Alton Advanced Energy Recovery Facility

Ecological interpretation of Air Quality Assessment

Technical Appendix 8.5

Prepared for Veolia

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Version 1.0 / Ref. 18-058_A5/1

15/04/2020

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Report Reference	Ref. 18-058_A5/1
Date	15/04/2020
Date of survey/s	03/12/2019

Issue	Prepared by	Checked by	Approved by	Status	Date
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1 Introduction

This document provides an assessment of the likely effects of changes in air quality at sensitive ecological receptors, as a consequence of the operation of the proposed North Hampshire Energy Recovery Facility, (NHERF; the 'Proposed Development'), to be located on the site of Alton Materials Recycling Facility (Alton MRF), Upper Froyle, Hampshire.

The assessment is designed both to provide an ecological interpretation of the Air Quality chapter (8.0) in the Environmental Statement (ES), and to inform the ecological impact assessment set out in the Ecology and Nature Conservation chapter (6.0) of the ES. Although written within the context of guidance designed for the assessment of planning applications, it is also designed to inform an Environmental Permit application for the Proposed Development.

This analysis is based on dispersion and deposition modelling undertaken by Fichtner Consulting Engineers, and reported in the Dispersion Modelling Assessment (Appendix 8.3 to the ES). It focusses on potential ecological effects at sensitive receptors where exceedances of the identified screening thresholds are predicted. Further ecological assessment has been undertaken to:

- Confirm sensitivity of qualifying and notified features;
- Assess potential effects by comparing dispersion and deposition model plots with the spatial distribution of sensitive habitats; and
- Provide an informed ecological opinion on the likelihood of significant effects or significant harm.

The information provided in this report and in Appendix 8.3 with respect to Habitats (Natura 2000) sites is also designed to inform the Habitats Regulations Assessment (HRA) Report (ES Technical Appendix 6.6).

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2 Scope and methodology

2.1 Scope of assessment

Geographic scope of assessment

The geographic scope of assessment is set out in Appendix 8.3, section 3.2 (Ecologically sensitive receptors), and is based on Environment Agency (EA) guidance, together with consultation responses from Hampshire County Council.

The following screening distances were applied in accordance with EA guidance:

- 10km from emission source for Habitat (Natura 2000) sites, including Special Areas of Conservation (SAC) and Special Protection Areas (SPA), and for Ramsar sites;
- 2km from emission source for National Nature Reserves (NNR) and Sites of Special Scientific Interest (SSSIs); and
- 2km from emission source for Local Nature Reserves (LNR), Local Wildlife Sites (LWS) and ancient woodlands.

In addition, in accordance with Hampshire County Council requirements, priority habitats[1] within 2km of the emission source were also considered in the assessment.

Screening thresholds

Screening thresholds used in Appendix 8.3 for statutory designated sites are based on Environment Agency guidance, and can be summarised as follows:

- For Ramsar, Natura 2000 sites and SSSIs, predicted process contributions (PCs) below 1% of the relevant long-term (annual) Critical Level and Critical Load or 10% of the relevant short-term (24-hour) Critical Level are screened out;
- For Ramsar, European sites and SSSIs, PCs above 1%, where the predicted environmental concentration (PEC; PC plus background) is <70% of the Critical Level and Critical Load are screened out.

For Natura 2000 sites the 1% PC has been regarded as a *de minimis* threshold, below which effects can be considered inconsequential. The English and Welsh agencies which make up the Air Quality Technical Advisory Group (AQTAG) clarified that projects below the 1% PC do not have to be considered in an in-combination

[1] Defined as habitats listed in Section 41 of the Natural Environment and Rural Communities Act 2006

assessment[2], although this has been subject to further revision (with respect to cumulative vehicle emissions) through UK and European case law.

For permitting purposes, EA advise that a 100% PC can be used for locally designated sites and ancient woodlands; however, for planning application purposes a 1% threshold has been applied, in accordance with the advice set out below.

IAQM guidance on scope

The Institute of Air Quality Management (IAQM) published guidance on the assessment of air quality impacts on designated sites in June 2019[3]. This confirmed the use of the 1% long-term / 10% short-term thresholds for industrial point source emissions, with some important clarifications:

- '*The 1% screening criterion is not a threshold of harm and exceeding this threshold does not, of itself, imply damage to a habitat*' (IAQM 2019, para. 5.5.1.8);
- The 70% PEC threshold '*was intended to be a trigger for detailed dispersion modelling. It is not intended to be a damage threshold*.' (5.5.3.2);
- The 100% threshold for locally designated sites and ancient woodlands used in permit applications purposes may be inappropriate in a planning context, failing to provide adequate protection.

IAQM guidance does not suggest a threshold for consideration of effects on locally designated sites, and there is as yet no established practice for treatment of locally designated sites in the ecological interpretation of air quality assessments. In order to take the guidance into account, predicted impacts in excess of the 1% long-term threshold have been identified and highlighted in this report, and the sensitivity of component habitats to air quality effects considered in greater detail. However, the interpretation of impact significance reflects the lower degree of policy protection of locally designated sites.

Receptors and impacts considered in assessment

Following dispersion and deposition modelling (Appendix 8.3, tables 28, 35 & 36) the following process contributions (PC) to statutory and locally designated sites were

[2] Environment Agency (2015). *AQTAG position. In-combination guidance and assessment*. Response to PINS, March 2015.

[3] Holman et al (2019). *A guide to the assessment of air quality impacts on designated nature conservation sites* – version 1.0, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/airquality-impacts-on-nature-sites-2019.pdf

modelled at above 1% of the relevant Critical Level or Critical Load. In the instances marked in bold face below, the PEC is close to or exceeds the relevant Critical Level or Critical Load cannot be screened out as inconsequential:

Table 1: Impacts at designated sites in excess of the 1% screening threshold

Site	NOx (annual / daily mean)	NH_3	N dep.	Acid dep.
Natura 2000 and UK designated sites				
Shortheath Common SAC (Bog woodland habitat)	-	-	-	**1.23%**
Bentley Station Meadow SSSI (Woodland habitat)	-	**1.07%**	-	**1.05%**
Non-statutory designated sites (all woodland habitat except where stated)				
Spollycombe Copse	-	**1.38%**	**1.41%**	-
Shrub Croft Copse	-	**1.51%**	**1.54%**	1.00%
Hawkins Wood & Stowell Copse	-	**1.74%**	**1.78%**	-
Forty Acres	-	**1.01%**	**1.03%**	-
Neatham Farm Manor Copse	-	**1.28%**	**1.30%**	-
Fielders & Shrub Croft Copses/ Ham Wood	-	**1.46%**	**1.49%**	-
Round Wood	1.34% / 13.94%	**3.35%**	**3.42%**	-
Quarry Bottom	2.09%	**5.23%**	**5.34%**	-
Froyle Mill Meadow 7	1.36%	1.13%	1.09%	**3.07%**
Forty Acres Wood	-	**1.11%**	**1.14%**	-
Chestnut Copse	1.21%	**3.03%**	**3.10%**	-
Stirvill's Copse	-	**1.20%**	**1.23%**	-

Round Wood and Quarry Bottom also have predicted process contributions which exceed 1% of the lower critical level for sulphur dioxide, but this is not considered in the ecological assessment due to the low background levels of SO_2.

