Permitting decisions

Variation including partial surrender and consolidation

We have decided to grant the variation and partial surrender for Bulwell Energy Recovery Facility operated by Bulwell Energy Limited.

The variation number is EPR/LP3239NX/V003 and the partial surrender number is EPR/LP3239NX/S004.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

Purpose of this document

This decision document provides a record of the decision making process. It:

- highlights key issues in the determination
- summarises the decision making process in the decision checklist to show how all relevant factors have been taken into account
- explains why we have also made an Environment Agency initiated variation
- shows how we have considered the consultation responses

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Read the permitting decisions in conjunction with the environmental permit and the variation notice. The introductory note summarises what the variation and partial surrender covers.

Key issues of the decision

The variation application EPR/LP3239NX/V003 is to vary an existing permit for a waste gasification (incineration) plant located in Bulwell, Nottingham. The gasification plant is currently permitted to treat non-hazardous waste (primarily refuse-derived fuels (RDF)). The plant has not yet been built or operated.

The gasification plant will heat the waste under low oxygen conditions to generate syngas, which will be burnt on-site in a boiler to generate steam. A steam turbine will be used to generate electricity which will be exported to the grid.

The original permit authorised the facility to use natural gas as the plant's auxiliary fuel for use in achieving and maintaining the required operating temperature of the heating and combustion chambers of the gasification plant.

This permit variation is to include the use of recovered fuel oil (RFO) as an alternative auxiliary fuel to replace the use of natural gas, although a reduced quantity of natural gas will still be used as a fuel on-site.

The facility will burn up to 18,800 tonnes of RFO per annum. RFO is classified as a hazardous waste and the application includes the addition of a Section 5.1 Part A(1)(a) activity to the existing permit for the incineration of hazardous waste (RFO).

The permit variation also increases the stack height of the facility from 50 to 70 metres.

The Operator also submitted a surrender application to the Environment Agency for the partial surrender of land from the permit/site boundary (EPR/LP3239NX/S004). At the time of the surrender application and determination, the facility had not been built or put into operation. The areas of land surrendered (as detailed in the application) have been removed from the permit/site boundary and an updated site plan has been included in the consolidated variation notice (which has been issued for both the variation and surrender applications).

The sections below summarise the key issues that have been considered during the variation application determination with regards to the changes applied for. Aspects of the facility that are not subject to the specific changes applied for through the variation application remain as assessed and permitted under the original permit application determination.

1.0 Assessment of the installation's emissions to air (air quality, human health and ecological impacts)

A methodology for the 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.

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).

PCs are considered insignificant if:

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

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

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

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

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

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

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

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

1.1 Assessment of impact upon air quality

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and their potential impact upon local conservation and habitat sites and human health. These assessments predicted the potential effects on local air quality from the Installation's stack emissions using the ADMS Version 5.1 dispersion model, which is a commonly used computer model for regulatory dispersion modelling. The model used 5 years of meteorological data collected from the weather station at Nottingham Watnall between 2011 and 2015. 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, for the following substances they assumed that the ELVs in the Permit would be the maximum permitted by Article 46(2) and Annex VI of the IED:

- Total dust
- Carbon monoxide (CO)
- Hydrogen chloride (HCl)
- Hydrogen fluoride (HF)
- Metals (Cadmium, Thallium, Mercury, Antimony, Arsenic, Lead, Chromium, Cobalt, Copper, Manganese, Nickel and Vanadium)
- Polychlorinated dibenzo-para-dioxins and polychlorinated dibenzo furans (referred to as dioxins and furans)
- Gaseous and vaporous organic substances, expressed as Total Organic Carbon (TOC)

For emissions of oxides of nitrogen (NOx) - expressed as NO_2 - and sulphur dioxide (SO_2) the assessment assumed operation at lower plant-specific ELVs, which have been set in Table S3.1 of the permit.

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 ammonia (NH3), polycyclic aromatic hydrocarbons (PAH) and Polychlorinated biphenyls (PCBs).

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

We have checked the background pollution data used by the Operator for those pollutants which did not screen out as insignificant. We consider the assumed background concentrations to be appropriate.

The way in which the dispersion models were used, the selection of input data, use of background data and the assumptions made have been reviewed by the Environment Agency's modelling specialists to establish the robustness of the Applicant's air impact assessment.

We have audited and checked the air quality and human health impact assessment provided and agree with the conclusions drawn from them.

1.2 Assessment of Air Dispersion Modelling Outputs

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

Emissions to air – non-metals

Pollutant	ES		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m³		µg/m³	µg/m³	% of ES	µg/m³	% of ES
NO_2	40	1	19.2	0.49	1.23	19.7	49.2
	200	2		4.8	2.4	4.8	2.4
PM_{10}	40	1		0.07	0.18	0.1	0.2
	50	3		0.22	0.44	0.22	0.4
$PM_{2.5}$	25	1		0.07	0.28	0.07	0.3
SO_2	266	4		5	1.9	5	1.9
	350	5		3.9	1.11	3.9	1.1
	125	6		1.3	1.0	1.3	1.0
HCl	750	7		2.3	0.3066667	2.3	0.31
HF	16	8		0.007	0.04	0.007	0.04
	160	7		0.23	0.14375	0.23	0.1
CO	10000	9		5.5	0.06	6	0.1
TOC	5	1		0.007	0.14	0.007	0.14
PAH	0.00025	1		7E-10	0.00	0.000000	0.0
NH_3	180	1		0.007	0.00	0.01	0.00
	2500	10		0.2	0.01	0.2	0.0
PCBs	0.2	1		0.000035	0.02	0.00004	0.02
	6	10		0.0011	0.02	0.00110	0.0
Dioxins		12	43.65[11]	0.70		44.35	

TOC as benzene

PAH as benzo[a]pyrene

1 Annual Mean

2 99.79th %ile of 1-hour means

3 90.41st %ile of 24-hour means

4 99.9th ile of 15-min means

5 99.73rd %ile of 1-hour means

6 99.18th %ile of 24-hour means

7 1-hour average

8 Monthly average

9 Maximum daily running 8-hour mean

10 1-hour maximum

11 2010 Average urban concentration (Toxic Organic Micropollutants Network)

