that the site ceases to pose a risk to soil or groundwaters. This takes 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 or part surrender of the permit, which we will not grant unless and until we are satisfied that these requirements have been met.

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

The Applicant is the sole Operator of the Installation.

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

The incineration of waste is not a specified waste management activity (SWMA). There are currently two SWMAs permitted at the site:

- Recyclables Bulking Facility (RBF)
- Community Recycling Centre (CRC)

A third SWMA is proposed by this variation:

- Road Sweepings Bulking Facility

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

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

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 WFD; ensuring that the requirements in the second paragraph of Article 23(1) of the WFD are met; and ensuring compliance with Articles 18(2)(b), 18(2)(c), 23(3), 23(4) and 35(1) of the WFD.

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; and
(f) such closure and after-care provisions as may be necessary.

These are all covered by permit conditions.

We are satisfied that the Applicant's submitted Opra profiles were accurate at the time of application.

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

4.3.2 Management

The Applicant has stated in the Application that they have developed and implemented a documented Environmental Management System (EMS) that has been certified under ISO14001.

The Applicant has stated that extensive training will be provided by both the gasifier and AD plant technology suppliers to ensure that all operatives are fully trained and competent. Training records will be kept, and will be available for inspection by Environment Agency officers.

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

4.3.3 Site security

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

4.3.4 Accident management

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

prior to commissioning as required by pre-operational condition PO3. They will combine the submitted plan with the existing plan for their current facility which is why the pre-operational condition refers to a revised plan.

We consulted the HSE on the Application but did not receive a response.

The Applicant has stated in the Application that the plant design will be subject to a Hazard and Operability, (HAZOP), study. This will ensure that all possible modes of failure have been considered and addressed. Pre-operational condition PO4 requires notification of completion of this HAZOP study to be sent to us before the commissioning of the new activities.

4.3.5 Off-site conditions

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

4.3.6 Operating techniques

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

Table 2: Operating techniques

Operating techniques		
Description	**Parts**	**Date Received**
Response to Schedule 5 Notice (sent on 6/4/11).	Answers to questions 2, 3, 4, 5, 6, & 12 (relating to AD sludge only).	9/5/11
Application EPR/VP3997NK/V005	Operating Techniques detailed in part C3, section 3a of the application form.	27/11/13
Application EPR/VP3997NK/V005	"EP Variation Supporting Information" document, Section 1.5.3 relating to incineration capacity.	27/11/13
Application EPR/VP3997NK/V005	"EP Variation Supporting Information" document, Section 2.4.1.2 and 2.4.1.3 relating to description of waste types permitted for incineration and AD respectively.	27/11/13
Application EPR/VP3997NK/V005	"EP Variation Supporting Information" document, section 2.5.1.4 relating to waste charging.	27/11/13
Application EPR/VP3997NK/V005	"EP Variation Supporting Information" document, sections 1.5.3, 2.1.3.2 and 2.3.1.1 relating to start-up and shut-down.	27/11/13
Application EPR/VP3997NK/V005	"EP Variation Supporting Information" document, sections 2.3.2.1 and 2.5.1.1 relating to temperature monitoring in the combustion chamber.	27/11/13

Operating techniques		
Description	**Parts**	**Date Received**
Application EPR/VP3997NK/V005	"EP Variation Supporting Information" document, sections 1.5.4, 2.4.6.1, 2.6.1 relating to energy recovery from the installation.	27/11/13
Application EPR/VP3997NK/V005	"EP Variation Supporting Information" document, section 1.5.8 and 2.3.1.1 relating to monitoring of emissions to air.	27/11/13
Application EPR/VP3997NK/V005	"EP Variation Supporting Information" document, section 1.5.8 and 2.3.1.1 relating to monitoring during abnormal operation (CEM failure).	27/11/13
Response to Schedule 5 notice (sent on 30/01/14)	Response to question 3 including the referenced diagram in Appendix B: Gasification plant design (general process flow). Response to question 16 relating to the gasification stack and odour stack.	21/02/14
Response to Schedule 5 notice (sent on 30/01/14)	Response to questions 8 and 9 correcting errors in the list of wastes.	21/02/14
Memo 'Justification of Gasification Technology' clarifying response to the Schedule 5 notices	Sections 2 and 3 describing the proposed staged gasification system, including figure 1 (staged gasification design).	29/05/14
Memo 'EP Variation Clarifications'	Section 3 relating to ash and APC residues. Section 4 relating to road sweepings bulking facility.	16/05/14
Further information: Operating technique clarifications	Response to question 2a relating to prevention of uncontrolled ingress of air. Response to question 2c relating to urea solution storage.	20/05/14
Further information: AD process diagram	Revised AD process diagram and additional information about the waste dissolvers.	06/06/14
Further information: revised site plan	Revised site plan showing the installation boundary and the revised emission points.	06/06/14
Email of further information: waste acceptance	Confirmation of waste acceptance for gasification during gasifier downtime.	10/07/14

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

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

Table 3: Raw materials

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

Gasification plant waste feed

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. Section 2.1.4.2 of the Application contains a list of those wastes to be incinerated, coded by the European Waste Catalogue (EWC) number. These are the wastes 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 Applicant's proposed list of wastes for gasification included four that have no calorific value and are therefore not suitable for gasification. The Applicant was questioned about these wastes in a Schedule 5 notice dated 30/01/14 and confirmed they were included in error. The wastes have not been permitted for acceptance and are: 20 01 02 glass; 20 01 40 metals; 20 02 02 soil and stones; and 20 01 36 Discarded electrical and electronic equipment.

We have specified the permitted waste types, descriptions and where appropriate quantities which can be accepted at the Installation in Table S2.2.

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

(i) these wastes are categorised as municipal waste in the European Waste Catalogue or are non-hazardous wastes similar in character to municipal waste;

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

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

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

The gasification plant will take municipal waste, which has not been source-segregated or separately collected or otherwise recovered, recycled or composted. Waste codes for separately collected fractions of waste (with the exception of waste wood classified under EWC code 20 01 38) are not included in the list of permitted wastes.

Protect legally privileged The document is in DRAFT at this stage, because we have yet to make a final decision.

This variation permits the addition of four ABPR waste codes:

- 02 01 02 Animal tissue waste
- 02 01 06 Animal faeces, urine and manure (including spoiled straw), effluent, collected separately and treated off-site.
- 02 02 02 Animal tissue waste
- 02 02 03 Materials unsuitable for consumption or processing.

These additional codes would allow the Operator to process catering wastes from the nearby airports. We consulted Animal Heath (as the regulator of ABPR facilities) and their response can be viewed in Annex 4. We are satisfied that the necessary controls and measures will be adopted to process and handle ABPR wastes.

The waste gasification facility will accept 55,460 tonnes per year of waste for pre-treatment. Pre-treatment will remove approximately 10,750 tonnes per annum resulting in a gasification plant feed of 44,710 tonnes per annum of waste with a net calorific value of 10.3 MJ/kg. Based on 8000 operating hours per year the waste throughput of gasifier will be 5.59 tonnes per hour.

The gasification facility 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 in section 6 of this document.

The anticipated composition of the RDF produced is shown in the table below.

Table 4 RDF composition

Element	Composition (%wt, dry)	Composition (%wt, as received)
Carbon	42	27.5
Hydrogen	5.8	3.8
Sulphur	0.27	0.18
Nitrogen	1	0.66
Oxygen	30.13	19.74
Chlorine	0.8	0.52
Ash	20	13.1
Moisture	-	34.5
Total	**100%**	**100%**

Anaerobic Digestion plant waste feed

The list of wastes to be treated in the AD plant remains unchanged.

RBF and CRC

The list of wastes for processing in the RBF and CRC remain unchanged.

Road sweepings bulking facility

The new road sweepings bulking facility will accept EWC code 20 03 03 with an annual throughput of 2,600 tonnes.

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

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

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

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

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

(ii) Use of energy within the Installation

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

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

- An energy efficiency plan will be built into the operation and maintenance procedures of the Installation ensuring maximum, practical, sustainable, safe and controllable electricity generation;
- The gasification facility will be designed with attention being paid to energy efficiency design features, such as high efficiency motors, high standards of cladding and insulation etc;
- The boiler plant will be designed to achieve a high thermal efficiency. In particular, the boilers will be equipped with economisers and super-heaters to optimise thermal cycle efficiency;
- Unnecessary releases of steam and hot water will be avoided, to avoid the loss of boiler water treatment chemicals and the heat contained within the steam and water;
- Steady operation of the gasifier will be maintained where necessary by using auxiliary fuel firing;

- Boiler heat exchange surfaces will be cleaned on a regular basis to ensure efficient heat recovery;
- Flue gases from the combustion zone are fed to the Waste Heat Boiler which is designed to cool the flue gas exiting the Secondary Combustion Chambers and recover the heat as superheated steam for use in the steam turbine;
- Prevention of uncontrolled air ingress within the gasification process will be achieved by providing and maintaining seals;
- The gasification facility is designed to minimise transfer of materials; and
- The biogas from the AD plant will be burnt in the CHP engines to generate electricity which will be exported to the national grid. The heat from the process will be used within the AD plant to run the pasteurisation process.

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, for the gasification facility will be 125kWh/tonne. The facility capacity is 44,710 t/a for gasification after pre-treatment.

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

Table 5: Range of specific energy consumptions from the BREF for Municipal Waste Incinerators.

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

The BREF says that it is BAT to reduce the average Installation electrical demand to generally below 150 kWh/tonne of waste with an LCV of 10.4 MJ/kg. The LCV in this case is expected to be 10.3 MJ/kg. Taking account of the difference in LCV, the specific energy consumption in the Application is in line with that set out above.

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

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

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

The term CHP in this context represents a plant which also provides a supply of heat from the electrical power generation process to either a district heating

network or to an industrial / commercial building or process. However, it is recognised that opportunities for the supply of heat do not always exist from the outset (i.e. when a plant is first consented, constructed and commissioned).

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

The BREF says that where a plant generates electricity only, it is BAT to recover 0.4 – 0.65 MWh/ tonne of waste (based on LCV of 10.4 MJ/kg). Our technical guidance note, SGN EPR S5.01, states that where electricity only is generated, 5-9 MW of electricity should be recoverable per 100,000 tonnes/annum of waste (which equates to 0.4 – 0.72 MWh/tonne of waste).

The gasification facility will generate electricity only and has been specified to maximise electrical output with little or no use of waste heat. The Sankey diagram in section 2.6.2 of the Application shows 3.65 MW of electricity produced for an annual burn of 44,710 tonnes, which represents 8.16MW per 100,000 tonnes/yr of waste burned (0.65 MWh/tonne of waste). The facility is therefore within the upper range in the indicative BAT range.

The SGN and Chapter IV of the IED both require that, as well as maximising the primary use of heat to generate electricity; waste heat should be recovered as far as practicable. The Application states that the possibility of exporting heat as well as power has been considered but that there is currently no substantive local heat demand. The Operator proposes to continue to review all local heat export options to ensure any new heat users are considered for supply from the Eco Park.

The location of the Installation largely determines the extent to which waste heat can be utilised, and this is a matter for the planning authority. There is provision within the design of the steam turbine to extract low-grade steam for heat export at a later date.

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

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

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

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

(v) Choice of Steam Turbine

Steam will be produced by the combustion of syngas. The steam boiler will generate 17.3 tonnes per hour of superheated steam at 40 bara and 400^{o}C. Wide tube spacing and relatively cool saturated temperatures will reduce the potential for ash bridging and provide initial flue gas cooling.

(vi) Choice of Cooling System

Air cooled condensers will condense the steam output from the turbine to allow return of the condensate to the boiler. Water cooling systems were not used because of the significant volume of water required and the absence of a local abstraction point.

(vii) Permit conditions concerning energy efficiency

Pre-operational condition PO1 requires the Operator to carry out a comprehensive review of the available heat recovery options prior to commissioning, in order to ensure that waste heat from the gasification plant is recovered as far as possible.

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

The Operator is required to report energy usage and energy generated under condition 4.2 and Schedule 4. The following parameters are required to be reported: total electrical energy generated; electrical energy exported; total energy usage and energy exported as heat (if any). Together with the total MSW burned per year, this will enable the Environment Agency to monitor energy recovery efficiency at the Installation and take action if at any stage the energy recovery efficiency is less than proposed.

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

4.3.8 Efficient use of raw materials

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

The Operator is required to report raw material usage under condition 4.2 and Schedule 4 of the permit, including consumption of lime, activated carbon and

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

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

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

The first objective is to avoid producing waste at all. In the gasification plant 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 3.1.4 and associated Table S3.5 of the permit 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.

Bottom ash (referred to by the technology supplier as tramp material) is collected from the fluidised bed with the sand and limestone. The sand and limestone will be recovered and re-circulated within the fluidised bed and the residual non-combustible fraction will be collected in a skip for transfer off-site to a suitably permitted waste management facility.

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. The APC residue will be collected in a dedicated silo and transferred off-site as hazardous waste to a suitably licensed hazardous waste facility.

In order to ensure that the IBA, boiler ash and APC residues are adequately characterised, pre-operational condition PO2 requires the Operator to provide a written plan for approval detailing the ash sampling protocols. Table S3.5 requires the Operator to carry out an ongoing programme of monitoring.

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

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

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

5. Minimising the Installation's environmental impact

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

We have assessed the impact of the new Road Sweepings Bulking Facility waste operation. We consider that the intended method of waste treatment is acceptable from the point of view of environmental protection.

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

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

5.1 Assessment Methodology

5.1.1 Application of Environment Agency H1 Guidance

A methodology for risk assessment of point source emissions to air, which we use to assess the risk of applications we receive for permits, is set out in our Horizontal Guidance Note H1 and has the following steps:

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

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

5.1.2 Use of Air Dispersion Modelling

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

Once short-term and long-term PCs have been calculated in this way, they are compared with Environmental Quality Standards (EQS) referred to as "benchmarks" in the H1 Guidance.

Where an EU EQS exists, the relevant standard is the EU EQS. Where an EU EQS does not exist, our guidance sets out a National EQS (also referred to as Environmental Assessment Level - EAL) which has been derived to provide a similar level of protection to Human Health and the Environment as the EU EQS levels. In a very small number of cases, e.g. for emissions of Lead, the National EQS is more stringent that the EU EQS. In such cases, we use the National EQS standard for our assessment.

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

PCs are considered **Insignificant** if:

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

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

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

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

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

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

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

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

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

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

5.2 Assessment of Impact on Air Quality

The Applicant's assessment of the impact of air quality is set out in:

- Annex 2- Air Quality Assessment in the Application
- Additional Information for Duly Making submitted on 14/11/2013
- Schedule 5 responses dated 21/02/14 and 05/03/14.

The assessment comprises:

- An H1 screening assessment of emissions to air from the operation of the incinerator.
- Dispersion modelling of emissions to air from the operation of the gasification plant and CHP gas engines.
- A study of the impact of emissions on nearby sensitive habitat site and human health.

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

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 5.0 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 Heathrow Airport between 2004 and 2008. The weather data was chosen to be consistent with the previous planning and permit determinations. 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.

- The Applicant assumed that the ELVs in the Permit would be the maximum permitted by Article 46(2) and Annex VI of the IED for the following substances:
  - Total dust
  - 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)

- For Oxides of nitrogen (NO_x), expressed as NO_2 the applicant assumed the emissions complied with the previously permitted lower limit of 100mg/m^3.
- They assumed that the Installation operates continuously at the relevant long-term or short-term emission limit values, i.e. the maximum permitted emission rate (except for emissions of arsenic, chromium and nickel, which are considered in section 5.2.3 of this decision document).
- For the gas engines, they have assumed that the engines will emit continuously at the emissions limits for SO_2, VOC's and CO proposed in Standard Rules SR2012No12.

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

Background air pollutant data was obtained from a variety of sources. For local annual mean NO_2 levels the applicant used data obtained from Spelthorne Council's diffusion tube background monitoring in 2010 and 2011. The applicant selected the maximum value for annual mean background NO_2 found within a 3 km radius of the facility; this was 37.6 µg/m^{-3}.

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

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

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

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

5.2.1 Assessment of Air Dispersion Modelling Outputs

The Applicant's modelling predictions are summarised in the tables below. The figures shown indicate the predicted peak ground level exposure to pollutants in ambient air.

Table 6: Assessment of long term impacts

Pollutant	EQS / EAL[1]	Back-ground	Process Contribution (PC)	Predicted Environmental Concentration (PEC)

		µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
Ammonia (NH_3)	180	1.48	0.04	0.02	-	-
Dioxins	-	2.8×10^{-8}	4.0×10^{-10}	-	2.84×10^{-8}	-
Dioxin like PCBs	0.2	0.00024	0.00002	0.01	-	-
Hydrogen Fluoride (HF)	16	2.35	0.004	0.03	-	-
Nitrogen Dioxide (NO_2)	40	37.6	0.61	**1.53**	38.2	95.5
PM_{10}	40	24.1	0.04	0.10	-	-
$PM_{2.5}$	25	17.45	0.04	0.16	-	-
Polycyclic aromatic hydrocarbons (PAHs)	0.00025	1.9×10^{-7}	8.1×10^{-7}	0.32	-	-
VOCs (as 1,3 butadiene)	2.25	0.34	0.16	**7.11**	0.500	22.22
VOCs as benzene	5	0.73	0.16	**3.20**	0.890	17.80

1. Annual mean except Hydrogen Fluoride which is monthly average

Table 7: Assessment of short term impacts

Pollutant	EQS / EAL µg/m^3		Back-ground µg/m^3	Process Contribution (PC) µg/m^3	% of EAL	Predicted Environmental Concentration (PEC) µg/m^3	% of EAL
Ammonia (NH_3)	2500	10	2.96	1.95	0.08	-	-
Carbon Monoxide (CO)	10000	9	940	55.8	0.56	-	-
Dioxin like PCBs	6	10	0.00049	0.00098	0.02	-	-
Hydrogen Chloride (HCl)	750	7	1.06	1.95	0.26	-	-
Hydrogen Fluoride (HF)	160	7	4.7	0.2	0.125	-	-
Nitrogen Dioxide (NO_2)	200	2	75.2	13.48	6.7	-	-
PM_{10}	50	3	48.2	0.15	0.30	-	-
Sulphur dioxide (SO_2)	266	4	8.78	24.14	9.1	-	-
	350	5	8.78	16.82	4.81	-	-
	125	6	8.78	5.25	4.2	-	-

TOC as 1,3 butadiene, 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

Table 8: Assessment of emissions of metals

Pollutant	EQS / EAL		Back-ground	Process Contribution		Predicted Environmental Concentration	
	µg/m^3		µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
Antimony	5	1	-	0.002	0.04	-	-
	150	2	0.00572	0.097	0.06	-	-
Arsenic	0.003	1	0.00051	0.00202	**67.33**	0.00253	84.3
Cadmium and Thallium	0.005	1	0.00022	0.0001	**2.0**	0.00032	6.4
	-		0.00044	0.00488	-	0.00532	-
Chromium (II)(III)	5	1	0.00286	0.00202	0.04	-	-
	150	2	0.00572	0.09768	0.07	-	-
Chromium (VI)	0.0002	1	0.00057	0.00202	**1010.00**	0.00259	**1295.0**
Cobalt	-		-	0.002	-	0.00200	-
Copper	10	1	0.00623	0.002	0.02	-	-
	200	2	0.01246	0.09768	0.05	-	-
Lead	0.25	1	0.0081	0.002	0.80	-	-
Magnesium	0.15	1	0.0056	0.002	**1.33**	0.0076	5.07
	1500	2	0.01132	0.09768	0.01	-	-
Mercury	0.25	1	0.002	0.0002	0.08	-	-
	7.5	2	0.004	0.0097	0.13	-	-
Nickel	0.02	1	0.00101	0.0020	**10.10**	0.00303	15.2
Vanadium	5	1	0.00101	0.00202	0.04	-	-
	1	3	0.00202	0.09768	9.77	-	-

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

(i) Screening out emissions which are insignificant

From the tables above the following emissions can be screened out as insignificant in that the process contribution is < 1% of the long-term EQS/EAL and <10% of the short-term EAQ/EAL. These are: Ammonia (NH_3), Carbon Monoxide (CO), Dioxin like PCBs, Hydrogen Chloride (HCl), Hydrogen Fluoride (HF), PM_{10}, $PM_{2.5}$, PAHs, Sulphur Dixoide (SO_2), Antimony, Chromium (II)(III), Cobalt, Copper, Lead, Mercury and Vanadium.