Appendix 8.3 provides a full list of sites considered in the Emissions Modelling, with modelled PCs; all other sites had predicted PCs below the 1% screening threshold.

In addition to the above sites, priority habitats within 2km of the Site were included in the assessment. The following impacts exceeded the screening threshold; values given are maximum for each habitat:

Table 2: Impacts on priority habitats considered in assessment

Habitat	NOx (annual / daily mean)	NH_3	N dep.	Acid dep.
Coastal and floodplain grazing marsh	-	-	2.2%	1.52%
Broadleaved deciduous woodland	-		7.30%	6.93%
Lowland hay meadows[4]	-		1.8%	1.26%
Lowland calcareous grassland			-	-
Purple moor grass and rush pastures	-		1.41%	1.82%

2.2 Methodology

Data search

Information including the Citations, notified natural features and condition of Natura 2000 sites and SSSIs were sourced from Natural England web pages. Digital boundary data for the designated sites obtained from Natural England were overlain on an OS Vector Map backdrop layer using QGIS 3.2 (see Appendix 6.1: PEA). Digital boundary data for locally designated sites were obtained from Hampshire biological records centre; ancient woodland inventory data and Priority Habitat Inventory data were obtained from Natural England's digital boundary datasets.

The Air Pollution Information System (APIS) website's Site Relevant Critical Loads function was used to provide an initial assessment of the sensitivity of statutory designated sites to pollutant impacts. This provides habitat-specific critical loads for

[4] Based on habitats classed as 'good quality semi-improved grassland' in the Priority Habitats Inventory

nitrogen and acid deposition, as well as setting out recommended Critical Levels for long-term (annual mean) ammonia (NH_3) and sulphur dioxide (SO_2).[5]

Identification of appropriate habitats and environmental quality standards

In order to assess whether potentially significant ecological effects are likely to occur, the vulnerability of component habitats is assessed for each of the qualifying features of the designated sites. For many habitats these can be expressed in terms of Critical Loads for nitrogen and acid deposition, and Critical Levels for short and long-term ground-level atmospheric concentrations of other pollutants.

Critical Levels are normally set at a single level for the protection of the most sensitive features of all habitats, although lower levels are used when particularly sensitive features (e.g. important lichen or bryophyte communities) are present. The appropriate level to use was based on published information (e.g. Natural England citations) about the SSSI (e.g. whether lichens or bryophytes were identified as important components of notified features); APIS also identifies whether lichens and bryophytes are present, but this is based on the habitat present and is not necessarily site-specific.

Critical Loads for nitrogen and acid deposition are set as a range with lower and upper limits. The APIS website recommends the appropriate Critical Load for different habitats to be used for environmental assessment purposes; this has been followed in the assessment, unless a different limit is justified in terms of published evidence or advice, or on the basis of the field survey. APIS sets Critical Loads for habitats based on the EUNIS (European Nature Information System) classification (Strachan, 2015[6]); however, Site-relevant Critical Loads for qualifying features of particular designated sites also give Broad Habitats and in some cases relevant NVC (National Vegetation Classification) plant communities. Notified habitat features in SSSIs are normally expressed in terms of NVC communities, while qualifying features of SACs are expressed in terms of Habitats Directive Annex I habitats. This can lead to anomalies in the way APIS treats what is essentially the same habitat in different sites (e.g. alder woodland (W7) NVC community is given a minimum Critical Load of 10kg N/ha/yr for SSSIs, but the equivalent EUNIS / Annex I habitat is considered not to be vulnerable to atmospheric nitrogen deposition). Where necessary, translation between NVC and

[5] http://www.apis.ac.uk/srcl

[6] Strachan, I.M. (2015). *Manual of terrestrial EUNIS habitats in Scotland*. Scottish Natural Heritage Commissioned Report No. 766.

EUNIS to ensure the correct quality standard is applied has been undertaken with reference to Strachan (2015).

Assessment of effect magnitude and significance

There are no currently accepted thresholds for assessing the magnitude of air quality effects on ecological receptors. At the time of preparation of this report, draft CIEEM / IAQM guidance has been published, but has not yet been finalised and cannot yet be referred to; neither this draft document nor the IAQM (2019) guidance provides any guidance on effect magnitude or ecological significance thresholds. In the absence of guidance for ecological receptors, Environmental Protection UK (EPUK, 2010)[7] advice can be applied with caution; although this was developed for assessment of nitrogen dioxide and particulate emissions on human health in a development control context, it provides a useful descriptor to express impact magnitude as a percentage of the relevant assessment level (see Table 2.2 below). This has now been superseded by revised advice, which is now explicitly reserved for application in a human health assessment context.

Table 3: EPUK (2010) guidance on impact magnitude

Magnitude of change	**Annual mean value increase / decrease (as percentage of assessment level)**
Large	>10%
Medium	5 – 10%
Small	1 – 5%
Imperceptible	<1%

With respect to assessing **significance** of ecological effects, it is important to note that the 1% screening threshold is not an effect threshold. The magnitude of impact which might result in a significant ecological effect is likely to depend on baseline conditions and sensitivity of the receiving environment.

CIEEM (2016[8]) define a significant ecological effect as *"an impact on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area"*. The guidelines do not favour a matrix approach to the

[7] Environmental Protection UK (2010). *Development Control: Planning For Air Quality (2010 Update)*. EPUK, April 2010.
[8] CIEEM (2016). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition*. Chartered Institute of Ecology and Environmental Management, Winchester

assessment of significance, because these can downplay impacts on features of local importance, and the ecological meaning of the resulting terms is often poorly defined. Instead, significance is defined at the geographic scale at which it occurs.

With respect to assessing whether it is possible to conclude no adverse effect on site integrity (European site) and to conclude no damage (SSSIs) in a permitting context in England and Wales, Environment Agency (EA) guidance[9] distinguishes between circumstances when:

- the background concentration is less than the appropriate environmental criterion but a small process contribution leads to an exceedance; or
- the background concentration is currently exceeding the appropriate environmental criterion and the new process contribution will cause an additional **small** increase; and
- the background concentration is less than the appropriate environmental criterion, but the process contribution is significant (*i.e. of higher magnitude*) and leads to an exceedance; or
- the background concentration is more than the appropriate environmental criterion, and the process contribution is **large.**

In the first two circumstances, the EA recommend that a decision is based on local circumstances, based on factors set out in guidance (such as spatial disposition of sensitive habitats relative to predicted effects); in the latter two circumstances, the EA state that it is not possible to conclude no adverse effect. The EA go on distinguish between the varying level of legal and policy protection applied to European sites relative to SSSIs. For European sites (SACs, SPAs and Ramsar sites) the key policy test is 'no likely significant effect', which is best understood as 'no possible significant effect according to best available scientific knowledge'. For SSSIs, the EA refer to 'operations likely to damage' a SSSI.