12 fg/m³

Emissions to air - metals

Pollutant	ES		Back-ground	Process Contribution		Predicted Environmental Concentration	
	µg/m³		µg/m³	µg/m³	% of ES	µg/m³	% of ES
Cd	0.005	1	0.00012	0.00018	3.6	0.00030	6.0
Hg	0.25	1		0.0004	0.16	0.00040	0.16
	7.5	2		0.011	0.15	0.01100	0.147
Sb	5	1		0.0004	0.01	0.0004	0.01
	150	2		0.013	0.01	0.01300	0.009
Pb	0.25	1		0.0004	0.16	0.00040	0.16
Co	0.2	1		0.0004	0.20	0.00040	0.2
Cu	10	1		0.0004	0.00	0.0004	0.004
	200	2		0.013	0.01	0.01300	0.007
Mn	0.15	1		0.0004	0.27	0.0004	0.27
	1500	2		0.013	0.00	0.01300	0.0009
V	5	1		0.0004	0.01	0.0004	0.01
	1	3		0.013	1.30	0.01300	1.30
As	0.003	1		0.000006	0.20	0.00001	0.2
Cr (II)(III)	5	1		0.0004	0.01	0.00040	0.008
	150	2		0.013	0.01	0.01300	0.0087
Cr (VI)	0.0002	1		0.00000004	0.02	0.00000	0.0
Ni	0.02	1	0.00103	0.0004	2.00	0.00143	7.2

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

The Applicant's modelling predicted peak ground level exposure to pollutants in ambient air. The modelling showed that the relevant environmental standards will not be exceeded by any of the modelled emissions at the point of maximum modelled ground level exposure.

i) Screening out emissions which are insignificant

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

- NO_2 (1-hr mean), PM_{10}, $PM_{2.5}$, SO_2, HCl, HF, CO, TOC, PAH, NH_3, PCBs,
- All metals with the exception of Cd and Ni.

Therefore we consider the Applicant's proposals for preventing and minimising the emissions of these substances are (and remain) BAT for the Installation.

ii) Emissions unlikely to give rise to 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 significantly less than 100% of the relevant ES (taking expected modelling uncertainties into account). These are:

- NO_2 (Annual Mean), Cd (Annual Mean) and Ni (Annual Mean).

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 assessed ES.

The primary and secondary techniques employed for preventing and minimising these emissions from the permitted facility have not changed as a result of this variation and based upon predicted emissions (as assessed above) we consider that the Applicant's proposals are (and remain) BAT for the Installation.

1.3 Human Health Risk Assessment

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. The potential environmental impact of emissions of dioxins were assessed as part of the Human Health Risk Assessment carried out for the facility, as detailed below.

In the original permit application for the facility a human health impact assessment was undertaken. This concluded that:

"*the Hypothetical Maximum Exposed Individual (HMEI) is not subject to a significant additional risk arising from exposures to emissions of dioxins, furans or PCBs via both inhalation and the ingestion of foods*."

The applicant's assessment was reviewed by the Environment Agency's modelling specialists, which involved checks based upon conservative intake assumptions for all pathways, including inhalation, and worst case dispersion modelling. The assessment concluded that the impact from the facility is not likely to contribute significantly to daily intake. Our checks showed that the applicant's worst case predictions were conservative and could be used for permit determination.

The human health risk assessment previously undertaken for the facility has been reviewed in light of this variation application and associated emissions. We are satisfied that the previous assessment was suitably conservative for the proposed stack emissions and that the conclusions from this risk assessment can be used for determination of this variation application.

The Environment Agency has reviewed the methodology employed to carry out the health risk assessment for the facility and agreed with the conclusions drawn, that there would be no significant risk from the proposed facility upon human health.

1.4 Impact on Habitat sites, SSSIs and non-statutory conservation sites

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

There are two Sites of Special Scientific Interest within 2km of the Installation; Seller's Wood (distance of approximately 565 m) and Bulwell Wood (distance of approximately 1080 m).

There are 32 non-statutory local wildlife and conservation sites (Local Nature Reserves (LNR), Local Wildlife Sites and Ancient Woodlands) located within 2 km of the Installation, including Seller's Wood LNR, Bulwell Hall Park Meadows LNR, Moorbridge Pond and Springfield Corner LNR and Hucknall Road Linear Walkway LNR.

The dispersion modelling and ecological impact assessment provided by the Operator considered the potential impact from emissions of oxides of nitrogen, sulphur dioxide and ammonia; nitrogen deposition and acid deposition associated with the plant's emission of combustion gases to air.

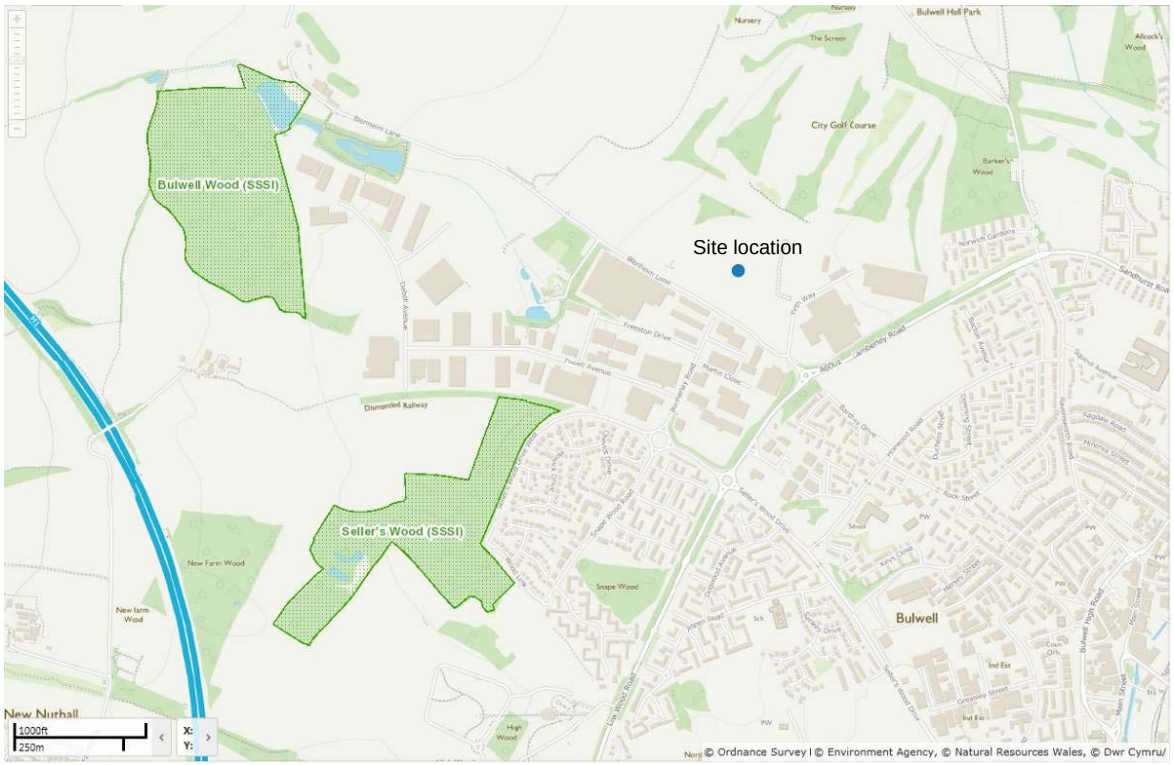
The assessments provided a conservative, worst-case assessment, on the basis that the maximum predicted process contributions referred to below are the maximum predicted concentrations modelled anywhere within the habitat/conservation sites, based upon worst-case meteorological conditions taken from 5 years of data and assumes the continuous operation of the facility at the permitted emission limit values.

