



Air Quality Impact Assessment Addendum for a Proposed Anaerobic Digestion Plant at Ashton Keynes, Wiltshire

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Abbreviations

AAD	Ambient Air Quality Directive (2008/50/EC)
AADT	Annual average daily traffic
AcidDep	Acid deposition
ACPH	Air changes per hour
AD	Anaerobic Digester
AQAL	Air quality assessment level
AQAP	Air Quality Action Plan
AQIA	Air Quality and Impact Assessment
AQIAA	Air Quality and Impact Assessment Addendum
AQMA	Air Quality Management Area
AQS	Air quality standards
AQSR	Air Quality Standards Regulations 2010
AW	Ancient Woodland
BAT	Best Available Techniques
BG	Biogas
CDC	Cotswold District Council
CHP	Combined heat and power engine
CLe	Critical level (concentration)
CLo	Critical load (deposition)
CO	Carbon monoxide
CO ₂	Carbon dioxide
Defra	Department for the Environment, Food and Rural Affairs
DM	Dry matter
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EAL	Environmental Assessment Level
ELV	Emission limit value
EPUK	Environmental Protection UK
GCER	Gloucestershire Centre for Environmental Records
GUU	Gas upgrading unit
HDV	Heavy Duty Vehicle
IAQM	Institute of Air Quality Management
kWe	Kilowatt electrical output
kWthi	Kilowatt thermal input
LAQM	Local Air Quality Management
LDV	Light Duty Vehicle
LNR	Local Nature Reserve
LWS	Local Wildlife Sites
mAOD	Metres Above Ordnance Datum
MCP	Medium Combustion Plant
MCPD	Medium Combustion Plant Directive

n/a	Not applicable
N	Nitrogen
NDep	Nutrient nitrogen deposition
NE	Natural England
NG	Natural gas
NGR	National Grid Reference
NH ₃	Ammonia
NMVOCs	Non-methane volatile organic compounds
NNR	National Nature Reserve
NO ₂	Nitrogen dioxide
NO _x	Oxides of nitrogen
O ₂	Oxygen
PC	Process Contribution
PEC	Predicted environmental concentration
PH	Priority Habitat
PM _{2.5}	Particulate matter, with aerodynamic diameter less than 2.5mm (very fine)
PM ₁₀	Particulate matter, with aerodynamic diameter less than 10mm (fine)
PRV	Pressure Relief Valve
PVRV	Pressure and Vacuum Relief Valve
RIGS	Regionally Important Geological and Geomorphological Site
SAC	Special Area of Conservation
SO ₂	Sulphur dioxide
SPA	Special Protection Area
TPA	Tonnes per annum
TVOC	Total gaseous and vaporous organic substances, expressed as total organic carbon
VOC	Volatile organic compounds
WSBRC	Wiltshire and Swindon Biodiversity Records Centre

Executive Summary

This 2025 Air Quality Impact Assessment Addendum (AQIAA), prepared by Earthcare Technical Ltd (ETL), forms an updated Technical Appendix to the 2023 Air Quality Impact Assessment (AQIA) and 2023 Air Quality Chapter 4 of the Environmental Statement (ES) also previously prepared by Earthcare Technical Ltd.

The purpose of this revised 2025 AQIAA is to assess the updated design of the Proposed Development, incorporating both the October 2024 Design Changes and the newly introduced 2025 Design Refinements and should be read alongside the 2023 AQIA and 2023 ES Chapter 4.

The October 2024 Design Changes were aimed at reducing the bulk, massing, and overall scale of the Proposed Development. The 2025 Design Refinements included lowering the height of the proposed manure processing building. This AQIAA also considers Statutory Consultee comments made with reference to the 2023 AQIA.

The core principles of the Proposed Development, the proposed feedstock composition, quantities and volumes of digestate output remain unchanged.

No changes are anticipated in terms of associated traffic movements with the revised Proposed Development. Therefore, in accordance with the conclusions of the original assessment, the potential for impact may be regarded as **not significant**.

There are no associated changes to the construction phase of the Proposed Development in terms of the scope or scale of activities to be undertaken. Therefore, construction dust impacts remain **not significant**, and the recommended mitigation originally proposed to reduce the potential for dust impact is still considered to be **proportionate and effective**.

Modifications to specific components of the proposed site infrastructure have further mitigated the potential for dust emissions during the operational phase. Consequently, the residual risk of dust-related impacts remains classified as **not significant**.

The scope of operations with the potential to generate bioaerosol impacts at nearby sensitive locations remains unchanged and as before are considered **not significant**.

Modifications to certain elements of the proposed site infrastructure have further reduced the likelihood of odour generation during the operational phase, ensuring that any potential odour impact remains **not significant**.

The potential for other emissions to air to adversely impact upon human health and sensitive ecological receptors within the locale during the operational phase of the Proposed Development is revaluated using qualitative and quantitative assessment approaches, including dispersion modelling.

The revaluation assesses the magnitude and significance of any potential short and long-term effects in relation to the air quality standards set in legislation and relevant evaluation criteria provided in guidance.

For modelled locations selected as representative of relevant human exposure, the long- and short-term predicted air quality impacts of the revised Proposed Development at receptors has been determined to be **not significant**.

Air quality impacts of predicted concentrations of the revised Proposed Development at ecological conservation areas during the operational phase are determined to be **not significant**. Predicted rates of nutrient nitrogen and acid deposition on sensitive conservation areas due to the proposal are considered **unlikely to unduly impact these sites**.

The Proposed Development is not expected to cause cumulative air quality impacts, with predicted pollutant levels remaining below established standards.

The design changes to the Proposed Development have been reassessed and it is considered that the conclusions of the original assessment **remain valid** and that the predicted impact of emissions to air are found not to be a constraint on the construction and operation of the Proposed Development.

Competency Statement

This Air Quality Impact Assessment Addendum (AQIAA) has been written by M Fuhrmann BSc (Hons) PISEP, MEnvSc, MIAQM, she has over 20 years' experience providing services in Environmental Consultancy specialising in Air Quality. She is a Member of the Institute of Air Quality Management (MIAQM), Member of the Institution of Environmental Science (MEnvSci), and a Practitioner of the Institute of Sustainability and Environmental Professionals (PISEP). She has extensive experience in air quality monitoring and assessment in the context of environmental permitting, planning/ EIA and statutory nuisance proceedings. She has overseen long-term monitoring contracts, ensuring that the approach remains in line with existing and/or emerging guidance, and has provided external training in monitoring methods.

1 Introduction

- 1.1.1 This 2025 Air Quality Impact Assessment Addendum (AQIAA), prepared by Earthcare Technical Ltd (ETL), forms an updated Technical Appendix to the 2023 Air Quality Impact Assessment (AQIA)¹ and 2023 Air Quality Chapter 4 of the Environmental Statement (ES) also previously prepared by Earthcare Technical Ltd. This 2025 AQIAA addresses design changes to the Proposed Development and should be read alongside the 2023 AQIA and 2023 ES Chapter 4.
- 1.1.2 The purpose of this revised 2025 AQIAA is to assess the updated design of the Proposed Development, incorporating both the October 2024 Design Changes and the newly introduced 2025 Design Refinements.
- 1.1.3 The October 2024 Design Changes were presented in revised planning application drawings, detailing modifications aimed at reducing the bulk, massing, and overall scale of the Proposed Development. These changes were made in response to feedback from Wiltshire Council's (WC) Landscape Team and were made possible by the Applicant's decision to adopt an alternative anaerobic digestion technology.
- 1.1.4 This updated technology involves fewer and lower-profile digestion tanks, positioned within reduced ground levels across the Site. Combined with enhanced landscape planting proposals, these adjustments substantially lessen the development's landscape and visual impact. The October 2024 revisions also included updated drainage plans and a supporting Drainage Impact Assessment.
- 1.1.5 Following consultations with Wiltshire Council's planning and landscape officers in March 2025, three further design enhancements have been proposed as part of the 2025 Design Refinements. These are considered beneficial from a landscape and visual impact standpoint:

¹ Earthcare Technical Ltd (2023) Air Quality Impact Assessment for a Proposed Anaerobic Digestion Plant at Ashton Keynes, Wiltshire. Ref: ETL733/AQIA/Final/V1.0/April 2023.

- Lowering the height of the proposed manure processing building
 - Introducing native willow screen planting behind the perimeter fence along part of the Site access
 - Establishing a native wildflower meadow in the northeast section of the Site
- 1.1.6 Further, this revised 2025 AQIAA considers Statutory Consultee comments made with reference to the 2023 AQIA. Natural England, the Arboricultural Officer, the Ecology Officer, the Environment Agency, and the Highways Department did not provide feedback or concerns regarding air quality.
- 1.1.7 The revised 2025 AQIAA acknowledges comments received from Wiltshire Council Environmental Protection, Ashton Keynes Parish Council and South Cerney Parish Council. The assessment has been updated to include quantitative (dispersion modelling) of odour impact; and includes evaluation of additional human and ecological receptor locations; and a cumulative air quality impact analysis that accounts for other relevant plans or projects.
- 1.1.8 The principle of the scheme, the proposed feedstock composition and quantities and volumes of digestate output remain unchanged.
- 1.1.9 There will be no changes to the proposed site access or vehicular **traffic movements** during either the construction or operational phases. As reported in the 2023 AQIA, during the construction phase an Annual Average Daily Traffic (AADT) flow of 72 light-duty vehicle (LDV) movements per day is forecast (over 365 days); and an AADT flow of 40 Heavy Duty Vehicle (HDV) movements per day is forecast. During the operational phase an AADT flow of 8 LDV movements per day is forecast; and an AADT flow of 68 HDV movements per day is forecast.
- 1.1.10 IAQM (2017) guidance² establishes benchmark criteria for further detailed assessment. For the Proposed development, which is located outside of an AQMA, an increase in AADT of 500 LDV and 100 HDV would require further assessment. AADT associated with the Proposed Development is projected to be less than screening criteria values and the potential for traffic from either the construction or operational phases to impact air quality is not significant.

² Moorcroft and Barrowcliffe. et al. (2017) Land-use Planning & Development Control: Planning for Air Quality. v1.2. Institute of Air Quality Management, London. (<http://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf>)

- 1.1.11 There are no associated changes to the **construction phase** of the Proposed Development in terms of the nature, scale or scope of activities undertaken during that construction phase. The 2023 AQIA assessed the potential for **construction dust** impact from the Proposed Development based on a qualitative risk assessment technique, that follows IAQM (2016) guidance.³ Therefore, in terms of the potential for dust soiling/ health impacts due to construction phase activities at sensitive human receptor locations and sensitive ecological areas, the proposed changes do not affect the conclusions of the 2023 AQIA. Impacts remain not significant, and the best practice mitigation measures originally proposed as a minimum requirement to reduce potential dust impacts are still considered proportionate and effective.
- 1.1.12 The 2023 AQIA assessed the potential for **operational dust** impact from the Proposed Development based on a qualitative risk assessment technique, that follows IAQM (2016) guidance⁴ for assessing the impacts from mineral workings. The 2023 AQIA concluded that the magnitude of dust effects would be negligible and the potential for **dust** impact from the operational phase was not significant. However, it is proposed that a fully enclosed Straw Processing Building be introduced to handle and store processed straw, thereby eliminating the need for a partially enclosed bunker. This revised design is expected to further mitigate any remaining risks. The potential for operational dust impact therefore remains not significant.
- 1.1.13 During the operational phase, the scope of operations with the potential to generate **bioaerosol** impacts at nearby sensitive locations remains unchanged. In accordance with Environment Agency guidance,^{5,6} in circumstances where a receptor is not located within 250 metres of a potential emission source and there will be no further treatment such as composting digestate fibre in the open taking place, then it is considered the potential impacts would have insignificant effects and no further risk assessment is required. There are two potential receptors located within 250m of the Proposed Development, although neither are considered to represent locations of relevant exposure. Consistent with the findings of the 2023 AQIA, the potential for operational bioaerosol impacts is considered not significant.

Scope and objectives of this addendum report

- 1.1.14 This AQIAA re-assesses the potential impact of **other emissions to air** namely odour, oxides of nitrogen (NO_x), hydrogen sulphide (H₂S), sulphur dioxide (SO₂), total volatile organic compounds (TVOC), carbon monoxide (CO), particulate matter (PM₁₀ and PM_{2.5}), and ammonia (NH₃), during the operational phase of the Proposed Development, on air quality at relevant receptor locations within the locale of the application site.

³ Holman et al (v1.1 01/06/2016). IAQM Guidance on the assessment of dust from demolition and construction, Institute of Air Quality Management, London. www.iaqm.co.uk/text/guidance/construction-dust-2014.pdf.

⁴ IAQM (2016) Guidance on the Assessment of Mineral Dust Impacts for Planning. Institute of Air Quality Management, London.

⁵ Environment Agency (2011) Composting and potential health effects from bioaerosols: our interim guidance for permit applicants Position Statement 031 Version 1.0 1st November 2010

⁶ Environment Agency (2011) Composting and potential health effects from bioaerosols: our interim guidance for permit applicants Position Statement 031 Version 1.0 1st November 2010

1.1.15 The assessment methodology includes the use of updated atmospheric dispersion model ADMS 6.0.0.1 and revised emission sources. Changes to baseline air quality conditions are considered with newly available background monitoring and modelled data presented. The effects of the amendments on predicted pollutant concentrations at sensitive receptors are quantified.

1.1.16 The results are compared to relevant guidelines for the protection of human health and conservation areas. The magnitude and significance of any potential effects in relation to the air quality standards set in legislation and relevant evaluation criteria provided in guidance is presented.

1.1.17 The updated assessment of air quality impacts is informed through:

- A review of Statutory Consultee comments with regard to the 2023 AQIA.
- An updated review of baseline conditions at the Site.
- An updated review of emissions data supplied by the proposed technology providers.
- Revaluation of operational phase impacts including quantitative assessment (modelling) of odour impacts. Updated atmospheric dispersion modelling of combustion emissions and NH₃ emissions is undertaken, from which the dry deposition to sensitive conservation sites has been calculated. Combustion sources have been modelled at the specified Emissions Limit Values (ELVs) if ELVs exist for the sources and from data for similar plant at other sites if there are no ELVs.
- A revaluation of the significance of any potential short and long-term effects in relation to air quality assessment levels (AQAL) (i.e., limits, targets, objectives, and assessment levels) set in legislation and evaluation criteria provided in relevant guidance.

1.1.18 The scope of changes considered within the updated AQIAA are summarised in Table 1 below.

Table 1 Scope of changes considered within the updated assessment

Parameter	Description
Emission sources and infrastructure	October 2024 Design Changes Revised source emission parameters, emissions profiles, updated infrastructure specifications and stack elevations based on alternative anaerobic digestion technology (Table 2 and Section 2.2.4). 2025 Design Refinements Lowering the height of the proposed Manure Building.

Baseline concentrations and depositions	Updated ambient background concentrations at modelled human receptor locations (NO ₂ , CO, SO ₂ , benzene, NH ₃) (Table 14 and Table 14), and at ecological receptors (NO _x , SO ₂ , NH ₃) in addition to background rates of nitrogen deposition (NDep) and acid deposition (AcidDep) (Table 16).
Odour impacts	The revised results for predicted odour impact at human receptor locations are presented in Section 5.1. This includes an updated qualitative risk assessment based on IAQM (2018) Guidance; ⁷ in addition to quantitative air dispersion modelling of predicted odour impact.
Air quality impacts at human and ecological receptors	The use of updated atmospheric dispersion model ADMS 6.0.0.1 and updates to the model parameters are summarised within Section 2, and detailed within Appendix C. The updated scenarios modelled include: a long-term operating scenario; a 'normal' short-term operating scenario; and two 'abnormal' short-term operating scenarios (Section 2.3). The revised results for predicted impacts at human and ecological receptor locations are presented in Section 5 and Section 6. For ecological receptors, the results are compared to updated Critical Levels (CLes) and Critical Loads (Clos) (summarised in Table 16), where applicable. Updated sensitivity testing of the model results to changes in model input are presented in Appendix D.
Cumulative impacts	Section 7 assess the potential for in-combination effects with other relevant plans or projects.

1.1.19 The updated Site layout is provided in Appendix A. Full details of the revised Proposed Development are provided in the accompanying 2025 ES Addendum. Table 2 lists the updated infrastructure considered specifically for emissions to air. The list also includes infrastructure that is excluded from consideration, such as essential safety features – like pressure relief valves (PRVs) or pressure and vacuum relief valves (PVRVs) on tanks - which are designed not to operate or emit under normal conditions.

⁷ Bull et al (2018). IAQM Guidance on the assessment of odour for planning – version 1.1, Institute of Air Quality Management, London.

Table 2 Infrastructure considered for emissions to air

Source	Emissions	Dimensions	Operation profile
Modelled emission sources			
CHP 1, Combined Heat and Power Engine (1.2 MWe) fuelled by biogas (BG)	NO _x , SO ₂ , TVOC, CO	Stack 8.7m, 0.4m diameter	8,760 hours per year, 100% load (modelled as continuous).
CHP 2, Combined Heat and Power Engine (1.2MWe) fuelled by natural gas (NG)	NO _x , TVOC, CO	Stack 8.7m, 0.4m diameter	8,760 hours per year, 100% load (modelled as continuous).
1No. Boiler, back-up (500 kWtho (BG)/ 560kWtho (NG))	SO ₂ , NO _x	Stack 7m, 0.25m diameter	Will only operate for maintenance or to provide additional heat where required e.g. during winter and/or if CHP offline. Assumed conservatively to operate for 15% of the year (approximately 2 months) for comparison with long-term AQS. Typically, however, the boiler will operate for approximately only 5% of the time.
Emissions abatement plant stack exhaust (Manure Reception Building)	Odour, NH ₃ , H ₂ S, PM ₁₀ , PM _{2.5}	Stack 10.2m, 0.7m diameter	Continuous.
Emergency Flare	TVOC, NO _x , CO	Stack 10.51m, 1.864m diameter	Safety feature used <10% of year. Modelled as continuous to determine short-term impacts. Long-term impacts based on 10% annual operation.
3No. feed hoppers (2No. silage hoppers, 1No. straw hopper).	Odour	120m ³ each (11m x3m x 3.5m)	Emissions from 2No. silage hoppers only. Feed 37 minutes/hour. Modelled as continuous - 24h/day, 365 days/year.
3No. Silage clamps	Odour	Clamps 1 & 2: 101m long x 35m wide x 3.5m high. Clamp 3: 124m long x 35m wide x 3.5m high.	Low emissions of odour during silage cutting, modelled as continuous.
2No. dirty water tanks with vents	Odour, NH ₃	400m ³ (8m x 8m) each	Continuous. Unabated emission from vents.
1No. Buffer tank with vent	Odour, NH ₃	400m ³ (8m x 8m)	Continuous. Unabated emission from vents.
1No. Reception tank with vent and carbon filter	Odour, NH ₃	400m ³ (8m x 8m)	Continuous. Abated emission from vents.

Source	Emissions	Dimensions	Operation profile
1No. Underground Leachate tank with vent	Odour, NH ₃	54m ³	Continuous, unabated emission from vent.
Separator Building	Odour, NH ₃	26m x 20m x 9m to ridge height	Continuous fugitive emissions building even when door is closed.
2No. Covered Digestate Storage Lagoons	Odour, NH ₃	8,000m ³ capacity	Modelled as a continuous emission, each with carbon filter outlet.
1No. Liquid digestate off-take point	Odour, NH ₃	Tanker vent with carbon filter	Long-term impacts based on off-take profile between: 08:00-18:00 Monday - Friday; 08:00 – 13:00 Saturdays.
Sources not required to be included			
1No. Emergency back-up generator	NOx, SO ₂ , TVOC, CO	/	Negligible long-term impact, likely to operate less than 50 hours/year (not used during normal operation).
Biogas upgrade unit (BUU) carbon dioxide (CO ₂) recovery vent	CO ₂	Vent height 7.5m	Under normal operating conditions there will be no emissions from the BUU: it will have gas capture and therefore the only emissions will be small amounts of CO ₂ periodically released during depressurisation.
BUU PRV	Odour, TVOC, NH ₃	Approx. PRV height 7.5m	Installed as a safety feature. Biogas will be released from the PRV on the BUU in over-pressure scenarios only.
Straw building	Dust	43m x 23m x 9.2m to ridge	Limited potential for dust emissions from enclosed building. Negligible odour.
Covered lagoon PVRVs	Odour, NH ₃	/	Operation unlikely due to low residual biogas potential of material stored. Installed as a safety feature to manage over-pressure within the lagoon storage system in the unlikely event this should occur.
1No. Primary and 1No. Secondary Digester Tanks and PVRVs	Odour, TVOC, NH ₃	9m straight wall height, flat topped. 45m diameter	Closed system, zero emissions except during PVRV operation (not used during normal operation).
1No. Post Digester Tank and PVRV	Odour, TVOC, NH ₃	Total height to top of dome: 16.5m. 34m diameter	Closed system, zero emissions except during PVRV operation (not used during normal operation).
Note: / = not applicable.			

2 Methodology

2.1.1 The methodology for the AQIAA comprised three parts which are described in more detail in Sections 2.2 and 2.3:

1. Updated baseline conditions at the Site and the surrounding area: AQMAs and designated conservation areas; background concentration and deposition (Sections 4.2 to Section 4.5).
2. Modelling of impacts:
 - assessment of the likely changes in concentration and deposition due emissions from the sources listed in Table 2. Operation of the plant under normal operating conditions and abnormal operating conditions such that the flare and/or boiler are in operation. The assessment was undertaken using the ADMS 6 dispersion model (Appendix C).
 - The modelling assessment included an assessment of the sensitivity of model results and hence, the impacts, to changes in model input (Appendix D).
3. Assessment of significance: Section 3 describes the tests of significance for planning and permitting.

2.1.2 If the impacts are significant then further investigation would be required.

2.2 Baseline conditions

2.2.1 The baseline assessment has used the latest available monitored and modelled data to establish the current state of the environment. The following sources of information have been used in preparing the baseline assessment which is presented in Section 4:

- Cotswold District Council 2024 Air Quality Annual Status Report (ASR):⁸ identification of AQMAs, monitoring sites and monitoring data.
- MAGIC website⁹: identification of Ramsar sites, SACs, SPAs, SSSIs, AWs, NNRs and LNRs
- Defra Background Mapping data for local authorities¹⁰: mapped concentrations on a 1km² basis. The mapped concentrations of NO_x, NO₂ are derived from maps based on 2021, for comparison with relevant monitored data. Data for SO₂ and benzene for 2023, CO for 2010, are also on a 1km x 1km basis.
- APIS, UK Air Pollution Information System website¹¹: for mapped background deposition values of NO_x, SO₂ and NH₃ at each ecological receptor, site-specific critical loads, and background deposition rates at SPAs and SSSIs, and gridded habitat-specific critical loads and background deposition rates at LWS and LNRs.

2.3 Modelling of air quality impacts

Model

2.3.1 The dispersion model used to predict ambient concentrations due to the stack emissions was ADMS 6 (version 6.0.0.1). Full details of the meteorological, buildings, terrain and receptor data are described in Appendix C.

Model scenarios

2.3.2 The updated modelled scenarios are summarised as:

- **Modelled Long-term Scenario, normal operation**, all sources
 - CHP1 (BG), CHP2 (NG), operating continuously, emergency boiler (15%), emergency flare (10%) plus all other sources operating continuously
- **Modelled Short-term Scenario, normal operation**
 - CHP1 (BG), CHP2 (NG), plus all other sources except the emergency boiler and emergency flare operating continuously.
- **Modelled Short-term Scenario, abnormal operation (1)**
 - CHP1 (BG), emergency boiler, emergency flare, plus all other sources except CHP2 (NG) all operating continuously.
- **Modelled Short-term Scenario, abnormal operation (2)**

⁸ Cotswold District Council 2024 Air Quality Annual Status Report (ASR) (<https://www.cotswold.gov.uk/media/wenmwzzb/air-quality-annual-report-2024.pdf>)

⁹ MAGIC website (<https://magic.defra.gov.uk/MagicMap.aspx>)

¹⁰ Defra Background Mapping data for local authorities (<https://uk-air.defra.gov.uk/data/laqm-background-home>)

¹¹ Air Pollution Information System (APIS) (<https://www.apis.ac.uk/>) [Accessed September 2025].

- CHP1 (BG), CHP2 (NG), plus emergency boiler, emergency flare, plus all other sources all operating continuously.

2.3.3 Both scenarios have been modelled as occurring all year to capture the impacts if the scenario were to coincide with the worst-case meteorological data that gives rise to the greatest impacts. It is a very conservative assumption in terms of the abnormal scenarios to assume that their occurrence, which will persist for a short period, will coincide with all the worst-case meteorological conditions.

Model options

2.3.4 The model was run for each of the five years of meteorological data (2017-2021) to account for intra-annual variation, and for three combinations of model option scenarios:

- Flat terrain: no buildings and no terrain (hills)
- Buildings: with buildings and no terrain (hills)
- Terrain (hills): with buildings

2.3.5 Results at the receptors were calculated as the maximum value at each receptor from these 15 models runs and are therefore worst-case values across all five years and the three model options scenarios. The assessment is therefore conservative (pessimistic) in this respect.

2.3.6 The impact of buildings, terrain and meteorological data year were assessed, and the results are given in Appendix D. For human and ecological receptors, modelling buildings led to higher model predictions than for flat terrain. Modelling terrain as well as buildings generally led to a further increase. The variation due to meteorological data year is generally less significant than the impact of modelling buildings.

Sources and emissions

2.3.7 The source geometry, parameters, ELVs, design emission limits and calculated emissions are given in Table 3 for the CHPs, emergency flare and emergency boiler. Table 4 summarises the input parameters for the emissions abatement plant stack for the Manure Reception Building, the Underground Leachate Tank, 2No. Covered digestate storage lagoon carbon filter outlets, and the Liquid digestate offtake point carbon filter.

2.3.8 Table 5 details the inputs for the 1No. Liquid Feedstock (Reception) Tank carbon filter outlet, the buffer tank vent and 2No. dirty water tank vent.

2.3.9 Table 6 sets out the parameters for volume sources including the silage clamps, feedstock hoppers, and Separation Bunker.

2.3.10 There are changes in ground level across the site. In the Flat terrain and Buildings model scenarios stack and building heights were modified to account for changes in ground level as described in Appendix C, section C.3. In the Terrain (hills) model scenario such an adjustment is not required as the ADMS model accounts for changes in terrain height. The heights of emission sources given in Table 3 to Table 6 inclusive are the unadjusted heights.

- 2.3.11 The CHPs and emergency boiler have been modelled using MCP ELVs. While the exact plant has not been finalised at this stage, representative data have been used in this assessment (Appendix C). There are no BAT-AELs for TVOC and CO for boilers; emissions of TVOC and CO from boiler exhausts are negligible.
- 2.3.12 Emissions from the emergency flare were modelled at typical permit ELVs; it can burn up to 3,000m³/h of biogas. The composition of the biogas consumed by all the sources has been assumed to be 56% methane (CH₄) and 44% carbon dioxide (CO₂). The efflux parameters have been provided by the manufacturer (Appendix C).
- 2.3.13 For the Emergency Flare there are no MCP ELVs. Guidance for monitoring enclosed landfill gas flares (LFTGN 05¹²) sets out the emission standards for enclosed gas flares and these have been used:
- 150 mg/Nm³ for NO_x (3% O₂), LFTGN 05
 - 50 mg/Nm³ for CO (3% O₂), LFTGN 05
 - 10 mg/Nm³ for TVOC (3% O₂), LFTGN 05
- 2.3.14 ELVs are specified as TVOC for which there are no EALs. There is an EAL for benzene, one component of TVOC. An AEA Technology report¹³ on the Speciation of UK emissions of non-methane volatile organic compounds (2002) reported on a series of VOC species profiles available for stationary combustion sources, covering a range of both fuel types and scale of combustion.
- 2.3.15 The benzene fraction in industrial and commercial combustion of natural gas was reported to be less than 10% of NMVOC, a subset of TVOC. For flares the NMVOC ELV is usually given as half that of TVOC, so for the Flare it has been assumed that 5% of the TVOC emission is benzene. For the CHPs, monitoring data from another AD site has shown that NMVOC, of which benzene is a component, is less than 2% of TVOC, so benzene has been modelled as 2% of TVOC. Both assumptions are conservative as benzene is one component of NMVOC (Appendix C, section C).

¹² Environment Agency (2010) Guidance for monitoring enclosed landfill gas flares LFTGN05 v2 2010, Available at: <https://www.gov.uk/government/publications/monitoring-enclosed-landfill-gas-flares-lftgn-05> [Accessed: September 2025]

¹³ N R Passant (2002) Speciation of UK emissions of non-methane volatile organic compounds. Reference: AEAT/ENV/R/0545 Issue 1

Table 3 CHP and flare emission parameters

Parameter	Units	CHP (BG) ¹	CHP (NG) ²	Emergency flare ₃	Emergency boiler ⁴
Location	X,Y	404067, 196074	404068, 196068	404098, 196077	404080, 196072
Fuel	-	Biogas	Natural gas	Biogas	Biogas/ Natural gas
Electrical output	kWe	1,200	1,200	n/a	n/a
Thermal output	kWtho	n/a	n/a	n/a	500 (BG), 560 (NG)
Stack height	m	8.7	8.7	10.51	7.0
Internal diameter at exit	m	0.4	0.4	1.864	0.25
Volume flow rate (dry)	Nm ³ /s	1.04	1.19	5.1	0.14
Volume flow rate (wet)	Am ³ /s	2.21	2.51	66.4	0.30
Velocity	m/s	17.6	20.0	24.3	6.01
Temperature	°C	150	150	1,000	180
Exit concentration SO ₂	mg/Nm ³	107 (ELV, 5% O ₂)	n/a	n/a	100 (ELV, 3% O ₂)
Exit concentration TVOC	mg/Nm ³	1,000 (ELV, 5% O ₂)	1,000 (ELV, 5% O ₂)	10 (ELV, 3% O ₂)	n/a
Exit concentration NOx	mg/Nm ³	500 (ELV, 5% O ₂)	250 (ELV, 5% O ₂)	150 (ELV, 3% O ₂)	200 (ELV, 3% O ₂)
Exit concentration CO	mg/Nm ³	1,400 (ELV, 5% O ₂)	1,400 (ELV, 5% O ₂)	50 (ELV, 3% O ₂)	n/a
Emission rate SO ₂	g/s	0.11	-	-	0.014 (0.002)
Emission rate TVOC	g/s	1.04 (0.02) ⁵	1.19 (0.02) ⁵	0.003 (0.0003) ⁶	-
Emission rate NOx	g/s	0.52	0.30	0.77 (0.077)	0.028 (0.004)
Emission rate CO	g/s	1.46	1.66	0.26 (0.026)	-
Notes: Details of the calculation of emissions and assumptions made are given in Appendix C, Section C.1 n/a = not applicable ¹ Emission rates have been calculated on the basis of the likely benzene component: 5% for the Flare (Section C.5.3) ² Emission rates in brackets are long-term emission rates taking into account the predicted hours of operation.					

Table 4 Other point source emission parameters

Parameter	Units	Emissions abatement plant stack	Leachate tank vent	2No. Covered digestate storage lagoons carbon filter outlets ³	Liquid digestate offtake point carbon filter
Location	NGR (X,Y) m	404044, 196272	404035, 196118	403935, 196014 403942, 196014	404007, 196010
Stack height	m	10.2	0.1	2.0	2.0
Internal diameter at stack exit	m	0.70	0.34	0.20	0.15
Volume flow rate (dry)	Nm ³ /s	-	-	-	-
Volume flow rate (wet)	Am ³ /s	5.30 ¹	0.0009	0.069	0.023
Exit velocity	m/s	13.8	0.01	2.21	1.27
Temperature	°C	22.5	Modelled as 'Ambient'	Modelled as 'Ambient'	Modelled as 'Ambient'
Exit concentration NH ₃	mg/Nm ³	0.177	16.7 (0.83) ²	958 (19) ³	4.93 (0.29) ⁴
Exit concentration PM ₁₀	mg/Nm ³	5.0	-	-	-
Exit concentration PM _{2.5}	mg/Nm ³	5.0	-	-	-
Exit concentration H ₂ S	mg/Nm ³	0.142	-	-	-
Exit concentration Odour	oue/Nm ³	1,000	10,000 (500) ²	10,000 (200) ³	10,000 (583) ⁴
Emission rate NH ₃	g/s	0.001	0.00002 (0.00000075) ²	0.067 (0.0013) ³	0.00011 (6.5x10 ⁻⁶) ⁴
Exit rate PM ₁₀	g/s	0.027	-	-	-
Exit rate PM _{2.5}	g/s	0.027	-	-	-
Emission rate H ₂ S	g/s	0.0008	-	-	-
Emission rate Odour	oue/s	5,300	9 (0.45) ²	694 (13.9) ³	225 (13.1) ⁴
Notes: Details of the calculation of emissions and assumptions made are given in Appendix C, Section C.1 n/a = not applicable. ¹ Assuming 3 air changes per hour (acph) ² Brackets indicate values used for modelling, factored to account for 50% reduction in emissions due to dilution of leachate stored and 80% due to containment within the underground tank. ³ 2No. carbon filter outlets: stack height, diameter and volume flow rates based on assumptions. NH₃ concentrations have been calculated based on the nitrogen content of fresh matter in the feedstock (8.1 kg total N/tonne) derived from the feedstocks used within the process. Odour concentrations based on measured odour concentrations for a digestate storage lagoon.¹⁴ Brackets indicate values used for modelling, factored to account for 90% reduction in emissions due to containment within a digestate storage lagoon, and a further 80% reduction in emissions through the carbon filter. ⁴ Brackets denote values after being factored for the number of tankers and the filling time of 20 minutes, which is spread across 60 minutes, the averaging time used by the ADMS model, assuming constant rate Monday to Friday, 10 hours per day, Saturday 5 hours per day (2,860 hours/year), with a further reduction of 80% in emissions through a carbon filter.					

¹⁴ A S Modelling & Data (2017) A Dispersion Modelling Study of the Impact of Odour from the Proposed Biofertilizer Storage Lagoon at land west of Hangman Stone Lane, near High Melton in South Yorkshire.

Table 5 Point sources, liquid process tanks

Parameter	Units	Liquid feedstock tank carbon filter	Buffer tank carbon filter	2No. dirty water tank carbon filter
Location	NGR (X,Y) m	404051,196089	404049,196100	404045,196125 404047,196113
Stack height	m	2.0	2.0	2.0
Internal diameter at stack exit	m	0.15	0.15	0.15
Volume flow rate (dry)	Nm ³ /s	-	-	-
Volume flow rate (wet)	Am ³ /s	0.035	0.0002 ⁴	0.0002 ⁴
Exit velocity	m/s	2.0 ⁴	0.01	0.01
Temperature	°C	Modelled as 'Ambient'	Modelled as 'Ambient'	Modelled as 'Ambient'
Exit concentration NH ₃	mg/Nm ³	1.5 (0.03) ¹	590 (7.4) ²	590 (2.9) ³
Exit concentration Odour	ouE/Nm ³	10,000 (200) ¹	10,000 (125) ²	10,000 (50) ³
Emission rate NH ₃	g/s	0.000053 (1.1x10 ⁻⁶) ¹	0.000104 (1.3x10 ⁻⁶) ²	0.000104 (5x10 ⁻⁷) ³
Emission rate Odour	ouE/s	353 (7.07) ¹	1.77 (0.022) ²	1.77 (0.009) ³
Notes: Details of the calculation of emissions and assumptions made are given in Appendix C, Section C.1 n/a = not applicable. ¹ Includes a 90% reduction in emissions due to containment within the tank, with a further reduction of 80% in emissions through a carbon filter. ² Includes a 90% reduction in emissions due to containment within the tank, with a further reduction of 25% based on the proportion of leachate contained within the tank (assuming the remaining volume is water from the Clean water lagoon), and a further 50% reduction for dilution of the leachate (with surface run-off) prior to storage within the tank. ³ Includes a 90% reduction in emissions due to containment within the tank, with a further reduction of 95% based on the assumption the contents are 95% clean water and 5% leachate. ⁴ Assumed velocity/ volume flow rate.				

