

## **Environment Agency permitting decisions**

### **Bespoke permit**

We have decided to grant the permit for Kings Road Power Plant operated by UK Power Reserve Limited.

The permit number is EPR/PP3339YQ

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.

#### **Description of the main features of the Installation**

The proposed facility will consist of twelve Cummins natural gas spark ignition engines (or equivalent) with an aggregated thermal input of 59.316MW. Natural gas will be utilised as the fuel source for the engines. The purpose of the engines is to serve the Balancing Market to prevent instability on the electricity grid by rapidly providing additional short term supply to meet peak demand or where there is a shortfall of available supply from other sources. The proposed installation of 12 engines will ensure that the Operator can meet the contractual requirements of the Short Term Operating Reserve (STOR) and Fast Reserve programme.

## **Change in company during application determination**

The company UK Power Reserve (Kings Road) Limited submitted an application (EPR/QP3531AC/A001) to the Environment Agency, which was Duly Made on 19 October 2015. During the determination of the application and prior to permit issue (under reference EPR/QP3531AC/A001), UK Power Reserve (Kings Road) Limited was dissolved. The dissolved company (UK Power Reserve (Kings Road) Limited) was a branch of UK Power Reserve Limited.

The dissolution of UK Power Reserve (Kings Road) Limited meant that the Environment Agency could not issue the environmental permit EPR/QP3531AC/A001 as there was no existing Operator. However, UK Power Reserve Limited provided evidence to demonstrate its commonality with the dissolved company. UK Power Reserve Limited demonstrated that its registered office, relevant persons listed on Companies House and the company shareholders are the same as those for UK Power Reserve (Kings Road) Limited.

The Environment Agency has exercised its discretion in this particular case (following a review of the information provided) to allow UK Power Reserve Limited to adopt the application EPR/QP3531AC/A001 and all information provided to support the determination of a permit under a new application (reference EPR/PP3339YQ/A001) for Kings Road Power Plant. UK Power Reserve Limited is the Applicant /Operator.

The content of the original application EPR/QP3531AC/A001 and all supporting documents have not been amended and have been incorporated in this application EPR/QP3531AC/A001.

## Key issues of the decision

### **BAT assessment – combustion technology**

The Applicant (now the Operator) carried out a review of the following candidate combustion technologies and made an assessment of the technology in order to determine which technology can be considered the best available technique (BAT).

- Reciprocating Engines – Compression Ignition (diesel)
- Reciprocating Engines – Spark Ignition (gas)
- Open Cycle Gas Turbines (OCGT)
- Combined Cycle Gas Turbines (CCGT)
- Aero Derivative Gas Turbines

Based on the result of this assessment, the Operator chose gas fired Spark Ignition engines for the following reasons.

- The ability to configure the engines and use lean burn to minimise air emissions;
- The engines use natural gas therefore the risk of impact from SO<sub>x</sub>, NO<sub>x</sub> and PM<sub>10</sub> emissions is low;
- 12 Cummins engines have a low environmental impact in regards to carbon dioxide than other options;
- The higher level of efficiency than other options (>40%).
- They are the most cost effective solution in terms of investment and maintenance costs.
- 12 x 2 MWe engines provide the greatest level of security in achieving 90% availability for the minimum level of total installed capacity meeting contractual requirements of the Short Term Operating Reserve (STOR) and Fast Reserve programme;
- The engines meet all the operational criteria for contracts within the Fast Start and STOR Balancing markets; and
- The spark ignition engines are a lower cost technology compared to turbine based technologies.

### **Choice of Fuel**

The Operator considered that other combustion technologies may operate using a range of fossil fuels. Owing to the primary need for flexibility, requiring immediate and relatively simple fuel availability for rapid start-up, the Operator chose natural gas delivered directly from the National Grid, as the optimum fuel for this installation.

The choice of fuel is also based on lack of available space for storing large volumes of hydrocarbon fossil fuel with the associated potential for significant environmental impact in the event of spillage or loss. Natural gas has therefore been selected as BAT in terms of fuel choice for this Installation.

### Operating under the balancing market

The new bespoke application is to allow UK Power Reserve Limited to operate twelve spark ignition engines (Cummins spark ignition engines or equivalent) in order to enable fast start-up to supply electricity to meet the National Grid requirements. The purpose of operating the gas engines is to prevent instability on the electricity grid by rapidly providing additional short term supply to meet peak demand or where there is a shortfall of available supply from other sources. The proposed installation of 12 engines will ensure that the contractual STOR and Fast Reserve Market requirements for delivery of at least 90% of stated power export can be assured even with one engine offline and undergoing maintenance.

### **Justification for allowing 1,500 hours unabated operation**

We have assessed the Operator's application and based on the following points we are satisfied that the Operator has demonstrated BAT for the use of gas engines, for 1,500 hours per year of unabated operation, to serve the National Grid Balancing Market.

### Primary emissions controls

The Operator has demonstrated that they have sufficient primary emission controls in place. These include the configuration of engine internals, such as cylinders, pistons and cylinder heads, as well as the tuning of engines to achieve Enhanced Lean Burn to maximise combustion efficiency and minimise the production of NOx.

