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

Decision document recording our decision-making process

The Permit Number is: EPR/LP3592NM
The Applicant / Operator is: Greenfield Properties (UK) Limited
The Installation is located at: Chelveston Non-Recyclable Plastic to Fuel Facility
Land Adjacent to the Cottage
Upper Higham Lane
Higham Ferrers
Northamptonshire
NN10 0SU

What this document is about

This is a decision document, which accompanies a permit.

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

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

Preliminary information and use of terms

We gave the application the reference number EPR/LP3592NM/V003. We refer to the application as "the **Application**" in this document in order to be consistent.

The number we have given to the permit is EPR/LP3592NM. We refer to the permit as "the **Permit**" in this document.

The Application was duly made on 11/05/2018.

The Applicant is Greenfield Properties (UK) Limited. We refer to Greenfield Properties (UK) Limited as "the **Applicant**" in this document. Where we are talking about what would happen after the Permit is granted, we call Greenfield Properties (UK) Limited "the **Operator**".

Greenfield Properties (UK) Limited facility is located at grid reference SP 99235 67300. We refer to this as "the **Installation**" in this document.

How this document is structured

- Glossary of acronyms
- Our decision
- How we reached our decision
- The legal framework
- The Installation
    - Description of the Installation and general issues
    - The site and its protection
    - Operation of the Installation – general issues
- Minimising the installation's environmental impact
    - Assessment Methodology
    - Air Quality Assessment
    - Human health risk assessment
    - Impact on Habitats sites, SSSIs, non-statutory conservation sites etc.
    - Impact of abnormal operations
    - Other Emissions
- Application of Best Available Techniques
    - Scope of Consideration
    - BAT and emissions control
    - BAT and global warming potential
    - BAT and POPs
    - Other Emissions to the Environment
    - Setting ELVs and other Permit conditions
    - Monitoring
    - Reporting
- Other legal requirements
    - The EPR 2016 and related Directives
    - National primary legislation
    - National secondary legislation
    - Other relevant legal requirements
- Annexes
    - Application of the Industrial Emissions Directive
    - Pre-Operational Conditions
    - Improvement Conditions
    - Consultation Reponses

Glossary of acronyms used in this document

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

AAD	Ambient Air Directive (2008/50/EC)
APC	Air Pollution Control
AQS	Air Quality Strategy
BAT	Best Available Technique(s)
BAT-AEL	BAT Associated Emission Level
BREF	BAT Reference Note
CEM	Continuous emissions monitor
CFD	Computerised fluid dynamics
CHP	Combined heat and power
COMEAP	Committee on the Medical Effects of Air Pollutants
CROW	Countryside and rights of way Act 2000
CV	Calorific value
DAA	Directly associated activity – Additional activities necessary to be carried out to allow the principal activity to be carried out
DD	Decision document
DSEAR	The Dangerous Substances and Explosive Atmospheres Regulations 2002
EAL	Environmental assessment level
ELV	Emission limit value
EMS	Environmental Management System
EPR	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154) as amended
ES	Environmental standard
EWC	European waste catalogue
FSA	Food Standards Agency
GWP	Global Warming Potential
HAZOP	Hazard and Operability Study
HHRAP	Human Health Risk Assessment Protocol
HPA	Health Protection Agency (now PHE – Public Health England)
IED	Industrial Emissions Directive (2010/75/EU)
I-TEF	Toxic Equivalent Factors set out in Annex VI Part 2 of IED
I-TEQ	Toxic Equivalent Quotient calculated using I-TEF
LOI	Loss on Ignition

MSW	Municipal Solid Waste
MWI	Municipal waste incinerator
NOx	Oxides of nitrogen (NO plus NO_2 expressed as NO_2)
PAH	Polycyclic aromatic hydrocarbons
PC	Process Contribution
PCB	Polychlorinated biphenyls
PEC	Predicted Environmental Concentration
PHE	Public Health England
POP(s)	Persistent organic pollutant(s)
PPS	Public participation statement
PXDD	Poly-halogenated di-benzo-p-dioxins
PXB	Poly-halogenated biphenyls
PXDF	Poly-halogenated di-benzo furans
RGS	Regulatory Guidance Series
SAC	Special Area of Conservation
SCR	Selective catalytic reduction
SNCR	Selective non-catalytic reduction
SPA(s)	Special Protection Area(s)
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
UN-ECE	United Nations Environmental Commission for Europe
US EPA	United States Environmental Protection Agency
WFD	Waste Framework Directive (2008/98/EC)
WHO	World Health Organisation
WID	Waste Incineration Directive (2000/76/EC) – now superseded by IED

1 Our decision

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

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

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

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

2 How we reached our decision

2.1 Receipt of Application

The Application was duly made on 11/05/2018. This means we considered it was in the correct form and contained sufficient information for us to begin our determination but not that it necessarily contained all the information we would need to complete that determination: see below.

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

2.2 Consultation on the Application

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

consider appropriate to secure the involvement of representatives of interested persons in the exercise of our functions, by providing them with information, consulting them or involving them in any other way. In this case, our consultation already satisfies the Act's requirements.

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

We made a copy of the Application and all other documents relevant to our determination (see below) available to view on our Public Register at the Environment Agency office in Brampton, Cambridgeshire. Anyone wishing to see these documents could do so and arrange for copies to be made.

In addition to publicising the Application, we held a meeting with the Applicant and the residents' action group, known as Residents Against Inappropriate Development (RAID) and the parish/district councillors on 19 July 2018.

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

- *Food Standards Agency*
- *Planning – East Northamptonshire Council*
- *Planning – Northamptonshire County Council*
- *East Northamptonshire Council (Environmental Protection)*
- *Northamptonshire Fire and Rescue*
- *Health and Safety Executive*
- *Anglian Water Services Ltd*
- *Public Health England*
- *Director of Public Health Northamptonshire*

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

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

2.3 Requests for Further Information

Although we were able to consider the Application duly made, we did in fact need more information in order to determine it, and issued information notices on 13/06/2018, 24/10/2018 and 08/01/2019. A copy of each information notice and the responses was placed on our public register.

In addition to our information notices, we received additional information during the determination from the Applicant about the air abatement systems and BAT. This was received by email on 12/02/2019, 13/02/2019 and 07/03/2019. Two further emails were received on 21/02/2019 and 06/03/2019 confirming the emission points and site layout plan. A final email containing an updated air emission assessment and shutdown procedure was received on 03/04/2019. We made a copy of this information available to the public in the same way as the responses to our information notices.

Finally we have consulted on our draft decision from 08/05/2019 to 06/06/2019. A summary of the consultation responses and how we have taken into account all relevant representations is shown in Annex 4B.

3 The legal framework

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

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

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

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

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

4 The Installation

4.1 Description of the Installation and related issues

The facility is currently permitted to operate a Household, Commercial and Industrial Waste Transfer Station with waste treatment. Non-hazardous wastes are treated by sorting, separation, screening, baling, shredding (including crumbing), crushing and compaction. Wastes are bulked up for disposal or recovery.

The basis of this permit variation is to change the activities on site from a waste operation to a listed waste co-incineration activity as described below. This includes a transition period where the existing activities will continue to be carried out on site, prior to construction of the new facility. Prior to the commencement of commissioning, the operator shall cease the waste activities and clear the site of the associated wastes, products and equipment. This is required as a pre-operational condition (PO5).

4.1.1 The permitted activities

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

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

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

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

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

Flaring is listed as a DAA, which is limited to emergency use only.

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

In addition to the new Section 5.1 Part A(1)(b) activity detailed above, the permit includes the existing waste operation, until such time as construction commences for the above activity.

4.1.2 The Site

The Installation is located on a small industrial estate 2.5 km east of the towns of Higham Ferrers and Rushden in East Northamptonshire, at grid reference SP 99235 67300. The site is bounded by industrial units and agricultural land, with several residential receptors and three villages within 2 km of the installation. The nearest residential receptor is Airfield Farm circa 0.4 km to the south-east.

Within 10 km of the installation there is the Upper Nene Valley Gravel Pits (SPA and Ramsar) and within 2 km of the installation there are: Yelden Meadows (SSSI and Local Wildlife Site), Newton Gorse Green Lane CWS (Local Wildlife Site) and Yelden Field CWS (Local Wildlife Site). The discharge to surface water from the wastewater treatment plant will flow into Chelveston Brook and then into the River Nene, which passes through the Upper Nene Valley Gravel Pits (SPA and Ramsar).

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

Existing Waste Management Activity

The facility is permitted to operate a Household, Commercial and Industrial Waste Transfer Station with waste treatment. Non-hazardous wastes, as detailed in Table S2.3 are bulked up for disposal or recovery elsewhere. Waste is also treated by sorting, separation, screening, baling, shredding (including crumbing), crushing and compaction.

New Co-incineration Activity

The Applicant has described the facility as a non-recyclable plastic waste to fuel facility. Our view is that for the purposes of IED (in particular Chapter IV) and EPR, the installation is a waste co-incineration plant. This is because, notwithstanding the fact that waste will be thermally treated by the process, the process is never the less ‘co-incineration’ because it is considered that main purpose of this plant is the production of material products.

The Applicant has not demonstrated to our satisfaction that the gases from the pyrolysis process have passed the ‘end of waste’ test as referred to in the Waste Framework Directive; therefore the whole process is considered to be a waste co-incineration plant and therefore subject to the requirements of Chapter IV of the IED. An improvement condition (IC6) requiring the operator

to report on the source, type and proportion of gases fuelling the boilers has been included in the permit.

The facility is permitted to import waste material to thermally treat in four pyrolysis units in order to produce liquid and gaseous fuel for sale and gaseous fuel for use on site to power the process. Waste plastic is the only feedstock that is permitted to be used at the facility.

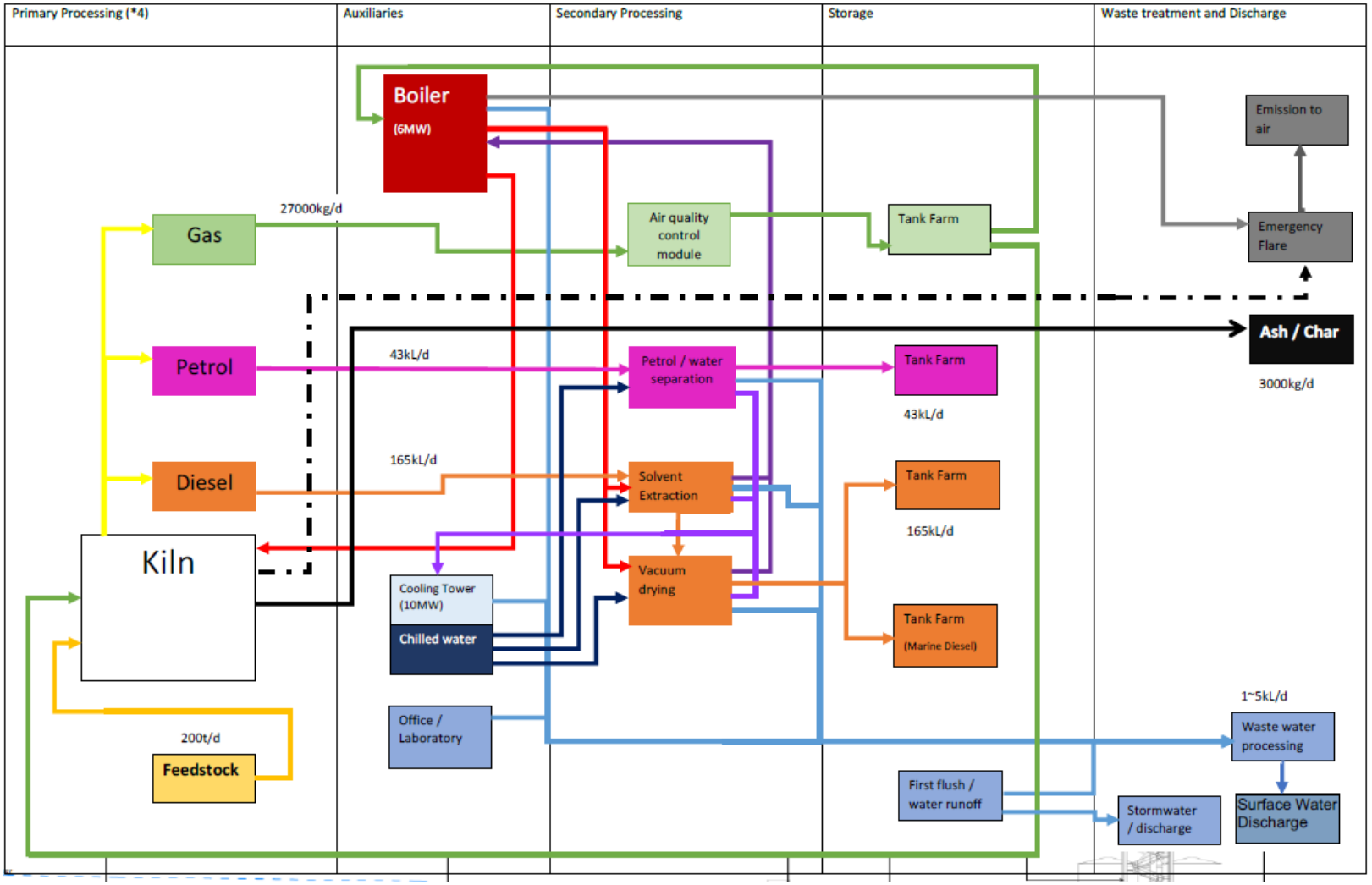
The pre-treatment of waste will include sorting of the plastic to remove any impurities, and a two-stage shredding process to form pellets. Once the plastic is formed into pellets, it will be temporarily stored in silos with fire resistant dividers, prior to passing via a screw conveyor into the catalytic reactors (pyrolysis kilns).

The catalytic reactors use heat to break down the bonds of the polymers with the aid of a catalyst. This forms a gaseous hydrocarbon vapour that is passed into a packed column scrubber in order to remove any particulate contaminants, which are returned into the catalytic reactor for further depolymerisation.

The vapour then passes into a fractionation column where diesel, marine diesel, petrol and liquefied petroleum gas (LPG) are separated. Diesel fuel passes into an impurity extraction system and then into a vacuum drying column to remove any moisture. Petrol and LPG vapours pass into the primary condenser, where the petrol is condensed out and transferred to the storage tanks. The remaining hydrocarbon vapour passes into the chilled vent condenser and compressor where LPG is condensed and transferred to the LPG storage tank.

Non-condensable vapours are passed into the cyclone combustor, along with LPG, where they are combusted to produce heat to power the process. The LPG is used as the fuel to initially start the depolymerisation reaction prior to the generation of non-condensable gas. Glycol-water chillers are used to condense the vapours.

The description is visualised in the process flowchart below.


Primary Processing (*4)
Auxiliaries
Secondary Processing
Storage
Waste treatment and Discharge
Boiler
(6MW)
Emission to air
27000kg/d
Gas
Air quality control module
Tank Farm
Emergency Flare
Ash / Char
3000kg/d
Petrol
43kL/d
Petrol / water separation
Tank Farm
43kL/d
Diesel
165kL/d
Solvent Extraction
Tank Farm
165kL/d
Kiln
Vacuum drying
Cooling Tower (10MW)
Chilled water
Tank Farm
(Marine Diesel)
1~5kL/d
Office / Laboratory
Waste water processing
200t/d
Feedstock
First flush / water runoff
Stormwater / discharge
Surface Water Discharge

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

Waste throughput, Tonnes/line	73,170 tonnes per annum	8.33 tonnes per hour
Waste processed	Plastic	
Number of lines	4 pyrolysis units	
Furnace technology	Pyrolysis	
Auxiliary Fuel	LPG	
Flue gas recirculation	Yes	
Stack	SP 99221 67322	
	Height, 35 m	Diameter, 0.67 m
Flue gas	Flow, 5.86 Nm^3/s @ 4% reference oxygen	Velocity, 16.6 m/s
	Temperature 120°C	

4.1.4 Key Issues in the Determination

The key issues arising during this determination were emissions to air and impacts on human health and the environment and we therefore describe how we determined these issues in most detail in this document.

4.2 The site and its protection

4.2.1 Site setting, layout and history

The site was used as agricultural land until approximately 1974, when industrial units were installed. Since then the site has remained as industrial units.

Currently the site is the location of an existing waste management facility, which will cease operation prior to construction of this facility. The waste management activities undertaken on the site include tyre crumbing to produce equestrian surfacing.

During the operation of the waste management facility a number of pollution incidents occurred. These incidents were rubber fires that were extinguished by the Fire Brigade, leading to potential contamination of the ground with fire-fighting water runoff and particulates from incomplete combustion.

4.2.2 Proposed site design: potentially polluting substances and prevention measures

The key features of the site that prevent the pollution of ground and ground water are:

- Impermeable concrete base that covers the entire site.
- Bunding (kerbing) surrounding the site to contain 1,022 m^3 of water within the site boundary.
- Routine inspections of the integrity of the concrete base and bunding.