Table 6 Volume sources Clamps, Hoppers, Separation Bunker

Parameter	Units	Working face of each clamp face exposed	2No. Feed hoppers ²	Separator bunker ⁶
Depth, width, length	Each in m	5, 31, 1	0.5, 11.3, 2.8	20, 13.55, 2.13
Emitting surface area	m ²	153 (cutting face)	31.3	314
Emission mid-height	m	4.25	3.0	1.06
Maximum solid digestate stored	Tonnes	n/a	n/a	303
Exit concentration NH ₃	kg/yr	n/a	n/a	37
Area emission rate odour	ouE/m ² /s	20 ¹	50 ³	2.8 ⁷
Emission rate NH ₃	g/m ³ /s	n/a	n/a	(4.6x10 ⁻⁶) ⁸
Emission rate Odour	ouE/m ³ /s	0.18	100 (86.3) ⁴ (109.4) ⁵	1.61 ⁸
Notes: Details of the calculation of emissions and assumptions made are given in Appendix C, Section C.1. n/a = not applicable. ¹ Redmore Environmental, Odour Assessment, Herriard Anaerobic Digestion Plant, Herriard, Reference: 2256-4r1, 16th December 2021. ² Data given are for one Feed hopper ³ Odour concentration increased from 20ouE/m ² /s to 50ouE/m ² /s to account for agitation within the hopper. ⁴ Brackets indicate Feed hopper 1 emission rate, adjusted for the dimensions of the source as represented within the model. ⁵ Brackets indicate Feed hopper 2 emission rate, adjusted for the dimensions of the source as represented within the model.				

⁶ Time varying emissions profile used within the model: a reduction factor of 0.3 was used for a 7-hour period each day, 7 days per week, to account for the impact of opening of the separator building door to allow for loading (duration approximately 20 minutes per hour), otherwise a reduction factor of 0.1 was used to account for residual emission when separator building door closed.

⁷ An odour emission rate of $2.80 \text{ ou}_E/\text{m}^2/\text{s}$ from the surface area has been assumed, applied based on similar assessment by Odournet UK Ltd, October 2013.

⁸ Emissions before consideration of a reduction in emissions due to containment by the structure. Brackets indicate emission rate adjusted for the dimensions of the source as represented within the model.

Summary

2.3.16 Consistent with the approach taken in the 2023 AQIA, the prediction of short-term impacts is conservative in several respects:

- Results at the receptors were calculated as the maximum value at each receptor from 15 model runs and are therefore worst-case values across all five years, all model option scenarios that includes the impact of meteorological data year, buildings, and terrain.
- The short-term scenarios assume the following proposed combustion plant will operate at full load, continuously all year, i.e., 8,760 hours, whereas in practice the following operational profiles are anticipated:
 - the boiler will operate as a back-up boiler, required intermittently according to heat demand for approximately 15% of the time;
 - the emergency flare will be used as a safety feature only (typically less than 10% of the year maximum).
- It is unlikely that the emergency flare and CHP would ever operate simultaneously as the role of the flare is to consume biogas when it is not burnt in the CHP.
- Assuming the NO_2 and SO_2 emissions will be at the MCPD ELVs for the CHP, and NO_x and TVOC emissions at the ELVs for the emergency flare.

3 Assessment Criteria

3.1 Odour benchmarks

- 3.1.1 Consistent with the approach adopted in the 2023 AQIA, Odours from the normal operation of the Site are considered to fall within the ‘moderately offensive’ category for which $30\mu\text{E}/\text{m}^3$ is the appropriate benchmark. That is not to say that the impact of the odour is ‘moderately offensive.’ It is a descriptor of the nature or character of the odour that might arise from a source, the category of the odour, but this says nothing about the magnitude of impact at the receptor. A mixture of pollutants that may give rise, at the source, to an odour described as ‘moderately offensive’ in its nature, may be contained and abated such that it is not perceived by any receptor.

3.2 AQS for human health

- 3.2.1 Table 7 sets out the AQS for human health for the pollutants relevant to the revaluation.

Table 7 Air Quality Standards for human health

Substance	Emission period	Limit (average)	Standard	Exceedances ¹
Ammonia	1-hour	$2,500\mu\text{g}/\text{m}^3$	EAL	None
Ammonia	Annual	$180\mu\text{g}/\text{m}^3$	EAL	None
Benzene	24-hour	$30\mu\text{g}/\text{m}^3$	EAL	None
Benzene	Annual	$5\mu\text{g}/\text{m}^3$	AAD Limit Value and AQS Objective	None
Carbon monoxide	8 hour running average across a 24-hour period	$10,000\mu\text{g}/\text{m}^3$	AAD Limit Value	None
Hydrogen sulphide	24-hour	$150\mu\text{g}/\text{m}^3$	EAL	None
Hydrogen sulphide	Annual	$140\mu\text{g}/\text{m}^3$	EAL	None
Nitrogen dioxide	1-hour	$200\mu\text{g}/\text{m}^3$	AAD Limit Value	Up to 18 1-hour periods
Nitrogen dioxide	Annual	$40\mu\text{g}/\text{m}^3$	AAD Limit Value	None
Particulates (PM_{10})	24-hour	$50\mu\text{g}/\text{m}^3$	AAD Limit Value	Up to 35 times a year
Particulates (PM_{10})	Annual	$40\mu\text{g}/\text{m}^3$	AAD Limit Value	None
Particulates ($\text{PM}_{2.5}$)	Annual	$20\mu\text{g}/\text{m}^3$	AAD Limit Value	None
Particulates ($\text{PM}_{2.5}$)	Annual	$10\mu\text{g}/\text{m}^3$	Target to be met by 2040 ⁽²⁾	None
Sulphur dioxide	15 minutes	$266\mu\text{g}/\text{m}^3$	UK AQS Objective	Up to 35 15-minute periods
Sulphur dioxide	1-hour	$350\mu\text{g}/\text{m}^3$	AAD Limit Value	Up to 24 1-hour periods

Substance	Emission period	Limit (average)	Standard	Exceedances ¹
Sulphur dioxide	24-hour	125µg/m ³	AAD Limit Value	Up to 3 24-hour periods
Notes: AQS taken from Defra/EA guidance ¹⁵ ¹ Number of times a year the limit may be exceeded. ² Environmental Targets (Fine Particulate Matter) (England) Regulations 2023, as required by UK Environment Act 2021.				

Significance of results

- 3.2.2 In alignment with the 2023 AQIA, the significance of long-term results are determined in accordance with IAQM (2017) guidance which outlines a method to assist with the determination of air quality impacts of planning proposals, to be applied alongside professional judgement.
- 3.2.3 It provides a framework for describing impacts based on the magnitude of change in the concentration from the scheme relative to the AQS and the overall concentration including the scheme, that is, the future background concentration plus the process contribution from the scheme. The matrix in Table 8 is intended to be used with annual mean concentrations.

Table 8 Impact descriptors for individual receptors – long term concentrations

Long-term average concentration	% Change in concentration relative to standard			
	1	2 – 5	6 – 10	>10
75% or less of AQS	Negligible	Negligible	Slight	Moderate
76 – 94% of AQS	Negligible	Slight	Moderate	Moderate
95 – 102% AQS	Slight	Moderate	Moderate	Substantial
103 – 109% of AQS	Moderate	Moderate	Substantial	Substantial
110% or more of AQS	Moderate	Substantial	Substantial	Substantial
Notes: From EPUK/IAQM guidance				

- 3.2.4 The outcome of the assessment procedure represented in Table 8 applies to an individual receptor and not the overall impact; the overall significance is determined alongside professional judgement.
- 3.2.5 Further, it is intended that the change in concentration relative to the AQAL is rounded to the nearest whole number, such as to ‘not assume a false level of precision’ in terms of the accuracy of the results. Where the overall effect is greater than ‘Slight Adverse’ the effect is likely to be considered as ‘significant’ in effect.

¹⁵ Department for Environment, Food & Rural Affairs and Environment Agency, Air emissions risk assessment for your environmental permit, Available at: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit> [Accessed September 2025].

3.2.6 EPUK/IAQM guidance provides additional criteria for the assessment of the impacts of 'peak' short-term concentrations, specifically those averaged over a period of 1-hour or less. Table 9 summarises the impact descriptors. This approach to the assessment of short-term impacts does not include consideration of background concentrations as baseline annual mean concentrations and the peak concentrations are not additive.

3.2.7 The criteria presented in Table 9 are stated as not applicable to averaging times over 1-hour, for example an 8-hour or 24-hour period. For these averaging periods criteria set out in the Defra/EA guidance¹⁶ has been followed in determining the significance of results. Following the Defra/EA guidance, a PC can be screened out from further assessment if:

- the short-term PC is less than 10% of the short-term environmental standard, and
- the long-term PC is less than 1% of the long-term environmental standard (if there is one).

3.2.8 The second stage of screening considers the PEC, the sum of the PC and background concentration. A further assessment is not needed if:

- the short-term PC is less than 20% of the 'headroom,' where headroom is defined as the short-term environmental standards minus twice the long-term background concentration, and
- the long-term PEC is less than 70% of the long-term environmental standards (if there is one).

Table 9 Impact descriptors for individual receptors – short term concentrations (≤ 1hour)

% Change in concentration relative to AQS	Magnitude of change	Severity of impact
<10%	Negligible	Not significant ¹
11 – 20 %	Small	Slight
21 – 50%	Medium	Moderate
>51%	Large	Substantial
Notes: Based on criteria provided in IAQM (2017) Land-use Planning guidance paragraph 6.39. ¹ Adopted from the EA threshold criterion of 10% of the short term AQS, below which an impact is regarded as having an insignificant or 'negligible' effect.		

3.3 AQS for sensitive conservation sites

3.3.1 For modelling purposes, discrete ecological receptors, E1 to E33, were placed at locations in the conservation sites. Table 10 presents the sensitive conservation sites, receptors, and habitats in each area. Figure 7 and Figure 8 show the receptor locations.

3.3.2 AQS for concentrations of pollutants are referred to as critical levels (CLes) and those for deposition flux of nutrient nitrogen (NDep) and acid deposition due to nitrogen (N) and sulphur (S) (AcidDep) are referred to as critical loads (CLOs).

¹⁶ Department for Environment, Food & Rural Affairs and Environment Agency, Air emissions risk assessment for your environmental permit, Available at: <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit> [Accessed September 2025].

- 3.3.3 In Table 11 the CLes for the pollutants relevant to this assessment for designated ecological site receptors are summarised. In Table 12 the CLos for NDep are given, and in Table 13 the CLos for AcidDep. As can be seen the CLos for AcidDep vary with habitat and location.
- 3.3.4 Table 12 and Table 12 show the most sensitive habitats and whether sites were modelled as forest (woodland) or grass (non-woodland) for the calculation of deposition flux. Deposition to forest is more rapid than that to grass, but the CLo for forest are typically higher than those for grassland; the most sensitive combination has been assessed.
- 3.3.5 The following sites have been designated primarily for geological interest and there are therefore presently, no CLes or CLos: Regionally Important Geological Sites (RIGS) including South Cerney Railway Cutting LWS/ RIGS and Shorncote Quarry RIGS in addition to Kemble Railway Cuttings geological SSSI. The River Churn Local Wildlife Sites (LWS) is designated for mammal interest and therefore there are no sensitive features listed within APIS.
- 3.3.6 For the Cotswold Water Park (CWP) SSSI there are no features of the designation identified as sensitive to the impacts of NO_x, SO₂, or NH₃. There are no formal or numerical critical load values for nitrogen deposition assigned to the features of the designation, or for relevant (inland) broad habitats that support the interest feature. While acid deposition critical loads are listed for one interest feature of the SSSI (Little ringed Plover), the citation within APIS states that the species is not sensitive due to acidity impacts on the broad habitat.¹¹

Table 10 Environmental standards for protected conservation areas

Substance	Target	Emission period
Ammonia	1 µg/m ³ where lichens or bryophytes are integral for the habitat 3 µg/m ³ where they are not integral for the habitat	Annual
Sulphur dioxide ¹	10 µg/m ³ where lichens or bryophytes are present 20 µg/m ³ where they are not present	Annual
Nitrogen oxide (expressed as nitrogen dioxide) ²	30 µg/m ³	Annual
Nitrogen oxide (expressed as nitrogen dioxide)	75 µg/m ³ 200 µg/m ³ for detailed assessments where the ozone is below the AOT40 critical level and sulphur dioxide is below the lower critical level of 10 µg/m ³	Daily
Nutrient nitrogen deposition	Depends on location, use www.apis.ac.uk ¹⁷	Annual
Acidity deposition	Depends on location, use www.apis.ac.uk	Annual
Notes: Environmental standards taken from Defra/EA guidance ¹ 20 µg/m ³ is an AAD Limit Value if you have nature or conservation sites in the area ² 30 µg/m ³ is an AAD Limit Value		

Table 11 Sensitive conservation sites

Receptor	Site	Designation	Lichens &/or bryophytes integral to habitat? ^(a)	NH ₃ Cle (mg/m ³)
E1 - E5	Cotswold Water Park	SSSI	n/a	n/a
E6	Wildmoorway Meadows	SSSI	No	3
E7	Upper Waterhay Meadow	SSSI	No	3
E8	Acres Farm Meadow	SSSI	No	3
E9	Elmlea Meadows	SSSI	No	3
E10	Kemble Railway Cuttings	SSSI	n/a	n/a
E11	Stoke Common Meadows	SSSI	No	3
E12	Distillery Farm Meadows	SSSI	No	3
E13	Emmett Hill Meadows	SSSI	Bryophytes	1
E14	Cloatley Farm	SSSI	No	3
E15	Cloatley Manor Farm Meadows	SSSI	No	3
E16	Ravensroost Wood	SSSI	Yes	1
E17	Barnsley Warren	SSSI	No	3
E18	Restrop Farm & Brockhurst Wood	SSSI	Yes	1
E19	Pike Corner	SSSI / LWS	No	3
E20 - E23	North Meadow and Clattinger Farm	SAC	No	3
E21, E22	Clattinger Farm	SSSI	No	3

¹⁷ UK Air Pollution Information System (APIS) (<http://www.apis.ac.uk/>) [Accessed September 2025]

Receptor	Site	Designation	Lichens &/or bryophytes integral to habitat? ^(a)	NH ₃ CLe (mg/m ³)
E20, E23	North Meadow Cricklade	SSSI	No	3
E20 - E23	North Meadow Cricklade	NNR	No	3
E24, E25	Cokes Pit Lake 34	LNR, LWS	Unknown	1 - 3
E26 - E27	Cotswold Water Park Lake Pit 26	LWS	Unknown	1 - 3
E28	Cotswold Water Park Lake Pits 28, 28a, 29, 30, 35, 38	LWS	Unknown	1 - 3
E29	Cotswold Water Park LWS Lakes 84 and 85 Shorncote Reedbed LWS	LWS	Unknown	1 - 3
E30	River Churn LWS	LWS	n/a	n/a
E31	South Cerney Railway Cutting	LWS RIGS	n/a	n/a
E32	Shorncote Quarry	RIGS	n/a	n/a
E33	Siddington Copse	AW	Unknown	1 - 3
Notes: Values from www.apis.ac.uk n/a = not applicable/ available (a) For the SACs and SSSIs APIS provides site-specific information on whether lichens and bryophytes are integral for the habitat. For LWSs, APIS provides location-specific information and CLe for NH₃ is given as 1-3 µg/m³. The lower value has been used as a conservative assumption for the LWSs. [1] Data supplied by Wiltshire and Swindon Biological Records Centre, Statutory Sites, Cotswold Water Park - Main Habitat (November 2022). [2] Data provided by Gloucestershire Centre for Environmental Records (November 2022). [3] Cotswold Lakes Trust Water Park Nature Reserves (https://waterpark.org/things-to-do/nature-reserves/)				

Table 12 Nutrient nitrogen deposition critical loads

Receptor	Site	Nitrogen critical load class	Critical load (kg/ha/yr)	Forest / Grass
E1 – E5	Cotswold Water Park SSSI	No comparable habitat with established critical load estimate available	n/a	n/a
E6	Wildmoorway Meadows SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E7	Upper Waterhay Meadow SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E8	Acres Farm Meadow SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E9	Elmlea Meadows SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E10	Kemble Railway Cuttings SSSI	No information on this site	n/a	n/a
E11	Stoke Common Meadows SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E12	Distillery Farm Meadows SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E13	Emmett Hill Meadows SSSI	Lowland to montane, dry to mesic grassland usually dominated by <i>Nardus stricta</i>	6 - 10	Grass
E14	Cloatley Farm SSSI	Lowland to montane, dry to mesic grassland usually dominated by <i>Nardus stricta</i>	6 - 10	Grass
E15	Cloatley Manor Farm Meadows SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E16	Ravensroost Wood SSSI	<i>Carpinus</i> and <i>Quercus</i> mesic deciduous forest	15 - 20	Forest
E17	Barnsley Warren SSSI	Semi-dry Perennial calcareous grassland (basic meadow steppe).	10 - 20	Grass
E18	Restrop Farm & Brockhurst Wood SSSI	<i>Carpinus</i> and <i>Quercus</i> mesic deciduous forest	15 - 20	Forest
		Low and medium altitude hay meadows	10 - 20	Grass
E19	Pike Corner SSSI	Semi-dry Perennial calcareous grassland (basic meadow steppe) / Low and medium altitude hay meadows	10 - 20	Grass
E20, E21, E22, E23	North Meadow and Clattinger Farm SAC	Low and medium altitude hay meadows	10 - 20	Grass
E20	North Meadow Cricklade SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E21	Clattinger Farm SAC	Low and medium altitude hay meadows	10 - 20	Grass
E21, E22	Clattinger Farm SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E23	North Meadow Cricklade SSSI	Low and medium altitude hay meadows	10 - 20	Grass
E20 - E23	North Meadow Cricklade NNR	Low and medium altitude hay meadows	10 - 20	Grass
E24, E25	Cokes Pit Lake 34	Mountain hay meadows	5 - 10	Grass
E26 - E27	Cotswold Water Park Lake Pit 26	Acidophilous <i>Quercus</i> -dominated woodland	10 - 20	Forest
E28	Cotswold Water Park Lake Pits 28, 28a, 29, 30, 35, 38	Broadleaved deciduous woodland	10 - 20	Forest
E29	Cotswold Water Park LWS Lakes 84 and 85 Shorncote Reedbed LWS	Mountain hay meadows	10 - 20	Grass
E30	River Churn LWS	No features in APIS	n/a	n/a

Receptor	Site	Nitrogen critical load class	Critical load (kg/ha/yr)	Forest / Grass
E31	South Cerney Railway Cutting	No features in APIS	n/a	n/a
E32	Shorncote Quarry	No features in APIS	n/a	n/a
E33	Siddington Copse	Acidophilous Quercus-dominated woodland	10 - 20	Forest
Note: Values from www.apis.ac.uk n/a = not applicable For the SACs and SSSIs APIS provides site-specific information on Critical Loads. For LWSs, APIS provides location-specific information for the specified habitat.				

Table 13 Acid deposition critical loads

Receptor	Site	Acidity critical load class	Critical loads (keq/ha/yr)			Forest / Grass
			CLmaxS	CLminN	CLmaxN	
E1 – E5	Cotswold Water Park	n/a	n/a	n/a	n/a	n/a
E6	Wildmoorway Meadows	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E7	Upper Waterhay Meadow	Calcareous grassland (using base cation)	n/a	n/a	n/a	n/a
E8	Acres Farm Meadow	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E9	Elmlea Meadows	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E10	Kemble Railway Cuttings	No information on this site	n/a	n/a	n/a	n/a
E11	Stoke Common Meadows	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E12	Distillery Farm Meadows	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E13	Emmett Hill Meadows	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E14	Cloatley Farm	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E15	Cloatley Manor Farm Meadows	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E16	Ravensroost Wood	Unmanaged Broadleaved/ Coniferous Woodland	2.583	0.357	2.940	Forest
E17	Barnsley Warren	Calcareous grassland (using base cation)	4.000	0.856	4.856	Grass
E18	Restrop Farm & Brockhurst Wood	Unmanaged Broadleaved/ Coniferous Woodland	2.562	0.357	2.919	Forest
		Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass

Receptor	Site	Acidity critical load class	Critical loads (keq/ha/yr)			Forest / Grass
			CLmaxS	CLminN	CLmaxN	
E19	Pike Corner	Calcareous grassland (using base cation)	4.000	0.856	4.856	Grass
E20 - E23	North Meadow and Clattinger Farm SAC	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E22	Clattinger Farm SSSI	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E20, E23	North Meadow Cricklade SSSI	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E20 - E23	North Meadow Cricklade NNR	Calcareous grassland (using base cation)	4.000	1.071	5.071	Grass
E24, E25	Cokes Pit Lake 34	Calcareous grassland (using base cation)	4.000	0.856	4.856	Grass
E26	Cotswold Water Park Lake Pit 26	Broadleaved/Coniferous unmanaged woodland	10.815	0.142	10.957	Forest
E27	Cotswold Water Park Lake Pit 26	Broadleaved/Coniferous unmanaged woodland	10.819	0.142	10.961	Forest
E28	Cotswold Water Park Lake Pits 28, 28a, 29, 30, 35, 38	Broadleaved/Coniferous unmanaged woodland	10.805	0.142	10.947	Forest
E29	Cotswold Water Park LWS Lakes 84 and 85 Shorncote Reedbed LWS	Calcareous grassland (using base cation)	4.000	0.856	4.856	Grass
E30	River Churn LWS	No features in APIS	n/a	n/a	n/a	Grass
E31	South Cerney Railway Cutting	No features in APIS	n/a	n/a	n/a	Grass
E32	Shorncote Quarry	No features in APIS	n/a	n/a	n/a	Grass
E33	Siddington Copse	Broadleaved/Coniferous unmanaged woodland	10.835	0.142	10.977	Forest
Note: Values from www.apis.ac.uk n/a = not applicable For the SACs and SSSIs APIS provides site-specific information on CLo. For LWSs, APIS provides location-specific information for the specified habitat.						

Significance of results

- 3.3.7 The IAQM Designated nature sites guidance¹⁸ references the Defra/EA guidance for assessment of impacts. The guidance states that for locally designated sites such as LWS, impacts can be screened out as insignificant if the short-term and long-term PCs are less than 100% of the relevant AQS.
- 3.3.8 For nationally designated sites, such as SSSIs, and European sites such as a Ramsar site, the Defra/EA guidance is similar to that for human receptors (Section 3.2).
- 3.3.9 Further assessment is not required if:
- the short-term PC is less than 10% of the short-term environmental standard for protected conservation areas
 - the long-term PC is less than 1% of the long-term environmental standard for protected conservation areas
- 3.3.10 If these are not met the PEC must be calculated and checked against the long-term standard. The PEC does not have to be calculated for short-term targets. If the long-term PC is greater than 1% and the PEC is less than 70% of the long-term environmental standard, the emissions are insignificant – there is no need to assess them any further.
- 3.3.11 If the short-term PC exceeds the screening criteria of 10%, or the PEC is greater than 70% of the long-term environmental standard, detailed modelling is required.

¹⁸ IAQM (2020). A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.1, Institute of Air Quality Management, London.

4 Baseline

4.1 Site description

- 4.1.1 There has been no discernible land use change within the immediate locale since the 2023 AQIA.
- 4.1.2 The proposed Site is not located within or in proximity to an Air Quality Management Area (AQMA). 'Kingshill Road' remains the closest AQMA located approximately 16km to the southeast, declared for annual mean nitrogen dioxide (NO₂).¹⁹
- 4.1.3 The human receptor locations evaluated are listed in Table 45. Discrete receptor locations are selected to represent the proximal extent of nearby land uses. For residential areas exposure against both the long and short-term objectives is relevant. For commercial, recreational and/or industrial land use short-term exposure limits apply.
- 4.1.4 In response to feedback received from Statutory Consultees, additional receptor locations have been selected as representative of Ann Edwards Church of England Primary School/South Cerney Pre-School; and extra locations representative of South Cerney residential area. Additional locations were also included at the Cotswold Residential Development, Ashton Keynes, Somerford Keynes, Shorncote, and Wheatleys Farm Quarry.
- 4.1.5 The nearest nationally and EU-designated ecological conservation sites are listed in Table 46, Appendix C. There are 18 designated sites within 10km of the Site and their locations shown in Figure 7 and Figure 8. This includes the Cotswold Water Park SSSI, the revised extent of which is now closer to the Proposed Development.
- 4.1.6 Since the 2023 AQIA, APIS GIS data (accessed September 2025) has been updated to show the extent to which the nearest SSSI, the Cotswold Water Park, has been extended to include more lakes and habitat; the nearest of which include areas within 300m of the proposed Site. As part of the AQIAA, additional discrete receptor points (E1a to E1i inclusive) have been modelled at the closest locations to the updated boundary of the CWP SSSI, alongside the ecological receptor sites previously assessed. Whilst the updated assessment acknowledges nearby areas of the SSSI, no interest features are identified as sensitive to the impacts of NO_x, SO₂, or NH₃. Relevant deposition thresholds are either absent or not applicable to inland habitats.

¹⁹Defra UK Air Kingshill Road, Swindon AQMA (Swindon Borough Council) https://uk-air.defra.gov.uk/aqma/details?aqma_ref=1745

4.2 Local monitoring of background concentrations

- 4.2.1 In 2023, Cotswold District Council (CDC) operated a network of 16 diffusion tubes for the monitoring of NO₂.²⁰ CDC does not operate any automatic monitoring sites. The nearest monitoring sites are roadside location diffusion tubes 'NAS34' and 'NAS35', located 3.8km and 4.4km to northwest of the Site respectively. The most recent monitoring data for diffusion tubes within 6km of the Site are presented in Table 14.
- 4.2.2 At NAS34, a roadside monitoring location on Spratsgate Lane near the junction with Park Way, Cirencester, the annual mean NO₂ for the latest relevant year for which data are available in 2023 was 6.4µg/m³. At roadside monitoring location (NAS35), situated on Berkeley Road junction with Somerford Road, the annual mean NO₂ was 7.3µg/m³. Roadside monitoring location (NAS36) is situated on Somerford Road, 5.3km northwest and is located more within the urban area of Cirencester. The location of diffusion tubes NAS34 and NAS35 may be considered as representative of background concentrations for roadside receptor locations within the locale of the Site considered within the study area.
- 4.2.3 From the monitoring data available, it can be concluded that NO₂ concentrations in the vicinity of the Site remain well below the annual mean AQAL.

Table 14 Annual mean NO₂ monitoring results (2020 - 2023)

Site ID	NGR X	NGR Y	Type of site	NO ₂ Annual Mean Concentration (µg/m ³) ⁽⁴⁾⁽⁵⁾				Distance from site (km)
				2020	2021	2022	2023	
NAS30	402783	201946	Kerbside	17.7	18.1	17.4	17.4	6.0
NAS31	402480	201772	Roadside	15.7	15.8	16.5	16.1	5.8
NAS32	402039	201765	Roadside	/	/	20.5	19.5	6.0
NAS33	401064	201044	Roadside	16.2	16.2	15.6	15.9	5.7
NAS34	402394	199581	Roadside	7.4	7.0	7.1	6.4	3.8
NAS35	402439	200297	Roadside	7.0	7.9	8.0	7.3	4.4
NAS36	402241	201102	Roadside	11.2	10.8	10.7	10.5	5.3
Notes: / = not available. BG = background.								

²⁰ Cotswold District Council 2024 Air Quality Annual Status Report (ASR)
(<https://www.cotswold.gov.uk/media/wenmwzzb/air-quality-annual-report-2024.pdf>)

4.3 National mapping of concentrations/ Defra modelled background

- 4.3.1 Defra provides maps of 2025 background concentrations of NO_x and NO₂ on a 1km x 1km gridded basis that have been projected from a reference year of 2021;²¹ and data for SO₂ and benzene for 2023, CO for 2010, also on a 1km x 1km basis.²² Defra guidance states that the concentrations for SO₂, benzene and CO can be used, unadjusted for future years, such as 2025.
- 4.3.2 The 2024 Defra spatially varying background concentrations (Table 15) for NO₂ (4.35 – 6.34µg/m³) are comparable to the concentrations monitored by CDC (Table 14). Therefore background 2025 concentrations have been determined using the maps have been used, which are shown in Table 16. Background concentrations of NH₃ are not part of the Defra mapped data and have been obtained from APIS.²³

Table 15 Defra background mapped 2025 concentrations at each Human receptor

ID	2025 Annual mean background concentration					
	NO ₂ (µg/m ³)	SO ₂ (µg/m ³)	Benzene (µg/m ³)	CO (mg/m ³)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)
H1	4.46	0.88	0.25	1.65	11.0	6.21
H2	6.34	2.35	0.29	1.65	11.3	6.48
H3	6.34	2.35	0.29	1.65	11.3	6.48
H4	4.46	0.88	0.25	1.65	11.0	6.21
H5	4.81	1.29	0.30	1.65	10.5	6.38
H6	4.58	1.49	0.26	1.65	10.6	6.22
H7	6.34	2.35	0.29	1.65	11.3	6.48
H8	4.58	1.49	0.26	1.65	10.6	6.22
H9	4.58	1.49	0.26	1.65	10.6	6.22
H10	6.34	2.35	0.29	1.65	11.3	6.48
H11	4.45	0.90	0.25	1.65	11.5	6.26
H12	4.69	0.95	0.26	1.65	11.0	6.27
H13	4.35	0.75	0.24	1.65	10.9	6.18
H14	4.79	1.19	0.29	1.65	10.9	6.33
H15	4.58	1.49	0.26	1.65	10.6	6.22
H16	4.45	0.90	0.25	1.65	11.5	6.26
H17	5.08	1.16	0.24	1.65	11.5	6.22
H18	6.34	2.35	0.29	1.65	11.3	6.48
H19	6.34	2.35	0.29	1.65	11.3	6.48
H20	4.45	0.90	0.25	1.65	11.5	6.26
H21	6.34	2.35	0.29	1.65	11.3	6.48
H22	4.58	1.49	0.26	1.65	10.6	6.22

²¹ Defra, Background Maps, Available at: <https://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html> (Accessed August 2025).

²² Defra, UK AAIR, Modelled background pollution data, Available at: <https://uk-air.defra.gov.uk/data/pcm-data> [Accessed September 2025]

²³ Air Pollution Information System, Available at www.apis.ac.uk, [Accessed September 2025]

ID	2025 Annual mean background concentration					
	NO ₂ (µg/m ³)	SO ₂ (µg/m ³)	Benzene (µg/m ³)	CO (mg/m ³)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)
H23	6.34	2.35	0.29	1.65	11.3	6.48
H24	4.45	0.90	0.25	1.65	11.5	6.26
H25	4.58	1.49	0.26	1.65	10.6	6.22
H7 a	6.34	2.35	0.29	1.65	11.3	6.48
H7 b	6.34	2.35	0.29	1.65	11.3	6.48
H1 a	4.46	0.88	0.25	1.65	11.0	6.21
H6 a	4.63	1.05	0.27	1.65	10.7	6.38
H6 b	4.63	1.05	0.27	1.65	10.7	6.38
H26	4.35	0.75	0.24	1.65	10.9	6.18
H27	4.33	0.74	0.24	1.65	12.1	6.28
H28	5.02	1.20	0.25	1.65	10.8	6.35
Notes: Concentrations are for 2025 except for the following: SO ₂ and benzene 2023, and CO 2010.						

4.4 Background concentrations and deposition at sensitive conservation sites

- 4.4.1 Updated background concentrations of NO_x, SO₂, NH₃ and values for nitrogen and acid deposition at all the ecological receptors have been obtained from APIS maps which provide the data on a 1 km grid cell basis.
- 4.4.2 The deposition values depend on whether the habitat is forest (woodland) or grass (moorland) as deposition rates vary according to the nature of the vegetation. Table 12 and Table 13 show which receptors have been modelled as forest and/or as grass; the appropriate value of background deposition (to forest or to grass) have been determined. The background values are the latest available and are an average for the years 2020-2022 and are presented for each receptor in Table 16.
- 4.4.3 Background concentrations of NO_x, SO₂ and deposition of NDep at all the ecological receptors have been obtained from APIS maps¹⁷ and the APIS location search, both of which provide the data on a 1 km grid cell basis. The NDep, AcidSDep and AcidNDep values depend on whether the habitat is forest or grass as deposition rates vary according to the nature of the vegetation.

Table 16 Background concentrations and deposition at ecological receptors

Receptor ID	NO _x (µg/m ³)	SO ₂ (µg/m ³)	NH ₃ (µg/m ³)	NDep (kgN/ha/yr)	AcidSDep (keqS/ha/yr)	AcidNDep (keqN/ha/yr)
E1	7.40	1.00	1.60	14.90	0.12	1.06
E1a	7.60	1.40	1.60	15.10	0.12	1.08
E1b	7.60	1.40	1.60	15.10	0.12	1.08
E1c	9.10	1.70	1.60	15.10	0.13	1.08
E1d	7.40	1.00	1.60	15.00	0.12	1.07
E1e	6.80	0.80	1.60	15.20	0.13	1.08
E1f	6.80	0.80	1.60	15.20	0.13	1.08
E1g	6.80	0.80	1.60	15.20	0.13	1.08
E1h	7.40	0.90	1.60	15.00	0.12	1.07
E1i	7.60	1.40	1.60	15.10	0.12	1.08
E2	8.30	0.80	1.60	14.80	0.11	1.05
E3	6.60	0.70	1.60	15.30	0.11	1.09
E4	6.60	0.70	1.70	15.40	0.12	1.10
E5	6.60	0.70	1.70	15.40	0.12	1.10
E6	7.40	0.80	1.60	14.80	0.12	1.06
E7	7.10	0.80	1.70	15.10	0.11	1.08
E8	6.50	0.70	1.70	15.40	0.11	1.10
E9	7.20	0.80	1.60	15.00	0.11	1.07
E10	6.70	0.80	1.60	15.20	0.15	2.13
E11	7.20	0.80	1.70	15.60	0.11	1.12
E12	6.90	0.80	1.70	15.90	0.11	1.14
E13	6.50	0.70	1.80	15.90	0.11	1.13
E14	6.30	0.60	1.80	16.00	0.10	1.14
E15	6.10	0.60	1.70	15.90	0.10	1.13
E16 (Forest)	6.80	0.70	1.80	29.90	0.15	2.13
E17	6.90	0.70	1.70	15.50	0.12	1.11
E18 (Forest)	7.70	0.90	1.80	29.80	0.17	2.13
E18 (Grass)	7.70	0.90	1.80	16.20	0.13	1.15
E19	6.60	0.70	1.70	15.30	0.11	1.09
E20	7.50	0.90	1.60	15.00	0.11	1.07
E21	6.40	0.60	1.70	15.00	0.11	1.07
E22	6.40	0.60	1.70	15.40	0.11	1.07
E23	8.50	1.10	1.60	15.40	0.12	1.07
E24	6.70	0.70	1.60	15.40	0.13	1.09
E25	6.70	0.70	1.60	15.40	0.13	1.09
E26 (Forest)	7.60	0.70	1.60	28.10	0.16	2.01
E27 (Forest)	9.10	1.40	1.60	28.00	0.17	2.00
E28 (Forest)	6.60	1.70	1.60	28.40	0.16	2.03
E29	6.70	0.70	1.60	15.30	0.13	1.08
E30	7.30	0.80	1.60	15.10	/	/
E31	7.00	1.10	1.60	15.10	/	/
E32	6.60	0.80	1.60	15.30	/	/
E33 (Forest)	7.30	0.70	1.60	27.90	0.17	2.00
Note: data from www.apis.ac.uk ¹⁷ for the period 2020-2022						
/ = No information on this site/ not given						

4.5 Background odour

- 4.5.1 Land use in the locale includes agricultural activities and predominantly minerals extraction operations. Operations identified in the locale that have the potential to generate odour may include the Cirencester Wastewater Treatment Works (WwTW), located at Ashton Road, Siddington situated approximately 1km to the northwest of the Proposed Development.
- 4.5.2 Data available from the Environment Agency Public Register²⁴ indicate that current Waste Management and/or Industrial permits held within 2km of the Site include those for the deposit of waste to land as a recovery operation, at Shorncote Quarry Complex (1.2km to the northwest of the Proposed Development), and at Spratsgate Lane (1.3km to the west). The recovery operation at both sites uses inert fill for restoration and will not be sources of odour. Other operations identified include physical treatment facilities associated with aggregate processing or management of inert or extractive waste, that are also not likely to be sources of odour.