### Secondary Abatement

Non-Selective Catalytic Reduction and Selective Catalytic Reduction are considered the most appropriate secondary abatement technique to manage NOx emissions. This abatement technology however is only considered to provide a significant reduction in emissions over a longer operating period than is proposed for the installation. The engines proposed for this site run intermittently for short periods of time, therefore the emissions reduction achieved is unlikely to be significant enough to improve long term NOx emissions. As a result it is not deemed appropriate to install secondary abatement and therefore the Operator's proposal to rely on primary emissions management measures can be considered BAT. We have inserted improvement condition 5 into the permit to check the times and durations the engines run in order to determine whether there are enough longer operating periods in practice in which secondary abatement maybe warranted.

### **Assessment against standards considered BAT for the energy balancing market**

The Operator has assessed their engines against the BAT standards and demonstrated that they meet the requirements outlined in the Department of Energy and Climate Change Balancing Market Report dated June 2016 and our draft guidance Regulatory Guidance for regulating >50MWth gas and oil fired combustion plants operating in the balancing market under the Industrial Emissions Directive. Requirements include using engines which are >40% efficient and using a Lean Burn system tuned to achieve Enhanced Lean Burn

which can achieve the <95 mg/m<sup>3</sup> NOx emissions limit stated in the Medium Combustion Plant Directive.

#### Assessment of air emissions from technology choice

The Operator has supplied air emissions modelling for the site and demonstrated that the emissions will not have a significant impact on human or ecological receptors. We have audited this modelling and agree with the conclusions. See air quality assessment below.

Based on the points above, we are satisfied that the engine technology and proposed primary emissions management measures are appropriate for managing emissions for operation up to 1500 hours per year to serve the energy balancing market.

#### **Medium Combustion Plant Directive (MCPD)**

As this site consists of 12 individual engines each less than 15MWth, the site does not fall under Chapter III and is not considered a large combustion plant. The MCPD Environmental Limit values do not apply at this time but they have been proposed by the operator and we agree that they are appropriate.

#### Engine arrangement

The Operator has demonstrated that the 12 spark ignition engine arrangement is the most appropriate as it allows one engine to be unavailable due to planned or unplanned maintenance, whilst still allowing the site to provide the 90% capacity to the National Grid. They have also highlighted that the requirement for 90% availability is better served by a larger number of smaller units than a smaller number of larger units where a greater level of installed capacity would be needed to provide the required redundancy.

#### **Stack arrangement**

The Operator outlined in the application that they consider the proposed single stack per engine set-up to be BAT. This was on the basis that single stacks are the simplest configuration to construct and maintain. It would also prevent exhaust back pressure issues and avoid the need to provide isolation to facilitate genset servicing. The Operator demonstrated through air quality modelling, that emissions from this proposed stack arrangements will not result in a significant impact at the nearby Air Quality Management Area (AQMA), human receptors and ecological receptors.

#### Cost benefit analysis on stack arrangement

The engines on this site are individually less than 15MWth and this is an emerging method of energy generation, therefore there is no specific BREF or BAT standards for stack configuration. As there is no specific BAT, in line with Article 14 (6) of the IED Directive we have consulted with the Operator and undertaken an assessment of single and aggregated stacks to determine BAT based on cost and benefit to the environment, giving consideration to the criteria listed in Annex III of the Directive. Aggregation of stacks has been chosen as a comparison as this configuration has been shown to increase

dispersion of emissions, reducing ground level concentrations and therefore must be considered in order to determine BAT.

The Operator carried out a cost benefit analysis to assess whether single or aggregated engine stacks would represent BAT for the installation, taking into account the predicted ground level concentration of NO<sub>x</sub>, additional NO<sub>x</sub> source emissions and capital costs associated with each option. The Operator's report was based on the best available data and consultation with engine manufactures and stated that additional back pressure on the gas engines as a result of aggregating the stacks would result in a reduction in energy efficiency of the plant of 3%. This reduction in plant efficiency would result in an increase in fuel use and associated NO<sub>x</sub> emissions in order to meet the National Grid STOR and Fast Response market requirements. It would also result in additional cost to the company in regards to additional infrastructure and carbon cost (a price applied to carbon pollution).

To determine whether an aggregated or single stack configuration would be BAT, taking into account emissions dispersion, plant energy efficiency, fuel use and NO<sub>x</sub> emissions, the Operator calculated and compared the environmental damage cost and additional capital cost of installing and using an aggregated stacks against the environment damage cost of using single stacks. The DEFRA 2015 environmental damage cost data for general industry is based on annual mass emissions of NO<sub>x</sub> from the site. For aggregated stacks (4 aggregated flues and a single stack), the environmental damage cost was extrapolated from the resulting percentage reduction in predicted ground level NO<sub>x</sub> concentrations at the worst case receptor which was based on the Applicant's detailed air quality modelling.

The cost benefit analysis results showed that aggregating stacks would result in a combined environmental damage cost for additional NO<sub>x</sub> emissions and capital cost of £1151,182 in the first year and £1,007,182 annually thereafter. The first year cost is based on a £44,000 Environmental damage cost from increased NO<sub>x</sub> source emissions, £7,157 due to increased carbon cost, £955,800 due to increased annual fuel cost and £144,000 resulting from construction, design and pipework costs. In comparison with this, the cost benefit analysis showed that using single stacks compared with aggregated stacks would result in an annual environmental damage cost of £589,666 based on predicted ground level NO<sub>x</sub> concentrations. Therefore, the annual environmental damage cost and capital cost of the aggregated stack configuration for the first year would be approximately 95% higher than the annual environment damage cost of the single stack configuration and 70.8% higher annually.