- Routine inspections of the underground pipework, tank and interceptor.
- Spill procedures to ensure that spills do not enter the ground or surface water and are cleaned up in a timely manner.

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 a pre-operational condition (PO7) requiring the Operator to provide this information prior to the commencement of operations. A pre-operational condition has also been set for the operator to provide a copy of the protocol for soil and groundwater sampling (PO8).

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

4.2.3 Closure and decommissioning

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

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

4.3 Operation of the Installation – general issues

4.3.1 Administrative issues

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.

4.3.2 Management

The Applicant has stated in the Application that they will implement an Environmental Management System (EMS) that will be certified under ISO14001. A pre-operational condition (PO1) is included requiring the Operator to provide a summary of the EMS prior to commissioning of the plant and to make available for inspection all EMS documentation. The

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

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

4.3.3 Site security

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

4.3.4 Accident management

The Applicant has 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. A pre-operational condition (PO10) requiring the operator to provide an updated Accident Management Plan to include the recommendations from the HAZOP and DSEAR risk assessments once individual pieces of equipment have been specified at the design stage, has been included in the permit.

The Applicant submitted a Fire Prevention 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 fires that may cause pollution are prevented but that, if they should occur, their consequences are minimised. An updated fire prevention plan has been requested as a pre-operational condition (PO11) to include finalised details on the design of the silos and deluge system.

4.3.5 Off-site conditions

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

4.3.6 Operating techniques

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

Description	Parts
Environmental Management System	Environmental Management System, Issue 1, January 2009
Application	Application documents, parts:

Description	Parts
EPR/LP3592NM/ V003	• Environmental Permit Application, Part 2.1.5 – Staffing and training • Environmental Permit Application, Table 2.1.2 – Raw materials and water use • Environmental Permit Application, Part 2.3 – Avoidance, recovery and disposal of waste • Environmental Permit Application, Part 3.1 – Process overview • Environmental Permit Application, Part 3.4 – Receipt and storage of raw materials (Waste Acceptance and Pre-Acceptance Criteria) • Environmental Permit Application, Part 3.5 – Cyclone combustor and catalytic reactor • Environmental Permit Application, Part 3.8 – Cooling • Environmental Permit Application, Table 4.2 – Stack height • Environmental Permit Application, Part 4.3 – Emissions of substances not controlled by emission limits
Response to Schedule 5 Notice dated 24/10/2018	• Response to Questions 7a and 7b – Management of waste plastic feedstock • Response to Question 7c – Management of fugitive VOC emissions • Response to Question 7m – Management of waste metals • Site Condition Report – Appendix C, Site Closure Plan (November 2018)
Response to Schedule 5 Notice dated 08/01/2019	• Response to Question 2b – Location of water meters • Odour Management Plan (January 2019) • Fire Prevention Plan (January 2019) • Response to Question 4f – Management of wastewater • Response to Questions 5a, 5b and 5c – Plastic feedstock processing • Response to Question 6h – Frequency of pyrolysis chamber maintenance • Response to Questions 7b and 7c – Management of char residue • Response to Question 9e – Operation of the activated carbon abatement for the storage tank vents

Description	Parts
	• Response to Questions 9f, 9g, 9h and 13 – Operation of the diesel reflux scrubber and impurity extraction system • Response to Questions 10a-f – Operation of the emergency flare • Response to Question 12 – Management of the out of specification products
Response to Schedule 5 Notice dated 08/01/2019	• Environmental Risk Assessment (December 2018) • Table 2-5 Accident Risk Assessment and Management Plan • Fire Action Plan • Spillage Procedure
Additional information received	Design of the flue gas management system to allow the retrospective addition of flue gas abatement techniques.
Additional information received	• Shutdown procedure in the event of CEMS failure • Back-up CEMS

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.

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

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

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

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

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

We have limited the capacity of the Installation to 73,170 tonnes per annum. This is based on the installation operating 8,784 hours per year (366 days) at a nominal capacity of 8.33 tonnes per hour. Taking into account the number of hours in a year this totals 73,170 tonnes per annum that the facility has the capacity to process.

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

4.3.7 Energy efficiency

(i) Consideration of energy efficiency

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

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

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

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

(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, which are:

- Energy recovery from the flue gas via a heat recovery unit after the reactor. Flue gases are 120°C when emitted from the stack. Energy recovered is used to primary and secondary air.
- Primary energy is not used to reheat the plume.
- Use of frequency controlled rotating equipment for equipment that rotates at variable speeds.
- Integrated PLC/SCADA system to maximise process efficiency.
- Combustion of waste gases to heat the pyrolysis process.

The Application states that the specific energy consumption, a measure of total energy consumed per unit of waste processed, will be 2.13 MWh/tonne. The installation capacity is 73,170 tonnes per annum.

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

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

Our CHP Ready Guidance - February 2013 considers that BAT for energy efficiency for Energy from Waste (EfW) plant is the use of CHP in circumstances where there are technically and economically viable opportunities for the supply of heat from the outset. This Installation is not classed as an EfW plant as it does not generate electricity, consequently the CHP Ready Guidance does not apply.

The operator utilises energy recovery systems as detailed in section 4.3.7 of this document.

(iv) Choice of Cooling System

Temperature Range	Suitable Cooling System	Typical Applications
Low temperature (10 – 25 °C)	• once-through systems (direct/indirect) • wet cooling towers (mechanical/natural draught) • hybrid cooling towers • combined cooling systems	• power generation • (petro-) chemical processes
Medium temperature (25 – 60 °C)	• once-through systems (direct/indirect) • wet cooling towers (mechanical/natural draught) • closed circuit cooling towers • evaporative condensers • air-cooled fluid coolers • air-cooled condensers • hybrid cooling towers/ condensers • hybrid closed circuit cooling tower	• refrigeration cycles • compressor • cooling of machines • autoclave cooling • cooling of rotary kilns • steel plants • cement plants • power generation in warmer regions (Mediterranean)
High Temperature (above 60 °C)	• once-through systems (direct/indirect) in special cases • wet cooling towers (mechanical/natural draught) • air-cooled fluid cooler/ condensers	• waste incineration plants • engine cooling • cooling of exhaust fumes • chemical processes

The cooling system that is to be used in the facility for the cooling of the products is a glycol water based wet cooling tower. The water for these will be taken from treated process water and harvested rainwater in order to minimise potable water usage. The Environment Agency accepts that the Applicant's proposals represent BAT for this Installation.

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

Compliance with Article 14(5) of the Energy Efficiency Directive is not a relevant consideration because the installation's total net thermal input is 6 MW, which is below the threshold specified in the Directive.

(vi) Permit conditions concerning energy efficiency

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

Condition 1.2.2 has also been included in the Permit, which require the Operator to provide and maintain the proposed steam/hot water pass-outs.

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

4.3.8 Efficient use of raw materials

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

The Operator is required to report with respect to raw material usage under condition 4.2 and Schedule 5, including consumption of LPG, potable water and electrical energy used per tonne of waste processed. These are the most significant raw materials that will be used at the Installation, other than the waste feed itself (addressed elsewhere).

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 char and sludge from the effluent treatment plant.

The first objective is to avoid producing waste at all. Waste production will be avoided by achieving a high degree of conversion from plastics to liquid and gaseous hydrocarbons, with only solid char remaining. Condition 3.1.3 and associated Table S3.4 specify limits for total organic carbon (TOC) of <3% and loss on ignition (LOI) of <5% in the char. Compliance with this limit will demonstrate that good conversion control is being achieved in the pyrolysis kilns and waste generation is being avoided where practicable.

Char will normally be classified as non-hazardous waste. However, char is classified on the European List of Wastes as a "mirror entry", which means char is a hazardous waste if it possesses a hazardous property relating to the content of dangerous substances. Monitoring of pyrolysis char will be carried

out in accordance with the requirements of Article 53(3) of IED. Classification of char for its subsequent use or disposal is controlled by other legislation and so is not duplicated within the permit.

In order to ensure that the char residues are adequately characterised, pre-operational condition PO3 requires the Operator to provide a written plan for approval detailing the char sampling protocols. Table S3.4 requires the Operator to carry out an ongoing programme of monitoring. An improvement condition (IC7) has been included to demonstrate what options have been considered for the recovery of the char.

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

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

5. Minimising the Installation's environmental impact

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

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

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

5.1 Assessment Methodology

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

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

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

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

and surrounding conditions, including local meteorology – these techniques are expensive but normally lead to a lower prediction of PC.

5.1.2 Use of Air Dispersion Modelling

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

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

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

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

PCs are considered **Insignificant** if:

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

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

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

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

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

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

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

For those pollutants which do not screen out as insignificant, we determine whether exceedances of the relevant ES are likely. This is done through detailed audit and review of the Applicant's air dispersion modelling taking background concentrations and modelling uncertainties into account. Where an exceedance of an AAD limit value is identified, we may require the Applicant to go beyond what would normally be considered BAT for the Installation or we may refuse the application if the applicant is unable to provide suitable proposals. Whether or not exceedances 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 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 the "Atmospheric Dispersion Modelling Assessment of a Proposed Plastic Pyrolysis Plant Near Chelveston" report included in the Application. The assessment comprises:

- Dispersion modelling of emissions to air from the operation of the pyrolysis plant.
- A study of the impact of emissions on nearby sensitive habitat sites and nearby residential receptors.

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

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

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon local conservation and habitat sites and human health. These assessments predict the potential effects on local air quality from the Installation's stack emissions using the ADMS 5.2 dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years of meteorological data (2006 to 2010) collected from the weather station at Bedford. This meteorological data was chosen as it is close (9.6 km) to the site and has similar terrain characteristics. The impact of the terrain surrounding the site upon plume dispersion was considered in the dispersion modelling.

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

- First, they assumed that the ELVs in the Permit would be the maximum permitted by Article 46(2) and Annex VI of the IED. These substances are:
    - Oxides of nitrogen (NO_x), expressed as NO_2
    - Particulate matter (PM)
    - Carbon monoxide (CO)
    - Sulphur dioxide (SO_2)
    - Hydrogen chloride (HCl)
    - Hydrogen fluoride (HF)
    - Metals (Cadmium, Thallium, Mercury, Antimony, Arsenic, Lead, Chromium (III & VI), 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) and referred to as VOCs
- Second, they assumed that the Installation operates continuously at the relevant long-term or short-term ELVs, i.e. the maximum permitted emission rate.
- Third, the model also considered emissions of pollutants not covered by Annex VI of IED, specifically polycyclic aromatic hydrocarbons (PAH) and Polychlorinated biphenyls (PCBs). Emission rates used in the modelling have been drawn from data in the Waste Incineration BREF and are considered further in section 5.2.5.

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

The Applicant has used the following sources to estimate the background concentrations:

- HCl data from the Acid Gas and Aerosols Network is taken from the Rothamstead background rural monitoring site, located approximately 56 km to the south of Chelveston.
- Mercury data reports the total gaseous Mercury recorded at Harwell. Harwell is located approximately 89 km to the south, south west of Chelveston.

- Other Heavy Metals data is taken from the Fenny Compton, rural background monitoring site, located approximately 60 km to the south west of the Chelveston site.
- Dioxin data (the sum of Dioxins and Furans) is taken from the Hazlerigg rural background site in Lancaster. Although located approximately 250 km to the north-west of Chelveston, this rural background monitoring site is considered to be the most representative of the few dioxin monitoring locations, due to its background nature and altitude of 98 m, which are similar to the Chelveston area.
- Predicted data taken from the Air Quality Archive Background Pollution Maps, comprise 2018 data for Nitrogen dioxide and Particulate matter (PM_{10}). The chosen data point for the general area background levels was national grid reference SP9850066500 and this point is representative of the nearest data record upwind of the discharge points.

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 predicted peak ground level exposure to pollutants in ambient air and at discreet receptors. Whilst we have used the Applicant's modelling predictions in the tables below, we have made our own simple verification and calculation of the percentage process contribution and predicted environmental concentration. Any such minor discrepancies that we may have found do not materially impact on our conclusions.

Tables 5.1 and 5.2 show the predicted peak ground level exposure to pollutants in ambient air.

Table 5.1 – Predicted peak ground level concentrations for long term impact to air from the Installation

Pollutant	ES µg/m³	Background [1] µg/m³	PC µg/m³	PC% of ES	PEC [2] µg/m³	PEC [2] % of ES
NO_x	40	8.05	5.41	13.5	13.46	33.7
PM_{10}	40	13.52	0.26	0.7	N/A	N/A
$PM_{2.5}$	25	13.52	0.26	1.0	N/A	N/A
TOC/VOC (1,3-Butadiene EQS)	2.25	0.06	0.26	11.6	0.32	14.2
Cadmium	5	0.134	1.35	26.9	1.48	29.6
Mercury	0.25	1.9×10^{-3}	1.3×10^{-3}	0.5	N/A	N/A
Antimony	5	None provided	29.9×10^{-5}	0.01	N/A	N/A
Arsenic	0.006	8.8×10^{-4}	6.5×10^{-4}	10.83	15.3×10^{-4}	25.5
Lead	0.25	63.1×10^{-4}	131.3×10^{-5}	0.53	N/A	N/A
Chromium (III)	5	2×10^{-4}	239.2×10^{-5}	0.05	N/A	N/A
Chromium (VI)	2×10^{-4}	4.4×10^{-5}	3.9×10^{-6}	1.95	47.9×10^{-6}	24.0
Cobalt	--	4.3×10^{-5}	14.3×10^{-5}	--	N/A	N/A
Copper	10	31.6×10^{-4}	75.4×10^{-5}	1 x10-3	N/A	N/A
Manganese	0.15	24.4×10^{-4}	15.6×10^{-4}	1.04	0.004	2.7
Nickel	0.02	1.4×10^{-4}	57.2×10^{-4}	28.60	58.6×10^{-4}	29.3
Vanadium	5	59.1×10^{-5}	15.6×10^{-5}	3×10^{-3}	N/A	N/A

Note 1 – Background concentration is that used by the Applicant.

Note 2 – Where the process contribution is demonstrated to be less than 1% of the long term ES (a level below which we consider to indicate insignificant impact), we consider that examination of the PEC and background is not necessary.

Table 5.2 – Predicted peak ground level concentrations for short term impacts to air from the Installation

Pollutant	ES µg/m³	Background [1] µg/m³	PC µg/m³	PC % of ES	PEC [2] µg/m³	%PC of headroom
NO_2	200	8.05	21.02	10.5	37.2	12.6
PM_{10}	50	13.52	0.71	1.4	N/A	N/A
SO_2 (15-min mean)	266	2.00	13.44	5.1	N/A	N/A
SO_2 (1-hour mean)	350	2.00	9.65	2.8	N/A	N/A
SO_2 (24-hour mean)	125	2.00	5.67	4.5	N/A	N/A
HCl	750	0.28	7.87	1.0	N/A	N/A
HF	160	None provided	1.16	0.7	N/A	N/A

CO	10000	1600	31	0.3	N/A	N/A

Note 1 – Background concentration is that used by the Applicant. There are no existing background concentrations for HF.

Note 2 – Where the process contribution is demonstrated to be less than 10% of the short term ES (a level below which we consider to indicate insignificant impact), we consider that examination of the PEC and background is not necessary. For the assessment of short term impacts, the PEC is determined by adding twice the long term background concentration to the short term process contribution.

(i) Screening out emissions which are insignificant

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

- SO_2, HCl, HF, CO, PM_{10}, $PM_{2.5}$, mercury, antimony, lead, chromium (III), cobalt, copper and vanadium.

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

(ii) Emissions unlikely to give rise to significant pollution

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

- Nickel, arsenic, cadmium, chromium (VI), manganese, TOC/VOC and oxides of nitrogen.

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

(iii) Emissions requiring further assessment

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

5.2.2 Consideration of key pollutants

(i) Nitrogen dioxide (NO_2)

The impact on air quality from NO_2 emissions has been assessed against the ES of 40 µg/m^3 as a long term annual average and a short term hourly average of 200 µg/m^3. The model assumes a 100% NO_X to NO_2 conversion for the long term and 50% for the short term assessment, which is more

conservative than the Environment Agency guidance on the use of air dispersion modelling, which states that a 70% NO_X to NO_2 conversion for the long term and 35% for the short term assessment should be used.

The above tables show that the peak long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded. The peak short term PC is marginally above the level that would screen out as insignificant (>10% of the ES). However it is not expected to result in the ES being exceeded.

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

The impact on air quality from particulate emissions has been assessed against the ES for PM_{10} (particles of 10 microns and smaller) and $PM_{2.5}$ (particles of 2.5 microns and smaller). For PM_{10}, the ES are a long term annual average of 40 µg/m^3 and a short term daily average of 50 µg/m^3. For $PM_{2.5}$ the ES of 25 µg/m^3 as a long-term annual average has been used.