Further sensitivity assessment of Shortheath Common SAC

Further information on the distribution and condition of bog woodland habitat at Shortheath Common SAC was obtained from sources including Natural England's

[9] Environment Agency (2012). *Detailed assessment of the impact of aerial emissions from new or expanding IPPC regulated industry for impacts on nature conservation*. Operational Instruction 67_12, Issued 08/05/12

Supplementary Advice for Conservation Objectives[10] (SACO), the SAC Site Improvement Plan (SIP)[11], and the online condition assessments for component SSSI units[12].

A site visit was undertaken in November 2019, primarily in order to gain a better understanding of the location, extent and context of the bog woodland habitat. All parts of the SAC accessible by public and permissive footpaths were walked, with the less accessible eastern part of the bog woodland viewed from the adjacent road.

[10] Natural England (2019). *European Site Conservation Objectives: Draft Supplementary advice on conserving and restoring site features. Shortheath Common Special Area of Conservation (SAC) UK0030275*. January 2019.

[11] Natural England (2014). *Site Improvement Plan. Shortheath Common.* Version 1. 12/12/2014.

[12] https://designatedsites.naturalengland.org.uk/ReportUnitCondition.aspx?SiteCode=S1003329&ReportTitle=Shortheath%20Common%20SSSI

3 Sensitivity of ecological receptors

3.1 Qualifying and notified features

Qualifying features of European designated sites

The Dispersion Modelling Assessment assessed air quality impacts at six European designated sites; their qualifying features are also listed in the PEA, Appendix 6.1, Table A6.1.1. As noted in the preceding section, all except Shortheath Common SAC could be screened out from further assessment.

Shortheath Common SAC is designated for the occurrence of the following Annex I Habitat:

- **7140** Transition mires and quaking bogs

The following Annex I habitats are also present as qualifying features, but are not a primary reason for site selection:

- **4030** European dry heaths
- **91D0** Bog woodland* (** = European priority habitat*)

For ecological assessment purposes (including Habitats Regulations Assessment) effects on all qualifying features require consideration.

Notified features of SSSIs

Notified features of the two SSSIs with Impact Risk Zones (IRZs) encompassing the Site are listed in Appendix 6.1, Table A6.1.2. One of the sites, Upper Greensand Hangers: Whyte to Wheatley SSSI, can be screened out from further consideration following completion of dispersion and deposition modelling.

Bentley Station Meadow SSSI has the following notified features:

- Invertebrate assemblage
- MG5 - *Cynosurus cristatus - Centaurea nigra* grassland
- W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland

The table below shows the correspondence between qualifying and notified features of statutory designated sites and the EUNIS habitats used to assess appropriate Critical Loads for nitrogen deposition.

Table 4: EUNIS habitats and critical load classes of statutory designated sites

Qualifying / notified features	**EUNIS habitat** (from Strachan (2015))	**Nitrogen deposition Critical Load Class** (from APIS)
Shortheath Common SAC		
7140 Transition mires and quaking bogs	**D2.3:** Transition mires and quaking bogs	**D2:** Valley mires, poor fens and transition mires
4030 European dry heaths	**F4.2:** Dry heaths	**F4.2:** Dry heaths
91D0 Bog woodland	**G1.51:** Birch bog woodland	**D1:** Raised and blanket bogs
Bentley Station Meadow SSSI		
Invertebrate assemblage	n/a	n/a
MG5 - *Cynosurus cristatus - Centaurea nigra* grassland	**E2.11:** Permanent mesotrophic pastures and aftermath-grazed meadows	**E2.2:** Low and medium altitude hay meadows
W10 - *Quercus robur - Pteridium aquilinum - Rubus fruticosus* woodland	**G1.A1:** *Quercus-Fraxinus-Carpinus betulus* woodland on eutrophic and mesotrophic soils	**G1.A:** Meso- and eutrophic *Quercus* woodland

Although there are some minor differences in interpretation of classifications when translating from Annex I habitats or NVC plant communities to EUNIS habitats, none of these are significant in terms of the air quality assessment, as none demand a lower Critical Load than those used in the dispersion modelling. They are therefore not discussed further.

3.2 Features of locally designated sites and Priority Habitats

Locally designated sites

Appendix 6.1, Table A6.1.3 gives a full list of locally designated Sites of Importance for Nature Conservation (SINCs) and their selection criteria. Locations of modelling points are shown in Appendix 6.3, Table 8.4. The following are relevant to the ecological interpretation of air quality impacts; the table lists selection criteria used in Hampshire, and relates habitats to relevant EUNIS categories for assessment of sensitivity to air quality impacts.

Table 5: EUNIS habitats of locally designated sites (SINCs)

Site (AQ modelling point)	Hants. selection criteria	EUNIS habitat
Spollycombe Copse (E7)	**1B:** woodland where there is a significant element of ancient semi-natural woodland surviving	**G1:** Broadleaved woodland
Fielders & Shrub Croft Copses/Ham Wood (E8 & E12))	**1B:** see above	**G1:** Broadleaved woodland
Hawkins Wood & Stowell Copse (E9)	**1B:** see above; **6A:** sites which support one or more notable species – pale St. John's-wort (*Hypericum montanum*)	**G1:** Broadleaved woodland
Neatham Farm Manor Copse (E11)	**1A:** ancient semi-natural woodland	**G1:** Broadleaved woodland
Round Wood (E13)	**1A:** ancient semi-natural woodland	**G1:** Broadleaved woodland
Quarry Bottom (E14)	**1A:** ancient semi-natural woodland	**G1:** Broadleaved woodland
Froyle Mill Meadow (E15)	**2B:** semi-improved grasslands which retain a significant element of unimproved grassland	**E2.2:** Low and medium altitude hay meadows
Forty Acres Wood (E10 / E16)	**1A:** ancient semi-natural woodland; **6A:** see above – green hellebore (*Helleborus viridus ssp. occidentalis*) & shining pondweed (*Potamogeton lucens*)	**G1:** Broadleaved woodland
Chestnut Copse (E17)	**1B:** see above	**G1:** Broadleaved woodland

Site (AQ modelling point)	Hants. selection criteria	EUNIS habitat
Stirvill's Copse (E18)	**1A:** ancient semi-natural woodland; **2D:** grasslands which have become impoverished through inappropriate management but which retain sufficient elements of relic unimproved grassland to enable recovery	**G1:** Broadleaved woodland; **E2.2:** Low and medium altitude hay meadows

Priority Habitats

The following priority habitats, defined as those listed on Section 41 of the Natural Environment and Rural Communities Act 2006, occur within 2km of the emission source, and have been included as sensitive receptors in the dispersion and deposition modelling:

Table 6: Priority Habitats

Priority Habitat	Relevant EUNIS habitat type
Coastal and floodplain grazing marsh	**E2.2:** Low and medium altitude hay meadows
Lowland Mixed deciduous woodland	**G1:** Broadleaved woodland
Wet woodland	**G1.21:** Mixed riparian and gallery floodplain woodland
Purple Moor Grass and Rush Pasture	**E3.41:** Atlantic and sub-Atlantic humid meadows

3.3 Statutory site Condition Assessment

Natural England Condition Assessment

The condition of notified features is assessed for units of SACs and SSSIs by Natural England, and provides an indication of whether existing pressures may be operating which could be potentially exacerbated by air quality impacts.