We have reviewed the above costs and considered them with the projected emissions reductions which are based on our checks on the detailed air quality modelling undertaken by the Operator. There is shown to be a potential reduction in emission concentrations as a result of stack aggregation. At the worst case receptor (i.e. the receptor where the highest

predicted impact has been modelled) this would reduce the predicted short term process contribution for NO<sub>x</sub> from 14.65% of the Air Quality Standard (AQS) down to 9% of the AQS based on conservative estimates (i.e. assuming the plant operates at permitted emissions limits). However emissions from the plant when operating under the single stack configuration were only marginally above 10% of the short term AQS (below which we would consider an emissions to be insignificant) and already screen out as not significant at the next stage of assessment as the PEC is less than 70% of the AQS.

Despite the modelled process contributions for NO<sub>x</sub> being slightly reduced as a result of stack aggregation, the detailed air quality modelling for both stack configurations showed that the emissions to air from the facility will not have a significant impact at any of the assessed sensitive receptors. Therefore the justification for the significantly higher combined environmental damage cost for additional NO<sub>x</sub>, fuel cost and capital cost as a result of aggregating stack is not justified as there is no significant environmental improvement gained from the significantly higher projected cost of 70.8%.

In conclusion we have reviewed the information above and we are satisfied that the site stack configuration is BAT for the proposed installation, given that:

- The cost benefit analysis shows the environmental damage and capital cost of aggregating stacks outweighed the environmental damage cost of single stacks;
- The air emissions modelling submitted with the application shows that the long term and short term air impact from the site with single stacks is not significant;
- As the detailed modelling showed air emissions were not significant, the cost associated with aggregate stacks would not achieve any prevention of significant impact it would only slightly reduce levels which are already considered not significant or insignificant;
- Aggregating stacks increases dispersion reducing ground level NO<sub>x</sub>, however it also counterproductively leads to increase NO<sub>x</sub> emission at source;
- The Operator has used the best available information on engine back pressure and its impact on energy efficiency and consulted with engine and exhaust manufacturers regarding the proposals; and
- The calculation to translate environmental damage cost to ground level NO<sub>x</sub> is a conservative calculation as it directly converts percentage reductions in concentration at ground level to reduction in source NO<sub>x</sub> it does not account for other dispersion factors.

We are satisfied that the single stack configuration is appropriate for this site. To ensure the figure in the Operator's application and cost benefit analysis reflect operational parameters we have included an improvement condition in the permit which requires the Operator to demonstrate their operational

figures are representative of the figures in their application. Please refer to Annex 1 of this document for further information.

## **Emissions and operating techniques assessment**

### Emissions of noise

The primary source of noise at this installation will be the gas engines.

The Operator has reviewed the onsite noise generating sources and their potential for impact in line with our H3 Noise guidance Part 2 – Noise Assessment and Control. We have assessed their proposals and agree with their conclusions.

They demonstrated that

- noise levels at the nearest residences will be below the BS8233 and WHO criteria for sleep disturbance should it be required to operate at night; and
- Noise levels at commercial and industrial receptors are within the recommended good noise criteria within BS8233.

### Noise Mitigation

To ensure there is an insignificant risk of noise at the site, the Operator has also outlined a number of measures they will implement to manage noise emissions:

- They have assessed the noise emissions from the different technologies in their cost benefit analysis to select those with the best noise ratings;
- The engines will be housed in containerised units which are acoustically treated to reduce external noise emissions to an acceptable level;
- Unit flues are fitted with silencers; and
- All units will be subject to planned preventative maintenance, which will minimise the risk of noise from vibration and plant failure.

Based on the results of the noise assessment and the proposed mitigation measures, we are satisfied that the Operator has implemented BAT to manage the risk of noise emissions from the facility. We have inserted an improvement condition (IC2) into the permit to ensure the Operator undertakes monitoring of noise post-commissioning to demonstrate the standards outlined in their noise assessment are comparable.

### Secondary containment

The Operator has outlined in their application that lubricating oil will be stored in two integrally bunded steel oil tanks which have a capacity of 5000L each. The bund will have a capacity of 110% of the volume of the liquid being stored. The tanks will be situated on a concrete plinth with Armco barriers and designed to meet the requirements of the Oil Storage. The Operator has confirmed that weekly checks are in place for tank integrity. We have assessed the Operator's proposals and consider them to represent BAT.



### Flood zone

The Operator has outlined measures to prevent significant failure of infrastructure or pollution due to flood. These include:

- Filling points for oil storage systems, telecoms and the battery and back-up interface will be raised to 2 metres above ground level to provide protection from potential floodwaters;
- Engine containers and the control room door will be bunded;
- Cooling oil and engines are contained within sealed systems; and
- UK Power Reserve also subscribe to the Environment Agency's Flood watch warning system.