²⁴ Environment Agency Public Registers Online (<https://environment.data.gov.uk/public-register/view/index>)
Accessed October 2025.

5 Impact assessment at human receptors

5.1 Odour

Qualitative assessment

5.1.1 The scheme evaluated in the 2023 AQIA was risk-assessed following the current IAQM (2018)⁷ methodology in terms of the potential for odour impact in the locale. Whilst the principal activities and potential odour sources remain largely unchanged, design changes have been implemented that will reduce the potential for odour impact from the operation and are listed in Table 17.

Table 17 Comparison of potentially odorous emissions between the previous and current Proposed Development

No.	2023 AD Plant application	Current 2025 AD Plant application	Impact
1	Manure transported from the Manure Building to external feed hoppers – potential source of odour emission outside.	Manure fed inside via a feed hopper inside the Manure Building. Therefore, odour release treated by the building's air extraction and abatement system.	Reduction in odour. No manure external to the enclosed Manure Building. Only low odour crop silage would be loaded in the external feed hoppers.
2	2No. 10,000m ³ slurry bags with vents, so there would be passive emission of air containing odour.	2No. 8,000m ³ covered digestate lagoons with vents including a carbon filter, so passive emission of air containing odour would be abated.	Reduction in odour. Any residual odour emissions from digestate storage will be further reduced before release to air.
3	When tankers are filled with digestate for spreading some air can be displaced from the tank which will vent, unabated to air.	Air displaced from the tanker will be passed through a carbon filter to reduce odours before it is released to air.	Reduction in odour.

5.1.2 On this basis, the qualitative odour assessment provided as Appendix B, has been updated to reflect the revised scheme and corresponding source odour potential.

5.1.3 Consistent with the 2023 AQIA, the overall source odour potential is considered as **'Medium'** for the revised scheme (Table 33, Appendix B). The qualitative method represents a conservative approach, as not all sources are rated as having a 'medium' source odour potential and the provision for odour abatement is also increased with the revised scheme. In accordance with the matrices provided in Appendix B, the estimated odour effect (impact) of the Proposed Development has been determined for all receptor locations (Table 18).

5.1.4 As shown the potential impact is determined using the qualitative method to be either 'Negligible' or 'Slight Adverse'. In accordance with IAQM guidance (2018), overall, the potential odour impact of the operation is considered **not significant**. The proposed changes to the scheme do not affect the conclusions of the 2023 AQIA qualitative air quality risk assessment.

Table 18 Qualitative risk assessment, summary of the likely odour effect

Receptor	Overall source odour potential	Pathway effectiveness	Odour exposure risk	Receptor sensitivity	Likely odour effect
H1	Medium	Moderately effective	Low	High	Slight
H2	Medium	Moderately effective	Low	High	Slight
H3	Medium	Moderately effective	Low	High	Slight
H4	Medium	Ineffective	Negligible	High	Negligible
H5	Medium	Ineffective	Negligible	High	Negligible
H6	Medium	Ineffective	Negligible	High	Negligible
H7	Medium	Moderately effective	Low	High	Slight
H8	Medium	Ineffective	Negligible	Medium	Negligible
H9	Medium	Ineffective	Negligible	Medium	Negligible
H10	Medium	Ineffective	Negligible	Medium	Negligible
H11	Medium	Ineffective	Negligible	Medium	Negligible
H12	Medium	Ineffective	Negligible	High	Negligible
H13	Medium	Ineffective	Negligible	Medium	Negligible
H14	Medium	Ineffective	Negligible	Medium	Negligible
H15	Medium	Moderately effective	Low	Medium	Negligible
H16	Medium	Ineffective	Negligible	Medium	Negligible
H17	Medium	Ineffective	Negligible	Low	Negligible
H18	Medium	Ineffective	Negligible	Medium	Negligible
H19	Medium	Ineffective	Negligible	Medium	Negligible
H20	Medium	Ineffective	Negligible	Medium	Negligible
H21	Medium	Ineffective	Negligible	Medium	Negligible
H22	Medium	Moderately effective	Low	Low	Negligible
H23	Medium	Moderately effective	Low	Low	Negligible
H24	Medium	Moderately effective	Low	Low	Negligible
H25	Medium	Moderately effective	Low	Low	Negligible
H7 a	Medium	Moderately effective	Low	High	Slight
H7 b	Medium	Moderately effective	Low	High	Slight
H1 a	Medium	Ineffective	Negligible	High	Negligible
H6 a	Medium	Ineffective	Negligible	High	Negligible
H6 b	Medium	Ineffective	Negligible	High	Negligible
H26	Medium	Ineffective	Negligible	High	Negligible
H27	Medium	Ineffective	Negligible	High	Negligible
H28	Medium	Ineffective	Negligible	High	Negligible

Quantitative impact assessment of odour

- 5.1.5 Table 19 shows the predicted 98th percentile of 1-hour mean odour concentrations at the modelled discrete receptor locations. The values given are the worst case for each year (with or without buildings and terrain) at each receptor.
- 5.1.6 For all modelled receptor locations, considered to be of 'medium' or 'high' sensitivity, the predicted odour concentrations are below the adopted criterion of 30_{UE}/m³ for 'moderately offensive' odours; a category assigned to the overall odour potential from the proposed development (Section 3.1). The maximum predicted odour concentration at a residential receptor (H1) is 0.60_{UE}/m³ which is below the adopted odour benchmark of 30_{UE}/m³ and it is below the odour detection threshold of 10_{UE}/m³.
- 5.1.7 The maximum concentration (1.80_{UE}/m³) is predicted at receptor H25, a location representative of the nearby automatic telephone exchange approximately 80m southeast of the Site entrance. This location would be occupied infrequently, and with regard to the nature of the land use, the sensitivity of the location is regarded as 'low'. In accordance with IAQM (2018) criteria, odour impacts predicted by modelling at all locations are determined as negligible.
- 5.1.8 The predicted odour impact has been quantified using modelling and consistent with the conclusions of the qualitative assessment (Section 5.1), it is further determined that the site operation is not likely to cause odour impact at human receptors.
- 5.1.9 The Proposed Development will require a bespoke installation permit from the Environment Agency (EA) to operate. This means the site cannot operate without first undergoing a rigorous assessment of the infrastructure and proposed operations as well as approval of a detailed Odour Management Plan (OMP). The permit dictates how the operational site is managed. A written Environmental Management System will be in place which includes the need for an OMP and daily odour monitoring, as well as daily checks and monitoring for all aspects of the wider site operation. A complaint procedure providing a clear communication pathway will be in place as part of the OMP should residents wish to raise a concern that can then be addressed.

Table 19 Model results, 98th percentile hour mean odour concentration (ou_E/m³), summary of the likely odour effect

ID	2017	2018	2019	2020	2021	Maximum	Receptor sensitivity	Likely odour effect
H1	0.2	0.3	0.4	0.4	0.6	0.6	High	Negligible
H2	0.4	0.4	0.5	0.4	0.5	0.5	High	Negligible
H3	0.3	0.4	0.3	0.3	0.5	0.5	High	Negligible
H4	0.1	0.1	0.2	0.1	0.2	0.2	High	Negligible
H5	0.1	0.1	0.2	0.1	0.2	0.2	High	Negligible
H6	0.1	0.1	0.2	0.1	0.1	0.2	High	Negligible
H7	0.3	0.2	0.4	0.4	0.4	0.4	High	Negligible
H8	0.5	0.5	0.5	0.6	0.6	0.6	Medium	Negligible
H9	0.3	0.3	0.4	0.4	0.4	0.4	Medium	Negligible
H10	0.2	0.2	0.2	0.2	0.2	0.2	Medium	Negligible
H11	0.1	0.1	0.2	0.2	0.1	0.2	Medium	Negligible
H12	0.2	0.2	0.2	0.2	0.2	0.2	High	Negligible
H13	0.1	0.1	0.1	0.1	0.1	0.1	Medium	Negligible
H14	0.1	0.2	0.1	0.2	0.2	0.2	Medium	Negligible
H15	0.8	0.8	1.1	1.4	1.1	1.4	Medium	Negligible
H16	0.1	0.2	0.3	0.3	0.2	0.3	Medium	Negligible
H17	0.1	0.1	0.1	0.1	0.1	0.1	Low	Negligible
H18	0.3	0.4	0.3	0.4	0.5	0.5	Medium	Negligible
H19	0.3	0.2	0.3	0.3	0.3	0.3	Medium	Negligible
H20	0.2	0.2	0.2	0.2	0.3	0.3	Medium	Negligible
H21	0.2	0.2	0.3	0.3	0.3	0.3	Medium	Negligible
H22	0.8	0.8	1.2	1.5	1.2	1.5	Low	Negligible
H23	0.8	0.8	1.0	1.1	1.0	1.1	Low	Negligible
H24	0.2	0.3	0.5	0.5	0.4	0.5	Low	Negligible
H25	1.0	1.0	1.5	1.8	1.4	1.8	Low	Negligible
H7 a	0.3	0.3	0.4	0.4	0.4	0.4	High	Negligible
H7 b	0.3	0.3	0.3	0.3	0.3	0.3	High	Negligible
H1 a	0.1	0.2	0.3	0.3	0.3	0.3	High	Negligible
H6 a	0.0	0.0	0.1	0.1	0.1	0.1	High	Negligible
H6 b	0.1	0.1	0.1	0.1	0.1	0.1	High	Negligible
H26	0.0	0.0	0.0	0.0	0.1	0.1	High	Negligible
H27	0.0	0.0	0.1	0.1	0.1	0.1	High	Negligible
H28	0.0	0.0	0.0	0.0	0.0	0.0	High	Negligible
Note: Bold font indicates the maximum predicted odour concentration at each receptor location								

5.2 Impact assessment of air quality on human health

5.2.1 Predicted impacts of each pollutant at each human receptor are given in Appendix E. In this section the highest results are presented, that is, the impacts at the worst-case receptor. Consistent with the 2023 AQIA, impacts have been compared to relevant standards and assessed with respect to the IAQM (2017) guidance significance criteria.

5.2.2 Long-term AQS

5.2.3 Table 20 shows the maximum annual mean (long-term) concentration. The predicted concentrations, with and without background concentrations, have been compared with the AQS. Long-term AQS are not applicable at the workplaces nor recreational locations where the public are unlikely to spend long periods of time.

5.2.4 Maximum long-term impacts for all modelled pollutants, excluding NH₃, are predicted at receptor H3, a location selected as representative of a residential area in South Cerney.

5.2.5 The PCs exceed 1% of the AQS (2.2% for NO₂, 1.2% for benzene) although the PECs are less than 70% of AQS. In accordance with EA/Defra criteria, the long-term impacts at all receptors can therefore be screened out as not significant. In accordance with IAQM criteria the long-term impact is negligible.

5.2.6 The maximum long-term impact for NH₃ is predicted at H1, an area selected as representative of Cotswold Community (residential area). In accordance with criteria, the NH₃ PC is <1% of the AQS and the long-term impacts would therefore be considered negligible and insignificant.

5.2.7 Consistent with the conclusion of the 2023 AQIA, the predicted long-term air quality impact of the revised scheme is negligible and **not significant**.

Table 20 Results, long-term AQAL

Pollutant	AQAL (µg/m ³)	PC (µg /m ³)	PC/AQAL (%)	PEC (µg /m ³)	PEC/AQAL (%)	Receptor	Predicted Impact ¹
Worst-case scenario							
NO ₂	40	0.87	2.2%	7.21	18%	H3	Negligible
PM ₁₀	40	0.06	0.1%	11.4	28%	H3	Negligible
PM _{2.5}	20	0.06	0.3%	6.54	33%	H3	Negligible
PM _{2.5}	10	0.06	0.6%	6.54	65%	H3	Negligible
Benzene	5	0.06	1.2%	0.35	6.9%	H3	Negligible
NH ₃	180	0.02	0.01%	1.82	1.01%	H1	Negligible
H ₂ S	140	0.002	0.001%	0.002	0.001%	H3	Negligible
Notes: Data on each row are for one receptor, the receptor at which the percentage of PC/AQAL is greatest							
¹ In accordance with IAQM criteria (section 3.2).							

Short-term AQS

- 5.2.8 Consistent with the 2023 AQIA, the predicted short-term concentrations have been compared with the AQALs in accordance with IAQM (2017) guidance and, where applicable, compared with the available headroom and in accordance with EA/Defra guidance.
- 5.2.9 The maximum short-term concentrations for each AQS, across all receptors and all meteorological years, and the worst of with and without buildings and terrain, are given in Table 21.
- 5.2.10 For most pollutants, the maximum short-term impacts are predicted at receptor H25, a location representative of the nearby automatic telephone exchange approximately 80m southeast of the Site.
- 5.2.11 The maximum predicted PC/AQS is less than 10% for all pollutants, except for the short-term PC for NO₂ at H25. In accordance with IAQM criteria, the magnitude of change for the predicted short-term NO₂ impact would be regarded as 'small' (Table 9) and therefore the severity of impact would be 'slight' at H25. The predicted PC is compliant with the air quality objectives at this receptor; a location that is expected to be occupied only occasionally for routine maintenance. The slight impact predicted at H25 is therefore regarded as **not significant**.
- 5.2.12 For all other predicted short-term concentrations, the magnitude of 15-minute and hourly changes has been assessed using the EPUK/IAQM guidance as shown in Table 21 as having 'Negligible' effect.
- 5.2.13 For the significance of 8-hour and 24-hour impacts, the Defra/EA guidance approach (Section 3.2) has been used. Calculated PCs have been compared with the AQS and to the 'Headroom' as defined in Section 3.2. All maximum predicted PCs, including short-term NO₂, do not exceed the screening threshold of 10% for PC/AQAL and are therefore considered **not significant** at all locations.
- 5.2.14 A conservative approach has been taken to the short-term modelling of combustion emissions, assuming that operation of either both CHPs, or one CHP in addition to the emergency flare and emergency boiler are operating simultaneously, and of which might coincide with all the worst-case meteorological conditions. The short-term impacts at all receptors can therefore be screened out as **not significant**.
- 5.2.15 Consistent with the conclusion of the 2023 AQIA the predicted short-term air quality impact of the revised scheme is Negligible and **not significant**.

Table 21 Results, short-term AQAL

Pollutant	Statistic	AQS (µg/m ³)	PC (µg/m ³)	PC/ AQAL (%)	Head- room (µg/m ³)	PC/ Head- room (%)	PEC/ AQAL (%)	Receptor	Magnitude of change
Averaging times ≤ 1 hour, using EPUK/IAQM guidance									
NO ₂	99.79 th 1h	200	22.7	11%	n/a	n/a	n/a	H25	Small ²
SO ₂	99.9 th 15min	266	13.5	5.1%	n/a	n/a	n/a	H9	Negligible ²
SO ₂	99.73 rd 1h	350	8.83	2.5%	n/a	n/a	n/a	H25	Negligible ²
NH ₃	Max 1h	2,500	5.99	0.2%	n/a	n/a	n/a	H25	Negligible ²
Averaging times > 1 hour, using Defra/EA guidance (Section 5.2.1)									
SO ₂	99.18 th 24h	125	5.20	4.2%	122	4.3%	6.6%	H25	³
PM ₁₀	90.41 24h	50	0.54	1.1%	27.4	2.0%	46%	H23	³
CO ¹	Max daily 8h	10,000	218	2.2%	6,694	3.3%	35.2%	H25	³
Benzene	Max 24h	30	2.00	6.7%	29.5	6.8%	8.4%	H25	³
H ₂ S	Max 24h	150	0.04	0.03%	150	0.03%	0.03%	H23	³
Notes: Data on each row is for one receptor, the receptor at which the percentage of PC/AQS is greatest. ¹ Maximum daily 8h running. ² EPUK/IAQM Guidance, Table 9 of this report ³ Defra/EA guidance (Section 3.2.1)									

6 Impact Assessment of Air Quality on Ecological Receptors

6.1.1 Predicted impacts of each pollutant at each ecological receptor are given in Appendix F. In this section the highest results are presented, that is, the impacts at the worst-case receptor across all meteorological years, and the worst with and without buildings and terrain. Impacts have been compared to the screening thresholds given in Section 3.3 following the EA/ Defra guidance.

6.2 Results at SACs and SSSIs

6.2.1 Table 22 and Table 22 show the predicted PCs at the SACs and SSSIs. The maximum predicted concentrations at any SAC occur at receptor location E21, selected as representative of North Meadow & Clattinger Farm SAC, that is also coincident with Clattinger Farm SSSI.

6.2.2 The long-term impacts do not exceed 1% of the relevant AQS and short-term impacts do not exceed 10%. For ecological receptors sensitive to NH₃, the impact is less than 1% of the critical level.

6.2.3 Table 26 to Table 29 inclusive show the maximum NDep and AcidDep impacts. At the SACs and SSSIs impacts are less than 1% of the NDep maximum and minimum CLoads and the AcidDep CLoad.

6.2.4 Predicted impacts at all SACs and SSSIs reevaluated can be screened out as **not significant**.

6.3 Results at LWS and AW

6.3.1 Table 24 and Table 24 show the predicted PCs at the LWS. The long-term and short-term impacts do not exceed 40%; they are therefore below 100% of the relevant long and short-term AQS. Maximum concentration impacts are predicted at E26 and E27; both locations were selected as representative of an area that includes LWS (CWP Lake Pit 26) also coincident with Priority Habitat and denotified SSSI.

6.3.2 Table 26 to Table 29 show that the maximum NDep and AcidDep impacts. At the LWSs maximum impacts are 4.2% - 8.4% of the NDep maximum and minimum CLoads for forest and 0.4% to 0.7% of the NDep maximum and minimum CLoads for grass. Maximum impacts are 1.3% of the AcidDep CLoad for forest and 0.2% for grass.

6.3.3 Impacts at LWS are well under 100% of the relevant CLe and CLo and may be regarded as unlikely to unduly impact on the receptors and can be screened out as **not significant**.

Table 22 Results at SAC and SSSI, long-term AQAL

Pollutant	AQAL (µg/m³)	Averaging time	Statistic	LT or ST AQAL	PC (µg/m³)	PC/AQAL (%)	PEC (µg/m³)	PEC/AQAL (%)	Receptor	Significant?
NOx	30	Annual	mean	LT	0.06	0.2%	6.46	22%	E21 (SAC)	Not significant
SO ₂	20	Annual	mean	LT	0.009	0.0%	0.61	3.0%	E21 (SAC)	Not significant
SO ₂	10	Annual	mean	LT	0.009	0.1%	0.61	6.1%	E21 (SAC)	Not significant
NH ₃	3	Annual	mean	LT	0.001	0.0%	1.70	57%	E21 (SAC)	Not significant
NOx	30	Annual	mean	LT	0.18	0.6%	7.58	25%	E6 (SSSI)	Not significant
SO ₂	20	Annual	mean	LT	0.02	0.1%	0.82	4.1%	E6 (SSSI)	Not significant
SO ₂	10	Annual	mean	LT	0.02	0.2%	0.82	8.2%	E6 (SSSI)	Not significant
NH ₃	1	Annual	mean	LT	0.0003	0.0%	1.60	160%	E13 (SSSI)	Not significant
NH ₃	3	Annual	mean	LT	0.002	0.1%	1.60	160%	E6 (SSSI)	Not significant
Notes: *LT= long-term, ST = short-term; n/a = not applicable/ available Data on each row are for one receptor, the receptor at which the percentage of PC/AQAL is greatest										

Table 23 Results at SAC and SSSI, short-term AQAL

Pollutant	AQAL (µg/m³)	Averaging time	Statistic	LT or ST AQ	PC (µg/m³)	PC/AQAL (%)	PC/ Headroom (%)	Receptor	Significant?
NOx	75	24-hour	100 th percentile	ST	1.38	1.84%	2.30%	E20 (SAC)	Not significant
NOx	200	24-hour	mean	ST	1.38	0.69%	0.75%	E20 (SAC)	Not significant
NOx	75	24-hour	100 th percentile	ST	3.40	4.53%	5.50%	E19 (SSSI)	Not significant
NOx	200	24-hour	mean	ST	3.40	1.70%	1.82%	E19 (SSSI)	Not significant
Notes: *LT= long-term, ST = short-term; Data on each row are for one receptor, the receptor at which the percentage of PC/AQAL is greatest									

Table 24 Results at NNR, LNR, LWS and AW - long-term AQAL

Pollutant	AQAL ($\mu\text{g}/\text{m}^3$)	Averaging time	Statistic	LT or ST AQAL	PC ($\mu\text{g}/\text{m}^3$)	PC/AQAL (%)	PEC ($\mu\text{g}/\text{m}^3$)	PEC/AQAL (%)	Receptor
NO _x	30	Annual	mean	LT	2.65	8.8%	11.7	39%	E27 (LWS)
SO ₂	20	Annual	mean	LT	0.35	1.8%	2.05	10%	E27 (LWS)
SO ₂	10	Annual	mean	LT	0.35	3.5%	2.05	21%	E27 (LWS)
NH ₃	1	Annual	mean	LT	0.04	4.5%	1.64	164%	E26 (LWS)
NH ₃	3	Annual	mean	LT	0.04	1.5%	1.64	55%	E26 (LWS)
Notes: *LT= long-term, ST = short-term. Data on each row are for one receptor, the receptor at which the percentage of PC/AQAL is greatest									

Table 25 Results at NNR, LNR, LWS and AW - short-term AQAL

Pollutant	AQAL ($\mu\text{g}/\text{m}^3$)	Averaging time	Statistic	LT or ST AQAL	PC ($\mu\text{g}/\text{m}^3$)	PC/AQAL (%)	PC/ Headroom (%)	Receptor
NO _x	75	24-hour	100 th percentile	ST	29.9	40%	50%	E26 (LWS)
NO _x	200	24-hour	mean	ST	29.9	15%	16%	E26 (LWS)
Notes: *LT= long-term, ST = short-term. Data on each row are for one receptor, the receptor at which the percentage of PC/AQAL is greatest								

Table 26 Worst-case nitrogen deposition (Forest)

Receptor	PC (kg/ha/y)	CLomin (ka/ha/y)	CLomax (ka/ha/y)	PC/CLomin (%)	PC/CLomax (%)	PEDR/CLomin (%)	PEDR/CLomax (%)	Receptor
SAC	0.022	n/a	n/a	n/a	n/a	n/a	n/a	n/a
SSSI	0.006	15	20	0.04%	0.03%	199%	150%	E16 (SSSI)
AW/ LWS	0.840	10	20	8.4%	4.2%	289%	145%	E26 (LWS)
Notes: Data on each row are for one receptor, the receptor at which the percentage of PC/CLmin is greatest n/a = not applicable/ available There is no comparable habitat in the CWP SSSI with an established nitrogen deposition critical load.								

Table 27 Worst-case nitrogen deposition (Grass)

Receptor	PC (kg/ha/y)	CLomin (ka/ha/y)	CLomax (ka/ha/y)	PC/CLomin (%)	PC/CLomax (%)	PEDR/CLomin (%)	PEDR/CLomax (%)	Receptor
SAC	0.013	10	20	0% (0.1%)	0% (0.1%)	154%	77%	E21 (SAC)
SSSI	0.274	10	20	0% (0.3%)	0% (0.1%)	148%	74%	E6 (SSSI)
AW/ LWS	0.074	10	20	1% (0.7%)	0% (0.4%)	153%	76%	E29 (LWS)
Notes: Data on each row are for one receptor, the receptor at which the percentage of PC/CLmin is greatest There is no comparable habitat in the CWP SSSI with an established nitrogen deposition critical load.								

Table 28 Worst-case acid deposition (Forest)

Receptor	PC_S (keqN/ha/yr)	PC_N (keqN/ha/yr)	PC/CLo (%)	Background/CLo (%)	PEC/CLo (%)	Receptor
SAC with respect to CLomax	0.002	0.002	n/a	n/a	n/a	E21 (SAC)
SSSI with respect to CLomax	0.0006	0.0004	0%	77.6%	77.6%	E16 (SSSI)
AW, LWS with respect to CLomax	0.084	0.060	1.3%	19.8%	21.1%	E27 (LWS)
Notes: Data on each row are for one receptor, the receptor at which the percentage of PC/CLo is greatest. n/a = not applicable/ available. There is no comparable habitat in the CWP SSSI with an established acid deposition critical load.						

Table 29 Worst-case acid deposition (Grass)

Receptor	PC_S (keqN/ha/yr)	PC_N (keqN/ha/yr)	PC/CLo (%)	Background/CLo (%)	PEC/CLo (%)	Receptor
SAC with respect to CLomax	0.0010	0.0009	0.0%	23.9%	23.9%	E21 (SAC)
SSSI with respect to CLomax	0.0012	0.0010	0.0%	24.7%	24.8%	E19 (SSSI)
AW, LWS with respect to CLomax	0.0058	0.0053	0.2%	24.9%	25.1%	E29 (LWS)
Notes: Data on each row are for one receptor, the receptor at which the percentage of PC/CLo is greatest. There is no comparable habitat in the CWP SSSI with an established acid deposition critical load.						

7 Cumulative Impact Assessment

7.1.1 The potential for cumulative effects of the Proposed Development have been assessed with consideration given to other nearby schemes, whether completed, under construction, or currently proposed. Consideration has been given to:

- Saxon Meadow, South Cerney, redevelopment of land at Berkeley Close, South Cerney, Cirencester -18/04656/REM, approximately 500m northeast of the application site.
- Cotswold Community, Ashton Keynes -21/02520/REM. Approved development of 75 dwellings approximately 350m southwest of the application site.
- The 'Steadings' mixed-use development at Chesterton, Cirencester – 16/00054/OUT, approximately 4km north of the application site.
- Wheatleys Farm Quarry, Ashton Keynes - PL/2023/03298, approximately 2.5km south-southeast of the application site.
- Cirencester Waste water Treatment Works (WwTW), approximately 1km northwest of the application site.

7.2 Construction Phase

7.2.1 If approved, the initial construction of the Proposed Development may overlap with the final construction phases of the Cotswold Community scheme; for which the earthworks and initial development phases are already complete. The nearest extent of the Cotswold Community development area is approximately 350m southwest of the Proposed Development boundary; the nearest dwelling is approximately 360m. There are no intervening receptors between the two sites.

7.2.2 The construction dust impacts from the Proposed Development **alone** have been assessed qualitatively in the 2023 AQIA as **not significant** at the Cotswold Community (receptor H1). Considering the scale and phasing of both developments the likelihood for cumulative construction dust impacts from both schemes due to the is considered **not significant**.

7.2.3 Other currently proposed schemes or those under construction are situated more than 350 metres from the boundary of the Proposed Development site and over 100 metres from vehicle routes on the public highway within 500 metres of the site entrance, placing them beyond the range where cumulative dust impacts would typically be anticipated. Background concentrations of PM₁₀ are sufficiently below objectives, such that the potential for cumulative impacts on air quality due to the construction phase is regarded to be **not significant**.

7.3 Operational Phase

Saxon Meadow, South Cerney

- 7.3.1 Land at Berkeley Close, South Cerney ('Saxon Meadow') is situated approximately 500m northeast of the Proposed Development site. Planning permission was granted for 94 dwellings. The scheme involves the demolition of 56 dwellings, and erection of 82–84 new residential units: a net increase of 28 dwellings.
- 7.3.2 The Transport Statement for Saxon Meadow concluded that the proposed net gain of 28 residential units is not expected to significantly affect the local highway network and that the residual cumulative impacts are not considered severe under paragraph 111 of the NPPF.²⁵
- 7.3.3 For the Proposed Development, in accordance with IAQM criteria (2017) the projected traffic flows were **not significant** and required no further air quality assessment.
- 7.3.4 The air quality impacts of NO_x and PM₁₀ from the Proposed Development **alone** at all receptor locations is determined as **not significant**. Background concentrations of NO_x and PM₁₀ are sufficiently below objectives, such that the potential for cumulative impacts on air quality due to traffic from both schemes is regarded to be **not significant**.

Cotswold Community, Ashton Keynes

- 7.3.5 Cotswold Community, Ashton Keynes is situated approximately 350m southwest of the Proposed Development site. The area being developed includes 75 dwellings comprising of 48 new homes and 27 dwellings which already benefit from lawful consent.
- 7.3.6 The Transport Assessment for the scheme concluded that the proposed development would have a negligible impact on the operation of the local highway network. Given the very small traffic flows arising from the 48 new dwellings it was not considered that any more detailed analysis of the impact on the local road network was required.²⁶
- 7.3.7 On this basis the potential for cumulative air quality impacts from the Cotswold Community scheme with the Proposed Development is regarded as **not significant**.

²⁵ Rappor (June 2023) Berkeley Close, South Cerney, Cirencester. Transport Statement.

²⁶ Development Transport Planning (March 2016) Transport Statement for The Cotswold Community Proposed Residential Community.

The Steadings, Cirencester

- 7.3.8 The approved mixed-use development includes 2,350 dwellings, community facilities and associated infrastructure. The development site includes approximately 120 hectares (ha) of land south of Cirencester, approximately 4km to the north of the Proposed Development. The Steadings represents a large-scale strategic development. Based on the findings of the Transport Assessment and the provisions of the Framework Travel Plan, the proposals were shown to meet the National Planning Policy Framework's requirement that development impacts on the highway network are not considered 'severe'.
- 7.3.9 Although the traffic impacts from the Proposed Development alone did not meet the threshold for further assessment, the separation distance between the Proposed Development and The Steadings scheme supports the conclusion that cumulative air quality effects from traffic associated with both developments on the local highway network would **not be significant**.

Wheatley's Farm Quarry

- 7.3.10 Wheatley's Farm Quarry is an approved 27 ha sand and gravel extraction, processing and back-filling operation approximately 2.5km south-southeast of the Proposed Development.
- 7.3.11 The Transport Statement²⁷ for the scheme projects that 75% of HGVs will travel south via the B4696 Ashton Road, while the remaining 25% are expected to head north along the same road before continuing on Spine Road East to access the A419 for destinations to the north. Although a routing agreement and plan have not yet been provided, it is expected that HGVs will be directed along the Spine Road, except where access to local roads is necessary to reach specific development sites and therefore it is considered unlikely that a significant number of HGVs would pass the Proposed Development site. The traffic impact of the quarry scheme on the existing local highway network is forecast to be negligible and **not significant**. Based on the projected traffic flows, it is therefore unlikely that the cumulative air quality impacts from traffic generated by both proposals would be significant.
- 7.3.12 In terms of the quarry operation, the Dust and Air Quality Assessment (2023)²⁸ for the scheme established that there are no nearby industrial areas or significant sources of particulate matter (PM₁₀ or PM_{2.5}) close enough to Wheatleys Farm to notably affect air quality in the surrounding area. As such, the assessment concluded that any cumulative impacts are expected to be minimal and are considered negligible.

²⁷ The Hurlstone Partnership (April 2023) Proposed Mineral Extraction at Wheatleys farm, Ashton Keynes, Wiltshire, SN6 6NX (<https://development.wiltshire.gov.uk/pr/s/planning-application/a0i3z00001AaRNc/pl202303298?tabset-8903c=2>)

²⁸ Earthline Ltd (April 2023) Dust and Air Quality Assessment - Proposed Sand and Gravel Extraction at Wheatleys Farm, Ashton Keynes (<https://development.wiltshire.gov.uk/pr/s/planning-application/a0i3z00001AaRNc/pl202303298?tabset-8903c=2>)

- 7.3.13 Based on the separation distance between the scheme and the Proposed Development the potential for cumulative $PM_{10}/PM_{2.5}$ impacts would be negligible. Furthermore, background $PM_{10}/PM_{2.5}$ concentrations in the locale of both sites are sufficiently below the AQO such that the risk of cumulative impact exceeding this is **not significant**.

Cirencester WwTW

- 7.3.14 Cirencester WwTW is located approximately 1km to the northwest of the application site. Facility upgrades aimed at expanding (almost doubling) the WwTW capacity are scheduled for completion in 2026.²⁹ Improvements will include an increase in storm water volume and treatment capacity via land treatment that will reduce the need for untreated discharges in wet weather. The upgrades will ensure improved efficiency and sufficient treatment capacity that will also support The Steadings strategic development at Chesterton.
- 7.3.15 The 2025 AQIAA has determined that the potential for odour impact arising from the Proposed Development is **not significant**. The maximum predicted odour concentration at any location was $1.8ou_E/m^3$ (at a nearby receptor 80m from the site) which is below the adopted odour benchmark of $3ou_E/m^3$; the maximum odour concentration predicted at a residential dwelling was $0.6ou_E/m^3$ (approximately 340m from the site boundary) which is below the odour detection threshold of $1ou_E/m^3$. Predicted odour concentrations at receptors 500m downwind of the site (H7, H7a, H7b) are $0.3 - 0.4ou_E/m^3$, and therefore also below the odour detection threshold.
- 7.3.16 The WwTW is located predominantly 1km downwind of the Proposed development. Given this separation distance, any short-term odour impacts, if they were to arise, are unlikely to coincide. Consequently, the likelihood of cumulative odour effects is low and considered **not significant**.

7.4 Summary

- 7.4.1 The 2023 AQIA evaluation of construction dust impacts from the Proposed Development alone determined potential impacts at all receptors to be not significant. There are no other significant dust sources sufficiently close to the Proposed Development to lead to cumulative dust impacts to any receptor during the construction phase.
- 7.4.2 The predicted air quality impacts of the Proposed Development alone during the operational phase have been assessed to be not significant. Further, background air quality concentrations for NO_x and $PM_{10}/PM_{2.5}$ in the locale are well within the Air Quality Objectives.

