APPENDIX 3 - TECHNICAL NOTE ON AIR QUALITY IMPACTS

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Technical Note: Air Quality Impacts

1. Introduction

1.1 The following information is presented in relation to Eggborough Power Limited's Environmental Permit variation application for the proposed Eggborough CCGT Project, with the purpose of bringing together the air quality impact assessment on European designated habitat sites with and without the use of Selective Catalytic Reduction (SCR) for the control of oxides of nitrogen (NO_x) from the Proposed Development; please refer to the air quality impact assessment within the permit variation application for further information.

1.2 A number of data sources and assumptions have been considered, as summarised below and discussed further within this document:

- The Large Combustion Plant BRef Note BAT Conclusions have been published (summer 2017), including BAT achievable emission levels (BAT-AELs) for NO_x (as previously considered) and ammonia slip associated with the use of SCR (3mg/Nm^3, previously assumed at 5mg/Nm^3). Long-term process contributions have also been factored to take account of expected annual mean plant Load Factor, assumed to be 8,000 hours/year (91%) for the CCGT plant, and 1,500 hours/year for the peaking plant;
- A review of sensitive habitat locations within a European designated site (Humber Estuary SAC) identified that the *Fixed coastal dunes* habitat is not present within the likely impact area of the proposed development, alternative habitat types within the area have therefore been assessed (*Estuaries; Atlantic salt meadows; and Mudflats and sandflats not covered by seawater at low tide*); and
- Presentation of several European designated sites that have been screened out of the HRA signposting, as the impacts have been assessed as insignificant on the basis of other sites within the screening distance, but that have been shown here for completeness: Hatfield Moor SAC; Strensall Common SAC; and North York Moors SAC.

1.3 The air quality assessment considers:

a. the maximum impacts from the proposed CCGT plant at the emission limit value (ELV) for NO_x published in the Industrial Emissions Directive (IED), which the Proposed Development would be expected to achieve without the use of secondary abatement techniques (50mg/Nm^3); and

b. the maximum impacts from the proposed CCGT plant at the BAT achievable emission level (BAT-AEL) for NO_x for CCGTs published in 2017 in the conclusions of the revised

Large Combustion Plant BRef Note (30mg/Nm^3, corrected to 33mg/Nm^3 assuming a correction factor for higher efficiency CCGT units (at 61% efficiency), as indicated in the published BAT Conclusions). In order to achieve the BAT-AEL the Proposed Development would potentially require the use of secondary abatement, such as SCR, therefore the combined impacts from the BAT-AEL for NO_x and ammonia emission (ammonia slip) associated with the use of SCR (assumed to be the lower BAT-AEL for NH_3 of 3mg/Nm^3)[1] have been considered. The proposed correction factors for higher efficiency CCGT units presented in the BAT Conclusions have been taken into account although it is recognised that, if these are not implemented, the BAT-AELs may revert to the 30mg/Nm^3 level, which would result in a reduction in predicted concentrations of NO_x of the order of 10%, or 0.02% reduction in the worst-case predicted impact at the most sensitive receptor for nitrogen deposition (E8).

1.4 The impact assessment, as described in the application, concluded that emissions to air from the Proposed Development at the IED limits would result in insignificant or imperceptible impacts at all identified ecological receptors. However, the emissions to air from the Proposed Development at the BAT-AELs for NO_x, requiring the application of SCR and therefore with associated ammonia slip emission (assessed at 5mg/Nm^3), would result in process contributions that were not below the EA threshold for insignificance (1% of the assessment level) at several European designated sites beyond 15km from the source.

1.5 Following the review of submitted data, as described above, the below information is submitted in order to confirm that an Appropriate Assessment, as defined by the Habitats Regulations, is not required on the basis that the Proposed Development will not have a significant adverse effect, either alone or in combination with other projects, on a European site.

1.6 The effects of reduced pollutant loading on the identified European sites from closure of the existing Eggborough coal-fired power station have been considered in this memo, as the coal-fired power station will not be able to operate when the CCGT is in operation (since they utilise the same grid and water connections). A requirement has been included in the draft DCO precluding simultaneous operation of the two power stations (requirement 4(2)). It is recognised that the existing baseline data at the European Habitat sites includes contributions of NO_x and SO_2 from the existing coal-fired power station. Therefore the impacts from the Proposed Development will be off-set by the reduction in pollutant loading from the closure of this plant. The indicative emissions from the two plants are provided in Table 7 at the end of this document for reference. Table 7 shows that the existing Eggborough coal-fired power station, operating at full load, emits more than 4.5 times the mass of NO_x that the Proposed Development would emit at full load.

1.7 Indicative dispersion modelling suggests that the existing coal-fired power station impacts at the most sensitive receptor for nitrogen deposition (E8) are of the order of 2.3% of the lower Critical Load for this habitat. The cessation of this process contribution would therefore offset any impacts associated with the proposed gas-fired power station.