The following table summarises feature condition in the two statutory designated sites considered in this assessment. The key units to consider in the context of the assessment of air quality effects are unit 1 at Shortheath Common (bog woodland element) and unit 2 at Bentley Station Meadows (broadleaved woodland habitat).

Table 7: Condition of statutory site units

Site	Unit no. / habitat	Feature condition (date last assessed)
Shortheath Common SAC	**001:** Fen, Marsh and Swamp (lowland)	Unfavourable - Recovering (2013)
Shortheath Common SAC	**002:** Rivers and Streams	Unfavourable – No change (2013)
Shortheath Common SAC	**003:** Dwarf Shrub Heath – lowland	Unfavourable – Recovering (2013)
Shortheath Common SAC	**004:** Acid Grassland – lowland	Favourable (2020)
Shortheath Common SAC	**005:** Acid Grassland – lowland	Unfavourable Recovering (2013)
Bentley Station Meadow SSSI	**001:** Neutral Grassland – lowland	Favourable (2010)
Bentley Station Meadow SSSI	**002:** Broadleaved, Mixed and Yew Woodland - lowland	Favourable (2013)

Air quality issues are not explicitly cited as a cause of unfavourable condition in any of the units; however, the quaking bog element of Shortheath Common was stated to be in unfavourable condition because of the extent of purple moor-grass (*Molinia*) cover. Growth of *Molinia* is favoured over more typical bog species by more frequent drying / lowering of the water table; however, it is also favoured by higher nitrogen availability.

Shortheath Common site visit

The site visit confirmed that all of the bog woodland habitat appeared to be confined to SSSI Unit 1, south of the lake, and associated with the valley mire habitat which extended to the south and south-east of the bog woodland.

The bog woodland was dominated by low stature downy birch (*Betula pubescens*) trees (NVC community W4, *Betula pubescens – Molinia caerulea* woodland), extending in a south-westerly direction from the lake edge. Aside from an area adjoining the lake edge, access to the bog woodland was not possible due to the quaking bog, and there was no evidence of regular public access into this area.

Most of the birch trees were 6m or less in height, with a few isolated trees to 10m. Interstitial vegetation was a *Schwingmoor*-type quaking bog, with tall tussocks of

Polytrichum commune interspersed with Sphagna, soft rush (*Juncus effusus*) and common cotton-grass (*Eriophorum angustifolium*) in open areas. There were also patches of dense 2-3m high regenerating birch. Much of the valley mire basin appeared dominated by *Molinia*.

Photograph 1 below shows a close-up of the area of bog woodland to the south of the lake; photograph 2 is taken from a public footpath on higher ground to the east, and shows the relatively low stature of the bog woodland, as well as its setting with the valley mire / quaking bog in the middle foreground.

Photograph 1: Bog woodland just south of main lake

Photograph 2: Bog woodland viewed from east

The water table appeared to be high at the time of survey, with no evidence of drying and presence of quaking bog-type vegetation on the periphery of the woodland.

The relatively low stature (<12m) of the bog woodland can be seen clearly in Photograph 2, relative to the mature peripheral mixed woodland beyond. This has implications for the actual background deposition velocity of nitrogenous and acidifying pollutants, which are standardised on the surface roughness of a mature woodland. Actual background levels, as well as the process contribution, are likely to be intermediate between the grassland values used for calculation of bog deposition rates, and values experienced by the mature woodland found in peripheral areas of the SAC.

The estimated extent of bog woodland habitat is set out in Annex A, Figure 1, based on a combination of the site visit and aerial photograph interpretation. This was confirmed as broadly accurate at a Discretionary Advice Service (DAS) meeting with Natural England staff, but should be regarded as indicative rather than definitive due to the lack of accessibility of the bog woodland margins for mapping purposes.

3.4 Sensitivity to air quality effects

Statutory designated sites

The table below shows site-relevant critical loads and levels for the most sensitive habitats within statutory designated sites, together with background levels, taken from the Site Relevant Critical Loads section of the APIS website.

Table 8: Site Relevant Critical Loads and background levels

Site / habitat	**Ammonia (NH_3) ($\mu g/m^3$)**		**Nitrogen deposition (kg N/ha/yr)**		**Acid deposition (keq H^+/ha/yr)**	
	CL	**Bg**	**CL**	**Bg**	**CL (CLmaxN)**	**Bg**
Shortheath Common SAC (Bog woodland habitat)	1	1.11 (111%)	5 – 10	24.6 (492%)	0.657	2.1 (320%)
Bentley Station Meadow SSSI (Woodland habitat)	1	1.33 (133%)	15 - 20	26.2 (175%)	2.105	2.1 (99.7%)

Ammonia Critical Levels

Note with respect to Critical Levels for ammonia, APIS state 'site specific advice should be sought' with respect to bog woodland habitats. As bryophytes and lichens, including in particular peat-forming *Sphagnum* species, are an important component of the habitat, then the lower 1µg/m^3 annual mean CL is appropriate.

With respect to woodland habitats at Bentley Station Meadow SSSI, APIS also state that 'site specific advice should be sought'. Woodland habitats can be important for epiphytic lichens, which are vulnerable to air quality effects, particularly elevated ammonia levels. However, Natural England's SSSI Citation[13] does not mention lichens or bryophytes as an important component of the site. Nevertheless, the lower 1µg/m^3 value was used in the dispersion modelling.

Exceedances of background levels are predicted at both sites; however, these are based on modelling at a 5km grid square scale of resolution. This masks a high degree of spatial and temporal variation in ammonia levels, which will be influenced by distance to emission sources (e.g. agriculture, road traffic), and the presence of features which will capture ammonia such as belts of trees.