²⁹ Thames Water Investment plans for storm discharge sites (<https://www.thameswater.co.uk/about-us/performance/river-health/frequently-asked-questions/information-about-specific-sites#s>) (accessed 02/10/25).

- 7.4.3 In accordance with criteria set out in IAQM guidance, the projected traffic from the Proposed Development is not considered significant to warrant further assessment. The supporting Transport Assessment for the Proposed Development also concluded that any impacts resulting from the proposals would be ‘negligible’ in terms of road safety, highway operation, and/or network capacity.³⁰ The supporting Transport Assessments for other plans or projects in the locale have demonstrated that the residual cumulative impacts of those proposals on the road network would not be severe.
- 7.4.4 Therefore, it is expected that the corresponding air quality effects from traffic on the local highway network would not be significant. On this basis the operation of the Proposed Development in combination with other relevant plans or projects would not be likely to exceed AQALs and/or lead to cumulative air quality impact at receptor locations.

³⁰ SLR Consulting (April 2023) Transport Statement Ashton Keynes.

8 Conclusion

- 8.1.1 This Air Quality Assessment Addendum evaluates the design modifications to the Proposed Development. Earthcare Technical Ltd has reassessed the potential air quality impacts associated with the Proposed Development, which will produce biogas for upgrading to biomethane for injection into the National Grid, carbon dioxide for industrial use, and biofertiliser for application on local farmland.
- 8.1.2 The updated AQIAA evaluates design changes to the Proposed Development, including the October 2024 Design Changes and the 2025 Design Refinements. The 2024 updates responded to Wiltshire Council's Landscape Team feedback and involved switching to a different anaerobic technology, resulting in fewer and lower digestion tanks, reduced ground levels, and enhanced landscape planting—significantly lowering visual impact. These changes also included new drainage plans and a Drainage Impact Assessment.
- 8.1.3 The 2025 Refinements, agreed upon with planning and landscape officers, introduce three further improvements:
- Lowering the manure processing building height
 - Adding native willow screen planting along part of the Site access
 - Creating a native wildflower meadow in the Site's northeast corner
- 8.1.4 The updated 2025 AQIAA considers statutory consultee feedback regarding the 2023 AQIA. No air quality-related comments were received from Natural England, the Arboricultural Officer, the Ecology Officer, the Environment Agency, or the Highways Department. The assessment has been updated to address comments from Environmental Protection and local parish councils. These updates include odour dispersion modelling, additional modelled receptor locations, and cumulative impact analysis.
- 8.1.5 The core principles of the scheme, including the proposed feedstock composition, quantities and digestate volumes remain unchanged.
- 8.1.6 There will be no changes to site access or vehicle movements during construction or operation for the revised scheme. Traffic levels remain below thresholds set out in guidance that would require further air quality assessment, and therefore, the impact on air quality is considered insignificant. Consistent with the conclusions of the 2023 AQIA, the potential for traffic-related air quality impacts remains is considered not significant.
- 8.1.7 The 2023 AQIA adopted a risk-based approach, in line with established guidance, to assess potential impacts from construction-related dust. The broad nature, scale, and location of construction activities remain unchanged. As such, the potential for construction-phase dust emissions remains not significant. The minimum best practice construction dust mitigation measures previously recommended are still deemed appropriate and effective to minimise dust-related impacts.

- 8.1.8 During the operational phase, the scope of activities that have the potential to generate dust and bioaerosols remains unchanged. In line with the 2023 AQIA, these impacts at nearby sensitive locations are considered not significant.
- 8.1.9 Modifications to certain elements of the proposed site infrastructure have further reduced the likelihood of odour generation during the operational phase, ensuring that any potential odour impact remains not significant. The maximum predicted odour concentration at a residential receptor is $0.6\text{ou}_\text{E}/\text{m}^3$ which is below the adopted odour benchmark of $3\text{ou}_\text{E}/\text{m}^3$ and it is below the odour detection threshold of $1\text{ou}_\text{E}/\text{m}^3$.
- 8.1.10 The Proposed Development will be managed under the provisions of a bespoke installation permit from the Environment Agency that will include the implementation of, and adherence to, an Odour Management Plan.
- 8.1.11 Further evaluation has been undertaken to assess the potential for other emissions to air to affect human health and sensitive ecological receptors. Updated dispersion modelling using ADMS 6.0.0.1, revised emission source data, and newly available background monitoring information confirm that predicted pollutant concentrations at representative receptors are predicted to be within relevant air quality assessment limits for each pollutant.
- 8.1.12 Air quality impacts on conservation areas are predicted to be within relevant air quality assessment limits for each pollutant. The predicted impacts of nutrient nitrogen and acid deposition are considered unlikely to result in adverse effects.
- 8.1.13 It is expected that the operation of the Proposed Development will not result in cumulative air quality impacts. Background air quality and projected exposure levels have been assessed at locations reflecting nearby approved developments, with predicted pollutant concentrations remaining well within established air quality standards. The supporting Transport Assessment has also demonstrated that the impacts on the road network would not be significant.
- 8.1.14 The proposed amendments to the Proposed Development do not alter the findings of the 2023 AQIA. The predicted impacts of emissions to air remain **not significant** and do not present a constraint to either the construction or operation of the Proposed Development.

Figures

Figure 1 Modelled point sources

Figure 2 Modelled volume sources

Figure 3 Modelled buildings

Figure 4 GFS meteorological data (51.661°, -1.942°), windroses 2017-2021

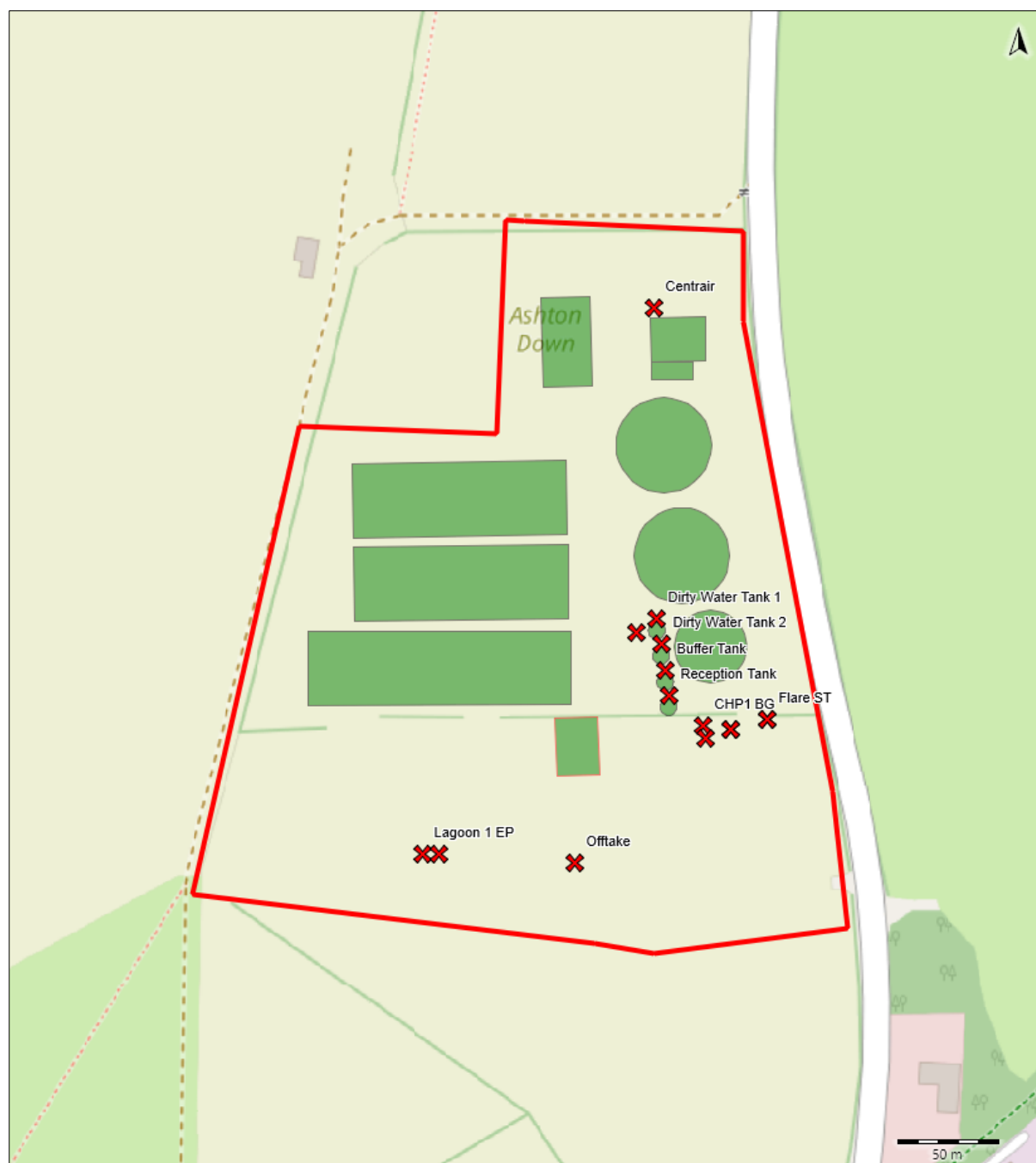
Figure 5 Terrain data

Figure 6 Human receptors within 2km

Figure 7 Ecological receptors within 2km

Figure 8 Ecological receptors within 10km

Figure 1 Modelled point sources

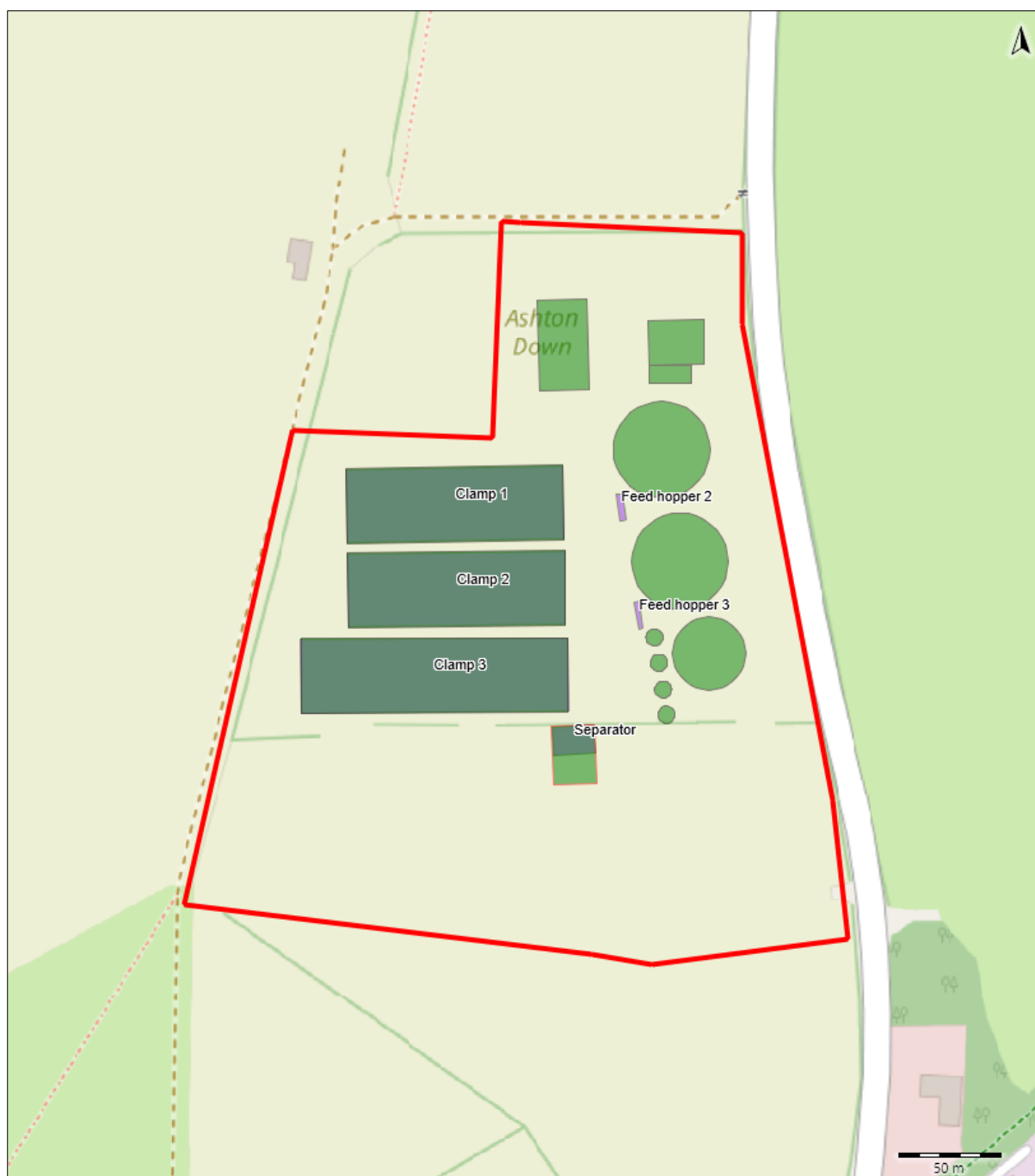


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Legend

- ☒ Point sources
- ☒ Boundary
- ☒ Buildings

Figure 2 Modelled volume sources

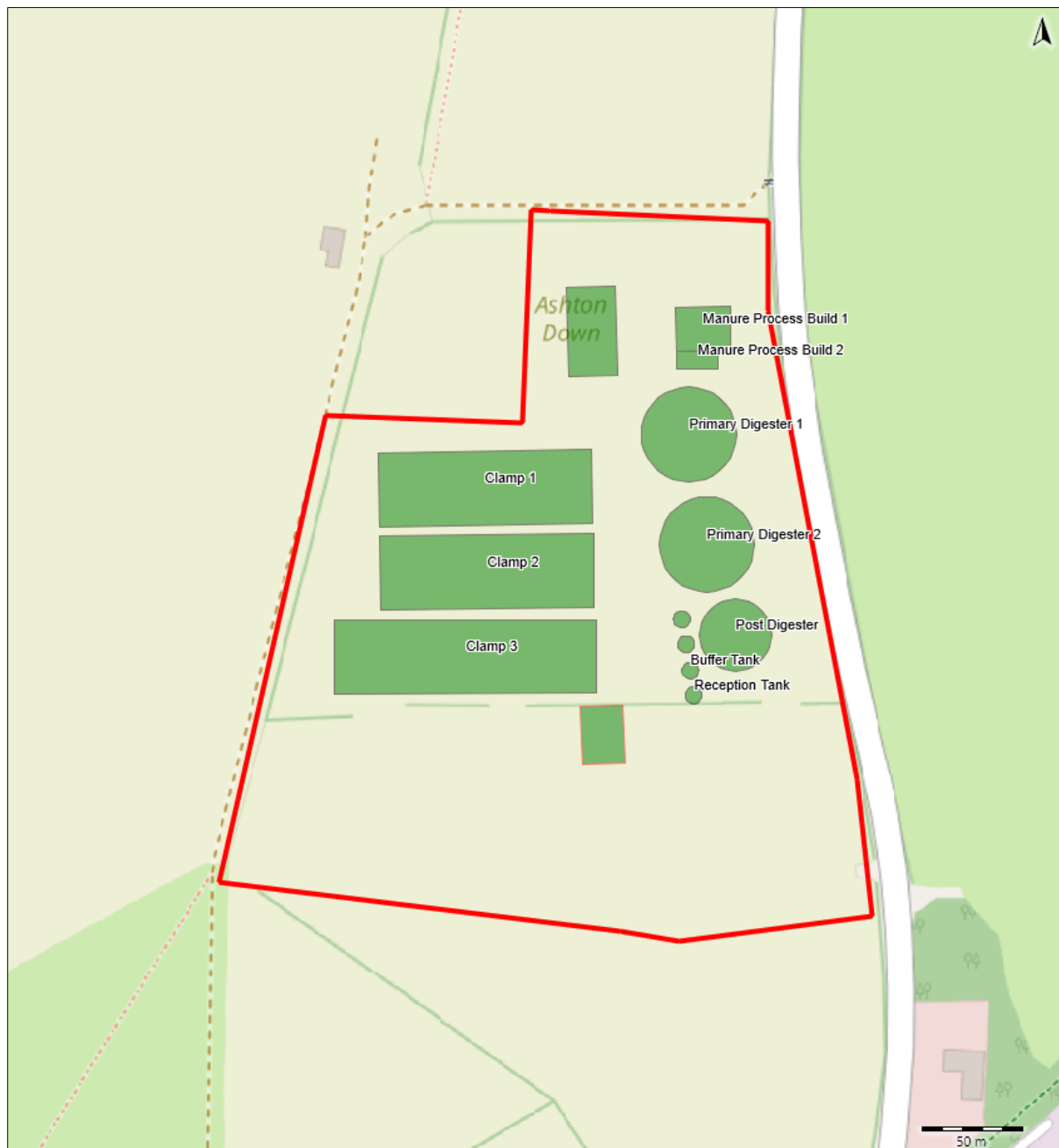


Background image ©OpenStreetMap contributors www.openstreetmap.org/copyright

Legend

- ☒ Volume sources
- ☒ Boundary
- ☒ Buildings

Figure 3 Modelled buildings



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Legend

- ☒ Buildings (
- ☒ Boundary

Figure 4 GFS meteorological data (51.661°, -1.942°), windroses 2017-2021

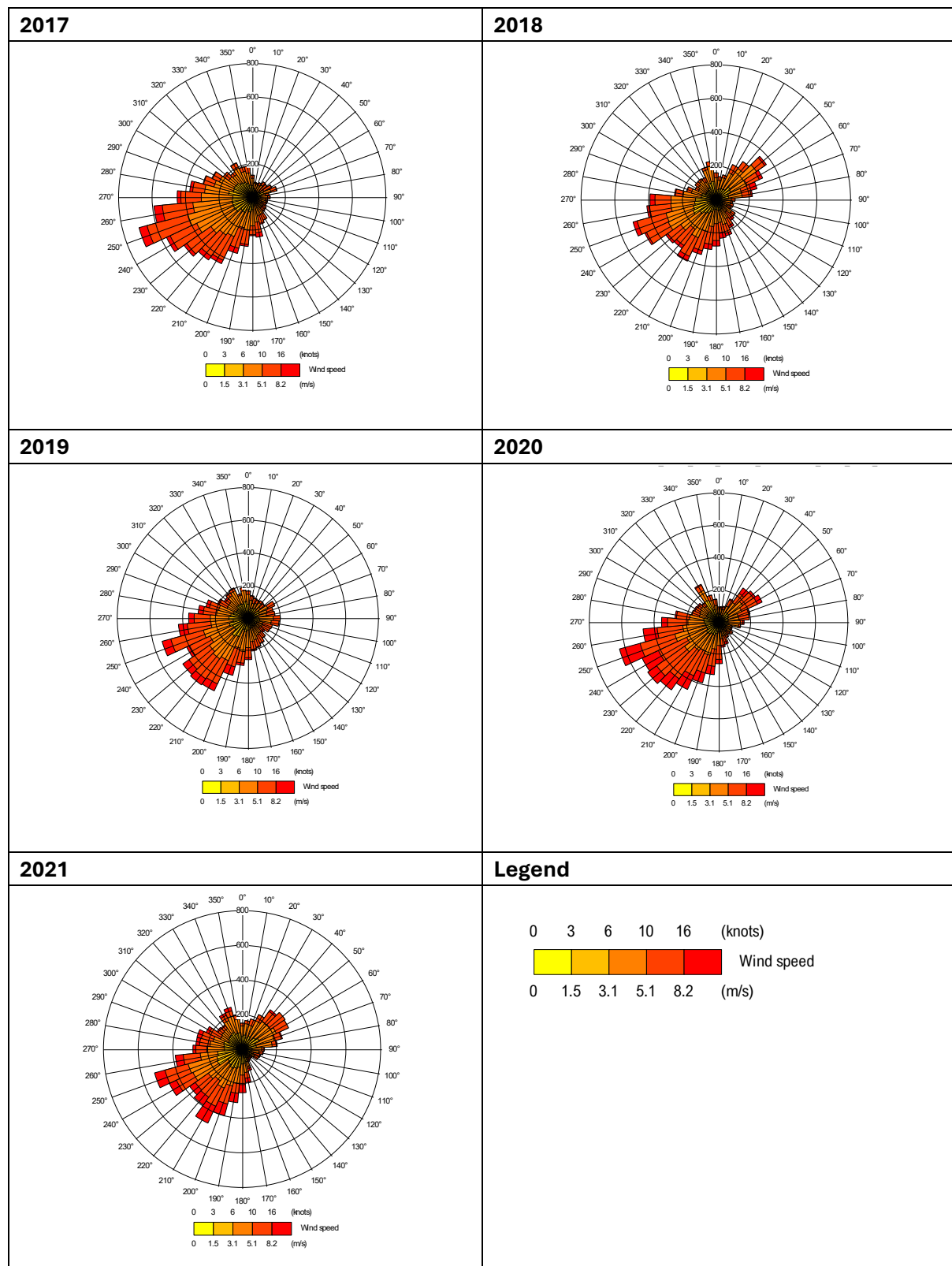
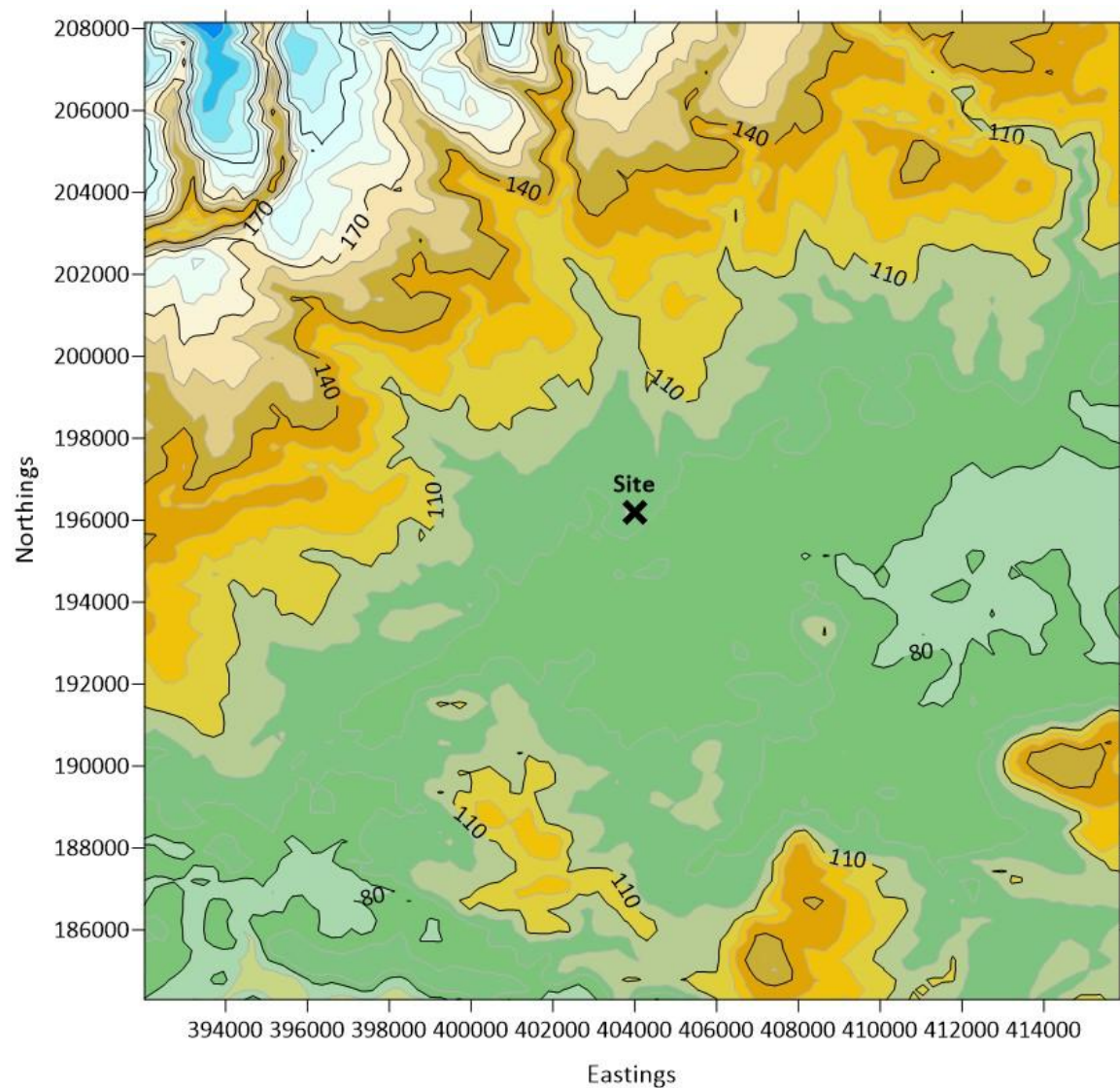


Figure 5 Terrain data



Elevation (m)

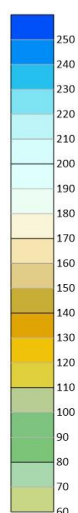
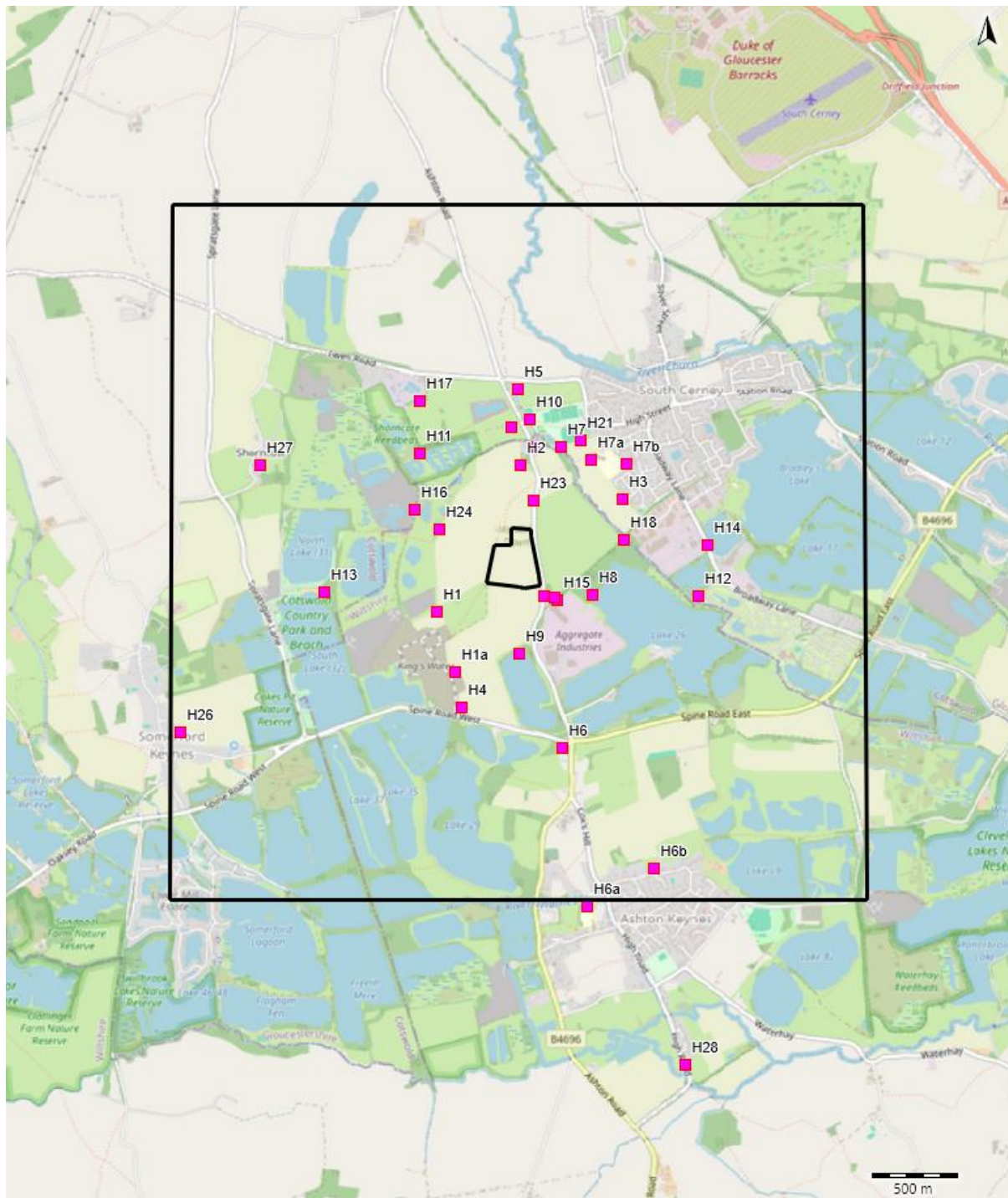