1.8 The modelling results as presented are considered to be conservative, since for the ammonia slip emissions no degradation or chemical reaction of the emission is predicted prior to deposition at the Habitat sites. Surface roughness and meteorological considerations are applied as normal for an air impact assessment.

[1] EU BAT Conclusions for Large Combustion Plant (2017)

2. European Designated Sites

2.1 The air quality impact assessment describes the potential impacts at identified protected conservation areas. European designated sites have been identified through application of the EA guidance criterion of 15km from the power station source, and nationally designated sites (SSSIs) within 10km of the Proposed Development.

2.2 However the study area has been extended to beyond 15km to include European designated sites that may be at risk from atmospheric nitrogen deposition at the request of the Statutory Consultees (North Yorks CC, Environment Agency). The identified sites, together with the features for which they are designated, are described in Table 1 below.

Table 1: Statutory designated sites with potential for air quality impacts

ID	Receptor name	Receptor type	Habitat for which statutory designation applies (most sensitive within 15km study area)[1]	Grid Reference		Distance (km) and direction from proposed power plant stacks	
				x	y		
E1	Burr Closes	SSSI	Neutral grassland, low and medium altitude hay meadows	459650	433900	10.2	N
E2	Eskamhorn Meadows	SSSI	Neutral grassland, low and medium altitude hay meadows	466300	423766	8.7	E
E3	Went Ings Meadows	SSSI	Neutral grassland, low and medium altitude hay meadows	464800	418300	9.1	SE
E4	Forlorn Hope Meadow	SSSI	Neutral grassland, low and medium altitude hay meadows	454450	417190	7.4	SW
E5	Brockadale	SSSI	Meso- and eutrophic *Quercus* woodland	450530	417690	9.4	SW
E6*	Humber Estuary	SAC	Estuaries; Mudflats and sandflats not covered by seawater at low tide; Atlantic salt meadows	473400	426200	16.0	E
E7*	Skipwith Common	SAC	Northern Atlantic wet heaths with *Erica tetralix*; European dry heaths	464900	436600	14.6	NE
E8*	Thorne Moor	SAC	Degraded bogs still capable of natural regeneration	472350	419350	15.4	SE
E9	Selby canal and towpath	SINC	-	457600	428300	4.4	N
E10	Burn disused airfield	SINC	-	460000	427600	4.4	NE
E11	Eggborough disused pit	SINC	-	458100	422800	1.2	S
E12*	River Derwent	SAC	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	467800	428700	11.3	NE
E13*	Strensall Common	SAC	Northern Atlantic wet heaths with *Erica tetralix*; European dry heaths	463600	458500	35.0	N
E14*	North York Moors	SAC	Blanket bog; Northern Atlantic wet heaths with *Erica tetralix*; European dry heaths	457600	488500	65.0	N
E15*	Hatfield Moor	SAC	Degraded bogs still capable of natural regeneration	469900	408300	20.0	SE

Taken from APIS and Defra Magic mapping data; * indicates European designated site

3. Assessment Criteria

3.1 Critical Levels are defined in EA Guidance as "*concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as…ecosystems…may occur according to present knowledge*". Critical Levels relate to the gaseous concentration of a pollutant in the air and may be applied to any of the identified protected conservation areas.

3.2 Critical Loads are defined as "*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*". Critical Loads relate to the quantity of pollutant deposited from air to the ground and Critical Load ranges (reflecting variation in ecosystem response across Europe) are defined for specific sensitive species or habitat types within an identified protected conservation area, typically only for national or European designated sites.

3.3 Critical Loads for acid deposition take into consideration the buffering capacity of soils and include contributions from sulphur (as sulphate) and nitrogen (as nitrate, ammonium and nitric acid). The acidity Critical Load function tool on APIS has been employed in the assessment of acid deposition impacts. Baseline Critical Loads and other pollutant concentrations have been obtained from APIS[2].

3.4 The assessment has been conducted in accordance with Environment Agency significance criteria which state that:

PCs [Process Contributions] are considered insignificant if the long-term process contribution is less than 1% of the relevant EQS [Environmental Quality Standard]. 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 and the threshold provides a substantial safety margin to protect health and the environment.

3.5 A PC which is not screened out as insignificant must then be considered in combination with the existing baseline to determine whether there is a likelihood of the EQS being exceeded.

3.6 The application of Critical Loads to Blanket Bogs and Raised Bogs has been made with reference to the APIS guidance, which states that the lower Critical Load should be applied where Conservation Objectives are not currently met (a site in unfavourable condition). This precautionary approach has also been used in assessment of the other sites, through application of the lower Critical Load in each case.