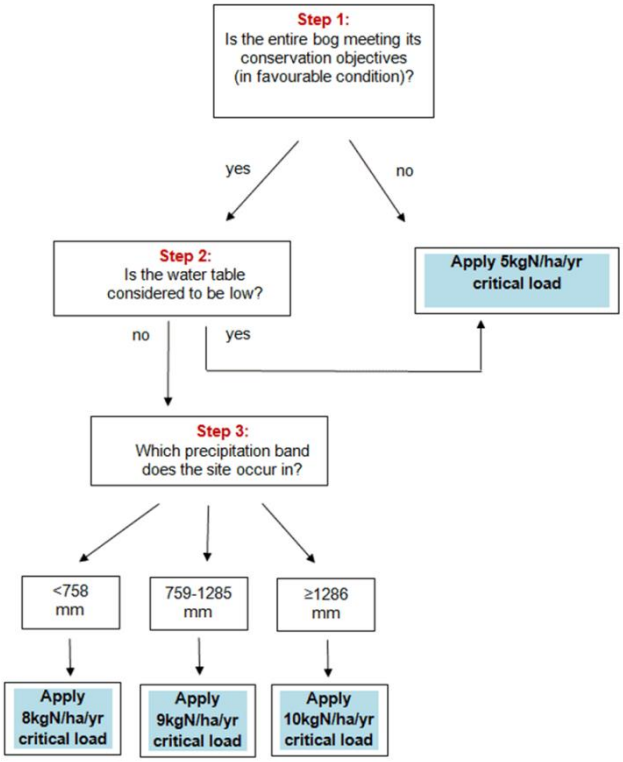
Nitrogen deposition Critical Loads: bog and bog woodland habitats

Bog habitats are acknowledged to be sensitive to nitrogen deposition, with a Critical Load range of 5-10kg N/ha/yr which has been applied in the Dispersion Modelling Assessment. This is regarded as reliable by APIS, with experimental and field evidence for the effects of excess nitrogen deposition to support these values.

APIS advise that the appropriate value to apply within this range for ecological assessment purposes depends on bog hydrology and rainfall, with wetter bogs being more resilient to nitrogen deposition. APIS have produced a flowchart to determine the most appropriate Critical Load, depending on rainfall, water table and bog condition. Annual average rainfall at the nearest weather station (Farnborough) is 691mm[14], placing it in the lower precipitation band, and indicating an 8kg N/ha/yr CL. However, as the entire bog habitat is not meeting favourable condition (due to excess *Molinia* on the adjoining quaking bog habitat) the more precautionary **5kg N/ha/yr CL** is advised. This value was used in the Dispersion Modelling report.

[13] https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1005615.pdf
[14] https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcp7wrjcg

Fig. 1: Flow chart for determining nitrogen Critical Load in bog habitats[15]



It should be noted that APIS identify the adjoining quaking bog habitat as having a Critical Load range of 10 – 15kg N/ha/yr, with a recommendation to use the minimum 10kg N/ha/yr rate for environmental assessment purposes. This feature is essentially contiguous in terms of location and hydrology with the bog woodland. It's higher CL relative to bog habitats is likely to derive from the lower degree of isolation from the surrounding landscape, and correspondingly greater nutrient inputs from groundwater.

Nitrogen deposition Critical Loads: Bentley Station Meadows SSSI woodland habitat

The Critical Load recommended by APIS for environmental assessment purposes for the G1.A meso- and eutrophic *Quercus* woodland habitat present at Bentley Station Meadow SSSI is the lower end of the range: **15kg N/ha/yr[16]**. A 10kg CL has been used in emissions modelling, and is therefore over-precautionary; this does not alter the conclusions of the Emissions Modelling report, which did not report an exceedance of the 1% screening threshold at the 10kg N/ha/yr Critical Load.

[15] http://www.apis.ac.uk/guidance-applying-critical-load-range-atmospheric-nitrogen-deposition-bog-habitats-uk
[16] http://www.apis.ac.uk/sites/default/files/downloads/APIS%20critical_load_range_document.pdf

Acid deposition Critical Loads: bog woodland habitat

Bog habitats are regarded as sensitive to acid deposition, with a Critical Load range of 0.1 – 1.0 keq/ha/yr given by APIS; this is regarded as quite reliable with respect to the underpinning scientific evidence. The acid deposition CL recommended by APIS for bog woodland habitat at Shortheath Common (using Site Relevant Critical Loads) and used in the Emissions Modelling assessment is **0.657 keq H^+/ha/yr** (based on the minCLmaxN value).

The most serious effects of acid deposition on bog habitats were experienced in locations with high levels of sulphur pollution, notably the English South Pennines, where there was a severe decline in *Sphagnum* species and consequent degradation of the bog surface; some recovery has now been seen, reflecting the decline in sulphur dioxide levels since the mid-20th century. A study of Scottish sites cited by APIS the pH of peat soils has declined by 0.5 units in 4-5 decades; peats with the highest acidity (< pH3.0) and lowest base saturation (<10%) are found in areas with acid deposition rates in excess of 0.8kg H^+/ha/yr (= 0.8keq/ha/yr).

Background rates at Shortheath Common SAC are listed by APIS as 2.1keq/ha/yr, significantly higher than the Site Relevant Critical Load. However, there are a number of factors which imply the habitat may not be quite as sensitive or likely to be suffering ecological consequences of exceedance as may be implied by these figures. These can be summarised as follows:

- As noted above, the woodland is relatively low in stature, so calculations using woodland deposition velocity are likely to overestimate actual rates at this habitat. However, as there are only two available velocities for use in deposition modelling, it is not possible to 'fine tune' this assessment, and woodland values remain the most appropriate;
- Although APIS apply the 0.657keq critical load to both bog and bog woodland habitats, it is likely that both habitats are more strongly buffered than raised and blanket mire habitats. The latter are hydrologically isolated, and consequently more heavily influenced by atmospheric inputs, whereas groundwater chemistry will play a much greater role in valley mire and quaking bog habitats, together with the bog woodland which establishes on them;
- The disposition of habitats on the SAC (illustrated for surrounding habitats in Annex A) is such that the valley mire and bog woodland is enclosed by higher

and drier habitats supporting mature mixed woodland. This is not a SAC qualifying feature, although it is listed in the SSSI notified features (as NVC W10 oakwood and W16 acidophilous oakwood communities). This feature will function to intercept a proportion of local, low-level agricultural ammonia emissions, which cannot be indicated by the coarse scale of resolution (5km grid square) of background modelling. As the source attribution from livestock is over 13% of total, and fertiliser use a further 5%, this is a potentially significant factor which may contribute to an over-estimation of background deposition rates.

Acid deposition Critical Loads: Bentley Station Meadows SSSI

Woodland habitats at Bentley Station Meadow SSSI have a relatively low CL for the habitat of 2.105keq/ha/yr (as minCLmaxN), by comparison to some of the locally designated SINC woodlands in closer proximity to the Proposed Development. The SSSI Citation describes how an area of dry acidic soil provides local variation to the underlying Gault Clay[17].