Figure 6 Human receptors within 2km

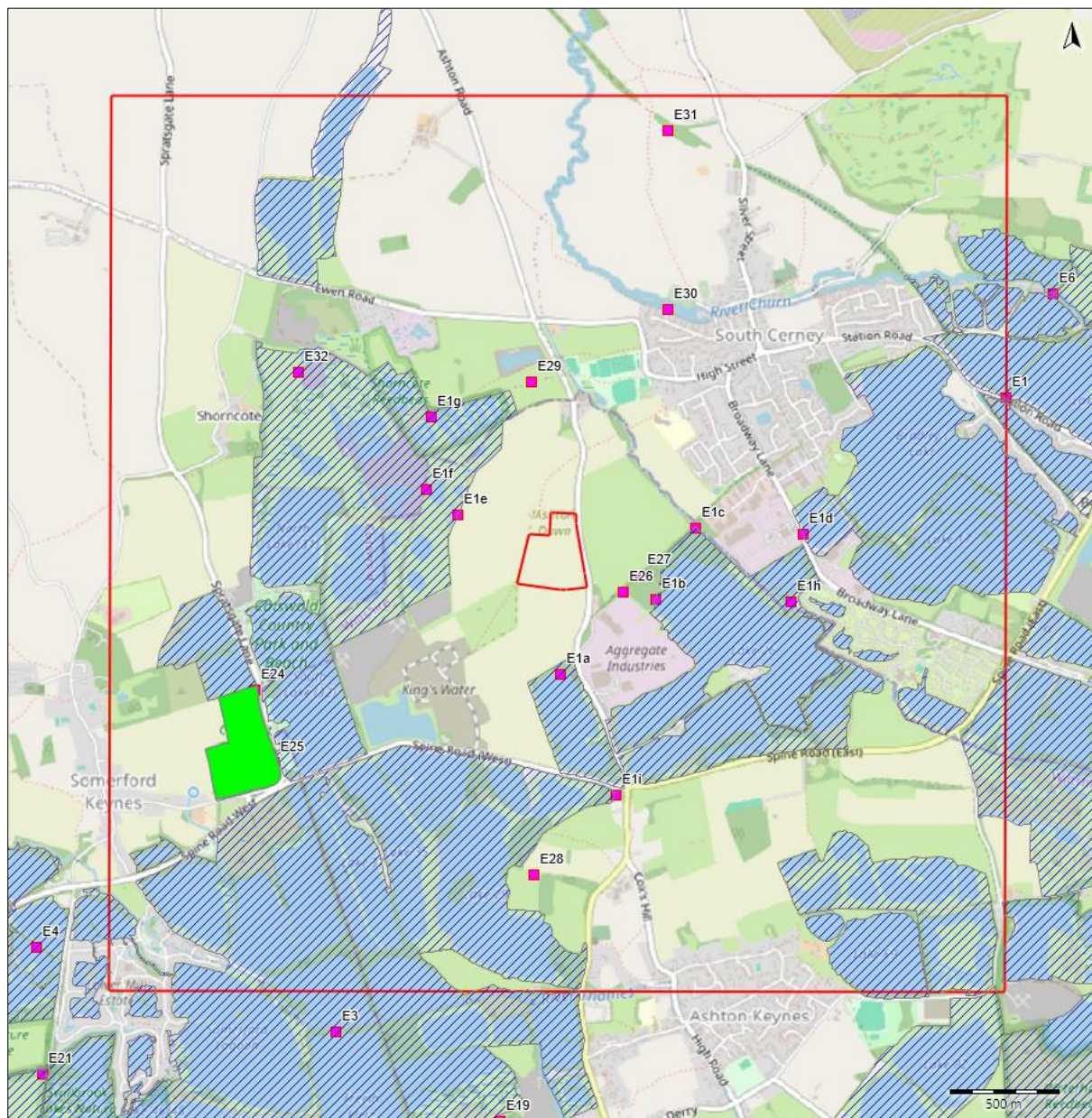


Background image ©OpenStreetMap contributors www.openstreetmap.org/copyright

Legend

- ☐ Human receptors
-

Figure 7 Ecological receptors within 2km

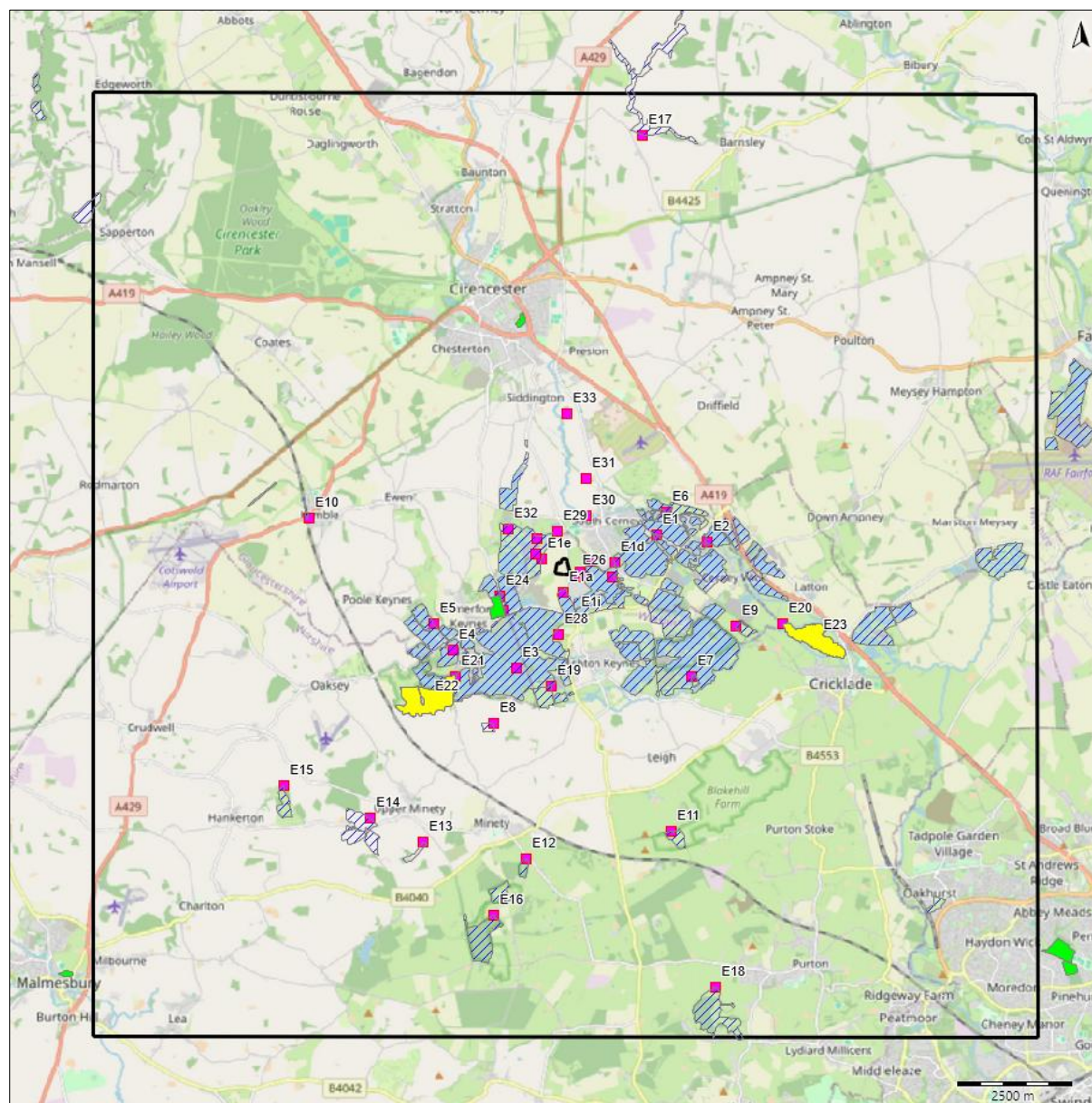


Background image ©OpenStreetMap contributors www.openstreetmap.org/copyright

Legend

- ☒ Ecological receptors
- ☒ SSSIs
- ☒ LNR
- ☒ +/-2km

Figure 8 Ecological receptors within 10km

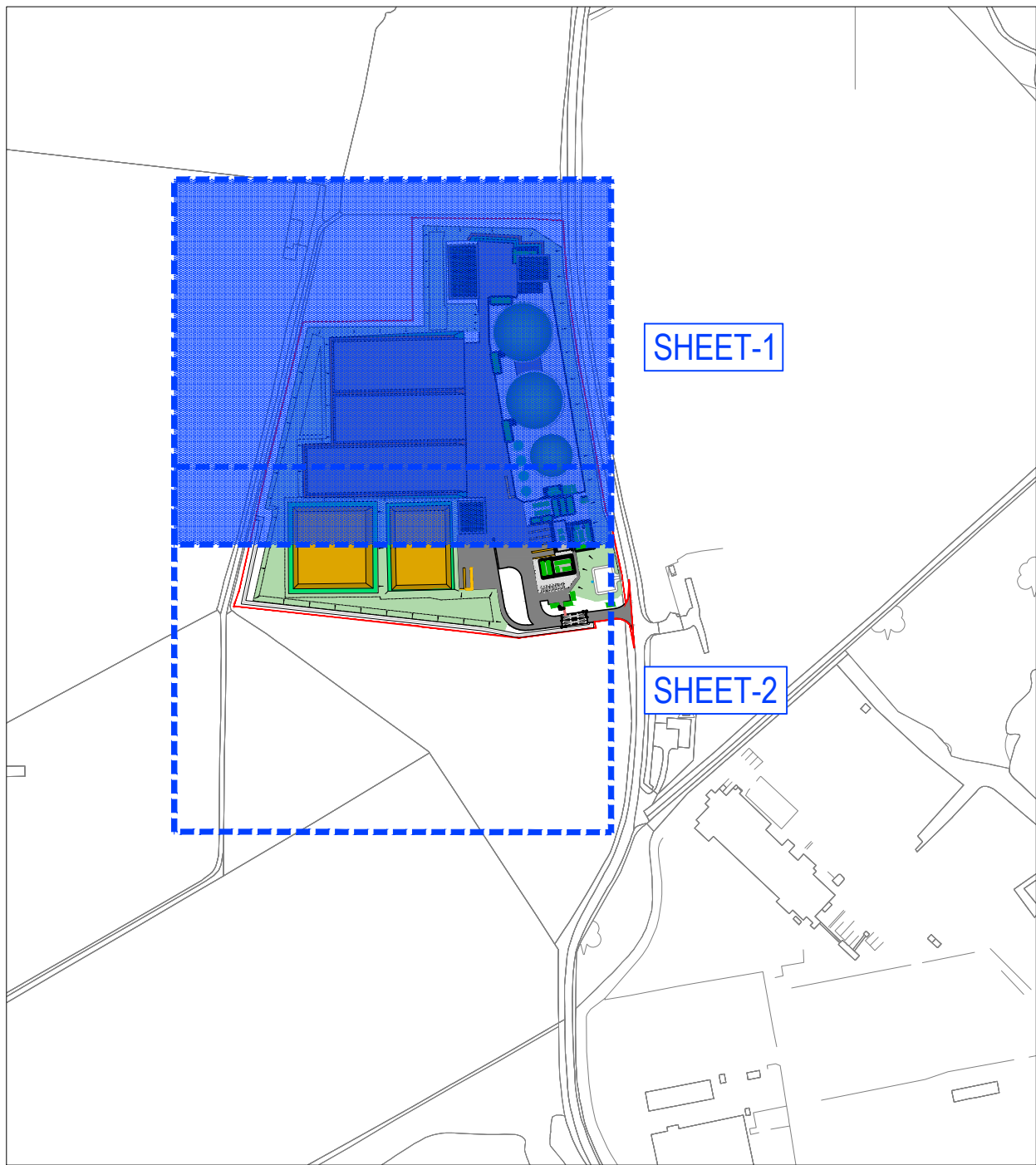


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Legend

- ☒ Ecological receptors
- ☒ SSSIs
- ☒ SACs

Appendix A Updated Site Layout Plan



SITE LOCATION PLAN
Scale: 1:5000 @ A1



SITE PLAN
Scale: 1:500 @ A1

NOT FOR CONSTRUCTION

NOTES:-

1. All dimensions must be checked on site and not scaled from this drawing.
2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
3. All levels shown on this drawing are relative to Agreed Topographic survey
4. This drawing is to be read in conjunction with 29419/100 Series Drawings.
5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

Site Red Line Boundary (7.06Ha)

0 5m 10m 15m 20m 25m
Scale 1:500 @ A1

0 50m 100m 150m 200m 250m
Scale 1:5000 @ A1

P03	11/09/24	ISSUED FOR APPROVAL	ASP	JHC
P02	10/09/24	ISSUED FOR APPROVAL	WPD	JHC
P01	07/08/24	ISSUED FOR APPROVAL	JHC	JHC
Rev	Date	Description	DR	CH

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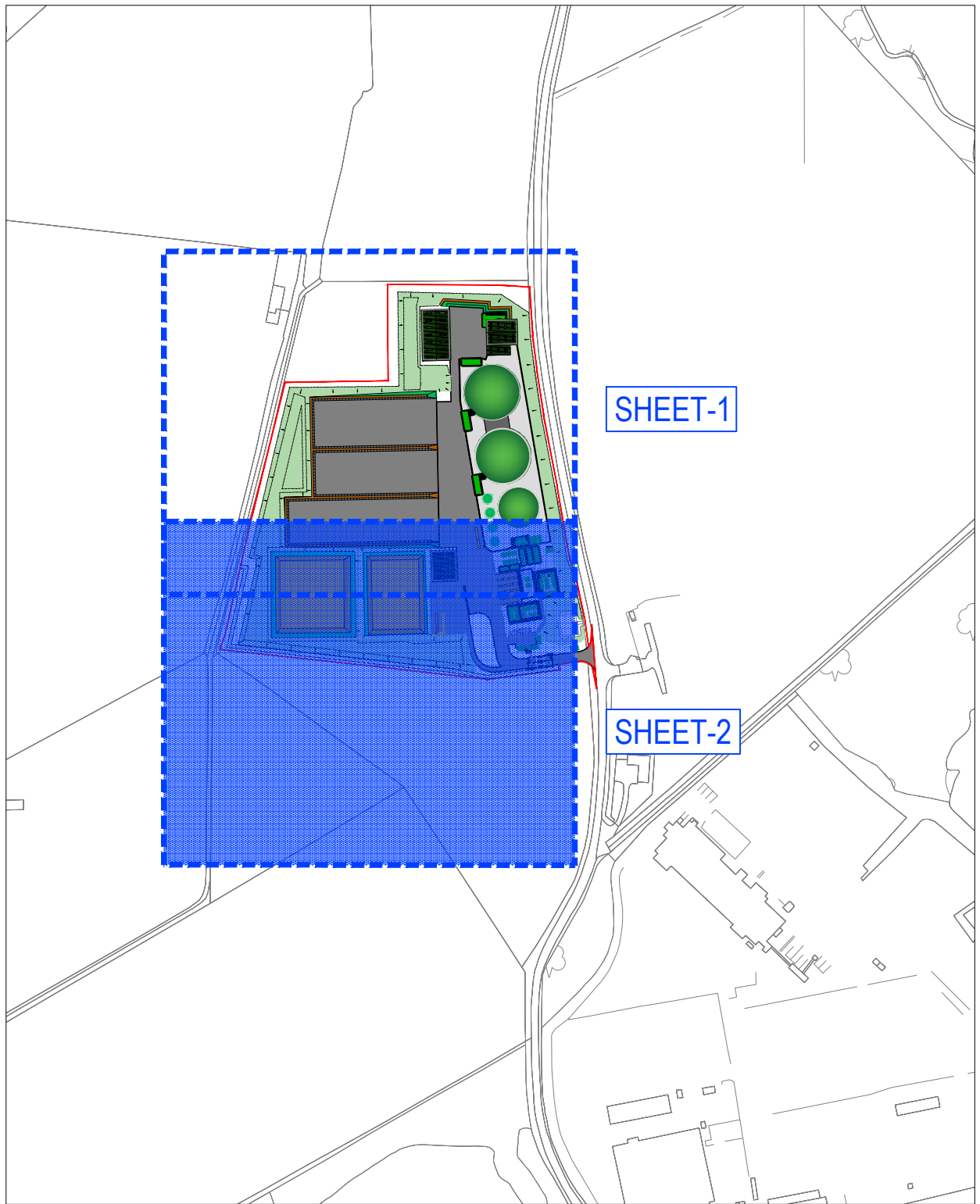
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Job Title
AD Plant.
Ashton Keynes

Drawing Title
Site Layout Plan
Sheet 1 of 2

Status	Planning		
Scale	As Noted @ A1	Date	July '24
Drawn By	J. Collins	Checked	JHC
Approved	JHC		
Dwg. No.	29419/P2/101		Rev
		P03	



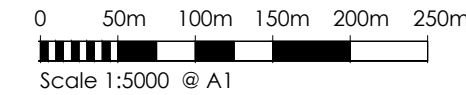
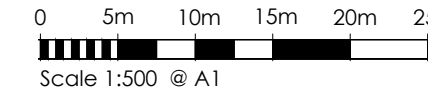
SITE LOCATION PLAN
Scale: 1:5000 @ A1

SITE PLAN
Scale: 1:500 @ A1

NOT FOR CONSTRUCTION

- NOTES:-
1. All dimensions must be checked on site and not scaled from this drawing.
 2. The Contractor shall make a survey of the site and shall be responsible for obtaining all dimensions and levels necessary for the proper fabrication of the structure as indicated.
 3. All levels shown on this drawing are relative to Agreed Topographic survey
 4. This drawing is to be read in conjunction with 29419/100 Series Drawings.
 5. All existing invert levels are to be confirmed by contractor prior to construction. Connection subject to approval.

Site Red Line Boundary (7.06Ha)



P03	11/09/24	ISSUED FOR APPROVAL	ASP	JHC
P02	10/09/24	ISSUED FOR APPROVAL	WP	JHC
P01	07/08/24	ISSUED FOR APPROVAL	JHC	JHC
Rev	Date	Description	DR	CH

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Job Title
AD Plant.
Ashton Keynes

Drawing Title
Site Layout Plan
Sheet 2 of 2

Status	Planning		
Scale	As Noted @ A1	Date	July '24
Drawn By	J. Collins	Checked	JHC
		Approved	JHC

Dwg. No.	29419/P2/101	Rev	P03
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Appendix B Odour Impact Assessment Method

B.1 Odour Impact Assessment Method

Table 30, summarised from IAQM guidance, provides criteria to assist with determining the risk factors for the odour source, pathway and receptor sensitivity.

Table 30 Risk factors for the odour source, pathway and receptor sensitivity

Source Odour Potential	Pathway Effectiveness	Receptor
Factors affecting source odour potential include: • magnitude of odour release • how odorous the compounds are • unpleasantness of the odour	Factors affecting odour transfer to receptor: • distance from source to receptor • frequency (%) of winds from source to receptor or, qualitatively, the direction of receptors • mitigation measures to reduce transfer • effectiveness of dispersion/ dilution in reducing transfer • topography and terrain	Air quality practitioner to apply professional judgement to determine whether a receptor falls into one of the following categories:
Large Source Odour Potential	Highly Effective Pathway	High Sensitivity Receptor
Large-scale, odorous sources, odours unpleasant (-2) to very unpleasant (-4) hedonic tone, process classed as 'Most offensive' in H4 guidance, compounds with low odour thresholds (OTs), open air operation with no mitigation/ control.	Small separation distance/ receptor is adjacent to source, high frequency (%) of winds from source to receptor or, qualitatively, receptors downwind of source with respect to prevailing wind, open processes with low-level releases.	Users expect high level of amenity, people may be present continuously or for extended periods e.g., residences, hospitals, schools, tourist.
Medium Source Odour Potential	Moderately Effective Pathway	Medium Sensitivity Receptor
Medium-scale, moderately odorous compounds, odours with neutral (0) to unpleasant (-2) hedonic tone, process classed as 'Moderately offensive' in H4 guidance, some mitigation in place but significant residual odour.	Receptor is local to the source; releases are elevated where mitigation relies on dispersion but compromised by building effects.	Users expect reasonable level of amenity, not present continuously or for extended periods e.g., places of work, commercial, recreational facilities.
Small Source Odour Potential	Ineffective Pathway	Low Sensitivity Receptor
Small-scale, mildly odorous compounds with high OTs, odours with neutral (0) to very pleasant (+4) hedonic tone, process classed as 'Less offensive' in H4 guidance, effective mitigation in place e.g., BAT, with little/ no residual odour.	Large separation distance/ receptor is remote from source, low frequency (%) of winds from source to receptor or, qualitatively, receptors upwind of source with respect to prevailing wind, where mitigation relies on dispersion, releases are high-level and not compromised by building effects.	Users would not reasonably expect a high-level of amenity, transient exposure/ present for limited periods only e.g., industrial, farms, footpaths and roads.

Source: Adapted from Bull et al (2018). IAQM Guidance on the assessment of odour for planning – version 1.1, Institute of Air Quality Management, London.

Based on the risk factors in Table 30, the source odour potential (accounting for odour control measures at source) is categorised as small, medium or large and the pollutant pathway from source to receptor categorised as ineffective, moderately effective or highly effective. The level of source odour potential risk and pathway effectiveness are then considered together to predict risk of odour exposure (impact) at each receptor location using the matrix in Table 31.

Table 31 Risk of odour exposure (impact) at the receptor location

		Source Odour Potential		
		Small	Medium	Large
Pathway Effectiveness	Highly effective	Low Risk	Medium Risk	High Risk
	Moderately effective	Negligible Risk	Low Risk	Medium Risk
	Ineffective	Negligible Risk	Negligible Risk	Low Risk

Source: Bull et al (2018). IAQM Guidance on the assessment of odour for planning – version 1.1, Institute of Air Quality Management, London.

The next step is to estimate the effect of the odour impact at each receptor location, based on receptor sensitivity using the matrix in Table 32.

Table 32 Likely magnitude of odour effect at the specific receptor location

Risk of Odour Exposure	Receptor Sensitivity		
	Low	Medium	High
High	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible	Negligible Effect	Negligible Effect	Negligible Effect

Source: Bull et al (2018). IAQM Guidance on the assessment of odour for planning – version 1.1, Institute of Air Quality Management, London.

The prediction of the likely odour effect at each sensitive receptor can then be determined.

B.2 Odour Impact Assessment: Source Odour Potential

The scheme evaluated in the 2023 AQIA was risk-assessed following the IAQM (2018) methodology in terms of the potential for odour impact in the locale. Table 33 has been updated to reflect the revised scheme and corresponding source odour potential.

Notwithstanding the design changes that have been implemented that will reduce the potential for odour impact from the operation (Table 17), as a precautionary approach the overall source odour potential for the proposed operation is categorised for assessment purposes as **‘Medium’** (Table 33).

Table 33 Potential odour sources

Process	Odour Source	Nature of emission	Intensity and offensiveness	Frequency and duration	Source Odour Potential (with controls)
Solid feedstock delivery - manure	FYM, poultry litter	FYM and poultry litter covered when transported and delivered into building when doors are closed.	FYM – medium to high intensity and offensiveness, cattle manure odour. Poultry litter - medium to high intensity and offensiveness, (urea/ fish odour).	There will be 2 – 4 deliveries per day of manure, delivered within the Manure Building.	Small: Manures accepted in line with waste acceptance criteria. Delivery vehicles will be covered.
Solid feedstock storage - manure	FYM, poultry litter	Stored within enclosed building with abatement to mitigate emissions.	FYM – medium to high intensity and offensiveness, cattle manure odour. Poultry litter - medium to high intensity and offensiveness, (urea/ fish odour).	Manure Building storage capacity – approximately 6 days' worth of feedstock. Loaded into the process twice daily within the Manure Building.	Medium: storage of manure within an enclosed building that includes an emissions extraction and abatement system so odour potential reduced.
Solid feedstock delivery and storage – crop	Maize and rye silage, crop residue	Negligible odour release during open-air transfer of maize, rye, brought in from farms (via tractor and trailer). Odours from silage/ crop residue material in temporary storage. Silage covered within purpose-built silage clamps. Straw no odour and delivered into purpose-built building for storage.	Crop residues – negligible odour. Low to medium intensity and offensiveness, sweet/ fermented odour. Correct storage conditions off-site should ensure silage product not degraded and/or malodorous. Typically, silage will be stored in covered silage clamps on site. Straw is not odorous.	Intermittent during cutting of open face of silage clamp.	Small: odour potential from open face of silage clamp. Straw negligible odour potential for odour and also stored within building.

Process	Odour Source	Nature of emission	Intensity and offensiveness	Frequency and duration	Source Odour Potential (with controls)
Liquid feedstock delivery and storage	Liquid feedstock (most odorous: cattle slurry)	Tankers discharge liquid feedstock to 4No. process liquid tanks including: 1No. Liquid Feedstock Tank, 1No. Buffer Tank and 2No. 'dirty' water tanks. Inputs may include slurry to the Liquid Feedstock Tank. Inputs (via sealed pipework) to the Liquid Feedstock Tank may include cattle slurry. During filling, displaced air will be released from the tank headspace via a carbon filter outlet.	Cattle slurry – medium to high intensity and offensiveness, cattle manure odour. Liquid feedstocks stored within sealed tanks; the Liquid Feedstock Tank will have a vent fitted with a carbon filter. Liquid feedstocks pumped from tanks to the digesters in a sealed system, therefore no source odour potential within the AD process.	Potential for passive emissions from the Liquid Feedstock Tank via a vent with a carbon filter. Peak emissions during filling of the tank.	Small: on-site source odour potential, mainly during filling
Solids feeder loading/ operation	Silage (in bucket loader and 2No. external solids feeders)	Odour release during transfer of silage to, and within, the feeders.	Agitation and deposition of some materials that are potentially of low to medium intensity and offensiveness.	Intermittent, loading in two phases, takes <4 hours (in total) per day.	Medium: silage is loaded and thereafter contained within the hoppers for gradual transfer into the process within a sealed system.
Solids feeder loading/ operation	Manure (in bucket loader/ walking floor) and 1No. solids feeder within Manure Building)	Odour release during transfer is contained, extracted and treated via the Manure Building emissions abatement system	Agitation and deposition of some materials that are potentially of medium to high intensity and offensiveness.	Intermittent, a front loader will be used to load manure into the hopper inside the odour-controlled building.	Medium: source odour potential as contained and treated by Manure Building extraction and emissions abatement system. Treated emissions released at height (10.2m stack) that will ensure effective emissions dispersal.
Anaerobic digestion	'Raw biogas' and/or whole digestate	Digestion process takes place in sealed, airtight vessels. There are no	Biogas - high intensity and offensiveness, (sweet, sulphurous). Sealed system,	Intermittent and brief release of biogas from PVRVs only, under abnormal	Negligible on-site source odour potential during normal operations.

Process	Odour Source	Nature of emission	Intensity and offensiveness	Frequency and duration	Source Odour Potential (with controls)
		emissions, other than from PVRVs; a safety feature that operate only in (abnormal) over or under-pressure scenarios. PVRV emissions released at height that will ensure effective emissions dispersal.	therefore, no source odour potential at the AD Plant other than abnormal operation of the PVRV (safety devices).	operating conditions. No emission to air during normal operations.	
Digestate separation and storage	Whole digestate within separator	Odours, released from surface of material during separation and temporary storage are contained within building.	Digestate – medium intensity and offensiveness. Agricultural, ‘sharp’/ fermented type odours.	Continuous (daily), however separator will be within an enclosed building.	Medium: intermittent release from building when access is required (during loading of fibre for offtake).
Solid digestate off-take	Separated solid (fibre) digestate	Odours, released when door opened for vehicular access and from agitation of material during vehicle loading.	Solid digestate – medium intensity and offensiveness. Agricultural, ‘sharp’/ fermented type odours.	Separated fibre will be contained within a building. Typically, the fibre will be stored for up to 2 days. Fibre will be loaded into trailers outside the Separator building, one load per day, for a duration of approximately 20 minutes.	Medium: intensity and offensiveness odours, restricted quantities held on-site for limited periods of time (per batch within building).
Liquid digestate storage	Separated liquid digestate (liquor)	Liquid digestate is fully contained the network of sealed pipework for re-use within AD process or stored within one of two digestate lagoons each with engineered covers. During filling displaced air from each lagoon may be released via a carbon filter outlet.	Liquid digestate – medium intensity and offensiveness. Agricultural, ‘sharp’/ fermented type odours.	The lagoon will be intermittently filled during operational hours when the site is staffed. During filling displaced air will be abated via a carbon filter on each lagoon.	Small on-site source odour potential

Process	Odour Source	Nature of emission	Intensity and offensiveness	Frequency and duration	Source Odour Potential (with controls)
Combustion	Combusted biogas	1 No. emergency flare. Emissions released at height that will ensure effective emissions dispersal.	Combusted biogas – very low intensity and offensiveness. The combustion of biogas will destroy any potential odorous compounds.	Flare will be installed as a safety feature only and will be used infrequently (typically between 2% - 8% of the year).	Negligible on-site source odour potential
Combustion	Combusted natural gas	2 No. gas engines. Emissions released at height that will ensure effective emissions dispersal.	Combusted natural gas – negligible to very low intensity and offensiveness. The combustion of natural gas will destroy any potential odorous compounds.	Gas engines - continuous operation, except for maintenance.	Negligible on-site source odour potential
Biogas upgrading	Upgraded/ cleaned biogas ('biomethane'), or 'raw' biogas	1 No. Gas Upgrading Unit will incorporate a PRV for over-pressure situations as a safety feature and when activated there would be an intermittent release of odorous biogas. Emissions from PRVs released at height that will ensure effective emissions dispersal. There should be no odorous emission to air during normal operations.	Biomethane – negligible to very low intensity and offensiveness. 'Raw' biogas – medium to high intensity and offensiveness. Odorous compounds within the biogas, principally H ₂ S, are removed in the desulphurisation process and filters prior to gas upgrading. No source odour potential at the GUU other than very infrequent operation of the PRV (safety devices).	Continuous during normal operating conditions, however the residual 'off-gas' will be principally CO ₂ that is odourless at low concentrations. The proposal includes CO ₂ capture. During abnormal operating conditions there may be a brief, intermittent release of 'raw' biogas from the operation of the GUU PRV(s) only. No emission to air of biogas during normal operations.	Negligible on-site source odour potential during normal operations

B.3 Pathway effectiveness

The site-specific factors considered to determine the pathway effectiveness include distance, direction of receptors relative to the prevailing wind directions and wind speed. The principal odour sources will be open processes with low-level releases. There are no topographical features in the immediate locale that would affect the dispersion of odours, although on-site infrastructure (large tanks, vessels) in addition to the change in levels across the Site will influence localised dispersion.

Table 34 presents directional wind data analysis, derived from Global Forecasting System (GFS) meteorological data for the Proposed Development site for a 5-year period. The data are also represented as windroses in Figure 4. The prevailing wind directions are predominantly from the south southwest, southwest, west southwest and west. The prevalence of winds from these directions means that those receptors that lie broadly to the northeast, of the Proposed Development will be those most frequently ‘downwind’ of the Site.

Table 34 Wind analysis (For location: latitude 51.661, longitude -1.942)

Speed\ Direction	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
<0.3	0.02	0.00	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.22
0.3 - 1.0	0.13	0.16	0.14	0.13	0.14	0.14	0.11	0.13	0.12	0.16	0.16	0.13	0.15	0.23	0.19	0.16	2.40
1.0 - 2.5	1.17	0.95	1.14	1.15	0.91	0.85	0.80	0.85	1.18	1.41	1.65	1.89	1.72	1.65	1.42	1.54	20.3
2.5 - 5.0	2.00	1.74	2.69	2.40	2.08	1.18	1.30	1.91	2.74	3.85	4.67	5.54	4.15	2.44	2.10	2.65	43.5
5.0 - 7.5	0.54	0.66	1.41	1.41	0.64	0.63	0.63	0.93	1.52	2.80	3.54	3.99	2.49	1.28	0.58	0.69	23.7
7.5 - 10.0	0.06	0.09	0.30	0.36	0.13	0.10	0.13	0.30	0.74	1.15	1.10	1.63	0.96	0.31	0.17	0.13	7.67
10.0 - 12.5	0.01	0.01	0.03	0.07	0.00	0.00	0.01	0.05	0.18	0.46	0.35	0.37	0.28	0.06	0.03	0.05	1.95
>12.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.07	0.06	0.01	0.01	0.00	0.01	0.26
Total	3.94	3.61	5.72	5.55	3.93	2.93	2.99	4.18	6.50	9.94	11.6	13.6	9.78	5.99	4.52	5.25	100

Source: A&S Modelling & Data (<https://asmodata.co.uk/>)

The nearest high sensitivity residential receptors to the Proposed Development are approximately 335m southwest of the site boundary, and approximately 400m from the nearest potential on-site odour source. The closest recreational facility (a sailing club) is located approximately 305m to the east southeast of the Site, and 420m from the nearest on-site odour source. An existing network of public footpaths are within close proximity of the Site, the closest of which is 100m to the southeast. Low wind speeds are those which represent the greatest risk of poor odour dispersion.

Table 35 presents the estimation of pathway effectiveness, that considers the distance between the nearest on-site odour source and the receptor together with the directional frequency of winds.

The Pathway Effectiveness is determined to be ‘ineffective’ for all receptors considered, with the exception of a ‘moderately effective’ pathway to receptors H15 Aggregate Industries, locations H22, H23, H24 selected as representative of footpaths to the northwest, south and east of the Site respectively and H25, representative of the automated telephone exchange to the southeast of the Site entrance.

Table 35 Estimation of pathway effectiveness

ID	Description	Nearest potential odour source	Approx. distance from odour source	Receptor bearing from source	Approx. % of time winds from source to receptor	Pathway effectiveness
H1	Residential	Lagoon 1 (outlet)	420	SW	5.7	Moderately effective
H2	Residential	Emissions abatement stack*	400	N	6.5	Moderately effective
H3	Residential (Town)	Emissions abatement stack	600	ENE	14	Moderately effective
H4	Residential	Lagoon 1 outlet	765	SSW	3.6	Ineffective
H5	Residential	Emissions abatement stack	840	N	6.5	Ineffective
H6	Residential	Offtake	990	S	3.9	Ineffective
H7	Recreation	Emissions abatement stack	550	NNE	9.9	Moderately effective
H8	Leisure	Reception tank outlet	420	ESE	6.0	Ineffective
H9	Leisure	Offtake	420	S	3.9	Ineffective
H10	Leisure	OCU stack	660	N	6.5	Ineffective
H11	Leisure	Clamp 1	705	NW	3.0	Ineffective
H12	Leisure	Reception tank outlet	1,005	ESE	6.0	Ineffective
H13	Leisure	Clamp 3	990	W	3.9	Ineffective
H14	Leisure	Reception tank outlet	1,060	E	9.8	Ineffective
H15	Industrial	Offtake	255	SE	4.5	Moderately effective
H16	Industrial	Clamp	530	WNW	2.9	Ineffective
H17	Industrial	Emissions abatement stack	960	NNW	4.2	Ineffective
H18	Commercial / Industrial	Emissions abatement stack	575	E	9.8	Ineffective
H19	Commercial	Emissions abatement stack	510	N	6.5	Ineffective
H20	Commercial	Emissions abatement stack	610	N	6.5	Ineffective
H21	Allotments	Emissions abatement stack	630	NNE	9.9	Ineffective
H22	Footpath	Offtake	235	SE	4.5	Moderately effective
H23	Footpath	Emissions abatement stack	205	NE	6.5	Moderately effective
H24	Footpath	Clamp	360	W	3.9	Moderately effective

ID	Description	Nearest potential odour source	Approx. distance from odour source	Receptor bearing from source	Approx. % of time winds from source to receptor	Pathway effectiveness
H25	Industrial	Offtake	175	SE	4.5	Moderately effective
H7a	Primary School	OCU stack	577	NE	12	Moderately effective
H7b	Residential	OCU stack	714	NE	12	Moderately effective
H1a	Residential	Lagoon 1 (outlet)	595	SW	5.7	Ineffective
H6a	Primary School	Offtake	1,920	SSE	5.2	Ineffective
H6b	Residential	Offtake	1,835	SE	4.5	Ineffective
H26	Residential	Lagoon 1 (outlet)	2,050	SW	5.7	Ineffective
H27	Residential	Clamp	1,465	NNW	2.9	Ineffective
H28	Quarry	Offtake	2,935	SSE	5.2	Ineffective
Notes: * Manure Reception Building emissions abatement stack						

B.4 Receptors

Risk of odour exposure (impact)

The risk assessment matrices in Appendix B have been used to establish that, in accordance with the conclusions of the 2023 AQIA, the odour exposure risk as a result of the proposed operations at the AD plant, is considered to be 'Negligible' at all locations, with the exception of a 'Low Risk' of odour exposure at receptor H15 Aggregate Industries, receptor locations H22, H23, H24 that represent footpaths to the northwest, south and east of the Site respectively and H25, representative of the automated telephone exchange to the southeast of the Site entrance.

Determination of likely odour effect of the Proposed Development

The adopted approach is based on a qualitative risk assessment technique, that follows IAQM (2018) guidance for assessing odour impact for planning.

Following this approach, the overall source odour potential for the AD Plant was determined to be 'Medium'. For the evaluation of pathway effectiveness, a key determining factor was the separation distances between potential odour sources and 'high sensitivity' receptors in the locale who may have relevant amenity concerns, or due to the low sensitivity of those nearest to the Proposed Development.

In accordance with the matrices provided in Appendix B, the estimated odour effect (impact) of the Proposed Development has been determined for all receptor locations (Table 18). As shown the potential impact is determined to be 'Negligible' at all locations. Overall, the potential odour

impact associated with the operation of the development are therefore considered to be ‘not significant’. The proposed changes to the scheme do not affect the conclusions of the 2023 AQIA.

Appendix C Model and Model Set-up

C.1 ADMS 6

The dispersion model originally used to predict ambient concentrations due to the emissions from the operation was ADMS 5 (version 5.2.2). The revaluation presented herein has used the latest version available - ADMS 6 (version 6.0.0.1). A comparison of both versions suggests that there are small-to-moderate differences in predicted concentrations, with ADMS 6 usually performing slightly better at higher concentration ranges, though both versions give broadly similar results across various sites and scenarios.^{31,32,33}

The model requires as input: data on the source of emissions and the mass emission rates of each pollutant, meteorological data and associated parameters, buildings data, terrain data, and receptor locations. An updated capability in ADMS version 6.0.01 enables the model to automatically identify and allocate the most appropriate building for each emission source.

Full details of the meteorological, buildings and receptor data and assumptions used to calculate emissions from the sources are described within Appendix C.

C.2 Sources and emissions

Table 36, Table 37 and Table 38 list the assumptions made in order to calculate emissions from the modelled sources (Section 4.5.4). Figure 4 shows the sources of emissions modelled.

The feedstocks have a calculated overall nitrogen (N) content of 8.1 kgN/tonne fresh feedstock.

Table 36 Combustion point source emissions: assumptions

Source	Assumptions
CHP1, CHP2	Each CHP is a pair of 1,200kWe engines. NO _x < 500mg/Nm ³ ; exhaust 150°C; 7,949 Nm ³ /h exhaust flow (wet); 3,752Nm ³ /h exhaust flow (dry). each stack 8.7m, 0.4m diameter. Assume 2% of the TVOC is benzene, Section C.5.3.
Emergency Flare	Flare can burn up to 3,000m ³ /h of biogas. Flue gases assumed to be 1,000°C. Volume flow rate calculated from first principles calculations assuming 200% excess air at input. ELVs taken from EA Guidance for monitoring enclosed landfill gas flares. ¹² Assume 5% of the TVOC is benzene, Section C.5.3.