4. Impacts from NO_x emission at the IED ELV

Critical Levels

4.1 The maximum daily mean NO_x process contribution at any of the identified designated sites is predicted to be less than 10% of the daily mean Critical Level (75µg/m^3); the maximum annual mean NO_x process contribution at any of the designated sites is predicted at less than 1.5% of the annual mean Critical Level (30µg/m^3) and is less than 1% of the Critical Level at all of the European designated sites (E6, E7, E8 and E12-15); the PEC is not predicted to exceed the Critical Level at any of the identified sites, therefore the process contribution to NO_x concentration at the designated sites has been determined to be **insignificant** or

[2] Centre for Ecology and Hydrology and APIS (2016) *Critical Load Function Tool.* [Online]. [Accessed September 2017]. Available from: http://www.apis.ac.uk

imperceptible according to the criteria outlined in the assessment. None of the designated sites has existing baseline NO_x concentrations above or close to the Critical Levels and therefore the NO_x emissions from the Proposed Development at the IED ELV are considered to have **negligible adverse effects** on the designated sites in respect to NO_x Critical Levels. Process contributions to daily mean and annual mean NO_x concentrations at the designated sites are shown in Tables 2 and 3 for reference.

Critical Loads

4.2 The impacts from the process contributions of NO_x to Critical Loads of nutrient nitrogen deposition (N-deposition) and acid deposition to land at the designated sites have also been considered, where such Critical Load data is published (APIS[3]).

4.3 The existing baseline N-deposition rates at all European designated sites, excluding E6 (and excluding E12 for which no data is published), exceed the specific Lower Critical Loads (LCL) identified for the most sensitive species within each habitat where the maximum process contribution would occur.

4.4 The maximum process contribution of N-deposition at each of these sites has been predicted at less than 1% of the LCL identified for each site. Although the existing baseline levels are very high, the process contribution is considered to be **insignificant** and also does not result in an exceedance of an LCL at any site that was not already occurring as a result of other sources.

4.5 Therefore the process contribution from the Proposed Development to N-deposition at the national and European designated sites has been determined to be **insignificant** or *imperceptible.* The NO_x emissions from the Proposed Development at the IED ELV are therefore considered to have **negligible adverse effects** on the designated sites in respect to the N-deposition. N-deposition rates at the designated sites are shown in Table 4 for reference.

4.6 The existing baseline acid deposition rates at five of the European designated sites (E7, E8, E13-15) exceed the specific Critical Load function. For all identified sites, the baseline nitrogen deposition is greater than CLminN and therefore both the nitrogen and any sulphur deposition will contribute to acidity[4], for both baseline effects and with the additional process contribution (nitrogen only, sulphur contributions from the Proposed Development are assumed to be zero).

4.7 The process contribution of acid deposition at each of the identified sites has been predicted at less than 1% of the Critical Load function identified for each site, and therefore the process contribution to acid deposition at the designated sites has been determined to be **insignificant**. Acid deposition rates at the designated sites are shown in Table 5 for reference.

4.8 In summary, the maximum predicted process contributions of NO_x at the IED ELV (with no SCR being used) are predicted to result in an **insignificant** or imperceptible change in atmospheric NO_x concentrations, nutrient nitrogen deposition and acid deposition at national and European designated sites, relative to the defined Critical Levels and habitat-specific Critical Loads. The air quality effects on national and European designated sites from emissions of NO_x at the IED ELV (50mg/Nm^3) from the Proposed Development are therefore

[3] Centre for Ecology and Hydrology and APIS (2016) *Critical Load Function Tool.* [Online]. [Accessed 2 November 2016]. Available from: http://www.apis.ac.uk

[4] Critical Load Function Tool – Guidance, APIS, http://www.apis.ac.uk/clf-guidance [Online]. [Accessed 2 November 2016]

considered to be **not significant** with respect to atmospheric NO_x concentrations, nutrient nitrogen deposition and acid deposition.

5. Impacts from emissions associated with the use of SCR to achieve the BAT-AEL

Critical Levels

5.1 The maximum daily mean NO_x process contribution, associated with emissions of NO_x at the BAT-AEL, at any of the designated sites is predicted are less than 10% of the daily mean Critical Level (75µg/m^3); the maximum annual mean NO_x process contribution at any of the designated sites is predicted at less than 1% of the annual mean Critical Level (30µg/m^3); therefore the process contribution to NO_x concentration at the designated sites has been determined to be **insignificant** or *imperceptible* according to the criteria outlined in the assessment. As before, none of the designated sites has existing baseline NO_x concentrations above or close to the Critical Levels and therefore the NO_x emissions from the Proposed Development at the BAT-AEL are considered to have **negligible adverse effects** on the designated sites with respect to NO_x Critical Levels.

5.2 The process contribution of ammonia, associated with the use of SCR (ammonia slip) is predicted to be 1% or lower (i.e. insignificant) of the habitat-specific Critical Level for ammonia at the European designated sites and therefore has been determined to be **insignificant** or *imperceptible* according to the criteria outlined in the assessment. Although at some sites the existing baseline levels are very high (E7, E8, E13-5), the process contribution to ammonia from the SCR scenario does not represent a significant proportion of the overall deposition rate, nor does the additional process contribution result in an exceedance at a site that was not already occurring as a result of other sources. However the SCR scenario does represent a marginal increase in nitrogen deposition contribution over the IED-ELV scenario and therefore, given the high baseline levels at some of the identified European designated sites, the use of SCR does give rise to a slight worsening of effect at these sites. While this effect is not considered to be significant, it nevertheless is different to the level of impact predicted for the IED ELV scenario presented in Section 4.