The Applicant's predicted impact of the Installation against these ESs is shown in the tables above. The assessment assumes that **all** particulate emissions are present as PM_{10} for the PM_{10} assessment and that **all** particulate emissions are present as $PM_{2.5}$ for the $PM_{2.5}$ assessment.

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

- It assumes all particulates emitted are below either 10 microns (PM_{10}) or 2.5 microns ($PM_{2.5}$), when some are expected to be larger.

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

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

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

There is currently no emission limit prescribed nor any continuous emissions monitor for particulate matter specifically in the PM_{10} or $PM_{2.5}$ fraction. Whilst the Environment Agency is confident that current monitoring techniques will capture the fine particle fraction ($PM_{2.5}$) for inclusion in the measurement of total particulate matter, an improvement condition (IC2) has been included that will require a full analysis of particle size distribution in the flue gas, and hence determine the ratio of fine to coarse particles. In the light of current

knowledge and available data however the Environment Agency is satisfied that the health of the public would not be put at risk by such emissions, as explained in section 5.3.3.

(iii) Acid gases, SO_2, HCl and HF

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

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

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

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

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

The Applicant has used the ES for 1,3-butadiene for their assessment of the impact of VOC. This is based on 1,3-butadiene having the lowest ES of organic species likely to be present in VOC (other than PAH, PCBs, dioxins and furans). The above tables show that for VOC (TOC as 1,3-butadiene) emissions, the peak long term PC is greater than 1% of the ES and therefore cannot be screened out as insignificant. Even so, from the table above, the emission is not expected to result in the ES being exceeded.

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

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

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

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 BAT, this is considered further in Section 6. We are satisfied that PAH and VOC emissions will not result in significant pollution.

(v) Summary

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

5.2.3 Assessment of Emission of Metals

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

Annex VI of IED sets three limits for metal emissions:

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

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

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

- *Mercury*
- *Antimony*
- *Lead*
- *Chromium (III)*
- *Cobalt*
- *Copper*
- *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

- Chromium (VI)
- Manganese
- Nickel

There were no metal emissions requiring further assessment. The Applicant has concluded that exceedances of the EAL for all metals are not likely to occur. The installation has been assessed as meeting BAT for control of metal emissions to air (see section 6 of this document). The Environment Agency's experience of regulating incineration plant is that emissions of metals are in any event below the Annex VI limits set in IED, and that the above assessment is an over prediction of the likely impact. We therefore agree with the Applicant's conclusions.

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

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

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

The Applicant has used the above data to model the predicted Cr(VI) impact. The PC is predicted as 24% of the EAL.

This assessment shows that emissions of Chromium (VI) are not insignificant, however they are unlikely to lead to a breach of the ES. We agree with the Applicant's conclusions. The installation has been assessed as meeting BAT for control of metal emissions to air. See section 6 of this document.

5.2.4 Consideration of Local Factors

Impact on Air Quality Management Areas (AQMAs)

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

5.3 Human health risk assessment

5.3.1 Our role in preventing harm to human health

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

i) Applying Statutory Controls

The plant will be regulated under EPR. These regulations include the requirements of relevant EU Directives, notably, the Industrial Emissions Directive (IED), the Waste Framework Directive (WFD), and Ambient Air Directive (AAD).

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

ii) Environmental Impact Assessment

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

iii) Expert Scientific Opinion

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

particular order). Although the following are predominately focus upon the impacts from municipal waste incinerators, the conclusions may also be used for co-incinerators.

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

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

HPA (now PHE) in 2009 stated that "The Health Protection Agency has reviewed research undertaken to examine the suggested links between emissions from municipal waste incinerators and effects on health. While it is not possible to rule out adverse health effects from modern, well-regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable". In January 2012 PHE confirmed they would be undertaking a study to look for evidence of any link between municipal waste incinerators and health outcomes including low birth weight, still births and infant deaths.

The first part of the study was published on 31st October 2018. The study found that living near an incinerator and being exposed to emissions from an incinerator were not associated with additional risk of any of the birth outcomes investigated. These were multiple births, sex ratio, low birth weight, stillbirth, preterm delivery, neonatal mortality (deaths in the first month of life) and post-neonatal mortality (deaths from the second month of life up to the end of the 12th month of life).
PHE's position remains that that modern, well run municipal waste incinerators are not a significant risk to public health.

The **Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (CoC) issued** a statement in 2000 which

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

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

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

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

The **US National Research Council Committee on Health Effects of Waste Incineration (NRC) (NRC 2000)** reviewed evidence as part of a wide ranging report. The Committee view of the published evidence was summarised in a key conclusion: “Few epidemiological studies have attempted to assess whether adverse health effects have actually occurred near individual incinerators, and most of them have been unable to detect any effects. The studies of which the committee is aware that did report finding health effects had shortcomings and failed to provide convincing evidence.

That result is not surprising given the small populations typically available for study and the fact that such effects, if any, might occur only infrequently or take many years to appear. Also, factors such as emissions from other pollution sources and variations in human activity patterns often decrease the likelihood of determining a relationship between small contributions of pollutants from incinerators and observed health effects. Lack of evidence of such relationships might mean that adverse health effects did not occur, but it could mean that such relationships might not be detectable using available methods and sources."

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

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

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

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

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

iv) Health Risk Models

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

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

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

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

In addition to an assessment of risk from dioxins, furans and dioxin-like PCBs, the HHRAP model enables a risk assessment from human intake of a range of heavy metals. In principle, the respective ES for these metals are protective

of human health. It is not therefore necessary to model the human body intake.

COMEAP developed a methodology based on the results of time series epidemiological studies which allows calculation of the public health impact of exposure to the classical air pollutants (NO_2, SO_2 and particulates) in terms of the numbers of "deaths brought forward" and the "number of hospital admissions for respiratory disease brought forward or additional". COMEAP has issued a statement expressing some reservations about the applicability of applying its methodology to small affected areas. Those concerns generally relate to the fact that the exposure-response coefficients used in the COMEAP report are derived 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 NOx, SO_2 and particulates cannot be screened out as insignificant in the Environmental Impact assessment, where there are high ambient background levels of these pollutants and we are advised that its use was appropriate by our public health consultees.

Our recommended approach is therefore the use of the methodology set out in our guidance for comparison for most pollutants (including metals) and dioxin intake model using the HHRAP model as described above for dioxins, furans and dioxin-like PCBs. Where an alternative approach is adopted for dioxins, we check the predictions ourselves.

v) Consultations

As part of our normal procedures for the determination of a permit application, we consult with Local Authorities, Local Authority Directors of Public Health, FSA and PHE. We also consult the local communities who may raise health

related issues. All issues raised by these consultations are considered in determining the application as described in Annex 4 of this document.

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

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

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

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

Table 5.3 – Predicted maximum daily intake of dioxins, furans and dioxin-like PCBs from the Installation

Receptor	Maximum predicted daily intake (pg I-TEQ/kg-BW/day)[1]
Chelveston Rise (Adult)	0.02
Chelveston Rise (Child)	0.048
Note 1 – Data shown is the calculated maximum daily intake of dioxins by local receptors resulting from the operation of the proposed facility (I-TEQ/ kg-BW/day).	

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

In 2010, FSA studied the levels of chlorinated, brominated and mixed (chlorinated-brominated) dioxins and dioxin-like PCBs in fish, shellfish, meat and eggs consumed in UK. It asked COT to consider the results and to advise on whether the measured levels of these PXDDs, PXDFs and PXBs indicated a health concern ('X' means a halogen). COT issued a statement in December 2010 and concluded that "The major contribution to the total dioxin toxic activity in the foods measured came from chlorinated compounds. Brominated compounds made a much smaller contribution, and mixed halogenated compounds contributed even less (1% or less of TDI). Measured

levels of PXDDs, PXDFs and dioxin-like PXBs do not indicate a health concern". COT recognised the lack of quantified TEFs for these compounds but said that "even if the TEFs for PXDDs, PXDFs and dioxin-like PXBs were up to four-fold higher than assumed, their contribution to the total TEQ in the diet would still be small. Thus, further research on PXDDs, PXDFs and dioxin-like PXBs is not considered a priority."

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

5.3.3 Particulates smaller than 2.5 microns

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

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

The HPA (now PHE) addresses the issue of the health effects of particulates in their September 2009 statement 'The Impact on Health of Emissions to Air from Municipal Incinerators'. It refers to the coefficients linking 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. PHE note that the coefficients that allow the use of number concentrations in impact calculations have not yet been defined because the national experts have not judged that the evidence is sufficient to do so. This is an area being kept under review by COMEAP.

In December 2010, COMEAP published a report on The Mortality Effects of Long-Term Exposure to Particulate Air Pollution in the United Kingdom. It says that "a policy which aims to reduce the annual average concentration of

$PM_{2.5}$ by 1µg/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."

PHE 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. PHE noted that in a sample collected in a day at a typical urban area, the proportion of $PM_{0.1}$ is around 5-10% of 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 PHE that "While it is not possible to rule out adverse health effects from modern, well-regulated municipal waste incinerators with complete certainty, any potential damage to the health of those living close-by is likely to be very small, if detectable."

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

The Applicant's assessment of the impact from SO_2, HCl, HF, CO, PM_{10}, $PM_{2.5}$, mercury, antimony, lead, chromium (III), cobalt, copper and vanadium have all indicated that the Installation emissions screen out as insignificant; where the impact of emissions of *Nickel, arsenic, cadmium, chromium (VI), manganese, TOC/VOC and oxides of nitrogen* have not been screened out as insignificant, the assessment still shows that the predicted environmental concentrations are well within air quality standards or environmental action levels.

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

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

Public Health England, the Director of Public Health Northamptonshire and the Food Standards Agency were consulted on the Application. Public Health England concluded that they had no significant concerns regarding the risk to the health of humans from the proposed installation. No response was received from the Local Authority Director Public Health and the Food Standards Agency. Details of the responses provided by Public Health England, the Local Authority Director of Public Health Northamptonshire and the FSA to the consultation on this Application can be found in Annex 4.

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

5.4 Impact on Habitats sites, SSSIs and non-statutory conservation sites

5.4.1 Sites Considered

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

- Upper Nene Valley Gravel Pits (SPA and Ramsar)

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

- Yelden Meadows

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

- Newton Gorse Green Lane
- Yelden Field
- Yelden Meadows

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.

Table 5.4 – Predicted pollutant concentrations at habitat sites

Pollutant	Critical level (µg/m³)	Back-ground (µg/m³) [note 2]	Process Contribution (PC) (µg/m³)	PC as % of Critical level	Predicted Environmental Concentration (PEC) (µg/m³) [note 2]	PEC as % Critical level
Direct Impacts [note 1]						
NOx Annual	30	--	0.03	0.1	--	--
NOx Daily Mean	75	--	0.74	1.0	--	--
SO_2	10	--	0.006	0.03	--	--
HF Weekly Mean	0.5	--	0.0008	0.18	--	--
HF Daily Mean	5	--	0.003	0.06	--	--
Note 1: Direct impact units are in µg/m³. Note 2: Where the process contribution is demonstrated to be less than 1% of the long term critical level and less than 10% of the short term critical level (a level below which we consider to indicate insignificant impact), we consider that examination of the PEC and background concentration is not necessary.						

As the long term NOx and HF is <1% of the ES and short term NOx, SO_2 and HF is <10% of the ES and the nutrient nitrogen and acid deposition is <1% of the critical level then the emissions can be considered to be insignificant.

5.4.3 SSSI Assessment

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

Table 5.5– Predicted pollutant concentrations at SSSIs

Pollutant	Critical level (µg/m³)	Back-ground (µg/m³) [note 2]	Process Contribution (PC) (µg/m³)	PC as % of Critical level	Predicted Environmental Concentration (PEC) (µg/m³) [note 2]	PEC as % Critical level
Direct Impacts [note 1]						
NO_x Annual	30	--	0.2	0.7	--	--
NO_x Daily Mean	75	--	4.1	5.5	--	--
SO_2	10	--	0.04	0.2	--	--
HF Weekly Mean	0.5	--	0.005	1.0	--	--
HF Daily Mean	5	--	0.02	0.4	--	--
Deposition Impacts [note 1]						

Pollutant	Critical level (µg/m³)	Back-ground (µg/m³) [note 2]	Process Contribution (PC) (µg/m³)	PC as % of Critical level	Predicted Environmental Concentration (PEC) (µg/m³) [note 2]	PEC as % Critical level
N Deposition (kg N/ha/yr)	20-30	--	0.02211	0.1	--	--
Acidification (keq/ha/yr)	1.905	--	0.01284	0.7	--	--
Note 1: Direct impact units are µg/m³ and deposition impact units are kg N/ha/yr or keq/ha/yr. Note 2: Where the process contribution is demonstrated to be less than 1% of the long term critical level and less than 10% of the short term critical level (a level below which we consider to indicate insignificant impact), we consider that examination of the PEC and background concentration is not necessary.						

As the long term NOx and HF is <1% of the ES and short term NOx, SO_2 and HF is <10% of the ES and the nutrient nitrogen and acid deposition is <1% of the critical level then the emissions can be considered to be insignificant.

5.4.4 Assessment of other conservation sites

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

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

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

Therefore, we would generally conclude that the Installation is not causing significant pollution at these other sites if the PC is less than the relevant

critical level or critical load, provided that the Applicant is using BAT to control emissions.

Table 5.6– Predicted pollutant concentrations at Newton Gorse Green Lane

Pollutant	Critical level (µg/m³)	Back-ground (µg/m³) [note 2]	Process Contribution (PC) (µg/m³)	PC as % of Critical level	Predicted Environmental Concentration (PEC) (µg/m³) [note 2]	PEC as % Critical level
Direct Impacts [note 1]						
NO_x Annual	30	--	0.1	0.4	--	--
NO_x Daily Mean	75	--	1.9	2.5	--	--
SO_2	10	--	0.02	0.1	--	--
HF Weekly Mean	0.5	--	0.002	0.4	--	--
HF Daily Mean	5	--	0.009	0.2	--	--

Note 1: Direct impact units are µg/m³ and deposition impact units are kg N/ha/yr or keq/ha/yr.
Note 2: Where the process contribution is demonstrated to be less than 1% of the long term critical level and less than 10% of the short term critical level (a level below which we consider to indicate insignificant impact), we consider that examination of the PEC and background concentration is not necessary.

The pollution concentrations at Yelden Meadows and Yelden Field Local Wildlife Sites are shown in table 5.5. Due to the proximity of these two sites the pollution concentrations are listed as the same.

The tables show that the PCs are <1% of the long term ES, or <10% of the short term ES, therefore we conclude that impacts are insignificant.

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.

The Operator has committed to installing back-up CEMS in case of CEMS failure, which will help to reduce plant downtime.

In the situation that both the CEMS and back-up CEMS fail, the following shutdown procedure will be undertaken:

- The heat source to the depolymerisation kilns (LPG burners) is shut down immediately (within 2 seconds)
- Flue gas recirculation is shut down immediately
- The plastic feed shuts down immediately (within 2 seconds)
- The impurity extraction system is shut down immediately (within 2 seconds)
- Due to the residual heat in the kiln the cooling systems will remain active
- Fuel and gas production start to slow within minutes of the heat source being turned off
- Gas production will slow to almost nothing in 30 minutes
- Gas being produced during the shutdown will be compressed and sent to storage
- If storage levels are high excess gas will be burnt off in the boiler under the same controlled conditions as normal operations
- Steam produced by combustion of excess gas will be condensed and returned to feed water
- Cooling systems will remain active until the plant is cool (24 hours)

In the event that the emission limits are breach the waste feedstock will ceased to be charged until the emissions are brought back within the permitted limits.

The Applicant has assessed abnormal emissions scenarios in relation to Article 46(6) of the IED for waste incineration plant. Their anticipated abnormal emission concentrations during abatement failure are reported in Table 11 of their air quality assessment, with a comparison to half-hourly ELVs.

The Applicant's predicted short term and long term impacts are reported in Appendix A, Table 5 and 6 respectively. However, short term impacts are the main concern from abnormal emissions because they are limited to up to 60 hours per year (less than 0.7% of the year).

We have conducted checks on abnormal emissions against all the relevant short-term environmental standards. We also carried out check modelling using ADMS 5, version 5.2. Our checks included sensitivity to abnormal emissions of dioxins and furans including higher potential concentrations of particulate matter.

Our abnormal emissions checks using plausible abnormal emissions concentrations indicate that the proposed plastic pyrolysis facility is unlikely to lead to any short term breaches of the environmental standards.

5.6 Other Emissions

5.6.1 Emissions to Surface Water

There is one emission point from the installation into Chelveston Brook, which is a tributary to the River Nene. There are two sampling points prior to the discharge. Sampling point S1, which is located immediately after the onsite effluent treatment plant, comprises treated wastewater from the onsite effluent treatment plant, which treats cooling tower water. Sampling point S2, is a combination of the treated effluent and surface water run-off from the concreted roadway, is located after the interceptor, but prior to the penstock valve.