We have assessed the Operator's proposals and we are satisfied they represent the best available techniques.

### **Assessment of Impact on Air Quality**

The Applicant's assessment of the impact on air quality is set out in the Application. The assessment comprises:

- Dispersion modelling of emissions to air from the operation of the spark ignition engines; and
- A study of the impact of emissions on nearby habitat/conservation sites.

Hourly sequential meteorological data from Humberside Airport over the years 2010-2014 was used in the model. This meteorological station is located approximately 10.5km west-south-west of the proposed development site and is considered the most representative meteorological station for the assessment.

The impact of the terrain surrounding the site and buildings upon plume dispersion was considered in the dispersion modelling. 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 modelling has considered the plant operating continuously for a total of 1500 hours per calendar year.

### **Human Receptors**

The Applicant's modelling predictions are presented in Table 1 below. The figures shown indicate the predicted peak ground level exposure to pollutants in ambient air. We have made our own verification of the percentage process contribution/deposition and predicted environmental concentration submitted by the Applicant. These may be very slightly different to those shown in the Application. Any such minor discrepancies do not materially impact on our conclusions

## Kings Road site Singular Impact

**Table 1 Maximum modelled nitrogen dioxide concentrations at the most sensitive human receptors.**

Pollutant	ES	Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m <sup>3</sup>		µg/m <sup>3</sup>	µg/m <sup>3</sup>	% of EAL	µg/m <sup>3</sup>
NO <sub>2</sub> (annual) 1 Queens Road	40	19.2	1.08	2.7	20.28	50.7
NO <sub>2</sub> (1 hour) 1 Queens Road	200	38.4	29.31	14.65	67.71	33.85

From the table above, nitrogen dioxide cannot be screened out as insignificant in that the process contribution is >1% of the long term EQS/EAL and >10% of the short term EAQ/EAL.

Although nitrogen dioxide did not screen out as insignificant, we consider that it is unlikely to give rise to significant pollution in that the predicted environmental concentration (PEC) is less than 100% of both the long term and short term EQS/EAL.

We have checked the modelling data and our results are consistent with the Applicant's assessment. The conclusion is that there will be no significant impact on human health caused by the operation of this installation.

**Table 2 Maximum modelled carbon monoxide concentrations at the most sensitive human receptors.**

Pollutant	EQS / EAL	Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	mg/m <sup>3</sup>		mg/m <sup>3</sup>	mg/m <sup>3</sup>	% of EAL	mg/m <sup>3</sup>
CO (8 hourly mean) 1 Queens Road	10	0.234	0.30	3	0.54	5.4

From the table above, carbon monoxide can be screened out as insignificant in that the process contribution is <10% of the short term EAQ/EAL.

We have checked the modelling data and our results are consistent with the Applicant's assessment. The conclusion is that there will be no significant impact on human health caused by the operation of this installation.

### Cumulative Impact with the Queens Road site at the most sensitive human receptors

As the Kings Road and Queens Road sites are within close vicinity of one another the Applicant has assessed their cumulative impact.

**Table 3 Maximum modelled nitrogen dioxide concentrations at the most sensitive human receptors.**

Pollutant	EQS / EAL	Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m3		µg/m3	µg/m3	% of EAL	µg/m3
NO2 (annual) <b>1Queens Road</b>	40	19.2	1.40	3.50	20.60	51.50
NO2 (1 hour) <b>33 Queens Road</b>	200	38.4	39.06	19.53	77.46	38.73

From the table above, nitrogen dioxide cannot be screened out as insignificant in that the process contribution is >1% of the long term EQS/EAL and >10% of the short term EAQ/EAL.

Although nitrogen dioxide did not screen out as insignificant, we consider that it is unlikely to give rise to significant pollution in that the predicted environmental concentration (PEC) is less than 100% of both the long term and short term EQS/EAL.

We have checked the modelling data and our results are consistent with the Applicant's assessment. The conclusion is that there will be no significant Cumulative impact on human health caused by the operation of this installation.

We have checked the Applicant's Cumulative Carbon Monoxide modelling data and our results are consistent with the Applicant's assessment. Carbon monoxide emissions from Kings Road (see table 2) are similar to that of Queens Road and therefore both can cumulatively be screened out as insignificant in that the process contribution is <10% of the short term EAQ/EAL. The conclusion is that there will be no significant impact to human health caused by the operation of this installation.

### **Ecological receptors**

#### 1. Toxic contamination – nitrogen dioxide

The modelling information provided by the Applicant has predicted that the process contribution slightly exceeded 1% of the relevant long-term critical level but did not exceed 10% of the relevant short-term critical level for nitrogen dioxide at the *Humber Estuary* (see Table 4 below).

We have made our own verification of the percentage process contribution/deposition and predicted environmental concentration submitted by the Applicant. These may be very slightly different to those shown in the Application. Any such minor discrepancies do not materially impact on our conclusions.

Kings Road Long Term Singular Impact

**Table 4 – Maximum modelled NO2 concentrations at the most sensitive conservation sites**

Pollutant	Critical Level (CLe)	Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)	
	µg/m3		µg/m3	µg/m3	% of CLe	µg/m3
<b>Humber Estuary SAC/SPA/Ramsar/SSSI</b>						
NO2 (annual)	30	19.2	0.13	0.43	19.33	64.4

From the table above, long term nitrogen dioxide emissions from the Kings Road site can be screened out as insignificant in that the process contribution is <1% of the long term EQS/EAL.