The dispersion modelling and assessment has been reviewed and checked by the Environment Agency's air quality modelling specialists and we agree with the conclusions drawn; that the Installation and changes permitted by the variation are not likely to damage the interest features of the sites in question.

The assessment provided by the Operator (as detailed in the following sections) did not consider the plant's predicted emissions of hydrogen fluoride (HF) and hydrogen chloride (HCl). However, the Environment Agency's modelling specialists carried out sensitivity tests to assess the potential impact of these emissions upon local habitat and conservation sites and concluded that they would not result in the exceedance of relevant critical levels or loads and would not affect the conclusion that emissions from the facility are not likely to damage the interest features of the sites in question.

1.4.1 Assessment of impact upon SSSIs

The only aspect of the proposed activity that could have the potential to damage the SSSI's special interest features is the point source emission of combustion gases from the waste gasification plant. The permit variation application included detailed dispersion modelling to assess the potential impact of these emissions upon the SSSIs and their features of interest. The locations of the proposed facility and the two SSSIs in question are shown in the map below:



We consulted Natural England during the determination of the permit variation application. Natural England considered that the proposed development will not have significant adverse impacts on the designated sites and confirmed that they have no objection to the variation application.

The results of the impact assessments for the two SSSIs are summarised below.

Seller's Wood

<u>Oxides of Nitrogen, sulphur dioxide & ammonia</u>

Predicted maximum emission concentrations of oxides of nitrogen (0.21 µg/m^3), sulphur dioxide (0.0 µg/m^3) and ammonia (0.0021 µg/m^3) are insignificant (maximum predicted process contributions at the habitat site

are no more than 1% of the relevant critical levels (30 µg/m^3, 20 µg/m^3 and 1 µg/m^3, respectively)) and therefore are considered unlikely to cause damage to the interest features of the site.

Nitrogen deposition

Nitrogen deposition is considered to be insignificant on the basis that the maximum predicted process contribution (0.060 kg N ha^{-1} year^{-1}) is less than 1% of the critical level (35.7 kg N ha^{-1} year^{-1}) and therefore unlikely to cause damage to the interest features of the site.

The critical loads for nutrient nitrogen deposition are exceeded by background deposition rates. However, nutrient nitrogen deposition resulting from the operation of the facility is considered unlikely to damage the interest features of the site on the basis that the maximum predicted process contribution (0.060 kg N ha^{-1} year^{-1}) is unlikely to be more than 1.2% of the relevant lower critical load (5 kg N ha^{-1} year^{-1}) and 0.4% of the higher critical load (15 kg N ha^{-1} year^{-1}). The maximum predicted process contribution from the facility would represent only 0.14% of existing deposition levels, which are likely to be from local road traffic and agricultural sources.

Acid deposition

On the basis of results of the modelling undertaken by the applicant and check modelling undertaken by the Environment Agency, the maximum process contributions from the facility may marginally exceed 1% of the MinCLMaxN critical load (2.852 kg N ha^{-1} year^{-1}) at the SSSI (maximum predicted process contribution of <1.2% from check modelling). However, it is unlikely that the MaxCLMaxN critical load for the site (11.94 kg N ha^{-1} year^{-1}) will be exceeded by the predicted environmental concentration (maximum predicted process contribution + existing background deposition rate = 3.4 kg N ha^{-1} year^{-1}) and therefore the proposed facility is not considered likely to damage any features of the SSSI as a result of acid deposition.

Bulwell Wood

Oxides of Nitrogen, sulphur dioxide & ammonia

Predicted maximum emission concentrations of oxides of nitrogen (0.12 µg/m^3), sulphur dioxide (0.0 µg/m^3) and ammonia (0.0012 µg/m^3) are insignificant (maximum predicted process contribution at the habitat site are no more than 1% of the relevant critical levels (30 µg/m^3, 20 µg/m^3 and 1 µg/m^3, respectively)) and therefore are considered unlikely to cause damage to the interest features of the site.

Nutrient Nitrogen deposition

Nutrient nitrogen deposition is considered to be insignificant on the basis that the maximum predicted process contribution (0.034 kg N ha^{-1} year^{-1}) is less than 1% of the relevant lower critical load (5 kg N ha^{-1} year^{-1}) and therefore unlikely to cause damage to the interest features of the site.

Nitrogen deposition is considered to be insignificant on basis that the maximum predicted process contribution (0.034 kg N ha^{-1} year^{-1}) is less than 1% of the critical level (35.7 kg N ha^{-1} year^{-1}) and therefore unlikely to cause damage to the interest features of the site.

Acid deposition

On the basis of the results of the modelling undertaken by the applicant and check modelling undertaken by the Environment Agency, the maximum process contributions from the facility may marginally exceed 1% of the MinCLMaxN critical load (11.94 kg N ha^{-1} year^{-1}) at the SSSI (maximum predicted process contribution of <1.2% from check modelling, based upon 5 years of meteorological data). However, it is unlikely that the MaxCLMaxN critical load for the site (11.97 kg N ha^{-1} year^{-1}) will be exceeded by the predicted environmental concentration (maximum predicted process contribution + existing background deposition rate = 3.39 kg N ha^{-1} year^{-1}) and therefore the proposed facility is not considered likely to damage any features of the SSSI as a result of acid deposition.

1.4.2 Assessment of impact upon other conservation sites

The assessment provided by the Operator (again using detailed dispersion modelling reviewed and assessed by the Environment Agency's technical specialists) showed that the predicted Process Contributions for all assessed pollutants are below the relevant critical levels and loads at each of the non-statutory conservation sites considered. Therefore, in line with our guidance, we have concluded that the Installation and proposed changes permitted by this variation will not cause significant pollution at these other conservation sites.