Sensitivity of locally designated sites

Ammonia Critical Levels

In the absence of detailed information on species composition and ecological interest features of SINC sites, the Emissions Modelling report used the precautionary 1µg/m^3 annual mean value for sites where bryophytes and lichens are important elements of the plant community. This is significant in terms of further interpretation of results, since modelled background levels just exceed this value, but are well within the 3µg/m^3 Critical Level for other habitats. The latter value is appropriate for grassland habitats, and for sites designated to protect rare vascular plant species.

Nitrogen deposition Critical Loads

Information on SINCs supplied by the local biological records centre identifies woodland sites to broadleaved woodland broad habitat only (see Table 5 above). The Critical Load recommended by APIS for environmental assessment purposes is **10kg N/ha/yr**. This is likely to be over-precautionary, when the underlying geology and indicated woodland communities are considered. Where woodland plant communities are distinguished from broad habitats, the 10kg CL is indicated for those communities associated with strongly leached, acidic soils such as G1.8 (Acidophilous

[17] https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1005615.pdf

Quercus –dominated woodland). Overlaying the British Geological Society (BGS) 1:50000 Bedrock GIS data on the SINC locations produces the following:

Table 9: Underlying geology of woodland SINCs

Sites	Geological formation
Spollycombe Copse Fielders & Shrub Croft Copses/Ham Wood Hawkins Wood & Stowell Copse	Lewes Nodular Chalk Formation
Round Wood	West Melbury Marly Chalk
Stirvill's Copse Neatham Farm Manor Copse	West Melbury Chalk
Forty Acres Wood Chestnut Copse Quarry Bottom (Upper Greensand Hangers SSSI)	Upper Greensand Formation – calcareous sandstone and siltstone
(Bentley Station Meadow SSSI)	Gault Formation Mudstone
(Shortheath Common SAC)	Folkestone Formation Sandstone

Most of the woodlands overlie chalk bedrock or other calcareous strata, and are therefore unlikely to support woodland communities associated with leached, acidic soils. In such situations NVC woodland plant community W8 is the most likely to occur; this is a subset of the EUNIS G1.A meso- and eutrophic woodland community, with a minimum CL of 15kg N/ha/yr.

It is possible that some of the woodlands on the upper greensand formation may occupy more strongly leached sites, and support beechwood community W1.6 *Fagus* woodland; Upper Greensand Hangers SAC supports this community. This has a CL range of 10 – 20kg N/ha/yr, but APIS recommend a CL for detailed environmental assessment purposes of 15kg N/ha/yr. In contrast to these sites, Shortheath Common SAC, on the Folkestone Formation Sandstone, overlies strata much more likely to weather to acidic soils, and this is reflected in the heathland and acidophilous oak woodland present at this site.

Froyle Mill Meadow SINC lies within the Low and Medium Altitude Hay Meadows Critical Load class, with a 20-30kg N/ha/yr range and recommended CL of 20kg for environmental assessment purposes.

Acid deposition Critical Loads

APIS Query by Location tool gives the following acid deposition Critical Loads (CLmaxN) values for the nearest locations for SINC sites. The points are the same as those used in the Emissions Modelling, but some of the values have been updated subsequently by APIS; a key change is in the CLmaxN for grassland habitats, which is raised from 1.183keq to 4.856 due to no longer being linked to acid grassland broad habitat.

Table 10: Acid deposition Critical Loads for SINCs

Site (AQ modelling point)	**Location (OS grid ref.)**	**Acid deposition CL keq H^+/ha/yr**
Spollycombe Copse (E7)	473830, 142480	11.376
Fielders & Shrub Croft Copses/Ham Wood (E8 & E12))	473808, 143273 473770, 143105	3.099 (both locations)
Hawkins Wood & Stowell Copse (E9)	474541, 143485	11.362
Neatham Farm Manor Copse (E11)	474402, 139940	11.403
Round Wood (E13)	474370, 142193	11.367
Quarry Bottom (E14)	475902, 142369	11.335
Froyle Mill Meadow (E15)	476435, 142393	4.856 (grassland)
Forty Acres Wood (E10 / E16)	476545, 140638 476591, 140856	2.112 (both locations)
Chestnut Copse (E17)	475569, 142299	2.108
Stirvill's Copse (E18)	474981, 140322	11.376 (woodland) 4.856 (grassland)

4 Predicted impacts

4.1 Predicted impacts at Shortheath Common SAC

Acid deposition

Dispersion and deposition modelling predicts a small magnitude exceedance of the 1% screening threshold for one of the five years' worth of meteorological data used in the model; this is summarised in the table below, with data taken from Appendix 8.3, Table 36.

Table 11: Shortheath Common SAC acid deposition (all values keq H^+/ha/yr)

Acidity class	Critical Load (CLmaxN)	Background	PC	% CL	PEC	% CL
Bogs (Bog woodland habitat)	0.657	2.1 (319.63%)	0.00286 N 0.00522 S (0.00808)	1.23%	2.1008	320.86%

The annual variation in the deposition model as a consequence of meteorological factors is illustrated in Appendix 8.3, Figure 8.34. Note that the modelling point E2 adjoins an area of acid grassland (SSSI unit 4); this is a SSSI notified feature (NVC U1 *Festuca ovina - Agrostis capillaris - Rumex acetosella* grassland)[18], not a SAC qualifying feature.

The bog woodland habitat is located in SSSI unit 1, to the south-west of the lake, and in the area predicted to experience a 1 – 1.1% PC in 2017 meteorological conditions. As Figure 8.34 illustrates, in the other four years, the bog woodland habitat would experience less than 1% PC. The difference in 2017 data can be further illustrated by the wind roses for the five years of meteorological data in Figure 8.6. This shows a relative lack of prevailing south-westerlies compared to other years.

In terms of impact magnitude, this can be characterised as a small scale increase just above screening thresholds; the Environment Agency impact characterisation set out in section 2.2 above classes this as a circumstance where the background concentration is currently exceeding the appropriate environmental criterion and the new process contribution will cause an additional **small** increase. In these situations

[18] https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1003329&SiteName=common&countyCode=19&responsiblePerson=&SeaArea=&IFCAArea=

EA advise that it is appropriate to make a decision on significance according to local circumstances. This is discussed further below.

4.2 Predicted impacts on Bentley Station Meadows SSSI

Ammonia levels

Appendix 8.5, Table 28 sets out the predicted PC to annual mean ammonia levels at Bentley Station Meadows SSSI. The MG5 grassland notified feature is set out below for comparison to illustrate the difference in Critical Levels, although no effect in excess of screening threshold is predicted:

Table 12: Bentley Station Meadows ammonia levels (all values μg/m³)

Notified feature	Critical Level	Background	PC	% CL	PEC	% CL
MG5 grassland	3	1.33 (43.3%)	0.011	0.36%	1.34	44.7%
W10 woodland	1	1.33 (133%)	0.011	1.07%	1.34	134%

Ammonia levels remain well below CL for grassland habitats, but a small magnitude exceedance of screening thresholds is predicted for woodland habitats, in a situation where background levels already exceed the relevant environmental quality standard.

