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Shropshire In-Vessel Composting Facility



Veolia

Air Quality Assessment Addendum – Planning

ENGINEERING CONSULTING

Document approval

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Contents

1 Introduction 4

2 Construction phase 5
2.1 Vehicle emissions 5
2.2 Dust emissions from construction phase activities 5

3 Operational phase 9
3.1 Vehicle emissions 9
3.2 Process emissions 9
3.3 Impact assessment 12

4 Conclusions 14

Appendices 15
A Figures 16
B Construction Phase Assessment Criteria 18
B.1 Introduction 18
B.2 Assessment methodology 18
C Air Quality Assessment 24

1 Introduction

Veolia (the Client) has engaged Fichtner Consulting Engineers Limited (Fichtner) to undertake an Air Quality Assessment (AQA) to support the environmental permit (EP) and planning applications for an in-vessel composting facility (the Facility) to be installed at the former Befesa salt slag processing facility, Fenn's Bank, near Whitchurch (the Site).

An AQA[1] (attached as Appendix C) has been submitted to Natural Resources Wales (NRW) as part of the EP application for the Facility. This AQA Addendum has been prepared to:

- provide an interpretation of the dispersion modelling results in line with best practice planning guidance: and
- present assessments of construction phase dust emissions and emissions from vehicles associated with the construction and operation of the Facility, which are not required as part of the EP application.

Previous versions of this AQA Addendum (UF00174-0030-0003SMN Shropshire IVC Facility Air Quality Assessment Addendum for Planning_r2, dated 23 September 2025) and the AQA prepared to support the EP application (UF00174-0030-0001SMN Shropshire IVC Facility Air Quality Assessment_r2, dated 23 May 2025) have been reviewed by NRW as part of the pre-application consultation (PAC) for the planning application for the Facility. NRW's feedback included the following relevant advice in relation to the AQA for the EP application:

> *"Our records illustrating the boundaries of the protected sites suggest that points E10, 12, 13 and 14 (from table 19) which are listed as 'local Nature sites', should be included within the statutory sites table.*
>
> *If the process contribution [of ammonia] plus the background level reaches or exceeds the critical level then abatement must be used to reduce the process contribution to below 1% of the critical level, in order for the application to proceed… … We therefore advise that any planning application submitted should present suitable mitigation measures to ensure the development proposal will not adversely affect the integrity of the SAC/Ramsar site. We also advise that other sources of ammonia should be considered and that an in-combination assessment is undertaken in line with the above noted guidance."*

In response to NRW's comments the AQA for the EP application has been updated to apply the screening criteria for European and UK designated sites to points E10, 12, 13 and 14, and the design of the Facility has been amended to increase the stack height to reduce the ammonia process contribution to below 1% of the Critical Level at the closest SAC qualifying habitat. The only development identified is the Whitchurch Biogas Ltd Anaerobic Digestion (AD) Plant (14/01398/MAW) located on the A525 approximately 5km east of the Facility. This has been operational since approximately 2016, and consequently any contribution it makes to ammonia concentrations and acid and nitrogen deposition will be in the background data used to inform this development. No other potentially significant new or planned sources of ammonia or nitrogen deposition have been identified within 5 km of the Facility, so an in-combination assessment is not required.

[1] Fichtner reference: UF00174-0030-0001SMN Shropshire IVC Facility AQA_r2, May 2025.

2 Construction phase

2.1 Vehicle emissions

The Institute of Air Quality Management (IAQM) guidance document "Land-Use Planning & Development Control: Planning for Air Quality" (referred to within this report as the IAQM 2017 guidance) states that an AQA of vehicle emissions is required where a development would cause a "significant change" in light duty vehicles <3.5 t (LDVs) or heavy duty vehicles (HDVs) >3.5 t. The indicative criteria to process to an assessment are:

- A change in LDV flows of:
  - more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA); or
  - more than 500 AADT elsewhere.
- A change in HDV flows of:
  - more than 25 AADT within or adjacent to an AQMA; or
  - more than 100 AADT elsewhere.

The construction phase is expected to generate a maximum of 36 two-way HDV movements per day (18 in and 18 out) and 150 LDV movements (75 in and 75 out). Therefore, construction phase traffic will be below the IAQM screening criteria so the impact will be 'negligible'.

2.2 Dust emissions from construction phase activities

The construction phase dust assessment has been undertaken in accordance with the methodology outlined within the IAQM document 'Guidance on the assessment of dust from demolition and construction' (2024). The full methodology is presented in Appendix B.

2.2.1 Stage one – screening

Whilst not all construction phase activities will occur across all parts of the Site, as a screening assumption it has been assumed that dust generating activities may occur up to the Site boundary.

The IAQM methodology outlined in Appendix B is based on:

- The risk category for the Site – which is based on the type of activity and the distance to the nearest receptor; and
- The sensitivity of the area – which is based on the number of properties within certain distances of the boundary of the works.

The methodology assesses the significance of the site rather than the significance of the impact on an individual receptor. As such, individual receptors have not been identified. However, the following table outlines how many properties have been identified in the relevant distance bands. For clarity, the IAQM methodology states that one residential unit is one high sensitivity receptor. Table 1 presents the construction phase screening distances based on the methodology presented in Appendix B. The screening distances are shown on Figure 1 of Appendix A.

Table 1: Dust Sensitive Receptors - Number of Human Receptors

Distance from the source (m)	Estimated number of human receptors			
	From Site boundary		From Site access routes*	
Receptor Sensitivity	High	Medium	High	Medium
<20	0	0	0	0
<50	0	0	0	0
<100	0	2	-	-
<250	4	2	-	-

Note:
**Distance from site access routes is used in the assessment of trackout, and only receptors within 50m of the edge of the road (up to 250m from the Site entrance) need to be considered.*

This shows there are no sensitive receptors within 50 m of the Site boundary, fewer than 10 medium sensitivity receptors within 100 m of the Site boundary, and fewer than 10 medium and high sensitivity receptors within 250 m of the Site boundary. There are no receptors within 50 m of any route used by construction vehicles on the public highway, up to 250 m from where HGVs leaving the site travel onto a paved road surface. As there are sensitive receptors located within the screening distances, an assessment of the risk of dust emissions is required.

No ecological receptors have been identified within 50 m of Site boundary, or within 50 m of any route used by construction vehicles. A screening distance of 200 m is used for some assessments in line with Natural England's internal guidance, which is more conservative than the 50 m recommended by the IAQM. However, there are also no ecological receptors within 200 m. Therefore, the impact on ecological receptors does not need to be considered.

2.2.2 Stage two - risk of dust emissions

2.2.2.1 Description of activities

The Site currently comprises an existing process building, hard standing, and some redundant process equipment and storage located outside the building.

Site preparation will involve removal of outdoor process equipment and storage, forming new openings in the existing building, and stripping of the area to the north of the building for the installation of a new access road. No structures will be fully demolished.

Earthworks will be limited to forming foundations for new structures and roadways. Construction will be limited to new buildings to house the biofilters and plant rooms, and new tanks. Various works will be undertaken inside the existing process building, but as these activities will be undertaken within the buildings the risk of significant dust emissions is negligible.

2.2.2.2 Dust emission magnitude

The dust emission magnitude is based on the scale of anticipated works and is classified as small, medium or large. The criteria for these definitions are set out in Appendix B.

The dust emission magnitude for each type of activity has been assessed and is displayed in the following table.

Table 2: Dust Emission Magnitudes

Activity	Dust emission magnitude	Justification
Demolition	N/A	No structures will be demolished. Removal of outdoor process equipment/storage and creation of new openings are not categorised as demolition.
Earthworks	Small	The site is already covered with hardstanding and will require minimal earthworks.
Construction	Small	The total building volume to be constructed is less than 12,000 m^3.
Trackout	N/A	There are no sensitive receptors within 50 m of the route used by HGVs, up to 250 m from where HGVs leaving the site are on a paved surface.

2.2.2.3 Sensitivity of area

The area has been assessed for its sensitivity to dust soiling effects, human health effects to PM_{10} and ecological effects, using the number of sensitive receptors identified in Table 1 and criteria set out in Appendix B. These are displayed for each type of dust emission activity:

Table 3: Sensitivity of the Area to Dust

Effect	Sensitivity	Justification
Earthworks and Construction		
Dust soiling	Low	There are no receptors of any level of sensitivity within 50 m. There are fewer than 10 medium and high sensitivity receptors within 250 m.
Human health impacts	Low	The baseline PM_{10} concentrations for the area are less than 24 µg/m^3 (8.9 µg/m^3, Defra 2023 dataset) and there are no receptors within 50 m.

2.2.2.4 Summary

The risk of dust impacts from construction and earthworks is summarised as using the criteria outlined in Appendix B. This is based on the dust emission magnitude and the sensitivity of the area.

Table 4: Summary of Dust Risk

Potential Impact	Demolition	Earthworks	Construction	Trackout
Dust soiling	N/A	Negligible risk	Negligible risk	N/A
Human health	N/A	Negligible risk	Negligible risk	N/A

2.2.3 Stage three – identification of mitigation measures

The dust assessment has identified that the highest risk category for the Site is 'negligible risk', for dust soiling effects from construction activities. The IAQM guidance states that *"for those cases where the risk is assigned as 'negligible', no mitigation measures beyond those required by legislation are required."*

2.2.4 Stage four - summary

The potential for significant effects due to demolition and trackout has been screened out, as has the potential for a significant effects on ecology. For earthworks and construction activities, the site has been assessed to be of 'negligible risk' for dust soiling and human health impacts. As such, no mitigation measures beyond those required by legislation are required. As such, the application of standard best-practice measures by the construction contractor will ensure that no significant effects occur due to construction phase dust emissions.

3 Operational phase

3.1 Vehicle emissions

The operational phase is expected to generate 55 two-way HDV movements (~23 in and ~23 out) on each day of a six day work week, equating to 47 two-way HDV movements on an AADT basis. The number of expected LDV movements is 18 two-way staff car trips (9 in and 9 out) on each day of a six day work week, equating to 15 two-way LDV movements on an AADT basis. Therefore, operational phase traffic will be below the IAQM screening criteria listed in section 2.1 so the impact will be 'negligible'.

3.2 Process emissions

A detailed assessment of process emissions is presented in the AQA, a copy of which is appended to this Addendum as Appendix C. The biofilters will be subject to an emission limit for ammonia. Emissions of odour have also been assessed.

Two operational scenarios have been assessed, the first assuming constant ammonia emissions at the proposed emission limit value (ELV), and the second which takes into account the expected seasonally-varying emission profile of ammonia. Details are provided in section 6.2.1 of the AQA.

3.2.1 Assessment criteria

The impacts have been assessed in line with the following criteria which are relevant to planning decisions.

3.2.1.1 Human health

The IAQM 2017 guidance has been developed for professionals operating within the planning system. It provides them with a means of reaching sound decisions, having regard to the air quality implications of development proposals. This is not intended to replace the guidance that exists for industrial developments which require a permit to operate but notes that guidance for permitting has not been developed for conducting an assessment to accompany a planning application.

The IAQM 2017 guidance states that this may be adapted using professional judgement. Therefore, where appropriate NRW guidance has been incorporated. This is appropriate as the project is an industrial source which will need an EP to operate and will be regulated by NRW.

The IAQM 2017 guidance provides the following matrix which can be used to describe the magnitude of change based on the change in concentration relative to the annual Air Quality Assessment Level (AQAL), and the total predicted concentration with the scheme – i.e. the future baseline plus the process contribution (PC). The total predicted concentration with the scheme is referred to as the predicted environmental concentration (PEC).

Table 5: IAQM Magnitude of Change Descriptors

Long-term average concentration at receptor in assessment year	**% change in concentration relative to AQAL**			
	1	**2-5**	**6-10**	**>10**
75% or less of AQAL	Negligible	Negligible	Slight	Moderate
76-94% of AQAL	Negligible	Slight	Moderate	Moderate
95-102% of AQAL	Slight	Moderate	Moderate	Substantial

Long-term average concentration at receptor in assessment year	% change in concentration relative to AQAL			
	1	2-5	6-10	>10
103-109% of AQAL	Moderate	Moderate	Substantial	Substantial
110% or more of AQAL	Moderate	Substantial	Substantial	Substantial

It is intended that the change in concentration relative to the AQAL (the PC) is rounded to the nearest whole number. Therefore, any impact which is between 0.5% and 1.5% will be classified as a 1% change in concentration. For a change in concentration to be described as 'negligible' irrespective of the PEC, the PC needs to be less than 0.5% of the AQAL.

Table 5 is only designed to be used with annual mean concentrations. For short-term concentrations (i.e. those averaged over a period of an hour or less) the IAQM 2017 guidance states that the following descriptors of change should be used to describe the severity of the impact:

- < 10% - negligible;
- 10 – 20% - slight;
- 20 – 50% - moderate; and
- > 50% - substantial.

The approach for assessing the impact of short-term emissions has been carried out in line with the IAQM 2017 guidance and does not take into account the background concentrations as it is noted that background concentrations are less important in determining the severity of impact for short-term concentrations.

For the purpose of this assessment, the IAQM criteria outlined above has been used to define the magnitude of change associated with the operation of the Facility. In accordance with IAQM 2017 guidance, professional judgement has then been used to determine the overall significance of effect of the development at receptor locations (i.e. as either 'significant' or 'not significant'). This judgement has considered:

- the existing air quality in the local area;
- the extent of the predicted impacts from the proposed development; and
- the influence and validity of the assumptions adopted in the dispersion modelling.

The IAQM 2017 guidance states that:

"In most cases, the assessment of impact severity for a proposed development will be governed by the long-term exposure experienced by receptors and it will not be a necessity to define the significance of effects by reference to short-term impacts. The severity of the impact will be substantial when there is a risk that the relevant AQAL for short-term concentrations is approached through the presence of the new source, taking into account the contribution of other prominent local sources."

3.2.1.2 Odour

Odour impacts are dependent on various factors, weather conditions, individual perceptions and are temperamental in their nature. Odours are characterised in terms of European odour units, OU_E, and odour concentrations, OU_E/m^3.

The OU_E strength of a release is the number of times the mixture must be diluted, at standard temperature and pressure, to reach the detection limit by 50% of the members of an olfactory

panel; i.e. a concentration of 1 OU_E/m^3 is the level at which an odour would be detectable (but not identifiable) to 50% of the population.

There is no statutory limit in the UK for ambient odour concentrations. However, the Environment Agency's H4 Odour Guidance (2011)[2]' sets benchmark levels which are commonly used for assessing odour impacts. These are as below, with all concentrations expressed the 98th percentile of hourly mean concentrations:

- 1.5 OU_E/m^3 for 'more offensive odours' (e.g. animal or fish remains, putrescible wastes, wastewater treatment);
- 3.0 OU_E/m^3 for odours which do not obviously fall within a high or low category (e.g. intensive livestock rearing, fat frying or food processing, sugar beet processing); and
- 6.0 OU_E/m^3 as the 98th percentile of hourly mean concentrations for less offensive odours (e.g. brewery, confectionery, coffee roasting).

As a conservative screening assumption, this assessment has been carried out using the most stringent assessment criterion/benchmark i.e. assuming the Facility has the potential to release the 'more offensive odours'.

Whilst the EP will include the condition that there shall be no offensive odour outside the permitted installation boundary, the H4 odour guidance states that these criteria are primarily for application at sensitive receptors such as housing; clearly, even if the benchmarks are exceeded outside of the installation boundary, this will not cause a significant odour effect if the exceedance occurs in an area with no receptors.

In addition to the guidance published by the Environment Agency, the IAQM 2018 document "Guidance on the assessment of odour for planning" (the IAQM 2018 guidance) draws upon the H4 odour guidance and includes matrixes which can be used to describe impacts from modelling. The following table from the IAQM 2018 guidance is that for "*most offensive*" odours.

Table 6: Odour Descriptors for Impacts Predicted by Modelling for 'Most Offensive' Odours

Odour exposure level (P98 OU_E/m^3)	**Receptor sensitivity**		
	Low	**Medium**	**High**
≥ 10	Moderate	Substantial	Substantial
5 – 10	Moderate	Moderate	Substantial
3 – 5	Slight	Moderate	Moderate
1.5 – 3	Negligible	Slight	Moderate
0.5 – 1.5	Negligible	Negligible	Slight
<0.5	Negligible	Negligible	Negligible

Where the overall effect is greater than 'slight adverse' the effect is likely to be considered significant.

3.2.2 Ecology

The IAQM 2017 guidance states that it is not intended to be used to assess impacts on ecological features. In lieu of any assessment criteria specific to planning, the Environment Agency's guidance

[2] https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management

"Air emissions risk assessment for your environmental permit[3]" (the Air Emissions Guidance), which is also used by NRW, has been applied.

The Air Emissions Guidance states that, to screen out impacts as 'insignificant' at European and UK statutory designated sites:

- the long-term PC must be less than 1% of the long-term environmental standard (i.e. the Critical Level or Load); and
- the short-term PC must be less than 10% of the short-term environmental standard.

If the above criteria are met, no further assessment is required. If the long-term PC exceeds 1% of the long-term environmental standard, the PEC must be calculated and compared to the standard. If the resulting PEC is less than 70% of the long-term environmental standard, the Air Emissions Guidance states that the emissions are 'insignificant' and further assessment is not required. In accordance with the guidance, calculation of the PEC for short-term standards is not required.