1.5 Impact of abnormal emissions

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

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

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

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

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

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

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

- PM_{10}, HCl, HF, PCBs and metals (Hg, Sb, Cu, Mn, Cr).

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

- NO_2, SO_2.

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

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

The impact of abnormal emissions of dioxins was considered as part of the original permit application determination with reference to the results of the human health risk assessment undertaken. We are satisfied that the human health risk assessment undertaken for the permit application was conservative in nature and that the conclusions of this assessment remain valid for this permit variation. Based upon this, we are satisfied that dioxin emissions associated with abnormal emissions from the facility will not pose a risk to human health.

Emissions to air - abnormal

Pollutant	ES		Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m³		µg/m³	µg/m³	% of ES	µg/m³	% of ES
NO_2	200	2	19.2	31.3	15.7	50.5	25.3
PM_{10}	50	3		3.3	6.60	3.3	6.6
SO_2	266	4	7.43	118	44.4	125.43	47.2
	350	5	7.43	92	26.29	99.43	28.4
HCl	750	6		50	6.67	50.0	6.67
HF	160	6		5.1	3.19	5.10	3.2
Hg	7.5	1		0.056	0.75	0.05600	0.747
Sb	150	1		0.043	0.03	0.04300	0.029
Cu	200	1		0.043	0.02	0.04300	0.022
Mn	1500	1		0.043	0.00	0.04300	0.0029
PCBs	6	1		0.11	1.83	0.11000	1.8333
Cr (II)(III)	150	1		0.043	0.03	0.04300	0.0287

1 1-hr Maximum

2 99.79th %ile of 1-hour means

3 90.41st %ile of 24-hour means

4 99.9th ile of 15-min means

5 99.73rd %ile of 1-hour means

6 1-hour average

2. Use of RFO – IED waste incineration requirements

On the basis of the information provided in the application, we are satisfied that the plant will be capable of achieving the relevant IED waste incineration requirements when RFO is used as a fuel in the auxiliary burners and that the Operator will be able to comply with the requirements of permit conditions 2.3.7, 2.3.8 and 2.3.9 for the incineration of hazardous waste.

Waste analysis information provided in support of the application confirms that the RFO will contain halogenated hydrocarbons (expressed as chlorine) at a concentration below 1% and therefore the lower furnace temperature of 850°C will apply to its combustion. The waste specification provided for the RFO has been incorporated as a condition of the permit (through condition 2.3.7 and Table S2.4).

The Operator has confirmed in the application that at any time when the combustion chamber is operating below the temperature required by the IED for waste incineration (850°C), only natural gas will be used as a support fuel in the auxiliary burners of the plant. During periods of plant start-up and shut-down only natural

gas will be used as a fuel until the combustion chamber has achieved the required operating temperature (850°C).

The original permit issued for the waste incineration plant included a pre-operational condition and improvement condition (PO5 and IC4) requiring the Operator to demonstrate and check that the design combustion conditions of the plant complied with the residence time and temperature requirements of IED and these requirements remain through this variation. Pre-operational condition PO2 of the permit requires the operator to submit a written report to the Environment Agency detailing the waste acceptance procedure to be used at the site. This has been updated to include specific reference to hazardous waste (i.e. RFO).

3. Energy efficiency (relating to use of RFO and changes to facility design subject to the variation application)

As a result of this variation, recovered fuel oil (RFO) will be used as a support fuel at the facility, replacing a significant proportion (approximately 95%) of the natural gas required in the original application, although a reduced natural gas will still be used as an auxiliary fuel on-site. As a result of this change, natural gas consumption at the facility will reduce from 29.75 MW to 1.46 MW, significantly reducing the use of fossil fuel used at the facility, replacing it with a recovered waste-derived fuel.

As well as permitting the facility to use RFO as a support fuel, the variation also changes the way that electricity will be generated by the plant. The original permit application included the use of gas engines and a steam turbine to generate electricity. Under this variation application the facility will only generate electricity using the heat recovery boilers and a high efficiency steam turbine. The steam turbine proposed under the variation application is different to the one proposed in the original application, being of a higher efficiency. The higher efficiency turbine was originally proposed as part of the R1 application for the facility, enabling the facility to achieve the R1 energy efficiency factor (0.65). The predicted efficiency of the proposed steam turbine is 87.4% at design conditions.

Other aspects of the design and operation of the plant remain as originally permitted.

Although not directly relevant to this determination, since the original permit was issued, it has been demonstrated by the Operator, and agreed by the Environment Agency, that the facility is capable of achieving an R1 factor of 0.65 or above following a provisional assessment. On this basis the facility can be classified as an R1 waste recovery operation (certification letter dated 12/05/2017). This will be subject to the facility's R1 status being demonstrated again using a full year's energy data, once the plant is operational.

When considering the overall (gross) energy efficiency of an incineration facility, the total thermal input of the thermal treatment units is considered, including waste and auxiliary fuels (in this case, RFO and natural gas). With regards to specific energy consumption, the RFO is considered as a waste input on the basis that the material is a hazardous waste and (through this variation) the plant is permitted to burn this waste as a Section 5.1 A(1)(a) activity.

The 2018 Draft Waste Incineration BREF provides a BAT-AEEL (energy efficiency levels associated with best available techniques) range for gross electrical efficiency of 20-35%, which applies to plant using a condensing turbine. Based upon the variation application information, the gross electrical efficiency of the Bulwell facility will be approximately 28%, which is within the BAT-AEEL range.

The facility will primarily burn refuse derived fuels produced from municipal waste as well as commercial/industrial waste of a type/composition similar to municipal waste. Data from the current (2006) BREF for Municipal Waste Incinerators shows that the range of specific energy consumptions is as in the table below.

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

The waste incineration capacity of the Bulwell facility is 160,000 tonnes per annum. Based upon the information provided in the application, the specific energy consumption of the facility (a measure of total energy consumed per unit of waste processed), will be approximately 313 kWh/tonne, which is within the range stated in the BREF for comparable sized plant.