Critical Loads

5.3 As stated above, the existing baseline N-deposition rates at all but two of the European designated sites exceed the specific Lower Critical Loads identified for the most sensitive species within each habitat where the maximum process contribution would occur.

5.4 The process contribution of N-deposition, resulting from nitrogen contributions from (lower) NO_x emission (at the BAT-AEL) and ammonia from use of SCR (ammonia slip, at the BAT-AEL), is below the EA insignificance criterion (1% of the LCL) at all but one of the identified designated sites. The European designated site E8 (Thorne Moor SAC) is predicted to receive a maximum process contribution of N-deposition (NO_x plus ammonia) at 1.5% of the LCL or 0.8% of the UCL at the worst-affected location within the site; APIS advises that the Lower Critical Loads should be applied as the overall site condition is currently *unfavourable recovering*.

5.5 Plate 1 shows the isopleth of process contribution (from use of SCR) to nitrogen deposition at the Thorne Moor SAC, and shows a small area of the site (<2%) is predicted to experience maximum PC of 1.5% of the Critical Load, with the majority of the site at 1% or less of the Critical Load, using the worst-case meteorological data year (2011); the average worst-case impact from 5-years' meteorological data represents 1.4% of the Critical Load at this worst-

affected location. The PEC is predicted at 293% of the Critical Load, however this includes contributions from the existing Eggborough coal-fired power station, which will cease operation prior to the Proposed Development operation.

5.6 N-deposition rates at the designated sites are shown in Table 4 and indicate the relative contributions to the N-deposition PC from NO_x and ammonia emissions; it can be seen from this data that the contribution to N-deposition is relatively higher from ammonia than NO_x, which is a result of the difference in deposition flux[5] at ground level for these species; also that the NO_x contribution to N deposition with SCR is only slightly lower than that predicted for the IED ELV scenario.

5.7 The existing baseline levels are very high at some receptors, including E8, and the process contribution to N-deposition from the SCR scenario does not represent a significant proportion of the overall deposition rate, nor does the additional process contribution result in an exceedance at a site that was not already occurring as a result of other sources. However the SCR scenario does represent a marginal increase in N-deposition contribution over the IED-ELV scenario and therefore the use of SCR does give rise to a slight worsening of effect at several of the identified European designated sites. While this effect is not considered to be significant, it nevertheless is different to the level of impact predicted for the IED ELV scenario presented in Section 4.

5.8 As stated above, the existing baseline acid deposition rates at several of the European designated sites (E7, E8, E13-5) exceed the specific Critical Load function identified for the most sensitive species within each habitat where the process contribution would occur.

5.9 The process contribution of acid deposition, resulting from nitrogen and ammonia contributions from the SCR scenario, at the European designated site E8 has been predicted at 1.2% of the maximum Critical Load of nitrogen function identified for the most sensitive species within the habitat site, and therefore is marginally greater than the EA insignificance criterion of 1%; the PC at other sites is less than 1% of the defined Critical Loads for the most sensitive species within each site.

5.10 Acid deposition rates at the designated sites are shown in Table 5 and indicate the relative process contributions to nitrogen-based acid deposition (sulphur assumed to be zero) from NO_x and ammonia and it can be seen that the ammonia contribution is relatively large compared to the NO_x contribution, as before.

5.11 As the existing baseline acid deposition levels at European designated sites are very high, the process contribution to acid deposition from the SCR scenario does not represent a significant proportion of the overall deposition rate, nor does the additional process contribution result in an exceedance at a site that was not already occurring as a result of other sources. However the SCR scenario does represent a marginal increase in acid deposition contribution over the IED-ELV scenario – and marginally exceeds the insignificance threshold at one site.

5.12 The use of SCR to reduce emissions of NO_x to the assumed draft BAT-AEL level (33mg/Nm^3) with associated ammonia slip (assumed at the lower BAT-AEL of 3mg/Nm^3), represents an increased contribution to atmospheric ammonia concentration, nutrient nitrogen deposition and acid deposition at national and European designated sites over the IED ELV scenario. The baseline nutrient nitrogen and acid deposition rates are currently exceeding habitat-specific Critical Loads for the most sensitive habitat type at several of the European designated sites. The predicted additional process contributions are not considered to be significant as they are proportionately very small relative to other sources, and do not result in an exceedance at a site that was not already occurring as a result of other sources, however the SCR scenario represents a marginal increase in both acid deposition and N-

[5] Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air, AQTAG06, Environment Agency, 2014

deposition at all designated sites over the IED-ELV scenario – and marginally exceeds the insignificance threshold at Thorne Moor SAC.