³¹ Cambridge Environmental Research Consultants (CERC) (April 2023) ADMS 6 Buildings Validation AGA Experiments (www.cerc.co.uk/environmental-software/assets/data/doc_validation/CERC_ADMS6_Study_Validation_AGA_5_2_vs_6_0.pdf)

³² Cambridge Environmental Research Consultants (CERC) (April 2023) ADMS 6 Buildings and Complex Terrain Validation (https://www.cerc.co.uk/environmental-software/assets/data/doc_validation/CERC_ADMS6_Study_Validation_MartinsCreek_5_2_vs_6_0.pdf)

³³ Cambridge Environmental Research Consultants (CERC) (April 2023) ADMS 6 Buildings and Flat Terrain Validation (https://www.cerc.co.uk/environmental-software/assets/data/doc_validation/CERC_ADMS6_Study_Validation_Kincaid_Indianapolis_PrairieGrass_5_2_vs_6_0.pdf)

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Emergency Boiler	Veissmann Vitoplex 200, firing on biogas. From specification: 761 kg/h exhaust mass; exhaust diameter 0.25m. From monitoring of a similar boiler at a different location: 4.3% O₂ ELVs for SO₂ and NO_x are the MCP Directive values for new plant.
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Table 37 Other point source emissions: assumptions

Source	Assumptions
Reception Building Abatement Stack	Building volume: 19,080m³. Assume 3 acph. Exhaust at 22.5°C. Assumed diameter: 0.7m Assume exhaust concentrations are 1,000ouE/m³, the upper limit of BAT³⁴ and 0.25ppm (0.177mg/m³ at 22.5°C) of NH₃. The infrastructure supplier expects 95% reduction of NH₃ and a concentration at the inlet of <5ppm.
Offtake Carbon Filter	The emission rate of NH₃ has been calculated based on the nitrogen content of fresh matter in the feedstock (8.1kg total N/tonne) derived from the feedstocks and an emission factor for digested material of 0.0266kg NH₃/kg N from EMEP/EEA²⁵ following the EMEP procedure. Liquid digestate will be removed by 2,503 slurry tankers (27m³). It was assumed a 27m³ tanker was half full (to calculate emissions of NH₃); filling each tanker is assumed to take 20 minutes and the emissions have been averaged over 1-hour, the time resolution of the meteorological data. Odour emissions have been calculated assuming a concentration of 10,000ouE/m³ before mitigation.³⁵ The carbon filter was assumed to reduce odour and NH₃ emissions by 80%; assumed stack diameter of 0.15m. Export of the liquid digestate has been assumed to occur 10 hours/day, 5 days per week, and 5 hours per day (Saturdays). Zero emissions are assumed outside working hours. A .fac file was used to model the time varying emissions.
1No. Underground Leachate Tank	The Leachate Tank (34m³) will be fitted with a vent that will enable the release of displaced air during filling. The tank will provide storage for run-off from the silage clamps apron including the clamp covers, and run-off from areas including the feeders, and waste and digestate handling areas. The emission rate of NH₃ was calculated on the basis of 375m³ of liquid feedstock (allowing for tank freeboard), liquid feedstock inputs (8.1 kgN/tonne) adjusted for an emission factor for feedstock inputs of 0.0009kg NH₃/kg N from EMEP/EEA.²⁵ Emissions were factored to account for 50% reduction due to dilution of leachate stored and 90% due to containment within the underground tank. An odour emission rate of 10,000ouE/m³ for undiluted leachate was assumed³⁵ and this was reduced to 500ouE/m³ due to the assumed dilution. A velocity of 0.01m/s was assumed in order to calculate an odour emission rate from the point source.
1No. Liquid Feedstock Tank	The Liquid Feedstock Tank (400m³) will be fitted with a vent that will enable the release of displaced air during filling.

³⁴ European Monitoring and Evaluation Programme and European Environment Agency (EMEP/EEA) (2023) Air pollutant emission inventory guidebook 2023 Emissions Guidebook, NFR 5.B.2, Biological treatment of waste – anaerobic digestion at biogas facilities. (<https://www.eea.europa.eu/publications/emep-eea-guidebook-2023>)

³⁵ A S Modelling & Data (2017) A Dispersion Modelling Study of the Impact of Odour from the Proposed Biofertilizer Storage Lagoon at land west of Hangman Stone Lane, near High Melton in South Yorkshire.

Source	Assumptions
	The emission rate of NH₃ was calculated on the basis of 375m³ of liquid feedstock (allowing for tank freeboard), liquid feedstock inputs (4.2 kgN/tonne) adjusted for an emission factor for feedstock inputs of 0.0009kg NH₃/kg N from EMEP/EEA.²⁵ A 90% reduction in emissions was applied due to containment within the tank, with a further reduction of 80% in emissions through a carbon filter. An odour emission rate of 10,000ouE/m³ for the liquid feedstock was assumed⁴⁶ and this was reduced to 200ouE/m³ due to the assumed emissions reductions. A velocity of 2.0m/s was assumed in order to calculate an odour emission rate from the point source.
1No. Buffer Tank	The Buffer Tank will hold leachate, dirty water (run-off from the containment areas) and/or clean water (from the Clean Water Lagoon). The contents were modelled as 75% clean water and 25% as leachate. The emission rate of NH₃ was calculated based on 375m³ of liquid feedstock (allowing for tank freeboard), liquid feedstock inputs (8.1 kgN/tonne) adjusted for an emission factor for feedstock inputs of 0.0009kg NH₃/kg N from EMEP/EEA.²⁵ An odour emission rate of 10,000ouE/m³ was assumed³⁵ and this was reduced to 125ouE/m³ due to the assumed dilution. A velocity of 0.01m/s was assumed in order to calculate an odour emission rate from the point source.
2No. Dirty Water Tanks	The Dirty Water Tanks (400m³ each) will hold mainly clean water from the Clean Water ('Compensation' Lagoon). The contents were modelled as 95% clean water and 5% as leachate. The emission rate of NH₃ was calculated on the basis of 375m³ of liquid feedstock (allowing for tank freeboard), liquid feedstock inputs (8.1 kgN/tonne) adjusted for an emission factor for feedstock inputs of 0.0009kg NH₃/kg N from EMEP/EEA.²⁵ An odour emission rate of 10,000ouE/m³ for undiluted leachate was assumed³⁵ and this was reduced to 50ouE/m³ due to the assumed dilution. A velocity of 0.01m/s was assumed to calculate an odour emission rate from the point source.

Table 38 Volume sources: Clamps, Feed Hoppers, Digestate Lagoons, Dirty Water Lagoon

Source	Assumptions
Working Face of Clamp	27,000 TPA of silage will be processed, equivalent to 74TPD or 99m³/day assuming a density of 0.75t/m³ for compacted silage. The height of the clamp walls is 3.5m, and the surcharge height of the clamps is approximately 1.5m; assumed 30% of the working face will be worked at a time, giving a daily volume of approximately 153m³ (31m x 5m x 1m). Emissions of odour have been calculated assuming a rate of 20ouE/m²/s from the vertical face (153m²).³⁶ The emissions from the working face of the clamps have been assumed to occur equally across the whole surcharge volume of the clamps, as the working face will vary in location throughout the year.
2No. Feed Hoppers	The hoppers will (each) receive a total of 37TPD of silage feedstock per day. Each Feed Hopper volume is 120m³ and the surface area is 2.782m x 11.25m = 31.3m².

³⁶ Redmore Environmental, Odour Assessment, Herriard Anaerobic Digestion Plant, Herriard, Reference: 2256-4r1, 16th December 2021

Source	Assumptions
	An odour emission rate of 50ouE/m²/s from the surface area has been assumed (increased from 20ouE/m²/s)³⁶ to account for agitation of the material (compared with emissions from the working face of the clamp) in the feed hoppers. The dimensions given in Table 5 are those of the volume source modelled in the dispersion model: a 0.5m deep cuboid at the top of the feed hopper i.e. where emissions occur.
Separator	55,283 TPA of solid digestate will be produced per year, equivalent to 151TPD. It is assumed that up to two days' worth of production (303 tonnes or 576m³ assuming a density of 0.5256 kg/m³) may be stored within the Separator Building at any one time. The dimensions of digestate pile as a rectangle were modelled as: 20m, 13.55m, 2.13m. An NH₃ emission rate was calculated based on 8.1kg total N/t of fibre digestate and an emission factor for digested material of 0.0266kg NH₃/kg N from EMEP/EEA.²⁵ An odour emission rate of 2.8ouE/m²/s from the surface area has been assumed, applied based on similar assessment by Odournet UK Ltd, October 2013 based on the exposed top and front size of the pile (314m²). A time varying emissions profile used within the model: a reduction factor of 0.3 was used for a 7-hour period each day, 7 days per week, to account for the impact of opening of the separator building door to allow for loading (duration approximately 20 minutes per hour), otherwise a reduction factor of 0.1 was used to account for residual emission when the Separator Building door is closed.
2No. Digestate Lagoons	The engineered cover was assumed to give a 90% reduction in emissions, as given in the SCAIL supporting document,³⁷ and a further 80% reduction in emissions through the carbon filter fitted to the vent on each lagoon. The emission rate of NH₃ was calculated as per that for the Offtake Carbon Filter, on the basis of 8,000 tonnes of liquid digestate in each lagoon. An odour emission rate of 10,000ouE/m³ before abatement by the cover was assumed.³⁵ A volume flow rate of 250m³/h was assumed in order to calculate an odour emission rate from each point source.

C.3 Meteorology and associated parameters

Hourly meteorological data

Computer modelling of dispersion requires hourly sequential meteorological data and to provide robust statistics, the record should be of a suitable length; preferably four years or longer. The meteorological data used in this study are obtained from assimilation and short-term forecast fields of the Numerical Weather Prediction (NWP) system known as the Global Forecast System (GFS),³⁸ for 2017-2021 inclusive for the vicinity of the Site. Figure 4 shows the windroses for the meteorological data supplied.

The prevailing wind directions are predominantly from the south southwest, southwest, west southwest and west. The data were used with the dispersion model's calms option with default values. Table 39 shows the number of lines of usable data each year with and without calms

³⁷ Sniffer (2014) SCAIL-Agriculture Update, Sniffer ER26: Final Report, March / 2014, Available at <https://www.scail.ceh.ac.uk/cgi-bin/agriculture/input.pl>, [Accessed May 2025]

³⁸ The GFS data used is derived from the high resolution operational GFS datasets, the data are not obtained from the lower resolution (0.5 degree) long-term archive.

option. Defra's LAQM TG22³⁹ contains cautionary guidance on use of data with less than 85% usable data in calculating for comparison with short-term AQS. The minimum values of usable data were far above this threshold.

Table 39 Meteorological station data and parameters

Year of data	Number of hours with calm conditions (modelled as calm)	Number of hours with inadequate data (excluding calms)	Hours used without calms option (%)	Hours used with calms option (%)
2017	5	0	99.94	100%
2018	10	0	99.89	100%
2019	9	0	99.90	100%
2020	12	0	99.86	100%
2021	7	0	99.92	100%

Notes: ¹Parameters are: wind speed, wind direction, near-ground air temperature, cloud cover

Meteorological parameters

The ADMS model uses various meteorological parameters to represent the area at the meteorological station and the location of the Site. The key parameters that have been defined are the surface roughness and minimum Monin-Obuhkov length which are defined at the site of the meteorological data measurement and the dispersion site (the Wider Site).

- Surface roughness: this is related to land-use and the height of obstacles on the ground which give rise to mechanically-generated turbulence; and
- Minimum Monin-Obuhkov length: this is used to model the extent to which the urban heat island effect limits the most stable atmospheric conditions. Heat released from the urban area prevents the atmospheric boundary layer becoming very stable.

Table 40 shows the values of the parameters that can be selected in the model from a drop-down menu. Other, intermediate, values can be entered directly. The values selected for the meteorological data site and the Wider Site are given in Table 41.

Table 40 ADMS 5 meteorological parameter values

Surface roughness		Minimum Monin-Obuhkov length	
Descriptor	Value (m)	Descriptor	Value (m)
Large urban areas	1.5	Large conurbations >1million	100m
Cities, woodland	1.0	Cities and large towns	30m
Parkland, open suburbia	0.5	Mixed urban/industrial	30m
Agricultural areas (max)	0.3	Rural areas (max) ¹	20m
Agricultural areas (min)	0.2	Small towns < 50,000	10m
Root crops	0.1	Rural areas (min) ¹	2m
Open grassland	0.02		
Short grass	0.005		
Sea	0.0001		

Notes: ¹ Not available from the ADMS drop-down menu

³⁹ Department for Environment, Food & Rural Affairs and the Devolved Authorities, Local Air Quality Management Technical Guidance (TG22), August 2022.

Table 41 Meteorological site and wide Site met parameters

Parameter	Meteorological data site	Wider Site
Surface roughness	0.2m	0.3m
Minimum Monin-Obukhov length	2m	2m

The dispersion model sets a higher value of minimum turbulence when modelling terrain, therefore, a value of 0.01m/s was set in the additional input file (.aai) so that the value used when modelling terrain would be the same as that calculated by the model for flat terrain as a function of Monin-Obukhov length (ADMS 6 User Guide, Section 4.15.3).

C.2 Buildings

In ADMS, for each stack a ‘main’ building must be specified; for each source the nearest building was specified as the main buildings. Table 42 shows the buildings modelled.

The presence of buildings close to an emission point can affect the dispersion from a source, bringing the plume centreline down towards the ground in the lee of a building and entraining pollutant into the cavity (or, recirculation) region in the lee of a building. In the cavity, concentrations are assumed to be uniform and it may be a region of high concentrations depending on the amount of pollutant entrained. The presence of buildings may increase or decrease concentrations at a location compared with the no buildings scenario.

ADMS allows up to 25 buildings to be included as input and the model combines the relevant input buildings into one effective building; the effective building is calculated for each line of meteorological data. Buildings can only be circular or rectangular in cross-section so the buildings entered are simplified geometries. Buildings less than one third of the height of the stack will be ignored by the ADMS model. Smaller Site structures such as the CHP containers, have not been as their effect outside the Site will be limited compared with the larger digester structures.

Table 42 shows the (simplified) parameters of the buildings on site used as input to the model. For each stack a ‘main’ building must be specified; ADMS version 6.0.0.1 enables the user to allow the model to select the ‘main’ building that may influence emissions sources and this option has been used.

Table 42 Modelled buildings

Building name	Building centre X	Building centre Y	Height (m)	Length/ Diameter (m)	Width (m)	Orientation (°)
Separator Building	404008	196064	8.39*	27.10	20.00	177.85
Clamp 2	403953	196142	5.00	101.25	35.00	89.50
Clamp 3	403943	196101	5.00	123.75	35.00	89.79
Primary Digester 1	404048	196207	9.00	45.00	45.00	0.00
Primary Digester 2	404057	196155	9.00	45.00	45.00	0.00
Post Digester	404071	196112	12.75*	34.00	34.00	0.00
Dirty Water Tank 1	404045	196119	8.00	8.00	10.00	0.00
Dirty Water Tank 2	404047	196107	8.00	8.00	10.00	0.00
Buffer Tank	404049	196095	8.00	8.00	10.00	0.00
Reception Tank	404051	196083	8.00	8.00	10.00	0.00

Manure Process Build 1	404055	196257	8.64*	26.00	21.00	88.91
Straw Process Building	404003	196255	8.60*	42.50	22.90	358.41
Clamp 1	403952	196181	5.00	101.25	35.00	88.94
Manure Process Build 2	404052	196242	6.50*	20.00	8.30	89.44
Notes: Buildings with circular cross-section, such as the digesters, do not have a width and orientation specified. *Adjusted roof mid-height						

C.3 Terrain

Table 43 details the terrain domain and resolution. The effect of terrain is not usually modelled when terrain gradients in the modelled domain are below the 1:10 threshold usually applied. However, when using numerical weather data it is recommended to consider the dispersion model predictions with and without terrain.

Table 43 Terrain domain and resolution

	Minimum	Maximum	Resolution (m)
X	392003	184174	255
Y	416003	208174	255
Z	59.8	250.9	n/a

Local changes in ground level

There will be changes in ground level across the site and in the Flat terrain and Buildings model scenarios (section 4.2) source and building heights were modified to account for changes in ground level. In the Terrain (hills) model scenario such an adjustment is not required as the dispersion model accounts for changes in terrain height.

Based on the proposed site levels, a datum was established as the base of the bund containing the Digester Tanks, and adjustment made to buildings and emission sources in accordance with that datum. Table 44 shows the base elevation, unadjusted and adjusted height of each source and building.

Table 44 Actual and modified stack and building heights

Building, stack or volume source	Name	AOD of base (m)	Unadjusted height (m) (a)	Adjusted height (m)
Building	Separator Building	95.03	8.39	10.9
Building	Clamp 1	95.55	5.00	8.05
Building	Clamp 2	95.55	5.00	8.05
Building	Clamp 3	95.50	5.00	8.00
Building	Primary Digester 1	92.50	9.00	9.00
Building	Primary Digester 2	92.50	9.00	9.00
Building	Post Digester	92.50	12.75	12.8
Building	Dirty Water Tank 1	92.50	8.00	8.00
Building	Dirty Water Tank 2	92.50	8.00	8.00
Building	Buffer Tank	92.50	8.00	8.00
Building	Reception Tank	92.50	8.00	8.00
Building	Manure Process Build 1	93.00	8.64	9.14
Building	Manure Process Build 2	93.00	6.50	7.00
Building	Straw Process Building	93.50	8.60	9.60
Stack	CHP 1 (BG)	93.50	8.70	9.70

Building, stack or volume source	Name	AOD of base (m)	Unadjusted height (m) (a)	Adjusted height (m)
Stack	CHP 2 (NG)	93.50	8.70	9.70
Stack	Flare	93.50	10.51	11.5
Stack	Boiler	93.50	7.00	7.50
Stack	OCU Abatement plant	93.00	10.2	10.7
Stack	Ugrd leachate tank	94.60	0.10	2.20
Stack	Lagoon 1 CF	98.00	2.00	7.50
Stack	Lagoon 2 CF	98.00	2.00	7.50
Stack	4No. Tanks vents	92.50	8.10	8.10
Stack	Dirty Water Tank 1	92.50	8.00	8.00
Stack	Dirty Water Tank 2	92.50	8.00	8.00
Stack	Buffer Tank	92.50	8.00	8.00
Stack	Reception Tank	92.50	8.00	8.00
Stack	Offtake	95.73	2.00	5.22
Volume source	Separator	95.03	2.13*	4.65**
Volume source	Hopper 2	92.50	3.00*	3.00**
Volume source	Hopper 3	92.50	3.00*	3.00**
Volume source	Clamp 1	95.55	4.25*	7.30**
Volume source	Clamp 2	95.55	4.25*	7.30**
	Minimum	92.50		
Notes: * Volume mid-height ** Adjusted volume mid-height				

C.4 Receptors

The impact of stack emissions at relevant human and ecological receptors has been modelled. A relevant receptor is defined in Defra's LAQM TG22 as:

'A location representative of human (or ecological) exposure to a pollutant, over a time period relevant to the objective that is being assessed against, where the Air Quality Strategy objectives are considered to apply.'

Human receptors

For long-term AQS the relevant receptors are residences (including care homes), schools and hospitals. For short-term AQS additional receptors may also need to be considered: outdoor spaces such as balconies, gardens, leisure sites and public space where human populations may spend the relevant time period. As most short-term AQS allow for a number of exceedances per annum, the human exposure may need to be repeated in order to be relevant. Workplaces are usually excluded from consideration as air quality in workplaces is covered by Health and Safety legislation.⁴⁰

⁴⁰ Health and Safety Executive EH40/2005 Workplace Exposure Limits (Fourth Edition 2020)

Table 45 shows the locations and type of the receptors selected to be representative of the relevant human receptors. All the receptors have been modelled at a height of 1.5m, representative of inhalation height (nose level) at ground level. Their locations are shown in Figure 6.

Table 45 Human receptors

ID	Location	Type	NGR X	NGR Y	Approx. distance from Site boundary (m)	Direction from Site
H1	Cotswold Community (residential cluster)	Residential	403543	195832	335	SW
H2	<10 residential properties	Residential	404026	196674	343	N
H3	South Cerney (Town)	Residential	404612	196476	555	ENE
H4	Residential Property	Residential	403689	195285	734	SSW
H5	Cross Roads Farm	Residential	404007	197106	799	N
H6	<10 residential properties along B4696	Residential	404264	195051	931	S
H7	Recreation fields	Primary School	404257	196779	504	NNE
H8	Whitefriars Sailing Club	Leisure	404442	195928	305	ESE
H9	Lake 62 LPS Events (Watersports)	Leisure	404018	195591	392	S
H10	Bike Track	Leisure	404078	196933	626	N
H11	Bird hide	Leisure	403444	196740	676	NW
H12	Hoburne Cotswold Holiday Park	Leisure	405046	195917	907	ESE
H13	Children's climbing frames etc / playground	Leisure	402900	195944	932	W
H14	South Cerney Angling Club	Leisure	405102	196215	984	E
H15	Aggregate Industries	Industrial	404236	195900	120	SE
H16	Sand and Gravel works	Industrial	403419	196414	501	WNW
H17	Cirencester WwTW	Industrial	403448	197038	898	NNW
H18	Industrial / Trading Estate	Commercial / Industrial	404621	196245	526	E
H19	3No. commercial units	Commercial	404114	196781	477	N
H20	Storage yard	Commercial	403973	196887	580	N
H21	Allotments Gardens	Allotments	404368	196813	582	NNE
H22	Footpath	Footpath	404222	195913	101	SE
H23	Footpath	Footpath	404103	196467	163	N
H24	Footpath	Footpath	403560	196305	333	W
H25	Telephone Exchange	Industrial	404160	195922	80	SE
H7a	Ann Edwards CoE Primary School/ South Cerney Pre-School	Primary Sch	404434	196699	536	NE
H7b	Dwellings, Berkeley Close, South Cerney	Residential	404637	196677	672	NE
H1a	Cotswold Community (residential cluster)	Residential	403647	195488	537	SW
H6a	Ashton Keynes CoE Primary School	Primary Sch	404408	194136	1,863	SSE
H6b	Back Street, Ashton Keynes	Residential	404795	194356	1,752	SE
H26	Somerford Keynes	Residential	402070	195141	1,951	SW
H27	Glebe Farm, Shorncote	Residential	402525	196670	1,425	NW
H28	Wheatleys Farm Quarry	Industrial	404975	193226	2,878	SSE

Notes: All modelled at a height of 1.5m.

Ecological receptors

The Defra/EA guidance¹⁵ specifies that SACs, SPAs and Ramsar site within 10 km should be considered and SSSIs, AWs, LWSs, Local Nature Reserves and National Nature Reserves within 2 km should also be considered.

Ecological receptors were placed in the designated areas at the nearest locations to the Site. Table 46 shows conservation sites identified within the specified distance, (2km for SSSIs, AW, LWS, NNR, LNR and 10km for SPAs, SACs) which have been modelled. In addition, SSSIs between 2km and 10km from the Site have been considered. All the ecological receptors have been modelled at a height of 1.5m. The ecological receptors are illustrated in Figure 7 and Figure 8.

Table 46 Ecological receptors

ID	Site name	Designation	NGR X	NGR Y	Approx. distance from boundary (m)
E1	Cotswold Water Park (SSSI) 1	SSSI	406003	196823	1,988
E1a	Cotswold Water Park (SSSI) 1a	SSSI	404018	195591	392
E1b	Cotswold Water Park (SSSI) 1b	SSSI	404442	195928	305
E1c	Cotswold Water Park (SSSI) 1c	SSSI	404621	196245	526
E1d	Cotswold Water Park (SSSI) 1d	SSSI	405102	196215	984
E1e	Cotswold Water Park (SSSI) 1e	SSSI	403560	196305	333
E1f	Cotswold Water Park (SSSI) 1f	SSSI	403419	196414	501
E1g	Cotswold Water Park (SSSI) 1g	SSSI	403444	196740	676
E1h	Cotswold Water Park (SSSI) 1h	SSSI	405046	195917	907
E1i	Cotswold Water Park (SSSI) 1i	SSSI	404264	195051	931
E2	Cotswold Water Park (SSSI) 2	SSSI	407065	196670	2,998
E3	Cotswold Water Park (SSSI) 3	SSSI	403015	193996	2,169
E4	Cotswold Water Park (SSSI) 4	SSSI	401680	194373	2,699
E5	Cotswold Water Park (SSSI) 5	SSSI	401253	194919	2,796
E6	Wildmoorway Meadows SSSI	SSSI	406213	197288	2,345
E7	Upper Waterhay Meadow SSSI	SSSI	406726	193802	3,376
E8	Acres Farm Meadow SSSI	SSSI	402529	192813	3,448
E9	Elmlea Meadows SSSI	SSSI	407686	194870	3,713
E10	Kemble Railway Cuttings SSSI	SSSI	398600	197163	5,356
E11	Stoke Common Meadows SSSI	SSSI	406293	190521	5,862
E12	Distillery Farm Meadows SSSI	SSSI	403231	189947	6,088
E13	Emmett Hill Meadows SSSI	SSSI	401041	190298	6,353
E14	Cloatley Farm SSSI	SSSI	399905	190807	6,514
E15	Cloatley Manor Farm Meadows SSSI	SSSI	398070	191482	7,324
E16	Ravensroost Wood SSSI	SSSI	402535	188732	7,388
E17	Barnsley Warren SSSI	SSSI	405688	205304	9,141
E18	Restrop Farm & Brockhurst Wood SSSI	SSSI	407250	187215	9,294
E19	Pike Corner SSSI LWS	SSSI LWS	403748	193600	2,400
E20	North Meadow and Clattinger Farm SAC, North Meadow Cricklade SSSI, North Meadow Cricklade NNR	SAC SSSI NNR	408670	194922	4,650

ID	Site name	Designation	NGR X	NGR Y	Approx. distance from boundary (m)
E21	North Meadow & Clattinger Farm SAC, Clattinger Farm SSSI	SAC SSSI	401709	193810	3,052
E22	North Meadow & Clattinger Farm SAC, Clattinger Farm SSSI	SAC SSSI	401167	193282	3,809
E23	North Meadow and Clattinger Farm SAC, North Meadow Cricklade SSSI, North Meadow Cricklade NNR	SAC SSSI NNR	409423	194570	5,466
E24	Cokes Pit LNR Lake 34 LWS (1)	LNR	402654	195522	1,271
E25	Cokes Pit LNR Lake 34 LWS (2)	LNR	402743	195200	1,353
E26	LWS (CWP lake Pit 26), Priority Habitat	LWS PH	404297	195960	156
E27	LWS (CWP lake Pit 26), Priority Habitat	LWS PH	404380	196032	243
E28	LWS (CWP lake Pits 28, 28a, 29, 30, 35, 38)	LWS	403899	194697	1,293
E29	Cotswold Water Park LWS Lakes 84 and 85 Shorncote Reedbed LWS;	LWS	403891	196896	594
E30	River Churn LWS	LWS	404499	197220	1,005
E31	South Cerney Railway Cutting	LWS RIGS	404498	198013	1,757
E32	Shorncote Quarry RIGS	LWS RIGS	402847	196939	1,258
E33	Siddington Copse	AW	404090	199375	3,068`
Notes: LWS = Local Wildlife Site; SAC = Special Area of Conservation; SSSI – Special Site of Scientific Interest; NNR = National Nature Reserve; LNR= Local Nature Reserve; RIGS = Regionally Important Geological Site; PH = Priority Habitat. n/a: note applicable.					

C.5 Post-processing

Use of background data

Considering long-term AQAL, it is a straightforward matter to add the annual mean contribution from the source, (annual mean PC) to the annual mean background concentration to predict the total concentration (annual mean PEC).

For comparison with short-term AQS the addition of background is not so straightforward. The dispersion model allows for the calculation of percentiles from hourly background and process concentrations, but hourly background concentrations are not commonly available, and not for all pollutants. The approach used was that described in the Defra/EA guidance:

‘When you calculate background concentration, you can assume that the short-term background concentration of a substance is twice its long-term concentration.’

This has been used for all for short-term AQS for averaging times for 15 minutes to 24 hours.

Conversion of NO_x to NO₂

The ADMS model includes a NO_x chemistry model, but the conversion of primary NO_x emissions to NO₂ is usually undertaken as a post-processing step for industrial permitting applications. For primary NO₂ to NO_x ratios of 10% or less, which is likely to be the case for the stack emissions,

the Environment Agency and Natural Resources Wales⁴¹ recommend use of the following conversion ratios:

- 35% for short term assessment
- 70% for long term assessment

These ratios have been used in this assessment.

Conversion of TVOC to benzene

Emissions are specified as TVOC for which there are no AQS. There is an AQS for benzene, one component of TVOC. An AEA Technology report on the Speciation of UK emissions of non-methane volatile organic compounds (2002)⁴² reported on a series of VOC species profiles available for stationary combustion sources, covering a range of both fuel types and scale of combustion. The benzene fraction in industrial and commercial combustion of natural gas was reported to be less than 10% of NMVOC, a subset of TVOC. For flares the NMVOC ELV is usually given as half that of TVOC, so the flare it has been assumed that 5% of the TVOC emission is benzene. The assumption is conservative as benzene is one component of NMVOC.

For the CHPs, monitoring data from another AD site has shown that NMVOC, of which benzene is a component, is less than 2% of TVOC, so benzene has been modelled as 2% of TVOC.

Deposition to ecological receptors

The dispersion model includes the ability to calculate the deposition flux rate (deposition) of pollutants, but the EA recommends deposition be calculated as a post-processing step in order to give conservative estimates of both ground level concentration and deposition, by assuming no loss of pollutant from air concentration to ground deposition.

Deposition may be 'dry' or 'wet'. Dry deposition of gases occurs due to diffusive motions and removal at surfaces, primarily the ground. It is characterised by a deposition velocity that depends on the pollutant and the nature of the surface.

⁴¹ <https://www.gov.uk/guidance/specified-generators-dispersion-modelling-assessment#nosubxsub-to-nosub2sub-conversion-ratios-to-use>

⁴² N R Passant (2002) Speciation of UK emissions of non-methane volatile organic compounds. Reference: AEAT/ENV/R/0545 Issue 1

Table 47 gives the deposition velocities for grassland and forest for the pollutants included in this assessment which are the values recommended by AQTAG 06.⁴³ The values for grassland, which are lower than those for forest, have been used to represent deposition at all receptors.

Wet deposition occurs when precipitation washes pollutants out of the air. Some pollutants have a low solubility, and in addition, wet deposition is considered to be of limited importance close to the source. Wet deposition has been neglected.

⁴³ Air Quality Advisory Group, 2014, AQTAG06 Technical guidance on detailed modelling approach for an appropriate assessment for emissions to air.

Table 47 Dry deposition velocities

Pollutant	Deposition velocity (m/s)	
	Grassland	Forest
NO ₂	0.0015	0.003
SO ₂	0.012	0.024
NH ₃	0.020	0.030

Deposition ($\mu\text{g}/\text{m}^2/\text{s}$) is calculated by multiplying the near ground air concentration ($\mu\text{g}/\text{m}^3$) by deposition velocity. Ecological receptors are sensitive to deposition of nitrogen (nutrient nitrogen) and to deposition of acid species including nitrogen (N), sulphur (S) and hydrogen chloride (HCl). To convert from deposition of a pollutant to deposition of a species, the conversion factors given in Table 48 were used.

Nutrient nitrogen deposition is calculated as the total deposition of N in kg/ha/year, due to NO₂ and NH₃. To convert from deposition of N or S deposited to equivalent acidification units, a measure of how acidifying the chemical species can be, (keq/ha/year), the conversion factors given in Table 49 were used. Acid deposition is calculated taking into account the acidifying nitrogen and sulphur deposition, both expressed as keq/ha/year.

Table 48 Conversion factors for deposition of species N, S

Pollutant	Species deposited	Conversion factor from deposition of pollutant ($\mu\text{g}/\text{m}^2/\text{s}$) to deposition of species (kg/ha/year)
NO ₂	N	96
SO ₂	S	157.7
NH ₃	N	259.7

Table 49 Conversion factors for deposition of species deposition to acid equivalent

Species	Conversion factor from deposition of species (kg/ha/year) to deposition of equivalent acidification units (keq/ha/year)
N	0.071428
S	0.0625

Appendix D Results of sensitivity tests

D.1 Sensitivity Analysis

The impact of buildings, terrain and meteorological data year have been assessed. The eight cases modelled, A-G, are shown in Table 50. Long-term impacts have been predicted assuming the proposed CHP operates continuously at full load and the emergency boiler emissions are equivalent to operating 15% of the year. Short-term impacts have been predicted assume both sources operate continuously at full load.

The sensitivity tests were based on the maximum concentration predicted at any human receptor and any ecological receptor. For each AQS, the predicted maximum was divided by (normalised) the AQS value, or if the AQS is expressed as a number of exceedances of threshold value, by the threshold value. These normalised values have been expressed as a percentage and are shown in Table 51. The comparison is expressed this way to show the relative importance of the change in terms of exceedance of the AQS. If all the results are a very small percentage of the AQS, the variation in results is unlikely to affect the conclusions of the study.

For human and ecological receptors, comparing the results for tests A, B and C, modelling buildings led to higher model prediction than for flat terrain. Modelling buildings with terrain produced results that were slightly greater than modelling buildings without terrain. Comparing the results for tests A, D, E, F and G shows that the variation due to meteorological data year is generally less significant than the impact of modelling buildings for human and ecological receptors.