The BREF states that where a plant generates electricity only, it is BAT to recover 0.4 – 0.65 MWh/ tonne of waste (based on LCV of 10.4 MJ/kg) for raw waste inputs or 0.6 – 1.0 MWh/tonne of waste (based on LCV of 15.2 MJ/kg) for pre-treated wastes (a range of 0.4 – 0.7 MWh is stated in the 2018 draft incineration BREF). Our technical guidance note, SGN EPR 5.01, states that where electricity only is generated, 5-9 MW of electricity should be recoverable per 100,000 tonnes/annum of waste (which equates to 0.4 – 0.72 MWh/tonne of waste). The Installation will generate electricity only and has been specified to maximise electrical output with limited use of waste heat. Accounting for the parasitic load, the application states that the facility will export 1.08 MWh per tonne of non-hazardous waste treated (this reduces to 0.97MWh when RFO is included in the tonnage of waste treated). This figure compares favourably with those provided in the BREF and exceeds the figure stated in EPR 5.01.

The current BREF identifies that it is BAT to reduce the average installation electrical demand to generally below 150 kWh/tonne of waste with a calorific value (CV) of 10.4 MJ/kg. In terms of average installation electrical demand, the waste incineration BREF provides a range of 0.062 MWh to 0.257 MWh per tonne of waste processed (0.045 – 0.264 MWh in the 2018 draft waste incineration BREF). When operating, the plant will not require any electrical input from the national grid and the electricity used will be generated on-site (i.e. as parasitic load from the gasification plant). The parasitic load of the facility is stated in the application as being 0.28 MWh per tonne of non-hazardous waste processed (0.25 MWh/tonne when corrected to account for the quantity of hazardous waste also incinerated). This load exceeds the electrical demand figure stated in the BREF (150 kWh/tonne) and the top end of the range provided in the BREF (0.257 MWh/tonne).

However, the parasitic load figure of 150 kWh/tonne stated in the BREF is based upon a waste CV of 10.4 MJ/kg. Section 3.5.5 of the BREF identifies that the energy consumption of incineration plant varies according to the CV of the waste, largely due to increased flue-gas volumes associated with higher CV waste. The CVs of the wastes assumed in the calculations for the Bulwell facility are 13.5 MJ/kg for the non-hazardous waste (160,000 t/yr) and 40MJ/kg for the RFO (18,800 t/yr), both of which are higher than the CV value assumed in the BREF (10.4 MJ/kg), and the RFO significantly so. On this basis, the installation electrical demand (parasitic load) of the Bulwell facility would be expected to be higher than that quoted in the BREF, in part due to the increased volumes of flue-gas associated with the higher CV waste. Based upon the figures provided in the application, the additional electrical energy consumption/parasitic load of the Bulwell plant relative to the figure quoted in the BREF (i.e. 250 kWh/tonne compared to 150 kWh/tonne) is approximately proportional to the difference between the combined/averaged calorific value of the waste to be incinerated at the Bulwell facility (i.e. 16.3 MJ/kg (based upon the relative CVs and quantities of non-hazardous waste and RFO to be incinerated)) and that assumed in the BREF (10.4 MJ/kg).

Taking into account the quantities and calorific values of the wastes that will be incinerated at the facility; the electrical demand of the facility which is wholly satisfied by the electricity generated on-site (i.e. not taken from the grid) and the specific energy consumption of the plant, which is within the range stated in the BREF for comparable sized plant, we are satisfied that the energy generation and consumption figures are in line with the BREF and represent BAT for the facility.

Having considered the information submitted in the Application, including techniques and measures to reduce overall process energy consumption, we are satisfied that appropriate measures will be in place to ensure that energy is used efficiently within the Installation.

The varied permit includes an updated pre-operational condition (PO3), which requires the company EMS to include an energy efficiency plan in accordance with Environment Agency web guidance 'Energy efficiency standards for industrial plants to get environmental permits' and Sector Guidance Note, The Incineration of Waste (EPR 5.01), to provide the basis for an ongoing energy efficiency improvement programme.

The Operator is required to report energy usage and energy generated under condition 4.2 and Schedule 5 of the permit. The following parameters are required to be reported: total electrical energy generated; electrical energy exported; total energy usage and energy exported as heat (if any). Together with the total MSW burned per year, this will enable the Environment Agency to monitor energy recovery efficiency at the Installation and take action if at any stage the energy recovery efficiency is less than proposed.

4. Storage of RFO

The facility will burn up to 18,800 tonnes of RFO per annum. The RFO used by the gasification plant will be stored in two 200,000 litre tanks. All RFO deliveries to the facility will be pre-booked and will be sampled and tested in accordance with the requirements of the permit to ensure that it meets the permitted specification. All tanker deliveries will be supervised by site personnel. Pre-operational condition PO2 requires the Operator to provide the Environment Agency with procedures for the acceptance of waste at the facility, including the RFO.

The storage tanks will meet the requirements of BS799-5:2010, which specifies requirements for the construction and testing of static carbon steel tanks for the storage of liquid fuel. The tanks will be located on an area of impermeable hard standing. The tanks and associated infrastructure will be subject to regular visual inspections and a programme of engineering inspections.

The Operator has confirmed in writing that the storage of RFO at the facility will meet the Class 2 containment requirements of the CIRIA C736 guidance document and the relevant requirements of Sector Guidance Note S5.06 (Sections 2.1.3 and 2.2.5); specifically that the storage tanks will be provided with independent reinforced concrete bunds and that the RFO tanker offloading area will have a self-contained drainage system. This has been made a condition of the permit (through the incorporation of this written confirmation as an operating technique referred to in Table S1.2 of the permit) and a pre-operational condition (PO11) has been included in the permit requiring the Operator to demonstrate that these requirements/standards are met before the RFO storage tanks and tanker offloading area can be put into operation.

Based upon the requirements of condition PO11 being met prior to operation, we are satisfied that the potential environmental risk posed by the storage of RFO at the facility (i.e. to ground and water) will be controlled and minimised using appropriate measures.

5. Fire Prevention

The Applicant submitted an updated Fire Prevention Plan (FPP) for the facility as part of the variation application. Although hazardous, flammable wastes are excluded from the scope of the Environment Agency's FPP guidance, the FPP provided for the facility also details relevant measures for the storage of RFO, which is subject to this variation.

We have reviewed the submitted FPP and are satisfied that it meets the relevant requirements of our guidance for the storage of non-hazardous combustible waste. Key features of the fire prevention plan are summarised below.

The FPP provided as part of the permit variation application states that it will ensure that the risk of a fire starting is minimised, that a fire can be extinguished within 2 hours (our guidance refers to the objective of extinguishing a fire in 4 hours) and that the spread of a fire will be minimised using fully automated fire detection and water delivery systems.

The site will accept up to 160,000 tonnes of non-hazardous waste per annum, primarily consisting of refuse derived fuels and other similar solid combustible waste materials. The material will be stored in the bays in either loose or baled form.