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

(ii) Emissions unlikely to give rise to significant pollution

Also from the tables above, the following emissions (which were not screened out as insignificant) have been assessed as being unlikely to give rise to significant pollution in that the predicted environmental concentration (PEC) is < 100% (taking expected modelling uncertainties into account) of both the long term and short term EQS/EAL. These are: NO_2, VOCs (as 1, 3 butadiene), VOCs as benzene, Arsenic, Cadmium and Thallium, Magnesium and Nickel. For NO_2 emissions are only 1.5% of the EAL, therefore we think this is worst case and NO_2 will not be emitted at levels that will cause a breach. VOCs are highly unlikely to be all butadiene therefore this is a very conservative assessment and reality the impact is likely to be insignificant.

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 Chromium (VI) is considered to have the potential to give rise to pollution in that the Predicted Environmental Concentration exceeds 100% of the long term EQS/EAL.

Refer to section 5.2.3 for a more detailed assessment of Chromium (VI).

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 this substance is set out in section 5.2.3.

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

The above tables show that the peak long term PC is greater than 1% of the EUEQS and therefore cannot be screened out as insignificant. We do not consider this will result in the EUEQS being exceeded. More detailed

consideration of impacts at specific receptors within the AQMA is in section 5.2.4 of this decision document. The peak short term PC is <10% of the EUEQS and therefore screens out and requires not further assessment.

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

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

The Applicant's predicted impact of the Installation against these EQSs 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. In reality it is predicted that the $PM_{2.5}$ faction makes up around 33% of the PM_{10} fraction. This was based on 3 sets of measurements available from the Environment Agency's public registers from incineration plants at Bolton, Stoke and Lewisham.

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 in the range 1 to 5 mg/m^3. It assumes all particulates emitted are below either 10 microns (PM_{10}) or 2.5 microns ($PM_{2.5}$), when some are expected to be larger.

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

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

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

There is currently no emission limit prescribed nor any continuous emissions monitor for particulate matter specifically in the PM_{10} or $PM_{2.5}$ fraction. Whilst the Environment Agency is confident that current monitoring techniques will capture the fine particle fraction ($PM_{2.5}$) for inclusion in the measurement of total particulate matter. An improvement condition 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.

We have retained Improvement Condition IC2 which requires an exercise be carried out to determine the size distribution of the particles emitted from the stacks to identify the fractions in the PM_{10} and $PM_{2.5}$ ranges. $PM_{1.0}$ has been removed from the condition as we no longer assess this due to absence of a standard to assess against. This is a standard improvement condition being imposed on all incinerators in order to gather information on the contribution of waste incineration generally to emissions of very fine particles.

(iii) Acid gases, SO_2, HCl and HF

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

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

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

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

The above tables show that for CO the peak long term PC is < 1% of the EAL/EQS and the peak short term PC is < 10% of the EAL/EQS and so can be screened out as insignificant. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of this substance to be BAT for the Installation.

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

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

for their assessment of the impact of PAH. We agree that the use of the BaP EQS is sufficiently precautionary.

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

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

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

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

In summary for the above emissions to air, for those emissions that do not screen out, we have carefully scrutinised the Applicant's proposals to ensure that they are applying the Best Available Techniques to prevent and minimise emissions of these substances. This is reported in section 6 of this document. Therefore, generally, we consider the Applicant's proposals for preventing and minimising the emissions of CO, NH_3, PAHs and PCBs to be BAT for the Installation. Dioxins and furans are considered further in section 5.3.2.

5.2.3 Assessment of Emission of Metals

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

Annex VI of IED sets three limits for metal emissions:

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

In addition the UK is a Party to the Heavy Metals Protocol within the framework of the UN-ECE Convention on long-range trans-boundary air pollution. Compliance with the IED 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: Antimony, Chromium (II)(III), Cobalt, Copper, Lead, Mercury and Vanadium.

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: Arsenic, Cadmium and Thallium, Magnesium and Nickel.

This left emissions of Chromium (VI) requiring further assessment. This means that for emissions of this metal, the assessment predicts that an exceedence of the relevant EAL could occur. 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 new ambient air quality guidelines for Arsenic, Nickel and Chromium (VI). These guidelines have been incorporated as EALs in the revised H1 Guidance issued by the Agency in 2010.

Chromium (VI) is not specifically referenced in 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 new guideline for Chromium (VI) is 0.2 ng/m^3.

- Measurement of Chromium (VI) at the levels anticipated at the stack emission points is expected to be difficult, with the likely levels being below the level of detection by the most advanced methods. We have considered the concentration of total chromium and chromium (VI) in the APC residues collected upstream of the emission point for existing Municipal Waste incinerators and have assumed these to be similar to the particulate matter released from the emission point. This data shows that the mean Cr(VI) emission concentration (based on the bag dust ratio) is $3.5 * 10^{-5}$ mg/m^3 (max $1.3 * 10^{-4}$).

There is little data available on the background levels of Cr(VI); so the Applicant has assumed this to be 20% of the total Cr background level, 20% is the typical value of Cr(VI) in total Cr reported in the environment in the EPAQS Guidelines.

The Applicant has used the above data to model the predicted Cr(VI) impact. The PC is predicted as 0.26% which is <1% therefore the assessment shows that emissions of Chromium (VI) are likely to be insignificant.

We agree with the applicant's conclusions.

The Applicant has assessed the impact of group 3 metals emissions to air, from the gasification plant using the Environment Agency's guidance "Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – V.3 September 2013" available on our website. The methodology follows 3 steps when required:

Step 1 (screening scenario) of this assessment assumes that each metal is emitted individually at the relevant aggregate emission limit value. This is something which can never actually occur in practice as it would inevitably result in a breach of the said limit, and so represents a very much worst case scenario.

Using the step 1 methodology, the applicant predicts that long term emissions of Antimony, Chromium, Cobalt, Copper, Lead and Vanadium would have a PC of < 1% of the relevant EAL and so can be considered insignificant. For those metals whose emissions are predicted to not be insignificant by this test, the Applicant's assessment finds that the PEC of Arsenic, Manganese and Nickel would be below 100% of the relevant EAL.

Short term group 3 metal impacts were assessed assuming that each metal is emitted individually at the relevant aggregate emission limit value; the results of this are discussed in section 5.2.1 above. None of the emissions are considered to have the potential to give rise to significant pollution

The step 2 (worst case scenario based on currently operating plant) of the group 3 metal assessment assumes that each metal is emitted as the proportion of metals in its group (i.e. one ninth of the limit for each of the group 3 metals). Historical data for Municipal Waste Incinerators indicates that 1/9th of the limit is an over estimate of actual emissions. Furthermore it is assumed that the proportion of Cr(VI) to total chromium is 20% as suggested as a worst case by the Expert Panel on Air Quality Standards (EPAQS) paper on Metals and Metalloids. The Step 2 assessment for Chromium (VI) indicates that there remains a risk of exceeding the EAL.

The step 3 (case specific scenario) assessment is carried out where Step 2 indicates that there remains a risk of exceeding the EAL for one or more metals, we require Applicants to justify their use of:

- percentages lower than 11% of the IED ELV,
- proportions of Cr(VI) of < 20%, or
- background levels different from the screening levels for their Step 3 assessment.

For their Step 3 assessment of Cr (VI) long term emissions, the applicant has used a percentage chromium figure of 2.2% of the IED ELV (mean figure for data from 10 municipal waste incinerators, taken from our "Guidance to Applicants on Impact Assessment for Group 3 Metals Stack Releases – V.3 September 2013") and have used a figure for the proportion of chromium (VI) in chromium as 8%. The applicant has taken a single background sample for chromium at the site which they have reduced for the proportion of the Cr (VI)

content, based on UK emission of air pollutants data, resulting in a background Cr (VI) figure of 0.23ng/m^3.

The step 3 assessment for Cr (VI) predicts a process contribution of just 0.26% of the EAL which we would consider to be insignificant. The PEC is predicted to be 114.66% of the EAL but this is down to the background figure used rather than predicted emissions from the facility. We consider the proposed installation will only make a negligible increase to this as per section 4.53 of Defra Part A Guidance.

We agree with the Applicant's conclusion that the PC is <1% and therefore insignificant. We have set improvement condition IC6 for the Operator to confirm this with monitoring data over the first 12 months of operation.

5.2.4 Consideration of Local Factors

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

Spelthorne Borough Council has declared the whole borough an Air Quality Management Area (AQMA) with respect to annual mean concentrations of nitrogen dioxide.

The Applicant has used local authority diffusion tube measurements for the background levels of NO_2 as per the previous variation EPR/VP3997NK/V003. The Applicant considered background data from Sunbury Cross (approximately 2km north-east of the facility) but it was not used because Sunbury Cross is located at the convergence of 4 major roads and near to the M3 motorway, whereas the facility is located near only to the M3. Thus there will not be as much traffic pollution around the facility as at Sunbury Cross. We agree that Sunbury Cross is situated in an area with higher traffic flows than is expected around the area of the proposed facility.

We therefore agree that the diffusion tube measurements are likely to be more representative of background NO_2 at the residential location of maximum predicted impacts.

We reviewed the data provided by the Applicant. The annual mean EAL was exceeded at seven roadside monitoring sites.

For the purpose of their assessment, the Applicant used the maximum monitored annual mean concentration at a background site within 3km of the facility. At the point of maximum impact the PC > 1% of the EAL.

The impact at sensitive receptors was assessed and screened out as the PC <1% of the EAL at all identified receptors. The most affected receptor is Birch Grove, which is a residential street in the AQMA. The predicted PC at this location is 0.34ug/m^3 which is 0.9% of the EAL. At the point of maximum impact the PC is 0.61 ug/m^3 which is 1.52% of the EAL.

The closest monitoring locations to Birch Street are SP11 Halliford Bypass (roadside) and SP21 Lincoln Way, Ashford (background). No exceedances were measured in 2010 or 2011. The impact of emissions at each diffuse monitoring point was assessed and the results are shown in table 9 below. The impact screened out as <1% at all monitoring locations.

The gasification facility is not predicted to cause a breach of the annual mean EAL for NO_2.

Table 9: Nitrogen dioxide impact at AQMA monitoring locations

Site Id		Classification	Back-ground (ug/m^3)	Process contribution ug/m^3	Process contribution % of EQS/ EAL	Predicted environmental concentration ug/m^3	Predicted environmental concentration % EQS/ EAL
SP4	Benwell Centre, Sunbury	Roadside	32.7	0.1	0.2	32.8	82
SP6	Goffs Road, Ashford Common	Background	32.5	0.06	0.2	32.56	81.4
SP7	High Street, Shepperton	Roadside	39.9	0.1	0.3	40	**100**
SP8	The Parade, Sunbury Cross	Roadside	53.2	0.1	0.3	53.3	**133.3**
SP9	Staines Road, West Sunbury	Roadside	46.9	0.11	0.3	47.1	**117.5**
SP10	Walton Bridge Road	Roadside	36.7	0.05	0.1	36.75	91.9
SP11	Halliford Bypass	Roadside	37.4	0.18	0.5	37.58	94
SP21	Lincoln Way, Ashford	Background	30.3	0.16	0.4	30.46	76.2
SP22	Manor Mead School Shepperton	Background	30.4	0.12	0.3	30.52	76.3
SP23	Greeno Crescent, Shepperton	Background	28.9	0.1	0.3	29	72.5
SP34	School Road, Ashford	Roadside	44.7	0.04	0.1	44.74	**111.8**
SP35	Vicarage Road, Sunbury	Roadside	42.2	0.09	0.2	42.29	**105.7**
SP36	St Ignatius School, Sunbury	Roadside	41.7	0.11	0.3	41.81	**104.5**
SP41	Green Street, Sunbury	Roadside	37.3	0.13	0.3	37.43	93.6
SP43	The Haven,	Background	36.1	0.09	0.2	36.19	90.5

Site Id		Classification	Back-ground (ug/m^3)	Process contribution ug/m^3	Process contribution % of EQS/ EAL	Predicted environmental concentration ug/m^3	Predicted environmental concentration % EQS/ EAL
	Sunbury						
SP44	The Haven, Sunbury	Background	37.6	0.09	0.2	37.69	94.2
SP45	Benwell Centre, Sunbury	Background	35.4	0.09	0.2	35.49	88.7
Average of background monitoring with 3km of facility						32.7	29.9
Maximum of background monitoring within 3km of facility						37.6	36.7

In making this assessment we have had regard to the DEFRA Guidance on A(1) installations, specifically section 4.52 which advises:

If a Community EQS is already being breached in a particular area, then a permit should not be issued to any new installation that would cause anything beyond a negligible increase in the exceedance. Again, however, if it is clear that a combination of controls on the proposed installation and measures to reduce emissions from other sources will achieve compliance with the EQS, then the installation may be permitted.

The key judgement is whether the proposed Installation would have anything beyond a "negligible" impact. We have considered:

- the peak process contribution at Birch Grove being 0.9% of the EU EQS;
- the uncertainties of modelling and the conservative nature of the assumptions used in the modelling:
    - modelling predictions are based on a worst case scenario of the plant emitting at the proposed daily average NO_2 emission limit of 100 mg/m^3 continuously throughout the year.
    - actual emissions should generally be lower as the emission limit should provide headroom to allow for unavoidable process fluctuations and there will be periodic shut downs for maintenance etc.
- improvement condition IC9 requiring a report on how NO_2 emissions are minimised through optimisation of the SNCR and SCR systems.

We can therefore conclude that assuming that the existing background levels already exceed the EU EQS the process contribution is negligible.

The impact will be small and localised. Compliance with the EU EQS is assessed over the Spelthorne geographic area as a whole and so we do not consider that the Installation will affect whether there is overall compliance or not. The annual mean is only actually known where it is continuously measured and at these points there would be no discernible impact.

It is for Defra to make the assessment of air quality for the purposes of reporting any exceedances under the Air Quality Directive. This is assessed using continuous monitors and modelling. We do not consider the Installation will have any discernible impact on this assessment or cause an exceedance of the EU EQS at any official monitor.

Nor do we consider that at the point of highest impact, assessed against what we consider to be a reasonable and representative background level, there will be an exceedance of the EU EQS. However, even if there was an existing exceedance at this point any impact on it would be negligible.

We would not consider it practical or reasonable to expect the Applicant to go beyond what is considered BAT for the control of NO_2. In this instance the applicant proposes to use SNCR and SCR for NO_x abatement.

Our assessment of BAT is detailed in Section 6 of this document.

5.3 Human health risk assessment

5.3.1 Our role in preventing harm to human health

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

i) Applying Statutory Controls

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

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

ii) Environmental Impact Assessment

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

iii) Expert Scientific Opinion

We take account of the views of national and international expert bodies. Following is a summary of some of the publications which we have considered (in no particular order).

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

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

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

The **Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (CoC) issued** a statement in 2000 which said that "any potential risk of cancer due to residency (for periods in excess of 10 years) near to municipal solid waste incinerators was exceedingly low and probably not measurable by the most modern epidemiological techniques." In 2009, CoC considered six further relevant epidemiological papers that had been published since the 2000 statement, and concluded that "there is no need to change the advice given in the previous statement in 2000 but that the situation should be kept under review".

Republic of Ireland Health Research Board report stated that "It is hard to separate the influences of other sources of pollutants, and other causes of cancer and, as a result, the evidence for a link between cancer and proximity to an incinerator is not conclusive".

The **Food Safety Authority of Ireland (FSAI) (2003)** investigated possible implications on health associated with food contamination from waste incineration and concluded: "In relation to the possible impact of introduction of waste incineration in Ireland, as part of a national waste management strategy, on this currently largely satisfactory situation, the FSAI considers that such incineration facilities, if properly managed, will not contribute to dioxin levels in the food supply to any significant extent. The risks to health and sustainable development presented by the continued dependency on landfill as a method of waste disposal far outweigh any possible effects on food safety and quality."

Health Protection Scotland (2009) considered scientific studies on health effects associated with the incineration of waste particularly those published after the Defra review discussed earlier. The main conclusions of this report were: "(a) For waste incineration as a whole topic, the body of evidence for an association with (non-occupational) adverse health effects is both inconsistent and inconclusive. However, more recent work suggests, more strongly, that there may have been an association between emissions (particularly dioxins) in the past from industrial, clinical and municipal waste incinerators and some forms of cancer, before more stringent regulatory requirements were implemented. (b) For individual waste streams, the evidence for an association with (non-occupational) adverse health effects is inconclusive. (c) The magnitude of any past health effects on residential populations living near incinerators that did occur is likely to have been small. (d) Levels of airborne emissions from individual incinerators should be lower now than in the past, due to stricter legislative controls and improved technology. Hence, any risk to the health of a local population living near an incinerator, associated with its emissions, should also now be lower."

The **US National Research Council Committee on Health Effects of Waste Incineration (NRC) (NRC 2000)** reviewed evidence as part of a wide ranging report. The Committee view of the published evidence was summarised in a key conclusion: "Few epidemiological studies have

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

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

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

A **Greenpeace** review on incineration and human health concluded that a broad range of health effects have been associated with living near to incinerators as well as with working at these Installations. Such effects include cancer (among both children and adults), adverse impacts on the respiratory system, heart disease, immune system effects, increased allergies and

congenital abnormalities. Some studies, particularly those on cancer, relate to old rather than modern incinerators. However, modern incinerators operating in the last few years have also been associated with adverse health effects."

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

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

iv) Health Risk Models

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

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

HHRAP has been developed by the US EPA to calculate the human body intake of a range of carcinogenic pollutants and to determine the mathematic quantitative risk in probabilistic terms. In the UK, in common with other European Countries, we consider a threshold dose below which the likelihood of an adverse effect is regarded as being very low or effectively zero. The HMIP model uses a similar approach to the HHRAP model, but does not attempt to predict probabilistic risk. Either model can however be used to make comparisons with the TDI.