We have checked the modelling data and our results are consistent with the Applicant’s assessment. The conclusion is that there will be no significant long term impact to Humber Estuary SAC/SPA/Ramsar/SSSI caused by the operation of the Kings Road installation.

## Cumulative Both Queens Road and Kings Road Sites

The Applicant undertook modelling for the short term and long term emissions based on the cumulative impact of the Kings Road and Queens Road sites as they are in close proximity and cumulatively the short term emissions results would represent the worst case scenario.

### Nitrogen Oxide

**Table 5 – Maximum modelled NOx concentrations at conservation sites**

Pollutant	Critical Level (CLe)	Back-ground	Process Contribution (PC)		Predicted Environmental Concentration (PEC)[1]	
	µg/m3		µg/m3	µg/m3	% of CLe	µg/m3
<b>Humber Estuary SAC/SPA/Ramsar/SSSI</b>						
NOx (annual)	30	39.37	0.59	1.96	39.96	133.2%
NOx (daily)	75	39.37	3.42	4.56	43.93	58%
<b>Homestead Park LWS</b>						
NOx (annual)	30	39.37	0.08	0.25	-	-
NOx (daily)	75	39.37	0.45	0.6	-	-
<b>Laporte Road LWS</b>						
NOx (annual)	30	39.37	0.34	1.15	-	-
NOx (daily)	75	39.37	1.98	2.64	-	-
<b>Dock Reedbeds LWS</b>						
NOx (annual)	30	39.37	1.19	3.96	-	-
NOx (daily)	75	39.37	6.86	9.15	-	-
<b>North Moss Land Meadow LWS</b>						
NOx (annual)	30	39.37	0.04	0.12	-	-
NOx (daily)	75	39.37	0.21	0.28	-	-
<b>Note [1]:</b> Where the PC is less than 1% of the benchmark for a long term measurement or less than 10% for a short term measurement, the impact is considered to be insignificant. In these cases, examination of the PEC is not required.						

### **Humber estuary**

From the table above, nitrogen oxide cannot be screened out as insignificant in that the process contribution is >1% of the long term EQS/EAL. We have checked the modelling data and our results are consistent with the Applicant's assessment.

## Local Wildlife Sites

From the table above, nitrogen oxide cannot be screened out as insignificant as PC is > 1% of EQS/EAL. However, we consider that there will be no significant pollution at the sites as PC is < 100% of the long term and short term EQS/EAL.

We have checked the modelling data and our results are consistent with the Applicant's assessment. The conclusion is that there will be no significant impact to Local wildlife sites caused by the operation of this installation

## Nutrient nitrogen enrichment

The background concentrations for nutrient nitrogen at the *Humber Estuary* were obtained from the APIS website. Table 6 below shows the predicted nutrient nitrogen deposition rates at the *Humber Estuary*.

**Table 6 – Maximum modelled nutrient nitrogen deposition at the *Humber Estuary* site based on the lowest value for sensitive features**

Habitat Site	Critical Load (CLo) kgN/ha/yr	Background N deposition kgN/ha/yr	PC N deposition kgN/ha/yr	PC as % of minimum threshold level	PEC deposition kgN/ha/yr	PEC as % of minimum threshold level	Significant
Humber Estuary SAC	Coastal stable dune grasslands - acid type 8 – 10 kgN/ha/yr	26.6	0.08	1	-	-	No
Humber Estuary SPA/Ramsar	Supralittoral sediment (acidic type) 8 – 10 kgN/ha/yr	26.04	0.08	1			No
Humber estuary SSSI	Coastal stable dune grasslands - acid type 8 – 10 kgN/ha/yr	26.6	0.08	1	-	-	No

From the table above, nitrogen deposition can be screened out as insignificant in that the process contribution is 1% of the critical load at the *Humber Estuary*. The Environment Agency conducted check modelling of the air quality assessment and the results were consistent with those of the Applicant. The Environment Agency can conclude no likely significant effect

from nutrient nitrogen deposition at the *Humber Estuary SAC/SPA/Ramsar* as process contribution is 1% of the critical load.

Acid deposition

The acid deposition rates were obtained from APIS website to obtain species-based critical loads for the *Humber Estuary* site. The results are presented in Table 7.

**Table 7 – Maximum modelled acid deposition rates at the *Humber Estuary* site**

Habitat Site	Critical Load (CLo) keq/ha/yr	Background deposition keq/ha/yr	PC deposition keq/ha/yr	PC as % of threshold level	Significant
Humber Estuary SAC	Coastal stable dune grasslands - acid type 0.643 keq/ha/yr	2.74	0.01	1.5	yes
Humber Estuary SPA/Ramsar	littoral sediment (acidic type) 0.643 keq/ha/yr	2.7	0.01	1.5	yes
Humber Estuary SSSI	Supralittoral sediment (acidic type) 0.643 keq/ha/yr	2.74	0.01	1.5	yes

From the table above, acid deposition cannot be screened out as insignificant in that the process contribution is >1% of the critical load. We have checked the modelling data and our results are consistent with the Applicant's assessment.