The waste will be stored within a dedicated waste reception building in 9 bays. Waste storage bays will have firewalls that meet the requirements of the FPP Guidance and a minimum of a 1.25m freeboard will be maintained between the top of the waste piles and the top of the firewalls. Appropriate separation distances (minimum of 6m) will be maintained between storage bays and the site office building and site perimeter. The waste quarantine area will have a minimum of a 6 m clear area around it.

All waste will be inspected prior to acceptance and deposition in the bays. Thermal imaging cameras will be used to check each load of waste to ensure that the temperature is below the trigger temperature of 50°C. If waste does not meet the relevant waste acceptance criteria, it will either be rejected from the site (if it has not yet been deposited) or transferred to the dedicated waste quarantine area.

Waste will not be stored at the facility for greater than 71 hours (including over bank holiday weekends) and will typically be stored for less than 50 hours. This is significantly less than the maximum storage timescales recommended by the FPP guidance, which states that combustible waste must not be stored for more than 6 months (3 months if at the maximum piles sizes) in order to prevent self-heating and combustion.

Continual bay rotation will be employed at the site to ensure that waste does not remain in the bays beyond the maximum storage duration. The bays will be fully emptied, clean and clear before being refilled.

Fire detection and suppression systems installed at the facility will be covered by an appropriate UKAS accredited third party certification scheme.

Thermal imaging cameras will be used to continuously monitor the condition of the waste stored in the waste reception building. The cameras will be positioned to provide full coverage of the building. The cameras will be connected to an automatic visual and audible alarm system and the alarm will be triggered if a hot spot is detected in the waste (>50°C). The site (including internal halls and external plant and site areas) will also be covered by 24hr visual CCTV monitoring and the waste reception/storage hall will have an additional continuously monitored aspirating smoke detection system.

All areas of the waste reception hall will be covered by a sprinkler suppression system, with each part of the hall also accessible by at least two water cannons. The site will be manned/supervised at all times including when the gasification process is not in operation but waste is still held on-site. The site will have appropriate procedures for regular site inspections, fire watches and for maintaining and cleaning site surfaces and plant.

No waste will be stored in the RODECS hall. It will be protected by a UKAS accredited monitoring and alarm system and protected by the site wide fire main, hydrant and fire hose outlet system designed to comply with UK Building Regulations.

We are satisfied that the facility will have adequate water supply (water supply rates) in line with the relevant requirements of the FPP guidance.

The waste reception hall will be designed and constructed to retain fire water within the confines of the building, with sealed reinforced concrete floor joints, raised access points and road humps across vehicle access points. We are satisfied that the facility will be able to contain fire water in accordance with the relevant requirements of the FPP guidance.

When operations are not in progress (e.g. planned maintenance/shutdowns), stock will be run-down accordingly and bays cleared if necessary to ensure material is on site for no longer than 71 hours.

The nine storage bays have maximum storage capacities ranging from 541 m^3 to 828 m^3, with a maximum pile height of 5 m, a maximum pile length of 10.8 m and maximum pile widths ranging from 8.14 m to 12.46 m. The total site storage capacity provided by the 9 bays is 6,235 m^3. The pile sizes exceed the maximum height and volumes stated in the guidance, although they are significantly below the maximum pile length/width dimensions stated in the guidance. Taking into account the nature of the operation (waste gasification), the short duration that waste will be stored at the facility (<71 hours), the fire detection, suppression and control measures proposed (including continuous waste temperature monitoring using thermal imaging cameras and

24/7 site supervision), we are satisfied that the 3 objectives of the fire prevention guidance can be met at the facility for the proposed pile sizes.

The permitted facility has a surface water infiltration lagoon, which receives surface water from clean areas of the site. Surface water will pass through an oil interceptor prior to entering the lagoon. The lagoon will also be protected by penstock valves which will automatically close upon activation of the fire alarm system.

The RFO storage tanks will be located to the western end of the site, away from the waste storage area and gasification plant. A dedicated fuel line will supply the gasification plant with oil from the tanks. The storage tanks will be provided with appropriate secondary containment (independent, reinforced concrete bunding, as confirmed in writing by the Operator (24/08/2018)) and tanker deliveries will be made to a dedicated and self-contained offloading area. Storage infrastructure provided for the RFO will meet the relevant requirements of CIRIA C736 and sector guidance note S5.06.

A pre-operation condition (PO12) has been included in the permit requiring the Operator to provide evidence to confirm that UKAS accredited fire detection and suppression systems have been installed and commissioned at the facility prior to operation.

Decision checklist

Aspect considered	Decision
Receipt of application	
Confidential information	A claim for commercial or industrial confidentiality has not been made.
Identifying confidential information	We have not identified information provided as part of the application that we consider to be confidential.
Consultation/Engagement	
Consultation	The consultation requirements were identified in accordance with the Environmental Permitting Regulations and our public participation statement. The application was publicised on the GOV.UK website. We consulted the following organisations: Food Standards Agency Public Health England/Director of Public Health Nottingham City Council (Planning & Environmental Health) Nottinghamshire Fire Service Health & Safety Executive Severn Trent Water Natural England The comments and our responses are summarised in the consultation section.
The facility	
The regulated facility	We considered the extent and nature of the facility at the site in accordance with RGN2 'Understanding the meaning of regulated facility', Appendix 2 of RGN 2 'Defining the scope of the installation', Appendix 1 of RGN 2 'Interpretation of Schedule 1', guidance on waste recovery plans and permits. The extent of the facility is defined in the site plan and in the permit. The activities are defined in table S1.1 of the permit. The facility, as originally applied for and permitted under EPR/LP3239NX/A001, will include two RODECS waste gasifiers, each with their own heat recovery boiler and air pollution control systems. Table S1.1 of the varied permit notice has been updated to make it clear that this is the case. The assessment of emissions to air from the waste gasification plant (as detailed in the Key Issues section of this document) considered total emissions from the operation of both gasifier plant.
The site	
Extent of the site of the facility	The operator has provided a plan which we consider is satisfactory, showing the extent of the site of the facility. The plan is included in the permit. The revised site plan incorporates the changes made to the site boundary as a

