Appendix 7.6: Assessment of Ecological Impacts

Scope

7.6.1 The EA guidance on 'Screening for protected conservations areas' [i] requires identification of:

- Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites (protected wetlands) within 10 km of the Proposed Development; and
- Sites of Special Scientific Interest (SSSIs), and Local Nature sites (ancient woodlands (AWs), local wildlife sites (LWSs) and national and local nature reserves (LNRs)) within 2 km of the Proposed Development.

7.6.2 The Screening Report provided by the Environment Agency, dated 30 April 2019, identifies an SSSI, an LNR, two LWSs and 15 AWs.

7.6.3 Warnham SSSI is 0.7 km north-east of the site. It is designated for geological reasons and is therefore not sensitive to air pollution and is not considered further. This assessment therefore focusses on the impacts at the remaining sites identified in the Screening Report which are all local designations.

Critical Levels

7.6.4 Critical levels are maximum atmospheric concentrations of pollutants for the protection of vegetation and ecosystems and are specified within relevant European air quality directives and corresponding UK air quality regulations.

7.6.5 The maximum annual-mean NOx PC has been calculated for comparison with the 30 $\mu g.m^{-3}$ critical level.

7.6.6 The maximum daily-mean NOx PC has been calculated for comparison with the 75 $\mu g.m^{-3}$ critical level.

7.6.7 The maximum annual-mean SO_2 PC has been calculated for comparison with the 20 $\mu g.m^{-3}$ critical level.

7.6.8 The maximum annual-mean NH_3 PC has been calculated for comparison with the 1 $\mu g.m^{-3}$ critical level. This is highly conservative as this critical level only applies to sites where lichens and bryophytes form a key part of the ecosystem integrity.

7.6.9 The maximum daily-mean HF PC has been calculated for comparison with the 5 $\mu g.m^{-3}$ critical level.

7.6.10 The maximum weekly-mean HF PC has been calculated for comparison with the 0.5 $\mu g.m^{-3}$ critical level.

Critical Loads

7.6.11 Critical loads refer to the quantity of pollutant deposited, below which significant harmful effects on sensitive elements of the environment do not occur, according to present knowledge.

Critical Loads – Nutrient Nitrogen Deposition

7.6.12 Percentage contributions to nutrient nitrogen deposition have been derived from the results of the ADMS dispersion modelling. Deposition rates have been calculated using empirical methods recommended by the EA, as follows:

- The
- dry deposition flux ($\mu g.m^{-2}.s^{-1}$) has been calculated by multiplying the ground level NO_2 and NH_3 concentrations ($\mu g.m^{-3}$) by the deposition velocity. For NOx, the EA guidance provides deposition velocities of 0.0015 $m.s^{-1}$ for short habitats and 0.003 $m.s^{-1}$ for tall habitats. For NH_3, the EA guidance provides deposition velocities of 0.02 $m.s^{-1}$ for short habitats and 0.03 $m.s^{-1}$ for tall habitats.
- Units of $\mu g.m^{-2}.s^{-1}$ have been converted to units of $kg.ha^{-1}.year^{-1}$ by multiplying the dry deposition flux by the standard conversion factor of 96 for NO_X and 259.7 for NH_3.

7.6.13 In this case, the highest deposition velocities, applicable to tall habitats has been used throughout.

7.6.14 Predicted contributions to nitrogen deposition have been calculated and compared with the critical load range for the range of habitat types associated with the sites [ii].

Critical Loads – Acidification

7.6.15 The dry deposition flux ($\mu g.m^{-2}.s^{-1}$) has been calculated by multiplying the ground level SO_2 concentrations ($\mu g.m^{-3}$) by the deposition velocity. The EA guidance provides deposition velocities of 0.012 $m.s^{-1}$ for short habitats and 0.024 $m.s^{-1}$ for tall habitats. Units of $\mu g.m^{-2}.s^{-1}$ have been converted to units of $kg.ha^{-1}.year^{-1}$ by multiplying the dry deposition flux by the standard conversion factor of 157.7 for SO_2. Again, the highest deposition velocities, applicable to tall habitats has been used.

7.6.16 The acid deposition rate, in equivalents $keq.ha^{-1}.year^{-1}$, has been calculated by multiplying the dry deposition flux ($kg.ha^{-1}.year^{-1}$) by a conversion factor of 0.071428 for N and 0.0625 for S. This takes into account the degree to which a chemical species is acidifying, calculated as the proportion of N or S within the molecule.