## **Assessment of impact on ecological receptors**

### **Humber Estuary**

Table 5 and Table 7 show that there is the potential for NO<sub>x</sub> and acid deposition to impact on the Humber Estuary. We have therefore reviewed the magnitude and location of the projected impact against the distribution and sensitivity of protected features, taking into account the conservative nature of the Applicant's air modelling.

Even though the combined process contributions from the Kings Road and Queens Road sites could potentially exceed the critical level thresholds, we are satisfied that emissions are unlikely to have a negative impact on the protected sites. We have considered the following points in our assessment:

- The process contributions exceeds the Critical Level thresholds by less than 1%;
- The process contributions are a small percentage of the existing background;
- The air quality report is based on the worst case scenario and therefore it is highly conservative;
- The isopleths show only a small proportion of the protected site may be affected and the unit areas at most risk contain features (e.g. littoral sediments, sand and mud flats) which are unlikely to be impacted by the emissions from the proposed operations;
- The area of impact is a tidal habitat, therefore the unit area is likely to be inundated twice a day by the tide and some areas are potentially entirely aquatic areas;
- Species highlighted as potentially at risk of impact are seasonal wintering and passage birds and are distributed throughout the entire Humber estuary. They are therefore not always present in the area outlined in the isopleths. This combined with the fact emissions from the installation are intermittent significantly reduces the potential for impact.
- NO<sub>x</sub> emissions at the Humber estuary may have potential positive impact on species due to impacts on the species food supply (source APIS);
- No expected negative impact on species due to impacts on the species' broad habitat (source APIS). In addition to this, the area of impact is only a small proportion of the protected site;
- NO<sub>x</sub> level set based on vegetation – breeding birds use vegetation during part of the season which are set well away from the zone of impact (SSSI citation);
- Estuary habitat in its entirety is not considered sensitive to nitrogen (APIS).
- Permanently aquatic areas of the Estuary and associated species e.g. grey seal are not considered sensitive; and



- Habitats associated with Littoral sediments such as mud banks and sand banks not covered by water at low tide designated under the SAC, SPA are not typically sensitive to acidity (APIS).

We consulted Natural England on this application and they agreed that the Kings Road and Queens Road sites are unlikely to have a negative impact on the Humber Estuary.

### **Assessment of non-statutory sites**

The Applicant's assessment of non-statutory sites (*Homestead Park, Laporte Road, Dock Reedbeds, North Moss Lane Meadow*) was reviewed by the Environment Agency and we agree with their conclusions, that the proposal will not damage the special features of the non-statutory sites. As there are no specific regulations for the protection of these sites (*beyond our requirements to enhance biodiversity under the Natural Environment and Rural Communities Act 2006 and our wider conservation duties under the Environment Act*), we are required to ensure that the permitting of the Installation will not result in significant pollution.

In accordance with Environment Agency guidance, we consider that given the size of the process contribution which is a small fraction of the critical level/load, the impact on the sites is not likely to cause significant pollution. As modelling and assessment has demonstrated that the predicted ground level environmental concentrations of pollutants in the area even at a maximum will not compromise any Air Quality Objectives, then we are satisfied that the operation of the facility will not compromise the integrity of the above local wildlife sites.

The Environment Agency is therefore satisfied that the operation of the facility is unlikely to have a significant effect on any of the sites identified in this assessment either alone or in-combination with other plans and projects.

### **Engine location change**

Following the Environment Agency's assessment of the application and prior to finalising permit documentation, the Operator changed the site plan to move the site's engines. The air emissions points have in turn moved at the furthest 12.35m to the south west from their original location.

To demonstrate that this amendment will not change the emissions from the site to a point where they may result in an impact on nearby sensitive receptors, the Operator has provided justification which demonstrates that:

- The closest human receptors are located 300m, 310m and 450m to the east and north east of the site. The emissions points are moving south west from their original positions, therefore moving further away from the receptors. This also applies to the Humber Estuary protected site which lies north east of the installation.

- Given the flat terrain and that dispersion from the stacks will not be differentially affected by the orientation of buildings to the stacks, it is appropriate to assume that the ground level concentrations would transpose the same distance and direction as the stack movement.
- The modelling contours will move with the engines, up to 12 metres to the south west, further away from sensitive receptors RR1 and RR2. The concentrations as depicted in the original air modelling would decrease marginally at the nearest receptors.
- The Operator has estimated the emissions figures based on the modelling emissions contours moving 12m to the south west and reports that the change in concentrations would not result in any change to the Predicted Environmental Concentrations (Process contribution + background) and therefore all emissions will screen out as not significant (less than 70% of the Air Quality Standard).

We have assessed the Operator's justification and undertaken our own assessment of the proposed changes to the site plan and we are satisfied that the Operator has provided sufficient justification to demonstrate that moving the emissions points will not result in any impact.

#### **Amenity issues as a result of ancillary infrastructure location changes**

The operator has provided a revised Environmental Risk Assessment as a result of the minor changes to the site. They have outlined that majority of the site infrastructure and management techniques will remain the same so there is no change to the risks posed.