Aspect considered	Decision
	result of the partial surrender application and which now also includes the locations of the emissions to air and water from the facility.
Site condition report	The operator has provided a description of the condition of the site, which we consider is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under the Industrial Emissions Directive.
Biodiversity, heritage, landscape and nature conservation	The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat. We have assessed the application and its potential to affect all known sites of nature conservation, landscape and heritage and/or protected species or habitats identified in the nature conservation screening report as part of the permitting process. We consider that the application will not affect any sites of nature conservation, landscape and heritage, and/or protected species or habitats identified. We have consulted Natural England on our SSSI assessments, and taken their comments into account in the permitting decision.
Environmental risk assessment	
Environmental risk	We have reviewed the operator's assessment of the environmental risk from the facility. The operator's risk assessment is satisfactory. Further information regarding the environmental risk assessment has been provided in the Key Issues section (item 1).
Operating techniques	
General operating techniques	We have reviewed the techniques used by the operator and compared these with the relevant guidance notes and we consider them to represent appropriate techniques for the facility. The operating techniques that the applicant must use are specified in table S1.2 in the environmental permit.
Operating techniques for emissions that do not screen out as insignificant	As detailed in item 1 of the Key Issues section, certain emissions cannot be screened out as insignificant. We have assessed whether the proposed techniques are BAT. The proposed techniques/emission levels for emissions that do not screen out as insignificant are in line with the techniques and benchmark levels contained in the technical guidance and we consider them to represent appropriate techniques for the facility. The permit conditions ensure compliance with relevant BREFs and BAT Conclusions, and ELVs deliver compliance with BAT-AELs.
Operating techniques for emissions that screen out as insignificant	For emissions that have been screened out as insignificant (as detailed in the Key Issues section (item 1)), we agree that the applicant's proposed techniques are BAT for the installation.

Aspect considered	Decision
	We consider that the emission limits included in the installation permit reflect the BAT for the sector.
Odour management	We consider that the changes subject to the variation application will not significantly affect potential odour emissions from those assessed during the original permit determination and therefore odour emissions from the facility have not been considered further through this variation determination and the conclusions of the original determination remain valid.
Noise management	We consider that the changes subject to the variation application will not significantly affect potential noise emissions from those assessed during the original permit determination and therefore noise emissions from the facility have not been considered further through this variation determination and the conclusions of the original determination remain valid.
Fire prevention plan	We have assessed the fire prevention plan and are satisfied that it meets the measures and objectives set out in the Fire Prevention Plan guidance. The plan sets out alternative measures that we consider meet the objectives of the Fire Prevention Plan guidance. We have included a pre-operational condition (PO12) requiring the operator to demonstrate that the fire detection and suppression systems installed and commissioned at the facility are covered by an appropriate UKAS accredited scheme (as stated in the FPP) prior to operation.
Permit conditions	
Updating permit conditions during consolidation	We have updated permit conditions to those in the current 'energy from waste' permit template as part of permit consolidation. The conditions will provide the same level of protection as those in the previous permit.
Raw materials	We have not specified any additional limits and controls on the use of raw materials and fuels through this variation.
Waste types	We have specified the permitted waste types, descriptions and quantities, which can be accepted at the regulated facility. We are satisfied that the operator can accept these wastes for the following reasons: • they are suitable for the proposed activities • the proposed infrastructure is appropriate; and • the environmental risk assessment is acceptable. The permitted waste list include separately collected fractions of waste such as wood, plastic, cardboard etc. The Operator has confirmed in writing that separately collected fractions of waste will only be incinerated at the facility if they are unsuitable for further recycling or recovery.
Pre-operational conditions	Based on the information in the variation application, we consider that we need to impose additional pre-operational conditions (PO11, PO12 and PO13). These conditions are detailed in the Key Issues section (PO11 and PO12) and the monitoring section of this checklist (PO13). Pre-operational condition PO2 of the permit has been updated to include reference to RFO

Aspect considered	Decision
	and PO3 has been updated to ensure that the Operators EMS includes an energy efficiency plan. The following pre-operational conditions have also been updated/included to include the requirements of the pre-operational conditions that are in the current version of the 'energy from waste' permit template: PO5, PO7, PO9, and PO10.
Improvement programme	We have not imposed any additional improvement conditions through this variation. However, Improvement Condition IC5 has been updated to reflect the wording and requirements included in the current 'energy from waste' permit template.
Emission limits	No emission limits have been added, amended or deleted as a result of this variation.
Monitoring	The facility (as originally applied for and permitted) will include two waste gasifiers, each of which will be served by its own heat recovery boiler, air pollution control system and flue (dual-flue stack). The varied permit notice has been amended to include two air emission and monitoring points (A1 and A2), one for each plant/flue. The assessment of emissions to air from the waste gasification plant (as detailed in the Key Issues section of this document) considered total emissions from the operation of both gasifier plant. During the determination of the variation application it became apparent that the original permit had not included the proposed emission points for discharges of surface water from the facility, only the emission of boiler blowdown to sewer (S1). Clean surface water from the facility will be directed to a retention/infiltration pond (via an oil/water interceptor and penstock valves) (W1), which includes an overflow to sewer (S2). To address this, these emission points have been included in Table S3.2 of the permit (the discharge to sewer identified in Table S3.2 of the original permit has been included in Table S3.3 of the varied permit). Pre-operational condition PO13 has been included in the permit requiring the operator to propose, agree and implement a monitoring programme for the emission of surface water from the facility.
Reporting	We have added reporting in the permit for the following parameters: Total recovered fuel oil incinerated (Table 4.2 Annual production/treatment). This parameter has been added so that the Operator is required to report to the Environment Agency the amount of RFO burnt in the plant per annum. We have also provided an updated set of reporting forms based upon those available for the current permit template.
Operator competence	
Management system	There is no known reason to consider that the operator will not have the management system to enable it to comply with the permit conditions.

Aspect considered	Decision
Technical competence	We are satisfied that the operator is technically competent.
Financial competence	There is no known reason to consider that the operator will not be financially able to comply with the permit conditions.
Growth Duty	
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.

Consultation

The following summarises the responses to consultation with other organisations, our notice on GOV.UK for the public, and the way in which we have considered these in the determination process.

Responses received from organisations listed in the consultation section

Response received from
Public Health England
Brief summary of issues raised
The main emissions from the proposed change to the installation are exhaust gases from the dual stack, and the use of recycled fuel oil, to support the burners. With regard to exhaust gases, the modelling included within the application indicates that with the revised stack height, the risk to public health is low. The potential risks to the public via groundwater contamination from the use of recovered fuel oil is considered within the Accident Management Plan. Based on the information contained in the application supplied to us, Public Health England has no significant concerns regarding the risk to the health of the local population from the installation.
Summary of actions taken or show how this has been covered
No specific actions taken. See Key Issues section for further information regarding emissions to air and on-site containment measures for the storage of recovered fuel oil.