The TDI is the amount of a substance that can be ingested daily over a lifetime without appreciable health risk. It is expressed in relation to bodyweight in order to allow for different body size, such as for children of

different ages. In the UK, the COT has set a TDI for dioxins and furans of 2 picograms I-TEQ/Kg-body weight/day (N.B. a picogram is a million millionths (10^{-12}) of a gram).

In addition to an assessment of risk from dioxins and furans, the HHRAP model enables a risk assessment from human intake of a range of heavy metals. The HMIP report does not consider metals. In principle, the respective EQS for these metals are protective of human health. It is not therefore necessary to model the human body intake.

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

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

The use of the COMEAP methodology is not generally recommended for modelling the human health impacts of individual Installations. However it may have limited applicability where emissions of NO_x, SO_2 and particulates cannot be screened out as insignificant in an H1 Environmental Impact assessment, there are high ambient background levels of these pollutants and we are advised that its use was appropriate by our public health consultees.

Our recommended approach is therefore the use of the H1 assessment methodology comparison for most pollutants (including metals) and dioxin intake models using either the HHRA or HMIP models as described above for

dioxins and furans. Where an alternative approach is adopted for dioxins, we check the predictions ourselves using the HMIP methodology.

v) Consultations

As part of our normal procedures for the determination of a permit application, we would consult PHE, FSA and in some cases HPA (often the PHE also consult with the HPA). We also consult the local communities who may raise health related issues. All issues raised by these consultations are considered in determining the application as described in Annex 4 of this document.

5.3.2 Assessment of Intake of Dioxins and Furans

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

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

The Applicant undertook a Human Health Risk Assessment (HHRA) to assess human exposure through direct inhalation and indirect exposure through ingestion of affected food. They used proprietary software IRAP-h View (version 4.0) for their assessment, which is based on the US EPA Human Health Risk Assessment Protocol (HHRAP).

The Applicant has assessed the point of maximum impact for a farmer adult and child receptor. They have also assessed the most impacted receptor (all receptors have been classed as residential).

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

Table 10: Assessment of intake of dioxins

Receptor	pg WHO-TEQ kg-1 bw day -1) [1]	% of TDI
Maximum impact – Adult	0.0208	1.04
Maximum impacted receptor – adult	0.0002	0.01
Maximum impact – child	0.0294	1.47
Maximum impacted receptor – child	0.0008.	0.04
Maximum impact – breastfeeding infant	0.311	15.57
Hetherington Road - breastfeeding infant	0.004	0.2

Calculated maximum daily intake of dioxins by local receptors resulting from the operation of the proposed facility (I-TEQ/ kg-BW/day)
Note 1 – Predicted concentrations for Adult and Child back calculated from percentage figures given by Applicant.

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

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

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

5.3.3 Particulates smaller than 2.5 microns

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

Nano-particles are considered to refer to those particulates < 0.1 µm in diameter ($PM_{0.1}$). Questions are often raised about the effect of nano-particles on human health, in particular on children's health, because of their high surface to volume ratio, making them more reactive, and their very small

size, giving them the potential to penetrate cell walls of living organisms. The small size also means there will be a larger number of small particles for a given mass concentration. However the HPA statement (referenced below) says that due to the small effects of incinerators on local concentration of particles, it is highly unlikely that there will be detectable effects of any particular incinerator on local infant mortality.

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

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

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

This is consistent with the assessment of this application which shows emissions of PM_{10} to air to be insignificant.

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

5.3.4 Assessment of Health Effects from the Installation

We have assessed the health effects from the operation of this Installation in relation to the above (sections 5.3.1 to 5.3.3). We have applied the relevant requirements of the national and European legislation in imposing the permit

conditions. We are satisfied that compliance with these conditions will ensure protection of the environment and human health.

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

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

The Applicant's assessment of the impact from Ammonia (NH_3), Carbon Monoxide (CO), Dioxins, Dioxin like PCBs, Hydrogen Chloride (HCl), Hydrogen Fluoride (HF), PM_{10}, $PM_{2.5}$, PAHs, Sulphur Dixoide (SO_2), Antimony, Chromium (II)(III), Cobalt, Copper, Lead, Mercury and Vanadium have all indicated that the Installation emissions screen out as insignificant. The impact of emissions of NO_2, VOCs (as 1, 3 butadiene), VOCs as benzene, Arsenic, Cadmium and Thallium, Magnesium and Nickel have not been screened out as insignificant. The assessment still shows that the predicted environmental concentrations are well within air quality standards or environmental action levels.

It was shown in section 5.2.3 that the long term PC for Chromium (VI) is likely to be insignificant.

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

We carried out check modelling and calculations to assess the impact of dioxins and furans on human health using the HMIP methodology and the US EPA Human Health Risk Assessment Protocol (HHRAP). Our checks are in agreement with the Applicant's that the intake of dioxins and furans is likely to be < 1% of the COT TDI, for lifetime exposure.

The Applicant also carried out an assessment of the intake of heavy metals. The EALs for metals are set to be protective of human health. We have considered the impacts of metals in section 5.2.3 above, where we agree with the Applicant's conclusion that exceedances of the EAL for all metals are not likely to occur. It is therefore not necessary to consider the metals intake assessment for the variation determination.

Overall, taking into account the conservative nature of the impact assessment (i.e. that it is based upon an individual exposed for a life-time to the effects of the highest predicted airborne concentrations and consuming mostly locally

grown food), it was concluded that the operation of the proposed facility will not pose a significant carcinogenic or non-carcinogenic risk to human health. Public Health England were consulted on the Application and concluded that they had no significant concerns regarding the risk to the health of humans from the Installation. The Food Standards Agency was also consulted during the permit determination process but no response was received. Details of the responses provided by Public Health England to the consultation on this Application can be found in Annex 2.

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

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

5.4.1 Sites Considered

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

- South West London Waterbodies (Ramsar and SPA)
- Thames Basin Heath (SPA)
- Thursley, Ash, Pirbright and Chobham Common (SAC) (not within 10km of the stack)

We consulted Natural England by means of an Appendix 11 assessment which was sent for notification purposes.

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

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

- Littleton Lake
- Queen Mary Reservoir
- Ferris Meadows
- River Ash: Gaston Bridge to Watersplash Farm
- River Thames (part)
- Charlton Quarry
- Sheepwalk Lake
- River Ash; Splash Meadow to Gaston Bridge
- Littleton Lake – Shepperton Green Reservoir
- River Ash; Splash Meadow
- River Ash; Shepperton Green
- Ashford Plant
- Ash Link Nature Reserve (designated on 4/11/11)

5.4.2 Habitats Assessment

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

We agree with the applicant's conclusions that the long term PC at the European sites were found to be < 1% of the relevant critical levels or loads and we consider that emissions are not likely to have significant effects on features of interest within the European sites either alone or in combination.

Table 11: Pollutant benchmarks

Pollutant	Objective	Time Period
Nitrogen Oxides (as NO_2)	30 µg/m^3	Annual mean
Nitrogen Oxides (as NO_2)	75 µg/m^3	Daily mean
Sulphur Dioxide	20 µg/m^3	Annual mean For all higher plants (all other ecosystems)
Ammonia[1]	1 µg/m^3	Annual mean
HF	5 µg/m^3	1 day
HF	0.5 µg/m^3	1 week

The impact at ecological receptors has been quantified by the Applicant and the results compared against the AQSs.

Table 12 Impact of emissions at sensitive ecological receptors within 10km of the stack

Site	Pollutant	Process Contribution	Percentage of benchmark
South West London Waterbodies Ramsar & SPA	Nitrogen Oxides (as NO_2) (Annual)	0.02 µg/m^3	0.06
	Nitrogen Oxides (as NO_2) (daily)	0.43 µg/m^3	0.58
	Sulphur Dioxide (annual)	0.02 µg/m^3	0.08
	Ammonia	0.0011 µg/m^3	0.04
	HF (daily)	0.0023 µg/m^3	0.05
	HF (weekly)	0.0007 µg/m^3	0.15
Thames Basin Heaths SPA	Nitrogen Oxides (as NO_2) (Annual)	0.02 µg/m^3	0.06
	Nitrogen Oxides (as NO_2) (daily)	0.23 µg/m^3	0.31
	Sulphur Dioxide (annual)	0.01 µg/m^3	0.06
	Ammonia	0.00095 µg/m^3	0.03
	HF (daily)	0.00140 µg/m^3	0.03
	HF (weekly)	0.0052 µg/m^3	0.10

There are no exceedances of the 'insignificant' screening criteria. The PC is <1% of the long term (annual) benchmark and <10% of the short term benchmark.

5.4.3 Assessment of Non-Statutory Sites

We have a duty under the Environment Act 1995 to ensure that there will be no significant impact on non-statutory sites. The Environment Agency considers that the emission of a pollutant will not be significant if the process contribution (PC), predicted by atmospheric dispersion modelling, is < 100% of the relevant critical level or load.

The Application included an assessment of the impact of emissions from the proposed Installation upon local non statutory conservation sites in terms of atmospheric concentrations of NOx, SO_2, ammonia, HF, acid deposition and nitrogen deposition.

We have checked the Applicant's annual NO_X, SO_2 and NH_3 predictions against the relevant critical levels and nutrient nitrogen and acid deposition against critical loads. We agree that the proposed plant is not likely to contribute to exceedances of the critical levels for NOx, SO_2, NH_3 and HF and critical loads for nutrient nitrogen and acid deposition.

For NO_x, the PC is >1% at 'River Ash Splash Meadow to Gaston Bridge', River Ash Splash Meadow' and 'Ashford Plant'. The highest predicted level is Ashford Plant where PC is 2.16% of the EAL. The PC at these locations is > 100%, however, the background is already over the EAL and the contribution from the installation is minimal.

For SO_2 the PC is >1% at 'Littleton Lake', 'River Ash Splash Meadow to Gaston Bridge', 'Littleton Lake Shepperton Green Reservoir', 'River Ash Splash Meadow', 'River Ash Shepperton Green' and 'Ashford Plant'. The PC is < 100% of the EAL therefore it can be assumed there will be no significant pollution as SO_2 is well below the 100% figure.

On 19 December 2011 Spelthorne Borough Council advised that a new local nature reserve was designated on 4 November 2011 called 'Ash Link Nature Reserve'. This is located 320m to the south west of the site. As discussed above, the PCs are < 100% of the appropriate environmental criterion for non-statutory conservation sites. Our check modelling also indicates the impact from the Installation on Ash Link Nature Reserve is not likely to be significant. We are satisfied that there will be no significant pollution.

Nitrogen deposition and Acid deposition:

Our check modelling indicates the impact from the proposed site on the Ash Link Nature Reserve is not likely to be significant.

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, even when the waste feed is stopped through the exceedence of an ELV or in the case of a breakdown. The CO and TOC limits are the same as for normal operation, and are intended to ensure that good combustion conditions are maintained. The backstop limit for particulates is 150 mg/m^3 (as a half hourly average) which is five times the limit in normal operation.

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

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

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

- Dioxin emissions of 10 ng/m^3 (100 x normal).
- NOx emissions of 550 mg/m^3 (1.4 x normal)
- Emission concentration of mercury has been assumed to be 100% of the IED emissions concentration of 0.05mg/m^3.
- Particulate emissions of 150 mg/m^3 (5 x normal)

- The Predicted Abnormal Emissions for each metal (except Mercury) calculated based on 15 times the emission concentration, as it is assumed that metals are in the particulate phase and so that the metal emissions during normal emissions will increase in proportion to the increase in particulate emissions.
- SO_2 emissions of 450 mg/m^3 (2.25 x normal)
- HCl emissions of 900 mg/m^3 (15 x 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.

Table 13 Assessment of abnormal emissions short term impacts – gasification facility only

Pollutant	EQS / EAL		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m^3		µg/m^3	µg/m^3	% of EAL	µg/m^3	% of EAL
NO_2	200	2	75.2	16.5	8.3	91.7	45.9
PM_{10}	50	3	48.2	2.2	4.40	50.4	100.8
SO_2	266	4	8.78	50.2	**18.9**	58.98	22.2
HCl	750	6	1.06	175.8	**23.44**	176.9	23.58
HF	160	6	4.7	17.6	11	22.30	13.9
Hg	7.5	1	0.004	0.147	1.96	0.15100	2.013
Sb	150	1	0.00572	0.0337	0.02	0.03942	0.026
Cu	200	1	0.01246	0.0478	0.02	0.06026	0.030
Mn	1500	1	0.01132	0.107	0.01	0.11832	0.0079
Cr (II)(III)	150	1	0.00572	0.153	0.10	0.15872	0.1058
Dioxins			2.8E-08	6.8E-07		7.08E-07	

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
6 1-hour average

From the table above the emissions of the following substances can still be considered insignificant, in that the PC is still <10% of the short-term EQS/EAL. These are Nitrogen Dioxide, PM_{10}, Hydrogen Fluoride, Mercury, Antimony, Copper, Magnesium and Chromium.

Also, from the table 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 < 100% of short term EQS/EAL. These are Sulphur Dioxide and Hydrogen Chloride. This is a worst case scenario and unlikely to occur. Failure of monitoring equipment will not of itself affect emission and in any event they have to restore normal conditions as soon as possible so we don't consider in practice a breach is likely.

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

We have not assessed the impact of abnormal operations against long term EQSs for the reasons set out above except for dioxins. To assess whether there will be a significant increase in the impact of dioxins, the Applicant has assessed the increase for a receptor exposed to the TDI.

The results predict an increase in the maximum ground level concentration of 67.8%. In the HHRA the Applicant predicted an adult farmer receptor at the point of maximum impact to be exposed to 36.04% of the TDI, of which 1.04% is the process contribution from the facility.

Assuming the impact of abnormal operations, the Applicant has calculated that the point of maximum impact will be exposed to 36.74% of the UK TDI for dioxins. At this level dioxins will not pose a significant risk to human health.

We are satisfied that these levels do not pose a risk to human health.

Abnormal emissions from gasifier, gas engines and AD flare stack

In response to a Schedule 5 notice dated 21/02/14, the Applicant stated that the AD flare is only designed to be operated when there is excess biogas, for example in the event of a failure of the AD gas engines. Therefore whilst the operation of the gasifier and flare is technically feasible, it is highly unlikely. The Applicant modelled the short term impact resulting from abnormal operation including the gas engines and flare stack. We audited the Applicant's modelling files for abnormal and short term emissions from the gasifier concurrently with emissions from the gas engines and flare and agree that the 15 minute SO_2 ground level concentration arising from the activities will not give rise to an exceedance of the relevant EQS.

Removal of boiler protection vents

The proposed gasification facility is a different technology to the previously proposed batch gasification system. In response to clarification questions in a memo dated 16/05/14 the Applicant stated that boiler protection vents are not required in the proposed fluidised bed gasification technology. Alternative process control measures are available to control the gasification process. The principle control to prevent the temperature within the gasification

chamber from becoming critical is to stop the fuel feed for the gasification system. This was not possible on the previous design. If the temperature within the gasification zone becomes elevated, the proportion of fluidising air which is taken from the flue gas recirculating system will be increased. This will further reduce the oxygen content in the gasification and oxidation zones and reduce the temperature within the staged gasifer.

6. Application of Best Available Techniques

6.1 Scope of Consideration

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

- Firstly we consider the measures required for the new waste operation; Road Sweeping Bulking Facility.

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

- We then consider particular control measures for the emissions which were not screened out as insignificant in the previous section on minimising the Installation's environmental impact. They are: NO_2, VOCs (as 1, 3 butadiene), VOCs as benzene, Arsenic, Cadmium and Thallium, Magnesium and Nickel.

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

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

We consider that the Operator has in place the necessary measures for the new waste operation. We are satisfied that the proposed drainage and effluent disposal is appropriate for the activity. The relevance with regard to the WFD is further discussed in section 7.1.2.

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; however no new BAT conclusions will be available before around 2020 therefore we still need to consider the WID Bref. Emissions should be prevented or minimised, so it may be possible and desirable to achieve emissions below IED limits. This is

the case for oxides of nitrogen emissions for which the permit currently has a daily emission limit of 100mg/m^3 which is half of the IED limit. This limit is retained for the new gasification technology.

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

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

6.1.1 Consideration of Furnace Type

The prime function of the furnace is to achieve maximum combustion of the waste. Chapter IV of the IED requires that the plant (furnace in this context) should be designed to deliver its requirements. The main requirements of Chapter IV in relation to the choice of a furnace are compliance with air emission limits for CO and TOC and achieving a low TOC/LOI level in the bottom ash.

The Waste Incineration BREF elaborates the furnace selection criteria as:

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

The BREF also provides a comparison of combustion and thermal treatment technologies and factors affecting their applicability and operational suitability used in EU and for all types of wastes. There is also some information on the comparative costs. The table below has been extracted from the BREF tables. This table is also in line with the Guidance Note "The Incineration of

Waste (EPR 5.01). However, it should not be taken as an exhaustive list nor that all technologies listed have found equal application across Europe.

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

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

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

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

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

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

Technique	Key waste characteristics and suitability	Throughput per line	Advantages	Disadvantages / Limitations of use	Bottom Ash Quality	Cost
Gasification - entrained flow	Mixed plastic wastes Other similar consistent streams Not suited to untreated MSW Gasification less widely used/proven than incineration	To 10 t/h	Low leaching slag Reduced oxidation of recyclable metals	Limited waste feed Not full combustion High skill level Less widely proven	Low leaching slag	High operation/ maintenance costs Pre-treatment costs high
Gasification - fluid bed	Mixed plastic wastes Shredded MSW Shredder residues Sludges Metal rich wastes Other similar consistent streams Less widely used/proven than incineration	5 – 20 t/h	Temperatures e.g. for Al recovery Separation of non-combustibles Can be combined with ash melting Reduced oxidation of recyclable metals	Limited waste size (<30cm) Tar in raw gas Higher UHV raw gas Less widely proven	If combined with ash melting chamber ash is vitrified	Lower than other gasifiers
Pyrolysis	Pre-treated MSW	~ 5 t/h (short drum)	No oxidation of metals	Limited wastes	Dependent on process	High pre-treatment,

	High metal inert streams shredder residues/plastics Pyrolysis is less widely used/proven than incineration	5 – 10 t/h (medium drum)	No combustion energy for metals/inert In reactor acid neutralisation possible Syngas available	Process control and engineering critical High skill req. Not widely proven Need market for syngas	temperature Residue produced requires further processing e.g. combustion	Operation and capital costs

As detailed in variation EPR/VP3997NK/V003, the selected technology for the treatment of waste at Charlton Lane Eco Park is gasification. In this variation, the Applicant has carried out a review of the following candidate furnace types:

- Conventional gasification and pyrolysis
- Close-coupled gasification
- Plasma gasification

The Applicant carried out a qualitative assessment of these techniques and concluded that, based on a comparison of the alternatives available for thermal treatment that fall within the constraints of the site and project, the option of close coupled fluidised bed gasification would be considered further.