It should be noted that deposition modelling only predicts an exceedance of the 1% threshold one year in the last five (2017), as illustrated by Figure 8.32.

Acid deposition rates

Appendix 8.5, Table 36 sets out the predicted PC to annual mean acid deposition rates for woodland habitats at Bentley Station Meadows SSSI. The PC to the MG5 grassland notified feature remains below the 1% screening threshold. Exceedance of the woodland deposition rate would also only have occurred in one of the five past year's meteorological conditions, as illustrated by Figure 8.33.

Table 13: Bentley Station Meadows acid deposition rates (all values keq H^+/ha/yr)

Notified feature	Critical Load CLmaxN	Background (% CL)	PC (keq N+S)	% CL	PEC	% CL
W10 woodland	2.105	2.10 (99.76%)	0.00783 N 0.01430 S (0.02213)	1.05%	2.12	100.8%

Based on updated (2016-18) concentration and deposition data on APIS, this is a situation where the background concentration is less than the appropriate environmental criterion, but the process contribution leads to an exceedance. Note that background values derived from the CBED model have been adjusted sharply downwards in the March 2020 update of the 2016-18 3-year rolling average on the APIS website; values used in the Emissions Modelling were 0.36keq higher at 2.46keq H^+/ha/yr.

However, it is a small magnitude contribution, and the PEC remains close to the Critical Load. The implications of this for effect significance are discussed below, with reference to IAQM (2019) advice.

4.3 Predicted effects on locally designated sites

Ammonia levels

The table below summarises predicted exceedances of 1% screening thresholds for ammonia.

Table 14: Ammonia levels at locally designated sites (values µg/m^3 annual mean)

Notified feature	Critical Level	Background	PC	% CL	PEC	% CL
Spollycombe Copse (E7)	1	1.29 (129%)	0.014	**1.38%**	1.30	**130%**
Fielders & Shrub Croft Copses/Ham Wood (E8)	1	1.29 (129%)	0.015	**1.51%**	1.31	**131%**
Fielders & Shrub Croft Copses/Ham Wood (E12)	1	1.29 (129%)	0.015	**1.50%**	1.31	**131%**
Hawkins Wood & Stowell Copse (E9)	1	1.29 (129%)	0.017	**1.74%**	1.31	**131%**

Notified feature	Critical Level	Background	PC	% CL	PEC	% CL
Neatham Farm Manor Copse (E11)	1	1.32 (132%)	0.013	**1.28%**	1.33	**133%**
Round Wood (E13)	1	1.29 (129%)	0.034	**3.35%**	1.32	**132%**
Quarry Bottom (E14)	1	1.33 (133%)	0.052	**5.23%**	1.38	**138%**
Froyle Mill Meadow (E15)	3	1.33 (44%)	0.034	**1.13%**	1.36	45%
Forty Acres Wood (E10)	1	1.33 (133%)	0.010	**1.01%**	1.34	**134%**
Forty Acres Wood (E16)	1	1.33 (133%)	0.011	**1.11%**	1.34	**134%**
Chestnut Copse (E17)	1	1.33 (133%)	0.030	**3.03%**	1.36	**136%**
Stirvill's Copse (E18)	1	1.29 (129%)	0.012	**1.20%**	1.30	**130%**

All of these are of low magnitude, with the exception of Quarry Bottom, which can be characterised as a medium magnitude impact. In quantitative terms, process contributions are all very small relative to annual and particularly small-scale spatial variation.

Background levels at all sites exceed the Critical Level, if the precautionary assumption is made that bryophytes and lichens are important components of the woodland habitat. On other habitats (Froyle Mill Meadow SINC) the Critical Level remains well below that required to protect other components of the ecosystem.

Nitrogen deposition rates

The table below summarises nitrogen deposition rates at those sites where PCs are predicted to exceed the 1% screening threshold for the minimum Critical Load of 10kg N/ha/yr for broadleaved woodland broad habitat, or 20kg for lowland and medium altitude hay meadows habitat.

Table 15: Nitrogen deposition rates at locally designated sites (kg N/ha/yr)

Notified feature	Critical Load	Background	PC	% CL	PEC	% CL
Spollycombe Copse (E7)	10	28.14 (281%)	0.141	**1.41%**	28.38	**283%**
Fielders & Shrub Croft Copses/Ham Wood (E8/E12)	10	28.14 (281%)	0.154	**1.54%**	28.39	**283%**
Hawkins Wood & Stowell Copse (E9)	10	28.14 (281%)	0.178	**1.78%**	28.51	**283%**
Neatham Farm Manor Copse (E11)	10	28.00 (280%)	0.130	**1.30%**	28.13	**281%**
Round Wood (E13)	10	28.14 (281%)	0.342	**3.42%**	28.58	**284%**
Quarry Bottom (E14)	10	26.18 (262%)	0.534	**5.34%**	28.61	**267%**
Froyle Mill Meadow (E15)	20	16.10 (80%)	0.217	**1.13%**	16.32	81.6%
Forty Acres Wood (E10)	10	26.18 (262%)	0.103	**1.03%**	26.28	**263%**
Forty Acres Wood (E16)	10	26.18 (262%)	0.113	**1.13%**	26.29	**263%**
Chestnut Copse (E17)	10	26.18 (262%)	0.309	**3.10%**	26.48	**265%**
Stirvill's Copse (E18)	10	28.14 (281%)	0.122	**1.23%**	28.36	**283%**

With the exception of Quarry Bottom SINC (medium magnitude), impacts on all the woodland sites can be characterised as low magnitude, in circumstances where background concentrations significantly exceed the relevant environmental quality standard. As noted in the discussion of sensitivity in the preceding section, it is likely to be more appropriate to assess the woodland sites on a 15kg N/ha/yr Critical Load. In those circumstances, a process contribution of 0.15kg or above would be necessary

to exceed the screening threshold, resulting in some sites being below screening threshold, and the maximum PC at Quarry Bottom of 3.56%.

Froyle Mill Meadow has a PC just exceeding the 1% screening threshold, but the PEC remains below the lower Critical Load.

Acid deposition rates

The table below summarises acid deposition rates at those sites where they were predicted in the Emissions Modelling report to exceed the relevant 1% screening threshold, as defined by the current APIS critical loads for habitat and grid square.