Table 50 Sensitivity tests

Sensitivity test	Flat/Buildings/Terrain options	model	Meteorological data year
A	Flat		2017
B	Buildings		2017
C	Terrain & buildings		2017
A	Flat		2017
D	Flat		2018
E	Flat		2019
F	Flat		2020
G	Flat		2021

Table 51 Sensitivity tests: results as a percentage of the AQS or threshold

Pollutant	Long-term (LT) or Short-term (ST)	Scenario	Value, EAL or threshold, (µg/m³)	A	B	C	A	D	E	F	G
Human receptors											
NOx	LT	LT	40	4%	5%	5%	4%	3%	3%	3%	4%
NOx	ST	ST Abnormal 1	200	6%	8%	8%	6%	6%	6%	6%	6%
NOx	ST	ST Abnormal 2	200	9%	11%	11%	9%	9%	9%	9%	9%
NOx	ST	ST Normal	200	8%	9%	10%	8%	8%	8%	8%	8%
CO	ST	ST Abnormal 1	10,000	1%	1%	1%	1%	1%	1%	1%	1%
CO	ST	ST Abnormal 2	10,000	2%	2%	2%	2%	2%	2%	2%	2%
CO	ST	ST Normal	10,000	2%	2%	2%	2%	2%	2%	2%	2%
SO2	ST	ST Abnormal 1	266	3%	4%	4%	3%	3%	3%	3%	3%
SO2	ST	ST Abnormal 2	266	3%	4%	4%	3%	3%	3%	3%	3%
SO2	ST	ST Normal	266	3%	4%	4%	3%	3%	3%	3%	3%
SO2	ST	ST Abnormal 1	350	2%	2%	3%	2%	2%	2%	2%	2%
SO2	ST	ST Abnormal 2	350	2%	2%	3%	2%	2%	2%	2%	2%
SO2	ST	ST Normal	350	2%	2%	2%	2%	2%	2%	2%	2%
SO2	ST	ST Abnormal 1	125	4%	4%	4%	4%	4%	3%	4%	3%
SO2	ST	ST Abnormal 2	125	4%	4%	4%	4%	4%	3%	4%	3%
SO2	ST	ST Normal	125	3%	4%	3%	3%	3%	3%	3%	3%
PM10	LT	LT	40	0%	0%	0%	0%	0%	0%	0%	0%
PM10	ST	ST Abnormal 1	50	1%	1%	1%	1%	1%	1%	1%	1%
PM10	ST	ST Abnormal 2	50	1%	1%	1%	1%	1%	1%	1%	1%
PM10	ST	ST Normal	50	1%	1%	1%	1%	1%	1%	1%	1%
H2S	LT	LT	140	0%	0%	0%	0%	0%	0%	0%	0%
H2S	ST	ST Abnormal 1	150	0%	0%	0%	0%	0%	0%	0%	0%
H2S	ST	ST Abnormal 2	150	0%	0%	0%	0%	0%	0%	0%	0%
H2S	ST	ST Normal	150	0%	0%	0%	0%	0%	0%	0%	0%
NH3	LT	LT	180	0%	0%	0%	0%	0%	0%	0%	0%
NH3	ST	ST Abnormal 1	2,500	0%	0%	0%	0%	0%	0%	0%	0%
NH3	ST	ST Abnormal 2	2,500	0%	0%	0%	0%	0%	0%	0%	0%
NH3	ST	ST Normal	2,500	0%	0%	0%	0%	0%	0%	0%	0%
VOC	LT	LT	5	2%	3%	3%	2%	2%	2%	2%	2%
VOC	ST	ST Abnormal 1	30	3%	3%	3%	3%	3%	3%	3%	2%

VOC	ST	ST Abnormal 2	30	6%	7%	7%	6%	5%	5%	5%	4%
VOC	ST	ST Normal	30	6%	7%	6%	6%	5%	5%	5%	4%
Ecological receptors											
NOx	LT	LT	30	8%	9%	9%	8%	6%	6%	6%	6%
NOx	ST	ST Abnormal 1	75	23%	27%	27%	23%	20%	20%	20%	23%
NOx	ST	ST Abnormal 2	75	33%	39%	40%	33%	29%	30%	29%	34%
NOx	ST	ST Normal	75	30%	37%	37%	30%	26%	27%	26%	30%
NOx	ST	ST Abnormal 1	200	9%	10%	10%	9%	8%	8%	8%	9%
NOx	ST	ST Abnormal 2	200	12%	15%	15%	12%	11%	11%	11%	13%
NOx	ST	ST Normal	200	11%	14%	14%	11%	10%	10%	10%	11%
SO2	LT	LT	20	2%	2%	2%	2%	1%	1%	1%	1%
SO2	LT	LT	10	3%	4%	3%	3%	2%	3%	2%	2%
NH3	LT	LT	3	1%	1%	1%	1%	1%	1%	1%	1%
NH3	LT	LT	1	3%	3%	4%	3%	3%	3%	3%	3%

Appendix E Human receptor results

Table 52 Long-term and short-term results NO₂

ID	Receptors	Comparison with annual mean AQAL: 40µg/m ³				Comparison with 99.79th percentile 1-hour threshold: 200µg/m ³			
		PC (µg/m ³)	PC/AQAL (%)	PEC (µg/m ³)	PEC/AQAL (%)	PC (µg/m ³)	PC/AQS (%)	Headroom (µg/m ³)	PC/Headroom (%)
H1	Cotswold Community	0.55	1%	5.01	13%	6.82	3%	191	4%
H2	<10 Residential properties	0.48	1%	6.82	17%	9.02	5%	187	5%
H3	South Cerney (Town)	0.87	2%	7.21	18%	6.14	3%	187	3%
H4	Residential property	0.23	1%	4.69	12%	4.71	2%	191	2%
H5	Cross Roads Farm	0.22	1%	5.03	13%	5.17	3%	190	3%
H6	<10 residential properties	0.19	0%	4.76	12%	5.10	3%	191	3%
H7	Recreation fields	0.46	1%	6.81	17%	5.89	3%	187	3%
H8	Whitefriars Sailing Club	0.98	n/a	n/a	n/a	9.32	5%	191	5%
H9	Lake 62 LPS Events (Watersports)	0.51	n/a	n/a	n/a	13.3	7%	191	7%
H10	Bike track	0.30	n/a	n/a	n/a	6.72	3%	187	4%
H11	Bird hide	0.17	n/a	n/a	n/a	5.04	3%	191	3%
H12	Hoburne Cotswold Holiday Pk	0.33	1%	5.03	13%	5.57	3%	191	3%
H13	Recreation/ playground	0.14	n/a	n/a	n/a	4.41	2%	191	2%
H14	South Cerney Angling Club	0.39	n/a	n/a	n/a	5.74	3%	190	3%
H15	Aggregate Industries	1.34	n/a	n/a	n/a	16.8	8%	191	9%
H16	Sand and Gravel works	0.20	n/a	n/a	n/a	4.64	2%	191	2%
H17	Cirencester WwTW	0.14	n/a	n/a	n/a	3.57	2%	190	2%
H18	Industrial / Trading Estate	1.14	n/a	n/a	n/a	9.32	5%	187	5%
H19	3No. commercial units	0.41	n/a	n/a	n/a	7.38	4%	187	4%
H20	Storage yard	0.29	n/a	n/a	n/a	6.41	3%	191	3%
H21	Allotments gardens	0.45	n/a	n/a	n/a	5.37	3%	187	3%
H22	Footpath	1.50	n/a	n/a	n/a	18.4	9%	191	10%
H23	Footpath	0.98	n/a	n/a	n/a	12.5	6%	187	7%
H24	Footpath	0.32	n/a	n/a	n/a	6.12	3%	191	3%
H25	Telephone Exchange Building	2.12	n/a	n/a	n/a	22.7	11%	191	12%
H7a	Primary Sch/Pre-Sch	0.59	1%	6.93	17%	5.6	3%	187	3%
H7b	Berkeley Close, South Cerney	0.57	1%	6.91	17%	5.0	2%	187	3%
H1a	Cotswold Community	0.37	1%	4.83	12%	4.8	2%	191	3%
H6a	Ashton Keynes Primary Sch	0.08	0%	4.71	12%	2.5	1%	191	1%
H6b	Back Street, Ashton Keynes	0.08	0%	4.71	12%	1.9	1%	191	1%
H26	Somerford Keynes	0.08	0%	4.43	11%	2.0	1%	191	1%

H27	Glebe Farm, Shorncote	0.07	0%	4.39	11%	2.0	1%	191	1%
H28	Wheatley's Farm Quarry	0.05	0%	5.07	13%	1.4	1%	190	1%
Notes: Shaded entries denote locations of non-relevant exposure. n/a = not applicable									

Table 53 Long-term and short-term results, PM₁₀

ID	Receptors	Comparison with annual mean AQAL: 40µg/m ³				Comparison with 90.41 st percentile 24-hour threshold: 50µg/m ³			
		PC (µg/m ³)	PC/AQAL (%)	PEC (µg/m ³)	PEC/AQAL (%)	PC (µg/m ³)	PC/AQAL (%)	Headroom (µg/m ³)	PC/Headroom (%)
H1	Cotswold Community Residences	0.03	0%	11.1	28%	0.13	0%	28.0	0%
H2	<10 Residential properties	0.04	0%	11.4	28%	0.17	0%	27.4	1%
H3	South Cerney (Town)	0.06	0%	11.4	28%	0.17	0%	27.4	1%
H4	Residential property	0.01	0%	11.0	28%	0.03	0%	28.0	0%
H5	Cross Roads Farm	0.02	0%	10.5	26%	0.06	0%	29.0	0%
H6	<10 residential properties	0.01	0%	10.6	27%	0.03	0%	28.7	0%
H7	Recreation fields	0.04	0%	11.4	28%	0.15	0%	27.4	1%
H8	Whitefriars Sailing Club	0.03	n/a	n/a	n/a	0.13	0%	28.7	0%
H9	Lake 62 LPS Events (Watersports)	0.02	n/a	n/a	n/a	0.06	0%	28.7	0%
H10	Bike track	0.02	n/a	n/a	n/a	0.09	0%	27.4	0%
H11	Bird hide	0.01	n/a	n/a	n/a	0.05	0%	27.1	0%
H12	Hoburne Cotswold Holiday Park	0.01	0%	11.0	28%	0.05	0%	28.0	0%
H13	Recreation/ playground	0.01	n/a	n/a	n/a	0.04	0%	28.3	0%
H14	South Cerney Angling Club	0.02	n/a	n/a	n/a	0.05	0%	28.3	0%
H15	Aggregate Industries	0.04	n/a	n/a	n/a	0.16	0%	28.7	1%
H16	Sand and Gravel works	0.02	n/a	n/a	n/a	0.07	0%	27.1	0%
H17	Cirencester WwTW	0.01	n/a	n/a	n/a	0.04	0%	27.0	0%
H18	Industrial / Trading Estate	0.04	n/a	n/a	n/a	0.14	0%	27.4	0%
H19	3No. commercial units	0.04	n/a	n/a	n/a	0.14	0%	27.4	1%
H20	Storage yard	0.02	n/a	n/a	n/a	0.09	0%	27.1	0%
H21	Allotments gardens	0.04	n/a	n/a	n/a	0.13	0%	27.4	0%
H22	Footpath	0.04	n/a	n/a	n/a	0.18	0%	28.7	1%
H23	Footpath	0.15	n/a	n/a	n/a	0.54	1%	27.4	2%
H24	Footpath	0.03	n/a	n/a	n/a	0.10	0%	27.1	0%
H25	Telephone Exchange Building	0.05	n/a	n/a	n/a	0.20	0%	28.7	1%
H7a	Ann Edwards Primary Sch/Pre-Sch	0.05	0%	11.4	28%	0.15	0%	27.4	1%
H7b	Berkeley Close, South Cerney	0.04	0%	11.4	28%	0.12	0%	27.4	0%
H1a	Cotswold Community (residential)	0.01	0%	11.0	28%	0.05	0%	28.0	0%
H6a	Ashton Keynes Primary Sch	0.00	0%	10.7	27%	0.02	0%	28.6	0%
H6b	Back Street, Ashton Keynes	0.01	0%	10.7	27%	0.02	0%	28.6	0%
H26	Somerford Keynes	0.01	0%	10.9	27%	0.02	0%	28.3	0%
H27	Glebe Farm, Shorncote	0.004	0%	12.1	30%	0.02	0%	25.9	0%
H28	Wheatley's Farm Quarry	0.003	0%	10.8	27%	0.01	0%	28.4	0%

Notes: Shaded entries denote locations of non-relevant exposure. n/a = not applicable

Table 54 Long-term results, PM_{2.5}

ID	Receptors	Comparison with annual mean AQAL: 20µg/m ³				Comparison with 2040 target: 10µg/m ³			
		PC (µg/m ³)	PC/AQAL (%)	PEC (µg/m ³)	PEC/AQAL (%)	PC (µg/m ³)	PC/AQS (%)	PEC (µg/m ³)	PEC/AQS (%)
H1	Cotswold Community Residences	0.03	0%	6.24	31%	0.03	0%	6.24	62%
H2	<10 Residential properties	0.04	0%	6.52	33%	0.04	0%	6.52	65%
H3	South Cerney (Town)	0.06	0%	6.54	33%	0.06	1%	6.54	65%
H4	Residential property	0.01	0%	6.22	31%	0.01	0%	6.22	62%
H5	Cross Roads Farm	0.02	0%	6.40	32%	0.02	0%	6.40	64%
H6	<10 residential properties	0.01	0%	6.23	31%	0.01	0%	6.23	62%
H7	Recreation fields	0.04	0%	6.52	33%	0.04	0%	6.52	65%
H8	Whitefriars Sailing Club	0.03	n/a	n/a	n/a	0.03	n/a	n/a	n/a
H9	Lake 62 LPS Events (Watersports)	0.02	n/a	n/a	n/a	0.02	n/a	n/a	n/a
H10	Bike track	0.02	n/a	n/a	n/a	0.02	n/a	n/a	n/a
H11	Bird hide	0.01	n/a	n/a	n/a	0.01	n/a	n/a	n/a
H12	Hoburne Cotswold Holiday Park	0.01	0%	6.29	31%	0.01	0%	6.29	63%
H13	Recreation/ playground	0.01	n/a	n/a	n/a	0.01	n/a	n/a	n/a
H14	South Cerney Angling Club	0.02	n/a	n/a	n/a	0.02	n/a	n/a	n/a
H15	Aggregate Industries	0.04	n/a	n/a	n/a	0.04	n/a	n/a	n/a
H16	Sand and Gravel works	0.02	n/a	n/a	n/a	0.02	n/a	n/a	n/a
H17	Cirencester WwTW	0.01	n/a	n/a	n/a	0.01	n/a	n/a	n/a
H18	Industrial / Trading Estate	0.04	n/a	n/a	n/a	0.04	n/a	n/a	n/a
H19	3No. commercial units	0.04	n/a	n/a	n/a	0.04	n/a	n/a	n/a
H20	Storage yard	0.02	n/a	n/a	n/a	0.02	n/a	n/a	n/a
H21	Allotments gardens	0.04	n/a	n/a	n/a	0.04	n/a	n/a	n/a
H22	Footpath	0.04	n/a	n/a	n/a	0.04	n/a	n/a	n/a
H23	Footpath	0.15	n/a	n/a	n/a	0.15	n/a	n/a	n/a
H24	Footpath	0.03	n/a	n/a	n/a	0.03	n/a	n/a	n/a
H25	Telephone Exchange Building	0.05	n/a	n/a	n/a	0.05	n/a	n/a	n/a
H7a	Ann Edwards Primary Sch/Pre-Sch	0.05	0%	6.53	33%	0.05	0%	6.53	65%
H7b	Berkeley Close, South Cerney	0.04	0%	6.52	33%	0.04	0%	6.52	65%
H1a	Cotswold Community (residential)	0.01	0%	6.23	31%	0.01	0%	6.23	62%
H6a	Ashton Keynes Primary Sch	0.00	0%	6.38	32%	0.00	0%	6.38	64%
H6b	Back Street, Ashton Keynes	0.01	0%	6.38	32%	0.01	0%	6.38	64%
H26	Somerford Keynes	0.01	0%	6.18	31%	0.01	0%	6.18	62%
H27	Glebe Farm, Shorncliffe	0.004	0%	6.28	31%	0.004	0%	6.28	63%
H28	Wheatley's Farm Quarry	0.003	0%	6.35	32%	0.003	0%	6.35	64%

Notes: Shaded entries denote locations of non-relevant exposure n/a = not applicable

Table 55 Short-term results, 15-minute and 1-hour, SO₂

ID	Receptors	Comparison with 99.9 th percentile 15-min threshold: 266µg/m ³				Comparison with 99.73 rd percentile 1-hour threshold: 350µg/m ³			
		PC (µg/m ³)	PC/AQAL (%)	Headroom (µg/m ³)	PC/Headroom (%)	PC (µg/m ³)	PC/AQAL (%)	Headroom (µg/m ³)	PC/Headroom (%)
H1	Cotswold Community Residences	4.79	2%	264	2%	2.98	1%	348	1%
H2	<10 Residential properties	7.54	3%	261	3%	3.77	1%	345	1%
H3	South Cerney (Town)	4.61	2%	261	2%	2.67	1%	345	1%
H4	Residential property	4.04	2%	264	2%	2.06	1%	348	1%
H5	Cross Roads Farm	5.36	2%	263	2%	2.20	1%	347	1%
H6	<10 residential properties	4.75	2%	263	2%	2.01	1%	347	1%
H7	Recreation fields	5.12	2%	261	2%	2.50	1%	345	1%
H8	Whitefriars Sailing Club	7.06	3%	263	3%	4.01	1%	347	1%
H9	Lake 62 LPS Events (Watersports)	13.5	5%	263	5%	5.25	2%	347	2%
H10	Bike track	5.50	2%	261	2%	2.71	1%	345	1%
H11	Bird hide	4.24	2%	264	2%	1.94	1%	348	1%
H12	Hoburne Cotswold Holiday Park	4.93	2%	264	2%	2.28	1%	348	1%
H13	Recreation/ playground	3.83	1%	265	1%	1.75	0%	349	1%
H14	South Cerney Angling Club	5.40	2%	264	2%	2.57	1%	348	1%
H15	Aggregate Industries	9.36	4%	263	4%	6.85	2%	347	2%
H16	Sand and Gravel works	3.51	1%	264	1%	1.96	1%	348	1%
H17	Cirencester WwTW	2.64	1%	264	1%	1.45	0%	348	0%
H18	Industrial / Trading Estate	8.65	3%	261	3%	4.35	1%	345	1%
H19	3No. commercial units	6.19	2%	261	2%	3.05	1%	345	1%
H20	Storage yard	5.22	2%	264	2%	2.73	1%	348	1%
H21	Allotments gardens	3.95	1%	261	2%	2.28	1%	345	1%
H22	Footpath	9.94	4%	263	4%	7.36	2%	347	2%
H23	Footpath	10.2	4%	261	4%	5.51	2%	345	2%
H24	Footpath	4.49	2%	264	2%	2.65	1%	348	1%
H25	Telephone Exchange Building	10.6	4%	263	4%	8.83	3%	347	3%
H7a	Ann Edwards Primary Sch/Pre-Sch	4.00	2%	261	2%	2.47	1%	345	1%
H7b	Berkeley Close, South Cerney	3.82	1%	261	1%	2.12	1%	345	1%
H1a	Cotswold Community (residential)	3.63	1%	264	1%	2.02	1%	348	1%
H6a	Ashton Keynes Primary Sch	2.88	1%	264	1%	1.05	0%	348	0%
H6b	Back Street, Ashton Keynes	1.61	1%	264	1%	0.78	0%	348	0%
H26	Somerford Keynes	1.75	1%	265	1%	0.84	0%	349	0%
H27	Glebe Farm, Shorncote	1.64	1%	265	1%	0.81	0%	349	0%
H28	Wheatley's Farm Quarry	1.14	0%	264	0%	0.59	0%	348	0%

Table 56 Short-term results, 24-hours, SO₂

ID	Receptors	Comparison with 24-hour mean AQAL: 125 µg/m ³			
		PC (µg/m ³)	PC/AQAL (%)	Headroom (µg/m ³)	PC/Headroom (%)
H1	Cotswold Community Residences	1.72	1%	123	1%
H2	<10 Residential properties	1.38	1%	120	1%
H3	South Cerney (Town)	1.08	1%	120	1%
H4	Residential property	0.81	1%	123	1%
H5	Cross Roads Farm	0.66	1%	122	1%
H6	<10 residential properties	0.60	0%	122	0%
H7	Recreation fields	0.99	1%	120	1%
H8	Whitefriars Sailing Club	2.08	2%	122	2%
H9	Lake 62 LPS Events (Watersports)	1.69	1%	122	1%
H10	Bike track	0.79	1%	120	1%
H11	Bird hide	0.53	0%	123	0%
H12	Hoburne Cotswold Holiday Park	0.68	1%	123	1%
H13	Recreation/ playground	0.58	0%	124	0%
H14	South Cerney Angling Club	0.69	1%	123	1%
H15	Aggregate Industries	3.13	3%	122	3%
H16	Sand and Gravel works	0.65	1%	123	1%
H17	Cirencester WwTW	0.48	0%	123	0%
H18	Industrial / Trading Estate	1.40	1%	120	1%
H19	3No. commercial units	1.00	1%	120	1%
H20	Storage yard	0.91	1%	123	1%
H21	Allotments gardens	0.83	1%	120	1%
H22	Footpath	3.51	3%	122	3%
H23	Footpath	2.29	2%	120	2%
H24	Footpath	0.94	1%	123	1%
H25	Telephone Exchange Building	5.20	4%	122	4%
H7a	Ann Edwards Primary Sch/Pre-Sch	0.88	1%	120	1%
H7b	Berkeley Close, South Cerney	0.82	1%	120	1%
H1a	Cotswold Community (residential)	0.87	1%	123	1%
H6a	Ashton Keynes Primary Sch	0.30	0%	123	0%
H6b	Back Street, Ashton Keynes	0.25	0%	123	0%
H26	Somerford Keynes	0.28	0%	124	0%
H27	Glebe Farm, Shorncote	0.24	0%	124	0%
H28	Wheatley's Farm Quarry	0.15	0%	123	0%

Table 57 Short-term results, CO

ID	Receptors	Comparison with maximum 8-hour running AQAL: 10,000µg/m³			
		PC (µg/m³)	PC/AQAL (%)	Headroom (µg/m³)	PC/Headroom (%)
H1	Cotswold Community Residences	80.8	1%	6,694	1%
H2	<10 Residential properties	87.5	1%	6,694	1%
H3	South Cerney (Town)	59.3	1%	6,694	1%
H4	Residential property	49.2	0%	6,694	1%
H5	Cross Roads Farm	56.8	1%	6,694	1%
H6	<10 residential properties	52.9	1%	6,694	1%
H7	Recreation fields	54.8	1%	6,694	1%
H8	Whitefriars Sailing Club	90.6	1%	6,694	1%
H9	Lake 62 LPS Events (Watersports)	208	2%	6,694	3%
H10	Bike track	69.5	1%	6,694	1%
H11	Bird hide	43.1	0%	6,694	1%
H12	Hoburne Cotswold Holiday Park	51.5	1%	6,694	1%
H13	Recreation/ playground	40.8	0%	6,694	1%
H14	South Cerney Angling Club	62.9	1%	6,694	1%
H15	Aggregate Industries	155	2%	6,694	2%
H16	Sand and Gravel works	58.2	1%	6,694	1%
H17	Cirencester WwTW	38.3	0%	6,694	1%
H18	Industrial / Trading Estate	82.4	1%	6,694	1%
H19	3No. commercial units	87.4	1%	6,694	1%
H20	Storage yard	62.3	1%	6,694	1%
H21	Allotments gardens	46.3	0%	6,694	1%
H22	Footpath	172	2%	6,694	3%
H23	Footpath	148	1%	6,694	2%
H24	Footpath	72.1	1%	6,694	1%
H25	Telephone Exchange Building	218	2%	6,694	3%
H7a	Ann Edwards Primary Sch/Pre-Sch	57.0	1%	6,694	1%
H7b	Berkeley Close, South Cerney	46.9	0%	6,694	1%
H1a	Cotswold Community (residential)	50.1	1%	6,694	1%
H6a	Ashton Keynes Primary Sch	29.0	0%	6,694	0%
H6b	Back Street, Ashton Keynes	18.0	0%	6,694	0%
H26	Somerford Keynes	23.1	0%	6,694	0%
H27	Glebe Farm, Shorncombe	23.0	0%	6,694	0%
H28	Wheatley's Farm Quarry	16.0	0%	6,694	0%

Table 58 Long-term and short-term results, NH₃

ID	Receptors	Comparison with annual mean AQAL: 180 µg/m ³				Comparison with maximum hourly AQS: 2,500 µg/m ³			
		PC (µg/m ³)	PC/AQAL (%)	PEC (µg/m ³)	PEC/AQAL (%)	PC (µg/m ³)	PC/AQAL (%)	Headroom (µg/m ³)	PC/Headroom (%)
H1	Cotswold Community Residences	0.02	0%	1.82	1%	2.34	0%	2,496	0%
H2	<10 Residential properties	0.01	0%	1.81	1%	1.90	0%	2,496	0%
H3	South Cerney (Town)	0.01	0%	1.81	1%	1.13	0%	2,496	0%
H4	Residential property	0.01	0%	1.81	1%	1.00	0%	2,496	0%
H5	Cross Roads Farm	0.01	0%	1.81	1%	0.82	0%	2,496	0%
H6	<10 residential properties	0.01	0%	1.81	1%	0.70	0%	2,496	0%
H7	Recreation fields	0.01	0%	1.81	1%	1.20	0%	2,496	0%
H8	Whitefriars Sailing Club	0.03	n/a	n/a	n/a	2.67	0%	2,496	0%
H9	Lake 62 LPS Events (Watersports)	0.02	n/a	n/a	n/a	1.84	0%	2,496	0%
H10	Bike track	0.01	n/a	n/a	n/a	1.13	0%	2,496	0%
H11	Bird hide	0.01	n/a	n/a	n/a	1.05	0%	2,496	0%
H12	Hoburne Cotswold Holiday Park	0.01	0%	1.81	1%	0.72	0%	2,496	0%
H13	Recreation/ playground	0.01	n/a	n/a	n/a	0.79	0%	2,496	0%
H14	South Cerney Angling Club	0.01	n/a	n/a	n/a	0.63	0%	2,496	0%
H15	Aggregate Industries	0.05	n/a	n/a	n/a	4.82	0%	2,496	0%
H16	Sand and Gravel works	0.01	n/a	n/a	n/a	2.02	0%	2,496	0%
H17	Cirencester WwTW	0.00	n/a	n/a	n/a	0.68	0%	2,496	0%
H18	Industrial / Trading Estate	0.02	n/a	n/a	n/a	1.55	0%	2,496	0%
H19	3No. commercial units	0.01	n/a	n/a	n/a	1.47	0%	2,496	0%
H20	Storage yard	0.01	n/a	n/a	n/a	1.20	0%	2,496	0%
H21	Allotments gardens	0.01	n/a	n/a	n/a	1.14	0%	2,496	0%
H22	Footpath	0.06	n/a	n/a	n/a	5.06	0%	2,496	0%
H23	Footpath	0.03	n/a	n/a	n/a	2.59	0%	2,496	0%
H24	Footpath	0.02	n/a	n/a	n/a	3.07	0%	2,496	0%
H25	Telephone Exchange Building	0.08	n/a	n/a	n/a	5.99	0%	2,496	0%
H7a	Ann Edwards Primary Sch/Pre-Sch	0.01	0%	1.81	1%	1.26	0%	2,496	0%
H7b	Berkeley Close, South Cerney	0.01	0%	1.81	1%	0.99	0%	2,496	0%
H1a	Cotswold Community (residential)	0.01	0%	1.81	1%	1.37	0%	2,496	0%
H6a	Ashton Keynes Primary Sch	0.002	0%	1.80	1%	0.29	0%	2,496	0%
H6b	Back Street, Ashton Keynes	0.003	0%	1.80	1%	0.31	0%	2,496	0%
H26	Somerford Keynes	0.002	0%	1.80	1%	0.24	0%	2,496	0%
H27	Glebe Farm, Shorncliffe	0.003	0%	1.80	1%	0.58	0%	2,496	0%
H28	Wheatley's Farm Quarry	0.001	0%	1.80	1%	0.16	0%	2,496	0%

Notes: Shaded entries denote locations of non-relevant exposure. n/a = not applicable

Table 59 Long-term and short-term results, TVOC as Benzene

ID	Receptors	Comparison with annual mean AQAL: 5µg/m ³				Comparison with 24-hour Mean AQS: 30µg/m ³			
		PC (µg/m ³)	PC/AQAL (%)	PEC (µg/m ³)	PEC/AQAL (%)	PC (µg/m ³)	PC/AQAL (%)	Headroom (µg/m ³)	PC/Headroom (%)
H1	Cotswold Community Residences	0.04	0.8%	0.29	5.8%	0.57	1.9%	29.5	1.9%
H2	<10 Residential properties	0.03	0.7%	0.32	6.4%	0.50	1.7%	29.4	1.7%
H3	South Cerney (Town)	0.06	1.2%	0.35	6.9%	0.54	1.8%	29.4	1.8%
H4	Residential property	0.02	0.3%	0.27	5.4%	0.29	1.0%	29.5	1.0%
H5	Cross Roads Farm	0.01	0.3%	0.31	6.2%	0.28	0.9%	29.4	0.9%
H6	<10 residential properties	0.01	0.3%	0.27	5.4%	0.28	0.9%	29.5	1.0%
H7	Recreation fields	0.03	0.6%	0.32	6.4%	0.37	1.2%	29.4	1.3%
H8	Whitefriars Sailing Club	0.07	n/a	n/a	n/a	0.91	3.0%	29.5	3.1%
H9	Lake 62 LPS Events (Watersports)	0.04	n/a	n/a	n/a	0.94	3.1%	29.5	3.2%
H10	Bike track	0.02	n/a	n/a	n/a	0.39	1.3%	29.4	1.3%
H11	Bird hide	0.01	n/a	n/a	n/a	0.22	0.7%	29.5	0.7%
H12	Hoburne Cotswold Holiday Park	0.02	0.5%	0.29	5.7%	0.32	1.1%	29.5	1.1%
H13	Recreation/ playground	0.01	n/a	n/a	n/a	0.19	0.6%	29.5	0.6%
H14	South Cerney Angling Club	0.03	n/a	n/a	n/a	0.32	1.1%	29.4	1.1%
H15	Aggregate Industries	0.09	n/a	n/a	n/a	1.23	4.1%	29.5	4.2%
H16	Sand and Gravel works	0.01	n/a	n/a	n/a	0.28	0.9%	29.5	1.0%
H17	Cirencester WwTW	0.01	n/a	n/a	n/a	0.19	0.6%	29.5	0.6%
H18	Industrial / Trading Estate	0.08	n/a	n/a	n/a	0.52	1.7%	29.4	1.8%
H19	3No. commercial units	0.03	n/a	n/a	n/a	0.50	1.7%	29.4	1.7%
H20	Storage yard	0.02	n/a	n/a	n/a	0.33	1.1%	29.5	1.1%
H21	Allotments gardens	0.03	n/a	n/a	n/a	0.30	1.0%	29.4	1.0%
H22	Footpath	0.10	n/a	n/a	n/a	1.36	4.5%	29.5	4.6%
H23	Footpath	0.07	n/a	n/a	n/a	1.00	3.3%	29.4	3.4%
H24	Footpath	0.02	n/a	n/a	n/a	0.40	1.3%	29.5	1.3%
H25	Telephone Exchange Building	0.14	n/a	n/a	n/a	2.00	6.7%	29.5	6.8%
H7a	Ann Edwards Primary Sch/Pre-Sch	0.04	0.8%	0.33	6.5%	0.42	1.4%	29.4	1.4%
H7b	Berkeley Close, South Cerney	0.04	0.8%	0.33	6.5%	0.29	1.0%	29.4	1.0%
H1a	Cotswold Community (residential)	0.03	0.5%	0.28	5.6%	0.31	1.0%	29.5	1.1%
H6a	Ashton Keynes Primary Sch	0.01	0.1%	0.27	5.4%	0.13	0.4%	29.5	0.4%
H6b	Back Street, Ashton Keynes	0.01	0.1%	0.27	5.4%	0.13	0.4%	29.5	0.4%
H26	Somerford Keynes	0.01	0.1%	0.25	4.9%	0.13	0.4%	29.5	0.5%
H27	Glebe Farm, Shorncote	0.004	0.1%	0.24	4.9%	0.08	0.3%	29.5	0.3%
H28	Wheatley's Farm Quarry	0.003	0.1%	0.25	5.0%	0.07	0.2%	29.5	0.3%

Notes: Shaded entries denote locations of non-relevant exposure. n/a = not applicable

Table 60 Long-term and short-term results H₂S

ID	Receptors	Comparison with annual mean AQAL: 140µg/m ³				Comparison with maximum hourly AQS: 150µg/m ³			
		PC (µg/m ³)	PC/AQAL (%)	PEC (µg/m ³)	PEC/AQAL (%)	PC (µg/m ³)	PC/AQAL (%)	Headroom (µg/m ³)	PC/Headroom (%)
H1	Cotswold Community Residences	0.0009	0%	0.0009	0%	0.013	0%	150	0%
H2	<10 Residential properties	0.0013	0%	0.0013	0%	0.019	0%	150	0%
H3	South Cerney (Town)	0.0017	0%	0.0017	0%	0.016	0%	150	0%
H4	Residential property	0.0002	0%	0.0002	0%	0.005	0%	150	0%
H5	Cross Roads Farm	0.0005	0%	0.0005	0%	0.008	0%	150	0%
H6	<10 residential properties	0.0003	0%	0.0003	0%	0.009	0%	150	0%
H7	Recreation fields	0.0012	0%	0.0012	0%	0.012	0%	150	0%
H8	Whitefriars Sailing Club	0.0009	n/a	n/a	n/a	0.017	0%	150	0%
H9	Lake 62 LPS Events (Watersports)	0.0005	n/a	n/a	n/a	0.012	0%	150	0%
H10	Bike track	0.0007	n/a	n/a	n/a	0.012	0%	150	0%
H11	Bird hide	0.0004	n/a	n/a	n/a	0.017	0%	150	0%
H12	Hoburne Cotswold Holiday Park	0.0004	0%	0.0004	0%	0.007	0%	150	0%
H13	Recreation/ playground	0.0003	n/a	n/a	n/a	0.011	0%	150	0%
H14	South Cerney Angling Club	0.0005	n/a	n/a	n/a	0.006	0%	150	0%
H15	Aggregate Industries	0.0012	n/a	n/a	n/a	0.024	0%	150	0%
H16	Sand and Gravel works	0.0005	n/a	n/a	n/a	0.009	0%	150	0%
H17	Cirencester WwTW	0.0004	n/a	n/a	n/a	0.013	0%	150	0%
H18	Industrial / Trading Estate	0.0013	n/a	n/a	n/a	0.011	0%	150	0%
H19	3No. commercial units	0.0010	n/a	n/a	n/a	0.015	0%	150	0%
H20	Storage yard	0.0007	n/a	n/a	n/a	0.010	0%	150	0%
H21	Allotments gardens	0.0011	n/a	n/a	n/a	0.012	0%	150	0%
H22	Footpath	0.0013	n/a	n/a	n/a	0.025	0%	150	0%
H23	Footpath	0.0045	n/a	n/a	n/a	0.038	0%	150	0%
H24	Footpath	0.0008	n/a	n/a	n/a	0.015	0%	150	0%
H25	Telephone Exchange Building	0.0015	n/a	n/a	n/a	0.026	0%	150	0%
H7a	Ann Edwards Primary Sch/Pre-Sch	0.0014	0%	0.0014	0%	0.015	0%	150	0%
H7b	Berkeley Close, South Cerney	0.0012	0%	0.0012	0%	0.013	0%	150	0%
H1a	Cotswold Community (residential)	0.0004	0%	0.0004	0%	0.007	0%	150	0%
H6a	Ashton Keynes Primary Sch	0.0001	0%	0.0001	0%	0.005	0%	150	0%
H6b	Back Street, Ashton Keynes	0.0002	0%	0.0002	0%	0.003	0%	150	0%
H26	Somerford Keynes	0.0002	0%	0.0002	0%	0.005	0%	150	0%
H27	Glebe Farm, Shorncote	0.0001	0%	0.0001	0%	0.004	0%	150	0%
H28	Wheatley's Farm Quarry	0.0001	0%	0.0001	0%	0.003	0%	150	0%

Notes: Shaded entries denote locations of non-relevant exposure. n/a = not applicable

Appendix F Ecological receptor results

Table 61 Results: Ecological receptors, long-term AQAL for NH₃

ID	Receptors	AQAL (µg/m ³)	BG (µg/m ³)	Comparison with annual mean AQAL			
				PC (µg/m ³)	PC/AQAL (%)	PEC (µg/m ³)	PEC/AQAL (%)
E1	Cotswold Water Park (SSSI) 1	n/a	1.60	0.003	n/a	n/a	n/a
E1a	Cotswold Water Park (SSSI) 1a	n/a	1.80	0.017	n/a	n/a	n/a
E1b	Cotswold Water Park (SSSI) 1b	n/a	1.80	0.026	n/a	n/a	n/a
E1c	Cotswold Water Park (SSSI) 1c	n/a	1.80	0.019	n/a	n/a	n/a
E1d	Cotswold Water Park (SSSI) 1d	n/a	1.80	0.007	n/a	n/a	n/a
E1e	Cotswold Water Park (SSSI) 1e	n/a	1.80	0.016	n/a	n/a	n/a
E1f	Cotswold Water Park (SSSI) 1f	n/a	1.80	0.010	n/a	n/a	n/a
E1g	Cotswold Water Park (SSSI) 1g	n/a	1.80	0.006	n/a	n/a	n/a
E1h	Cotswold Water Park (SSSI) 1h	n/a	1.80	0.007	n/a	n/a	n/a
E1i	Cotswold Water Park (SSSI) 1i	n/a	1.80	0.005	n/a	n/a	n/a
E2	Cotswold Water Park (SSSI) 2	n/a	1.60	0.002	n/a	n/a	n/a
E3	Cotswold Water Park (SSSI) 3	n/a	1.60	0.001	n/a	n/a	n/a
E4	Cotswold Water Park (SSSI) 4	n/a	1.70	0.001	n/a	n/a	n/a
E5	Cotswold Water Park (SSSI) 5	n/a	1.70	0.001	n/a	n/a	n/a
E6	Wildmoorway Meadows SSSI	3	1.60	0.002	0.1%	1.60	160%
E7	Upper Waterhay Meadow SSSI	3	1.70	0.001	0.0%	1.70	170%
E8	Acres Farm Meadow SSSI	3	1.70	0.001	0.0%	1.70	170%
E9	Elmlea Meadows SSSI	3	1.60	0.001	0.0%	1.60	160%
E10	Kemble Railway Cuttings SSSI	n/a	1.60	0.0004	n/a	n/a	n/a
E11	Stoke Common Meadows SSSI	3	1.70	0.0005	0.0%	1.70	170%
E12	Distillery Farm Meadows SSSI	3	1.70	0.0003	0.0%	1.70	170%
E13	Emmett Hill Meadows SSSI	1	1.80	0.0003	0.0%	1.80	180%
E14	Cloatley Farm SSSI	3	1.80	0.0004	0.0%	1.80	180%
E15	Cloatley Manor Farm Meadows SSSI	3	1.70	0.0003	0.0%	1.70	170%
E16	Ravensroost Wood SSSI	1	1.80	0.0002	0.0%	1.80	180%
E17	Barnsley Warren SSSI	3	1.70	0.0002	0.0%	1.70	170%
E18	Restrop Farm & Brockhurst Wood SSSI	1	1.80	0.0002	0.0%	1.80	180%