A fluidised bed gasification process was considered to have significant advantages over other gasification systems. In particular the Applicant states the following:

- The gasification chamber operates at a lower temperate than the combustion chamber for a conventional EfW plant;
- The combustion of syngas to generate steam is simpler than using syngas in a gas engine or turbine.
- Fluidised bed is appropriate where waste fuels, such as those to be treated within the gasification plant, have been pre-treated at a pre-treatment facility.

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

The Applicant proposes to use low sulphur fuel oil as support fuel for start-up, shut down and for the auxiliary burners. The Applicant states that the Installation of a fuel oil tank is appropriate for Charlton Lane Eco Park. The Applicant acknowledges that fuel oil is classed as flammable, but that it does not pose the same type of safety risks as the storage of LPG. The combustion of fuel oil will lead to emissions of sulphur dioxide but these emissions will be minimised as far as practicable through the use of low sulphur fuel oil. We agree that the use of low sulphur fuel oil represents BAT for the Installation.

Boiler Design

In accordance with our Technical Guidance Note, S5.01, the Applicant has confirmed that the boiler design will include the following features to minimise the potential for reformation of dioxins within the de-novo synthesis range:

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

- design of boiler surfaces to prevent boundary layers of slow moving gas.

We have considered the assessments made by the Applicant and agree that the furnace technology chosen represents BAT. We believe that, based on the information gathered by the BREF process, the chosen technology will achieve the requirements of 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 flue-gas treatment (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 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; and
- release of noise.

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

6.2.1 Particulate Matter

Table 14 Particulate matter abatement

Particulate matter				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Bag / Fabric filters (BF)	Reliable abatement of particulate	Max temp 250°C	Multiple compartments	Most plants

	matter to below 5mg/m^3		Bag burst detectors	
Wet scrubbing	May reduce acid gases simultaneously.	Not normally BAT. Liquid effluent produced	Require reheat to prevent visible plume and dew point problems.	Where scrubbing required for other pollutants
Ceramic filters	High temperature applications Smaller plant.	May "blind" more than fabric filters		Small plant. High temperature gas cleaning required.
Electrostatic precipitators	Low pressure gradient. Use with BF may reduce the energy consumption of the induced draft fan.	Not normally BAT.		When used with other particulate abatement plant

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

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

6.2.2 Oxides of Nitrogen

Table 15 NO_x abatement: primary measures

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)

Table 16 NOx abatement: secondary measures

Oxides of Nitrogen : Secondary Measures (BAT is to apply Primary Measures first)				
Technique	**Advantages**	**Disadvantages**	**Optimisation**	**Defined as BAT in BREF or TGN for:**
Selective catalytic reduction (SCR)	NOx emissions < 70mg/ m^3 Reduces CO, VOC, dioxins	Expensive. Re-heat required – reduces plant efficiency		All plant
Selective non-catalytic reduction (SNCR)	NOx emissions typically 150 - 180mg/m^3	Relies on an optimum temperature around 900 °C, and sufficient retention time for reduction May lead to Ammonia slip	Port injection location	All plant unless lower NOx release required for local environmental protection.
Reagent Type: Ammonia	Likely to be BAT Lower nitrous oxide formation	More difficult to handle Narrower temperature window		All plant
Reagent Type: Urea	Likely to be BAT			All plant

The Applicant proposes to implement the following primary measures:

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

recovery, although in some applications there can be corrosion problems – the technique is considered BAT for all plant

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

SCR can reduce NO_x levels to below 70 mg/m^3 and can be applied to all plant, it is generally more expensive than SNCR and requires reheating of the waste gas stream which reduces energy efficiency, periodic replacement of the catalysts also produces a hazardous waste. SNCR can typically reduce NO_x levels to between 150 and 180 mg/m^3; it relies on an optimum temperature of around 900 deg C and sufficient retention time for reduction. SNCR is more likely to have higher levels of ammonia slip. The technique can be applied to all plant unless lower NO_x releases are required for local environmental protection. Urea or ammonia can be used as the reagent with either technique, urea is somewhat easier to handle than ammonia and has a wider operating temperature window, but tends to result in higher emissions of nitrous oxide (N_2O). Either of the reagents can be considered to be BAT and the use of one over the other is not normally significant in environmental terms.

The Applicant proposes to use SNCR as primary NO_x abatement and SCR as secondary NO_X abatement. The SNCR system will operate by injecting urea solution into the gasifier which reacts with NO_x at temperatures between 900^oC and 1000^oC.

The SCR unit will be located between the multicyclone and the economiser. The SCR system will operate by injecting urea into the flue gas stream before passing over a catalyst.

Emissions of NO_x have were not screened out as insignificant but have been assessed as being unlikely to give rise to significant pollution in that the predicted environmental concentration is < 100% (taking expected modelling uncertainties into account) of both the long term and short term EQS/EAL. The Environment Agency agrees that the Applicant's proposed technique is BAT for the Installation.

The amount of urea / ammonia used for NO_x abatement will need to be optimised to maximise NO_x reduction and minimise NH_3 slip. Improvement condition IC5 requires the Operator to report to the Environment Agency on optimising the performance of the NO_x abatement system. The Operator is also required to monitor and report on NH_3 and N_2O emissions every 6 months.

6.2.3 Acid Gases, SO_x, HCl and HF

Table 17 Acid gas abatement: primary measures

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

Table 18 Acid gas abatement: secondary measures

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 solid residue production Reagent consumption controlled only by input rate		All plant

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

The Applicant proposes to implement the following primary measures:

- Use of low sulphur fuels for start up and auxiliary burners – gas oil will be used, this will be low sulphur (i.e. <0.1%), this will reduce SO_x at source. The Applicant has justified its choice of gas oil 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 is high acid gas and metal components in the exhaust gas as may be the case for some hazardous waste incinerators. In this case, the Applicant does not propose using wet scrubbing, and the Environment Agency agrees that wet scrubbing is not appropriate in this case.

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

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

In both dry and semi-dry systems, the injected powdered reagent reacts with the acid gases and is removed from the gas stream by the bag filter system. The powdered materials are either lime or sodium bicarbonate. Both are effective at reducing acid gases, and dosing rates can be controlled from continuously monitoring acid gas emissions. The decision on which reagent to use is normally economic. Lime produces a lower leaching solid residue in the APC residues than sodium bicarbonate and the reaction temperature is well suited to bag filters, it tends to be lower cost, but it is a corrosive material and can generate a greater volume of solid waste residues than sodium bicarbonate. Both reagents are 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, as energy efficiency will be better due to the flue gases not being cooled by evaporating water, water use will be less and the operating costs will be slightly lower with no reduction in abatement.

The Applicant proposes to use lime instead of sodium bicarbonate as the acid gas reagent for the following reasons:

- Sodium bicarbonate residue has a higher leaching ability than lime based residue, and therefore may require additional treatment prior to disposal, making it more expensive to dispose of; and
- The reaction temperature for sodium bicarbonate doesn't match as well with the optimum adsorption temperature for activated carbon, which will be dosed at the same time as the acid gas reagent.

Taking this into consideration, we agree the use of lime is considered to represent BAT for this facility.

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.

Table 19 Carbon monoxide and VOCs abatement

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)

Table 20 Dioxins and furans abatement

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 section 6.2.1 above; and
- 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

Table 21 Metals abatement

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

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

Taking this into account, the net emissions of CO_2 from the Installation are estimated at 19,640 tonnes per annum. At this level emissions cannot be characterised as insignificant. The Installation is not subject to the Greenhouse Gas Emissions Trading Scheme Regulations 2003; therefore it is a requirement of IED to investigate how emissions of greenhouse gases emitted from the Installation might be prevented or minimised.

The Applicant has considered GWP as part of its BAT options appraisal. There are a number of areas in which a difference can be made to the GWP of the Installation. For example, the Applicant will be utilising SCR as well as SNCR methods of secondary NO_x abatement. In summary: the following factors influence the GWP of the facility:-

On the debit side

- CO_2 emissions from the burning of the waste;
- CO_2 emissions from burning auxiliary or supplementary fuels;
- CO_2 emissions associated with electrical energy used; and
- 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; and

- CO_2 saved from the use of waste heat by displacement of burning of virgin fuels.

The plant will burn 44,710 tonnes per annum (tpa) of waste. The applicant has estimated the carbon content of incoming waste at 27.5% w/w. This has been calculated from data collated from a number of waste projects. The applicant has also estimated the renewable content (biodegradable carbon) of the incoming waste is 64% in accordance with the Landfill Allowance Trading Scheme. From this we have estimated the emissions of CO_2 as follows in the table below.

Table 22 CO_2 balance

Source		**GWP (CO_2 tonnes equivalent per annum)**	
		Released	**Saving/offset**
Direct CO_2 emissions (auxiliary fuel)	[1]	220	
Direct CO_2 emissions (imported electricity)	[2]	90	
CO_2 emissions from the process	[3]	28,853	
N_2O from the process (urea method)	[4]	2,100	
Total released		**31,262**	
Energy recovered (electricity)	[5]		**11,622**
Energy recovered (heat)			0
Total offset			**11,622**
Net GWP (total released – total offset)		**19,640**	

[1] [2] [4] [5] Figures from permit application EPR/VP3997NK/V005, Greenhouse Gas Assessment, Section 2 (page 6).

[3] RDF dry waste throughput = 44,710 tonnes per year

C content of incoming waste = 27.5% (figure provided by applicant)

Renewable content of incoming waste = 64% (figure provided by applicant)

CO_2:C factor = 44/12

Calculation as follows:

44,710 x 0.275 x 0.64 x (44/12) = 28,853 tpa

Direct CO_2 emissions from the process = 28,853 tpa CO_2

[5]
29,200MWh of electricity
CO_2 equivalence factor = 0.398
Energy recovered (electricity) = 29200 x 0.398 = 11,621.6

This is based on 29,200 MWh of electricity being exported from the Installation. The applicant has used a CO_2 equivalence factor of 0.6 tonnes per MWh. This is higher than the factor stated in Environment Agency Guidance Note H1 (Annex h) which states that electricity from public supply will have emissions of 0.166 t CO2/MWh with a primary conversion factor of

2.4. Therefore the carbon dioxide emissions from public supply will be 0.398 tonnes per MWh. Although this is more conservative than the factor used by the applicant, it does not change the conclusions made in our assessment.

The net GWP is therefore 19,640 tonnes of CO_2, which is equivalent to 0.44 tonnes of CO_2 per tonne of waste incinerated.

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

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

The Environment Agency agrees that the chosen option is BAT for the Installation.

6.4 BAT and POPs

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

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

The unintentionally-produced POPs addressed by the Convention are:

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

Protect legally privileged The document is in DRAFT at this stage, because we have yet to make a final decision.

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

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

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 Equivalent) limit of 0.1 ng/m^3. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK's independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. EPR 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. EPR 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 will be no process emissions to water. 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.

There are no changes to the discharge of surface water. Rainwater run off will continue to be discharged to groundwater through an infiltration basin at discharge point W1 listed in table S3.2 of the Permit. Oil separators and catch pits will be incorporated into the drainage system to capture any oil spills from vehicles and to limit siltation within the system and basin. There will also be a small reed bed prior to the basin.

As this will be clean surface water, no emission limits have been set in the Permit for this discharge. Consequently this discharge is covered by Permit conditions 3.2.1 and 3.2.2.

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

6.5.2 Emissions to sewer

The following effluent streams will be discharged to sewer:

- Liquor from the AD facility;
- Boiler blowdown and other liquid effluent from the Gasification Plant;
- Wastewaters from the demineralisation water treatment plant; and
- Wash down waters from operational areas.

The emissions to sewer will be subject to an existing Trade Effluent Consent issued by Thames Water. The facility's discharge to sewer leads to Mogden Sewage treatment works which discharges to the River Thames. Mogden

Treatment works already has an Environmental Permit for its water discharge to the river Thames, which has been assessed by the Environment Agency previously.

The PC for Ammonia is >4% of the EQS and therefore didn't screen out in the H1 software tool. However, the receiving watercourse is transitional therefore ammonia can be screened out if it is <100% of the EQS, which in this case it is. No further modelling was required. Emissions from this Installation into the River via the STW will not have a significant impact on the River. Discharge to sewer is BAT for the discharges in question.

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

6.5.3 Fugitive emissions

The IED specifies that Applciant 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 Application details the following measures.

Odour and dust in the gasification plant building will be controlled by draught fans located in the reception hall that would extract air for use within the gasification process; this would result in a slight negative pressure within the tipping hall preventing odours, dust or litter from escaping the building. Air extracted from the waste reception and processing building areas shall be treated by a carbon filter based odour control system, further described in section 6.5.4 below.

The Gasification building will contain a dust suppression system, consisting of a sprinkler type system which emits a very fine spray to suppress dust. Additives can be incorporated into the spray to mitigate odours when required.

Access to the AD reception area would be via fast acting doors operated by staff within the AD facility. Delivery vehicles will reverse into the reception area and the doors will remain closed whilst waste is deposited. The building would be maintained under negative air pressure through the extraction of air by forced ventilation. Air extracted from the AD Process Building will be pressurised before being passed through a carbon filter system contained within the Odour Control Facility. The carbon filters will remove odours and particulate elements ensuring dust and odour are not released into the surrounding atmosphere. Having passed through the carbon filters the treated air would be discharged to the atmosphere using the main stack (emission point A7).

The biogas gasholder is a safety device acting as a volume buffer to the digester and hydrolysis tank. When liquid is pumped out of the digestate tanks the gasholder provides biogas to replace the lost volume hence maintaining system pressure. Similarly when biogas is produced within the digester tanks the gasholder will act as a storage volume for this gas, hence preventing an increase in gas pressure.

The diesel storage tank will be located in a bunded area. As mentioned above, we have not yet approved the bund design for this tank. The tank will be equipped with level indicators and an overfilling protection level switch which will close the motorised valves in the filling line. The filling of the tank will be carried out by road tanker. The tanker hose coupling will be located in a bunded area.

A bunded oil gas tank will be situated above ground and within the building envelope to provide oil for the combustion chamber burners and on-site vehicles. The tank bunding system will contain 110% of the tank contents.

The application states that all chemicals stored on site will be kept inside bunded areas or in double skinned vessels. Diesel fuel and urea solution will be held in a bunded storage tank and a double skinned storage tank respectively. Pre-operational condition PO15 will ensure that all tanks are reviewed and that secondary containment is to the relevant standards.

In the event of a fire, all fire water will be collected in the site drainage system. This will prevent any water discharges from leaving the Installation. The capacity of the drainage system and kerbed areas of hard standing will have a capacity corresponding to greater than the volume of water from 2 hydrants operating at full capacity for 2 hours. We have included pre-operational condition PO14 requiring the Operator to submit the final site drainage plan to the Environment Agency for approval.

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 and taking into account the requirements of pre-operational condition PO12, 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 application proposes that air extracted from the waste reception and processing building areas shall be treated by a carbon-filter-based odour control system. Odour from the maturation hall shall be pre-treated in an ammonia scrubber first. Air extracted from the AD Process Building will be pressurised before being passed through a carbon filter system. The carbon filters will remove odours and particulate elements. Treated air from the odour control system will be discharged via emission point A7, 49m in height,

located adjacent to the gasification plant. This is the main stack with a shared windshield.

The entry/exit into the gasification building will be equipped with a manually operated, fast acting, roller shutter door which would be kept closed when deliveries were not taking place.

The Applicant carried out a H1 risk assessment for odour releases and concluded that the overall risk of odour emissions is not significant. They also modelled the odour releases from the odour control plant stack, which we audited.

In their response to a schedule 5 notice, dated 21/02/14, the Applicant explained that the odour release rate from the SBR tank (10 OuE/m^{-2}) has been provided by the manufacturer (Monsal) as a 'typical value'. This does not take into account the possibility of seasonal or other variations in emission rate that may occur. However, our audit predicts the maximum predicted value at a receptor is such that this 'typical' value would have to increase by around an order of magnitude for the odour benchmark at a receptor to be reached which we think is unlikely.

The Applicant modelled odour release stack at a volumetric flow rate of 15 m/s which equates to 54,000m^3/hr and an emission rate of 13,899 OuE/s. This equates to odour emission concentration of 1,000 ouE /m^3. 1,000 ouE /m^3 is a commonly used odour emission concentration for filters in AD plants. A well designed and maintained filter should be able to reduce odour concentrations to below 1,000 ouE /m^3. However, actual concentrations are dependent on the inlet odour loading.

The Applicant assumed a typical odour emission provided by the technology suppliers of 10 ouE /m^2/s for the SBR tank. They have modelled the tank as an area source with dimensions 14m x 14m.

The Applicant assessed the 98th percentile of hourly average concentrations against the odour benchmark of 1.5ouE/m^3 given in the Environment Agency Horizontal guidance note H4 "Odour Management". This is the strictest benchmark for 'most offensive' odours.

The highest predicted 98th percentile of hourly means is 1.43 ou_E/m^3 which is 95% of the 1.5OuE/m^3 odour benchmark.

We carried out detailed check modelling based on the odour release concentrations in the Application and response to the Schedule 5 notice. We carried out our own modelling using meteorological data observed at Heathrow between 2003 and 2007.

Our predictions are in agreement with the Applicant: the 98th percentile hourly average odour concentration is likely to be below the strictest Environment Agency benchmark of 1.5 ouE /m^3 for 'most offensive' odours. This indicates

the proposed facility is unlikely to be a cause of odour annoyance based on emissions from the stack and SBR tank.

Whilst we consider it unlikely that the facility will cause odour annoyance, the facility is undertaking activities where odour can be a problem. Consequently we have retained pre-operating condition PO12 which was imposed in the previous variation EPR/VP3997NK/V003, requiring the submission of an odour management plan before the proposed facility can operate.

6.5.5 Noise and vibration

Based upon the information in the Application, and taking into account the requirements of pre-operating condition PO9, 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. Our check modelling indicates that the noise impact of the site is likely to remain similar to the currently permitted Installation.

The Application contained a noise impact assessment which identified local noise-sensitive receptors, potential sources of noise at the proposed plant and noise attenuation measures. Measurements were taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS4142 to compare the predicted plant rating noise levels with the established background levels. They used noise modelling software Cadna-A, which incorporates the ISO 9613-2:19962 calculation scheme. The Applicant calculated on-site traffic movements using the CRTN scheme. This is a commonly used calculation scheme which is built into Cadna.

The BS 4142 provides appropriate guidance for assessing the likelihood of complaints being received about noise from a new industrial premises or processes. The Standard uses the concept of a 'rating level' which is based on the 'specific' noise from the new development (measured in terms of LAeq), with a correction of 5 dB applied to account for any tonal or impulsive characteristics in the noise (in recognition of the fact that these can increase the likelihood of complaint). The rating level is compared against the pre-existing background noise level (measured in terms of LA90) and where the rating level exceeds the background level by 10 dB(A) or more the Standard observes that complaints are likely. Where the rating level exceeds background by around 5 dB(A) the Standard considers the noise impact to be of 'marginal significance' with respect to complaint risk. Where the rating level is more than 10 dB(A) below background the Standard considers this to be a positive indication that complaints are unlikely.