5.13 For both the IED-ELV scenario and the BAT-AEL (SCR) scenario, the overall emission of atmospheric nitrogen from the Proposed Development will be less than half that from the existing coal-fired power station, which it is intended to replace, as shown in Table 7. The indicative modelled impact at Thorne Moor SAC from the existing coal-fired operations, at peak load, is predicted to be 2.3% of the Critical Load for nitrogen deposition, and this is comparable to the APIS source attribution data used in the determination of the baseline levels for nitrogen and acid deposition.

5.14 The operation of the Proposed Development would therefore represent a net reduction in nitrogen deposition loading from levels associated with the operation of the coal-fired power station. This reduction is approximately 1.7% of the Critical Load at Thorne Moor SAC with IED ELVs applied, or 0.7% of the Critical Load with BAT-AELs and SCR applied.

6. Consideration of Finalised BAT Conclusions

6.1 The above summary of the assessment of insignificance, as presented in the air impact assessment (May 2017), is based on the IED-ELV (50mg/Nm^3) as a worst-case, which the Proposed Development would be expected to achieve without the use of secondary abatement techniques.

6.2 The assessment of the SCR scenario has been made assuming that the plant achieves the BAT-AEL of 33mg/Nm^3 (30mg/Nm^3, with assumed correction for an efficiency of 61%) as published in the revised Large Combustion Plant BRef BAT Conclusions document (2017).

6.3 It is understood that the Environment Agency (the EA) are reviewing the applicability of the revised BAT Conclusions to high efficiency (greater than 60.5% efficiency) CCGT units. This figure is being considered as the threshold for which the BRef annual NO_x AEL of 30mg/m^3 may not need to apply. In other words, if efficiency is greater than 60.5%, the EA are considering setting site specific Achievable Emission Levels which are no worse than Annex V of the IED.

6.4 This position will form part of the BAT discussion and justification for the CCGT design, submitted as part of the Environmental Permit application that has now been confirmed as Duly Made by the EA. These levels of predicted impact with and without the use of SCR may help to determine that BAT for the Eggborough CCGT is to operate the plant without the use of SCR and thereby at higher NO_x AEL than specified in the revised BRef BAT Conclusions, but without the ammonia slip that is predicted to contribute to higher nitrogen deposition at the receptors.

7. Summary and Conclusions

7.1 Of the identified European designated sites, only one lies within 15km of the Proposed Development stacks. The impact of the Proposed Development emissions at the IED ELVs is considered to be **not significant** in respect of atmospheric NO_x, nutrient nitrogen deposition and acid deposition at all of the European designated sites.

7.2 The use of SCR, to reduce emissions of NO_x to the draft BAT-AEL level with associated ammonia slip, represents an increased contribution to atmospheric ammonia concentration, nutrient nitrogen deposition and acid deposition at national and European designated sites over the IED ELV scenario. The baseline nutrient nitrogen and acid deposition rates are

currently exceeding habitat-specific Critical Loads for the most sensitive habitat type at several of the European designated sites.

7.3 The predicted additional process contributions are not considered to be significant as there is a net reduction in process contribution from the Eggborough CCGT from that associated with the operation of the existing coal-fired power station. In addition, the contribution is proportionately very small relative to other sources, and does not result in an exceedance at a site that was not already occurring as a result of other sources. However, the SCR scenario represents a marginal increase in both acid deposition and N-deposition at all designated sites over the IED-ELV scenario – and results in a maximum nitrogen deposition PC of 1.5% or less within a small area of one European site, Thorne Moor SAC, with a five-year average nitrogen deposition of 1.4% or below. This compares with the 2.3% process contribution from operation of the coal-fired power station.

7.4 Conservative assumptions have been made within the air impact assessment, in particular with respect to dispersion modelling parameters; emission parameters and selection of the maximum impact location within each receptor. The principal uncertainty associated with the dispersion modelling results arises from the inter-annual variation in meteorological conditions. The assessment described in the application and outlined above is based on the worst-case predicted results from 5-years of meteorological data, and the worst-case plant layout (as defined within the Rochdale Envelope). The results are therefore considered to represent the worst-case assessment. Sensitivity of the results to the assessment assumptions are reported within the application.

7.5 It is recognised that within the Conservation Objectives for designated European sites there is a requirement to prevent deterioration of a site's qualifying features, and to maintain or restore the supporting processes on which qualifying natural habitats rely; and that the purpose of an Appropriate Assessment is to ascertain whether the Proposed Development would or would not have an adverse effect on the integrity of the European Site in view of such Conservation Objectives.

7.6 Given the net reduction in process contribution from the Eggborough power station site, the conservative assumptions used in the assessment, and the insignificant long-term and short-term impacts predicted at all European designated sites, with the exception of a small area of the Thorne Moor SAC only in the event that SCR is determined to be BAT for the site, it is considered that the Proposed Development is unlikely to have significant adverse effects on a European designated site.