There have however been two amendments which the Operator has assessed to demonstrate BAT techniques will remain in place. Amendments include:

- Surface water discharge point has moved from the south western site boundary to the north eastern site boundary for ease of connection into the existing surface water drainage infrastructure. The gradient of the surfacing has been reversed to fall towards the north western site boundary due to this change to ensure that surface water is directed into the drainage channel. This does not present any increased risk to the environment as the entry point remains connected to the same external drainage infrastructure, only at a slightly different location.
- There are now two oil tanks, whereas previously one 5000L tank was proposed. The tanks are 5000L, integrally bunded, situated on hard standing and subjected to regular inspections. The two tanks are designed to meet the requirements of the Oil Storage Regulations.

We have reviewed the Operator's risk assessment in line with the requirements of our guidance and we are satisfied that BAT techniques are in place to manage emissions from the site.

## Changes to thermal input during determination.

The Operator stated that the size (thermal input) of each CHP engine in Megawatts (MWth) provided with the application was incorrect. It was therefore requested that the MWth stated was reduced from 5.35MWth to 4.943MWth. We have reviewed this change as the thermal input is being reduced this will not result in significant change in emissions from the plant therefore we are satisfied the new figure can be used in the application.

### **Annex 1: decision checklist**

This document should be read in conjunction with the application, supporting information and permit/notice.

Aspect considered	Justification / Detail	Criteria met
		Yes
<b>Receipt of submission</b>		
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. The decision was taken in accordance with our guidance on commercial confidentiality.	✓
<b>Consultation</b>		
Scope of consultation	<p>The consultation requirements were identified and implemented. The decision was taken in accordance with RGN 6 High Profile Sites, our Public Participation Statement and our Working Together Agreements.</p> <p>For this application we consulted the following bodies:</p> <ul style="list-style-type: none"> <li>• Local Authority Environmental Protection Department - North East Lincolnshire Council</li> <li>• Health and Safety Executive</li> <li>• National Grid</li> <li>• Public Health England and the relevant Director of Public Health - North East Lincolnshire</li> </ul>	✓
Responses to consultation and web publicising	<p>The web publicising and consultation responses (Annex 2) were taken into account in the decision.</p> <p>The decision was taken in accordance with our guidance.</p>	✓
<b>Operator</b>		
Control of the facility	We are satisfied that the applicant (now the Operator) is the person who will have control over the operation of the facility after the grant of the permit. The decision was taken in accordance with our	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	guidance on what a legal operator is.	
<b>European Directives</b>		
Applicable directives	All applicable European directives have been considered in the determination of the application.	✓
<b>The site</b>		
Extent of the site of the facility	<p>The Operator has provided a plan which we consider is satisfactory, showing the extent of the site of the facility including discharge points.</p> <p>A plan is included in the permit and the Operator is required to carry on the permitted activities within the site boundary.</p>	✓
Site condition report	<p>The Operator has provided a description of the condition of the site.</p> <p>We consider this description is satisfactory. The decision was taken in accordance with our guidance on site condition reports and baseline reporting under IED guidance and templates (H5).</p>	✓
Biodiversity, Heritage, Landscape and Nature Conservation	<p>The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat.</p> <p>A full assessment of the application and its potential to affect the sites has been carried out as part of the permitting process. We consider that the application will not affect the features of the sites (see key issues section of this document).</p>	✓
<b>Environmental Risk Assessment and operating techniques</b>		
Environmental risk	<p>We have reviewed the Operator's assessment of the environmental risk from the facility.</p> <p>The Operator's risk assessment is satisfactory.</p> <p>The assessment shows that, applying the conservative criteria in our guidance on Environmental Risk Assessment [or similar methodology supplied by the Operator and reviewed by ourselves], all emissions may be categorised as environmentally insignificant (see key issues section of this document).</p>	✓
Operating techniques	<p>We have reviewed the techniques used by the Operator and compared these with the relevant guidance notes.</p> <p>(See Key Issues)</p>	✓
<b>The permit conditions</b>		
Use of conditions other than those from the template	Based on the information in the application, we consider that we do not need to impose conditions other than those in our permit template, which was developed in consultation with industry having regard to the relevant legislation.	✓
Improvement conditions	Based on the information on the application, we consider that we need to impose improvement conditions.	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	<p>IC1 has been inserted to ensure the Operator confirms the Installation's commissioning date to the Environment Agency to allow us to track the operation of the site and determine timescales for other improvement conditions.</p> <p>IC2 has been inserted to ensure the Operator reports the outcome of the commissioning of the Installation to the Environment Agency. This is to ensure the Environment Agency is aware of any change to infrastructure or operating techniques.</p> <p>IC3 has been inserted to ensure the net rated thermal input specified by the Operator in the application is the same in practice.</p> <p>IC4 has been inserted to ensure the Operator undertakes an additional noise survey post commissioning and provides a report to the Environment Agency. The operator will be required to demonstrate whether those measures outlined in the application are sufficient or whether additional noise management and/or mitigation techniques need to be implemented in practice.</p> <p>IC5 has been inserted to ensure the Operator reports the number of hours the site has operated over 3 years and undertakes a cost benefit analysis to determine whether there are periods of operation long enough for secondary abatement measures to become effective and therefore BAT.</p> <p>IC6 has been inserted to ensure the Operator assesses the level of methane emissions from the engines against the engine specifications and appropriate benchmarks and demonstrates that they have effective action plans in place in the event of methane slip using this data.</p> <p>IC7 has been inserted to ensure the Operator assesses the level of carbon dioxide and formaldehyde emissions from the engines against the appropriate benchmarks and reviews the findings in line our H1 guidance or equivalent methodology.</p> <p>IC8 has been inserted to ensure the Operator reports the parameters used in their application and supporting documents in order to demonstrate that the operational figures are representative during operation of the site.</p> <p>IC9 has been inserted to allow the Operator to provide a definition of start up and shut down periods once the plant is commissioned to the Environment Agency for agreement and approval.</p>	
Incorporating the application	<p>We have specified that the Applicant must operate the permit in accordance with descriptions in the application, including all additional information received as part of the determination process.</p> <p>These descriptions are specified in the Operating Techniques table in</p>	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	the permit.	
Emission limits	<p>We have decided that emission limits should be set for the parameters listed in the permit.</p> <p>The following substances have been identified as being emitted in significant quantities and ELVs and equivalent parameters or technical measures have been set for those substances</p> <ul style="list-style-type: none"> <li>Oxides of Nitrogen (NO<sub>x</sub> and NO<sub>2</sub> expressed as NO<sub>2</sub>). These limits have been imposed in line with the requirements of the Medium Combustion Plant Directive MCPD for this type of plant.</li> </ul> <p>It is considered that the ELVs/ equivalent parameters or technical measures described above will ensure that significant pollution of the environment is prevented and a high level of protection for the environment secured.</p>	✓
Monitoring	<p>We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified.</p> <p>These monitoring requirements have been imposed in order to meet the requirement of the Medium Combustion Plant Directive MCPD to monitor emissions from Medium Combustion Plant with a rated thermal input greater than 20MW on an annual basis.</p> <p>Based on the information in the application we are satisfied that the Operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.</p> <p>We have specified process monitoring based on the practicality of taking readings via the Operator's proposed systems. The Operator has confirmed the type of process monitoring they can undertake and we are satisfied that the parameters in the permit will allow demonstration that the engines are being operated to an appropriate standard in line with the manufacturer's specifications and are achieving the expected temperatures and pressures.</p>	✓
Reporting	<p>We have specified reporting in the permit.</p> <p>Reporting frequencies are based on annual requirement for monitoring and that the site operates at 1500 hours per year. The result will allow us to compare air emissions and operating hours projected in the air quality modelling reflect those achieved in practice and are in line with Medium Combustion Plant Directive.</p>	✓
<b>Operator Competence</b>		
Environment management system	<p>There is no known reason to consider that the Operator will not have the management systems to enable it to comply with the permit conditions. The decision was taken in accordance with RGN 5 on Operator Competence.</p>	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
Relevant convictions	<p>The National Enforcement Database has been checked to ensure that all relevant convictions have been declared.</p> <p>No relevant convictions were found. The Operator satisfies the criteria in RGN 5 on Operator Competence.</p>	✓
Financial provision	<p>There is no known reason to consider that the Operator will not be financially able to comply with the permit conditions. The decision was taken in accordance with RGN 5 on Operator Competence.</p>	✓