The emission limits detailed in table S3.2 of the permit for sampling point S1 were back calculated using Monte Carlo modelling, so as to not exceed the Environmental Quality Standards (EQS) and not adversely impact the receiving waters. These limits are based on a maximum discharge of $5m^3/d$. The limits for pH are standard limits to protect surface waters. We are satisfied that the treatment of process water to the limits set in table S3.2 of the permit represent BAT for this facility.

The only emission limit for sampling point S2 is 'no visible oil and grease'. This has been included as surface water that has been in contact with roadways will pass through this point, which may be contaminated with oils or hydrocarbons, however the interceptor is designed to remove these contaminants.

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.

- We consider in particular control measures for the emissions which were not screened out as insignificant in the previous section on minimising the installation's environmental impact. They are emissions of NOx, TOC/VOC, cadmium, arsenic, manganese 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.

Chapter IV of the IED specifies a set of maximum emission limit values. Although these limits are designed to be stringent, and to provide a high level of environmental protection, they do not necessarily reflect what can be achieved by new plant. Article 14(3) of the IED says that BAT Conclusions

shall be the reference for setting the permit conditions, so it may be possible and desirable to achieve emissions below the limits referenced in Chapter IV. However, BAT Conclusions and a revised BREF for Incineration have not yet been drafted or published, so the existing BREF and Chapter IV of the IED remain relevant.

Even if the Chapter IV limits are appropriate, operational controls complement the emission limits and should generally result in emissions below the maximum allowed; whilst the limits themselves provide headroom to allow for unavoidable process fluctuations. Actual emissions are therefore almost certain to be below emission limits in practice, because any Operator who sought to operate their 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 Boiler Design and Fuel Type

Fuel Type

The Applicant proposes to use LPG as support fuel for start-up and during normal operation when insufficient non-condensable gas is being formed to maintain the pyrolysis process. The choice of support fuel is based on the burner being a single fuel source burner and the production of LPG during the pyrolysis process. We are satisfied this represents BAT for this facility.

Boiler Design

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

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

We are satisfied this represents BAT for this facility as emissions to air from the boiler are within the relevant ES.

6.2 BAT and emissions control

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

The BREF lists the general factors requiring consideration when selecting FGT systems as:

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

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

The fuel combusted at the facility will be a combination of non-condensable gas and LPG. The boilers have a combined thermal input of 6 MW. The Applicant has supplied the expected chemical composition of the non-condensable gas, which is shown in the table below.

Table 6.1 Expected composition of non-condensable gas

Substance	Composition of Gas (%)
Methane	22.7
Ethane	27.4
Ethylene	1.4
C3	26.6
C4	11.0
C5	6.9
C6	2.1

The combustion of the non-condensable gas and LPG are expected to produce emissions to air with similar pollution concentrations as combustion of natural gas i.e. primarily emissions of acid gases, NOx, CO and CO_2. Concentrations of particulate matter, SO_2, HCl, HF, metals (all species),

dioxins and furans, VOCs and CO are anticipated to be insignificant due to the following process controls which we are satisfied are BAT:

- **HCl/HF** – the stringent waste acceptance criteria and pre-sorting of the feedstock ensures that it is of high purity with low/no chlorine or fluoride content.
- **SO_2** – the plastic feedstock has a low sulphur content.
- **Particulates** – the non-condensable gas and LPG are filtered by passing the gas stream through the scrubber to remove any particulates.
- **Metals** – the acceptance of only high-quality plastic waste that is pre-sorted to remove metals will ensure that the metal concentrations are low or nominally zero.
- **Furans** – due to the fuel type (gas with no particulates) complete combustion is expected. This is ensured through optimisation of combustion control including the maintenance of permit conditions on combustion temperature and residence time, therefore furans are unlikely to be formed during combustion.
- **Dioxins** – the Waste Acceptance Criteria states that impurities from plastics that contain chlorine (PVC) is limited to <0.5%, therefore minimal chlorine will be present to form dioxins. Due to the high combustion temperatures and residence times, any dioxins formed during the processing of the waste plastics is likely to be destroyed during combustion.
- **CO and VOCs** – the conditions within the boiler should ensure near complete combustion, which means the CO and VOCs content will be minimal.

Emissions of acid gases and NOx are assessed below against BAT.

6.2.2 Oxides of Nitrogen

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

	NOx control. May increase overall energy recovery	problems.		to be demonstrated)

The Applicant proposes to implement the following primary measures:

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

The Applicant has confirmed that they can meet the emission limits for NOx set in the Permit without the need for secondary abatement. This approach also reduces the energy and resource consumption associated with treatment of NOx, making the facility more energy and resource efficient. It also reduces the risk to the surface water as no reagents will need to be stored onsite.

An operating technique has been included in table S1.2 of the permit that requires the operator to be 'abatement ready' and to retrofit NOx and acid gas abatement if they cannot meet the ELVs without them. We consider this to represent BAT for this installation.

6.2.3 Acid Gases – SO_2, HCl and HF

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

The Applicant initially proposed to use an alkaline scrubber to reduce the concentrations of acid gases, however during determination they revised their abatement proposals to not include acid gas abatement. They confirmed that they would still be able to meet the emission limit values listed in Schedule 3 of the permit without the need for abatement. The applicant gave them following justification for not requiring acid gas abatement:

The Applicant reports that waste acceptance criteria will be in place on site. This waste acceptance criteria is in place to ensure only the three types of plastic that are suitable for the process are accepted into the process. As part of this process waste plastics will only be accepted with a PVC content of <0.5%. The plastics will then be de-baled, coarsely shredded and pass through near infra-red sorting machine that will reduce the PVC content down to 0.0075%. Material that has been separated and is not suitable for the process will be stored in containers within the building and is then returned to the suppliers for correct disposal. Chlorides that do pass into the pyrolysis kilns will be separated out with the water/petrol fraction in the condensers as they are hydroscopic. The petrol and water will be separated, with the chlorides remaining in the separated water fraction. As there will be no chlorides present in the waste gas then no HCl should be formed in the emissions from the combustor.

The applicant will also use the following primary measures to control acid gas generation:

- Use of low sulphur fuel (LPG) for start-up.
- Management of heterogeneous wastes – this will disperse problem wastes such as PVC, by ensuring a homogeneous waste feed.

Acid gas emissions have been previously been screened out as insignificant, and so the Environment Agency agrees that the Applicant's proposed technique, including the ability to retrofit if required, is BAT for the installation.

6.2.4 Particulate Matter

Emissions of particulates are controlled through primary reduction methods, which we consider are BAT:

- The use of LPG during start-up
- The use of non-condensable gas alongside LPG during normal operation
- Through CFD modelling the optimisation of the burner so that carbon monoxide and unburnt hydrocarbon formation is minimised during combustion

6.2.5 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. We consider this to represent BAT for this installation.

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	--	Covered in section on furnace	All plants

	these species.		selection	

6.2.6 Dioxins and furans (and Other POPs)

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

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

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

6.2.7 Metals

The prevention and minimisation of metal emissions is achieved through the waste acceptance and pre-acceptance procedures, where metals are removed prior to the pyrolysis of the plastics. Within the kiln the plastics will be vaporised into a gaseous form, leaving the metals in the char, which is continually removed into a sealed container. This means that there will be no emissions of metals from the pyrolysis process.

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

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 major source of greenhouse gas emissions from the installation is CO_2 from the combustion of waste gases. BAT for greenhouse gas emissions is to maximise energy recovery and efficiency.

The fuel that is produced by the Installation will displace emissions of CO_2 elsewhere in the UK, as virgin fossil fuels will not be extracted to create the same fuel, except for the ancillary LPG used during start-up.

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

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

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

On the credit side

- CO_2 saved from the production of fuel displaces the CO_2 associated with extracting crude oil;
- Heat recovered from the flue gases is recycled within the process to reduce energy usage.

The GWP of the plant will be dominated by the emissions of carbon dioxide that are released as a result of waste gas combustion.

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.

The Environment Agency agrees that the technology used is BAT for the installation.

6.4 BAT and POPs

International action on Persistent Organic pollutants (POPs) is required under the UN's Stockholm Convention, which entered into force in 2004. The EU implemented the Convention through the POPs Regulation (850/2004), which

is directly applicable in UK law. The Environment Agency is required by national POPs Regulations (SI 2007 No 3106) to give effect to Article 6(3) of the EC POPs Regulation when determining applications for environmental Permits.
However, it needs to be borne in mind that this application is for a particular type of installation, namely a waste co-incinerator. The Stockholm Convention distinguishes between intentionally-produced and unintentionally-produced POPs. Intentionally-produced POPs are those used deliberately (mainly in the past) in agriculture (primarily as pesticides) and industry. Those intentionally-produced POPs are not relevant where waste incineration is concerned, as in fact high-temperature incineration is one of the prescribed methods for destroying POPs.

The unintentionally-produced POPs addressed by the Convention are:

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

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

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

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

The 1998 Protocol to the Convention recommended that unintentionally produced POPs should be controlled by imposing emission limits (e.g. 0.1 ng/m^3 for MWIs) and using BAT for incineration. UN Economic Commission for Europe (Executive Body for the Convention) (ECE-EB) produced BAT guidance for the parties to the Convention in 2009. This document considers various control techniques and concludes that primary measures involving management of feed material by reducing halogenated substances are not technically effective. This is not surprising because halogenated wastes still need to be disposed of and because POPs can be generated from relatively low concentrations of halogens. In summary, the successful control techniques for waste incinerators listed in the ECE-EB BAT are:

- maintaining furnace temperature of 850°C and a combustion gas residence time of at least 2 seconds;
- rapid cooling of flue gases to avoid the *de novo* reformation temperature range of 250-450°C; and
- 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 explained above, high-temperature incineration is one of the prescribed methods for destroying POPs. Permit conditions are based on the use of BAT and Chapter IV of IED and incorporate all the above requirements of the UN-ECE BAT guidance and deliver the requirements of the Stockholm Convention in relation to unintentionally-produced POPs.

The release of **dioxins and furans** to air is required by the IED to be assessed against the I-TEQ (International Toxic Equivalence) limit of 0.1 ng/m^3. Further development of the understanding of the harm caused by dioxins has resulted in the World Health Organisation (WHO) producing updated factors to calculate the WHO-TEQ value. Certain **PCBs** have structures which make them behave like dioxins (dioxin-like PCBs), and these also have toxic equivalence factors defined by WHO to make them capable of being considered together with dioxins. The UK's independent health advisory committee, the Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) has adopted WHO-TEQ values for both dioxins and dioxin-like PCBs in their review of Tolerable Daily Intake (TDI) criteria. The Permit requires that, in addition to the requirements of the IED, the WHO-TEQ values for both dioxins and dioxin-like PCBs should be monitored for reporting purposes, to enable evaluation of exposure to dioxins and dioxin-like PCBs to be made using the revised TDI recommended by COT. The release of dioxin-like PCBs and PAHs is expected to be low where measures have been taken to control dioxin releases. The Permit also requires monitoring of a range of PAHs and dioxin-like PCBs at the same frequency as dioxins are monitored. We have included a requirement to monitor and report against these WHO-TEQ values for dioxins and dioxin-like PCBs and the range of PAHs as listed in the Permit. We are confident that the measures taken to control the release of dioxins will also control the releases of dioxin-like PCBs and PAHs. Section 5.2.1 of this document details the assessment of emissions to air, which includes dioxins and concludes that there will be no adverse effect on human health from either normal or abnormal operation.

Hexachlorobenzene (HCB) is released into the atmosphere as an accidental product from the combustion of coal, waste incineration and certain metal processes. It has also been used as a fungicide, especially for seed treatment although this use has been banned in the UK since 1975. Natural fires and

volcanoes may serve as natural sources. Releases of (HCB) are addressed by the European Environment Agency (EEA), which advises that:

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

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

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

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

6.5 Other Emissions to the Environment

6.5.1 Emissions to water

The operator will have an onsite wastewater treatment plant that will treat the wastewater from the cooling towers. This wastewater treatment plant will be able to meet the limits set in table S3.2 of the permit.

An interceptor will be in place prior to the penstock valve and final discharge. Surface runoff water and process water will pass through the interceptor prior to discharge. This is designed to remove suspended solids and oil/grease, which are the usual pollutants that are washed off from roadways. It is not designed to treat any of the contaminants from the process.

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

6.5.2 Emissions to sewer

There are no proposed emissions to sewer.

6.5.3 Fugitive emissions

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

The site will be on a large sealed concrete pad, with surface water run-off originating from the concreted roadways passing through an interceptor to remove oil and suspended solids prior to discharge to surface water. There is a penstock valve on the final discharge to act as a final means of protection to prevent emissions of polluting substances reaching the surface water. This penstock valve will be closed in the event of a large spill or fire so as to contain contaminated water within the site boundary. In addition to this, there is an underground tank for the storage of firewater and the surface area of the site can also be used to store firewater as it is surrounded with a kerb that acts as a bund. All of these systems will be regularly inspected and maintained to ensure that they remain fit for purpose. A pre-operational condition has been included (PO12) that requires the operator to demonstrate that their secondary containment systems are in line with the CIRIA C736 guidance.

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

Potential sources of odour are as follows:

- VOCs from the pyrolysis and hydrocarbon separation/purification process
- VOCs from storage
- Wastewater interceptor cleaning
- Wastewater treatment plant

Odour from the wastewater interceptor will only occur during periodic cleaning and is likely to be minimal. The wastewater treatment plant is unlikely to produce high levels of odour.

Odours from the main processing building are minimised by keeping the building under a slightly negative pressure. This is achieved by drawing the air from the main processing building and feeding it into the burner, which will oxidise the VOCs and therefore ensure minimal odour escapes the main building. Fast acting roller shutter doors ensure that a negative pressure is kept within the facility.

Waste accepted at the installation will be delivered in covered vehicles or within containers and bulk storage of waste will only occur in the installation's waste bunker inside the reception building. A roller shutter door will be used to

close the entrance to the reception/tipping hall outside of the waste delivery periods and combustion air will be drawn from above the waste storage bunker in order to prevent odours and airborne particulates from leaving the facility building. Waste will not be stored for a duration of more than three months. During periods of shutdown and maintenance waste will remained stored within the confines of the reception building.

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

6.5.5 Noise and vibration

The Applicant initially provided a Noise Impact Assessment (NIA) of the existing tyre crumbing facility. We requested a new NIA to be undertaken that examined the impacts from the proposed facility, which the applicant undertook and provided to us in their response to an information notice.

The closest residential receptor assessed in the NIA is in Chelston Rise. The NIA listed the sources of noise and their noise levels as follows:

- Cooling tower Lw95dB
- Chiller on office roof Lw90dB
- Chimney exit @2m 73dBA
- Gas loading operation – 4hrs during the day period @77dBA
- 30 HGV movements during the day period
- All production areas internal noise levels assumed to be 85dBA
- 50Rw for wall façade
- 40Rw for roof (reduction from 50Rw to allow for sky lights)
- All doorways assumed to be 50Rw

The noise impact assessment identified local noise-sensitive receptors, potential sources of noise at the proposed plant and noise attenuation measures. Measurements were taken of the prevailing ambient noise levels to produce a baseline noise survey and an assessment was carried out in accordance with BS 4142:2014 to compare the predicted plant rating noise levels with the established background levels.

The NIA concluded that there would be little or no impact at the local receptors during both the day and night periods.

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

6.6 Setting ELVs and other Permit conditions

6.6.1 Translating BAT into Permit conditions

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

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

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

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

(i) Local factors

We have considered the information submitted by the Applicant with respect to the nearby Listed Buildings, residential properties and local wildlife sites. The impact of the proposed Installation on these features is not significant.

(ii) National and European ESs

There are no additional National and European EQS (including Article 18) that need to be considered other than the limits in Chapter IV of the IED to protect the local environment.

(iii) Global Warming

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

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

Installation and permit conditions relating to energy efficiency effectively apply equivalent technical measures to limit CO_2 emissions.

(iv) Commissioning

The proposed Installation will undergo a period of commissioning before the plant becomes fully operational. The IED and the conditions set out in the Permit cover activities at the Installation once it is fully operational. Prior to commissioning of activities AR1, AR2 and AR3 in Table S1.1 of the Permit, the Applicant shall submit a commissioning plan (PO4) to the Environment Agency for approval outlining the expected emissions during different stages of commissioning, the expected duration and timeline for completion of activities and any necessary action to protect the environment in the event that actual emissions exceed expected emissions.