8. Tabulated results

Table 2: Maximum daily mean NO_x predicted concentrations at ecological receptors

Receptor ID	2013-15 NOx short-term baseline (µg/m³)	Baseline / Critical Level	Daily mean PC at IED NOx ELV (µg/m³)	Daily mean PC_{IED} / Critical Level	Magnitude of change	Daily mean PEC_{IED} / Critical Level	Effect	Daily mean PC_{SCR} at BAT-AEL NOx / Critical Level (µg/m³)	Daily mean PEC_{SCR} / Critical Level
E1	38.2	51%	2.2	2.9%	Imperceptible	54%	Negligible adverse	2.3%	53%
E2	43.5	58%	3.8	5.1%	Imperceptible	63%	Negligible adverse	4.1%	62%
E3	40.5	54%	1.7	2.3%	Imperceptible	56%	Negligible adverse	1.9%	56%
E4	44.8	60%	2.8	3.8%	Imperceptible	64%	Negligible adverse	3.0%	63%
E5	45.4	61%	2.4	3.2%	Imperceptible	64%	Negligible adverse	2.5%	63%
E6*	37.5	50%	1.8	2.4%	Imperceptible	52%	Negligible adverse	1.9%	52%
E7*	31.0	41%	2.2	3.0%	Imperceptible	44%	Negligible adverse	2.4%	44%
E8*	36.1	48%	2.1	2.7%	Imperceptible	51%	Negligible adverse	2.2%	50%
E9	39.5	53%	3.6	4.8%	Imperceptible	57%	Negligible adverse	3.8%	57%
E10	40.0	53%	5.1	6.8%	Imperceptible	60%	Negligible adverse	5.4%	59%
E11	32.7	44%	5.6	7.5%	Imperceptible	51%	Negligible adverse	7.1%	51%
E12*	27.3	36%	2.3	3.0%	Imperceptible	39%	Negligible adverse	2.4%	39%
E13*	32.8	44%	0.8	1.1%	Imperceptible	45%	Negligible adverse	0.6%	44%
E14*	16.4	22%	0.5	0.7%	Imperceptible	23%	Negligible adverse	0.4%	22%
E15*	45.7	61%	1.3	1.7%	Imperceptible	63%	Negligible adverse	1.0%	62%

* Indicates European designated site

Short-term baseline assumed to be twice the annual average baseline; EA short-term significance criteria: Insignificant / imperceptible<10% of short-term Critical Level;

Table 3: Maximum annual mean NO_x predicted concentrations at ecological receptors

Receptor ID	2013-15 Annual mean NOx baseline (µg/m³)	Baseline / Critical Level	Annual mean PC at IED NOx ELV (µg/m³)	Annual mean PC_{IED}/ Critical Level	Magnitude of change	Annual mean PEC_{IED}/ Critical Level	Effect	Annual mean PC_{SCR} at BAT-AEL NOx (µg/m³)	Annual mean PEC_{SCR} / Critical Level
E1	19.1	64%	0.2	0.7%	Imperceptible	64%	Negligible adverse	0.4%	64%
E2	21.7	72%	0.3	1.1%	Very low	74%	Negligible adverse	0.8%	73%
E3	20.3	68%	0.1	0.3%	Imperceptible	68%	Negligible adverse	0.2%	68%
E4	22.4	75%	0.1	023%	Imperceptible	75%	Negligible adverse	0.1%	75%
E5	22.7	76%	<0.1	0.1%	Imperceptible	76%	Negligible adverse	0.1%	76%
E6*	18.8	63%	0.2	0.7%	Imperceptible	63%	Negligible adverse	0.4%	63%
E7*	15.5	52%	0.1	0.5%	Imperceptible	52%	Negligible adverse	0.3%	52%
E8*	16.4	60%	0.2	0.6%	Imperceptible	55%	Negligible adverse	0.4%	55%
E9	19.8	66%	0.2	0.6%	Imperceptible	66%	Negligible adverse	0.4%	66%
E10	20.0	67%	0.2	0.8%	Imperceptible	68%	Negligible adverse	0.5%	67%
E11	16.3	55%	0.1	0.2%	Imperceptible	55%	Negligible adverse	0.1%	55%
E12*	13.6	45%	0.2	0.8%	Imperceptible	46%	Negligible adverse	0.5%	46%
E13*	16.4	55%	0.1	0.4%	Imperceptible	55%	Negligible adverse	0.2%	55%
E14*	8.2	27%	0.1	0.2%	Imperceptible	28%	Negligible adverse	0.1%	27%
E15*	22.9	76%	0.1	0.2%	Imperceptible	76%	Negligible adverse	0.1%	76%

* Indicates European designated site

Long-term significance criteria: Insignificant / imperceptible<1% of long-term Critical Level;

Table 4: Nutrient nitrogen deposition (as kg N/Ha/Yr) at designated habitat sites