We agree with the modelling approach taken by the Applicant to the noise impact assessment but found that some aspects of the modelling were flawed. Using noise modelling software Cadna-A 4.3, our check modelling confirms that the dominant source of noise at Ivydene Cottage receptor is predicted to

be the movement of HGVs, cars and noise coming from the building interior when the gasification doors are open. With the exception of noise assessment impact at Ivydene Cottage we agree with the applicants conclusions that the impact at sensitive receptors is likely to be below 'marginal significance' for both day and night-time operations. Ivyedene Cottage is no longer occupied and is now owned by SITA.

The Applicant's noise modelling report included details of a number of noise remediation measures to be incorporated in the plant design including acoustic screens at the northern and western boundary of Ivydene Cottage, and alongside the HGV manoeuvring area on the eastern facade of the gasification building. In the original application the screen alongside the HGV area was not included in the model set up. In the Schedule 5 response dated 05/03/14 the Applicant re-submitted the model including the barrier. This indicates that the screen leads to a reduction in the noise impact at Hawthorne Way during the daytime and at Ivydene Cottage during the daytime and night-time.

The Application states that the noise coming from the interior building when the gasification doors are open has been modelled for daytime. However, the model files appear to show the sound power level used in the model is an order of magnitude too low. The Schedule 5 response dated 05/03/14 stated that the model was assessed without any Sound Reduction Index (SRI) value in the calculation. This shows the significance of the door being open in the overall calculation. Our check modelling included sensitivity analysis to model the open doors on the eastern side of the gasification plant. It used the applicant's values for reverberant sound pressure in the gasification building and a transmission loss of zero. Our check modelling indicates that the Applicant's assessment is likely to have underestimated the noise impact because the gasification door sound power levels are too low.

The Applicant did not calculate the specific noise for a receptor of 4 metres in height during the daytime, stating that they believed the 4 metre position was relevant for night-time periods only, as this is when sleep disturbance is a consideration. We disagree with this justification. The 4 metre height represents the first floor of a building and is relevant during both daytime and night-time, to take account of individuals who may spend daylight hours on the first floor level. We tested sensitivity to a 4 metre receptor in our check modelling which indicated that the Applicant's assessment is likely to have underestimated the noise impact.

BS4142 states that certain acoustic features can increase the likelihood of complaint over that expected from a simple comparison between the specific noise level and the background noise level. These features include a distinguishable, discrete, continuous note; distinct impulses; or noises that are irregular enough to attract attention. Where present at the assessment location, such features are taken into account by adding 5 dB to the specific noise level to obtain the rating level. For all receptors the applicant has assumed that the rated noise level is equal to the specific noise level – i.e.

that there are no noise sources that would give rise to the types of features described above. The Applicant has not provided any justification for this assumption. However, a consideration of the most prominent site noise sources at some local receptors shows that noise is likely to be experienced as irregular and therefore the 5 dB(A) penalty is appropriate.

Our assessment indicates that as a worst case if the 5dB penalty is not applied (because the facility is proposed to be designed to eliminate tonal or unusual noise characteristics) the worst case noise impacts would be at Ivydene Cottage on Saturday and Sunday daytime, where noise impacts could be of marginal significance. If the 5dB penalty is applied the worst case noise impacts would be at Ivydene Cottage where noise impacts could be above marginal significance on Saturday daytime and complaints are likely on Sunday daytime.

For most receptors we are satisfied noise is not an issue. For Ivydene Cottage we are satisfied that at most times noise will not be an issue. We have retained pre-operational condition, PO9, to provide details of final design of the plant and to demonstrate that noise emissions will be at levels that will not cause significant pollution. The proposed activities are not permitted to operate until we have received and approved the response to PO9. They will then have to construct and operate in accordance with the approved details. The submission will have to take into account a receptor height of 4m for daytime and night-time and include a tonal element or justify why this is not appropriate.

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

Gasification plant

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.

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. We also explain where we have set emission limits below benchmark levels for emission points not subject to WID.

- NO_2 daily emissions limit has been set at 100mg/m^3, which is half that of the IED limit. At this level, even combined with the gas engine emissions, we agree with the Applicant's assessment that the EQS is unlikely to be exceeded.

- NO_2 half hourly limit has been set at the IED limit of 400 mg/m^3. We consider that NOx control techniques discussed in section 6.2.2 of this document can be considered BAT, and as the PEC is only 47.15% of the short term EQS we do not consider it necessary to go beyond BAT or the IED limit.

- The VOC daily emission limit has been set at the IED limit. At this limit, the max PC of long term VOC emissions is predicted to be up to 18.96% of the EQS, whilst the PEC is only 26.07% of the EQS. Thus we do not we do not consider it necessary to go beyond BAT or the IED limit.

- The Cadmium and Thallium emission limit has been set at the IED limit. At this limit, the PC of long term Cadmium emissions is predicted to be 6.64% of the EQS, whilst the PEC is only 10.64% of the EQS. Thus we do not we do not consider it necessary to go beyond BAT or the IED limit.

- The Group III metals emission limit has been set at the IED limit, as proposed by the Applicant. At one 9th of this limit, the PC of long term Arsenic emissions is predicted to be 12.3% of the EQS, whilst the PEC is 43.97% of the EQS. At the IED limit, the PC of long term Nickel, Manganese and Lead emissions are predicted to be over 1% of the EQS, whilst their PECs are well below the EQS. At the IED limit, the PC of Vanadium is predicted to be 18.6% of the EQS, whilst the PEC is 19.2% of the EQS. Thus we do not we do not consider it likely that Group III metal EQS's will be exceeded and so do not consider it necessary to go beyond BAT or the Group III metals IED limit.

- The Hydrogen Fluoride emission limit, for the Gasifiers, has been set at 2mg/m^3. This is the limit proposed by the Applicant. In their air dispersion modelling they used a figure of 1mg/m^3. However for both long term and short term emissions the PC was predicted to be well below the thresholds of insignificance. The 2mg/m^3 figure is considered appropriate, because the impact at this limit will still be insignificant, and it will allow for fluctuations in operation.

There is no IED limit for PAH emissions, however the Applicant's modelling showed that the predicted PC for long term emissions screened out as <1% of the EQS. We consider that compliance with the ELV for dioxins will ensure that PAHs emissions are minimised, and therefore we have decided not to set a specific ELV for PAHs. PAH emissions have proved to be variable across the sector and the Environment Agency is currently collating data and reviewing the emissions of PAH's from a number of incinerator sites as part of a review of the requirement for emissions monitoring of PAH's.

Gas Engines

- The NO_2 emission limit has been left at 300mg/m^3, which is lower than the 500mg/m^3 benchmark figure given in table 2.4 of technical guidance note "Guidance for monitoring landfill gas engine emissions LFTGN08 v2 2010" (there is no specific technical guidance note for AD plant gas engines and flares, but the gas which they burn is comparable to landfill biogas and we therefore apply the same standards). The impacts of NOx emissions are discussed above.

- The carbon monoxide, CO, emission limit has been changed to 1400mg/m^3, which is the benchmark figure given in table 2.4 of technical guidance note "Guidance for monitoring landfill gas engine emissions LFTGN08 v2 2010". The impacts of CO have been modelled to be insignificant at this emission limit.

- The sulphur dioxide, SO_2, emission limit has been changed to 350mg/m^3, which is the benchmark figure given in table 2.1 of technical guidance note "Guidance for monitoring landfill gas engine emissions LFTGN08 v2 2010". The impacts of SO_2 have been modelled to be insignificant at this emission limit. There is no benchmark figure for SO_2.

- The VOC limit has been set at 1000mg/m^3, the benchmark figure given in table 2.4 of technical guidance note "Guidance for monitoring landfill gas engine emissions LFTGN08 v2 2010" is 1000mg/m^3. At this level we agree with the Applicant's assessment that EQS's are unlikely to be exceeded.

Flare stack

The flare stack will normally only be required to operate when the CHP gas engines are not in use for routine maintenance and are unavailable to use the biogas produced by the digester. If it operates for more than 10% in a year (876 hours) then, in accordance with our Technical Guidance Note for monitoring enclosed landfill gas flares, LFTGN05, the Permit requires the flare to be monitored.

- The NO_2 emission limit has been set at 150mg/m^3 (at 3% oxygen reference conditions) which is the benchmark in table 2.1 of LFTGN05. The impacts of NO_2 emissions, when the flare stack operates at this limit, but at 5% oxygen reference conditions, have been modelled to be insignificant for short term impacts and will not cause a breach of the EQS for long term impacts. The use of the higher oxygen reference condition overestimates the effects of NO_2 at the permitted emission limit.

- The carbon monoxide, CO, emission limit has been set 50mg/m^3 (at 3% oxygen reference conditions) which is the benchmark in table 2.1 of LFTGN05. The impacts of CO emissions, when the flare stack operates at this limit, at 5% oxygen reference conditions, have been modelled to be insignificant. The use of the higher oxygen reference

condition overestimates the effects of CO at the permitted emission limit.

- The sulphur dioxide, SO_2, emission limit has been set at 395mg/m^3 (at 3% oxygen reference conditions). There is no benchmark figure for SO_2. The impacts of SO_2 emissions have been modelled to show that a breach of an EQS is unlikely.

- The VOC limit has been set at 10mg/m^3, which is the benchmark in table 2.1 of LFTGN05.

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.

(i) Local factors

We have considered the fact that the Installation is within the Spelthorne AQMA for NO_2. As discussed in section 5.2.4, we conclude that any breach of the NO_2 AQS will be unlikely.

(ii) National and European EQSs

As discussed above, the facility is within the Spelthorne AQMA for NO_2, however we have concluded that any breach of the NO_2 AQS is unlikely.

(iii) Global Warming

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

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

(iv) Commissioning

The Application refers to commissioning and the validation of combustion conditions for the Gasification plant, however it does not give any specific plan with timetables and does not cover all the requirements of our guidance note Incineration of Waste Sector Guidance Note EPR 5.01. As a consequence we have retained pre-operational condition PO6.

Pre-operational condition PO8 requires a commissioning plan for the new activities (A1 to A3) including timelines for completion. The commissioning plan will include the expected actual emissions (rather than the permitted 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.

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 and SCR systems; to deliver the EPR requirement that dioxin-like PCBs and PAHs should be monitored and to deliver the requirements of Chapter IV of IED for monitoring of residues and temperature in the combustion chamber.

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

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

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

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

Condition 2.3.10 of the permit requires that the abnormal operating conditions apply.

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

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

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

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

In the case of dioxins, equipment is available for taking a sample for an extended period (several weeks), but the sample must then be analysed in the conventional way. However, the continuous sampling systems do not meet the requirements of BS EN 1948 which is the standard for dioxin analysis. BS EN 1948 requires traversing the sampler across the duct and collecting parts of the sample at various points across the duct to ensure that all of the gas phase is sampled proportionately, in case there are variations in gas flow rate or composition resulting in a non-homogeneous gas flow. This requirement is particularly important where suspended solids are present in the gas, and dioxins are often associated with suspended solid particles. Continuous samplers are currently designed for operation at one or two fixed sampling points within the duct, and traverses are not carried out automatically. Using such samplers, more information could be obtained about the variation with time of the dioxin measurement, but the measured results could be systematically higher or lower than those obtained by the approved standard method which is the reference technique required to demonstrate compliance with the limit specified in the IED. The lack of a primary reference method (e.g. involving a reference gas of known concentration of dioxin) prohibits any one approach being considered more accurate than another. Because compliance with the IED's requirements is an essential element of EPR regulation, we have set emission limits for dioxins in the permit based on the use of BS EN 1948 and the manual sampling method remains the only acceptable way to monitor dioxins for the purpose of regulation.

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

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

6.8 Reporting

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

7 Other legal requirements

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

7.1 The EPR 2010 and related Directives

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

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

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

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

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

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

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

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

The Planning Committee approved the application at the Committee on 17 March 2014. It was then referred to the National Planning Casework Unit (NPCU). Final approval of the planning permission is subject to this referral.

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 2010 – **Waste Framework Directive (WFD)**

As the Installation involves the treatment of waste, it is carrying out a *waste operation* for the purposes of the EPR 2010, and the requirements of Schedule 9 and WFD 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 WFD is applied to the generation of waste and that any waste generated is treated in accordance with Article 4 of the WFD. (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 WFD; ensuring that the requirements in the second paragraph of Article 23(1) of the WFD are met; and ensuring compliance with Articles 18(2)(b), 18(2)(c), 23(3), 23(4) and 35(1) of the WFD.

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:

(g) the types and quantities of waste that may be treated;
(h) for each type of operation permitted, the technical and any other requirements relevant to the site concerned;
(i) the safety and precautionary measures to be taken;
(j) the method to be used for each type of operation;
(k) such monitoring and control operations as may be necessary;
(l) such closure and after-care provisions as may be necessary.

These are all covered by permit conditions.

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

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

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

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

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

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

7.1.4 Directive 2003/35/EC – The Public Participation Directive (PPD)

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

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

Our draft decision in this case has been reached following a programme of extended public consultation, both on the original application and later, separately, on the draft permit and a draft decision document. The way in which this has been done is set out in Section 2.2. 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 7 (Pursuit of Conservation Objectives)

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

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

(iii) Section 81 (National Air Quality Strategy)

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

7.2.2 Human Rights Act 1998

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

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

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

7.2.4 Wildlife and Countryside Act 1981

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

We assessed the Application and concluded that the Installation will not damage the special features of any SSSI as there are none within 2km of the Installation.

7.2.5 Natural Environment and Rural Communities Act 2006

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

7.3 National secondary legislation

7.3.1 The Conservation of Natural Habitats and Species Regulations 2010

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

We consulted Natural England by means of an Appendix 11 assessment which was sent for notification purposes. The habitat assessment is summarised in greater detail in section 5.4 of this document. A copy of the full Appendix 11 Assessment can be found on the public register.

7.3.2 Water Framework Directive Regulations 2003

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

7.3.3 The Persistent Organic Pollutants Regulations 2007

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

7.4 Other relevant legal requirements

7.4.1 Duty to Involve

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

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

Protect legally privileged The document is in DRAFT at this stage, because we have yet to make a final decision.

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

IED Article	Requirement	Delivered by
45(1)(a)	The permit shall include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2000/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate.	Condition 2.3.3 and Table S2.2 in Schedule 2 of the Permit
45(1)(b)	The permit shall include the total waste incinerating or co-incinerating capacity of the plant.	Condition 2.3.3 and Table S2.2 in Schedule 2
45(1)(c)	The permit shall include the limit values for emissions into air and water.	Condition 3.1.2 and Tables S3.1, S3.1(a), S3.2, S3.3 and S3.4 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 and Tables S3.1, S3.1(a), S3.2, S3.3 and S3.4. Also compliance with Articles 10 and 11
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 2.3.6 to 2.3.10
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.	Emissions and their ground-level impacts are discussed in the body of this document.
46(2)	Emission into air shall not exceed the emission limit values set out in	Conditions 3.1.1 and 3.1.2 and Tables

IED Article	Requirement	Delivered by
	part of Annex VI.	S3.1 and S3.1(a)
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/m3), CO and TOC not to be exceeded during this period.	Conditions 2.3.6 and condition 2.3.10 and Table S3.1(a)
47	In the event of breakdown, reduce or close down operations as soon as practicable. Limits on dust (150 mg/m3), CO and TOC not to be exceeded during this period.	Condition 2.3.10
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Schedule 6 details this standardisation requirement
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.	Improvement Condition 1, condition 3.5.3, and tables S3.1, S3.1(a), and S3.4
48(3)	The competent authority shall determine the location of sampling	Tables S3.1, S3.1(a) and S3.4

IED Article	Requirement	Delivered by
	or measurement points to be used for monitoring of emissions.	
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.	Schedules 4 and 5
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.	S3.1 and S3.1(a)
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) < 3% or loss on ignition (LOI) < 5%.	Conditions 3.5.1 and Table S3.5
50(2)	Flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber.	Pre-operational condition PO5 and Improvement Condition IC4.
50(3)	At least one auxiliary burner which must not be fed with fuels which can cause higher emissions than those resulting from the burning of gas oil liquefied gas or natural gas.	Condition 2.3.7
50(4)(a)	Automatic shut to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.6
50(4)(b)	Automatic shut to prevent waste feed if the combustion temperature is not maintained.	Condition 2.3.6
50(4)(c)	Automatic shut to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.6
50(5)	Any heat generated from the process shall be recovered as far as practicable.	The plant will generate electricity. The Operator is to review the available heat recovery options prior to commissioning (Condition PO1) and then every 2 years (Condition 1.2.3)
50(6)	Relates to the feeding of infectious	No infectious clinical

IED Article	Requirement	Delivered by
	clinical waste into the furnace.	waste will be burnt
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit fulfil this requirement
51(1)	Different conditions than those laid down in Article 50(1), (2) and (3) and, as regards the temperature Article 50(4) may be authorised, provided the other requirements of this chapter are me.	No such conditions have been allowed
51(2)	Changes in operating conditions do not cause more residues or residues with a higher content of organic polluting substances compared to those residues which could be expected under the conditions laid down in Articles 50(1), (2) and (3).	No such conditions have been allowed
51(3)	Changes in operating conditions shall include emission limit values for CO and TOC set out in Part 3 of Annex VI.	No such conditions have been allowed
52(1)	Take all necessary precautions concerning delivery and reception of Wastes, to prevent or minimise pollution.	EPR require prevent or minimise pollution. Section 2.1.4 of the Application defines how this will be carried out. Conditions 2.3.1, 2.3.3, 3.2, 3.3 and 3.4
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Section 2.1.4 of the application supporting document describes procedures for the reception and monitoring of incoming waste
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 3.5.1 and 1.4.1
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	Conditions 2.3.1 and 3.2.1
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy	Condition 3.5.1 and pre-operational condition PO2.

IED Article	Requirement	Delivered by
	metal content (soluble fraction).	
55(1)	Application, decision and permit to be publicly available.	Section 2 and annex 4 of the decision document.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2; Table S4.2

Protect legally privileged The document is in DRAFT at this stage, because we have yet to make a final decision.