It is recognised that certain information provided in the Application is based upon design data or data from similarly designed operational plant. The commissioning stage provides an early opportunity to verify much of this information and the following points will be verified by the Applicant:

- A commissioning plan to be agreed with the Environment Agency (PO4).
- Submission of the computational fluid dynamic model/report (PO6) and confirmation that the residence time and temperature requirements in the combustion chamber are met (IC4).
- Monitoring of the size fraction of particulate matter in the exhaust gases (IC2).
- A report on the environmental performance of the plant as installed against the design parameters set out in the application (IC3).
- An investigation of the options for the re-use of wastewater within the facility (IC8).
- A report on the TOC and LOI content of the char (IC9).

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. A pre-operational condition (PO9) has been included for the operator to demonstrate how they are in line with the methods specified and an improvement condition (IC5) has been included to demonstrate that the monitors have been correctly calibrated. 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 establish data on the release of dioxin-like PCBs and PAHs from the incineration process and to deliver the requirements of Chapter IV of IED for monitoring of residues and temperature in the combustion chamber.

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

For emissions to water, the methods for continuous and periodic monitoring are in accordance with the Environment Agency's Guidance M18 for monitoring of discharges to water and sewer.

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, and if the CEMS fails then the pyrolysis unit will shut down and feedstock will cease to be charged into the kilns. In the unlikely event that both of the CEMS fail Condition 2.3.10 of the permit requires that the abnormal operating conditions apply.

6.7.3 Continuous emissions monitoring for dioxins and heavy metals

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

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

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

In the case of dioxins, equipment is available for taking a sample for an extended period (several weeks), but the sample must then be analysed in the conventional way. A CEN committee has agreed Technical Specifications (EN TS 1948-5) for continuous sampling of dioxins. This specification will lead to a CEN standard following a validation exercise which is currently underway. According to IED Article 48(5), "As soon as appropriate measurement

techniques are available within the Union, the Commission shall, by means of delegated acts in accordance with Article 76 and subject to the conditions laid down in Articles 77 and 78, set the date from which continuous measurements of emissions into the air of heavy metals and dioxins and furans are to be carried out. This is yet to happen. However, our extant 'dioxin enforcement policy' recommends continuous sampling of dioxins where multiple emission exceedances occur and no clear root cause can be identified. Therefore should continuous sampling be required at a later date during the operation of the installation, then sampling and analysis shall comply with the requirements of EN TS 1948.

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

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

6.8 Reporting

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

7 Other legal requirements

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

7.1 The EPR 2016 and related Directives

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

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

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

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

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

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

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

- The Environmental Statement submitted with the planning application (which also formed part of the Environmental Permit Application).
- The decision of the Northamptonshire County Council to grant planning permission on 18 October 2018.
- The report and decision notice of the local planning authority accompanying the grant of planning permission.
- The response of the Environment Agency to the local planning authority in its role as consultee to the planning process.

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

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

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

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

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

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

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

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

Article 23(1) requires the permit to specify:

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

These are all covered by permit conditions.

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

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

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

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

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

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

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

Regulation 60 of the EPR 2016 requires the Environment Agency to prepare and publish a statement of its policies for complying with its public participation duties. We have published our public participation statement.

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

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

7.2 National primary legislation

7.2.1 **Environment Act 1995**

(i) Section 4 (Pursuit of Sustainable Development)

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

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

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

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

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

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

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

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

(iv) Section 6(6) (Fisheries)

We have a duty to maintain, improve and develop fisheries of salmon, trout, eels, lampreys, smelt and freshwater fish. We consider that no additional or different conditions are appropriate for this Permit

(v) Section 7 (Pursuit of Conservation Objectives)

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

areas; and to take into account any effect which the proposals would have on the beauty or amenity of any rural area.

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

(vi) Section 39 (Costs and Benefits)

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

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

(vii) Section 108 Deregulation Act 2015 – Growth duty

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

Paragraph 1.3 of the guidance says:
"The primary role of regulators, in delivering regulation, is to achieve the regulatory outcomes for which they are responsible. For a number of regulators, these regulatory outcomes include an explicit reference to development or growth. The growth duty establishes economic growth as a factor that all specified regulators should have regard to, alongside the delivery of the protections set out in the relevant legislation."

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

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

(viii) Section 81 (National Air Quality Strategy)

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

7.2.2 **Human Rights Act 1998**

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

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

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

7.2.4 **Wildlife and Countryside Act 1981**

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

We assessed the Application and concluded that the Installation will not damage the special features of any SSSI. This was recorded on a CROW Appendix 4 form. A copy of the full Appendix 4 assessment can be found on the public register.

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

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

7.3 National secondary legislation

7.3.1 **Conservation of Habitats and Species Regulations 2017**

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

We consulted Natural England by means of an Appendix 11 assessment, and they agreed with our conclusion, that the operation of the Installation would not have a likely significant effect on the interest features of protected sites.

A copy of the full Appendix 11 assessment can be found on the public register.

7.3.2 **Water Environment (Water Framework Directive) Regulations 2017**

Consideration has been given to whether any additional requirements should be imposed in terms of the Environment Agency's duty under regulation 3 to secure compliance with the requirements of the Water Framework Directive and the EQS Directive through (inter alia) environmental permits, and its obligation in regulation 33 to have regard to the river basin management plan (RBMP) approved under regulation 31 and any supplementary plans prepared under regulation 32. However, it is felt that existing conditions are sufficient in this regard and no other appropriate requirements have been identified.

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

In taking this decision we have applied the physico-chemical standards, environmental quality standards and biological element status boundary values for surface water bodies specified in Articles 8-10 of, and Schedule 3 to, the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.

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 them with information, consulting them or involving them in any other way. S24 requires us to have regard to any Secretary of State guidance as to how we should do that.

The way in which the Environment Agency has consulted with the public and other interested parties is set out in section 2 of this document. The way in which we have taken account of the representations we have received is set out in Annex 4. Our public consultation duties are also set out in the EP

Regulations, and our statutory Public Participation Statement, which implement the requirements of the Public Participation Directive. In addition to meeting our consultation responsibilities, we have also taken account of our guidance in Environment Agency Guidance Note RGS6 and the Environment Agency's Building Trust with Communities toolkit.

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

IED Article	Requirement	Delivered by
45(1)(a)	The permit shall include a list of all types of waste which may be treated using at least the types of waste set out in the European Waste List established by Decision 2000/532/EC, if possible, and containing information on the quantity of each type of waste, where appropriate.	Condition 2.3.4(a) and Tables S2.2 and S2.3 in Schedule 2 of the Permit.
45(1)(b)	The permit shall include the total waste incinerating or co-incinerating capacity of the plant.	Condition 2.3.4(a) and Tables S2.2 and S2.3 in Schedule 2 of the Permit.
45(1)(c)	The permit shall include the limit values for emissions into air and water.	Conditions 3.1.1 and 3.1.2 and Tables S3.1 and S3.2 in Schedule 3 of the Permit.
45(1)(d)	The permit shall include the requirements for pH, temperature and flow of waste water discharges.	Conditions 3.1.1 and 3.1.2 and Table S3.2 in Schedule 3 of the Permit.
45(1)(e)	The permit shall include the sampling and measurement procedures and frequencies to be used to comply with the conditions set for emissions monitoring.	Conditions 3.5.1 to 3.5.5 and Tables S3.1 and S3.2 in Schedule 3 of the Permit.
45(1)(f)	The permit shall include the maximum permissible period of unavoidable stoppages, disturbances or failures of the purification devices or the measurement devices, during which the emissions into the air and the discharges of waste water may exceed the prescribed emission limit values.	Conditions 2.3.10 and 2.3.11.
46(1)	Waste gases shall be discharged in a controlled way by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.	Condition 2.3.1 and Table S1.2 of Schedule 1 of the Permit.
46(2)	Emission into air shall not exceed the emission limit values set out in parts 4 or determined in accordance with part 4 of Annex VI.	Conditions 3.1.1 and 3.1.2 and Table S3.1.
46(3)	Relates to conditions for water discharges from the cleaning of exhaust gases.	Conditions 3.1.1 and 3.1.2 and Table S3.2.
46(4)	Relates to conditions for water discharges from the cleaning of exhaust gases.	Conditions 3.1.1 and 3.1.2 and Table S3.2.
46(5)	Prevention of unauthorised and accidental release of any polluting	The application explains the measures to be in

IED Article	Requirement	Delivered by
	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.	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.	Conditions 2.3.10 and 2.3.11
47	In the event of breakdown, reduce or close down operations as soon as practicable.	Condition 2.3.10
48(1)	Monitoring of emissions is carried out in accordance with Parts 6 and 7 of Annex VI.	Conditions 3.5.1 to 3.5.5. Reference conditions are defined in Schedule 6 of the Permit.
48(2)	Installation and functioning of the automated measurement systems shall be subject to control and to annual surveillance tests as set out in point 1 of Part 6 of Annex VI.	Condition 3.5.3, and Tables S3.1 and S3.2
48(3)	The competent authority shall determine the location of sampling or measurement points to be used for monitoring of emissions.	Conditions 3.5.3 and 3.5.4
48(4)	All monitoring results shall be recorded, processed and presented in such a way as to enable the competent authority to verify compliance with the operating conditions and emission limit values which are included in the permit.	Conditions 4.1.1 and 4.1.2, and Tables S4.1 and S4.4
49	The emission limit values for air and water shall be regarded as being complied with if the conditions described in Part 8 of Annex VI are fulfilled.	Conditions 3.1.1 and 3.1.2 and 3.5.5
50(1)	Slag and bottom ash to have Total Organic Carbon (TOC) < 3% or loss on ignition (LOI) < 5%.	Conditions 3.5.1 and Table S3.4
50(2)	Flue gas to be raised to a temperature of 850ºC for two seconds, as measured at representative point of the combustion chamber.	Condition 2.3.7, Pre-operational condition PO6 and Improvement condition IC4 and Table S3.3
50(4)(a)	Automatic shut to prevent waste feed if at start up until the specified temperature has been reached.	Condition 2.3.7
50(4)(b)	Automatic shut to prevent waste feed if the combustion temperature is not	Condition 2.3.7

IED Article	Requirement	Delivered by
	maintained.	
50(4)(c)	Automatic shut to prevent waste feed if the CEMs show that ELVs are exceeded due to disturbances or failure of waste cleaning devices.	Condition 2.3.7
50(5)	Any heat generated from the process shall be recovered as far as practicable.	Operator to review the available heat recovery options prior to commissioning (Condition PO2) and then every 2 years (Conditions 1.2.1 and 1.2.2)
50(7)	Management of the Installation to be in the hands of a natural person who is competent to manage it.	Conditions 1.1.1 to 1.1.3 and 2.3.1 of the Permit.
51(1)	Different conditions than those laid down in Article 50(1), (2) and (3) and, as regards the temperature Article 50(4) may be authorised, provided the other requirements of this chapter are met.	No such conditions have been allowed
51(3)	Changes in operating conditions shall include emission limit values for CO and TOC set out in Part 3 of Annex VI.	No such conditions have been allowed
52(1)	Take all necessary precautions concerning delivery and reception of wastes, to prevent or minimise pollution.	Conditions 2.3.1 to 2.3.6.
52(2)	Determine the mass of each category of wastes, if possible according to the EWC, prior to accepting the waste.	Condition 2.3.4 and Table S2.2 in Schedule 2 of the Permit.
53(1)	Residues to be minimised in their amount and harmfulness, and recycled where appropriate.	Conditions 1.4.1, 1.4.2 and 3.5.1 with Table S3.4
53(2)	Prevent dispersal of dry residues and dust during transport and storage.	Conditions 1.4.1, 2.3.1, 2.3.2 and 3.2.1.
53(3)	Test residues for their physical and chemical characteristics and polluting potential including heavy metal content (soluble fraction).	Condition 3.5.1 and Table S3.4 and pre-operational condition PO3.
55(1)	Application, decision and permit to be publicly available.	All documents are accessible from the Environment Agency Public Register.
55(2)	An annual report on plant operation and monitoring for all plants burning more than 2 tonne/hour waste.	Condition 4.2.2 and 4.2.3.

ANNEX 2: Pre-operational Conditions

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

Reference	Pre-operational measures
PO1	Prior to the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall send a summary of the site Environment Management System (EMS) to the Environment Agency for written approval and make available for inspection all documents and procedures which form part of the EMS. The EMS shall be developed in line with the requirements set out in Environment Agency web guide on developing a management system for environmental permits (found on www.gov.uk). The documents and procedures set out in the EMS shall form the written management system referenced in condition 1.1.1 (a) of the permit.
PO2	Prior to the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall send a report to the Environment Agency for written approval, which will contain a comprehensive review of the options available for utilising the heat generated in order to ensure that it is recovered as far as practicable. The review shall detail any identified proposals for improving the recovery and utilisation of heat and shall provide a timetable for their implementation. This review must include the potential for heat to be utilised in the proposed Rushden Sustainable Urban Extension.
PO3	Prior to the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall submit to the Environment Agency for written approval a protocol for the sampling and testing of the char for the purposes of assessing its hazard status, which must be in line with Technical Guidance Note M4 – Guidelines for Ash Sampling and Analysis, V7, June 2016.
PO4	Prior to the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall provide a written commissioning plan, including timelines for completion, for written 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.

Reference	Pre-operational measures
PO5	Prior to commissioning of activity AR1 to AR3, the Operator shall cease activities AR4 and AR5 and clear the site of the associated wastes, products and equipment. The Operator must provide a report, including images of the site, demonstrating that the activities have ceased and the site has been cleared, to the Environment Agency for written approval.
PO6	After completion of furnace design and at least three calendar months before commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall submit a written report to the Environment Agency for written approval of the details of the computational fluid dynamic (CFD) modelling. The report shall demonstrate whether the design combustion conditions comply with the residence time and temperature requirements as defined by Chapter IV and Annex VI of the IED. The report shall include a proposed location, to be agreed with the Environment Agency, for the continuous monitoring of temperature close to the combustion chamber inner wall.
PO7	Prior to the commencement of construction of the facilities comprising activity AR1 to AR3 in table S1.1, the Operator shall submit a report for written approval by the Environment Agency on the baseline conditions of soil and groundwater at the installation and update the Site Condition Report Evaluation Template (SCRET) to include this information. 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.
PO8	Prior to the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall submit the written protocol referenced in condition 3.2.4 for the monitoring of soil and groundwater for written approval by the Environment Agency. The protocol shall demonstrate how the Operator will meet the requirements of Articles 14(1)(b), 14(1)I and 16(2) of the IED. The procedure shall be implemented in accordance with the written approval from the Agency.

Reference	Pre-operational measures
PO9	At least three months before the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall submit a written report for approval in writing by the Environment Agency. This shall specify arrangements for continuous and periodic monitoring of emissions to air to comply with Environment Agency guidance notes M1 and M2. The report shall include the following: • Plant and equipment details, including accreditation to MCERTS • Methods and standards for sampling and analysis • Details of monitoring locations, access and working platforms
PO10	Prior to the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall submit an updated Accident Management Plan for written approval by the Environment Agency to include the recommendations from the HAZOP and DSEAR risk assessments and how they have addressed these risks.
PO11	Prior to the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall submit an updated Fire Prevention Plan (FPP) for written approval by the Environment Agency, that includes the following: • Details on the construction of the silos used to store the shredded plastic and demonstrate that they are in line with section 11.2 of the Fire Prevention Plan guidance, available from: https://www.gov.uk/government/publications/fire-prevention-plans-environmental-permits/fire-prevention-plans-environmental-permits • An updated site plan in line with section 6.2 of the Fire Prevention Plan guidance listed above • Details on the deluge system, including calculations to demonstrate how the volumes of water supplied are sufficient for the waste pile sizes • The certificate demonstrating that the fire detection and deluge systems comply with a UKAS accredited third party certification scheme.
PO12	At least 8 weeks (or any other date as agreed with the Environment Agency) prior to the commencement of commissioning of the facility comprising the activities in AR1 to AR3 in table S1.1, the operator shall ensure that a review of the design, method of construction and integrity of the proposed site secondary containment is carried out by a qualified engineer. The review shall compare the constructed secondary containment against the standards set out in CIRIA C736 - Containment Systems for the Prevention of Pollution - secondary, tertiary and other measures for industrial and commercial premises or other relevant industry standard. The review shall include:

Reference	Pre-operational measures
	• the physical condition of the secondary containment • the suitability for providing containment when subjected to the dynamic and static loads caused by catastrophic tank failure; and • any work required to ensure compliance with the standards set out in CIRIA C736 or other relevant industry standard. A written report of the review shall be submitted to the Environment Agency for approval detailing the review's findings and recommendations. Remedial action shall be taken to ensure that the secondary containment meets the standards set out in the technical guidance documents. The maintenance and inspection regime must be incorporated into the Environmental Management System.