The Air Emissions Guidance states further that to screen out impacts as 'insignificant' at local nature sites[4]:

- the long-term PC must be less than 100% of the long-term environmental standard; and
- the short-term PC must be less than 100% of the short-term environmental standard.

In 2020 the IAQM published the guidance document 'A guide to the assessment of air quality impacts on designated nature conservation sites' (the IAQM 2020 guidance), which draws on the permitting guidance above, but states:

"For local wildlife sites and ancient woodlands, the Environment Agency uses less stringent criteria in its permitting decisions. Environment Agency policy for its permitting process is that if either the short-term or long-term PC is less than 100% of the critical level or load, they do not require further assessment to support a permit application. In ecological impact assessments of projects and plans, it is, however, 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. It is difficult to understand how the Environment Agency's approach can provide adequate protection."

As such, it is considered appropriate to apply the screening criteria for SSSIs and European Sites to local nature sites for the assessment of significance for planning.

3.3 Impact assessment

3.3.1 Human health

As shown in section 8.1 of the AQA attached as Appendix C, the maximum impact of ammonia emissions anywhere outside of the installation boundary is less than 0.5% of the annual mean AQAL and less than 10% of the short-term AQAL in both emissions scenarios. Therefore, all impacts on human health can be screened out as 'negligible' and the effect is 'not significant'.

3.3.2 Odour

As shown in section 9 of the AQA attached as Appendix C, assuming an odour emission concentration of 1,000 OU_E/m^3, the maximum odour concentration predicted at a receptor location is 0.28 OU_E/m^3. In accordance with the criteria in Table 6, for a high sensitivity receptor (which is

[3] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

[4] National Nature Reserves (NNRs), Local Nature Reserves (LNRs), Local Wildlife Sites (LWSs) and ancient woodlands

applicable as the receptor in question is The View, Fenn's Bank Road, a residential receptor), this results in a 'negligible' impact which is 'not significant'.

As further explained in section 8.3 of the AQA, it is anticipated that there will not be an emission limit for odour included in the EP. The odour emission concentration would need to be less than 5,420 OU_E/m^3 for the impact to be less than the 1.5 OU_E/m^3 criterion at the receptor with the highest predicted impact, and therefore remain no worse than a 'slight adverse' impact which is 'not significant'. It is anticipated that the biofilter will achieve an average odour emission concentration well below this level.

In addition, there is the potential for odour emissions from waste reception and handling, and from the maturation pads which will utilise a forced aeration system which means there is no need to turn the piles. Waste reception and handling procedures will be developed as part of the Odour Management Plan (OMP) for the Facility, while the forced aeration used in the maturation process will ensure aerobic conditions are maintained thereby preventing the formation of highly odourous compounds. As such, no significant odour impacts are anticipated due to odour emissions from either the biofilter (as assessed above) or any other sources.

3.3.3 Ecology

As shown in section 8.2 of the AQA, the following impacts (taking into account the anticipated seasonal variation in ammonia emissions and, for deposition, interannual variability in weather conditions) exceed 1% of the long term Critical Level or Load and cannot be screened out as 'insignificant':

- Annual mean ammonia impacts at:
  - Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SSSI, SAC, Ramsar (E1); and
  - Fenn's Rough ancient woodland (E11).
- Nitrogen deposition impacts at:
  - Fenn's Rough ancient woodland (E11).

The significance of effect of impacts that cannot be screened out as 'insignificant' has been assessed in the report "Ecological interpretation of AQA" prepared by Kevin Barry Honour[5]. This has concluded that dispersion and deposition modelling undertaken in the AQA predicted a small magnitude exceedance of screening thresholds for annual mean ammonia levels in the northernmost area of Fenn's Moss, within the boundary of the designated sites. The areas affected by a greater than 1% increase in ammonia levels do not support SAC, Ramsar or SSSI qualifying or notable features, and consequently there would be no likely significant effect on the Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SAC or Ramsar site as a consequence of the Proposed Development. In addition, the conclusion of the "Ecological Interpretation of AQA" is that the Proposed Development is not likely to damage the special interest features of the SSSI, nor be likely to cause unacceptable harm to ancient woodlands.

[5] Veolia Fenn's Bank IVC facility, Ecological interpretation of AQA, Kevin Barry Honour, February 2026.

4 Conclusions

This AQA Addendum has been prepared to assess the potential impacts of the construction and operational of the Facility on air quality in accordance with best-practice planning guidance. This has concluded that no significant effects are predicted on human health, amenity due to odour emissions, or ecology due to the construction and operation of the Facility. Therefore, there should be no air quality constraint to granting planning permission.

Appendices

A Figures

351000

339000



Legend

- Application boundary

Screening distance (m)

- 20
- 50
- 100
- 250

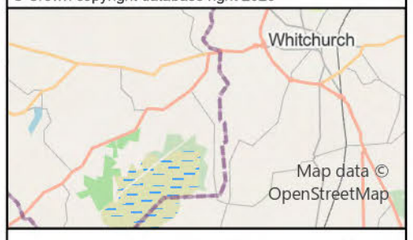
Client:	Veolia
Site:	Fenn's Bank IVC EP Application
Project:	Air Quality Assessment Addendum

Title:

Figure 1. Construction Dust Assessment Screening Distances

Drawn by: SMN	Date: 22/09/2025

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0 0.04 0.07 0.14 km

N

Scale: 1:3,500

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B Construction Phase Assessment Criteria

B.1 Introduction

This appendix presents the methodology used in the assessment of construction phase impacts. The construction phase assessment has been undertaken in accordance with the methodology outlined within the IAQM document 'Guidance on the assessment of dust from demolition and construction' (2024). This guidance sets out the methodology for assessing the air quality impacts of construction and demolition and identifies good practice for managing air quality impacts.

B.2 Assessment methodology

For developments where there are sensitive receptors within 250 m of where dust-generating activities may occur (as is the case for the Proposed Development) a detailed assessment is required. The risk of dust impacts is determined based on two factors:

1. dust emission magnitude; and
2. the sensitivity of the area.

These factors combine to give the risk of dust impacts in the absence of any mitigation measures.

B.2.1 Dust emission magnitude

The dust emission magnitude should be determined by considering the following criteria:

Table 7: Dust Emission Magnitude Criteria

Magnitude	Description
Demolition Activities	
Large	total building volume > 75,000m^3, potentially dusty construction material (i.e. concrete), on-site crushing and screening, demolition activities > 12m above ground level
Medium	total building volume 12,000 - 75,000m^3, potentially dusty construction material, demolition activities 6 – 12m above ground level
Small	total building volume < 12,000m^3, construction material with low potentially for dust release (i.e. metal cladding or timber), demolition activities <6m above ground level, demolition during wetter months
Earthworks	
Large	total size area > 110,000m², potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size), > 10 heavy earth moving vehicles active at any one time, formation of bunds > 6m in height,
Medium	total size area 18,000 – 110,000m², moderately dusty soil type (i.e. silt), 5 – 10 heavy earth moving vehicles active at any one time, formation of bunds 3 – 6m in height
Small	total size area < 18,000m², soil type with large grain size (i.e. sand), < 5 heavy earth moving vehicles active at any one time, formation of bunds < 3m in height
Construction Activities	

Magnitude	Description
Large	total building volume > 75,000m³, piling, on site concrete batching, sandblasting
Medium	total building volume 12,000 – 75,000m³, potentially dusty construction material (e.g. concrete), piling, on site concrete batching
Small	total building volume < 12,000m³, construction material with low potential for dust release (e.g. metal cladding or timber)
Trackout	
Large	> 50 HDV (> 3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100 m
Medium	20 – 50 HDV (> 3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100 m
Small	< 20 HDV (> 3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length < 50 m

Source: Section 7.2, Guidance on the assessment of dust from demolition and construction, IAQM (2024)

Only receptors within 50 m of the routes(s) used by vehicles on the public highway and up to 250 m from the site entrance(s) are considered to be at risk from the effects of dust from trackout.

B.2.2 Sensitivity of the area

The sensitivity of the area takes account of a number of factors:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentration; and
- site-specific factors, such as whether there are natural shelters, such as trees or other vegetation, to reduce the risk of wind-blown dust.

The type of receptors at different distances from the site boundary or, if known, from the dust generating activities, should be included. Consideration should also be given to the number of `human receptors'. Exact counting of the number of `human receptors' is not required. Instead, the guidance recommends that judgement is used to determine the receptors (a residential unit is one receptor) within each distance band.

There is no unified sensitivity classification scheme that covers the different potential effects on property, human health and ecological receptors. However, the following guidance is provided on the sensitivity of different types of receptors. For the sensitivity of people and their property to soiling, it is recommended that professional judgement is used to identify where on the spectrum between high and low sensitivity a receptor lies, considering the principles presented in Table 8.

Table 8: Sensitivity to Dust Soiling Effects

Sensitivity	Justification
High	Users can reasonably expect an enjoyment of a high level of amenity; or The appearance, aesthetics or value of their property would be diminished by dust deposition; and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods as part of the normal pattern of use of the land.

Sensitivity	Justification
	Indicative examples include dwellings, museums and other culturally important collections, medium and long-term car parks and car showrooms.
Medium	Users would expect to enjoy a reasonable level of amenity but would not reasonably expect to enjoy the same level of amenity as in their home; or The appearance, aesthetic or value of their property could be diminished by dust deposition; or The people or property would not reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land; Indicative examples include parks and places of work.
Low	The enjoyment of amenity would not reasonably be expected; or Property would not reasonably be expected to be diminished in appearance, aesthetics or value by dust deposition; or There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land. Indicative examples include playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short-term car parks and roads.

Source: Box 6, Guidance on the assessment of dust from demolition and construction, IAQM (2024)

For the sensitivity of people to the health effects of PM_{10} the IAQM categorises the sensitivity based on whether or not the receptor is likely to be exposed to elevated concentrations over a 24-hour period, as presented in Table 9.

Table 9: Sensitivity to Heath Effects of PM_{10}

Sensitivity	Justification
High	• Locations where members of the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
Medium	• Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24- hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day). Indicative examples include office and shop workers, but will generally not include workers occupationally exposed to PM_{10}, as protection is covered by Health and Safety at Work legislation.
Low	• Locations where human exposure is transient. Indicative examples include public footpaths, playing fields, parks and shopping streets

Source: Box 7, Guidance on the assessment of dust from demolition and construction, IAQM (2024)

Table 10 provides an example of possible sensitivities of receptors to ecological effects.

Table 10: Sensitivity to Ecological Effects

Sensitivity	Justification
High	• Locations with an international or national designation and the designated features may be affected by dust deposition; or • Locations where there is a community of a particularly dust sensitive species such as vascular species included in the Red Data List for Great Britain. Indicative examples include a Special Area of Conservation (SAC) designated for acid heathlands or a local site designated for lichens adjacent to the demolition of a large site containing concrete (alkali) buildings.
Medium	• Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or • Locations with a national designation where the features may be affected by dust deposition. Indicative example is a Site of Special Scientific Interest (SSSI) with dust sensitive features.
Low	• Locations with a local designation where the features may be affected by dust deposition. Indicative example is a Local Nature Reserve with dust sensitive features.

Source: Box 8, Guidance on the assessment of dust from demolition and construction, IAQM (2024)

Table 11, Table 12 and Table 13 show how sensitivity of the area should be determined for dust deposition, human health and ecosystem impacts respectively. The sensitivity of the is then derived for construction, earthworks and trackout.

Table 11: Sensitivity of the Area to Dust and Soiling Impacts on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<250
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Source: Table 2, Guidance on the assessment of dust from demolition and construction, IAQM (2024)

Table 12: Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM_{10} Conc.	No. of Receptors	Distance from the Source (m)			
			<20	<50	<100	<250
High	>32 µg/m³	>100	High	High	High	Medium
		10-100	High	High	Medium	Low
		1-10	High	Medium	Low	Low
	28 - 32 µg/m³	>100	High	High	Medium	Low
		10-100	High	Medium	Low	Low
		1-10	High	Medium	Low	Low
	24 – 28 µg/m³	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<24 µg/m³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium	>32 µg/m³	>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	28 – 32 µg/m³	>10	Medium	Low	Low	Low
		1-10	Low	Low	Low	Low
	24 - 28 µg/m³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
	<24 µg/m³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	-	>1	Low	Low	Low	Low

Source: Table 3, Guidance on the assessment of dust from demolition and construction, IAQM (2024)

Table 13: Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Source: Table 4, Guidance on the assessment of dust from demolition and construction, IAQM (2024)

B.2.3 Risk of dust impacts

The dust magnitude and sensitivity of the area are then combined using the following matrix to determine the risk of impacts with no mitigation applied. For the cases where the risk category is 'negligible', no mitigation measures beyond those required by legislation would be necessary.

Table 14: Risk of Dust Impacts – to Determine the Level of Mitigation Required

Sensitivity of area	Dust emission magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Source: Tables 6 - 9, Guidance on the assessment of dust from demolition and construction, IAQM (2024)

C Air Quality Assessment

FICHTNER

Consulting Engineers Limited





Shropshire In-Vessel Composting Facility



Veolia

Air Quality Assessment

ENGINEERING CONSULTING

Document approval

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Management Summary

Fichtner Consulting Engineers Ltd (Fichtner) has been engaged by Veolia ES Shropshire Limited (the Client) to prepare an Air Quality Assessment (AQA) to support the Environmental Permit (EP) application for an in-vessel composting facility (the Facility) to be installed at the former Befesa salt slag processing facility, Fenn's Bank, near Whitchurch.

The assessment has been carried out in a number of stages.

1) Review of Legislation

The Facility will be permitted by Natural Resources Wales (NRW) under the Environmental Permitting (England and Wales) Regulations (2016) as amended.

In the UK, the levels of pollution in the atmosphere are controlled by the National Air Quality Strategy and a number of European Directives which have been fully implemented. These have led to the setting of Environmental Assessment Levels (EALs) for the protection of human health. In addition, Critical Levels for ammonia and Critical Loads for nitrogen and acid deposition have been set for the protection of ecosystems.

2) Review of Ambient Air Quality

Mapped background concentrations and monitoring information has been used to assess the current levels of pollutants in the atmosphere close to the site. Baseline concentrations in the vicinity are well below the relevant EALs.

3) Identification of Sensitive Receptors

When assessing the impact of the proposal, the assessment considers the point of maximum impact outside of the installation boundary as a worst-case. In addition, the impact has been assessed at the closest residential receptor. Sensitive ecological sites within the relevant screening distances from the stack have been included in the assessment.

4) Dispersion Modelling of Emissions

The ADMS dispersion model is routinely used for air quality assessments to the satisfaction of local authorities and NRW. The model uses weather data from the local area to predict the spread and movement of the exhaust gases from the stack for each hour over a five-year period. The model takes account of wind speed, wind direction, temperature, humidity and the amount of cloud cover, as all of these factors influence the dispersion of emissions. The model also takes account of the effects of buildings and terrain on the movement of air.

Modelling has been undertaken for two scenarios to account for the expected daily variation in air flow to the biofilters, and for the expected seasonal variation in ammonia emissions concentrations.

The model has been used to predict the ground level concentration of pollutants on a long-term and short-term basis across a grid of points. In addition, concentrations have been predicted at the identified sensitive receptors.

Dispersion modelling of odour emissions has also been undertaken.

5) Assessment of Impact on Air Quality – Protection of Human Health

The air quality impact of the proposals on human health has been assessed using a standard approach based on guidance provided by NRW and the English Environment Agency (EA) as appropriate.

Using this approach, the following can be concluded from the assessment.

1. No exceedance of any EAL is predicted;
2. All impacts can be screened out as 'insignificant'.

6) Assessment of Impact on Air Quality – Protection of Ecosystems

The impact of air quality on ecology has been assessed using a standard approach based on guidance provided by NRW and the EA as appropriate.

1. The impact on annual mean airborne ammonia concentrations can be screened out as 'insignificant', except at the Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SAC. However, the impact that cannot be screened out as 'insignificant' does not occur at any locations where the SAC qualifying habitats are present. The maximum impact where the qualifying bog habitat is present is predicted to be less than 1% of the Critical Level and can be screened out as 'insignificant'. Furthermore, compared to historical ammonia emissions (from activities for which the site is still permitted), the predicted impact is very small.
2. Taking into account the likely emissions profile and average impact over five years of modelled weather data, the nitrogen and acid deposition impact at all receptors can be screened out as 'insignificant'.

7) Odour

The impact of odour has been assessed using a standard approach based on guidance provided by NRW and the EA as appropriate.

1. Odour dispersion modelling has shown that the maximum odour impact due to emissions from the biofilters will be well below the assessment criterion of 1.5 OUE/m^3.
2. An Odour Management Plan will be implemented, which will effectively manage other sources of odour associated with the operation of the Facility to ensure there are no significant odour impacts.

8) Summary and Conclusions

In summary, the assessment has shown that the operation of the Facility would not have a significant impact on local air quality, the general population or the local community. As such there should be no air quality constraint in granting an EP to operate the Facility.