ANNEX 2: Pre-Operational Conditions

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

Reference	Pre-operational measures
PO1	Prior to the commencement of commissioning, of activity A1, the Operator shall send a report to the Environment Agency for approval which will contain a comprehensive review of the options available for utilising the heat generated by the waste incineration process in order to ensure that it is recovered as far as practicable. The review shall detail any identified proposals for improving the recovery and utilisation of waste heat and shall provide a timetable for their implementation.
PO2	Prior to the commencement of commissioning, of activity A1, the Operator shall submit to the Environment Agency for approval a protocol for the sampling and testing of incinerator bottom ash, boiler ash and APC residues for the purposes of assessing its hazard status. Sampling and testing shall be carried out in accordance with the protocol as approved.
PO3	Prior to the commencement of commissioning of activities A1 to A5, the Operator shall send a summary of the revised site Accident Management Plan to the Environment Agency for approval, and make available for inspection all documents and procedures which form part of the Plan. The Plan shall be developed in line with the requirements set out in Section 1 of How to comply with your environmental permit (EPR 1.00).
PO4	Prior to the commencement of commissioning, of activities A1 to A5, the Operator shall notify the Environment Agency of the completion of the HAZOP study.
PO5	After completion of furnace design and at least three calendar months before any furnace operation; the operator shall submit a written report of the details of the computational fluid dynamic (CFD) modelling to the Agency for approval. The report shall demonstrate whether the design combustion conditions comply with the residence time and temperature requirements as defined by the Waste Incineration Directive.
PO6	After completion of the detailed furnace design and at least 3 months before furnace operation, the Operator shall submit a written report on the proposed techniques to validate combustion conditions during the commissioning of the furnace to the Environment Agency for approval. The report shall demonstrate that the indicative BAT “operational stage”, “qualifying zone” and “test conditions” requirements, given in section 2.5 of the Incineration of Waste Sector Guidance note EPR 5.01, will be applied.
PO7	After any land remediation work has been completed on the site, and

	prior to the commencement of commissioning of activities A1 to A5, the Operator shall submit a report on the baseline conditions of soil and groundwater at the installation to the Environment Agency for approval. The report shall contain the information necessary to determine the state of soil and groundwater contamination so as to make a quantified comparison with the state upon definitive cessation of activities provided for in Article 22(3) of the IED. The report shall contain information, supplementary to that already provided in application Site Condition Report, needed to meet the information requirements of Article 22(2) of the IED, including a revised gas risk assessment report, incorporating the monitoring of gas levels in boreholes when the ambient air pressure is less than 1000 mbar, and confirming whether the conclusion of the original gas risk assessment report (dated 28 Feb 2011) is still correct.
PO8	Prior to the commencement of commissioning of activities A1 to A5; the Operator shall provide a written commissioning plan, including timelines for completion, for approval by the Environment Agency. The commissioning plan shall include the expected emissions to the environment during the different stages of commissioning, the expected durations of commissioning activities and the actions to be taken to protect the environment and report to the Environment Agency in the event that actual emissions exceed expected emissions. Commissioning shall be carried out in accordance with the commissioning plan as approved.
PO9	On completion of the final design, of activities A1 to A5, the Operator shall, revise the Noise Assessment submitted as part of the Environmental Permit Application, and re-submit the assessment to the Environment Agency for approval. The revised assessment shall include the details of the measures, designed to eliminate any acoustic features that could increase the likelihood of complaint, sufficiently to justify not applying the BS:4142 noise (tonal) correction factors.
PO10	Prior to the commencement of commissioning, of activities A1 to A5, the Operator shall submit a written report to the Environment Agency detailing the revised waste acceptance procedure to be used at the site. The waste acceptance procedure shall include the process and systems by which wastes unsuitable for incineration at the site will be controlled and confirm the arrangements for the handling of wastes when the gasification plant is not operating. The procedure shall be implemented in accordance with the written approval from the Environment Agency.
PO11	Prior to the commencement of commissioning, of activity A1, the Operator shall submit a written report to the Environment Agency detailing the controlled shut down procedure required by condition 2.3.6. The procedure shall ensure that the primary gasification chambers are shut down as quickly as possible. The procedure shall be implemented in accordance with the written approval from the Environment Agency.
PO12	Prior to the commencement of commissioning, of activities A1 to A5, the Operator shall submit an odour management plan to the Environment

	Agency for written approval. Once approved, the Operator shall undertake any required measures, as submitted in the plan.
PO13	The Operator shall submit the written protocol referenced in condition 3.2.4 for the monitoring of soil and groundwater for approval by the Environment Agency. The protocol shall demonstrate how the Operator will meet the requirements of Articles 14(1)(b), 14(1)(e) and 16(2) of the IED. The procedure shall be implemented in accordance with the written approval from the Agency.
PO14	At least 8 weeks (or such other date as agreed in writing by the Environment Agency) prior to the commissioning of activities A1 to A5, the operator shall submit the final site drainage plan to the Environment Agency for approval. The site drainage plan shall include the location of the proposed secondary containment for all above-ground tanks at the facility.
PO15	Following the completion of PO14, (at least 4 weeks or such other date as agreed in writing by the Environment Agency) prior to the commissioning of activities A1 to A5, the operator shall ensure that a review of the design, method of construction and integrity of all secondary containment surrounding all above-ground tanks at the facility is carried out by a qualified structural engineer. The review shall compare the constructed secondary containment against the standards set out in Section 2.2.5 of the Sector Guidance Note IPPC S5.06 – *Guidance for the Recovery and Disposal of Hazardous and Non Hazardous Waste* and CIRIA Report C736 – *Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises*. The review shall include: • the physical condition of the secondary containment, • their suitability for providing containment when subjected to the dynamic and static loads caused by catastrophic tank failure, • any work required to ensure compliance with the standards set out in CIRIA Report C736, and • a preventative maintenance and inspection regime. A written report of the review shall be submitted to the Environment Agency detailing the reviews findings and recommendations. Remedial action shall be taken to ensure that the secondary containment meets the standards set out in the above technical guidance documents and implement the maintenance and inspection regime. No site operations shall commence or waste accepted at the facility unless the Environment Agency has given prior written permission under this condition.

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ANNEX 3: Improvement Conditions

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

Reference	Improvement measure	Completion date
IC1	The Operator shall submit a written summary report to the Agency for approval to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.	Initial calibration report to be submitted to the Agency within 3 months of completion of commissioning. Full summary evidence compliance report to be submitted within 18 months of commissioning.
IC2	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission points A1 identifying the fractions within the PM_{10} and $PM_{2.5}$ ranges. The proposal shall include a timetable, for approval by the Environment Agency, to carry out such tests and produce a report on the results. On receipt of written agreement by the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	Within 6 months of the completion of commissioning.
IC3	The Operator shall submit a written report to the Environment Agency for approval, on the commissioning of activities A1 to A5. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions.	Within 4 months of the completion of commissioning.

IC4	The Operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the exhaust gases in the combustion zone whilst operating under the anticipated most unfavourable operating conditions. The results shall be submitted in writing to the Environment Agency for approval.	Within 4 months of the completion of commissioning.
IC5	The Operator shall submit a written report to the Environment Agency for approval, describing the performance and optimisation of the Selective Non Catalytic and Catalytic Reduction (SNCR and SCR) systems to minimise oxides of nitrogen (NOx) emissions within the emission limit values described in this permit with the minimisation of ammonia and nitrous oxide emissions. The report shall include an assessment of the level of NOx and N_2O emissions that can be achieved under optimum operating conditions. The report shall also provide details of the optimisation (including dosing rates) for the control of acid gases and dioxins.	Within 4 months of the completion of commissioning.
IC6	The Operator shall carry out an assessment of the impact of emissions to air of the following metals subject to emission limit values cadmium, arsenic and nickel. A report on the assessment shall be made to the Environment Agency for approval. Emissions monitoring data obtained during the first year of operation shall be used to compare the actual emissions with those assumed in the impact assessment submitted with the Application. An assessment shall be made of the impact of each metal against the relevant EQS/EAL. In the event that the assessment shows that an EQS/EAL can be exceeded, the report shall include proposals for further investigative work.	15 months from commencement of operations

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ANNEX 4: Consultation Reponses

A) Advertising and Consultation on the Application

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

The Application was advertised on the Environment Agency website from 19 December 2013 to 3 February 2014 and in the Staines Informer on 19 December 2013. Copies of the Application were placed on our Public Register. We also sent a copy to Spelthorne Borough Council for its own Public Register, located at: The Environmental Health Services, Spelthorne Borough Council, Council Offices, Knowle Green, Staines, TW18 1XB. Additionally copies of the Application were placed at Shepperton Library, High Street, Shepperton, Middlesex, TW17 9AU and at The Environment Agency, Apollo Court, 2 Bishops Square Business Park, St Albans Road West, Hatfield, Herts, AL10 9EX. Copies of the application were also available on CD.

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

- Spelthorne Borough Council
- Surrey County Council
- Food Standards Agency (FSE)
- Thames Water
- Public Health England (PHE)
- Health and Safety Executive (HSE)
- Animal Health
- London Fire Brigade

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response received from Animal Health and Veterinary Laboratories Agency (AHVLA)	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No issues raised.	AHVLA are aware of this site and that the Applicant is also applying for approval under the Animal By-Product (Enforcement) (England) Regulations 2013. No further action required.

Response received from Public Health England (Previously known as Health Protection Agency).	
Brief summary of issues raised:	Summary of action taken / how this has been covered
The PHE recommends: 1. Consideration should be given to the fact that the Installation is within an Air Quality Management area for NO_2 and it may impact on the local authority's attempts to reduce NO_2 concentrations in the area. 2. Any Environmental Permit for this site should contain conditions to ensure that point source emissions to air do not impact upon public health. 3. The Environment Agency should consult the local authority, Food Standards Agency and Director of Public Health.	1. The impact on the Air Quality Management Area is considered in section 5.2.4 of this document. 2. In reaching our decision, we have assessed the health effects from the operation of the proposed Installation and have applied the relevant requirements of the national and European legislation in imposing the permit conditions. We are satisfied that compliance with these conditions will ensure protection of the environment and human health. 3. Consultation was carried out in line with the Public Participation Directive and a list of consultees can be seen above.

Response received from Department of Public Health (Surrey County Council)	
Brief summary of issues raised:	Summary of action taken / how this has been covered
Surrey County Council recommends there is an opportunity to increase active travel to the site, and consideration should be given as to how this can be achieved.	The consideration of transport to and from the site is a matter for the Operator and Local Planning Authority and is not relevant to this determination.

Response received from Planning Department (Minerals & Waste Development, Environment & Infrastructure), Surrey County Council	
Brief summary of issues raised:	Summary of action taken / how this has been covered
No recommendations made	No further action required.

Response received from Spelthorne Borough Council	
Brief summary of issues raised:	Summary of action taken / how this has

	been covered
It has not been demonstrated that the refuse derived fuel derived from municipal waste will be of sufficient calorific value or homogeneity so as not to affect the performance of the gasification system and syngas production.	The gasification plant waste feed is discussed in section 4.3.6 of this document. We have specified the permitted waste types and descriptions which can be accepted at the Installation in table S2.2 of the permit.
Regarding syngas quality, assurance is required that the requirements of the IED can be met. Also request details of the volume and quality of the syngas and how it may vary depending on the quality of the RDF.	Above the fluidised bed, the syngas is contained in the gasification zone where it can be sampled for energy content to verify the quality of the syngas, in accordance with the requirements of the Renewables Obligation. The plant is designed to maintain the bed temperature control if there is an increase or decrease in energy levels or varying moisture and quality levels of the fuel. The plant is designed to ensure that through selection of the amount of flue gas recirculation blended into the ambient air supply, the optimum gas fluidization velocity can be maintained while the sub stoichiometric oxygen levels fed to the bed can be adjusted to provide sufficient heat to maintain the desired bed temperature for gasification.
Given the degree of harm to human health caused by dioxins/furans, they need to be monitored using CEMS rather than by batch.	The control of dioxin emissions is discussed in detail in section 6.2.5 of this document. Continuous sampling of dioxins is discussed in detail in section 6.7.4 of this document. We will audit the operation of the plant and check records to ensure that it is run as described in the Application and as required by the conditions of the Permit.
The flare might be used for 10% of the time. Why is the use of the gas flare so high at 10%? The flare gas emissions should be monitored.	The AD plant flare stack will normally only be required to operate when CHP gas engines are not in use for routine maintenance and are unavailable to use the biogas produced by the digester. If it operates for more than 10% in a year (876 hours) then, in accordance with our Technical Guidance Note for monitoring enclosed landfill gas flares LFTGN05, the Permit requires the flare to be monitored. The emission limits that apply are set in table S3.1 of the Permit, and discussed in section 6.6.1 of this document.

No odour management plan has been submitted as part of the permit variation. Further assessment would be welcomed that considers the whole Installation including fugitive emissions.	An odour management plan will be produced as a result of pre-operational condition PO12, and will need approval by ourselves. In accordance with our guidance it will need to include consideration of fugitive emissions of odour.
A full account of all assumptions and justifications in the application should be provided. It should be demonstrated that process contributions of nitrogen dioxide of greater than 1% of the AQO do not coincide with locations where the annual mean objective may be exceeded under the baseline conditions.	We have assessed the Application and where necessary we have requested further information and/or justification. We have considered the fact that the Installation is within the Spelthorne Air Quality Management Area for NO_2 and this is discussed in section 5.2.4.
The gas flare model inputs (particularly emission rates) and modelling methodology are poorly defined. The assessment should consider tandem operation of the gas flare and CHP engines.	We requested further information about this in a Schedule 5 on 30/01/14 and received a response on 21/02/14. This is discussed in section 5.5. We audited the Applicant's modelling files and agree that the 15 minute ground level concentration of NO_2, SO_2 and CO arising from the site activities under this scenario will not give rise to an exceedance of the relevant EQS.
For the abnormal conditions modelling it is unclear what locations the predicted concentrations relate to.	The impact of emissions during abnormal operation, has been calculated by increasing pro-rata, the maximum ground level concentration (point of maximum impact for emissions from the gasification plant), by the relevant factors stated within the Abnormal Emissions Assessment report.
The metals and dioxin emissions used in the HHRA are not referenced to a gas flow volume to allow transparent review of calculations.	We have carried out an audit of the HHRA and are satisfied that the Applicant's conclusions are soundly based and we conclude that the potential emissions of pollutants, including dioxins, furans and metals are unlikely to have an impact on human health. This is discussed in section 5.3 of this document. We have checked the Applicant's calculations for the flow rates and emission rates in the stacks. A transcription error was found and this was corrected in the response received

	on 21/02/14 in response to the Schedule 5 notice (30/01/14). The corrected data does not change the results or the conclusions of the assessment.
Can reassurances be provided that the IED requirements for the carbon content of bottom ash being less than 3% or the loss on ignition (LOI) being less than 5% and combustion gases remaining above 850^{O}C will be satisfied.	Condition 3.5.1 and associated Table S3.5 specify limits for total organic carbon (TOC) of <3% in bottom ash. Compliance with this limit will demonstrate that good combustion control and waste burnout is being achieved in the furnaces and waste generation is being avoided where practicable. Compliance with the LOI criterion will be demonstrated during commissioning and checked at periodic intervals agreed with the Environment Agency throughout the life of the plant. Testing for LOI will be conducted by an independent laboratory. Condition 2.3.6 requires that waste shall not be charged, or shall cease to be charged if the combustion temperature falls below 850^{o}c.

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

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

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

a) Representations from Individual Members of the Public

A total of 43 of responses were received from individual members of the public. Many of the issues raised were the same as those considered above. Only those issues additional to those already considered are listed below:

	Brief summary of issues raised:	**Summary of action taken and/or how this has been covered**

	Brief summary of issues raised:	**Summary of action taken and/or how this has been covered**
1	Questions about why we have not consulted the following: • Local fire service • Health Protection Agency (HPA) • European Union environment commissioner • Highways Agency	We carried out consultation in accordance with EPR, our statutory PPS and our own RGN Note 6 for Determinations involving Sites of High Public Interest. A list of the bodies we consulted is given in section 2.2 of this document • The London Fire Brigade was consulted on 09/01/14. • The Health Protection Agency is now part of Public Health England, an executive agency of the Department of Health and we consulted them on 12/12/13. We did not consult The European Union Commissioner or The Highways Agency. We consulted with bodies whose expertise, democratic accountability and/or local knowledge make it appropriate for us to seek their views directly.
2	Concern that the fire service is not consulted on the fire safety of an industrial development until the Building Regulations approval stage and concern that Sunbury Fire Station know very little about the proposed redevelopment and the fire implications that will occur. The number of fire stations in the borough will be halved meaning the whole borough of Spelthorne will only be served by one full time fire appliance. The local fire brigade have examined the plans and already stated that if human life was not threatened as result of a fire at the site the site it would be allowed to burn until the combustible materials were consumed, as it carries far too many compounding risks to enter while on fire.	The London Fire Brigade was consulted on 09/02/14 and a reminder letter sent on 04/03/14. No response was received. We are satisfied the operational methods including those in the accident management plan will minimise the risk of accidents. The London Fire Brigade have not raised any objection. How Spelthorne provides cover and manages fires is not relevant for this determination and we are therefore not able to consider it further.
3	Concern that the proposed technology is not gasification as per Ofgem and DECC rules. Believe that it is instead two staged incineration. Has the Environment Agency	Our view is that for the purposes of IED and EPR, the gasification plant is an incinerator because it has no output other than the generation of electricity from the burning of waste. The gasification plant is an activity listed in Part 1

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	investigated the claim that this is gasification and can you justify the use of the term 'gasification'? The use of the term gasifier will prejudice the consultation process.	of Schedule 1 to the Environmental Permitting Regulations: *Section 5.1A(1)(b) The incineration of non-hazardous waste in an incineration or co-incineration plant with a capacity exceeding 3 tonnes per hour.* The terminology used by the applicant does not change the section of the Regulations we permit the activity as. This is discussed in section 4.1.3.1 of this document. The IED and EPR only draw distinction between incineration and co-incineration although the definition of incineration and co-incineration plant includes reference to gasification.
4	Concern that this it is an incinerator made to look like a gasifier to gain ROC subsidies, which they will fail on.	The Operator has applied to Ofgem for ROC accreditation. Any application to Ofgem is outside of the Environment Agency's remit. This is discussed in section 4.1.3.1 of this document.
5	Concern that the application is misleading and incorrect because of the artist's impression on the front cover. The picture was banned from being used by Advertising Standards Agency ruling as it is misleading and does not show changes to the site such as wider and higher stack, new roof vents, building size increase and extra buildings.	We do not consider matters relating to visual impact when we determine an application to vary an Environmental Permit. This is considered under the terms of the planning regime determined by Surrey County Council. The picture is on documents supplied by the applicant as part of their variation application. We have a duty to publicise and consult on the documents submitted to us. The issues about the use of the image are not directly relevant to our determination and do not change our view that the Applicant is competent to run the Facility.
6	The previous Environment Agency permit variation issued to SITA, for the previous Eco Park application/BOS gasifier by Ascot, was withdrawn and quashed, with agreement by SITA and Surrey, when threatened with a judicial review by Spelthorne Borough Council, who after receiving advice agreed the permit was illegal. This application cannot be classed as a variation to that part of the permit, as that part of the permit does not exist. The previous variation was subject to	There is an existing permit for the site. On 08/10/2012 variation EPR/VP3997NK/V003 was issued for the proposed Eco Park. This permit was then varied on 30/05/2013 to update the Schedule 1 references following changes brought in by the Environmental Permitting (England and Wales) (Amendment) Regulations 2014 to reflect the implementation of the IED. The judicial review was discontinued on the basis that the existing permit would not be relied on unless and until it was varied to reflect the fact that the Applicant was intending to adopt a different form of gasification technology to that originally proposed. Neither the permit nor any part of it has been surrendered or withdrawn. As such, the permit is 'effective' and can be varied.