ID	Receptor name (Critical Load Class: most sensitive species)	Critical Load	2013 Baseline	Baseline / LCL	Annual mean PC at IED NO_x ELV	PC_{IED} / LCL	PEC_{IED} / LCL	Annual mean PC at BAT AEL with SCR [NO_x : NH_3][1]	PC_{SCR} / LCL	PEC_{SCR} / LCL
E1	Burr Closes SSSI (Low and medium altitude hay meadows)	20-30	20.0	**100%**	0.04	0.2%	**100%**	0.09 [0.03:0.06]	0.4%	**101%**
E2	Eskamhorn Meadows SSSI (Low and medium altitude hay meadows)	20-30	17.8	89%	0.06	0.3%	89%	0.15 [0.04:0.10]	0.7%	90%
E3	Went Ings Meadows SSSI (Low and medium altitude hay meadows)	20-30	17.6	88%	0.02	0.1%	88%	0.05 [0.01:0.03]	0.2%	88%
E4	Forlorn Hope Meadow SSSI (Low and medium altitude hay meadows)	20-30	19.6	98%	0.01	0.1%	98%	0.03 [0.01:0.02]	0.1%	98%
E5	Brockadale SSSI (Meso- and eutrophic Quercus woodland)	15-20	31.8	**212%**	0.02	0.1%	**212%**	0.03 [0.01:0.02]	0.2%	**212%**
E6*	Humber Estuary SAC (Estuaries-Pioneer low-mid, mid-upper salt marshes)	20-30	18.6	93%	0.03	0.1%	93%	0.08 [0.02:0.06]	0.4%	93%
E7*	Skipwith Common SAC (Northern wet heath: Erica tetralix)	10-20	18.2	**182%**	0.02	0.3%	**182%**	0.06 [0.02:0.04]	0.6%	**183%**
E8*	Thorne Moor SAC (Raised and Blanket Bogs)	5-10	14.6	**292%**	0.03	0.7%	**292%**	0.08 [0.02:0.06]	**1.5%**	**293%**
E9-E12: No published data										
E13*	Strensall Common (Northern wet heath: Erica tetralix)	10-20	18.2	**216%**	0.02	0.2%	**216%**	0.04 [0.01:0.03]	0.4%	**216%**
E14*	North York Moors (Raised and Blanket Bogs)	5-10	21.6	**398%**	0.01	0.2%	**398%**	0.02 [<0.01:0.02]	0.5%	**398%**
E15*	Hatfield Moor (Raised and Blanket Bogs)	5-10	19.9	**350%**	0.01	0.2%	**350%**	0.02 [<0.01:0.02]	0.5%	**350%**

Notes: * Indicates European designated site;
LCL = lower Critical Load; PC = Process Contribution; PEC = Predicted Environmental Concentration (PC + baseline);
[1] [Relative N deposition contributions from NO_x : NH_3]

Table 5: Acid deposition (as keq /Ha/Yr) at designated habitat sites

ID	Receptor name (Critical Load Class: most sensitive species)	$CL_{min}N$-$_{max}N$	$CL_{min}S$	Total Baseline N:S	Baseline/ $CL_{max}N$	Annual mean PC at IED NO_x ELV	PC_{IED}/ $CL_{max}N$	PEC_{IED} / $CL_{max}N$	Annual mean PC at BAT AEL with SCR [NO_x : NH_3][1]	PC_{SCR} / $CL_{max}N$	PEC_{SCR} / $CL_{max}N$
E1	Burr Closes SSSI (Low and medium altitude hay meadows)	0.44-1.25	0.81	1.43:0.39	**146%**	0.003	0.2%	**146%**	0.006 [0.002:0.004]	0.5%	**146%**
E2	Eskamhorn Meadows SSSI (Low and medium altitude hay meadows)	0.44-2.00	1.56	1.27:0.38	83%	0.004	0.2%	83%	0.010 [0.003:0.007]	0.5%	83%
E3	Went Ings Meadows SSSI (Low and medium altitude hay meadows)	0.44-2.80	1.57	1.26:0.41	60%	0.001	<0.1%	60%	0.003 [0.001:0.002]	0.1%	60%
E4	Forlorn Hope Meadow SSSI (Low and medium altitude hay meadows)	0.44-1.26	0.82	1.40:0.47	**149%**	<0.001	<0.1%	**149%**	0.002 [0.001:0.001]	0.2%	**149%**
E5	Brockadale SSSI (Meso- and eutrophic Quercus woodland)	0.14-1.75	1.57	2.27:0.53	**160%**	0.001	<0.1%	**160%**	0.002 [<0.001:0.001]	0.1%	**160%**
E6*	Humber Estuary SAC	No sensitive habitats in study area									
E7*	Skipwith Common SAC (Northern wet heath: Erica tetralix)	0.64-0.82	0.16	1.30:0.40	**207%**	0.002	0.2%	**208%**	0.004 [0.001:0.003]	0.5%	**208%**
E8*	Thorne Moor SAC (Raised and Blanket Bogs)	0.32-0.46	0.14	1.04:0.30	**290%**	0.002	0.4%	**290%**	0.005 [0.001:0.004]	**1.2%**	**291%**
E9-E12: No published data											
E13*	Strensall Common (Northern wet heath: Erica tetralix)	0.71-1.51	0.80	1.54:0.34	**124%**	0.001	<0.1%	**124%**	0.003 [<0.001:0.002]	0.2%	**124%**
E14*	North York Moors (Raised and Blanket Bogs)	0.32-0.54	0.18	1.42:0.36	**330%**	<0.001	0.1%	**330%**	0.002 [<0.001:0.001]	0.3%	**330%**
E15*	Hatfield Moor (Raised and Blanket Bogs)	0.32-0.48	0.15	1.25:0.43	**354%**	<0.001	0.2%	**354%**	0.002 [<0.001:0.001]	0.3%	**354%**