Contents

Management Summary 3

1 Introduction 6
1.1 Structure of the report 6

2 Legislation 7
2.1 Environmental Assessment Levels 7
2.2 Application of EALs 7
2.3 Industrial pollution regulation 8

3 Baseline Air Quality 9
3.1 Mapped background data 9
3.2 Monitoring data 9
3.3 Summary 9

4 Sensitive Receptors 10
4.1 Human sensitive receptors 10
4.2 Ecological sensitive receptors 10

5 Assessment Criteria 13
5.1 Air quality 13
5.2 Odour 14

6 Dispersion Modelling Methodology 16
6.1 Selection of dispersion model 16
6.2 Model inputs 16
6.3 Baseline concentrations 19

7 Sensitivity Analysis 20
7.1 Stack height justification 20
7.2 Surface roughness length 22
7.3 Terrain 23
7.4 Building parameters 23
7.5 Operating below maximum load 24
7.6 Summary 25

8 Results 26
8.1 Human health 26
8.2 Ecology 28
8.3 Odour 35

9 Conclusions 37

Appendices 38
A Figures 39
B APIS Critical Loads 48
C Deposition Analysis 53

1 Introduction

Fichtner Consulting Engineers Ltd (Fichtner) has been engaged by Veolia ES Shropshire Limited (the Client) to prepare an Air Quality Assessment (AQA) to support the Environmental Permit (EP) application for an in-vessel composting facility (the Facility) to be installed at the former Befesa salt slag processing facility, Fenn's Bank, near Whitchurch. The site location is shown in Figure 1.

The Facility will treat up to 100,000 tonnes per annum (tpa) of compostable waste. The activities to be undertaken will be permitted by Natural Resources Wales (NRW) under the Environmental Permitting (England and Wales) Regulations (2016).

The assessment has considered the following:

1. the impact of emissions on human health and ecological receptors; and
2. the impact of odour emissions.

A version of this report (UF00174-0030-0001SMN Shropshire IVC Facility Air Quality Assessment_r2, dated 23 May 2025) has been reviewed by NRW as part of the pre-application consultation (PAC) for the planning application for the Facility. NRW's feedback included the following relevant advice:

> *"Our records illustrating the boundaries of the protected sites suggest that points E10, 12, 13 and 14 (from table 19) which are listed as 'local Nature sites', should be included within the statutory sites table.*
>
> *If the process contribution [of ammonia] plus the background level reaches or exceeds the critical level then abatement must be used to reduce the process contribution to below 1% of the critical level, in order for the application to proceed… … We therefore advise that any planning application submitted should present suitable mitigation measures to ensure the development proposal will not adversely affect the integrity of the SAC/Ramsar site. We also advise that other sources of ammonia should be considered and that an in-combination assessment is undertaken in line with the above noted guidance."*

In response to NRW's comments this assessment has been updated to apply the screening criteria for European and UK designated sites to points E10, 12, 13 and 14, and the design of the Facility has been amended to increase the stack height to reduce the ammonia process contribution to below 1% of the Critical Level at the closest SAC qualifying habitat (refer to section 7.1). No other potentially significant new or planned sources of ammonia or nitrogen deposition have been identified within 5 km of the Facility, so an in-combination assessment is not required.

1.1 Structure of the report

This report has the following structure.

- Air quality legislation and guidance is considered in section 2.
- The current levels of ambient air quality are described in section 3.
- Section 4 highlights the residential and ecological receptors considered.
- The assessment criteria are detailed in section 5.
- The dispersion modelling methodology and inputs are presented in section 6.
- The results of sensitivity tests for the model inputs are presented in section 7.
- The impact of emissions from the Facility is presented in section 8.
- The conclusions of the assessment can be found in section 9.
- The Appendices include figures and detailed results tables.

2 Legislation

2.1 Environmental Assessment Levels

The only pollutant of concern for human health and ecological impacts that will be emitted by the Facility is ammonia. The English Environment Agency (EA) includes Environmental Assessment Levels (EALs) for ammonia in the environmental management guidance 'Air Emissions Risk Assessment for your Environmental Permit'[1] ("Air Emissions Guidance"), which is considered in lieu of guidance specific to Wales. Critical Levels for the protection of sensitive ecosystems and habitats are also contained within the Air Emissions Guidance and the Air Pollution Information System (APIS). Table 1 summarises the EALs and Critical Levels used in this assessment.

Table 1: Environmental Assessment Levels (EALs)

Pollutant	EAL or Critical Level (µg/m³)	Averaging Period	Source
Ammonia	180	Annual	Air Emissions Guidance
	2,500	1 hour	Air Emissions Guidance
	1	Annual mean where lichens and bryophytes are an important part of the ecosystem's integrity	Air Emissions Guidance / APIS
	3	Annual mean for all higher plants	Air Emissions Guidance / APIS

In addition to these Critical Levels, APIS provides habitat specific Critical Loads for nitrogen and acid deposition. These are detailed in Appendix B for the identified ecological receptors.

2.2 Application of EALs

The EALs apply at areas of relevant exposure relevant to the assessment level. The following table extracted from Local Authority Air Quality Technical Guidance (2022) (LAQM.TG(22)) explains where the relevant EALs apply.

Table 2: Guidance on where EALs apply

Averaging period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed. Building façades of residential properties, schools, hospitals, care homes etc.	Building façades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties.

[1] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit#environmental-standards-for-air-emissions

Averaging period	Objectives should apply at:	Objectives should generally not apply at:
		Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short-term.
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives apply. Kerbside sites (for example, pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where members of the public might reasonably be expected to spend one hour or more. Any outdoor locations where members of the public might reasonably be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.

Source: Box 1-1, Local Air Quality Management Technical Guidance (TG22), Defra, August 2022

2.3 Industrial pollution regulation

Atmospheric emissions from industrial processes are controlled through the Environmental Permitting (England and Wales) Regulations (2016). The Facility will be subject to an EP to operate. The EP will include conditions to minimise the environmental impact by:

- preventing fugitive emissions of dust and odour beyond the boundary of the permitted activity; and
- limiting emissions to air in accordance with Best Available Techniques (BAT), as laid out in the Waste Treatment BAT Reference document (BREF) and Waste Treatment BAT Conclusions.

Compliance with these conditions is demonstrated through the periodic monitoring of emissions, as required by the EP.

3 Baseline Air Quality

3.1 Mapped background data

Concentrations will vary over the modelling domain area, which extends up to approximately 5 km from the Facility. Therefore, the maximum from the 1 x 1 km grid squares within 5 km of the Facility has been extracted from the APIS dataset, along with the concentrations at the grid square containing the Facility. These are presented in Table 3.

Table 3: Mapped background analysis

Pollutant	Concentration (µg/m³)		Dataset
	At Facility	Max in modelling domain	
Ammonia	2.90	3.40	APIS 2021 mid-year

Source: APIS

3.2 Monitoring data

A review of the UK Eutrophying and Acidifying Network (UKEAP) shows that there is one ammonia monitoring site within 10 km of the Facility, located at Fenn's Moss approximately 3 km south-west of the Facility. The monitored ammonia concentration at this site for the most recent five years of monitoring data is presented in Table 4.

Table 4: Monitoring data – Fenn's Moss

ID	Distance from site (km)	APIS 2021 Mapped Bg (µg/m³)	Annual mean concentration (µg/m³)				
			2020	2021	2022	2023	2024
Fenn's Moss	3.1	3.10	2.67	2.13	2.45	2.15	1.88

Source: © Crown 2025 copyright Defra via uk-air.defra.gov.uk, licenced under the Open Government Licence (OGL).

As shown, the monitored concentrations have shown a slight decreasing trend over the most recent five years of data. In addition, the monitored concentrations are lower than the APIS mapped background concentration. This suggests that in the vicinity of the monitoring site the background maps may be over-estimating the baseline concentration.

Data from the Fenn's Moss monitoring site will include a contribution from the Befesa operations previously undertaken at the site up until the time that operations ceased; however, due to the 3 km distance to the monitoring site it is considered that any contribution would be small and no adjustment to the baseline concentrations has been made to account for the reduction in concentrations due to the cessation of activities.

3.3 Summary

The maximum ammonia concentration from within 5 km of the Facility obtained from the APIS background maps (3.40 µg/m³) has been used as the baseline concentration for the assessment of impacts on human health. Receptor-specific ammonia concentrations have been obtained from APIS for any impacts on ecological receptors that cannot be screened out as 'insignificant' (refer to section 5). For the assessment of impacts in close proximity to Fenn's Moss, consideration has been given to the monitored concentrations.

4 Sensitive Receptors

4.1 Human sensitive receptors

The general approach to the assessment is to evaluate the highest predicted process contribution (PC) across the grid of output points. In addition, the predicted PC at sensitive receptors at areas of relevant exposure has been evaluated. The locations of the receptors included in this assessment are shown in Figure 2 and listed in Table 5. The receptors have been modelled at a height of 1.5 m to represent a typical breathing height.

Table 5: Human sensitive receptors

ID	Receptor Name	Location		Distance from stack (m)
		X (m)	Y (m)	
R1	Park Farm Cottages, Fenn's Bank Road	350891	339166	281
R2	Fenn's Bank Road 2	350922	339100	322
R3	Fenn's Bank Road 3	350928	339018	357
R4	Residence near Mereside Industrial Park	350821	338955	308
R5	The Conery, Conery Lane	349892	338730	847
R6	Woodlands Farm, Conery Lane	350026	339207	585
R7	Conery Lane Farm, Conery Lane	349879	339573	830
R8	Pinfold Cottage, Long Lane	350115	339862	843
R9	The View, Fenn's Bank Road	350572	339584	406

There are additional receptors where 24-hour and 1-hour EALs apply, for example gardens and footpaths. Odour benchmarks also apply at residential properties, and at gardens and footpaths. If necessary, consideration has been given to impacts at locations other than the receptors above using contour plot files.

4.2 Ecological sensitive receptors

A study has been undertaken to identify the following sites of ecological importance in accordance with the following screening distances laid out in the Air Emissions Guidance, which have been applied in lieu of any guidance specific to Wales:

- Special Protection Areas (SPAs), Special Areas of Conservation (SACs), or Ramsar sites within 10 km of the Site;
- Sites of Special Scientific Interest (SSSIs) within 2 km of the Site; and
- National Nature Reserves (NNR), Local Nature Reserves (LNRs), local wildlife sites (LWSs) and ancient woodlands (AWs) within 2 km of the Site. These are collectively referred to as local nature sites.

The ecological receptors identified are displayed in Figure 3 and are listed in Table 6. The Midland Meres and Mosses Phase 1 and Phase 2 Ramsar sites comprise a number of separate sites, each of which is also designated as a SSSI. Although these lie outside of the screening distances for SSSIs, the SSSI names have been listed to identify each site.

Table 6: Ecological Sensitive Receptors

ID	Site	Designation	Closest point to stack		Distance from stack at closest point (km)
			X (m)	Y (m)	
European and UK Designated Sites					
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	SSSI, SAC, Ramsar	350405	338878	0.4
E2	Brown Moss	SAC, Ramsar	355950	339320	5.3
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Ramsar	356230	343450	7.1
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	Ramsar	354580	345280	7.3
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Ramsar	347170	339010	3.4
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Ramsar	345600	339320	5.0
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	SAC, Ramsar	343560	334250	8.6
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Ramsar	343800	333370	9.0
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Ramsar	345940	330390	9.9
Local Nature Sites					
E10	Fenn's, Whixall & Bettisfield Mosses	NNR (+SSSI, SAC, Ramsar)	350350	338760	0.5
E11	Fenn's Rough Ancient Woodland	AW	351185	339342	0.6
E12	Fenn's Wood Ancient Woodland North	AW (+SSSI, SAC, Ramsar)	350750	338198	1.0
E13	Fenn's Wood Ancient Woodland Mid	AW (+SSSI, SAC, Ramsar)	350650	337750	1.4
E14	Fenn's Wood Ancient Woodland South	AW (+SSSI, SAC, Ramsar)	350680	337390	1.8
E15	Unnamed Ancient Woodland 1	AW	350785	337872	1.3
E16	Unnamed Ancient Woodland 2	AW	349940	340640	1.6
E17	Unnamed Ancient Woodland 3	AW	350112	340885	1.8

NRW's PAC response noted that receptors E10, E12, E13, and E14 overlap with the Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SSSI, SAC, and Ramsar designations. These receptor locations have been used to assess the impact of emissions on the features for which the local nature sites are designated. However, as these also lie within the SSSI, SAC, and Ramsar designations, the

assessment criteria applicable to European and UK designated sites (as detailed in section 5.1.2) have been applied at these receptors.

As all sites considered are designated as mosses (i.e. bogs) or ancient woodlands, lichens or bryophytes are likely to be an important part of each ecosystem's integrity, and the more stringent Critical Level for ammonia has been applied at all sites in the first instance.

Site-specific data on APIS has been reviewed to determine the applicable Critical Loads, which are presented in Appendix B. In the first instance, the most sensitive habitat in each site featuring aquatic habitats, short vegetation and woodland have been included in the assessment. For any impacts that cannot be screened out, consideration has been given to the impact on all designated features at the affected site.

5 Assessment Criteria

5.1 Air quality

5.1.1 Human health

The Air Emissions Guidance states that to screen out 'insignificant' process contributions (PCs):

- *the long-term PC must be less than 1% of the long-term environmental standard; and*
- *the short-term PC must be less than 10% of the short-term environmental standard.*

As part of this assessment, predicted PCs have been compared to the EALs presented in section 2.1.

If the above criteria are achieved, it can be concluded that it is not likely that emissions would lead to significant environmental impacts and the PCs can be screened out.

The long-term 1% PC threshold is based on the judgement 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.

The short-term 10% PC threshold is based on the judgement that:

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

For the purpose of this assessment, if the impact can be screened out as 'insignificant' at the point of maximum impact, further assessment is not required. If PCs cannot be screened out, assessment will be undertaken for the following:

- the Predicted Environmental Concentration (PEC, defined as the PC plus the background concentration) at the point of maximum impact; and
- the PC and PEC at areas of public exposure.

If the long-term PEC is below 70% of the EAL, or the short-term PC is less than 20% of the headroom[2], it can be concluded that there is little risk of the PEC exceeding the EAL, and the impact can be considered to be 'not significant'.

5.1.2 Ecology

The Air Emissions Guidance states that to screen out impacts as 'insignificant' at European and UK statutory designated sites:

- the long-term PC must be less than 1% of the long-term environmental standard (i.e., the Critical Level or Load); and
- the short-term PC must be less than 10% of the short-term environmental standard.

If the above criteria are met, no further assessment is required. If the long-term PC exceeds 1% of the long-term environmental standard, the PEC must be calculated and compared to the standard. If the resulting PEC is less than 70% of the long-term environmental standard, the Air Emissions Guidance states that the emissions are 'insignificant' and further assessment is not required. In accordance with the guidance, calculation of the PEC for short-term standards is not required.

[2] Calculated as the AQAL minus twice the long-term background concentration

The Air Emissions Guidance states further that to screen out impacts as 'insignificant' at local nature sites[3]:

- the long-term PC must be less than 100% of the long-term environmental standard; and
- the short-term PC must be less than 100% of the short-term environmental standard.

In accordance with the guidance, calculation of the PEC for local nature sites is not required.

5.2 Odour

Odour impacts are dependent on various factors, weather conditions, individual perceptions and are temperamental in their nature. Odours are characterised in terms of European odour units, OU_E, and odour concentrations, OU_E/m^3.

The OU_E strength of a release is the number of times the mixture must be diluted, at standard temperature and pressure, to reach the detection limit by 50% of the members of an olfactory panel.

5.2.1 Odour assessment criteria

The main requirement with respect to odour control from industrial activities is the Environmental Permitting (England and Wales) Regulations (2016). Typically, the EP will include a condition to ensure that "*emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable to minimise the odour.*"

There is no statutory limit in the UK for ambient odour concentrations, and the EA's odour management guidance[4] does not include any odour exposure thresholds or benchmarks. However, the EA's superseded H4 Odour Management guidance (2011)[5] sets benchmark levels which are commonly used for assessing odour impacts. Odours are characterised in terms of European odour units, OU_E, and odour concentrations, OU_E/m^3.The OU_E strength of a release is the number of times the mixture must be diluted, at standard temperature and pressure, to reach the detection limit by 50% of the members of an olfactory panel; i.e. a concentration of 1 OU_E/m^3 is the level at which an odour would be detectable (but not identifiable) to 50% of the population.

The odour assessment benchmark levels taken from the H4 guidance are as below:

- 1.5 OU_E/m^3 as the 98th percentile of hourly mean concentrations for the most offensive odours (e.g. decaying animal or fish remains, septic effluent or sludge, biological landfill);
- 3.0 OU_E/m^3 as the 98th percentile of hourly mean concentrations for moderately offensive odours (e.g. intensive livestock rearing, fat frying or food processing, green waste composting); and
- 6.0 OU_E/m^3 as the 98th percentile of hourly mean concentrations for less offensive odours (e.g. brewery, confectionery, coffee).

In accordance with the H4 guidance these criteria are primarily for application at sensitive receptors such as housing.

[3] National Nature Reserves (NNR), Local Nature Reserves (LNRs), local wildlife sites and ancient woodlands

[4] https://www.gov.uk/guidance/odour-management-comply-with-your-environment-permit

[5] https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management

In the absence of an odour benchmark in the current EA odour guidance, it is considered appropriate to use the benchmarks taken from the H4 guidance to assess whether the impact of odour emissions would be acceptable.

As a conservative screening assumption, this assessment has been carried out using the most stringent assessment criterion/benchmark i.e. assuming the Facility could have the potential to produce the 'most offensive odours'.