## Annex 2: Consultation and web publicising

Summary of responses to consultation and web publication and the way in which we have taken these into account in the determination process.

<b>Response received from</b>
Centre for Radiation, Chemical and Environmental Hazards (CRCE) at Public Health England on 18 <sup>th</sup> December 2015.
<b>Brief summary of issues raised</b>
The main emissions of concern are the impact of private water supplies/the aquifer by flooding and natural gas emissions of NO <sub>x</sub> and CO. However, emissions are modelled as being non-significant to public health and flood mitigation has been included to protect the aquifer from spillage.  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.  This consultation response is based on the assumption that the permit holder shall take all appropriate measures to prevent or control pollution, in accordance with the relevant sector guidance and industry best practice.
<b>Summary of actions taken or show how this has been covered</b>
We have taken into consideration the points outlined above as part of our determination of this application and we are satisfied that no action is required.

The Local Authority Environmental Protection Department, Health and Safety Executive and National Grid were consulted however, consultation responses from these parties were not received - (receipt of comments to be received by 15<sup>th</sup> January 2016.)

This proposal was also publicised on our website between 17/12/2015 and 17/01/2015 and No relevant comments / representations were received

### Re-consultation

As a result of UK Power Reserve Limited adopting the application originally made by UK Power Reserve (Kings Road) Limited we have re-consulted on the application.

<b>Response received from</b>
Centre for Radiation, Chemical and Environmental Hazards (CRCE) Public Health England
<b>Brief summary of issues raised</b>
No further comments to make on this application.
<b>Summary of actions taken or show how this has been covered</b>
We have taken into consideration the points outlined above as part of our determination of this application and we are satisfied that no action is required.

The Local Authority Environmental Protection Department, Health and Safety Executive, and National Grid were consulted however, consultation responses from these parties were not received - (receipt of comments to be received by 03/02/2017).

This proposal was also publicised on our website between 06/01/2017 and 03/02/2017 and No relevant comments / representations were received