Response received from
Nottingham City Council
Brief summary of issues raised
No issues were raised regarding the changes to the permitted facility that are subject to the variation application.
Summary of actions taken or show how this has been covered
No specific actions taken or required.

Response received from
Natural England
Brief summary of issues raised
Based on the plans submitted, Natural England considers that the proposed development will not have significant adverse impacts on designated sites and has no objection.
Summary of actions taken or show how this has been covered
No actions required. See Key Issues section for more information regarding the assessment of the facility's emissions upon local wildlife and conservation sites.

Representations received from individual members of the public.

Brief summary of issues raised
1. Waste composition: Whilst details are given of the RFO specification, no composition details are given for the municipal and commercial/industrial waste in order to estimate the emissions rates from the facility. 2. It is unclear whether or not the emissions data in the application include both the emissions from the combustion of RFO and natural gas.

3. It is unclear whether emissions resulting from the combustion of the RFO go straight to the stack or are treated with the other gases resulting from the combustion of natural gas and non-hazardous waste.

4. The proposed emission limits for NO_2 and SO_2 are below those concentrations achieved by other waste incinerators and gasification equipped with similar abatement systems. The application hasn't considered the effects from exceedance of these proposed emissions limits.

5. The RFO specification in the application Supporting Information gives a sulphur content limit of 1%. However, elsewhere in the application reference is made to the use of low sulphur fuels <0.2% w/w for start-up and support. This seems mutually conflicting and raises doubts regarding the applicant's statements in the application regarding the assessment and control of SO_2 emissions.

6. Whilst the energy in the RFO is treated as part of EfW (energy from waste) for the purposes of the R1 calculation, the proposed plant will achieve an overall energy efficiency of some 21%. The use of RFO in this way cannot be described as recycling or Best Practice.

7. The application appears to include wastes other than those normally present in MSW, the incineration of which informed the emission limits set in the Waste Incineration Directive/IED. The operators of incinerators now seeking permits will, if and when the incinerators are commissioned, find that the waste types preferred have been secured by the operators of long established incinerators and are no longer available. They will be obliged to take less suitable waste codes. The present applicant should be requested to undertake modelling for combinations of those waste codes which are considered to present the greatest challenges to the plant's emission management systems.

8. The proposed technology is, as I understand it, the same as that at IES Oldbury which experienced a fatal explosion in 2017 that is being investigated by the HSE and West Midlands Police. In these circumstances, the Environment Agency should not issue a final permit for the Bulwell Facility at least until the results of the police, and the presumably HSE, investigations are available.

Summary of actions taken / how issues raised have been covered

1) The variation application and issued permit variation does not add any additional waste codes to the permit other than the RFO, for which compositional information has been provided and made a condition of the permit. The Operator confirmed during the determination that the proposed emissions levels from the facility (as assessed during determination) include emissions from the combustion of the non-hazardous commercial and industrial waste and the hazardous RFO. Emission limits have been set in the permit to reflect the emission concentrations assessed in the application and we are satisfied that emissions to air from the facility will not have a significant environmental impact, as detailed in the Key Issues section of this document.

2) The emissions assessed in the application include both the emissions resulting from the thermal treatment of the non-hazardous municipal and commercial/industrial wastes and the hazardous RFO waste. Emissions from the thermal treatment of the wastes will be released from emission points A1 & A2 of the facility, having passed through the emission abatement systems, and the emission limits set in the permit will apply to these emissions.

3) The Operator has confirmed in the application that the gases/emissions resulting from the combustion of the RFO will pass through the same emission abatement systems as the gases/emissions resulting from the thermal treatment of the municipal and commercial/industrial waste and combustion of natural gas. They will not bypass the combustion chamber of the gasification or the plant's emission abatement systems and go straight to the stack.

4) The assessment of the facility's emissions to air has primarily been based upon the maximum emission levels associated with the normal operation of the facility as detailed in the application. These emission levels have been set as emission limit values in the permit, which the Operator is required to comply with. We have also assessed the potential environmental impacts associated with emissions to air from abnormal operations (technically unavoidable stoppages, disturbances, or failures of measurement devices), as covered by Article 46(6) of the IED. Based upon the assessments undertaken (for normal and abnormal

operations), we are satisfied that the operation of the facility will not have a significant environmental impact, as detailed in the Key Issues section of this document.

5) The Operator has confirmed that the sulphur content of the RFO will be <1% w/w, not <0.2%. The 0.2% w/w figure referred to in the application relates to the use of natural gas as a fuel used for start-up and support. A reduced quantity of natural gas will still be used by the facility during times of start-up and shut-down (i.e. when the combustion chamber of the facility is at a temperature below 850°C). We have assessed the emissions of SO_2 from the facility, based upon the emission limits set in the permit, and we are satisfied that these emissions will not cause a significant environmental impact (as detailed in the Key Issues section of this document).

6) We have considered the energy efficiency of the waste gasification (incineration) facility and compared it against the waste incineration BREF and sector guidance note and we are satisfied that appropriate measures will be in place to ensure that energy is used efficiently within the Installation. Further information has been provided in section 3 of the Key Issues section of this document.

7) The variation application and the issued permit variation does not add any additional waste codes to the permit other than the hazardous waste code for Recovered Fuel Oil. The recovered fuel oil will be used as an auxiliary/support fuel at the facility and we are satisfied that the plant will be capable of satisfying the relevant requirements of the Industrial Emissions Directive for the incineration of this waste and meeting the emission limits set in the permit. Further information regarding the use and storage of the recovered fuel oil at the facility is provided in the Key Issues section of this document. All other codes included in the varied permit were included in the original permit, although some waste codes have been removed by the Operator as they will no longer be accepted at the facility. The Operator will be required to meet the emission limits set in the permit for the facility regardless of the mix of waste thermally treated in the plant. We have assessed the environmental impact of the emissions from the facility based upon the emission limits imposed and have concluded that the facility will not have a significant environmental impact, as documented further in the Key Issues section of this document.

8) At the time of variation determination the results of the incident investigation remained unknown. However, the variation application and issued permit variation (EPR/LP3239NX/V003) does not make any changes to the waste gasification technology used at the facility and permitted under EPR/LP3239NX/A001. The permit variation does not permit the facility to process any additional waste codes from those permitted under EPR/LP3239NX/A001. As detailed earlier in this document, the changes permitted through this variation are specifically to enable the plant to use RFO as a support fuel, to increase the proposed stack height serving the gasification plant and to reflect that electricity will be generated using a steam turbine alone. On this basis, the incident referred to is not considered relevant to the determination of this permit variation.