6 Dispersion Modelling Methodology

6.1 Selection of dispersion model

Detailed dispersion modelling was undertaken using the model ADMS 6, developed and supplied by Cambridge Environmental Research Consultants (CERC). This is a new generation dispersion model, which characterises the atmospheric boundary layer in terms of the atmospheric stability and the boundary layer height. In addition, the model uses a skewed Gaussian distribution for dispersion under convective conditions, to take into account the skewed nature of turbulence. The model also includes modules to take account of the effect of buildings and complex terrain, and is capable of modelling atmospheric chemical reactions, odour, and plume visibility. ADMS is routinely used for modelling of emissions for planning and environmental permitting purposes to the satisfaction of the NRW, the EA and local authorities.

6.2 Model inputs

6.2.1 Source and emissions data

The biofilter stack for the Facility is designed to release a maximum of 120,000 m^3/h of air. The technology provider has advised that the flow rate will vary, being typically 70% of the maximum during the day (07:00 – 19:00) and 40% of the maximum overnight (19:00 – 07:00). This has been accounted for in the modelling by the use of a time-varying emissions file.

The emission limit values (ELVs) for ammonia and odour are the taken from the Waste Treatment Best Available Techniques Reference (BREF) document. Typically, the upper end of the BAT-associated emission levels (BAT-AELs) are applied, which are 20 mg/m^3 for ammonia and 1,000 OU_E/m^3 for odour. However, preliminary modelling identified that the ELV for ammonia would need to be set below the upper end of the BAT-AEL range, even when accounting for anticipated airflows through the biofilters. It is proposed to apply an ELV of 3.5 mg/m^3 for ammonia, which the technology provider has confirmed is achievable.

In addition, the technology provider has advised that ammonia emissions are likely to vary seasonally, being highest in winter and lowest in summer (refer to Table 8). This is due to the expected ratio of food waste to green waste, with food waste which has the highest potential to generate ammonia emissions making up a greater proportion of the waste during the winter months. A time-varying emissions file has been used to represent the expected seasonal changes in ammonia emission concentration.

In summary, modelling has been undertaken for the following scenarios:

- Scenario 1: Ammonia emission concentrations at the proposed ELV of 3.5 mg/Nm^3.
  - Flow at 70% of maximum during the day (07:00 – 19:00) and 40% of the maximum overnight (19:00 – 07:00) for the assessment of annual mean impacts; and
  - Flow at 100% of maximum for the assessment of short-term impacts.
- Scenario 2: Daily varying flow as per Scenario 1 (for both annual mean and short-term impacts), and seasonally varying ammonia emission concentrations as detailed in Table 8.

The model input parameters are presented in Table 7 and Table 8.

Table 7: Biofilter stack source data

Item	Unit	Value		
Stack Data				
Height	m	27 – see stack height assessment (section 7.1)		
Internal diameter	m	1.46		
Location	m, m	350631, 339158		
Flue Gas Conditions				
Temperature	°C	30		
		100% flow	**70% flow**	**40% flow**
Volume at reference conditions[(1)]	Nm³/s	30.0	21.0	12.1
Volume at actual conditions	Am³/s	33.3	23.3	13.3
Flue gas exit velocity	m/s	20.0	14.0	8.0
Note: *[(1)] Reference conditions of 273K, no correction for oxygen or water vapour.*				

Table 8: Biofilter stack emissions data

Pollutant	Concentration (OU_E/m^3 or mg/Nm³)	Release rate (OU_E/m^3 or g/s)		
		100% flow	**70% flow**	**40% flow**
Odour	1,000	30,033	21,023	12,013
Ammonia – at ELV	3.50	0.1051	0.0736	0.0420
Ammonia – max (winter)	3.50	0.1051	0.0736	0.0420
Ammonia – min (summer)	1.40	0.0420	0.0294	0.0168
Ammonia – average (spring and autumn)	2.45	0.0736	0.0515	0.0294
Note: 'Winter' means December to February, 'spring' means March to May, 'summer' means June to August, and 'autumn' means September to November.				

6.2.2 Modelling domain

Modelling has been undertaken using a grid of 1.5 x 1.5 km with a grid spacing of 15 m nested within a wider grid of 9 x 9 km with a grid spacing of 90 m. The minimum grid spacing is less than 1.5 times the stack height in accordance with LAQM.TG(22) guidance and is considered fine enough to accurately capture the maximum concentrations. The results for the fine grid have been output at 0 m height (for assessment of ecological impacts) and 1.5 m height (for assessment of impacts on human health and odour concentrations). For the wide grid only results at 0 m for assessment of ecological impacts have been output.

The grid parameters are detailed in Table 9 and the modelling domain shown in Figure 4.

Table 9: Modelling Domain

Parameter	Fine grid	Wide grid
Grid spacing (m)	15	90
Grid height (m)	0 and 1.5	0
Grid start X	350005	346000
Grid finish X	351505	355000
Grid start Y	338510	333500
Grid finish Y	340010	342500

6.2.3 Meteorological data and surface characteristics

The impact of meteorological data was taken into account by using weather data from the Shawbury meteorological station for the years 2018 – 2022. Shawbury is located approximately 17 km to the south of the Facility and is the closest and most representative meteorological site available. The data was obtained from Enviro Data Services. Five years of data have been used to take into account inter-annual fluctuations in weather conditions. Wind roses from Shawbury for each year are presented in Figure 5.

6.2.3.1 Minimum Monin-Obukhov length

The minimum Monin-Obukhov length can be selected in ADMS for both the dispersion site and the meteorological site. This is a measure of the minimum stability of the atmosphere and can be adjusted to account for urban heat island effects which prevent the atmosphere in urban areas from ever becoming completely stable. The minimum Monin-Obukhov length has been set to 1 m for the dispersion and meteorological sites, as recommended by CERC for “rural” areas.

6.2.3.2 Surface roughness

The surface roughness length can be selected in ADMS for the dispersion and the meteorological site, which are both located in rural, relatively open settings. The surface roughness length has been set to 0.2 m for the dispersion site, which is the minimum value recommended by CERC for “agricultural areas” and is considered representative of the mainly open land around the dispersion site. The surface roughness length has been set to 0.3 m for the meteorological site, which is the maximum value recommended by CERC for “agricultural areas”. The surface roughness length for the meteorological site has been set at a slightly higher value than for the dispersion site to account for the proximity of Shawbury village.

6.2.3.3 Summary of meteorological parameters

A summary of the meteorological parameters used in the dispersion modelling is shown in Table 10.

Table 10: Meteorological parameters

Parameter	Dispersion site value (m)	Met site value (m)
Surface roughness length	0.2	0.3
Minimum Monin-Obukhov length	1	1

The sensitivity of the modelling results to the choice of surface roughness length has been considered in Section 7.1.

6.2.4 Terrain

It is recommended that, where gradients within 500 m of the modelling domain are greater than 1 in 10, the complex terrain module within ADMS (FLOWSTAR) should be used. A review of the local area indicates that some small sections of the modelling domain may have such gradients. A sensitivity analysis has been undertaken to determine the effect of terrain (refer to section 7.3). This shows that terrain does not have a significant effect on the dispersion modelling results, so it is not considered necessary to include a terrain file in the dispersion modelling.

6.2.5 Buildings

The presence of adjacent buildings can significantly affect the dispersion of the atmospheric emissions in the following ways.

- Wind blowing around a building distorts the flow and creates zones of turbulence. The increased turbulence can cause greater plume mixing.
- The rise and trajectory of the plume may be depressed slightly by the flow distortion. This downwash leads to higher ground level concentrations closer to the stack than those which would be present without the building.

The EA recommends that buildings should be included in the modelling if they are both:

- Within 5L of the stack (where L is the smaller of the building height and maximum projected width of the building); and
- Taller than 40% of the stack.

The ADMS 6 user guide also states that buildings less than one third of the stack height are ignored within the model as they will not have a significant effect on dispersion.

A review of the surroundings of the Facility has been undertaken. Details of the buildings modelled are presented in Table 11 and a site plan is presented in Figure 6.

Table 11: Building Details

Buildings	Centre point		Height (m)	Width (m)	Length (m)	Angle (°)
	X (m)	Y (m)				
Existing building(1)	350626	339113	12.8	55.0	96.0	55
Biofilters	350625	339171	7.8	25.0	48.5	55

Note:
(1) Selected as the main building in the model; as this is the taller and larger building it is expected to have the greatest effect on dispersion.

The sensitivity of the results to the inclusion of the building effects has been considered in section 7.4.

6.3 Baseline concentrations

Background concentrations for the assessment have been derived from national mapping and monitoring as presented in section 3. For short term averaging periods, the background concentration has been assumed to be twice the long term ambient concentration in accordance with EA guidance.

7 Sensitivity Analysis

7.1 Stack height justification

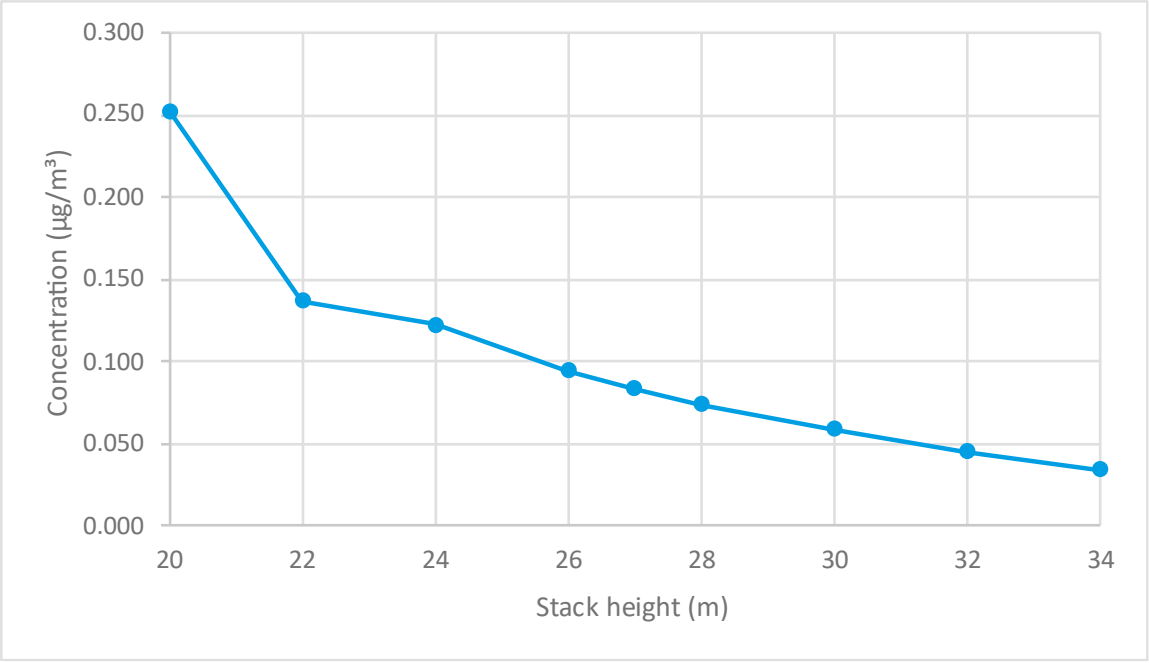
A stack height assessment has been run for a range of stack heights from 20 m to 34 m. The results are shown on the graphs below on which the maximum predicted concentration has been plotted against stack height for annual mean and maximum hourly concentrations. This assumes operation at the anticipated operational profile (scenario 2; refer to section 6.2.1).

Typically, the minimum recommended stack height is determined by identifying any step changes in the angle of the slope, which would indicate reduced benefit to increasing the stack height beyond the height at which the step change in angle occurs.

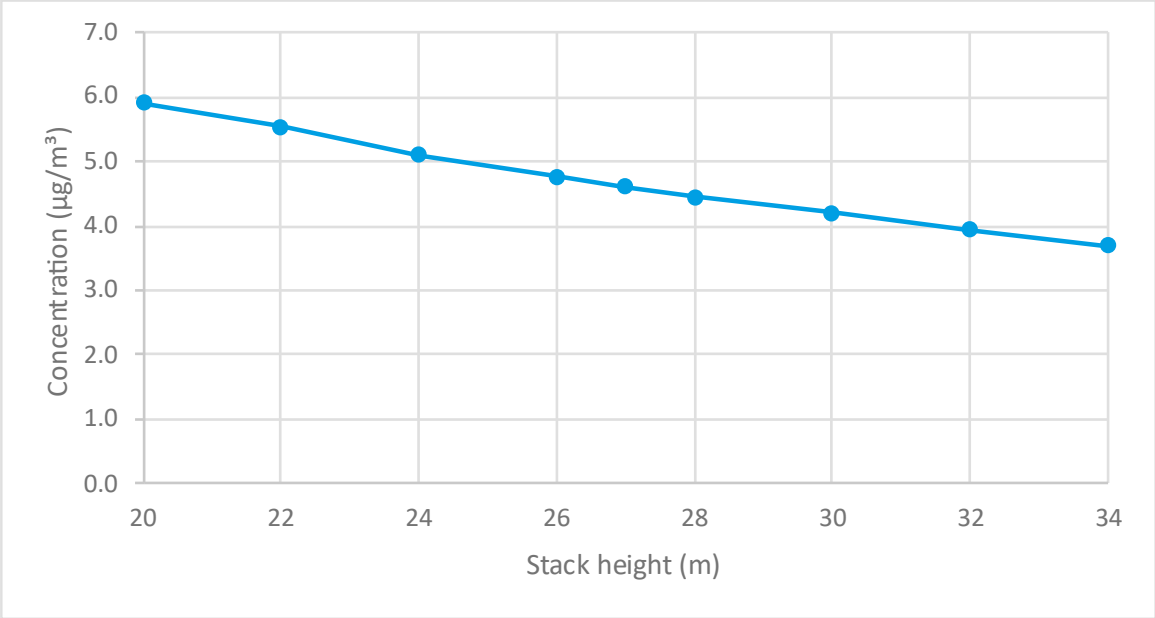
The following parameters have been kept constant:

- emissions scenario – seasonally varying profile;
- buildings – included;
- terrain – excluded;
- dispersion site surface roughness length – 0.2 m;
- meteorological surface roughness length – 0.3 m;
- dispersion and meteorological site Minimum Monin-Obukhov length – 1 m;
- meteorological data used – Shawbury 2018 - 2022.

Graph 1: Stack Height Analysis – Maximum Annual Mean Impact

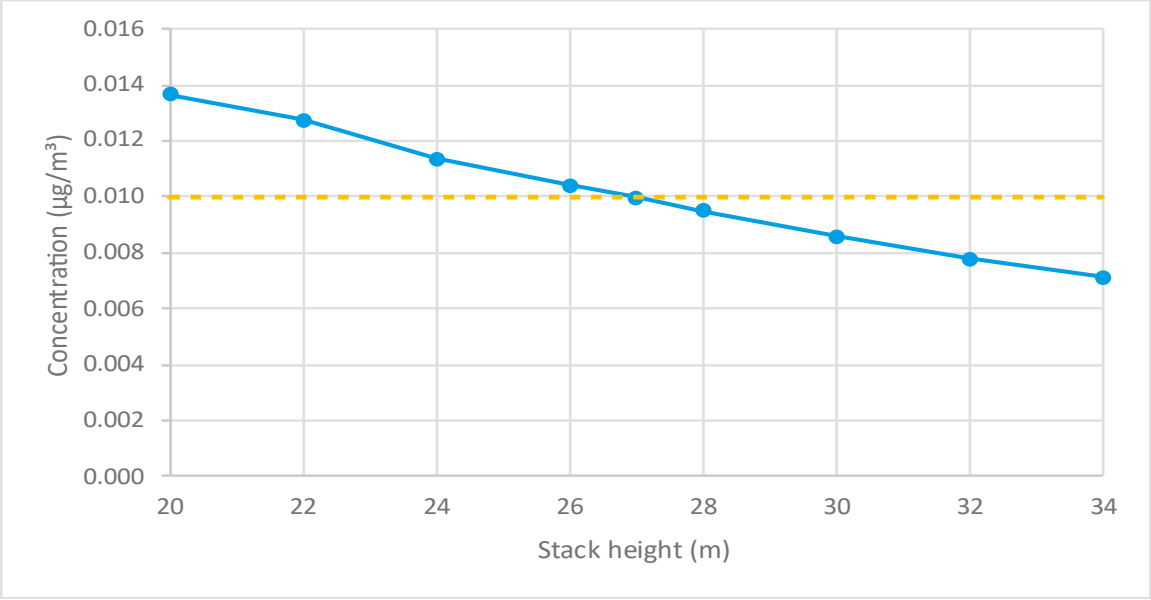


Graph 2: Stack Height Analysis – Maximum Short-Term Stack Impact



As shown, for annual mean concentrations there is a steep drop in concentrations for a stack height of 22 m, a levelling-off in the slope up to 24 m, then a steady decrease in impact with increasing stack height. For short-term (maximum 1-hour) impacts there is a steady decrease in impacts with increasing stack height. These graphs show that increasing the stack height to 22 m has the most benefit to dispersion, particularly for reducing maximum annual mean concentrations. Considering the magnitude of the impacts, the concentrations for all stack heights considered are well below 1% of the annual mean EAL of 180 µg/m³ and hourly mean EAL of 2,500 µg/m³ for ammonia, so impacts on human health are not a constraint. Therefore, consideration has been given to the effect of the choice of stack height on the maximum predicted impact at the closest SAC qualifying feature, which is bog habitat located at receptor E10 (X: 350350, Y: 338760). The concentration that equates to 1% of the Critical Level of 1 µg/m³ (i.e., 'insignificant') is shown by the orange line.