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	judicial review and the permit was withdrawn.	
7	Concern raised regarding the Dargavel plant in Scotland and Energos in the Isle of Wight. Concerns about toxic emissions from these plants and breaches of dioxin emissions. Dargavel had illegal emission breaches above the 'safe' limit (and it was a remote location compared to the Charlton Lane location), its SEPA permit was revoked, the plant burnt down and its designer/supplier went bankrupt. The Dargavel plant had an extremely poor performance record until it burned down in July 2013. When the Environment Agency issued the permit for Charlton Lane in October 2012, did the Environment Agency know that the prototype at Dargavel was already failing badly and, if so, what additional requirements were written in to the permit, if any?	The Isle of White plant and the Dargavel plant are based on different designs to the Charlton Lane proposal, and so are not directly comparable. If the plant failed to comply with the emission limits in the permit then we would take enforcement action against the Operator.
8	Concern that this is new, novel, unproven technology and that previously used data and experience cannot be assumed to apply in this case. Concern that nobody has any experience of operating the proposed combustion plant to burn municipal waste. Specifically, how can it be known what risk management system to put into place through the environmental permit when we don't know for sure everything that could possibly go wrong. There has never been a gasifier using RDF anywhere in the UK or anywhere else. We are the guinea pigs in a highly	Gasification itself is not an untried technology and has been used for many years successfully, for example in the gasification of coal. As discussed in section 6.1.1, the different types of furnace have been assessed. We have considered the assessments made by the Applicant and agree that the gasification furnace technology chosen represents BAT. Our assessment of the Accident Management Plans is summarised in section 4.3.4 of this document. 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. Pre-operational conditions have been set out in the permit to require the Operator to confirm that the details and measures proposed in the Application have been adopted or implemented

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	residential area.	prior to the operation of the Installation. These are discussed in annex 2 of this document. Improvement conditions have been set to require the Operator to provide the Environment Agency with details that need to be established or confirmed during and/or after commissioning. These are discussed in Annex 3 of this document. If the Operator failed to comply with the emission limits in the permit then we would take enforcement action against the Operator. We are satisfied the Applicant can accept the waste contained in Table S2.2 of the permit and that they are suitable for the proposed gasification plant as discussed in section 4.3.6. The location of the site is an issue for the planning permission but we have assessed the impacts for this given location.
9	The 2009 HPA report says "modern well regulated incinerators make only a very small contribution to local air pollution". Gasifiers are not well managed as can be seen from the performance of the Dargavel plant and others.	The impact on human health is discussed in detail in section 5.3 of this document. We are proposing to impose limits on emissions to air that are as tight (tighter for NO_x) as we impose on well managed incinerators mentioned in the HPA report. We consider that the facility is unlikely to cause harm to human health. We are satisfied the plant will be properly managed and we will be regulating it to ensure it is. Public Health England was consulted specifically on the Application they concluded that, subject to confirmation of certain points addressed in section A above, they had no significant concerns regarding the risk to the health of humans from the Facility.
10	The Environment Agency language is overstated, e.g. "...a safe plant that does not pose a risk to the environment and human health" when we all know that such a facility would pose a risk to the environment/health, at the very least a risk that the facility might not conform to the permitted operation (as per Dargavel) and as even the thought of such a facility cause harm by virtue of the stress	We are satisfied the proposed facility will not pose a significant risk to human health; see section 5.3 of this decision document. We are satisfied that the Applicant has management systems in place to ensure they run it safely and minimise any risk. This is discussed in section 4.3. We will visit the site regularly to ensure they continue to operate in accordance with their management systems and these visits will be both announced and unannounced.

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	caused.	
11	The current design of the AD plant is unsafe.	Our assessment of the Accident Management Plans is summarised in section 4.3.4 of this document. 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. We are satisfied that the design is safe.
12	No proven gasification facilities have combined waste pre-treatment, waste storage, gasification, combustion, ash handling, steam generation, power generation and flue gas treatment in the same unventilated building.	Accident management is discussed in section 4.3.4 of this document 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.
13	How many applications does the EA actually refuse, especially in relation to waste plants, EfW, gasification etc, what percentage? Are there actually ever any refused by the EA? The EA (from a FOI request) has admitted it has never rejected a permit for a waste plant/EfW/AD etc in the last three years, proves very worrying.	Since 1 January 2011, we have not refused an Application for these types of plants. It is important to note, however, that an Operator may decide to withdraw an Application at any time, for example when they appreciate the full extent and implications of our requirements to obtain a Permit and consequently choose not to continue with an Application because of this. Potential Applicant's are invited to take part in pre-application discussions with us as well, which means that Operators could be deciding not to make a formal application to us during this time, effectively withdrawing from the Application process almost before it is begun. We can only refuse an Application when we believe that there will be harm to the environment or human health or legal requirements will not be met.
14	Requests for a public meeting after the Application was duly made, during the initial public consultation, due to the contentious nature of the application to vary the environmental permit. A public meeting is normal practice. It is important that at some stage you hold a public meeting at which you can explain to residents what you think could go wrong and what measures you have put in place to monitor and (hopefully) control the	We conduct our public consultations in accordance with our public participation statement (available on our website) and the Environmental Permitting (England and Wales) Regulations 2010. We work hard to ensure that local residents and stakeholders are involved in our consultations so that we make the correct decisions when determining applications. We do not routinely hold a public meeting or public drop in session during this initial public consultation. The decision is made on a case by case basis as to whether we hold a drop in session which, during this stage in the determination would be to explain the process we use to determine the application; it is not an opportunity for more detailed technical

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	situation.	discussion. In this case, we were satisfied that the steps we took provided the public with a suitable opportunity to make comments. Submitting comments in writing or via email is a tried and tested method of collecting the views of the local residents and stakeholders. We consider all consultation comments and summarise how we have done this in section 2 of Annex 4 of this decision document. We have met and exceeded the statutory obligations placed upon us for public consultations. We extended the consultation beyond the usual 20 working day timescale and made copies available on CD and in the Shepperton Library. We also considered comments submitted after the consultation closing date.
15	In the application the address has been entered using the town of Sunbury instead of Shepperton. This is the incorrect address and is very misleading, especially to any member of the public viewing the application. Request that the Applicant reapplies using the correct address.	We are satisfied that the information given in the application makes clear which permit the variation application relates to.
16	Effect of very small particles emitted ($PM_{2.5}$ and below) on the health of the people living close to the proposed gasification plant. The 2009 HPA report says “modern well regulated incinerators make only a very small contribution to local air pollution”. Gasifiers are not well managed as can be seen from the performance of the Dargavel plant and others. Concerns about the impact on air quality and health impacts, especially as the facility is in an Air Quality Management Area and located in a residential area with many schools. The location is in an AQMA due to A roads, M3 Motorway, Heathrow	See section 5.3 of this document.

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	Airport and numerous gravel extraction and aggregate recycling schemes. Residents of Spelthorne are already exposed to very high ambient concentrations of air pollutants including $PM_{2.5}$. The European commission have stated that they are very concerned by the effect of $PM_{2.5}$ and intend to lower what is considered 'safe', and the USA already have significantly lower limits for $PM_{2.5}$ based on advice from the WHO. How can the Health Protection England ignore set 'safe' levels well above that recommended by the WHO.	
17	Concern over the location of the advert in the Staines Informer under the heading Family Notices.	We are not able to control the decision of where exactly the advert is placed in a newspaper. This is a matter for the Newspaper's editorial control. The advert did appear under the heading of Public Notices and we consider it was suitably prominent.
18	Regarding the following quote from the factsheet sent out by the Environment Agency on 19/12/2013: *"We will not issue an environmental permit for any site if we consider it will cause significant pollution to the environment or harm human health".* Concern that this statement could be taken to mean that nothing can go wrong with a plant once an environmental permit is issued.	We think this sentence is perfectly clear. We have assessed the competence of the company (as discussed in section 4.3.2 of this document). We are satisfied that appropriate management systems and management structures will be in place for this Facility, and that sufficient resources are available to the Operator to ensure compliance with all the Permit conditions. If the plant failed to comply with the emission limits in the permit then we would take enforcement action against the Operator.
19	The type of Incinerator intended for Charlton Lane will routinely emit very high levels of pollution during normal start-up or shut-down of the plant. This cannot be avoided. Similarly, failure of the equipment will cause extremely high levels of pollution to be emitted. The residents of Spelthorne could be exposed to very high isolated concentrations of dangerous pollutants.	Use of low sulphur fuels for start up and auxiliary burners – gas oil will be used, this will be low sulphur (i.e. <0.1%), this will reduce SO_x at source. 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. Abnormal operations are considered in section 5.5 of this document. Unnecessary start up and

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
		shut down will be avoided and in practice these should be few and far between. They don't affect our overall conclusions that we are satisfied that emissions during abnormal operation do not pose a risk to human health.
20	Nitrogen dioxide, along with ammonia, also contributes to the formation of microscopic airborne particles, one of the many components of particulate matter (PM_{10} and $PM_{2.5}$) which have been calculated to have an effect equivalent to 29,000 premature deaths each year in the UK. It is currently unclear which of these components or characteristics of particulate matter lead to these health impacts. Children and residents may experience 'insignificant' risks of health damage by toxins, PM_{10}, $PM_{2.5}$ and PM_1 but would be forced to endure it over years and years with long term damage building up.	Emissions of particulates are discussed in response 16. As regulators we work with Air Quality Standards as defined in European and national legislation. The following is taken from the DEFRA website: "The national Air Quality Objectives and EU limit and target values with which the UK must comply are summarised in the National air quality objectives (PDF 210 KB) of the Air Quality Strategy. Definitions: Air Quality Standards are concentrations recorded over a given time period, which are considered to be acceptable in terms of what is scientifically known about the effects of each pollutant on health and on the environment. They can also be used as a benchmark to indicate whether air pollution is getting better or worse." We are satisfied that emissions from the installation do not pose a risk to human health.
21	How can the drive in society for cleaner air be rationalised against the known risks of emitting into the atmosphere more fine particles when the removal of harmful emissions is the only way forward in the improvement of air quality.	How we assess emissions of particulates is discussed in sections 5.3.3 and 5.3.4 of this document.
22	Reference to the article in Private Eye dated around 28/10/2013. Claim that the Environment Agency admit that bag filters are only 5-30% effective for $PM_{2.5}$ particles. How can residents be certain that fine particles are being monitored effectively?	Bag filters are the recognised Best Available Technique used for particulate control across Europe. Plant studies undertaken in USA, Finland and Italy show that these devices are over 99% percent efficient in removing particles. Also note that the estimated contribution of $PM_{2.5}$ from the plant is only 0.16% of the Environment Quality Standard (see section 5.2.1 of this document) We have decided that monitoring should be

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
		carried out for the parameters listed in tables S3.1 to S3.5 in Schedule 3 of the permit 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. 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.
23	What steps will be taken regarding emissions monitoring during commissioning and what conditions will be set in regard to post commissioning emissions monitoring? Will your decision document explain how you will monitor the commissioning process leading up to the commencement of burning RDF?	The commissioning phase is discussed in section 6.6.1 of this document. The Permit requires that prior to the commencement of commissioning the Operator provides a written commissioning plan, including timelines for completion, for approval by the Environment Agency. The commissioning plan shall include the expected emissions to the environment during the different stages of commissioning, the expected durations of commissioning activities and the actions to be taken to protect the environment and report to the Environment Agency in the event that actual emissions exceed expected emissions. Commissioning shall be carried out in accordance with the commissioning plan as approved
24	Request that we make clear that the Environment Agency cannot guarantee that nothing will ever go wrong because under the Environmental Permit there are only powers to deal with the consequences if something does go wrong.	This document summarises our assessment of the application and how we have taken into account all relevant factors in reaching our position. The Permit requires the Operator to have an EMS in place. The EMS will include preventative maintenance procedures to minimise the risk of malfunctions of key equipment. Under EPR we can also take pro-active measures if we consider it necessary. In particular, any breach of emission limits must be reported by the Operator without delay as required by condition 4.3.1 of the Permit. Schedule 5 gives details of what information must be in the notification and this includes corrective actions taken by the Operator. Breaches will be investigated robustly and quickly by the Environment Agency and will be dealt with in accordance with our Enforcement and Sanctions

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
		Statement.
25	Concern about the composition of waste feed for the gasification plant and that the screening process was designed to protect the plant rather than to protect residents by preventing undesirable material from entering the incinerator e.g. hazardous waste.	The site will accept residual municipal waste (i.e. post sorting by households) and commercial and industrial wastes which will have been sorted before coming to site. The pre-treatment process is discussed in section 4.1.3.1. Pre-treatment of the incoming waste will ensure that a homogenous feedstock is delivered to the fluidised bed which protects it from harmful elements in the waste. The pre-treatment also removes unacceptable waste for further inspection and quarantine. Condition 2.3.3 and associated table S2.2 specifies the permitted wastes for gasification. We are satisfied the applicant can accept the waste contained in Table S2.2 of the permit and that they are suitable for the proposed gasification plant as discussed in section 4.3.6.
26	Will the permit specify what can or cannot be burnt and if so, what monitoring system will be put in place and how this will be enforced? What is the exact composition of the waste being incinerated?	The composition of the RDF is discussed in section 4.3.6 of this document. Condition 2.3.3 and associated table S2.2 specifies the permitted wastes for gasification. We are satisfied the applicant can accept the waste contained in Table S2.2 of the permit and that they are suitable for the proposed gasification plant as discussed in section 4.3.6.
27	Does the operator have licence to put anything in the incinerator (including hazardous waste) as long as the emissions stay within the prescribed limits?	Condition 2.3.3 and associated table S2.2 specifies the only wastes that can be accepted under the permit for gasification. We are satisfied the Applicant can accept the waste contained in Table S2.2 of the permit and that they are suitable for the proposed gasification plant as discussed in section 4.3.6 of this document. Emission limits are binding irrespective of the exact composition of each waste load.
28	What is the composition of flue gases? The operator has said the environmental permit will list all the potentially harmful substances that are expected to be in the flue gases. Where does this list of harmful substances come from; SITA or the EA?	A general list of polluting substances that need to be controlled from industrial processes is given in Annex II of IED. Polluting substances that are to be controlled from incineration processes are specified in Annex VI of IED. This Annex also gives the limits for the specified pollutants that must be achieved as a minimum. The flue gases cleaning addresses the following groups of emissions: NO_x; particulates;

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	Will the Environment Agency draft the Environmental Permit to cater for the presence of all possible harmful substances in the flue gas? Is that possible?	condensable heavy metals; acid gases; volatile metals; and dioxins and furans. The prime function of flue gas treatment is to reduce the concentration of pollutants in the exhaust gas as far as practicable. We have set emission limit values to meet the requirements set out in Articles 11 and 18 of the IED. These requirements include the application of BAT, which may in some circumstances dictate tighter emission limits and controls than those set out in Chapter IV of IED on waste incineration and co-incineration plants. The assessment of BAT for this Installation is detailed in section 6 of this document. By controlling substances set out in Schedule 3 of the permit, other substances are also going to be abated but it is not considered necessary to set individual limits for everything.
29	Will the Environment Agency ignore expense when it comes to deciding what continuous monitoring is required to protect the environment and human health?	Monitoring of emissions is discussed in section 6.7 of this document. We have set monitoring in accordance with the requirements of IED chapter IV. The cost of such monitoring is not a factor in our decision.
30	Fire, explosion and safety concerns regarding the site, in particular to visitors and staff. Concern that there are no emergency exits for people on foot. Domino effect of one area impacting on another and the location and design of the control room were raised.	Our assessment of the Accident Management Plans is detailed in section 4.3.4 of this document. The health and safety of visitors and staff are primarily a matter for the HSE. The HSE and the local Fire Service were consulted but did not respond. We are satisfied that in respect of the operation of the regulated facility 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. In addition, typically the employer, owner or occupier of the premises is responsible for fire safety. In law, they are known as the 'responsible person'. All workplaces, commercial premises and other buildings to which the public have access must have a fire safety risk assessment carried out by a ‘responsible person’. Under the Regulatory Reform (Fire Safety) Order 2005, the responsible person must carry out a fire safety risk

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
		assessment and implement and maintain a fire management plan. Completed buildings have the standards of fire protection required by the Building Regulations 2010 which deal with building controls in new and altered premises. They specify the requirements for building design and construction in relation to, the health and safety of building users, and fire safety (including means of warning; escape routes). Local Government is responsible for building regulations in England and Wales
31	Also, fires occur in waste as it is transported by lorry on the road network. Are these fires recorded by the Environment Agency?	The occurrence of fire offsite during transport is outside the Environment Agency's remit.
32	Reference to an article on letsrecycle.com about firms not being able to get insurance due to high fire risk.	Insurance for Operators is outside of the Environment Agency's remit.
33	Concern that, providing there are no lives at risk, the Fire Service will not put their own men at risk simply to put a fire out. If a pile of rubbish is burning without risk to human life, they will leave it to burn.	This is a matter for the Fire Service and is outside of the Environment Agency's remit.
34	Will contaminated fire fighting water be a source of pollution? Will smoke be a problem because all the waste processing seems to take place in one building?	Measures will be in place to ensure that potentially contaminated firewater can be retained on site. Accident management systems will take account of the presence of waste in the building Our assessment focuses on preventing fires in the first place. The London Fire Brigade have not raised any objections.
35	All options and sensitivity testing of the economics have not been carried out in the statutory "value for money" analysis. For example, exporting the waste to Norway, where it is in demand as CHP incinerator fuel. Concern that the project is designed to harvest the maximum subsidy profit per tonne by whatever means from the waste available to SITA from its PFI (private finance initiative) contract with Surrey, versus the	This is outside of the Environment Agency's remit.

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	available option to process it at a lower cost with greater energy recovery elsewhere. Subsidy fuelled experiments are being built to maximise profit from subsidy, not for any eco motivation.	
36	The local Spelthorne Borough Council has strongly objected to these proposals. Their objection should carry a lot of weight in your deliberations.	We consulted Spelthorne Borough Council on the application and they responded dated 31 January 2014. A summary of their comments and our consideration of them is given in section 1 of this annex. We consider all representations in our deliberations.
37	Concern that the permit may allow excessive toxic emissions from the plant for up to 4 hours, to give time for intermediate rectifications, before mandatory plant shut down. Concern about those living downwind.	This is discussed in section 5.5 of this document. Article 46(6) of IED allows for the continued incineration and co-incineration of waste under such conditions as disturbances or failures, 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.
38	View that the change should be considered a “significant” variation rather than a “normal” variation due to the large number of hazardous processes changing.	The Applicant applied for a ‘normal variation’. However, during our duly making checks we made the decision that the application should be treated as a substantial variation due to the changes proposed. Furthermore, we identified the Installation as a Site of High Public Interest and as a result we undertook a second consultation on our ‘minded to’ decision.
39	The application suggests that the Environment Agency permit requirements will be dealt with in the design stage, but give values in the emission tables as if the design has been completed and the figures based on proven examples. For example, Paragraph 2.1.5.1 Dioxin Control.	Pre-operational conditions have been set out in the permit to require the Operator to confirm that the details and measures proposed in the Application have been adopted or implemented prior to the operation of the Installation. These are discussed in Annex 2 of this document. Improvement conditions have been set to require the Operator to provide the Environment Agency with details that need to be established or confirmed during and/or after commissioning.