7.6.17 Wet deposition in the near field is not significant compared with dry deposition for N [iii] and therefore for the purposes of this assessment, wet deposition has not been considered.

7.6.18 Predicted contributions to acid deposition have been calculated and compared with the minimum critical load function for the habitat types associated with the site as derived from the UK Air Pollution Information System (APIS) database [iv].

Significance Criteria

7.6.19 The PCs have been compared against the relevant critical level/load, for the relevant habitat type/interest feature.

7.6.20 For local designations, the Environment Agency guidelines [v] states that:

"If your emissions meet both of the following criteria they're insignificant – you don't need to assess them any further:

the short-term PC is less than 100% of the short-term environmental standard

the long-term PC is less than 100% of the long-term environmental standard

You don't need to calculate PEC for local nature sites. If your PC exceeds the screening criteria you need to do detailed modelling."

7.6.21 The maximum predicted annual-mean NO_X, SO_2 NH_3 and HF concentrations across the grid are compared with the critical level in Table 7.6.1.

7.6.22 The maximum predicted nutrient N deposition rate across the grid is compared with the critical load in Table 7.6.2.

7.6.23 The maximum predicted acid deposition rate is compared with the critical load function in Table 7.6.3.

Table 7.6.1 Comparison of PCs with Critical Levels

Pollutant/Averaging Period	Critical Level	PC Maximum Across Modelled Grid ($\mu g.m^{-3}$)	PC Maximum Across Modelled Grid at Percentage of Critical Level (%)
NOx (Annual-mean)	30	0.80	3
NOx (Maximum Daily-mean)	75	6.91	9
SO_2	20	0.20	1
NH_3	1*	0.04**	4
HF (Maximum Daily-mean)	5	0.034	1
HF (Maximum Weekly-mean)	0.5	0.026	5

Notes: * Critical Levels for NH_3 range between 1 and 3 $\mu g.m^{-3}$. In this case, the lowest value has been used.
** The maximum predicted NH_3 PC has been modelled assuming an emission concentration of 10 $\mu g.m^{-3}$ [vi].

Table 7.6.2 Predicted Nutrient N Deposition at Habitat Sites

Habitat	Critical Load Range ($kgN.ha^{-1}.yr^{-1}$)	PC ($kgN.ha^{-1}.yr^{-1}$)	PC as Percentage of Critical Load Range (%)
Various	5 - 20	0.47	2 – 9

Table 7.6.3 Predicted Acid Deposition at Habitat Sites

Habitat	CLF ($keq.ha^{-1}.yr^{-1}$)			PC ($keq.ha^{-1}.yr^{-1}$)		PC/CLF (%)
	ClminN	CLmaxS	ClmaxN	S	N	
Woodland	0.357	2.653	3.01	0.0472	0.0337	3
Acid Grassland	0.223	0.95	1.173	0.0236	0.0206	4

Note: CLF = Critical Load Function

Interpretation of Results

Table 7.6.1 shows that the maximum PCs across the grid are below 100% of relevant critical level for all pollutants and the impacts can be screened out as not having a significant effect.

Table 7.6.2 shows that the maximum predicted nutrient nitrogen deposition rate across the grid is below 100% of the lower and upper bounds of the relevant critical load range and the impacts can be screened out as not having a significant effect.

The maximum acid deposition PC has been compared with the critical load for woodland and acid grassland. Any grassland in the area is likely to be calcareous so use of the critical load for acid grassland is conservative. Table 7.6.3 shows that the maximum acid deposition PC across the grid is below 100% of the critical load for woodland and acid grassland and the impacts can be screened out as not having a significant effect.

References

i https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#screening-for-protected-conservation-areas

ii http://www.apis.ac.uk/indicative-critical-load-values

iii Approaches to modelling local nitrogen deposition and concentrations in the context of Natura 2000 - Topic 4

iv Air Pollution Information Systems, www.apis.ac.uk

v Air emissions risk assessment for your environmental permit

vi Commission implementing decision (EU) 2019/2010 of 12 November 2019 establishing the best available techniques (BAT) conclusions, under Directive 2010/75/EU of the European Parliament and of the Council, for waste incineration