Graph 3: Stack Height Analysis – Maximum Annual Mean Impact at Bog Habitat



As shown, increasing the stack height results in a steady decrease in impact across the range of stack heights considered. A stack height of 27 m is required for the predicted impact to be less than 1% of the Critical Level at the closest SAC qualifying features. Therefore, a 27 m stack height is considered sufficiently tall to provide adequate dispersion of emissions and prevent a potentially significant impact.

7.2 Surface roughness length

The sensitivity of the results to surface roughness length has been considered by running the model with a range of surface roughness lengths for the dispersion site.

The following parameters have been kept constant:

- stack height – 27 m;
- emissions scenario – seasonally varying profile;
- buildings – included;
- terrain – excluded;
- meteorological site surface roughness length – 0.3 m;
- dispersion site and meteorological Minimum Monin-Obukhov length – 1 m;
- meteorological data used – Shawbury 2020.

Table 12 presents the concentration at the point of maximum impact and at the maximum impacted receptor for each surface roughness value.

Table 12: Choice of Surface Roughness Length

Dispersion site surface roughness length (m)	Ammonia PC (µg/m³)			
	Point of maximum impact		Maximum impacted receptor	
	Annual mean	Max 1-hour	Annual mean	Max 1-hour
0.02	0.060	4.54	0.036	1.13
0.1	0.071	4.50	0.044	1.06
0.2	**0.077**	**4.61**	**0.048**	**1.03**
0.3	0.081	4.70	0.049	1.01
0.5	0.087	3.89	0.052	1.00
% Change from 0.2 m				
0.02	-22.2%	-1.4%	-23.7%	9.3%
0.1	-8.2%	-2.3%	-7.3%	2.4%
0.3	5.6%	2.0%	2.2%	-2.0%
0.5	13.0%	-15.6%	10.1%	-3.2%

As shown, the maximum annual mean results are sensitive to the choice of surface roughness length, but short-term results are less sensitive. The selected value of 0.2 m is considered appropriate given the relatively open rural surroundings of the Facility.

7.3 Terrain

The sensitivity of the results to the effect of terrain has been considered by running the model with and without a complex terrain file at 64 x 64 resolution.

The following parameters have been kept constant:

- stack height – 27 m;
- emissions scenario – seasonally varying profile;
- buildings – included;
- dispersion site surface roughness length – 0.2 m;
- meteorological surface roughness length – 0.3 m;
- dispersion and meteorological site Minimum Monin-Obukhov length – 1 m;
- meteorological data used – Shawbury 2020.

Table 13 presents the concentration at the point of maximum impact and at the maximum impacted receptor for each scenario.

Table 13: Effect of Terrain

Scenario	Ammonia PC (µg/m³)			
	Point of maximum impact		Maximum impacted receptor	
	Annual mean	Max 1-hour	Annual mean	Max 1-hour
Excluding terrain	**0.077**	**4.61**	**0.048**	**1.03**
Including terrain	0.080	4.83	0.047	1.10
% change	3.3%	4.8%	-1.1%	6.3%

Modelling the effect of terrain results in very small changes to the modelled concentrations. As terrain effects are negligible and the surrounding landscape is relatively flat, terrain effects have not been applied in the main model runs.

7.4 Building parameters

The sensitivity of the results to the effect of the modelled building has been considered by running the model with and without the building.

The following parameters have been kept constant:

- stack height – 27 m;
- emissions scenario – seasonally varying profile;
- terrain – excluded;
- dispersion site surface roughness length – 0.2 m;
- meteorological surface roughness length – 0.3 m;
- dispersion site and meteorological Minimum Monin-Obukhov length – 1 m;
- meteorological data used – Shawbury 2020.

Table 14 presents the concentration at the point of maximum impact and at the maximum impacted receptor for each scenario.

Table 14: Effect of Buildings

Scenario	Ammonia PC (µg/m³)			
	Point of maximum impact		Maximum impacted receptor	
	Annual mean	Max 1-hour	Annual mean	Max 1-hour
Including buildings	**0.077**	**4.609**	**0.048**	**1.03**
Excluding buildings	0.051	2.190	0.032	1.02
% change	-33.4%	-52.5%	-32.3%	-0.8%

Modelling the presence of the buildings results in significantly higher annual mean and short-term concentrations, except for maximum short-term concentrations at the maximum impacted receptor for which there is little difference. The buildings have been included in the dispersion model as this represents a realistic approach.

7.5 Operating below maximum load

It has been assumed that the Facility will operate as per the expected daily operational profile described in section 6.2. It is considered appropriate to base the assessment of annual mean impacts on the model results using the expected daily operational profile. However, for the assessment of short-term impacts it is possible that the range of meteorological conditions modelled and the operational profile do not combine to assess the worst-case combination of emissions and meteorological conditions. Therefore, the model has been run with the flow rate at 100%, 70% and 40% of full load and ammonia emissions at the proposed ELV. This has considered all five years of weather data to account for worst-case weather conditions for dispersion.

The following parameters have been kept constant:

- stack height – 27 m;
- terrain – excluded;
- dispersion site surface roughness length – 0.2 m;
- meteorological surface roughness length – 0.3 m;
- dispersion site and meteorological Minimum Monin-Obukhov length – 1 m;
- meteorological data used – Shawbury 2018 - 2022.

Table 15 presents the concentration at the point of maximum impact and at the maximum impacted receptor for each scenario. This has considered the effect on short-term concentrations only.

Table 15: Effect of Flow Rate

Scenario	Maximum 1-hour ammonia PC (µg/m³)	
	Point of maximum impact	Maximum impacted receptor
100% flow rate	**7.10**	**1.81**
70% flow rate	6.96	1.59
40% flow rate	6.47	1.32
% Change from 100% flow rate		
70% flow rate	-1.9%	-12.2%
40% flow rate	-8.8%	-26.7%

The differing loads result in minimal changes in the predicted short-term concentration at the point of maximum impact, with the 100% flow rate resulting in the highest concentration by a small margin. At the maximum impacted receptor location the 100% flow rate scenario clearly results in the greatest impact. As such, the full load scenario is considered to represent the worst-case scenario for short-term concentrations. The varying flow scenario described in section 6.2.1 has been used to assess long-term impacts.

7.6 Summary

In summary, the remainder of this assessment has been based on the following assumptions:

- stack height – 27 m;
- buildings – included;
- terrain – excluded;
- dispersion site surface roughness length – 0.2 m;
- meteorological surface roughness length – 0.3 m;
- dispersion and meteorological site Minimum Monin-Obukhov length – 1 m;
- meteorological data used – Shawbury 2018 to 2022.

8 Results

8.1 Human health

8.1.1 At the point of maximum impact outside of the installation boundary

Table 16 presents the results of the dispersion modelling at the point of maximum impact of the Facility. The maximum predicted concentrations are based on the following:

- Grid spacing – 15 m fine grid nested within a wider grid of 90 m resolution;
- The maximum impact over five years of weather data from 2018 to 2022 from the Shawbury meteorological recording station;
- Two scenarios:
  - 1. Ammonia emission concentrations at the proposed ELV of 3.5 mg/Nm³; and
  - 2. Seasonally varying ammonia emission concentrations as detailed in section 6.2.1;
- Operation at 70% load during daytime and 40% during nighttime (07:00 – 19:00) and 40% of the maximum overnight (19:00 – 07:00); and
- Operation at 100% load and at the proposed ELV of 3.5 mg/Nm³ during the worst-case weather conditions for dispersion, for the assessment of short-term impacts (scenario 1 only).

The baseline concentrations are taken from the review of baseline data contained in section 3.

Table 16: Dispersion Modelling Results – Point of Maximum Impact Outside of Installation Boundary

Pollutant	Quantity	Units	EAL	Bg Conc.	PC at point of max impact outside installation boundary						Max as % of EAL	PEC (PC +Bg)	PEC as % of EAL
					2018	2019	2020	2021	2022	Max			
Scenario 1: Emissions at ELV													
Ammonia	Annual mean	µg/m³	180	3.40	0.10	0.09	0.11	0.10	0.12	0.12	0.07%	3.52	1.96%
	Hourly mean	µg/m³	2,500	6.80	3.78	3.72	3.87	3.98	4.01	4.01	0.16%	10.81	0.43%
Scenario 2: Seasonally Varying Emissions													
Ammonia	Annual mean	µg/m³	180	3.40	0.07	0.06	0.08	0.07	0.08	0.08	0.05%	3.48	1.94%
	Hourly mean	µg/m³	2,500	6.80	2.63	2.33	2.69	2.80	2.13	2.80	0.11%	9.60	0.38%

As shown, with regard to human health the PC of ammonia is less than 1% of the long-term and 10% of the short-term EALs for both scenarios. Therefore, all impacts on human health can be screened out as 'insignificant'.

For completeness, the annual mean and maximum 1-hour PC at each receptor location identified in Table 5 are presented in Table 17 and Table 18.

Table 17: Annual Mean Ammonia Impacts at Human Receptor Locations

Receptor	Scenario 1 – at ELV		Scenario 2 – seasonally varying	
	µg/m³	% of EAL	µg/m³	% of EAL
R1	0.07	0.04%	0.05	0.03%
R2	0.04	0.02%	0.03	0.02%
R3	0.03	0.02%	0.02	0.01%
R4	0.04	0.02%	0.03	0.02%
R5	0.01	<0.01%	0.00	<0.01%
R6	0.02	0.01%	0.02	0.01%
R7	0.01	0.01%	0.01	<0.01%
R8	0.01	0.01%	0.01	0.01%
R9	0.06	0.03%	0.04	0.02%

Table 18: Maximum Hourly Mean Ammonia Impacts at Human Receptor Locations

Receptor	Scenario 1 – at ELV		Scenario 2 – seasonally varying	
	µg/m³	% of EAL	µg/m³	% of EAL
R1	1.81	0.07%	1.07	0.04%
R2	1.66	0.07%	0.99	0.04%
R3	1.47	0.06%	0.98	0.04%
R4	1.81	0.07%	1.15	0.05%
R5	0.91	0.04%	0.39	0.02%
R6	1.22	0.05%	0.64	0.03%
R7	0.81	0.03%	0.43	0.02%
R8	0.62	0.02%	0.45	0.02%
R9	1.42	0.06%	1.01	0.04%

8.2 Ecology

8.2.1 Airborne ammonia emissions – assessment against Critical Levels

The impact of emissions has been compared to the Critical Levels listed in Table 1. Further assessment has been undertaken where the PC is greater than 1% of the long Critical Level at European and UK designated sites, or greater than 100% of the Critical Level at local nature sites.

The maximum annual mean ammonia PCs from the Facility at each identified ecological receptor are presented in Table 19. Impacts that cannot be screened out as 'insignificant' are highlighted.

Table 19: Airborne Ammonia Impacts at Ecological Receptors

Receptor	Scenario 1 – at ELV		Scenario 2 – seasonally varying	
	µg/m³	% of Critical Level	µg/m³	% of Critical Level
European and UK designated sites				
E1	0.021	**2.08%**	0.013	**1.29%**
E2	0.001	0.15%	0.001	0.10%
E3	0.001	0.12%	0.001	0.09%
E4	0.001	0.09%	0.001	0.06%
E5	0.002	0.22%	0.001	0.15%
E6	0.001	0.14%	0.001	0.10%
E7	<0.001	0.04%	<0.001	0.02%
E8	<0.001	0.04%	<0.001	0.02%
E9	<0.001	0.02%	<0.001	0.02%
Local nature sites				
E10	0.016	**1.63%**	0.010	1.00%
E11	0.046	4.63%	0.033	3.30%
E12	0.013	**1.28%**	0.008	0.81%
E13	0.006	0.60%	0.004	0.39%
E14	0.004	0.45%	0.003	0.29%
E15	0.008	0.85%	0.005	0.53%
E16	0.007	0.71%	0.005	0.50%
E17	0.007	0.74%	0.005	0.53%

As shown, in both scenarios the annual mean ammonia impact is less than the screening criteria and is 'insignificant' at all receptor locations, with the exception of E1 (Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SAC), and E10 and E12 which are also constituent parts of the Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SAC. An illustrative plot file of the annual mean ammonia PC is provided as Figure 7 of Appendix A, which shows the extent of impacts greater than 1% of the Critical Level.

At E1 the maximum impact is predicted to be 2.08% of the Critical Level of 1 µg/m³, assuming ammonia is continually emitted at the ELV, and 1.29% of the Critical Level in the likely scenario that emissions vary seasonally. As detailed in section 3, annual mean baseline ammonia concentrations monitored at Fenn's Moss range from 1.53 µg/m³ to 2.67 µg/m³, and the maximum mapped background concentration within 5 km of the Facility as taken from APIS is 3.40 µg/m³. As such, the PEC is a minimum of 1.55 µg/m³, which exceeds the Critical Level.

These results are based on the maximum annual mean impact across the five years of modelled weather data, to account for worst-case weather conditions. The average impact is considerably less. The PC in each of the five years of weather data for receptors E1, E10, and E12 are presented in

Table 20: Airborne Ammonia Impacts at Selected Ecological Receptors – Interannual Variability

Receptor	Ammonia PC – as % of Critical Level					
	2018	2019	2020	2021	2022	Average
Scenario 1 – at ELV						
E1	**1.34%**	0.57%	**1.63%**	**2.08%**	0.88%	1.30%
E10	**1.07%**	0.46%	**1.21%**	**1.63%**	0.69%	1.01%
E12	**1.24%**	0.93%	0.94%	**1.28%**	1.02%	1.08%
Scenario 2 – seasonally varying						
E1	0.86%	0.33%	1.00%	**1.29%**	0.48%	0.79%
E10	0.70%	0.27%	0.75%	1.00%	0.39%	0.62%
E12	0.78%	0.59%	0.57%	0.81%	0.60%	0.67%

As shown, the average ammonia PC over the five years of modelled weather data is much lower than in the maximum year at these receptors; in the seasonally-varying emissions scenario the PC is not predicted to exceed 1% of the Critical Level except for one year (2021) at one receptor (E1).

As the PC in the worst-case year of weather data exceeds 1% of the Critical Level and the PEC exceeds the Critical Level, the impact cannot be screened out as 'insignificant'. One pathway via which ammonia emissions could have an impact is due to the eutrophying effect of nitrogen deposition, which is considered in section 8.2.2. In addition to this, the following considerations can be made:

- Operation at the ELV is a worst-case scenario, with emissions typically expected to be below this level all year;
- As shown in Table 20, the predicted impacts in the worst-case year of weather data are much higher than the average across the five years of weather data, such that the impact is a typical year will be much less than presented in Table 19.
- As detailed in section 6.2.1, ammonia emissions are expected to be highest in winter and lowest in summer. Ammonia impacts on vegetation are likely to be highest during the growing season in spring and summer, when emissions are not at their highest;
- As shown on Figure 7, the area of impacts greater than 1% of the Critical Level in the worst-case year of weather data is limited to a small section in the north-east of the SAC. As detailed in the "Ecological interpretation of AQA" (Kevin Barry Honour) submitted in support of the application, there are no SAC qualifying habitats in this area; the closest area that can be considered to support an SAC qualifying habitat (bogs) is co-located with E10. As shown in Table 19 and on Figure 7, the annual mean ammonia impact at the SAC qualifying habitat, assuming seasonally-varying emissions, is no more than 1% of the Critical Level and can be screened out as 'insignificant'.
- Although no activities are currently undertaken at the site, an impact assessment undertaken by Befesa in 2018 for the previous activities predicted a maximum ammonia PC at E1 of 0.149 µg/m³ (for operation at 90% of the ELV for the Befesa operations; the ammonia ELV for the four scrubbers at the Befesa facility is 9 mg/m³, compared to 3.5 mg/m³ for the proposed Facility). These activities remain permitted. The PC of 0.149 µg/m³ is 15% of the Critical Level, much higher than the 0.033 µg/m³ (3.3%) maximum impact predicted due to emissions from the proposed Facility.

As such, it is considered that ammonia emissions from the Facility would not have a significant effect and would have a much smaller impact than the activities currently permitted.

8.2.2 Deposition of emissions – assessment against Critical Loads

In addition to the Critical Levels for the protection of ecosystems, habitat specific Critical Loads for nature conservation sites at risk from acidification and nitrogen deposition (eutrophication) are outlined in APIS. In terms of acid deposition, the APIS Database contains a maximum Critical load for sulphur (ClmaxS), a minimum Critical Load for nitrogen (CLminN) and a maximum Critical Load for nitrogen (ClmaxN). These components define the Critical Load function for acid deposition. Where the acid deposition flux falls within the area under the Critical Load function, no exceedances are predicted.

The APIS database does not include site-specific data for local nature sites. The Critical Loads applied in this assessment have been determined based on a review of the habitats likely to be present at each local nature site.

The relevant Critical Loads for each site are presented in Appendix B.

8.2.2.1 Nitrogen deposition calculation

The impact of deposition has been assessed using the methodology detailed within the Habitats Directive AQTAG 6 (March 2014). The steps to this method are as follows.