Notes: * Indicates European designated site;

CL = Critical Load; PC = Process Contribution; PEC = Predicted Environmental Concentration (PC + baseline);

[1] [Relative N deposition contributions from NO_x : NH_3]; sulphur contribution from Proposed Development assumed to be zero

Table 6: Maximum predicted ammonia concentration associated with potential SCR use, at ecological receptors

Receptor ID	2013-15 NH_3 baseline ($\mu g/m^3$)	Baseline / Critical Level	Habitat specific Critical Level ($\mu g/m^3$)	Annual mean NH_3 PC_{SCR} ($\mu g/m^3$)	Annual mean PC_{SCR}/ Critical Level	Magnitude of change	Annual mean PEC_{SCR}/ Critical Level	Effect
E1	2.2	78%	3	0.01	<1%	Imperceptible	78%	Negligible
E2	1.8	60%	3	0.02	<1%	Imperceptible	61%	Negligible
E3	1.7	57%	3	0.01	<1%	Imperceptible	57%	Negligible
E4	1.8	61%	3	<0.01	<1%	Imperceptible	61%	Negligible
E5	1.9	**189%**	1	<0.01	<1%	Imperceptible	**189%**	Negligible
E6*	2.3	77%	3	0.01	<1%	Imperceptible	77%	Negligible
E7*	2.0	**201%**	1	0.01	<1%	Imperceptible	**202%**	Negligible
E8*	1.2	**123%**	1	0.01	1%	Imperceptible	**124%**	Negligible
E9	2.31	78%	3	0.01	<1%	Imperceptible	78%	Negligible
E10	2.31	78%	3	0.01	<1%	Imperceptible	78%	Negligible
E11	1.82	61%	3	<0.01	<1%	Imperceptible	61%	Negligible
E12*	2.3	75%	3	0.01	<1%	Imperceptible	75%	Negligible
E13*	2.5	**250%**	1	<0.01	<1%	Imperceptible	**250%**	Negligible
E14*	1.4	**136%**	1	<0.01	<1%	Imperceptible	**136%**	Negligible
E15*	1.6	**161%**	1	<0.01	<1%	Imperceptible	**161%**	Negligible

1. Based on baseline for E1;
2. Based on baseline for E4;
3. Critical load of 1$\mu g/m^3$ for habitats with lichens / bryophytes; 3$\mu g/m^3$ for all higher plants

Table 7: Modelled CCGT plant stack emission parameters

Parameter	Worst-case CCGT power plant (3 units, total emission)	*Existing coal-fired power plant (2 units in operation, based on recent plant regime)*	*Existing coal-fired power plant, running at peak output (4 units)*
Nominal generation capacity (MW)	2,500	*1,000*	*2,000*
Assumed maximum operating hours / year [ii]	8760	*(Maximum 17,500 hours from 01/01/16 – 31/12/23)*	*(Maximum 17,500 hours from 01/01/16 – 31/12/23)*
Concentration of oxides of nitrogen (NO_x) (milligrammes per cubic metre of exhaust gas)	50	*400 [iii]*	*400 [iii]*
Nominal annual emission NO_x (tonnes)	5,500 [ii]	*13,370*	*26,740*
Nominal annual emission SO_2 (tonnes)	*Negligible*	*10,740*	*21,480*
Nominal annual emission as N (tonnes)	1700 (IED scenario)	*4000*	*8000*
SCR Scenario: Nominal annual emission as N (tonnes)	1400 (of which 270 from NH_3)		

i. Tabulated data for the proposed CCGT plant is taken from permit variation air impact assessment
ii. Assuming the maximum possible operation 24hours/day, 365 days/year.
iii. Existing permitted Base-load operation
iv. Reference conditions: 273 K, 15 % O_2, dry
v. Reference conditions: 273 K, 6 % O_2, dry
vi. IED ELV = EU Industrial Emissions Directive, Emission Limit Value

Plate 1: Process Contribution, with SCR, to nitrogen deposition at Thorne Moor SAC, as percentage of Lower Critical Load (5µg/m^3)