Reference	Pre-operational measures
PO13	Prior to the commencement of construction of the facilities comprising the activities in AR1 to AR3 in table S1.1, the Operator shall submit an updated Surface Water Proposals document for written approval by the Environment Agency, which must include the following: • A site layout plan detailing the above and below ground water storage tanks, interceptors, drains, pipework, pollution control valves and bunding, including kerbing that is used as bunding and the effluent sampling locations; • A process flow chart of water management, including process water, treated water, surface water run-off and rainwater, including tank volumes, expected flowrates and valves; • Calculations to show that the effluent treatment plant and reverse osmosis plant are suitably sized to cope with the expected flowrates; • The inspection frequency and maintenance routines for the tanks, bunding and pipework listed above.
PO14	Prior to the commencement of construction of the facilities comprising the activities in AR1 to AR3 in table S1.1, the Operator shall provide a list of the changes that have been made between the design of the facility that was submitted with the application EPR/LP3592NM/V003 and the Schedule 5 Notice responses and the final design to be constructed.
PO15	Prior to the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall submit for written approval by the Environment Agency the operating techniques for the delivery of chemicals to the installation and collection of the liquid products from the installation.
PO16	Prior to the commencement of commissioning of activity AR1 to AR3 in table S1.1, the Operator shall submit a report detailing the design of the flare for written approval by the Environment Agency. This report must include: • Calculations to show that the flare is appropriately sized • The operational tolerances for contaminants, such as liquids and particulates • The expected composition of the gas that would be flared in an emergency • The operational temperature and residence time

ANNEX 3: Improvement Conditions

Based on 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	Requirement	Date
IC1	The Operator shall submit a written report to the Environment Agency on the implementation of its Environmental Management System (EMS) and the progress made in the certification of the system by an external body or if appropriate submit a schedule by which the EMS will be certified.	Within 12 months of the completion of commissioning of the activities detailed in AR1 to AR3.
IC2	The Operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission point A1, identifying the fractions within the PM_{10} and $PM_{2.5}$ ranges. On receipt of written approval from the Environment Agency to the proposal and the timetable, the Operator shall carry out the tests and submit to the Environment Agency a report on the results.	Within 6 months of the completion of commissioning of the activities detailed in AR1 to AR3.
IC3	The Operator shall submit a written report to the Environment Agency on the commissioning of the installation. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions and confirm that the Environmental Management System (EMS) has been updated accordingly.	Within 4 months of the completion of commissioning of the activities detailed in AR1 to AR3.
IC4	The Operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the exhaust gases in the furnace whilst operating under the anticipated most unfavourable operating conditions. The results shall be submitted in writing to the Environment Agency and include a comparison with the CFD modelling submitted with PO6.	Within 4 months of the completion of commissioning of the activities detailed in AR1 to AR3.

Reference	Requirement	Date
IC5	The Operator shall submit a written summary report to the Environment Agency to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 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 commencement of commissioning of the activities detailed in AR1 to AR3, or as otherwise agreed with the Environment Agency. Full summary evidence compliance report to be submitted within 8 months of completion of commissioning of the activities detailed in AR1 to AR3, or as otherwise agreed with the Environment Agency.
IC6	The Operator must submit a report detailing the types, sources and proportion of gases used for the heating of the pyrolysis process. The report must also state if any of the gases originating from the pyrolysis process have been granted end of waste status. This must be presented in monthly datasets from the date that the facility has been fully commissioned.	Within 6 months of commissioning of the installation of the activities detailed in AR1 to AR3.
IC7	The Operator shall submit a written report to the Environment Agency on the options they have considered for the recovery of the char.	Within 6 months of commissioning of the installation of the activities detailed in AR1 to AR3.
IC8	The Operator shall submit a written report to the Environment Agency on the potential for use of recycled water in their processes. The	Within 6 months of commissioning of the

Reference	Requirement	Date
	report should include assessments of multiple potential uses, taking into account the chemical composition of the wastewater.	installation of the activities detailed in AR1 to AR3.
IC9	The Operator shall submit a written report to the Environment Agency that details the TOC and LOI content of the char for a minimum of 12 samples taken over a three-month period. These must be compared to the limits stated in table S3.4.	Within 4 months of commissioning of the installation of the activities detailed in AR1 to AR3.

ANNEX 4: Consultation Responses

A) Advertising and Consultation on the Application

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

The Application was advertised on the Environment Agency website from 26/07/2018 to 23/08/2018. We made a copy of the Application and all other documents relevant to our determination available to view on our Public Register located at the Brampton Environment Agency office.

The following statutory and non-statutory bodies were consulted during the determination:

- *Food Standards Agency*
- *Planning – East Northamptonshire Council*
- *Planning –Northamptonshire County Council*
- *East Northamptonshire Council (Environmental Protection)*
- *Northamptonshire Fire and Rescue*
- *Health and Safety Executive*
- *Anglian Water Services Ltd*
- *Public Health England*
- *Director of Public Health Northamptonshire*
- *Natural England*

1) Consultation Responses from Statutory and Non-Statutory Bodies

Response Received from East Northamptonshire Council (Environmental Protection)	
Brief summary of issues raised	Summary of action taken / how this has been covered
The Noise Impact Assessment submitted with the application is only representative of the impacts from the facility that is currently operational and not the proposed facility.	A new noise impact assessment was requested from the Applicant that is based upon the impacts of the proposed facility. This was received on 1 August 2018. See section 6.5.5 of this decision document.
The Site Condition Report submitted with the application does not include any baseline monitoring, which is necessary as the site has had four significant tyre fires in the past two decades.	Baseline monitoring has been requested through a pre-operational condition (PO7) in the permit. This is to be undertaken during construction of the new facility.
The impacts of odour upon local receptors if the Odour Management Plan is not sufficiently robust to mitigate the odour from the activities.	An Odour Management Plan has been submitted with the application, which was assessed during permit determination. We consider that operations on the site will not cause annoyance due to odour. Condition 3.3.1 in the permit requires the activities to be free from odour at levels likely

	to cause pollution outside of the site.

Response Received from Public Health England	
Brief summary of issues raised	Summary of action taken / how this has been covered
The main emissions of concern are fugitive emissions of ash and dry raw materials.	The char (ash) generated in the process is collected in a sealed metal cooling vessel via vapour locks from the catalytic reactor. The cooling vessel is subject to a slightly negative pressure, with the extracted air being drawn into the cyclone combustor for use as combustion air. The ash will be removed by a licensed waste courier and taken to an appropriately permitted waste management facility. Dry raw materials are primarily activated bauxite, which is stored in 20 kg sealed bags, with a maximum of 1 tonne stored on site under shelter. Under normal operation, the 20 kg bags will only be on site for three days prior to use so deterioration of the bags is unlikely. In addition to the measures above routine housekeeping will be conducted on site to ensure that any waste around the site is collected prior to being blown offsite. Dust emissions from the main building will be minimal as the air for the combustors will be extracted from within the building, therefore creating a negative pressure, which will reduce the mass of dust passing out of the building.

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 Local MP, Councillors and Parish / Town / Councils

Representations were received from the Member of Parliament, Rt. Hon. Peter Bone MP, Parish Councils (Chelveston-cum-Caldecott Parish Council

Northamptonshire) and Rushden Town Council who raised the following issues:

Representations from the Rt. Hon. Peter Bone MP for Wellingborough and Rushden Constituency	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Letter received from Local MP containing representations from the Chairman of Residents Against Inappropriate Development (RAID).	We have taken the relevant comments into account in the determination (see comments from the Community and Other Associations in this Annex).

Representations from Chelveston-cum-Caldecott Parish Council Northamptonshire	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. Reassurance that the environmental and technical standards used in Australia for facilities such as this are as stringent as those standards in the UK. 2. An independent air quality assessment should be requested. 3. It has been highlighted that the distances between source and receptors at Chelston Rise in the Air Dispersion Modelling Report and the Noise Impact Assessment are not the same. 4. The number of residential dwellings at Chelston Rise has been incorrectly calculated at 30, when there are actually 50. 5. Concerns if the correct technology is being used for the activity being undertaken. 6. Are the rates of deposition of emissions representative of the actual efficiency of the pollution abatement systems? 7. A survey of how	1. It is not known what environmental and technical standards are used in Australia, however this application has been assessed in accordance with the environmental and technical standards required for facilities such as this in the UK. 2. The Applicant provided air dispersion modelling which we audited to ensure that the modelling is representative of the predicted impact expected at local receptors. 3. A new Noise Impact Assessment was submitted, which used the mostly southerly domestic property on Chelston Rise as the nearest sensitive receptor. 4. The number of residential dwellings at Chelston Rise is 50, however the total number is not relevant as it is the impact on the nearest receptor that is important. The impacts from both emissions to air and noise will be lesser at the other residential dwellings than at the nearest one. The modelling has shown that the impact from emissions to air and noise will not have a significant impact on the nearest receptor at Chelston Rise. This conclusion can be applied to all of the properties within Chelston Rise. 5. A BAT assessment of this facility has been undertaken in Section 6 of this document, demonstrating that the technology used is appropriate. 6. The rates of deposition of air pollutants are based upon the concentration of those pollutants being emitted from the stack. The concentrations emitted from the stack are expected to be the same as those used in the modelling as this is based on the plant design. The operation is not permitted to emit at higher concentrations under normal operation. 7. The Health Impact Assessment has considered the impact upon humans who buy locally grown produce, therefore it is not necessary to undertake a survey of local residents. 8. The impact of traffic on the local community are relevant considerations for the grant of planning permission and do not form part of the environmental permit decision-making process except in terms of how they affect the prevailing

many local residents grow their own produce and rear their own chickens has been requested by the Council. 8. The impacts of odour and noise from traffic upon Rushden East Sustainable Urban Expansion have not been taken into account. 9. What will the impact be from vehicle reversing alarms and forklift movements around the site? 10. The site condition report omits the fires that occurred on site in 2007 and 2008. 11. There is a high risk of escape of liquid fuels to land and watercourses. 12. What is the risk of airborne pollution in the event of a fire at the site?	background pollutant levels. Where there are established high background concentrations contributing to poor air quality, the increased level of traffic might be significant in these limited circumstances. The Environmental Permitting Regulations are concerned with control of emissions from the proposed Installation and in determining this Application under these regulations, we have considered the impact of noise from the installation and emissions from it on local air quality. The Applicant has demonstrated that noise from the installation will not be an issue and that emissions from the operation of the facility are well below the ES. 9. The impact of noise from reversing alarms and forklifts manoeuvring around the site has been taken into account in the Noise Impact Assessment, which has shown that there will be no impact from noise upon sensitive receptors. Although it is not considered that this will be the case, if forklift movements and reversing alarms do become a nuisance, the operator will be required to submit a noise management plan with further proposals to reduce noise emissions. 10. A pre-operational condition is included in the permit for the operator to undertake baseline monitoring in order to establish baseline conditions for use in the Site Condition Report. 11. The tank farm is bunded and has sufficient capacity to manage a tank failure. A pre-operational condition (PO15) has been included requiring the operator to provide a formal operating technique for the delivery/collection of liquids to the tank farm. This operating technique will ensure that loading/unloading is undertaken correctly in order to minimise the risk from spillages. The non-operational areas of the facility that have vehicle traffic are concreted with kerbing to stop liquids flowing to unmade ground, instead directing them to the surface water drainage system. The surface water drainage systems utilises an interceptor prior to discharging to the local watercourse. A shut-off valve can also be used in the event of a spill. Spill kits are located around the site and operating procedures cover their use. A pre-operational condition (PO13) requiring the operator to demonstrate their bunding is in line with CIRIA C736 has been included. 12. There is a risk from airborne pollution in the event of a fire. The likelihood and potential duration of a fire is minimised through operating techniques listed in the Applicant's Accident Management Plan and Fire Prevention Plan.

Representations from Rushden Town Council	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**

1. Concerns over the impact on human health from dioxins. 2. Concerns over local residents' safety due to accidents at the site. 3. Impact of dioxins on land and wildlife. 4. Impacts of odour and noise from vehicle movements to and from the site. 5. Lack of data to substantiate impact assessments.	1. The Human Health Impact Assessment has shown that the risk to health from dioxins is low as dioxin and furan emissions are generally less than 1% of the Committee on Toxicity (COT) Tolerable Daily Intake (TDI). We are satisfied that the emissions will not have a significant impact upon human health or the environment. 2. The operator is required to have an accident management plan in place prior to the commencement of operations on site. We are satisfied that the operator will have measures in place to prevent and reduce the risk from accidents. This has been covered in section 4.3.4 of this document. 3. Our assessment (see section 5 of this decision document) shows that the emissions will have no significant effect on any of the conservation sites in the vicinity of the facility. We consulted the Food Standards Agency, Public Health England and the Director of Public Health Northamptonshire during the determination of this Application. They have not raised any concerns with respect to contamination of the food chain from locally grown crops, soil or animals. 4. As mentioned above off site traffic-related matters are the consideration of the local planning authority we do not consider that any emissions from the site will be unacceptable. 5. We assess modelling data provided by applicants during permit determinations. We do this by using technical specialists within the Environment Agency who look in detail at the modelling data. They ensure that the input data is correct and has been correctly applied and all factors have been taken into account, such as appropriate emissions data and also human and ecological receptors. Following the issue of the permit, we will regulate the emissions from samples of air taken from within the stack. This means that emissions are monitored from the source and it is from that point that the emission limits are enforced. This monitoring will give a more accurate picture of the emissions from the facility.

b) Representations from Community and Other Organisations

Representations were received from Residents Against Inappropriate Development (RAID), a number of these issues are the same as those raised by the Local MP / Town Council / Parish Council. The additional issues raised were:

Representations from RAID	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. The health impacts have been understated, including on the 2,500 houses, known as	1. The air dispersion modelling provided by the Applicant identifies the maximum pollution concentration on a grid system, from which the assessments were undertaken. These

Representations from RAID	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Rushden Sustainable Urban Expansion, which are yet to be built. 2. The installation has been incorrectly described as a recycling facility, when in reality it is more akin to a petrochemical fractionation plant. 3. The operator needs to demonstrate that they have the necessary technical ability with regards to professional qualifications, practical experience and technical expertise in order to operate this facility safely. 4. Due to the previous instances of fires at the site are the baseline conditions for the surrounding land representative of the values used in the human health impact report for deposition of pollutants and should the operator undertake sampling to establish baseline conditions on areas surrounding the installation? 5. There is no fire risk assessment for the finished products included within the Fire Prevention Plan. 6. The fire suppression systems are not fully specified at the design stage. More details of these fire suppression systems should be included before operation. 7. A plan for catastrophic failure should be included in the application. 8. The current security proposals appear to be inadequate given the desirability of the	assessments show that there will be no significant impact upon human health or the environment. 2. We consider this to be a recycling facility and have imposed relevant controls and limits in order to ensure that there is no significant impact upon human health or the environment from the activities undertaken onsite. 3. The operator has stated that the personnel who will initially run the facility consist of mechanical and chemical engineers with 22 years of experience in this field of operation. They also have two years' experience in managing the sister facility in Australia. The plant is to be designed and built by technical experts in their respective fields, who will also be in charge of commissioning the facility and training the local team in its operations. We are satisfied that the operator has the necessary technical competence. 4. The pollutants of primary concern that are deposited are dioxins. Dioxins accumulate gradually in the body over a period of decades, primarily through the consumption of food. The background concentration of dioxins and furans is therefore less relevant. Assessing whether the process contribution of dioxins, furans and dioxin-like PCBs intake is insignificant compared to the COT TDI using conservative food-chain modelling eliminates the need to consider the background concentrations and intakes. The operator is not required to undertake sampling to establish baseline conditions on areas surrounding the installation. 5. The risk from the combustion of the liquid fuels is assessed in the Accident Management Plan. 6. The full details of the fire suppression systems will be required to be submitted and approved as a pre-operational condition as the final detailed design of the facility is yet to be completed. The plant will not be permitted to operate until this has been complied with. 7. The Accident Risk Assessment and Management Plan assesses the risks to the facility, including risks from failure of the pyrolysis units and fire at the site. In the event of plant failure, the pyrolysis units are automatically shutdown, which will stop the formation of the hydrocarbon products. In the event of fire, the Fire Action Plan will be enacted. In the event of tank failure, bunding is in place to prevent the liquid from entering the nearby watercourse. We are satisfied that their plans cover all realistic scenarios. 8. Alongside the security arrangements listed below, there will be regular site inspections for