1. Determine the annual mean ground level concentrations of ammonia at each site.
2. Calculate the dry deposition flux (µg/m^2/s) at each site by multiplying the annual mean ground level concentration by the relevant deposition velocity presented in Table 21.
3. Convert the dry deposition flux into units of kgN/ha/yr using the conversion factors presented in Table 21.
4. Compare this result to the nitrogen deposition Critical Load.

Table 21: Deposition Factors

Pollutant	Deposition velocity (m/s)		Conversion factor (µg/m^2/s to kg/ha/year)
	Grassland	Woodland	
Ammonia	0.02	0.03	259.7

Source: AQTAG 6 (March 2014)

8.2.2.2 Acid deposition calculation

Deposition of ammonia can cause acidification and should be taken into consideration when assessing the impact of the Facility.

The steps to determine the acid deposition flux are as follows.

1. Determine the dry deposition rate in kg/ha/yr of nitrogen using the methodology outlined in section 8.2.2.1.
2. Apply the conversion factor for N outlined in Table 22 to the nitrogen deposition rate in kg/ha/year to determine the total keq N/ha/year.
3. Plot the results against the Critical Load functions.

Table 22: Conversion Factors

Pollutant	Conversion factor (kg/ha/year to keq/ha/year)
Nitrogen	Divide by 14

Source: AQTAG (March 2014)

The contribution from the Facility has been calculated using APIS formula:

Where PEC N Deposition < CLminN:

PC as % of CL function = PC S deposition / ClmaxS

Where PEC N Deposition > CLminN:

PC as % of CL function = (PC S + N deposition) / ClmaxN

8.2.2.3 Deposition results

The detailed deposition analysis and results are presented in Appendix C. The results are summarised in Table 23. The results summary is based on the following approach:

- the seasonally varying emissions concentrations scenario (i.e. scenario 2) has been applied, which is considered to be the most realistic emissions scenario;
- where more than one sensitive habitat (with short vegetation or woodland) is present in the designated site, the impact has been presented for the habitat that experiences the greatest impact as a percentage of the Critical Load; and
- the average over five years of weather data has been presented; this is considered appropriate as the effects of deposition impacts occur over multi-year timescales.

Full results for all habitats assessed and a comparison with the results assuming continual operation at the proposed ELV and for the worst-case year of weather data are presented in Appendix C.

Table 23: Deposition results summary – Scenario 2, Average

Ref	Receptor name	Nitrogen deposition			Acid deposition		
		Min CL kgN/ha/yr	PC kgN/ha/yr	PC %CL	Min CLmaxN keq/ha/yr	PC keq/ha/yr	PC %CL
European and UK designated sites							
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	5	0.041	0.82%	0.534	0.0029	0.55%
E2	Brown Moss	2	0.005	0.24%	0.545	0.0003	0.06%
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	10	0.006	0.06%	1.806	0.0005	0.03%
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	15	0.003	0.02%	-(1)	-	-
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	2	0.006	0.32%	1.661	0.0007	0.04%
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	-(1)	-	-	-(1)	-	-
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	5	0.001	0.02%	0.511	0.0001	0.02%
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	10	0.001	0.01%	1.607	0.0001	0.01%
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	5	0.001	0.02%	1.6	0.0001	0.01%
Local nature sites							
E10	Fenn's, Whixall & Bettisfield Mosses	5	0.032	0.65%	0.534	0.0023	0.43%
E11	Fenn's Rough Ancient Woodland	10	0.228	2.28%	1.672	0.0163	0.97%
E12	Fenn's Wood Ancient Woodland North	10	0.052	0.52%	0.546	0.0037	0.68%

Ref	Receptor name	Nitrogen deposition			Acid deposition		
		Min CL kgN/ha/yr	PC kgN/ha/yr	PC %CL	Min CLmaxN keq/ha/yr	PC keq/ha/yr	PC %CL
E13	Fenn's Wood Ancient Woodland Mid	10	0.025	0.25%	0.547	0.0018	0.33%
E14	Fenn's Wood Ancient Woodland South	10	0.019	0.19%	0.547	0.0013	0.24%
E15	Unnamed Ancient Woodland 1	10	0.035	0.35%	0.547	0.0025	0.45%
E16	Unnamed Ancient Woodland 2	10	0.036	0.36%	1.75	0.0025	0.15%
E17	Unnamed Ancient Woodland 3	10	0.035	0.35%	1.777	0.0025	0.14%
Note: *(1) No Critical Loads defined.*							

As shown, nitrogen and acid deposition impacts on sensitive habitats are all less than the relevant screening criteria for the habitat type and designation, and are 'insignificant' at all receptor locations.

The detailed results in Appendix C show that the impact at the Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SAC is predicted to exceed 1% of the Critical Load and cannot be screened out as 'insignificant' for Scenario 1 and Scenario 2 (taking the maximum rather than the average of years of modelled weather data). The same is true at E12 (Fenn's Wood Ancient Woodland North) for Scenario 1. E12 overlaps with the SAC designation.

It is considered the most realistic scenario to take the seasonally varying emissions profile and the average impact over five years of weather data. Under this scenario, as reported in Table 23, all predicted deposition impacts at European and UK designated sites (including at the local nature sites designated at receptors E10, E12, E13, and E14, which overlap with European and UK designations) are below 1% of the relevant Critical Load and can be screened out as 'insignificant'. All impacts at the remaining local nature sites are well below 100% of the Critical Level. As such, no significant impacts are predicted.

8.3 Odour

As detailed in section 5.2.1, the applicable odour assessment criterion is that odour concentrations should be below 1.5 OU_E/m^3 as the 98th percentile of hourly means for the most offensive odours; it has conservatively been assumed that odours from the process would fall into this 'most offensive' category.

The odour concentrations due to emissions from the biofilters have been assessed at the point of maximum impact outside of the installation boundary and at areas of relevant exposure. Table 24 presents the results of the modelling. This has assumed continual operation of the biofilter at 100% flow rate with emissions at the BAT-AEL of 1,000 OU_E/m^3, although it is noted that in accordance with BAT 34 of the Waste Treatment BAT Conclusions, for channelled emissions to air either the BAT-AEL for ammonia or odour applies. As a BAT-AEL for ammonia is being applied for, it is anticipated that the BAT-AEL for odour will not be included as an emission limit in the EP.

Table 24: Odour Modelling Results

ID	Receptor name	98th%ile of hourly odour concentration		Maximum hourly odour concentration	
		OU_E/m^3	% of criterion	OU_E/m^3	% of criterion
Point of maximum impact		0.43	29%	1.15	76%
R1	Park Farm Cottages, Fenn's Bank Road	0.26	17%	0.52	34%
R2	Fenn's Bank Road 2	0.24	16%	0.47	32%
R3	Fenn's Bank Road 3	0.22	15%	0.42	28%
R4	Residence near Mereside Industrial Park	0.22	15%	0.52	34%
R5	The Conery, Conery Lane	0.07	5%	0.26	17%
R6	Woodlands Farm, Conery Lane	0.15	10%	0.35	23%
R7	Conery Lane Farm, Conery Lane	0.09	6%	0.23	15%
R8	Pinfold Cottage, Long Lane	0.10	6%	0.18	12%
R9	The View, Fenn's Bank Road	0.28	18%	0.40	27%

As shown, the maximum impact on the 98th percentile of hourly mean odour concentrations at any location outside of the installation boundary, considering maximum flow rate and the worst-case of the five years of modelled weather data, is only 29% of the assessment criterion. The impact at receptor locations is lower at 18% of the assessment criterion. Therefore, no significant odour impacts are expected due to emissions from the biofilter. Figure 8 of Appendix A illustrates the dispersion pattern. Furthermore, the maximum hourly concentration at any location outside of the installation boundary is 1.15 OU_E/m^3, and the maximum hourly concentration at a receptor is only 0.52 OU_E/m^3. The maximum predicted hourly concentration at a receptor is well below the threshold of 1 OU_E/m^3 which is the concentration at which an odour is detectable to 50% of the population (refer to section 5.2.1).

These results show that an odour emission concentration of less than 3,500 OU_E/m^3 is required for the impact to be less than the 1.5 OU_E/m^3 criterion at the point of maximum impact outside of the installation boundary. The odour emission concentration would need to be less than 5,420 OU_E/m^3 for the impact to be less than 1.5 OU_E/m^3 criterion at the receptor predicted to experience the highest impact.

In addition, there is the potential for odour emissions from waste reception and handling, and from the maturation pads which will utilise a forced aeration system which means there is no need to turn the piles. Waste reception and handling procedures will be developed as part of the Odour Management Plan (OMP) for the Facility, while the forced aeration used in the maturation process will ensure aerobic conditions are maintained thereby preventing the formation of highly odourous compounds. As such, no significant odour impacts are anticipated due to odour emissions from either the biofilter (as assessed above) or any other sources.

9 Conclusions

This Air Quality Assessment has been undertaken to support the EP application for an in-vessel composting facility to be installed at the former Befesa salt slag processing facility, Fenn's Bank, near Whitchurch.

The primary conclusions of the assessment are presented below.

1. In relation to the impact of ammonia emissions on human health:
   a. No exceedance of an EAL is predicted.
   b. All impacts can be screened out as 'insignificant'.
2. In relation to the impact of ammonia emissions on ecological sensitive sites:
   a. The impact on annual mean airborne ammonia concentrations can be screened out as 'insignificant', except at the Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SAC. However, the impact that cannot be screened out as 'insignificant' does not occur at any locations where the SAC qualifying habitats are present. The maximum impact where the qualifying bog habitat is present is predicted to be less than 1% of the Critical Level and can be screened out as 'insignificant'. Furthermore, compared to historical ammonia emissions (from activities for which the site is still permitted), the predicted impact is very small.
   b. Taking into account the likely emissions profile and average impact over five years of modelled weather data, the nitrogen and acid deposition impact at all receptors can be screened out as 'insignificant'.
3. In relation to odour emissions:
   a. Odour dispersion modelling has shown that the maximum odour impact due to emissions from the biofilters will be well below the assessment criterion of 1.5 OU_E/m^3.
   b. An Odour Management Plan will be implemented, which will effectively manage other sources of odour associated with the operation of the Facility to ensure there are no significant odour impacts.

Based on the above, it is concluded that the operation of the Facility will not have a significant effect on local air quality, the general population or the local community. As such there should be no air quality constraint in granting an EP to operate the Facility.

Appendices

A Figures

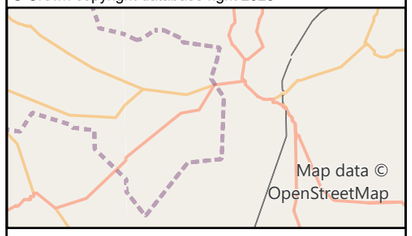


Legend

Site location

Client:	Veolia
Site:	Fenn's Bank IVC EP Application
Project:	Air Quality Assessment
Title:	Figure 1. Site Location
Drawn by: SMN	Date:

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Scale: 1:25,000

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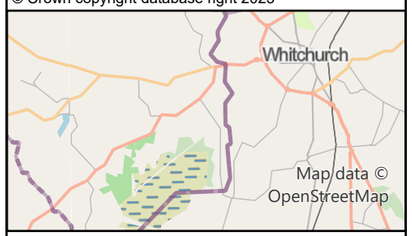
Legend

- Installation boundary
- Stack
- Human receptors

Client:	Veolia
Site:	Fenn's Bank IVC EP Application
Project:	Air Quality Assessment
Title:	Figure 2. Human Receptors

Drawn by: SMN | Date:

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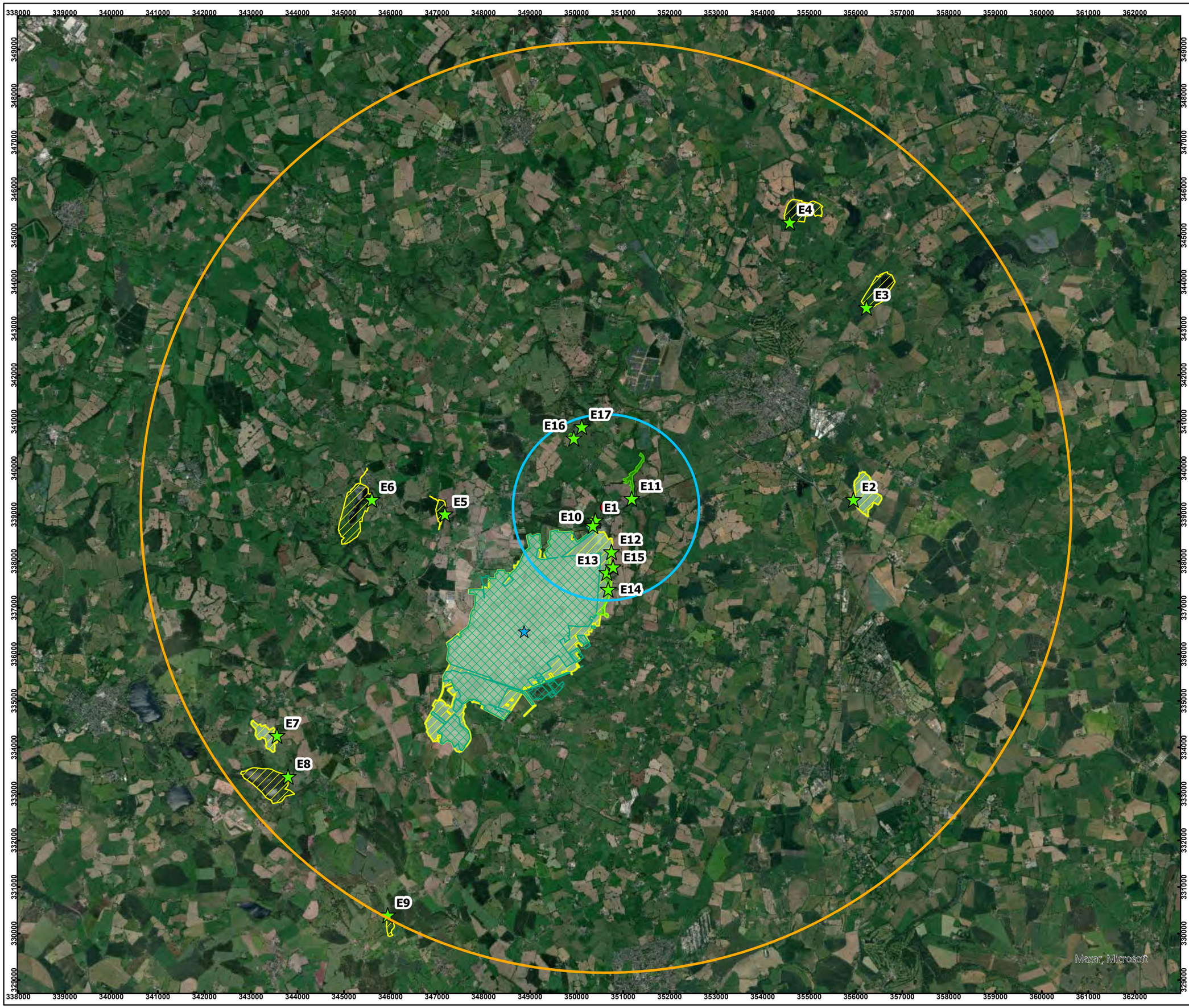
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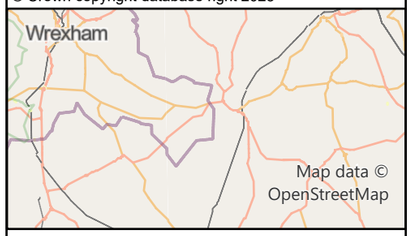


Legend

- Stack
- 10 km screening distance
- 2 km screening distance
- Ecological Receptors
- Ancient Woodlands
- National Nature Reserves
- Ramsars
- SACs
- Fenns Bank Ammonia Monitoring Site

Client:	Veolia
Site:	Fenn's Bank IVC EP Application
Project:	Air Quality Assessment
Title:	Figure 3. Ecological Receptors
Drawn by: SMN	Date:

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Scale: 1:75,000

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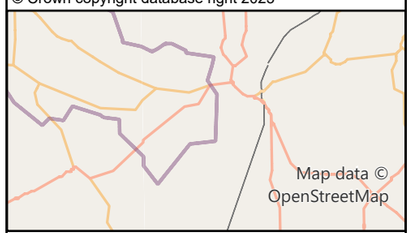


Legend

- Site location
- Wide grid extent
- Fine grid extent

Client:	Veolia
Site:	Fenn's Bank IVC EP Application
Project:	Air Quality Assessment
Title:	Figure 4. Modelling Domain
Drawn by: SMN	Date:

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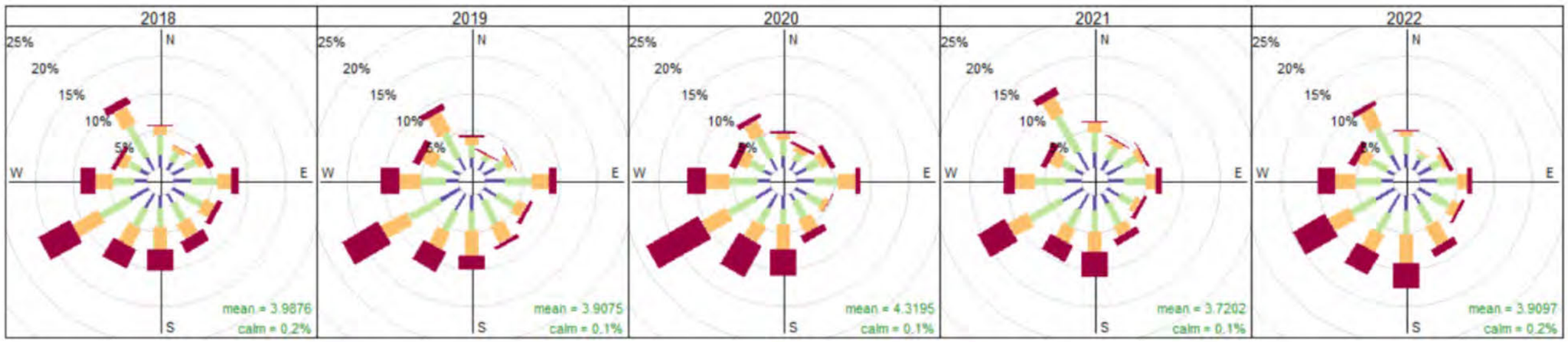
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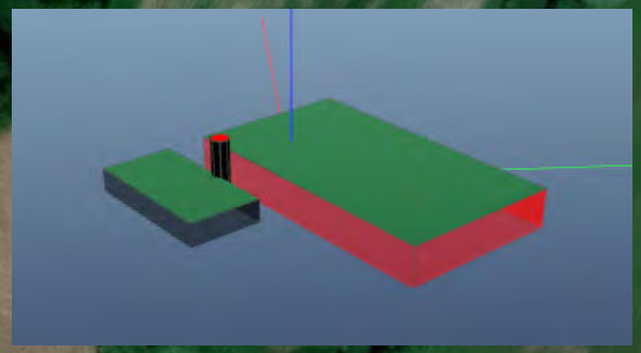
Frequency of counts by wind direction (%)

Legend

Client:	Veolia
Site:	Fenn's Bank IVC EP Application
Project:	Air Quality Assessment
Title:	Figure 5. Wind Roses Shawbury 2018 - 2022
Drawn by: SMN	Date: 02/05/2025

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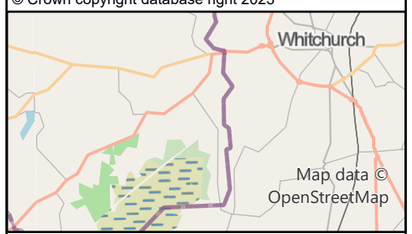
Legend

- Installation boundary
- Stack
- Buildings modelled

Client:	Veolia
Site:	Fenn's Bank IVC EP Application
Project:	Air Quality Assessment
Title:	Figure 6. Buildings Modelled

Drawn by: SMN | Date:

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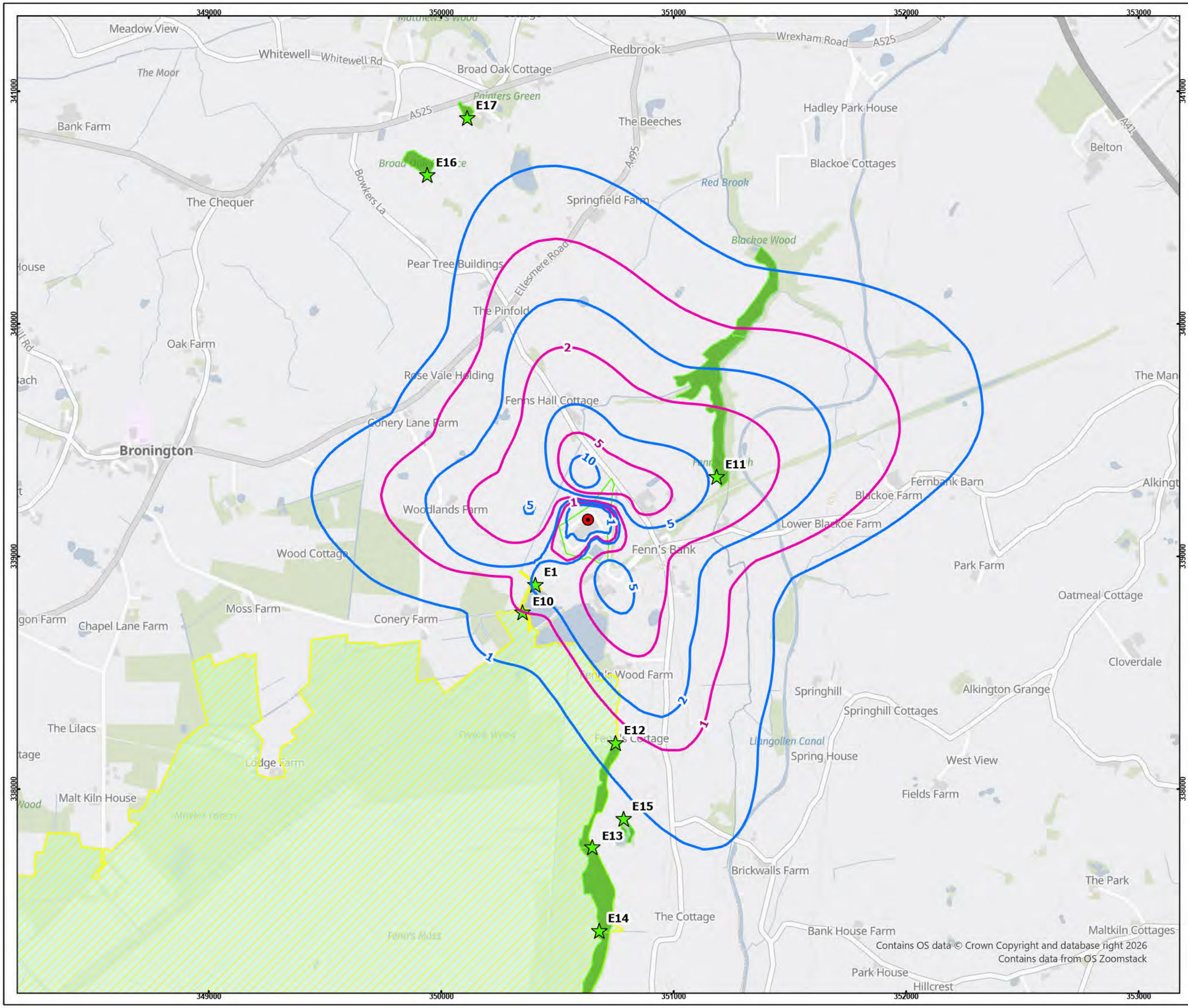
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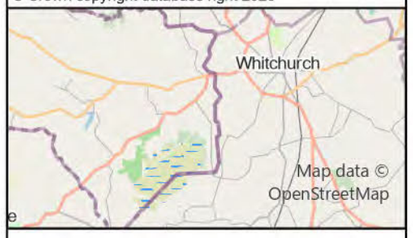
Legend

- Installation boundary
- Stack
- Ecological Receptors
- Ancient Woodlands
- Ramsars
- SACs
- Ammonia as % of Critical Level - Scenario 1
- Ammonia as % of Critical Level - Scenario 2

Notes: Impact as % of lower Critical Level of 1 µg/m³

Client:	Veolia
Site:	Fenn's Bank IVC EP Application
Project:	Air Quality Assessment
Title:	Figure 7. Ammonia Impact at Ecological Receptors
Drawn by: SMN	Date: 22/01/2026

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Scale: 1:15,000

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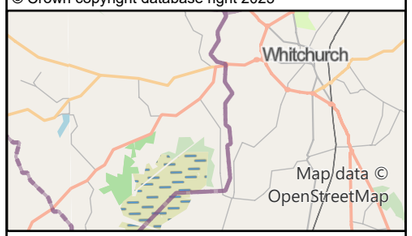
Legend

- Installation boundary
- Stack
- Human receptors
- 98th percentile of hourly mean odour concentrations - OUe/m³

Client:	Veolia
Site:	Fenn's Bank IVC EP Application
Project:	Air Quality Assessment
Title:	Figure 8. Odour Impact

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0 0.05 0.1 0.2 km

Scale: 1:7,000

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B APIS Critical Loads

Table 25: Nitrogen deposition critical loads

Ref	Site name	Species/habitat type	NCL class[(1)]	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Background (kgN/ha/yr)
European and UK statutory designated sites						
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	Active raised bogs	Raised and blanket bogs	5	10	22.5
		Semi-natural woodland (SSSI feature only)	Broadleaved deciduous woodland	10	15	41.6
E2	Brown Moss	Luronium natans	Permanent oligotrophic lakes, ponds and pools (including softwater lakes)	2	10	24.8
		Transition mires and quaking bogs	Valley mires, poor fens and transition mires	5	15	24.8
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Phragmites Australis Swamp And Reed-Beds	Rich fens	15	25	23.8
		Alnus glutinosa - Carex paniculata Woodland	Broadleaved deciduous woodland	10	15	43.3
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	Juncus Effusus / Acutiflorus - Galium Palustre Rush Pasture	Moist or wet mesotrophic to eutrophic hay meadow	15	25	23.4
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Standing water -Oligotrophic	Permanent oligotrophic lakes, ponds and pools (including softwater lakes)	2	10	21.7
		Semi-natural woodland (Alnus glutinosa-Urtica dioica woodland: Typical subcommunity)	Broadleaved deciduous woodland	10	15	39.6

Ref	Site name	Species/habitat type	NCL class[1]	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Background (kgN/ha/yr)
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	-	No Critical Load defined	-	-	-
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	Sphagnum Cuspidatum/recurvum (Fallax) Bog Pool Community	Raised and blanket bogs	5	10	20.2
		Quercus Spp.-Betula Spp.-Deschampsia Flexuosa Woodland	Acidophilous Quercus forest	10	20	37.3
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Cynosurus Cristatus - Centaurea Nigra Grassland	Low and medium altitude hay meadows	10	20	20.2
		Alnus glutinosa - Carex paniculata Woodland	Broadleaved deciduous woodland	10	15	37.2
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Carex Rostrata - Potentilla Palustris Swamp	Valley mires, poor fens and transition mires	5	15	20.5
		Alnus glutinosa - Carex paniculata Woodland	Broadleaved deciduous woodland	10	15	37.9
Local nature sites						
E10	Fenn's, Whixall & Bettisfield Mosses	Active raised bogs	Raised and blanket bogs	5	10	22.5
E11	Fenn's Rough Ancient Woodland	Woodland	Broadleaved deciduous woodland	10	15	40.9
E12	Fenn's Wood Ancient Woodland North	Woodland	Broadleaved deciduous woodland	10	15	41.0
E13	Fenn's Wood Ancient Woodland Mid	Woodland	Broadleaved deciduous woodland	10	15	41.6
E14	Fenn's Wood Ancient Woodland South	Woodland	Broadleaved deciduous woodland	10	15	41.6
E15	Unnamed Ancient Woodland 1	Woodland	Broadleaved deciduous woodland	10	15	41.6
E16	Unnamed Ancient Woodland 2	Woodland	Broadleaved deciduous woodland	10	15	39.6

Ref	Site name	Species/habitat type	NCL class[(1)]	Lower Critical Load (kgN/ha/yr)	Upper Critical Load (kgN/ha/yr)	Background (kgN/ha/yr)
E17	Unnamed Ancient Woodland 3	Woodland	Broadleaved deciduous woodland	10	15	40.0

Note:

(1) For sites where multiple sensitive habitats are present, the most sensitive of the habitats present that can be categorised as *aquatic habitats, short vegetation and woodland have been included in the assessment. If any potentially significant deposition impacts are identified, the full range of habitats present will be considered.*

Table 26: Acid deposition critical loads

Ref	Site name	Species/ habitat type	Acidity class[1]	Critical Load Function (keq/ha/yr)			Background (keq/ha/yr)
				CLminN	CLmaxN	CLmaxS	N + S
European and UK designated sites							
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	Active raised bogs	Bogs	0.321	0.534	0.213	1.7
		Semi-natural woodland (SSSI feature only)	Unmanaged Broadleafed/ Coniferous Woodland	0.357	1.877	1.52	3.1
E2	Brown Moss	Transition mires and quaking bogs	Bogs	0.321	0.545	0.224	1.8
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Alnus glutinosa - Carex paniculata Woodland	Unmanaged Broadleafed/ Coniferous Woodland	0.357	1.806	1.449	3.2
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	-	No Critical Load defined	-	-	-	-
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Semi-natural woodland (Alnus glutinosa-Urtica dioica woodland: Typical subcommunity)	Unmanaged Broadleafed/ Coniferous Woodland	0.142	1.661	1.393	2.9
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	-	No Critical Load defined	-	-	-	-
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	Sphagnum Cuspidatum/recurvum (Fallax) Bog Pool Community	Bogs	0.321	0.511	0.19	1.5
		Bog woodland	Bogs	0.321	0.511	0.19	2.7
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Cynosurus Cristatus - Centaurea Nigra Grassland	Calcareous grassland (using base cation)	0.856	4.856	4	1.5
		Alnus glutinosa - Carex paniculata Woodland	Unmanaged Broadleafed/	0.142	1.607	1.465	2.7

Ref	Site name	Species/ habitat type	Acidity class[1]	Critical Load Function (keq/ha/yr)			Background (keq/ha/yr)
				CLminN	CLmaxN	CLmaxS	N + S
			Coniferous Woodland				
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Alnus glutinosa - Carex paniculata Woodland	Unmanaged Broadleafed/ Coniferous Woodland	0.142	1.6	1.333	2.8
Local nature sites							
E10	Fenn's, Whixall & Bettisfield Mosses	Active raised bogs	Bogs	0.321	0.534	0.213	1.7
E11	Fenn's Rough Ancient Woodland	Woodland	Unmanaged Broadleafed/ Coniferous Woodland	0.142	1.672	1.53	3.0
E12	Fenn's Wood Ancient Woodland North	Woodland	Unmanaged Broadleafed/ Coniferous Woodland	0.285	0.546	0.261	3.0
E13	Fenn's Wood Ancient Woodland Mid	Woodland	Unmanaged Broadleafed/ Coniferous Woodland	0.285	0.547	0.262	3.1
E14	Fenn's Wood Ancient Woodland South	Woodland	Unmanaged Broadleafed/ Coniferous Woodland	0.285	0.547	0.262	3.1
E15	Unnamed Ancient Woodland 1	Woodland	Unmanaged Broadleafed/ Coniferous Woodland	0.285	0.547	0.262	3.1
E16	Unnamed Ancient Woodland 2	Woodland	Unmanaged Broadleafed/ Coniferous Woodland	0.357	1.75	1393	2.9
E17	Unnamed Ancient Woodland 3	Woodland	Unmanaged Broadleafed/ Coniferous Woodland	0.357	1.777	1.42	3.0

Note:

(1) For sites where multiple sensitive habitats are present, the most sensitive of the habitats present that can be categorised as aquatic habitats, short vegetation and woodland have been included in the assessment. If any potentially significant deposition impacts are identified, the full range of habitats present will be considered.

C Deposition Analysis

Table 27: Annual mean process contribution used for deposition calculation

Ref	Site name	Annual mean ammonia PC (µg/m³)		
		Scenario 1	Scenario 2	Scenario 2 – average of met data
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	0.0208	0.0129	0.0079
E2	Brown Moss	0.0015	0.0010	0.0009
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	0.0012	0.0009	0.0008
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	0.0009	0.0006	0.0006
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	0.0022	0.0015	0.0012
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	0.0014	0.0010	0.0008
E7	Clarepool Moss SSSI (Midland Meres and Mosses Phase 1 Ramsar)	0.0004	0.0002	0.0002
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	0.0004	0.0002	0.0001
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	0.0002	0.0002	0.0002
E10	Fenn's, Whixall & Bettisfield Mosses	0.0163	0.0100	0.0062
E11	Fenn's Rough Ancient Woodland	0.0463	0.0330	0.0292
E12	Fenn's Wood Ancient Woodland North	0.0128	0.0081	0.0067
E13	Fenn's Wood Ancient Woodland Mid	0.0060	0.0039	0.0032
E14	Fenn's Wood Ancient Woodland South	0.0045	0.0029	0.0024
E15	Unnamed Ancient Woodland 1	0.0085	0.0053	0.0044
E16	Unnamed Ancient Woodland 2	0.0071	0.0050	0.0046
E17	Unnamed Ancient Woodland 3	0.0074	0.0053	0.0046

Note: Scenario 1 = emissions at proposed ELV, Scenario 2 = seasonally varying emissions. Average of met data = average concentration over five years of modelled weather data.