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
		These are discussed in Annex 3 of this document. We have sufficient information at this time to determine the Application.
40	The application answers "yes" to all questions regarding documented procedures being in place for training, auditing, maintenance etc. How can this be correct if the plant design has not been completed or site specific staff appointed.	We are satisfied that the Operator will have appropriate procedures in place. Pre-operational conditions, as discussed in this document and shown in Annex 2, have been set to ensure these procedures are in place before operations commence.
41	Concern that the AD tank is fitted with vacuum and pressure valves which under abnormal conditions will release biogas to air.	The pressure and vacuum release valve is a safety device designed to operate under abnormal conditions to protect against excessively high or low pressures.
42	In section 1.6.5.5 of the application it is of concern that if the penstock valve fails to close automatically following an alarm from the SCADA system, contaminated water will go directly into the storm water system.	The Applicant's drainage plan and bund design, including the penstock valve, is subject to final approval from the Environment Agency as set out in pre-operational conditions PO14 and PO15. See section 6.5.3 of this document.
43	Releases of biogas to air could also occur following a SCADA alarm, by operation of similar valves on the gas holder. Elsewhere in paragraph 1.6.6.4 it states that in the case of the gasholder any venting will be sent to the flare stack. Which is correct?	A SCADA failure will not cause the biogas holder safety valves to open and release biogas to atmosphere under normal operating conditions. Release of biogas to atmosphere through biogas holder safety valves will only occur under abnormal plant operating conditions but not under SCADA failure. The flare stack us designed to operate in the event that more biogas is generated than is used. Normally this will only be when the CHP is not in use such as for routine maintenance. The purpose is to prevent the gasholder from becoming overfull which would result in the over pressurisation of the gas system and release to atmosphere by the pressure release valves of unburnt biogas. Venting will not be a routine process.
44	What happens to the gasifier and AD plant in the event of SCADA fail? Do either or both plants go into auto shutdown or continue to operate without monitoring of the hazardous gases.	A SCADA failure would not affect the plant operating and safety systems. The plant would continue to operate as controlled by the Programmable Logic Controller (PLC) in case of SCADA failure, which would be a rare event. During the Hazop and SIL Hazard Assessments for this project, the plant safety integrity and

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
		shutdown systems will be reviewed to ensure safety and environmental hazards and risks are eliminated/reduced/controlled. Safety systems (i.e. safety relief valves) will be designed to "fail safe" under fault conditions.
45	The original permit queried if the limit for PM_{10} of 40mg/m^3 and $PM_{2.5}$ of 25 mg/m^3 could be achieved by 2015 as required by the new regulations. No mention of PM_{10} etc is mentioned in this application. Will it meet the upcoming 2015 limits?	We assume that the reference is to the EU PM_{10} EQS annual average of 40μg/m^3 and the EU $PM_{2.5}$ EQS of 25μg/m^3 as a long-term annual average to be achieved by 2010 (as a Target Value and by 2015 as a Limit Value). This is discussed in section 5.2.2 of this document. We agree with the Applicants conclusions that impacts due to the facility will be insignificant and that the Operator will be able to meet the limits in the permit.
46	What are the technical specifications of a filtering system that is more effective than the human lung? It is scientifically accepted that $PM_{2.5}$ crosses the lining of the lung into the blood stream. How can these tiny particles be stopped by a filter bag? Also, it is unclear how effective the filtration arrangements will be for other metals and for dust/particulates in general and, particularly for $PM_{1.0}$.	Particulate emissions, including $PM_{2.5}$, were predicted to be insignificant as discussed in sections 5.2.1 and 5.2.2. Bag filters used for dust abatement are effective in removing $PM_{2.5}$. Heavy metals in the particulate phase will be removed from the flue gases by the bag filters. Mercury in the gas phase will be removed by injection of powered activated carbon into the flue gas. The particulate emissions will be continuously monitored to ensure that the filters are working. Also, the differential pressure across the bag filters will be measured, in order to optimise the performance of the cleaning system and to detect bag failures. Sections 5.3.3 and 5.3.4 of this document further discuss particulates and human health.
47	Concern that the safe operation of the process depends on the precise amount of oxygen being introduced at the top of the vessel to match the exact amount of syngas which is being produced from the bottom half of the vessel. Concern that this is unstable because any imbalance between the supplies of oxygen and syngas will not be self rectifying and that the Operator will need to intervene to maintain the	The proposed staged gasification system creates sub-stoichiometric conditions through the fluidising air which is utilised as a fluidising medium and the primary source for partially oxidising the fuel in the bed. The balance of oxygen will be maintained by the Operator. Through selection of the amount of flue gas recirculation blended into the ambient air supply the optimum gas fluidisation velocity can be maintained while the sub-stoichiometric oxygen levels fed to the bed can be adjusted to provide sufficient heat to maintain the desired bed

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	delicate balance required.	temperature. The heat conditions required to maintain the bed temperature control will vary, hence the need for a varying range of oxygen in the fluidising medium.
48	If the combustion plant malfunctions, is the worst outcome that the flue emission levels will be exceeded and if so, how long will the situation be allowed to persist before the process has to be shut down? How long will unacceptable pollution be tolerated under the Environmental Permit?	In making our assessment of abnormal operations we have assessed the worst case scenario as discussed in section 5.5 of this document. For the gasification process, Permit condition 2.3.6 lays out the requirements for a controlled shut down of the gasification chamber. In some instances this will start immediately for example, a breach of a limit in table S3.1(a). For other cases the IED allows up to 4 hours abnormal operation before the shut down is initiated, for example, failure of a CEM. The controlled shut down will not be immediate, as this could cause damage to the gasification chamber. Pre-operational condition PO11 requires the Operator to develop a procedure to shut down the plant as quickly as possible. For periodic monitoring if a breach is detected then the relevant plant will only be shut down if it is suspected that the breach is continuing. The cause will be investigated, situation rectified and systems re-tested.
49	Concern about no experience or analysis of the consequences of combustion chamber secondary air failure, which could result in un-combusted syngas at above its auto combustion temperature passing through the system leading to a catastrophic event. Are there any circumstances in which the combustion plant could actually explode and if so what measures are in place to prevent that happening and how sure can we be that such measures will actually work every time without fail	In the unlikely event of secondary air supply system failure, any unburned gases in the combustion chamber will be extracted by the ID fan and vented to atmosphere through the stack. The operator will also initiate emergency shutdown procedures as appropriate.
50	Will SITA be required to display the number of days since the facility last exceeded the conditions of the Environmental Permit? How is the	Monitoring returns and reports required by permit conditions will be publicly available documents and will be placed on the public registers.

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	public going to know whether the facility is performing safely or not? Will the EA be publishing regular reports on the performance of Charlton Lane with respect to the Environmental Permit and, if so, will those reports be put in the public domain?	
51	Footpath 70 is very close to the west and north sides of the site, close to the methane store and the flare. There has been an inquiry about the footpath diversion. Who is responsible for the safety of footpath users? Has the potential impact on public who use the footpath been assessed and considered?	We requested details of how the Applicant had assessed the impact of air emissions on the public footpath in a Schedule 5 notice dated 11/02/14. They responded on 05/03/14. The Applicant considered the short term impacts upon the footpath. The modelling submitted with the Application shows that the predicted impact of short term emissions under normal operation at the point of maximum impact are insignificant. We agree with the Applicant's conclusions that a person using the footpath will not be subjected to an unacceptable impact.
52	The route of footpath 70 will be landscaped with trees that will grow over time. Are these trees a fire risk for the flare?	The Environmental Management System requires the Operator to minimise risk. It is a dynamic document and if trees present a risk, then they will need to take measures to address this.
53	Concern about effect of excessive carcinogenic and other emissions on human health.	We are satisfied there will be no significant risk to human health.
54	DEFRA in their AD Operators Guidance note states: *'that only a handful of commercial scale AD plants in the world accept only food waste',* which is the planned feed stock for Charlton Lane. The problem is that domestic food waste produces a high concentration of ammonia, which after about 100 days brings about acidification and ultimately failure of the digester. This problem was brought to the attention of the Applicant earlier this year, who was not aware of the problem and to date has not proposed a solution as to how the 480 tonnes per annum of ammonia	The list of wastes to be accepted to the AD facility remains unchanged by this variation. A high ammonia concentration could be caused by high nitrogen and ammonium concentration in the feedstock. Feedstock with high nitrogen content is usually mixed with nitrogen-poor substrates. Operators are also required to monitor certain parameters during the digestion process, including ammonia concentration in the digester. The Operator has proposed monitoring of the digestion process by using SCADA (Supervisory Control and Data Acquisition) system. The operator has also proposed a biogas scrubbing system which will use sulphuric acid for the removal of ammonia from the biogas prior to combustion. We assessed the AD plant in the original application. We consider that the operator has

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	produced is to be disposed of. In conclusion it appears that the current AD plant is not commercially viable. Further Mr Palmer Jones CE of SITA U.K when addressing a business forum on 26 September 2013 said he did not believe that '*AD was really the panacea for resolving the residual waste problem.'* And, he cautioned that for the AD sector*, 'there may be a shortage of feedstock in some areas as well as difficulties in finding outlets for digestate.'*	proposed techniques that are in accordance with our technical guidance *How to Comply* and IPPC S5.06 – *Guidance for the Recovery and Disposal of Hazardous and Non-Hazardous Waste*. We are satisfied that it can operate in the manner proposed without causing pollution or harm to human health. Availability of feedstock is not within the remit of this EPR determination. We are concerned with the environmental impact of what is proposed and not its commercial viability.
55	Concern about how the Environment Agency will ensure the safe storage of ammonia from AD, and its safe transfer to a tanker for removal by a safe route. Additionally large quantities of methane and ammonia will be stored with no supporting European data on such co-location – it is an explosive combination.	There is no storage of ammonia from the AD process. Ammonia is present in the centrate/liquor which will be treated by the sequential batch reactor (SBR) prior to discharge from the site. A buffer tank permits the controlled release of the SBR effluent to sewer. This is discussed in section 4.1.3.2. The biogas holder is a double membrane system. The gasholder will be fitted with a pressure and vacuum relief valve that will protect the gasholder against excessively high or low pressures which, could occur under abnormal fault conditions. This device is a safety device and should not operate under normal working conditions, however under abnormal conditions this valve is designed to release biogas to the air. This potential abnormal emission is defined within the air emission schedule provided. We have set pre-operational condition PO15 to ensure suitable design, method of construction and integrity of all secondary containment.
56	Concern that SITA are not competent to operate such a risky facility dependent on continuous measurement and highly sophisticated controls to remain safe.	This is discussed in section 4.3.2 of this document. We are satisfied that the appropriate management systems and structures are in place for this Installation.
57	Surrey County Council has stated "SITA are required to provide a plant which will produce a measurable syngas of the quality required to meet the qualifying criteria for ROCS.	This is discussed in section 4.1.3.1 of this document. Whilst it does not affect our determination, the Operator is in on-going discussions with the Ofgem for the development of an application for pre-accreditation of the

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	Syngas quality will be measured as part of the gasifier acceptance tests and the plant will only be accepted by the council if it meets the quality required to qualify for ROCS". The physical design proposed has no syngas output from the primary combustion chamber to be used in a subsequent process, which makes it impossible to meet the current very clear specification, a more rigorous specification designed specifically to deter designs like the one now proposed.	Renewables Obligation Order.
58	Will your decision document include any HAZOP studies or risk assessments that have been carried out by the Applicant? Calling for a HAZOP to be completed before commissioning is a meaningless requirements and flies in the face of acceptable industrial practice.	The Applicant has stated in the Application that the plant design will be subject to a Hazard and Operability, (HAZOP), study. This will ensure that all possible modes of failure have been considered and addressed. We have included pre-operational condition PO4, requiring notification of completion of this HAZOP study to be sent to us before the commissioning of the new activities. We are satisfied that we have sufficient information to determine the Application.
59	Paragraph 1.5.2.1. Are the "periodical" checks on incoming waste adequate especially on waste that will be delivered by small businesses and self employed traders?	The Application states the Charlton Lane Installation has acceptance procedures for waste. These procedures will be reviewed and extended to include the proposed activities. It specifically states that incoming waste will be unloaded into the enclosed reception area. Inspection procedures will be employed to ensure that, as far as practicable, any wastes which would prevent the gasifier from operating in compliance with its permit are removed. Further inspection will take place by the operator during vehicle tipping and waste mixing. This is considered to be BAT for incineration. PO10 has been set to provide details of the revisions to the procedures.
60	The EA statutory rules on the location of AD plants namely 'the permitted activities must not be carried within 250 metres of any offsite building used by the public'. Where this condition cannot be met the Applicant	There are standard rules permits for a number of different operations including AD. These are based on generic as opposed to site specific risk assessments. If a proposed operation is able to meet these rules, then it is considered to be of such low risk to enable the Applicant to make a

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	must tender reasons why this condition can be ignored – i.e. the Application becomes 'bespoke'. Despite enquiries you have never explained why these requirements may be ignored.	simpler, cheaper application, and enables us to more swiftly determine the application. In this case the Applicant applied for what we call a "bespoke permit", which is determined specifically for the applied facility and the distance criteria mentioned are not applicable. It does not necessarily mean that the facility is a high risk site, but that a bespoke permit determination and a bespoke risk assessment is required to assess and manage the risk. This could be due to the presence of receptors closer than 250m that need to be specifically assessed. The presence of receptors within that distance does not mean the activity cannot be carried out only that it cannot be carried out under a standard rules permit and that a site specific risk assessment (as has been provided here) is required.
61	Intelligent Energy Europe (within input from HSE) in their 'Guide lines for safe Gasification' state: '*For safety reasons, the control room and staff (admin) rooms must be separated from the remainder of the plant due to fire, explosion and toxic gas release*.' Takes issue with the previous statement that *'as the guidelines refer to small 1MWe gasification facilities, their requirements do not apply to larger facilities*.' Common sense dictates that safety requirements stipulated for small plants must also apply or are increased for large plants. The storage of waste in the same building as the combustion facilities is not supported by Intelligent Energy Europe whose guide lines call for material to be stored in a separate building.	The HSE have been a consultee to both the Environmental Permit and Planning Permission consultation. The HSE expect the Applicant to observe all relevant health and safety legislation. Failure to do so would result in the HSE taking appropriate enforcement action. We consulted the HSE but they did not respond. These are only guidelines. 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.
62	The EA state in the siting of flares: "*Every attempt should be made to ensure that the plume from a flare, no matter how high a quality, should not be allowed to pass directly to a dwelling or human habitation under prevailing wind conditions*".	We are satisfied measures will be in place to prevent accidents and minimise their impact.

	Brief summary of issues raised:	Summary of action taken and/or how this has been covered
	Concern about a MRF on site with a taller AD gas holder and flare stack increases fire risk.	
63	In the draft permit decision for the Hatfield incinerator Ref: EPR/MP3637FL/A001, the analysis of Best Available Technique (BAT) for MSW recorded that when compared to standard Energy from Waste (EfW), incineration combustors using fluidised bed gasification technology are not BAT for MSW disposal.	As discussed in section 6.1.1 of this document, the different types of furnace have been assessed. We have considered the assessments made by the applicant and agree that the gasification furnace technology chosen represents BAT. Each application is determined on its merits but as explained in section 6.1.1, overall any one of several furnace technologies could be considered BAT provided it is justified in a given case.
64	This combination of waste pre-treatment, waste storage, gasification, combustion, ash handling, steam generation, power generation and flue gas treatment in the same unventilated building will produce unacceptable exposure levels to bio-aerosols, dust, noise, high humidity and heat resulting in working conditions that are unlikely to satisfy the requirements of 'Workplace (Health, Safety and Welfare) Regulations 1992.	We have assessed dust and noise emissions and conclude that there will be no significant impact on human health. The health and safety of staff is primarily a matter for the HSE. The HSE have been a consultee to both the Environmental Permit and Planning Permission consultation. The HSE do not issue any kind of permit but instead expect the Applicant to observe all relevant health and safety legislation. Failure to do so would result in the HSE taking appropriate enforcement action.
65	The drawings do not specify the hazardous zones inside the MSW building as defined in 'Dangerous Substances and Explosive Atmosphere Regulations 2002'.	These Regulations impose duties on employers and are a matter for the HSE
66	The AD plant bunded area is now 3.2 metres high. Concern that it does not comply with HSE requirements for secondary containment.	The height of the bund has increased and is designed in accordance with BS EN 1992-3 Liquid Retaining and Containment Structures. We are satisfied that the bund will comply with the necessary requirements.
67	What requirements and controls are proposed to ensure the safety of construction workers, staff and the general public during the construction phase?	The EPR permit will control operation of the site but not construction. Consideration of impacts during construction is outside of the Environment Agency's remit.
68	At a Charlton Lane Community Liaison Group (CLG) meeting it was discussed that that there will be no constant monitoring of the incinerator	We have decided that monitoring should be carried out for the parameters listed in tables S3.1 to S3.5 in Schedule 3 of the permit using the methods and to the frequencies specified in those

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	and the pollutants leaving the stack as it's too expensive.	tables. These monitoring requirements have been imposed in order to demonstrate compliance with emission limit values. The permit requires continuous monitoring for particulates, oxides of nitrogen, sulphur dioxide, hydrogen chloride, carbon monoxide and volatile organic compounds. Other pollutants, for which continuous monitors do not exist, are required to be monitored quarterly or bi-annually. These requirements are in line with the IED chapter IV and we consider these measures to be appropriate. The Permit also requires continuous monitoring of several process variables (e.g. combustion temperature) to ensure that the incinerator is running optimally and minimising emissions. This monitoring acts as a surrogate for the continuous monitoring of some pollutants.
69	The environment agency runs no inspections or unannounced visits and the site is untested 363 days of the year.	We will visit the site regularly to ensure the Operator continues to operate to a high standard. These visits will be both announced and unannounced to ensure we visit the site in all states of operation.
70	Regarding pre-operational condition 13 from EPR/VP3997NK/V003. Does this condition apply covering a period of not less than 12 months following commissioning and will the results be made available in the public domain?	PO13 from EPR/VP3997NK/V003 related to boiler protection vents which are no longer required for the proposed fluidised bed gasifier. Therefore, this pre-operational condition has been removed.
71	The greenhouse gas assessment is based on flawed assumptions that are out of line with requirements of DECC as set out in table 1 of Tables 1-20: supporting the toolkit and the guidance via "Guidance Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal". The electrical power from the proposed gasification plant will carry a greater carbon burden than that it replaces and over the 25 year life of the plant, the burden will for the gasification plant exceed that of the source offset by some 13,000 tonnes CO_2 equivalent each year. The power	This is discussed in section 6.3 of this document. We have carried out our own audit check of the greenhouse gas assessment We agree with the assessment and that the chosen option is BAT for the Installation.

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	originating from the AD plant does little to improve the situation.	