Representations from RAID	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
product and the potential for arson. 9. Will any security lighting proposed be governed by environmental legislation? 10. What testing methods will be undertaken on the wastes produced on site and who will undertake this testing? 11. Why is there such a high discrepancy between the ash produced on similar technologies (20-35%) and the ash expected to be generated using this process (6%)? 12. How will the fly ash be disposed of? 13. Are the remote locations that have been chosen for their data sets for use in the Health Impact Assessment representative of the conditions in Chelveston for the following pollutants; Dioxins and Furans, HCl and heavy metals? 14. How is the weather data used in the assessments representative of the conditions experienced at the site? 15. How will the wind turbines impact the dispersion of pollutants locally? 16. Concerns were raised that concentrations of dioxins at start-up and shut-down may be higher than during normal operation. 17. What concentrations of dioxins are expected during abatement failure and for what lengths of time? 18. Concerns that the dioxin intakes for beef, pork, lamb and cheese	signs of fire. An Accident Management Plan and Fire Prevention Plan have been provided that includes response to onsite fires. These measures stated are satisfactory with regards to the security of the site and minimisation of risk from arson. a. Staff onsite 24 hours per day b. CCTV that is monitored c. Enclosure by a secure fence d. Gated entry system 9. Light pollution is primarily a visual amenity issue for the planning regime and therefore we do not consider it as a matter for control through the permit. 10. The wastes produced on site will be subject to the waste pre-acceptance criteria and the waste acceptance criteria of the waste management facilities where the wastes will be sent. This will be undertaken by the waste management companies who dispose of or recover their waste. 11. The technologies that produce ash (char) contents of 20-35% are generally waste incineration that are fuelled by a wide range of materials, which are combusted directly using a flame. In contrast, pyrolysis uses an indirect source of heat to liquefy the high purity plastic waste, meaning that there are fewer impurities to remain as solids and become char. It is expected that due to the operating conditions and high waste purity, the char content will be around 6%. 12. No fly ash will be produced at this facility as no abatement that captures particulate emissions to air is required. 13. Yes they are representative because dioxins accumulate gradually in the body over a period of decades, primarily through the consumption of food. The background concentration of dioxins and furans is therefore less relevant. Assessing whether the process contribution of dioxins, furans and dioxin-like PCBs intake is insignificant compared to the COT TDI using conservative food-chain modelling eliminates the need to consider the background concentrations and intakes. 14. The data is from Bedford Airfield and is part of the Met Office network so is validated and ratified for use in dispersion models. It is 9 km away with no major changes in topography in the area. Our technical specialists have audited the weather data and they agree that it is representative of the surrounding area. 15. There is likely to be no impact from the wind turbines upon the air pollution dispersion given the distance of the site from the source. The plume will be well dispersed before reaching the

Representations from RAID	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
were not considered. 19. Concerns that the predicted dioxin exposure would be different if semi-skimmed milk is consumed instead of full fat milk. 20. Why has a timescale of 30 years for the deposition of dioxins to land been used in the Health Impact Assessment?	areas where the turbulence effects of the wind turbines could have an impact. 16. The proposed plant operations are continuous in nature, therefore start-up and shut-down emissions are not considered to be significant when calculating the average daily intake over a prolonged period. 17. An abnormal emissions assessment was audited assuming 60 hours of unabated emissions at 100 times the emission limit value of 0.1 ng/m^3. At this concentration, there would be no significant impacts upon human health from the facility. 18. Beef and pork were considered. Lamb and cheese were not considered; however, they make up a much smaller portion of a typical diet. Additionally, all food (produce, beef, milk, pork, poultry, eggs, fish and water) is assumed to be locally sourced from the location of the highest impacted receptor. Therefore, the omission of some lesser foodstuffs is offset by worst case locally sourced consumption of other foods and does not change the conclusions on impacts. 19. Dioxins and furans accumulate in fats. Assuming full fat milk consumption rather than semi-skimmed is therefore more conservative. 20. The applicant followed the US EPS Human Health Risk Assessment Protocol (HHRAP). 30 years is the recommended exposure duration recommended by the US EPA in HHRAP. It represents the useful life of a hazardous waste combustion source. It should also be noted that the COT state that dioxins, furans and dioxin-like PCBs accumulate gradually in the body over a period of about 30 years, after which the intake level will be about the same as the level eliminated by the body.

c) Representations from Individual Members of the Public

A total of 59 responses were received from individual members of the public. A meeting was held between the Environment Agency, local councillors, the Applicant and a local community group. A number of these responses came from people attending the meeting. Many of the issues raised were the same as those considered above. Only those issues additional to those already considered are listed below.

Representations from Individual Members of the Public Issues Relating to Legislation and Permitting	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. Is the permit	1. The permit will continue until surrendered. The

Representations from Individual Members of the Public Issues Relating to Legislation and Permitting	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
indefinite? 2. Concern raised about whether the proposals are in line with the Climate Change Act 2008?	permit can also be suspended or revoked in appropriate circumstances. 2. The Climate Change Act 2008 targets a number of greenhouse gases with the aim of reducing the volumes of these gases produced upon the baseline levels in either 1990 or 1995. The only relevant greenhouse gas that this facility generates is CO_2. The aim of the Act is to reduce at least 80% of CO_2 emissions against the 1990 baseline by 2050. This facility utilises waste plastic that would otherwise be disposed of via incineration or landfill. Producing a fuel means that energy can be recovered from the waste plastic, even though some of this energy is used in the processing of the plastic. This also means that no additional crude oil needs to be extracted and processed into fuel. Overall, this means that this production process is recovering energy that may otherwise be wasted through the disposal of the plastic. It also means that CO_2 has avoided being produced through a reduction in the volume of crude oil needing to be extracted and processed into fuel.

Representations from Individual Members of the Public Issues Relating to Air Dispersion Modelling	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. Concern that there is a lack of data and modelling does not appear to be robust. 2. Concern regarding seasonal variation impacting the dispersion of pollutants.	1. We have audited the Applicant's air dispersion modelling and determined there is sufficient information to audit their impact assessments. We have also carried out detailed check modelling relating to all aspects of their assessments and undertaken sensitivity analysis relating to our observations. Based on our audit, we conclude that the proposed Installation will not cause significant pollution or harm to the environment and human health. 2. We are satisfied that the use of 5 consecutive years of meteorological data takes into account inter-annual and seasonal meteorological variation.

Representations from Individual Members of the Public Issues Relating to Emissions to Air	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. What is the criteria used to predict the required height of the stack? 2. Is there the	1. Article 46(1) of the IED requires Applicants to ensure that waste gases from waste incineration plants and waste co-incineration plants are discharged in a controlled way by means of a stack the height of which is calculated in such a way as

Representations from Individual Members of the Public Issues Relating to Emissions to Air	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
possibility that local residents can undertake air quality monitoring using Environment Agency air monitoring equipment? 3. There are concerns that there may be uncontrolled emissions of VOCs into the atmosphere, groundwater and surface water. 4. Concerns were raised that emissions to air would include sulphur hexafluoride (a potential product of the reaction of bauxite). 5. How do the Environment Agency monitor emissions from the plant, including frequency?	to safeguard human health and the environment. The applicant used the air dispersion software ADMS v5.2 to calculate a stack height that ensured that the Environmental Quality Standards were not breached. 2. Environment Agency equipment is not available for the public to undertake their own monitoring with. 3. Uncontrolled emissions of VOCs may come from leaking pipework and storage vessels, incomplete combustion and damage or poor operation of systems that contain VOCs. Emissions from leaking pipework and storage vessels will be minimised as the operator has provided an operating technique that requires them to annually monitor for VOCs around seals and tanks and act upon the results accordingly. Emissions from incomplete combustion will be minimised as the residence time at >850°C for a minimum of 2 seconds will ensure complete combustion and destruction of VOCs. Emissions due to damage to pipework and storage vessels will be minimised by ensuring that vehicles are kept at a safe distance through the use of crash barriers. Bunds will also be located around storage tanks to ensure that any spills are contained and cannot pass into surface water or groundwater. 4. Sulphur hexafluoride is usually created in incinerators due to the sulphur content of the general waste that is incinerated. However due to the purity of the catalyst and waste plastic, no sulphur is expected to be present in the reactors, therefore no sulphur hexafluoride is expected to be formed. 5. The monitoring frequencies are listed in Schedule 3 of the permit. This must be undertaken using the standards listed in table S3.1 of the permit. The operator must periodically report the results to the Environment Agency.

Representations from Individual Members of the Public Issues Relating to Impacts on Human Health	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. Concerns over the health impacts from dioxins – especially on children and those with compromised immune systems. How will the chimney alter these impacts? 2. Is the cumulative	1. The COT TDI was set to protect the most vulnerable population against the harmful effects that could occur at the lowest levels of exposure to dioxins, furans and dioxin-like PCBs. The TDI is based on the health effects on a developing embryo/foetus, which are the health effects most likely to be associated with low levels of exposure. It is therefore protective of infants and those with compromised immune

Representations from Individual Members of the Public Issues Relating to Impacts on Human Health	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
impacts from the nearby facilities, specifically Biogen plant (2.9 MWth AD plant) and two intensive chicken farms (Bedfordia Chicken Farm) taken into account in the Human Health Risk Assessment? 3. There appears to be an underestimation of consumption of locally produced food and therefore the calculations in the Human Health Risk assessment are not representative, including during abatement failure. 4. Concern over health impacts from the char, especially with regards to cyanide and cyanate. 5. Concern that this is an emerging technology and therefore the impacts from it may not be fully understood. 6. Concerns over the impact from pests. 7. Concerns over the impact of fugitive emissions of dust upon local receptors and ecological sites. 8. Concerns over the impacts on human health from emissions to air of heavy metals and persistent organic pollutants. 9. Concerns over impacts upon human health from emissions of carbon dioxide. 10. Concerns over the potential risk to human health from chemicals used on site. 11. What are the impacts from contamination carried offsite from vehicle movements upon human health?	systems. For other pollutants the environmental standards are protective of the human health impacts, based on current evidence. 2. The emissions from these facilities have been taken into account by using background pollutant concentrations in the air dispersion modelling concentrations. Emissions from the chicken farms are primarily ammonia and therefore are not relevant to this facility. 3. Our conservative screening of dioxins, furans and dioxin-like PCBs during our review and audit of the Applicant's assessment assumed that all food consumed was locally sourced from the location of the highest impacted receptor. The process contributions are not significant, even under these highly pessimistic worst-case food intake assumptions. The Applicant's human health risk assessment has shown that the exposure to dioxins from those who daily consume locally grown chicken, eggs, milk, soil (on vegetables etc) and produce are exposed to 4.7% of the tolerable daily intake for dioxins. This is based upon all of the produce, including chicken and milk, being produced at a location 220 metres from the installation. This location was chosen at it has the highest rate of dioxin deposition from the installation. Overall, the Health Impact Assessment has shown that the exposure to dioxins will be less than 1% of the tolerable daily intake at the local receptors in Chelston Rise, which relates to a risk of 1 in 750,000 risk of cancer in adults. The abnormal emissions assessment showed that no short term Environmental Standards would be breached. We consider that there will be no significant impact on human health as a result of abnormal operations, which is limited to 60 hours per year. 4. The containment measures for the char are sufficient to prevent releases to ground, air or water. The applicant will store the char in sealed metal containers that will be removed for disposal frequently. So it is not considered that there will be any health impacts from the char. 5. This technology is based around combustion of a hydrocarbon based gas, the impacts from which are well understood. Concentrations of pollutants from the combustion of the gas have been modelled and have been shown to have no significant impact upon human health. Limits have been set to ensure the environment and human health have been protected, which the operator will be required to meet. 6. No substances that could attract pests are stored on site, therefore we consider that the

Representations from Individual Members of the Public Issues Relating to Impacts on Human Health	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
12. Drinking water contamination may occur from the deposition of particulates.	risk of pests is low. Permit condition 3.6 allows the Environment Agency to request a Pest Management Plan from the operator in the unlikely event pests were to give rise to annoyance. 7. Dusty waste produced on site is stored in covered skips and therefore there is no pathway for this dust to cause an issue. Dusty raw materials are stored indoors in bags, under negative pressure. This will reduce the impact of dust on sensitive receptors as a result of operations on site. Permit condition 3.2 allows the Environment Agency to request an emissions management plan from the operator (which identifies and minimises the risks of pollution from emissions) in the unlikely event dust were to give rise to pollution. 8. The impacts upon human health from emissions to air have been assessed in section 5.2 of this document and we are satisfied that there will be no significant impact on human health or the environment. 9. 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. We do not consider there will be any impacts on human health from the emissions from this facility. 10. Chemicals used on site include Aluminium bauxite, N-methylpyrrolidone, Glycol, Sodium hydroxide, Lubricant oil, Steamate NA1321, Control OS5300. The Applicant has demonstrated that all of the liquids will be stored in bunded areas with sufficient capacity to store at least 110% of the largest vessel or 25% of the total tankage volume, whichever is the greater. The operator will also manage all of the solid chemicals indoors so fugitive emissions from these chemicals will be minimised. The operator has appropriate spill clean-up procedures in place if a spill were to occur. There will be no significant impact on human health from chemicals used on site. 11. Due to the enclosed storage of waste and raw materials on site, we do not consider that there will be any contamination carried over from vehicle movements. In addition, routine housekeeping will be employed by the operator to ensure that any dust or waste that does occur on site is periodically removed. 12. We do not consider that drinking water in the locality will be contaminated from the deposition of particulates as there is no pathway for the particulates to directly enter the groundwater.

Representations from Individual Members of the Public Issues Relating to Impacts on Human Health	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
	The nearest abstraction point for drinking water is 9 km to the west in Wellingborough.

Representations from Individual Members of the Public Issues Relating to Impacts from Noise	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. Concerns raised over noise measurements and relevant locations used and the noise impact on local receptors, especially with 24 hour operations. 2. Clarification of the exact number of HGV movements is needed as there is a discrepancy between the Noise Impact Assessment and the application. 3. Noise impacts on the local receptors should take account of other noise sources in the area.	1. A new Noise Impact Assessment (NIA) that predicted the potential impacts of the proposed facility was requested via an information notice. This new NIA predicted that the proposed facility had minimal impact upon the relevant local receptors. We are satisfied that this assessment is appropriate and that there will be little or no impact at any time of day. Comparing the results from this new NIA to the previously submitted one (that is based upon the impact of the current installation) shows that the impact from the site will be reduced. 2. The Applicant stated in the liaison meeting that there would be 14 HGV movements per day and the main application stated there would be 17 HGV movements per day, however the Noise Impact Assessment has assessed 30 HGV movements during the day. The 30 HGV movements per day is likely to be an overestimation of the number of HGV movements required. We are satisfied that there will be no impact upon the local receptors with 30 HGV movements per day, fewer vehicle movements will only reduce noise emissions. 3. The Noise Impact Assessment takes account of other noise sources in the area by measuring the background noise (i.e. L90 or residual noise) whilst the facility is not operating. The noise from the site is then added to this and modelled to calculate the sound level that is expected to occur at the local receptors.

Representations from Individual Members of the Public Issues Relating to the Impact on Ecological Receptors	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. Concerns were raised about the impacts from the release of sulphur dioxide, in particular acid rain on the local ecology. 2. Concerns were raised about the impacts on	1. The impacts have upon ecological sites have been assessed in section 5.4 of this document and we are satisfied that there will be no significant impacts from this facility. 2. The pollution concentrations at the Upper Nene Valley Gravel Pits SPA (commonly known as Rushden Lakes) and Yelden Meadows SSSI are insignificant. The pollution concentrations at

Representations from Individual Members of the Public Issues Relating to the Impact on Ecological Receptors	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
wildlife – especially at Rushden Lakes. 3. Concerns were raised about the potential for land, groundwater and surface water contamination from particulates.	the local wildlife sites are well below the 100% no significance pollution criteria. 3. The impact from particulates was considered in section 5.4 of this document and were shown to be insignificant, therefore we are satisfied that there will be no significant impacts from this facility.