Table 28: Detailed results – nitrogen deposition – Scenario 1

Ref	Site	NCL class	Deposition velocity	PC			PEC		
				PC N dep kgN/ha/yr	% of Lower CL	% of Upper CL	PEC N dep kgN/ha/yr	% of Lower CL	% of Upper CL
European and UK designated sites									
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	Raised and blanket bogs	Grassland	0.108	**2.16%**	**1.08%**	22.6	**452.2%**	**226.1%**
		Broadleaved deciduous woodland	Woodland	0.162	**1.62%**	**1.08%**	41.7	**417.6%**	**278.4%**
E2	Brown Moss	Permanent oligotrophic lakes, ponds and pools (including softwater lakes)	Grassland	0.008	0.38%	0.08%	24.8	1240.4%	248.1%
		Valley mires, poor fens and transition mires	Grassland	0.008	0.15%	0.05%	24.8	496.2%	165.4%
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Rich fens	Grassland	0.006	0.04%	0.03%	23.8	158.7%	95.2%
		Broadleaved deciduous woodland	Woodland	0.010	0.10%	0.06%	43.3	433.1%	288.7%
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	Moist or wet mesotrophic to eutrophic hay meadow	Grassland	0.005	0.03%	0.02%	23.4	156.0%	93.6%
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Permanent oligotrophic lakes, ponds and pools (including softwater lakes)	Grassland	0.011	0.57%	0.11%	21.7	1085.6%	217.1%
		Broadleaved deciduous woodland	Woodland	0.017	0.17%	0.11%	39.6	396.2%	264.1%
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	No Critical Load defined	-	-	-	-	-	-	-
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	Raised and blanket bogs	Grassland	0.002	0.04%	0.02%	20.2	404.0%	202.0%
		Acidophilous Quercus forest	Woodland	0.003	0.03%	0.01%	37.3	373.0%	186.5%

Ref	Site	NCL class	Deposition velocity	PC			PEC		
				PC N dep kgN/ha/yr	% of Lower CL	% of Upper CL	PEC N dep kgN/ha/yr	% of Lower CL	% of Upper CL
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Low and medium altitude hay meadows	Grassland	0.002	0.02%	0.01%	20.2	202.0%	101.0%
		Broadleaved deciduous woodland	Woodland	0.003	0.03%	0.02%	37.2	372.0%	248.0%
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Valley mires, poor fens and transition mires	Grassland	0.001	0.02%	0.01%	20.5	410.0%	136.7%
		Broadleaved deciduous woodland	Woodland	0.002	0.02%	0.01%	37.9	379.0%	252.7%
Local nature sites									
E10	Fenn's, Whixall & Bettisfield Mosses	Raised and blanket bogs	Grassland	0.085	**1.70%**	0.85%	22.6	**451.7%**	225.8%
E11	Fenn's Rough Ancient Woodland	Broadleaved deciduous woodland	Woodland	0.361	3.61%	2.41%	41.3	412.6%	275.1%
E12	Fenn's Wood Ancient Woodland North	Broadleaved deciduous woodland	Woodland	0.100	**1.00%**	0.67%	41.1	**411.0%**	274.0%
E13	Fenn's Wood Ancient Woodland Mid	Broadleaved deciduous woodland	Woodland	0.047	0.47%	0.31%	41.6	416.5%	277.6%
E14	Fenn's Wood Ancient Woodland South	Broadleaved deciduous woodland	Woodland	0.035	0.35%	0.23%	41.6	416.3%	277.6%
E15	Unnamed Ancient Woodland 1	Broadleaved deciduous woodland	Woodland	0.066	0.66%	0.44%	41.7	416.7%	277.8%
E16	Unnamed Ancient Woodland 2	Broadleaved deciduous woodland	Woodland	0.055	0.55%	0.37%	39.7	396.6%	264.4%
E17	Unnamed Ancient Woodland 3	Broadleaved deciduous woodland	Woodland	0.058	0.58%	0.38%	40.1	400.6%	267.1%

Table 29: Detailed results – nitrogen deposition – Scenario 2

Ref	Site	NCL class	Deposition velocity	PC			PEC		
				PC N dep kgN/ha/yr	% of Lower CL	% of Upper CL	PEC N dep kgN/ha/yr	% of Lower CL	% of Upper CL
European and UK designated sites									
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	Raised and blanket bogs	Grassland	0.067	**1.34%**	0.67%	22.6	**451.3%**	225.7%
		Broadleaved deciduous woodland	Woodland	0.100	**1.00%**	0.67%	41.7	**417.0%**	278.0%
E2	Brown Moss	Permanent oligotrophic lakes, ponds and pools (including softwater lakes)	Grassland	0.005	0.27%	0.05%	24.8	1,240.3%	248.1%
		Valley mires, poor fens and transition mires	Grassland	0.005	0.11%	0.04%	24.8	496.1%	165.4%
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Rich fens	Grassland	0.005	0.03%	0.02%	23.8	158.7%	95.2%
		Broadleaved deciduous woodland	Woodland	0.007	0.07%	0.05%	43.3	433.1%	288.7%
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	Moist or wet mesotrophic to eutrophic hay meadow	Grassland	0.003	0.02%	0.01%	23.4	156.0%	93.6%
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Permanent oligotrophic lakes, ponds and pools (including softwater lakes)	Grassland	0.008	0.38%	0.08%	21.7	1085.4%	217.1%
		Broadleaved deciduous woodland	Woodland	0.011	0.11%	0.08%	39.6	396.1%	264.1%
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	No Critical Load defined	-	-	-	-	-	-	-
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	Raised and blanket bogs	Grassland	0.001	0.02%	0.01%	20.2	404.0%	202.0%
		Acidophilous Quercus forest	Woodland	0.002	0.02%	0.01%	37.3	373.0%	186.5%

Ref	Site	NCL class	Deposition velocity	PC			PEC		
				PC N dep kgN/ha/yr	% of Lower CL	% of Upper CL	PEC N dep kgN/ha/yr	% of Lower CL	% of Upper CL
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Low and medium altitude hay meadows	Grassland	0.001	0.01%	0.01%	20.2	202.0%	101.0%
		Broadleaved deciduous woodland	Woodland	0.002	0.02%	0.01%	37.2	372.0%	248.0%
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Valley mires, poor fens and transition mires	Grassland	0.001	0.02%	0.01%	20.5	410.0%	136.7%
		Broadleaved deciduous woodland	Woodland	0.001	0.01%	0.01%	37.9	379.0%	252.7%
Local nature sites									
E10	Fenn's, Whixall & Bettisfield Mosses	Raised and blanket bogs	Grassland	0.052	**1.04%**	0.52%	22.6	**451.0%**	225.5%
E11	Fenn's Rough Ancient Woodland	Broadleaved deciduous woodland	Woodland	0.257	2.57%	1.72%	41.2	411.6%	274.4%
E12	Fenn's Wood Ancient Woodland North	Broadleaved deciduous woodland	Woodland	0.063	0.63%	0.42%	41.1	410.6%	273.8%
E13	Fenn's Wood Ancient Woodland Mid	Broadleaved deciduous woodland	Woodland	0.030	0.30%	0.20%	41.6	416.3%	277.5%
E14	Fenn's Wood Ancient Woodland South	Broadleaved deciduous woodland	Woodland	0.022	0.22%	0.15%	41.6	416.2%	277.5%
E15	Unnamed Ancient Woodland 1	Broadleaved deciduous woodland	Woodland	0.042	0.42%	0.28%	41.6	416.4%	277.6%
E16	Unnamed Ancient Woodland 2	Broadleaved deciduous woodland	Woodland	0.039	0.39%	0.26%	39.6	396.4%	264.3%
E17	Unnamed Ancient Woodland 3	Broadleaved deciduous woodland	Woodland	0.041	0.41%	0.28%	40.0	400.4%	266.9%

Table 30: Detailed results – nitrogen deposition – Scenario 2, average over five years of weather data

Ref	Site	NCL class	Deposition velocity	PC			PEC		
				PC N dep kgN/ha/yr	% of Lower CL	% of Upper CL	PEC N dep kgN/ha/yr	% of Lower CL	% of Upper CL
European and UK designated sites									
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	Raised and blanket bogs	Grassland	0.041	0.82%	0.32%	22.5	450.8%	225.4%
		Broadleaved deciduous woodland	Woodland	0.062	0.62%	0.41%	41.6	416.6%	277.7%
E2	Brown Moss	Permanent oligotrophic lakes, ponds and pools (including softwater lakes)	Grassland	0.005	0.24%	0.05%	24.8	1240.2%	248.0%
		Valley mires, poor fens and transition mires	Grassland	0.005	0.10%	0.03%	24.8	496.1%	165.4%
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Rich fens	Grassland	0.004	0.03%	0.02%	23.8	158.7%	95.2%
		Broadleaved deciduous woodland	Woodland	0.006	0.06%	0.04%	43.3	433.1%	288.7%
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	Moist or wet mesotrophic to eutrophic hay meadow	Grassland	0.003	0.02%	0.01%	23.4	156.0%	93.6%
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Permanent oligotrophic lakes, ponds and pools (including softwater lakes)	Grassland	0.006	0.32%	0.06%	21.7	1085.3%	217.1%
		Broadleaved deciduous woodland	Woodland	0.010	0.10%	0.06%	39.6	396.1%	264.1%
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	No Critical Load defined	-	-	-	-	-	-	-
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	Raised and blanket bogs	Grassland	0.001	0.02%	0.01%	20.2	404.0%	202.0%
		Acidophilous Quercus forest	Woodland	0.001	0.01%	0.01%	37.3	373.0%	186.5%

Ref	Site	NCL class	Deposition velocity	PC			PEC		
				PC N dep kgN/ha/yr	% of Lower CL	% of Upper CL	PEC N dep kgN/ha/yr	% of Lower CL	% of Upper CL
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Low and medium altitude hay meadows	Grassland	0.001	0.01%	<0.01%	20.2	202.0%	101.0%
		Broadleaved deciduous woodland	Woodland	0.001	0.01%	0.01%	37.2	372.0%	248.0%
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Valley mires, poor fens and transition mires	Grassland	0.001	0.02%	0.01%	20.5	410.0%	136.7%
		Broadleaved deciduous woodland	Woodland	0.001	0.01%	0.01%	37.9	379.0%	252.7%
Local nature sites									
E10	Fenn's, Whixall & Bettisfield Mosses	Raised and blanket bogs	Grassland	0.032	0.65%	0.32%	22.5	450.6%	225.3%
E11	Fenn's Rough Ancient Woodland	Broadleaved deciduous woodland	Woodland	0.228	2.28%	1.52%	41.1	411.3%	274.2%
E12	Fenn's Wood Ancient Woodland North	Broadleaved deciduous woodland	Woodland	0.052	0.52%	0.35%	41.1	410.5%	273.7%
E13	Fenn's Wood Ancient Woodland Mid	Broadleaved deciduous woodland	Woodland	0.025	0.25%	0.17%	41.6	416.3%	277.5%
E14	Fenn's Wood Ancient Woodland South	Broadleaved deciduous woodland	Woodland	0.019	0.19%	0.12%	41.6	416.2%	277.5%
E15	Unnamed Ancient Woodland 1	Broadleaved deciduous woodland	Woodland	0.035	0.35%	0.23%	41.6	416.3%	277.6%
E16	Unnamed Ancient Woodland 2	Broadleaved deciduous woodland	Woodland	0.036	0.36%	0.24%	39.6	396.4%	264.2%
E17	Unnamed Ancient Woodland 3	Broadleaved deciduous woodland	Woodland	0.035	0.35%	0.24%	40.0	400.4%	266.9%

Table 31: Detailed results – acid deposition – Scenario 1

Ref	Site	Acidity class	Deposition velocity	PC		PEC	
				N keq/ha/yr	% of CL Function	keq/ha/yr	% of CL Function
European and UK designated sites							
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	Bogs	Grassland	0.0077	**1.44%**	1.71	**319.8%**
		Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0116	0.62%	3.11	165.8%
E2	Brown Moss	Bogs	Grassland	0.0005	0.10%	1.80	330.4%
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0007	0.04%	3.20	177.2%
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	No critical load defined	-	-	-	-	-
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0012	0.07%	2.90	174.7%
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	No Critical Load defined	-	-	-	-	-
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	Bogs	Grassland	0.0001	0.03%	1.50	293.6%
		Bogs (bog woodland)	Woodland	0.0002	0.04%	2.70	528.4%
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Calcareous grassland (using base cation)	Grassland	0.0001	<0.01%	1.50	30.9%
		Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0002	0.01%	2.70	168.0%
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0001	0.01%	2.80	175.0%

Ref	Site	Acidity class	Deposition velocity	PC		PEC	
				N keq/ha/yr	% of CL Function	keq/ha/yr	% of CL Function
Local nature sites							
E10	Fenn's, Whixall & Bettisfield Mosses	Bogs	Grassland	0.0061	**1.13%**	1.71	**319.5%**
E11	Fenn's Rough Ancient Woodland	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0258	1.54%	3.03	181.0%
E12	Fenn's Wood Ancient Woodland North	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0071	**1.31%**	3.01	**550.8%**
E13	Fenn's Wood Ancient Woodland Mid	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0034	0.61%	3.10	567.3%
E14	Fenn's Wood Ancient Woodland South	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0025	0.46%	3.10	567.2%
E15	Unnamed Ancient Woodland 1	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0047	0.86%	3.10	567.6%
E16	Unnamed Ancient Woodland 2	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0039	0.22%	2.90	165.9%
E17	Unnamed Ancient Woodland 3	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0041	0.23%	3.00	169.1%

Table 32: Detailed results – acid deposition – Scenario 2

Ref	Site	Acidity class	Deposition velocity	PC		PEC	
				N keq/ha/yr	% of CL Function	keq/ha/yr	% of CL Function
European and UK designated sites							
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	Bogs	Grassland	0.0048	0.89%	1.70	319.2%
		Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0072	0.38%	3.11	165.5%
E2	Brown Moss	Bogs	Grassland	0.0004	0.07%	1.80	330.3%
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0005	0.03%	3.20	177.2%
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	No critical load defined	-	-	-	-	-
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0008	0.05%	2.90	174.6%
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	No Critical Load defined	-	-	-	-	-
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	Bogs	Grassland	0.0001	0.02%	1.50	293.6%
		Bogs (bog woodland)	Woodland	0.0001	0.02%	2.70	528.4%
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Calcareous grassland (using base cation)	Grassland	0.0001	<0.01%	1.50	30.9%
		Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0001	0.01%	2.70	168.0%
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0001	0.01%	2.80	175.0%

Ref	Site	Acidity class	Deposition velocity	PC		PEC	
				N keq/ha/yr	% of CL Function	keq/ha/yr	% of CL Function
Local nature sites							
E10	Fenn's, Whixall & Bettisfield Mosses	Bogs	Grassland	0.0037	0.69%	1.70	319.0%
E11	Fenn's Rough Ancient Woodland	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0184	1.10%	3.02	180.5%
E12	Fenn's Wood Ancient Woodland North	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0045	0.82%	3.00	550.3%
E13	Fenn's Wood Ancient Woodland Mid	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0022	0.39%	3.10	567.1%
E14	Fenn's Wood Ancient Woodland South	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0016	0.29%	3.10	567.0%
E15	Unnamed Ancient Woodland 1	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0030	0.54%	3.10	567.3%
E16	Unnamed Ancient Woodland 2	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0028	0.16%	2.90	165.9%
E17	Unnamed Ancient Woodland 3	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0030	0.17%	3.00	169.0%

Table 33: Detailed results – acid deposition – Scenario 2 – average over five years of weather data

Ref	Site	Acidity class	Deposition velocity	PC		PEC	
				N keq/ha/yr	% of CL Function	keq/ha/yr	% of CL Function
European and UK designated sites							
E1	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses	Bogs	Grassland	0.0029	0.55%	1.70	318.9%
		Unmanaged Broadleafed/ Coniferous Woodland	Grassland	0.0044	0.23%	3.10	165.4%
E2	Brown Moss	Bogs	Grassland	0.0003	0.06%	1.80	330.3%
E3	Oss Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0005	0.03%	3.20	177.2%
E4	Quoisley Meres SSSI (Midland Meres and Mosses Phase 1 Ramsar)	No critical load defined	-	-	-	-	-
E5	Llyn Bedydd SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0007	0.04%	2.90	174.6%
E6	Hanmer Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	No Critical Load defined	-	-	-	-	-
E7	West Midland Mosses SAC (Midland Meres and Mosses Phase 1 and Clarepool Moss SSSI)	Bogs	Grassland	0.0001	0.01%	1.50	293.6%
		Bogs (bog woodland)	Woodland	0.0001	0.02%	2.70	528.4%
E8	Cole Mere SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Calcareous grassland (using base cation)	Grassland	0.0001	<0.01%	1.50	30.9%
		Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0001	0.01%	2.70	168.0%
E9	Brownheath Moss SSSI (Midland Meres and Mosses Phase 2 Ramsar)	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0001	0.01%	2.80	175.0%

Ref	Site	Acidity class	Deposition velocity	PC		PEC	
				N keq/ha/yr	% of CL Function	keq/ha/yr	% of CL Function
Local nature sites							
E10	Fenn's, Whixall & Bettisfield Mosses	Bogs	Grassland	0.0023	0.43%	1.70	318.8%
E11	Fenn's Rough Ancient Woodland	Unmanaged Broadleafed/	Woodland	0.0163	0.97%	3.02	180.4%
E12	Fenn's Wood Ancient Woodland North	Coniferous Woodland	Woodland	0.0037	0.68%	3.00	550.1%
E13	Fenn's Wood Ancient Woodland Mid	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0018	0.33%	3.10	567.1%
E14	Fenn's Wood Ancient Woodland South	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0013	0.24%	3.10	567.0%
E15	Unnamed Ancient Woodland 1	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0025	0.45%	3.10	567.2%
E16	Unnamed Ancient Woodland 2	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0025	0.15%	2.90	165.9%
E17	Unnamed Ancient Woodland 3	Unmanaged Broadleafed/ Coniferous Woodland	Woodland	0.0025	0.14%	3.00	169.0%

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