Table 16: Local sites acid deposition rates (all values keq H^+/ha/yr)

Notified feature	Critical Load CLmaxN	Background	PC	% CL	PEC	% CL
Fielders & Shrub Croft Copses/Ham Wood (E8 only)	3.099	1.83 (59%)	0.031	**1.00%**	1.861	60%
Froyle Mill Meadow (E15)	4.856	1.12 (23%)	0.036	0.74%	1.156	24%

Although acid deposition at Shrub Croft (nearest point to emission source only) reaches 1% of Critical Load, the PEC is only 60% of CL, and therefore can be discounted from further consideration.

The change in CL in APIS advice for neutral grassland habitats means that the process contribution at Froyle Mill Meadow SINC is no longer above screening threshold, while the PEC is also well below Critical Load.

4.4 Predicted impacts on Priority Habitats

Nitrogen deposition

Predicted impacts on Priority Habitats in the vicinity of the emission source are set out in Appendix 8.3, Table 35. All could be described as being of small magnitude, with broadleaved woodland reaching a maximum of 7.32% due to the higher deposition velocity and use of the precautionary 10kg N/ha/yr Critical Load. Based on observations on woodland habitats in the vicinity of the Proposed Development, a 15kg meso- and eutrophic woodland minimum CL is more appropriate. This gives a small magnitude process contribution of 4.86% (based on maximum modelled deposition rate of 0.73kg/ha/yr.

Acid deposition

Predicted impacts of acid deposition are all of small magnitude, with the exception of a medium magnitude impact of 6.93% maximum process contribution to broadleaved woodland habitats. The only habitats where the PEC exceeds the CL are deciduous woodland and purple moor-grass and rush-pasture priority habitat; the latter is a relatively base-poor habitat, which justifies the retention of the acid grassland broad habitat CL for calculation of impact.

5 Effect significance

5.1 Significance of effects on Shortheath Common SAC

Acid deposition

The discussion of sensitivity of bog woodland habitat in section 3 above highlighted why the Critical Load for bog habitats may not be appropriate for a site which is influenced by groundwater chemistry, and why background deposition rates may be overestimated due to the low stature of the habitat.

In terms of predicted effects, the rate of acid deposition was only predicted to exceed the 1% screening threshold one year in the past five, due to a weaker than usual south-westerly airflow in 2017. Even taking the worst-case 2017 predictions in isolation, the predicted impact is of low magnitude, particularly when compared to consistent downward trends in SO_2 levels in particular shown on the APIS website.

Dispersion and deposition modelling also builds in a number of precautionary assumptions regarding emission rates and load factors of the Proposed Development, which are set out in more detail in Chapter 8.0 of the ES. It is therefore very likely that actual impacts will be negligible in magnitude, obscured by temporal variation, and could be regarded as *de minimis* in terms of their likely significant effect on the SAC.

However, in accordance with the precautionary principle, following consultation with Natural England it has been agreed that exceedance of a screening threshold should trigger an Appropriate Assessment under the Habitats Regulations. An HRA Report has therefore been prepared to assist this assessment; it includes consideration of additional pressures on the SAC and determines whether they could operate in-combination with the effects of the Proposed Development to affect the integrity of the Natura 2000 site.

5.2 Significance of effects on Bentley Station Meadow SSSI

Ammonia levels

The predicted maximum process contribution to ammonia levels only exceeds the 1% screening threshold one year in the past five, also using the atypical 2017 meteorological data. The actual maximum PC is very low, and would be obscured by much larger spatial and temporal variations in ammonia levels, particularly those arising from agricultural activities. The Proposed Development would not significantly add to ammonia levels on the SSSI, or hamper improvement towards the

lower Critical Level. Impacts of the Proposed Development on ammonia levels are not significant in terms of the EIA, and do not risk significant harm to the SSSI.

Acid deposition rates

The predicted maximum process contribution to acid deposition rates only exceed the 1% screening threshold one year in the past five, using the atypical 2017 meteorological data. Although this would cause the PEC to slightly exceed the Critical Load, it has to be seen in the context of a much more significant reduction in modelled background deposition rates using the 2016-18 data. This has reduced the 3-year rolling average by 17% of CL (0.36keq) from the previous year. There is likely to be a continuing downward trend in acid deposition rates, as evidenced by the SO_2 emission trends for Bentley Station Meadow SSSI in APIS Site Relevant Critical Loads.

Impacts of the Proposed Development on acid deposition rates are not significant in terms of the EIA, and do not risk significant harm to the SSSI.

5.3 Significance of effects on locally designated sites

IAQM (2019) guidance on treatment of air quality effects on locally designated sites states (paragraph 5.5.2.2): '*In ecological impact assessments of projects and plans, it is…normal practice to treat such sites in the same manner as SSSIs and European Sites, although the determination of the significance of an effect may be different*.'

In all but two cases (ammonia levels and nitrogen deposition rates at Quarry Bottom SINC) the PC of the Proposed Development is of small magnitude (<5% of relevant environmental quality standard). This is in the context of a precautionary approach to setting appropriate Critical Levels for ammonia and Critical Loads for nitrogen deposition, in the absence of the same detail of site-specific information available for locally designated sites as SACs and SSSIs.

This impact magnitude is not likely to have any measurable effect on the sites, or significantly affect the maintenance or recovery of favourable condition. It cannot therefore be regarded as significant in EIA terms.

The predicted impacts on Quarry Bottom SINC just exceed the threshold for medium magnitude, **if** the site is regarded as having important lichen and bryophyte communities, and **if** it is an acidophilous oakwood or other woodland plant community to which the 10kg N/ha/yr deposition rate should apply. Based on location of the woodland close to the A31 and with a high degree of edge habitat adjoining agricultural land (see Appendix 6.1 for location plan), it is very unlikely to

support important lichen communities. Based on its location in the Wey valley, it is extremely unlikely to support woodland communities for which the 10kg nitrogen critical load should apply. The Proposed Development is not likely to have any measurable effect on this site, or significantly affect the maintenance or recovery of favourable condition. It cannot therefore be regarded as significant in EIA terms.

6 Conclusions

Effects of emissions to air on sensitive ecological receptors as a consequence of the operation of the Proposed Development have been assessed. This was based on dispersion and deposition modelling set out in the Emissions Modelling report (Appendix 8.3), and with reference to Environment Agency, IAQM and APIS advice. All impacts in excess of screening thresholds have been considered; some identified in the Emissions Modelling report have been recalculated following a recent update in APIS Critical Loads advice for acid deposition to grassland habitats.

Having due regard to the sensitivity of ecological receptors, background levels and process contributions, no significant effects have been identified as a consequence of the Proposed Development.

With respect to Shortheath Common SAC, following advice by Natural England a small magnitude exceedance of screening thresholds for acid deposition has triggered the requirement for the Competent Authority to carry out an Appropriate Assessment. Information to inform the Appropriate Assessment is provided in a Habitats Regulations Assessment Report, which assesses air quality impacts of the Proposed Development in combination with other plans and projects.

Annex A Shortheath Common SAC – extent of bog woodland habitat