Representations from Individual Members of the Public Issues Relating to The Process/Technology	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. Is this plant identical to the plant in NSW, Australia? 2. Concerns were raised about whether hazardous substances are stored on site. 3. Concerns were raised about whether expanded polystyrene will be accepted. 4. Concerns were raised about the production of cyanide as part of the process. 5. What is the likely proportion of halogen contaminated plastic in the bales? 6. Concern about the contaminants in the wastewater and how these will be treated 7. Concerns were raised about how contamination from metals in the waste stream would be removed. 8. Concern about the use of the emergency flare and whether it requires a heat exclusion zone 9. What is the onsite storage capacity for the liquid and gaseous fuels? 10. Concerns were raised about the pyrolysis	1. The operator explained that it is not identical and is slightly smaller scale. The process will be the same, but the new plant will be re-designed, and the equipment improved. 2. No hazardous substances are anticipated to be stored on site. 3. No, this material will not be accepted, only polystyrene in the form of butter tubs and yoghurt pots will be accepted. 4. It is not anticipated that cyanide will be produced due to this process. 5. The Applicant anticipates contamination at 1 to 1.5%, which will be extracted and returned to the producer. The Waste Acceptance Criteria stipulate that no more than 0.5% contamination entering the front end of the process. 6. The potential contaminants in the wastewater are considered to be BOD, suspended solids, pH, mercury, cadmium, arsenic, lead, chromium, copper, nickel and zinc. An onsite effluent treatment plant will treat the wastewater and reduce the concentration of the pollutants to the limits stated in Schedule 3 of the permit, or lower. Emission limit values have been included for metals, however due to the expected purity of the feedstock it is likely that the concentration of metals will be lower than these limits, if detectable at all. 7. Contamination from metals will be minimised prior to entering the pyrolysis process through the use of Waste Acceptance Criteria and pre-sorting using an eddy current machine. 8. If there is an emergency shut down of the process, there is potential for over pressure from the kiln. Consequently, any gas release is controlled through the flare, rather than being released to the atmosphere. The flare is 2 m in diameter and 10 m tall. The flare also has a back-up power supply if needed under

Representations from Individual Members of the Public Issues Relating to The Process/Technology	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
process in terms of temperature control in order to sufficiently control the plastic to fuel reaction given that there may be low concentrations of polystyrene and other non-desirable plastics contaminating the feedstock 11. Concern raised about the moisture of the feedstock and whether this would be a barrier to complete pyrolysis, instead aiding in the generation of small-scale airborne plastic particulates 12. What happens within the process if a breach in the permitted limits occurs? 13. Concerns were raised about whether the carbon filters on the air abatement will be regularly changed.	emergency conditions. The flare is only to be used in emergency situations. This flare has a special lining so that no radiant heat is produced as there are volatile materials on site. The Applicant is required to undertake a HAZOP process and a DSEAR assessment prior to the commencement of operation under pre-operational condition (PO10). These assessments will inform whether a heat exclusion zone is required. A pre-operational condition (PO16) has been included to demonstrate that the flare is appropriate for the fuels combusted. 9. Two 250 m^3 diesel tanks, total volume 500m^3. One 250 m^3 marine diesel tank, one 250 m^3 petrol tank and a 24 tonne LPG tank. 10. Temperatures are monitored in the combustion chamber to ensure that complete combustion occurs. Primary air flow will be varied depending upon the temperature within the combustion chamber, which will control the temperature of combustion. This process is computer controlled. Should the temperature drop below 850C, then the waste plastic feedstock will automatically stopped being fed into the pyrolysis unit until the correct temperature has been reached again. 11. The moisture content of the feedstock is limited to a maximum of 10% by mass, as stated in the waste acceptance criteria. This moisture content is determined by testing prior to acceptance of the waste and during acceptance of the waste. The effect moisture has upon the process is only to increase the heating requirements due to the latent heat of vaporisation of water. 12. The continuous emissions monitoring system will be interlocked with the plastic feed system to prevent plastic being fed into the kilns when emission limit values are exceeded during normal operation. The operator is required to report breaches of the emission limit values to the Environment Agency. 13. The requirement to change the filters in accordance with the manufacturers' recommendations is incorporated as an operating technique.

Representations from Individual Members of the Public Issues Relating to Accidents and Emergencies	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**

Representations from Individual Members of the Public Issues Relating to Accidents and Emergencies	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. What ignites the emergency flare during a power failure? 2. Concerns were raised about the risk of fire including how run off will be dealt with, whether water pressure is adequate, whether the fire service have been consulted and the risk from arson or the burning of nearby agricultural waste. 3. Concern about whether the operator will ensure that the facility runs safely, especially during emergency/abnormal situations and whether they have the operational experience to manage the site. 4. Concerns were raised about previous fires at the site under the supervision of the same operator 5. How would an on-site fuel spillage be managed? 6. Concerns were raised about the measures in place to prevent accidents including explosions and to deal with them if they occur including major accidents	1. There is battery operated electrical back-up. 2. Fire prevention has been assessed through the Applicant's Fire Prevention Plan and Accident Management Plan. Fire water run-off is managed through the use of a penstock valve on the outfall and the provision of high volumes of storage capacity of fire water. Further details on fire water management are in the Water Management section below. Fire prevention is managed through: i. Good housekeeping ii. Safety checks of mobile plant iii. Electrical equipment compliant with ATEX where there is potential for an explosive atmosphere iv. Routine maintenance of mobile plant and electrical equipment v. Operational procedures for chemical/products transfer vi. Use of a flare when required vii. Monitoring of process parameters to ensure they remain within the operational range There will be CCTV, a designated entrance gate and high fence. This will be monitored/ computer controlled to prevent unauthorised access and prevent arson. We are satisfied that in the event of a fire sufficient volume of water required can be delivered through the fire hydrant situated in the locality. The Northamptonshire Fire and Rescue were consulted during this determination. No response and concerns were raised. The operator will utilise fire detection and suppression systems, along with a Fire Action Plan to reduce the likelihood and impacts from fires. We are satisfied with the measures to prevent fire and to deal with one if it did occur. The operator has sufficient management systems and containment in place to minimise the risk to local receptors if an accident were to occur. 3. The operator has stated that the personnel who will initially run the facility consist of mechanical and chemical engineers with 22 years of experience in this field of operation. They also have two years' experience in managing the sister facility in Australia. The plant will be designed and built by technical experts in their respective fields, who will also be in charge of commissioning the facility and training the local team in its operations. The Applicant is required to undertake a HAZOP process and a DSEAR assessment prior to the commencement of site operations.

Representations from Individual Members of the Public Issues Relating to Accidents and Emergencies	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
	These assessments will inform what safe distances will be which will be fed into the site fire prevention plan and accident management plan. 4. The existing site has been operational without a fire incident for ten years, demonstrating that the operator is able to minimise risk from fires. 5. The Spillage Procedure has been included as an operating technique, which details how the operator will manage a spill. The operator would prevent the spill from entering the surface water management system and surface water. The operator will identify the source of the leak and make the necessary repairs. Spill kits are located around the site that contain absorbents to contain the spills. 6. Accidents in the workplace are primarily regulated by the Health and Safety Executive, whilst the Environment Agency primarily manages the risks to the environment from accidents. The operator has an Accident Risk Assessment and Management Plan, Fire Action Plan and Spillage Procedure in place to address the likely scenarios that may occur that could pose a risk to human health and the environment. These contain measures including monitoring operational parameters to prevent accidents that may cause pollution and to minimise their consequences if they do occur. We consider these plans are suitable to address the risks posed by this site. There are pressure release vents that would activate if a tank exceeded a certain pressure. These safety features should ensure that the risk from explosions is minimal. The operator will follow the procedures as set out in their site accident management plan.

Representations from Individual Members of the Public Issues Relating to Water Management	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. Concerns about the requirements for water and whether this will this affect local supply/ pressure. 2. Concern raised as to whether the drainage scheme for surface water included interceptors and where	1. The water used on site is sourced from mains water, runoff from roofs and treated water from the effluent treatment plant. The supply will be a standard commercial supply, a larger main is not required and will not affect local water pressure. There is also a requirement for water to be supplied in event of fire. This would be supplied from a nearby fire hydrant. 2. The surface water will flow into a holding tank and then discharge via an outfall into the old

Representations from Individual Members of the Public Issues Relating to Water Management	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
the surface water discharge. 3. Concern as to whether the most recent criteria for flood assessments has been used. 4. Concern about the potential of waste entering the watercourse. 5. How have the changes in surface water management been incorporated into the permit?	airfield surface water system. There will be a class 1 interceptor with an auto shut-off valve. There will also be a penstock valve at the outfall to stop the flow in the event of an emergency. The discharge flows into Chelveston Brook, which is a tributary of the River Nene. 3. The site is not located within a flood risk zone and therefore no assessment of flood risk was required. 4. The operator has an operating technique covering the routine housekeeping of the site, including management of litter, which is expected to be low. Imported waste will be unbaled and stored in enclosed buildings in order to minimise fugitive emissions of plastics. Waste char skips will be covered. 5. The changes have been incorporated into the permit as an operating technique. A pre-operational condition (PO13) has been included to update the Surface Water Proposals document once the final designs of the facility have been completed.

Representations from Individual Members of the Public Issues Relating to Management of Wastes	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. What are the waste streams created from the process, including sludge from the effluent treatment plant and how are they stored/ disposed of? 2. Is the char classed as a hazardous waste?	1. PTFE/PVC/ black plastics are returned to the supplier. Prior to return, these are stored within the feedstock reception building. Metals are sent to a materials recycling facility where they are recovered. Prior to transfer offsite, they are stored within the feedstock reception building. The char generated in the process is pushed out of the back of the kiln and then cooled and stored in a covered skip. The operator is currently looking for alternative uses for this waste, i.e. as a filler in tarmac. However, it is currently planning to be disposed of to landfills. The sludge generated at the on-site effluent treatment plant will be stored in covered skips prior to despatch offsite by licensed waste contractors. It will be recovered or disposed of at a suitably permitted waste management facility. Rejected feedstock will be reworked within the process or sold as fuel oil. Oil will be stored in IBCs or drums. IBCs and drums will be stored in a designated area. Electronic waste will be stored with other WEEE waste. Lamps and tubes will be stored in a designated container. The waste hierarchy will be applied to all of the wastes produced at the site.

Representations from Individual Members of the Public Issues Relating to Management of Wastes	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
	2. It is not expected to be a hazardous waste, however this will be confirmed when the waste is produced as testing of the characteristics of the waste can only be undertaken then.

Representations from Individual Members of the Public Issues Relating to Monitoring and Reporting	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
1. How are particulate matter (PM) and volatile organic compounds (VOCs) measured? 2. What are the air quality monitoring requirements and is there independent monitoring? 3. How is the combustion of the fuel produced on site monitored offsite?	1. Particulate matter and VOCs as total organic carbon will be monitored from the stack using a continuous emissions monitor to BS EN 14181 and BS EN 15267-3 standard. The monitoring methodology is specified in the Environment Agency's monitoring guidance notes: M1 – Sampling requirements for stack emission monitoring; and M2 – Monitoring of stack emissions to air. 2. Continuous Emissions Monitors (CEMs) that are capable of undertaking continuous sampling of emissions will be installed in the flue. The operator is required to monitor the pollutants listed in Schedule 3 of the permit. They are required to use the monitoring methods listed, which ensures that the monitoring is accurate and representative of their emissions using an internationally recognised standard. The operator is required to periodically report the findings of the monitoring to the Environment Agency. The results of the monitoring will be placed on our public register which is available to the public. The Environment Agency can and will undertake its own monitoring as it considers appropriate. 3. If the substances meets end of waste status then it can be used as any other diesel or petrol product would be and therefore there is no requirement for the operator or the Environment Agency to monitor those emissions. If it does not meet end of waste then it can be sold as waste fuel oil for offsite combustion, the monitoring of which is dictated by the size and type of plant.

Representations from Individual Members of the Public Issues Relating to Decommissioning	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
Concerns were raised about what measures there will be to remediate the site at the end of	A site closure plan was included in the updated Site Condition Report provided in response to the Schedule 5 Notice dated 24/10/2018.

Representations from Individual Members of the Public Issues Relating to Decommissioning	
Brief summary of issues raised:	**Summary of action taken / how this has been covered**
operations and who will be responsible for it	The current condition of the land is not known. However we have included a pre-operational condition (PO6) in the permit, which requires the operator to undertake baseline monitoring. Upon permit surrender, the land all necessary measures will be required to be taken by the operator to avoid a pollution risk arising from the operation of the facility and to return the site to a satisfactory state. This will relate to both the proposed activities and those that have already taken place under the existing permit.

B) Advertising and Consultation on the Draft Decision

This section reports on the outcome of the public consultation on our draft decision carried out between 08/05/2019 and 06/06/2019.

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

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

Representations were received from Chelveston-cum-Caldecott Parish Council, who raised the following issues:-

1. Concerns that the air dispersion modelling was not undertaken using latest update to AMDS v5.2.4, released in November 2018.
2. There is a contradictory statement with regards the use of back-up CEMS in section 5.5 and 6.72 of the decision document.
3. Concerns that the cumulative hours of abnormal operation are not the standard at 60 hours.

Our response:

1. As the air dispersion modelling was undertaken prior to November 2018, the operator used the current version of ADMS at the time of application. We consider the use of the ADMS version 5.2 does not impact upon the modelling results or conclusions drawn from the air dispersion modelling.

2. Section 6.7.2 of the decision document has been corrected to state that the operator has committed to having back-up CEMS.

3. Permit condition 2.3.10 (a) limits the number of hours the facility can operate under abnormal operation to 60 hours. This is a standard permit condition for waste co-incinerators.

b) Representations from Community and Other Organisations

Representations were received from Residents Against Inappropriate Development (RAID), who raised the following issues.

1. Predicted emissions of mercury and dioxins should be based upon the measured emissions from the sister facility in Australia, instead of anticipated emissions from the new facility in Chelveston.
2. Concerns that the facility should meet the BAT Conclusions for the waste incineration sector.
3. Concerns that this is not described as the correct activity type and this has changed during permit determination from pyrolysis to co-incineration.
4. Concerns that the method of processing of the waste plastic has been changed during permit determination.
5. Concerns that the flammability of the products has not been considered, taking into account pre-operational conditions 10 and 11.
6. Concerns that the site is a COMAH site and that the facility needs to take the changes coming into force in July 2019 into account.
7. Concerns that the proposed development Rushden East Sustainable Urban Expansion has not been taken into account in the risk assessments.

Our response:

1. The ELVs for dioxins and mercury have been set as the maximum permitted for waste co-incineration plants under IED. The sister site in Australia is similar, but not identical to the facility in Chelveston, therefore actual emissions from the Australian facility may not be representative of emissions from this facility.

2. The BAT Conclusions document is expected to be published later in 2019, however the facility is deemed to meet BAT within the current waste incineration BRef.

3. The facility processes the waste plastic by pyrolysis technology, which produces a hydrocarbon-rich gas that is combusted to heat the pyrolysis kiln. It is both a waste co-incineration activity incorporating pyrolysis technology. The waste co-incineration description takes precedence over the technology description. The way that the activity is described in this document has not changed the method that the Operator will use to process the waste plastic.

4. The method of processing the waste plastic has not changed during permit determination.

5. The possibility of fire from the products has been considered in the Environmental Risk Assessment and Accident Management Plan. Pre-operational condition 10 requires the Operator to further assess and mitigate the risks from the facility after the completion of HAZOP and DSEAR risk assessments. Pre-operational condition 11 requires the Operator to update the Fire Prevention Plan once the design of the

storage silos, fire suppression system and fire detection system has been finalised.

6. During permit determination the HSE were consulted on and confirmed that this site is not currently a COMAH site. It is the responsibility of the Operator to ensure that they are in line with any relevant HSE guidance.
7. Where relevant, proposed developments are taken into account in permit applications. However if there are new receptors which are established prior to the commencement of commercial operations of the facility, we will require the Operator to provide revised risk assessment at that time.

Matters on which the public may comment which may be more relevant to an application for Planning Permission or other matters

Precautionary Principle: The United Kingdom Interdepartmental Liaison Group on Risk Assessment (UK-ILGRA) state in their paper "The Precautionary Principle: Policy and Application" that the precautionary principle should be invoked when there is good reason to believe that harmful effects may occur and the level of scientific uncertainty about the consequences or likelihood of the risk is such that the best available scientific advice cannot assess the risk with sufficient confidence to inform decision making. The Health Protection Agency, (Response to British Society for Ecological Medicine Report, "The Health Effects of Waste Incinerators) say that "as there is a body of scientific evidence strongly indicating that contemporary waste management practices, including incineration, have at most a minor effect on human health and the environment, there are no grounds for adopting the 'precautionary principle' to restrict the introduction of new incinerators"

Location of the installation: Decisions over land use are matters for the planning system. The location of the installation is a relevant consideration for Environmental Permitting, but only in so far as its potential to have an adverse environmental impact on communities or sensitive environmental receptors. The environmental impact is assessed as part of the determination process and has been reported upon in the main body of this document. The location of the installation can have an impact on the ability to recover waste heat for use in nearby residential, commercial or industrial premises and we commented on this in our consultation response to the local planning authority.

Vehicle access to the installation and traffic movements: These are relevant considerations for the grant of planning permission, but do not form part of the Environmental Permit decision making process except where there are established high background concentrations contributing to poor air quality and the increased level of traffic might be significant in these limited circumstances.

Flood Risk: The Environment Agency provides advice and guidance to the local planning authority on flood risk in our consultation response to the local planning authority. Our advice on these matters is normally accepted by both Applicant and Planning Authority. When making permitting decisions, flood risk is still a relevant consideration, but generally only in so far as it is taken into account in the accident management plan and that appropriate measures are in place to prevent pollution in the event of a credible flooding incident.

Public Health England's New Health Study

The Environment Agency takes advice from PHE on the health implications of incinerators generally and specifically on each application for a permit. In January 2012 PHE confirmed they would be undertaking a study to look for evidence of any link between municipal waste incinerators and health outcomes including low birth weight, still births and infant deaths. Their current position that modern, well run municipal waste incinerators are not a significant risk to public health remains valid. The study has been undertaken to extend the evidence base and provide the public with further information; as such it does not justify a delay in our decision making on permit applications.