ID	Receptors	AQAL (µg/m³)	BG (µg/m³)	Comparison with annual mean AQAL			
				PC (µg/m³)	PC/AQAL (%)	PEC (µg/m³)	PEC/AQAL (%)
E19	Pike Corner SSSI LWS	3	1.70	0.0013	0.0%	1.70	170%
E20 (SAC)	North Meadow and Clattinger Farm SAC	3	1.60	0.0007	0.0%	1.60	160%
E20 (SSSI)	North Meadow Cricklade SSSI, (& North Meadow Cricklade NNR)	3	1.60	0.0007	0.0%	1.60	160%
E21 (SAC)	North Meadow & Clattinger Farm SAC	3	1.70	0.0012	0.0%	1.70	170%
E21 (SSSI)	Clattinger Farm SSSI	3	1.70	0.0012	0.0%	1.70	170%
E22 (SAC)	North Meadow & Clattinger Farm SAC	3	1.70	0.0009	0.0%	1.70	170%
E22 (SSSI)	Clattinger Farm SSSI	3	1.70	0.0009	0.0%	1.70	170%
E23 (SAC)	North Meadow and Clattinger Farm SAC	3	1.60	0.0006	0.0%	1.60	160%
E23 (SSSI)	North Meadow Cricklade SSSI, (& North Meadow Cricklade NNR)	3	1.60	0.0006	0.0%	1.60	160%
E24	Cokes Pit LNR Lake 34 LWS (1) CWP SSSI	1	1.60	0.004	0.4%	1.60	160%
E25	Cokes Pit LNR Lake 34 LWS (2) CWP SSSI	1	1.60	0.004	0.4%	1.60	160%
E26	LWS (CWP lake Pit 26), Priority Habitat	1	1.60	0.045	4.5%	1.64	164%
E27	LWS (CWP lake Pit 26), Priority Habitat	1	1.60	0.034	3.4%	1.63	163%
E28	LWS (CWP lake Pits 28, 28a, 29, 30, 35, 38)	1	1.60	0.003	0.3%	1.60	160%
E29	Cotswold Water Park LWS Lakes 84 and 85 Shorncote Reedbed LWS;	1	1.60	0.007	0.7%	1.61	161%
E30	River Churn LWS	n/a	1.60	0.005	n/a	n/a	n/a
E31	South Cerney Railway Cutting	n/a	1.60	0.002	n/a	n/a	n/a
E32	Shorncote quarry RIGS LWS	n/a	1.60	0.003	n/a	n/a	n/a
E33	Siddington Copse AW	1	1.60	0.001	0.1%	1.60	160%
Notes: n/a = not applicable/ available Shaded entries denote locations for which no sensitive habitat is identified							

Table 62 Results: Ecological receptors, long-term AQAL for NO_x

ID	Receptors	AQAL (µg/m ³)	BG (µg/m ³)	Comparison with annual mean AQAL			
				PC (µg/m ³)	PC/AQAL (%)	PEC (µg/m ³)	PEC/AQAL (%)
E1	Cotswold Water Park (SSSI) 1	n/a	7.40	0.23	n/a	n/a	n/a
E1a	Cotswold Water Park (SSSI) 1a	n/a	7.60	0.73	n/a	n/a	n/a
E1b	Cotswold Water Park (SSSI) 1b	n/a	7.60	1.40	n/a	n/a	n/a
E1c	Cotswold Water Park (SSSI) 1c	n/a	9.10	1.63	n/a	n/a	n/a
E1d	Cotswold Water Park (SSSI) 1d	n/a	7.40	0.56	n/a	n/a	n/a
E1e	Cotswold Water Park (SSSI) 1e	n/a	6.80	0.46	n/a	n/a	n/a
E1f	Cotswold Water Park (SSSI) 1f	n/a	6.80	0.29	n/a	n/a	n/a
E1g	Cotswold Water Park (SSSI) 1g	n/a	6.80	0.25	n/a	n/a	n/a
E1h	Cotswold Water Park (SSSI) 1h	n/a	7.40	0.47	n/a	n/a	n/a
E1i	Cotswold Water Park (SSSI) 1i	n/a	7.60	0.27	n/a	n/a	n/a
E2	Cotswold Water Park (SSSI) 2	n/a	8.30	0.12	n/a	n/a	n/a
E3	Cotswold Water Park (SSSI) 3	n/a	6.60	0.08	n/a	n/a	n/a
E4	Cotswold Water Park (SSSI) 4	n/a	6.60	0.09	n/a	n/a	n/a
E5	Cotswold Water Park (SSSI) 5	n/a	6.60	0.07	n/a	n/a	n/a
E6	Wildmoorway Meadows SSSI	30	7.40	0.18	0.6%	7.58	25%
E7	Upper Waterhay Meadow SSSI	30	7.10	0.05	0.2%	7.15	24%
E8	Acres Farm Meadow SSSI	30	6.50	0.04	0.1%	6.54	22%
E9	Elmlea Meadows SSSI	30	7.20	0.06	0.2%	7.26	24%
E10	Kemble Railway Cuttings SSSI	n/a	6.70	0.02	n/a	n/a	n/a
E11	Stoke Common Meadows SSSI	30	7.20	0.03	0.1%	7.23	24%
E12	Distillery Farm Meadows SSSI	30	6.90	0.02	0.1%	6.92	23%
E13	Emmett Hill Meadows SSSI	30	6.50	0.02	0.1%	6.52	22%
E14	Cloatley Farm SSSI	30	6.30	0.02	0.1%	6.32	21%
E15	Cloatley Manor Farm Meadows SSSI	30	6.10	0.03	0.1%	6.13	20%
E16	Ravensroost Wood SSSI	30	6.80	0.02	0.1%	6.82	23%
E17	Barnsley Warren SSSI	30	6.90	0.02	0.1%	6.92	23%
E18	Restrop Farm & Brockhurst Wood SSSI	30	7.70	0.02	0.1%	7.72	26%
E19	Pike Corner SSSI LWS	30	6.60	0.07	0.2%	6.67	22%
E20 (SAC)	North Meadow and Clattinger Farm SAC	30	7.50	0.05	0.2%	7.55	25%

ID	Receptors	AQAL (µg/m³)	BG (µg/m³)	Comparison with annual mean AQAL			
				PC (µg/m³)	PC/AQAL (%)	PEC (µg/m³)	PEC/AQAL (%)
E20 (SSSI)	North Meadow Cricklade SSSI, (& North Meadow Cricklade NNR)	30	7.50	0.05	0.2%	7.55	25%
E21 (SAC)	North Meadow & Clattinger Farm SAC	30	6.40	0.06	0.2%	6.46	22%
E21 (SSSI)	Clattinger Farm SSSI	30	6.40	0.06	0.2%	6.46	22%
E22 (SAC)	North Meadow & Clattinger Farm SAC	30	6.40	0.05	0.2%	6.45	21%
E22 (SSSI)	Clattinger Farm SSSI	30	6.40	0.05	0.2%	6.45	21%
E23 (SAC)	North Meadow and Clattinger Farm SAC	30	8.50	0.04	0.1%	8.54	28%
E23 (SSSI)	North Meadow Cricklade SSSI, (& North Meadow Cricklade NNR)	30	8.50	0.04	0.1%	8.54	28%
E24	Cokes Pit LNR Lake 34 LWS (1)	30	6.70	0.18	0.6%	6.88	23%
E25	Cokes Pit LNR Lake 34 LWS (2)	30	6.70	0.19	0.6%	6.89	23%
E26	LWS (CWP lake Pit 26), Priority Habitat	30	7.60	2.43	8.1%	10.0	33%
E27	LWS (CWP lake Pit 26), Priority Habitat	30	9.10	2.65	8.8%	11.7	39%
E28	LWS (CWP lake Pits 28, 28a, 29, 30, 35, 38)	30	6.60	0.16	0.5%	6.76	23%
E29	Cotswold Water Park LWS Lakes 84 and 85 Shorncote Reedbed LWS	30	6.70	0.36	1.2%	7.06	24%
E30	River Churn LWS	n/a	7.30	0.33	n/a	n/a	n/a
E31	South Cerney Railway Cutting	n/a	7.00	0.15	n/a	n/a	n/a
E32	Shorncote Quarry RIGS	n/a	6.60	0.10	n/a	n/a	n/a
E33	Siddington Copse	30	7.30	0.07	0.2%	7.37	25%
Notes: n/a = not applicable/ available Shaded entries denote locations for which no sensitive habitat is identified							

Table 63 Results: Ecological receptors, short-term AQAL for NOx

ID	Receptors	Comparison with maximum daily AQS: 75µg/m ³				Comparison with 24 hour mean AQS: 200 µg/m ³			
		PC (µg/m ³)	PC/AQS (%)	Headroom (µg/m ³)	PC/Headroom (%)	PC (µg/m ³)	PC/AQS (%)	Headroom (µg/m ³)	PC/Headroom (%)
E1	Cotswold Water Park (SSSI) 1	2.69	n/a	n/a	n/a	2.69	n/a	n/a	n/a
E1a	Cotswold Water Park (SSSI) 1a	19.9	n/a	n/a	n/a	19.9	n/a	n/a	n/a
E1b	Cotswold Water Park (SSSI) 1b	20.1	n/a	n/a	n/a	20.1	n/a	n/a	n/a
E1c	Cotswold Water Park (SSSI) 1c	12.4	n/a	n/a	n/a	12.4	n/a	n/a	n/a
E1d	Cotswold Water Park (SSSI) 1d	7.07	n/a	n/a	n/a	7.07	n/a	n/a	n/a
E1e	Cotswold Water Park (SSSI) 1e	10.1	n/a	n/a	n/a	10.1	n/a	n/a	n/a
E1f	Cotswold Water Park (SSSI) 1f	6.53	n/a	n/a	n/a	6.53	n/a	n/a	n/a
E1g	Cotswold Water Park (SSSI) 1g	4.81	n/a	n/a	n/a	4.81	n/a	n/a	n/a
E1h	Cotswold Water Park (SSSI) 1h	6.97	n/a	n/a	n/a	6.97	n/a	n/a	n/a
E1i	Cotswold Water Park (SSSI) 1i	6.40	n/a	n/a	n/a	6.40	n/a	n/a	n/a
E2	Cotswold Water Park (SSSI) 2	1.96	n/a	n/a	n/a	1.96	n/a	n/a	n/a
E3	Cotswold Water Park (SSSI) 3	2.30	n/a	n/a	n/a	2.30	n/a	n/a	n/a
E4	Cotswold Water Park (SSSI) 4	2.06	n/a	n/a	n/a	2.06	n/a	n/a	n/a
E5	Cotswold Water Park (SSSI) 5	2.71	n/a	n/a	n/a	2.71	n/a	n/a	n/a
E6	Wildmoorway Meadows SSSI	2.53	3.4%	60.2	4.2%	2.53	1.26%	185	1.4%
E7	Upper Waterhay Meadow SSSI	1.20	1.6%	60.8	2.0%	1.20	0.60%	186	0.6%
E8	Acres Farm Meadow SSSI	1.46	1.9%	62.0	2.4%	1.46	0.73%	187	0.8%
E9	Elmlea Meadows SSSI	1.45	1.9%	60.6	2.4%	1.45	0.73%	186	0.8%
E10	Kemble Railway Cuttings SSSI	0.86	n/a	n/a	n/a	0.86	n/a	n/a	n/a
E11	Stoke Common Meadows SSSI	0.76	1.0%	60.6	1.3%	0.76	0.38%	186	0.4%
E12	Distillery Farm Meadows SSSI	1.24	1.7%	61.2	2.0%	1.24	0.62%	186	0.7%
E13	Emmett Hill Meadows SSSI	0.79	1.1%	62.0	1.3%	0.79	0.40%	187	0.4%
E14	Cloatley Farm SSSI	0.46	0.6%	62.4	0.7%	0.46	0.23%	187	0.2%
E15	Cloatley Manor Farm Meadows SSSI	0.79	1.1%	62.8	1.3%	0.79	0.40%	188	0.4%
E16	Ravensroost Wood SSSI	0.86	1.1%	61.4	1.4%	0.86	0.43%	186	0.5%
E17	Barnsley Warren SSSI	0.62	0.8%	61.2	1.0%	0.62	0.31%	186	0.3%
E18	Restrop Farm & Brockhurst Wood SSSI	0.60	0.8%	59.6	1.0%	0.60	0.30%	185	0.3%
E19	Pike Corner SSSI LWS	3.40	4.5%	61.8	5.5%	3.40	1.70%	187	1.8%
E20 (SAC)	North Meadow and Clattinger Farm SAC	1.38	1.8%	60.0	2.3%	1.38	0.69%	185	0.7%

ID	Receptors	Comparison with maximum daily AQS: 75µg/m ³				Comparison with 24 hour mean AQS: 200 µg/m ³			
		PC (µg/m ³)	PC/AQS (%)	Headroom (µg/m ³)	PC/Headroom (%)	PC (µg/m ³)	PC/AQS (%)	Headroom (µg/m ³)	PC/Headroom (%)
E20 (SSSI)	North Meadow Cricklade SSSI, (& North Meadow Cricklade NNR)	1.38	1.8%	60.0	2.3%	1.38	0.69%	185	0.7%
E21 (SAC)	North Meadow & Clattinger Farm SAC	1.32	1.8%	62.2	2.1%	1.32	0.66%	187	0.7%
E21 (SSSI)	Clattinger Farm SSSI	1.32	1.8%	62.2	2.1%	1.32	0.66%	187	0.7%
E22 (SAC)	North Meadow & Clattinger Farm SAC	1.03	1.4%	62.2	1.7%	1.03	0.51%	187	0.5%
E22 (SSSI)	Clattinger Farm SSSI	1.03	1.4%	62.2	1.7%	1.03	0.51%	187	0.5%
E23 (SAC)	North Meadow and Clattinger Farm SAC	1.19	1.6%	58.0	2.0%	1.19	0.59%	183	0.6%
E23 (SSSI)	North Meadow Cricklade SSSI, (& North Meadow Cricklade NNR)	1.19	1.6%	58.0	2.0%	1.19	0.59%	183	0.6%
E24	Cokes Pit LNR Lake 34 LWS (1)	4.83	6.4%	61.6	7.8%	4.83	2.42%	187	2.6%
E25	Cokes Pit LNR Lake 34 LWS (2)	3.37	4.5%	61.6	5.5%	3.37	1.69%	187	1.8%
E26	LWS (CWP lake Pit 26), Priority Habitat	29.9	40%	59.8	50%	29.9	15.0%	185	16%
E27	LWS (CWP lake Pit 26), Priority Habitat	26.0	35%	56.8	46%	26.0	13.0%	182	14%
E28	LWS (CWP lake Pits 28, 28a, 29, 30, 35, 38)	6.35	8.5%	61.8	10%	6.35	3.17%	187	3.4%
E29	Cotswold Water Park LWS Lakes 84 and 85 Shorncote Reedbed LWS	7.40	10%	61.6	12%	7.40	3.70%	187	4.0%
E30	River Churn LWS	3.90	n/a	n/a	n/a	3.90	n/a	n/a	n/a
E31	South Cerney Railway Cutting RIGS	2.61	n/a	n/a	n/a	2.61	n/a	n/a	n/a
E32	Shorncote Quarry RIGS	3.03	n/a	n/a	n/a	3.03	n/a	n/a	n/a
E33	Siddington Copse	2.66	3.5%	60.4	4.4%	2.66	1.33%	185	1.4%
Notes: n/a = not applicable/ available Shaded entries denote locations for which no sensitive habitat is identified									

Table 64 Results: Ecological receptors, long-term AQAL for SO₂

ID	Receptors	BG (µg/m³)	Comparison with annual mean AQS: 20µg/m³				Comparison with annual mean AQS: 10µg/m³			
			PC (µg/m³)	PC/AQS (%)	PEC (µg/m³)	PEC/AQS (%)	PC (µg/m³)	PC/AQS (%)	PEC (µg/m³)	PEC/AQS (%)
E1	Cotswold Water Park (SSSI) 1	1.00	0.031	n/a	n/a	n/a	0.031	n/a	n/a	n/a
E1a	Cotswold Water Park (SSSI) 1a	1.40	0.100	n/a	n/a	n/a	0.10	n/a	n/a	n/a
E1b	Cotswold Water Park (SSSI) 1b	1.40	0.191	n/a	n/a	n/a	0.19	n/a	n/a	n/a
E1c	Cotswold Water Park (SSSI) 1c	1.70	0.222	n/a	n/a	n/a	0.22	n/a	n/a	n/a
E1d	Cotswold Water Park (SSSI) 1d	1.00	0.076	n/a	n/a	n/a	0.08	n/a	n/a	n/a
E1e	Cotswold Water Park (SSSI) 1e	0.80	0.064	n/a	n/a	n/a	0.06	n/a	n/a	n/a
E1f	Cotswold Water Park (SSSI) 1f	0.80	0.040	n/a	n/a	n/a	0.04	n/a	n/a	n/a
E1g	Cotswold Water Park (SSSI) 1g	0.80	0.034	n/a	n/a	n/a	0.03	n/a	n/a	n/a
E1h	Cotswold Water Park (SSSI) 1h	0.90	0.064	n/a	n/a	n/a	0.06	n/a	n/a	n/a
E1i	Cotswold Water Park (SSSI) 1i	1.40	0.036	n/a	n/a	n/a	0.04	n/a	n/a	n/a
E2	Cotswold Water Park (SSSI) 2	0.80	0.016	n/a	n/a	n/a	0.016	n/a	n/a	n/a
E3	Cotswold Water Park (SSSI) 3	0.70	0.011	n/a	n/a	n/a	0.011	n/a	n/a	n/a
E4	Cotswold Water Park (SSSI) 4	0.70	0.012	n/a	n/a	n/a	0.012	n/a	n/a	n/a
E5	Cotswold Water Park (SSSI) 5	0.70	0.010	n/a	n/a	n/a	0.010	n/a	n/a	n/a
E6	Wildmoorway Meadows SSSI	0.80	0.024	0.1%	0.82	4.1%	0.024	0.2%	0.82	8.2%
E7	Upper Waterhay Meadow SSSI	0.80	0.007	0.0%	0.81	4.0%	0.007	0.1%	0.81	8.1%
E8	Acres Farm Meadow SSSI	0.70	0.006	0.0%	0.71	3.5%	0.006	0.1%	0.71	7.1%
E9	Elmlea Meadows SSSI	0.80	0.008	0.0%	0.81	4.0%	0.008	0.1%	0.81	8.1%
E10	Kemble Railway Cuttings SSSI	0.80	0.003	0.0%	0.80	4.0%	0.003	0.0%	0.80	8.0%
E11	Stoke Common Meadows SSSI	0.80	0.004	0.0%	0.80	4.0%	0.004	0.0%	0.80	8.0%
E12	Distillery Farm Meadows SSSI	0.80	0.003	0.0%	0.80	4.0%	0.003	0.0%	0.80	8.0%
E13	Emmett Hill Meadows SSSI	0.70	0.003	0.0%	0.70	3.5%	0.003	0.0%	0.70	7.0%
E14	Clootley Farm SSSI	0.60	0.003	0.0%	0.60	3.0%	0.003	0.0%	0.60	6.0%
E15	Clootley Manor Farm Meadows SSSI	0.60	0.004	0.0%	0.60	3.0%	0.004	0.0%	0.60	6.0%
E16	Ravensroost Wood SSSI	0.70	0.002	0.0%	0.70	3.5%	0.002	0.0%	0.70	7.0%
E17	Barnsley Warren SSSI	0.70	0.003	0.0%	0.70	3.5%	0.003	0.0%	0.70	7.0%
E18	Restrop Farm & Brockhurst Wood SSSI	0.90	0.002	0.0%	0.90	4.5%	0.002	0.0%	0.90	9.0%
E19	Pike Corner SSSI LWS	0.70	0.010	0.1%	0.71	3.6%	0.010	0.1%	0.71	7.1%
E20 (SAC)	North Meadow and Clattinger Farm SAC	0.90	0.007	0.0%	0.91	4.5%	0.007	0.1%	0.91	9.1%
E20 (SSSI)	North Meadow Cricklade SSSI, (& North Meadow Cricklade NNR)	0.90	0.007	0.0%	0.91	4.5%	0.007	0.1%	0.91	9.1%
E21 (SAC)	North Meadow & Clattinger Farm SAC	0.60	0.009	0.0%	0.61	3.0%	0.009	0.1%	0.61	6.1%
E21 (SSSI)	Clattinger Farm SSSI	0.60	0.009	0.0%	0.61	3.0%	0.009	0.1%	0.61	6.1%

ID	Receptors	BG ($\mu\text{g}/\text{m}^3$)	Comparison with annual mean AQS: $20\mu\text{g}/\text{m}^3$				Comparison with annual mean AQS: $10\mu\text{g}/\text{m}^3$			
			PC ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ($\mu\text{g}/\text{m}^3$)	PEC/AQS (%)	PC ($\mu\text{g}/\text{m}^3$)	PC/AQS (%)	PEC ($\mu\text{g}/\text{m}^3$)	PEC/AQS (%)
E22 (SAC)	North Meadow & Clattinger Farm SAC	0.60	0.006	0.0%	0.61	3.0%	0.006	0.1%	0.61	6.1%
E22 (SSSI)	Clattinger Farm SSSI	0.60	0.006	0.0%	0.61	3.0%	0.006	0.1%	0.61	6.1%
E23 (SAC)	North Meadow and Clattinger Farm SAC	1.10	0.005	0.0%	1.11	5.5%	0.005	0.1%	1.11	11%
E23 (SSSI)	North Meadow Cricklade SSSI, (& North Meadow Cricklade NNR)	1.10	0.005	0.0%	1.11	5.5%	0.005	0.1%	1.11	11%
E24	Cokes Pit LNR Lake 34 LWS (1)	0.70	0.025	0.1%	0.72	3.6%	0.025	0.2%	0.72	7.2%
E25	Cokes Pit LNR Lake 34 LWS (2)	0.70	0.026	0.1%	0.73	3.6%	0.026	0.3%	0.73	7.3%
E26	LWS (CWP lake Pit 26), Priority Habitat	1.40	0.332	1.7%	1.73	8.7%	0.332	3.3%	1.73	17%
E27	LWS (CWP lake Pit 26), Priority Habitat	1.70	0.354	1.8%	2.05	10%	0.354	3.5%	2.05	21%
E28	LWS (CWP lake Pits 28, 28a, 29, 30, 35, 38)	0.70	0.022	0.1%	0.72	3.6%	0.022	0.2%	0.72	7.2%
E29	Cotswold Water Park LWS Lakes 84 and 85 Shorncote Reedbed LWS	0.80	0.050	0.2%	0.85	4.2%	0.050	0.5%	0.85	8.5%
E30	River Churn LWS	1.10	0.045	n/a	n/a	n/a	0.045	n/a	n/a	n/a
E31	South Cerney Railway Cutting RIGS	0.80	0.020	n/a	n/a	n/a	0.020	n/a	n/a	n/a
E32	Shorncote Quarry RIGS	0.70	0.014	n/a	n/a	n/a	0.014	n/a	n/a	n/a
E33	Siddington Copse	0.80	0.009	0.0%	0.81	4.0%	0.009	0.1%	0.81	8.1%
Notes: n/a = not applicable/ available BG = Background concentration Shaded entries denote locations for which no sensitive habitat is identified										

Table 65 Results: Ecological receptors, nutrient nitrogen deposition

Rece ptors	Designation	Deposition velocity type	BG NDep	Comparison with nutrient nitrogen critical loads							
				PC (kgN/ha/yr)	CLmin (kgN/ha/yr)	CLmax (kgN/ha/yr)	PC/CLmin (%)	PC/CLmax (%)	PEC (kgN/ha/yr)	PEC/ CLmin (%)	PEC/ CLmax (%)
E1	SSSI	Grass	14.90	0.039	n/a	n/a	n/a	n/a	14.94	n/a	n/a
E1a	SSSI	Grass	15.10	0.164	n/a	n/a	n/a	n/a	15.26	n/a	n/a
E1b	SSSI	Grass	15.10	0.274	n/a	n/a	n/a	n/a	15.37	n/a	n/a
E1c	SSSI	Grass	15.10	0.261	n/a	n/a	n/a	n/a	15.36	n/a	n/a
E1d	SSSI	Grass	15.00	0.095	n/a	n/a	n/a	n/a	15.10	n/a	n/a
E1e	SSSI	Grass	15.20	0.130	n/a	n/a	n/a	n/a	15.33	n/a	n/a
E1f	SSSI	Grass	15.20	0.079	n/a	n/a	n/a	n/a	15.28	n/a	n/a
E1g	SSSI	Grass	15.20	0.057	n/a	n/a	n/a	n/a	15.26	n/a	n/a
E1h	SSSI	Grass	15.00	0.085	n/a	n/a	n/a	n/a	15.08	n/a	n/a
E1i	SSSI	Grass	15.10	0.055	n/a	n/a	n/a	n/a	15.15	n/a	n/a
E2	SSSI	Grass	14.80	0.020	n/a	n/a	n/a	n/a	14.82	n/a	n/a
E3	SSSI	Grass	15.30	0.015	n/a	n/a	n/a	n/a	15.32	n/a	n/a
E4	SSSI	Grass	15.40	0.016	n/a	n/a	n/a	n/a	15.42	n/a	n/a
E5	SSSI	Grass	15.40	0.013	n/a	n/a	n/a	n/a	15.41	n/a	n/a
E6	SSSI	Grass	14.80	0.029	10	20	0.3%	0.1%	14.83	148%	74%
E7	SSSI	Grass	15.10	0.010	10	20	0.1%	0.1%	15.11	151%	76%
E8	SSSI	Grass	15.40	0.008	10	20	0.1%	0.0%	15.41	154%	77%
E9	SSSI	Grass	15.00	0.011	10	20	0.1%	0.1%	15.01	150%	75%
E10	SSSI	Grass	15.20	0.004	n/a	n/a	n/a	n/a	15.20	n/a	n/a
E11	SSSI	Grass	15.60	0.005	10	20	0.1%	0.0%	15.61	156%	78%
E12	SSSI	Grass	15.90	0.004	10	20	0.0%	0.0%	15.90	159%	80%
E13	SSSI	Grass	15.90	0.004	6	10	0.1%	0.0%	15.90	265%	159%
E14	SSSI	Grass	16.00	0.004	6	10	0.1%	0.0%	16.00	267%	160%
E15	SSSI	Grass	15.90	0.005	10	20	0.0%	0.0%	15.90	159%	80%
E16	SSSI	Forest	29.90	0.006	15	20	0.0%	0.0%	29.91	199%	150%
E17	SSSI	Grass	15.50	0.003	10	20	0.0%	0.0%	15.50	155%	78%
E18	SSSI	Forest	29.80	0.005	15	20	0.0%	0.0%	29.81	199%	149%
E18	SSSI	Grass	16.20	0.003	10	20	0.0%	0.0%	16.20	162%	81%
E19	SSSI	Grass	15.30	0.014	10	20	0.1%	0.1%	15.31	153%	77%
E20	SAC	Grass	15.00	0.009	10	20	0.1%	0.0%	15.01	150%	75%
E20	SSSI	Grass	15.00	0.009	10	20	0.1%	0.0%	15.01	150%	75%
E21	SAC	Grass	15.40	0.013	10	20	0.1%	0.1%	15.41	154%	77%
E21	SSSI	Grass	15.40	0.013	10	20	0.1%	0.1%	15.41	154%	77%

E22	SAC	Grass	15.40	0.009	10	20	0.1%	0.0%	15.41	154%	77%
E22	SSSI	Grass	15.40	0.009	10	20	0.1%	0.0%	15.41	154%	77%
E23	SAC	Grass	15.00	0.007	10	20	0.1%	0.0%	15.01	150%	75%
E23	SSSI	Grass	15.00	0.007	10	20	0.1%	0.0%	15.01	150%	75%
E24	LNR SSSI	Grass	15.30	0.036	5	10	0.7%	0.4%	15.34	307%	153%
E25	LNR SSSI	Grass	15.30	0.038	5	10	0.8%	0.4%	15.34	307%	153%
E26	LWS PHI	Forest	28.10	0.840	10	20	8.4%	4.2%	28.94	289%	145%
E27	LWS PHI	Forest	28.00	0.802	10	20	8.0%	4.0%	28.80	288%	144%
E28	LWS	Forest	28.40	0.056	10	20	0.6%	0.3%	28.46	285%	142%
E29	LWS	Grass	15.20	0.074	10	20	0.7%	0.4%	15.27	153%	76%
E30	LWS	Grass	15.00	0.060	n/a	n/a	n/a	n/a	15.06	n/a	n/a
E31	LWS RIGS	Grass	15.10	0.026	n/a	n/a	n/a	n/a	15.13	n/a	n/a
E32	LWS RIGS	Grass	15.30	0.025	n/a	n/a	n/a	n/a	15.32	n/a	n/a
E33	AW	Forest	27.90	0.021	10	20	0.2%	0.1%	27.92	279%	140%

Notes: No further analysis required if PC/AQAL < 100%

n/a = not applicable/ available

Shaded entries denote locations for which no sensitive habitat is identified

Table 66 Results: Ecological receptors, acid deposition

Receptors	Designation	Deposition velocity type	PC (keqS/ha/yr)	PC (keqN/ha/yr)	Background (keqS/ha/yr)	Background (keqN/ha/yr)	Maximum critical loads		
							PC (%)	Background (%)	PEC (%)
E1	SSSI	Grass	0.0037	0.0028	n/a	n/a	n/a	n/a	n/a
E1a	SSSI	Grass	0.0118	0.0117	n/a	n/a	n/a	n/a	n/a
E1b	SSSI	Grass	0.0225	0.0195	n/a	n/a	n/a	n/a	n/a
E1c	SSSI	Grass	0.0262	0.0186	n/a	n/a	n/a	n/a	n/a
E1d	SSSI	Grass	0.0089	0.0068	n/a	n/a	n/a	n/a	n/a
E1e	SSSI	Grass	0.0075	0.0093	n/a	n/a	n/a	n/a	n/a
E1f	SSSI	Grass	0.0047	0.0057	n/a	n/a	n/a	n/a	n/a
E1g	SSSI	Grass	0.0040	0.0041	n/a	n/a	n/a	n/a	n/a
E1h	SSSI	Grass	0.0075	0.0060	n/a	n/a	n/a	n/a	n/a
E1i	SSSI	Grass	0.0043	0.0039	n/a	n/a	n/a	n/a	n/a
E2	SSSI	Grass	0.0019	0.0014	n/a	n/a	n/a	n/a	n/a
E3	SSSI	Grass	0.0013	0.0011	n/a	n/a	n/a	n/a	n/a
E4	SSSI	Grass	0.0014	0.0011	n/a	n/a	n/a	n/a	n/a
E5	SSSI	Grass	0.0012	0.0009	n/a	n/a	n/a	n/a	n/a
E6	SSSI	Grass	0.0028	0.0021	0.12	1.06	0.1	3.0	3.1
E7	SSSI	Grass	0.0008	0.0007	n/a	n/a	n/a	n/a	n/a
E8	SSSI	Grass	0.0007	0.0006	0.11	1.10	0.0	23.9	24.0
E9	SSSI	Grass	0.0010	0.0008	0.11	1.07	0.0	2.8	2.8
E10	SSSI	Grass	0.0004	0.0003	n/a	n/a	n/a	n/a	n/a
E11	SSSI	Grass	0.0004	0.0004	0.11	1.12	0.0	24.3	24.3
E12	SSSI	Grass	0.0004	0.0003	0.11	1.14	0.0	24.6	24.7
E13	SSSI	Grass	0.0003	0.0003	0.11	1.13	0.0	24.5	24.5
E14	SSSI	Grass	0.0004	0.0003	0.10	1.14	0.0	24.5	24.5
E15	SSSI	Grass	0.0004	0.0003	0.10	1.13	0.0	24.3	24.3
E16	SSSI	Forest	0.0006	0.0004	0.15	2.13	0.0	77.6	77.6
E17	SSSI	Grass	0.0003	0.0002	0.12	1.11	0.0	25.3	25.3
E18	SSSI	Forest	0.0006	0.0004	0.17	2.13	0.0	78.8	78.8
E18	SSSI	Grass	0.0003	0.0002	0.13	1.15	0.0	25.2	25.3
E19	SSSI	Grass	0.0012	0.0010	0.11	1.09	0.0	24.7	24.8
E20	SAC	Grass	0.0008	0.0006	0.11	1.07	0.0	2.8	2.8

E20	SSSI	Grass	0.0008	0.0006	0.11	1.07	0.0	2.8	2.8
E21	SAC	Grass	0.0010	0.0009	0.11	1.10	0.0	23.9	23.9
E21	SSSI	Grass	0.0010	0.0009	0.11	1.10	0.0	23.9	23.9
E22	SAC	Grass	0.0008	0.0007	0.11	1.10	0.0	23.9	23.9
E22	SSSI	Grass	0.0008	0.0007	0.11	1.10	0.0	23.9	23.9
E23	SAC	Grass	0.0006	0.0005	0.12	1.07	0.0	3.0	3.0
E23	SSSI	Grass	0.0006	0.0005	0.12	1.07	0.0	3.0	3.0
E24	LNR SSSI	Grass	0.0029	0.0026	0.13	1.09	0.0	25.1	25.2
E25	LNR SSSI	Grass	0.0031	0.0027	0.13	1.09	0.0	25.1	25.2
E26	LWS PHI	Forest	0.078	0.060	0.16	2.01	1.3	19.8	21.1
E27	LWS PHI	Forest	0.084	0.057	0.17	2.00	1.3	19.8	21.1
E28	LWS	Forest	0.005	0.004	0.16	2.03	0.1	20.0	20.1
E29	LWS	Grass	0.0058	0.0053	0.13	1.08	0.0	24.9	25.1
E30	LWS	Grass	0.0053	0.0043	n/a	n/a	n/a	n/a	n/a
E31	LWS RIGS	Grass	0.0024	0.0019	n/a	n/a	n/a	n/a	n/a
E32	LWS RIGS	Grass	0.0017	0.0018	n/a	n/a	n/a	n/a	n/a
E33	AW	Forest	0.002	0.002	0.17	2.00	0.0	19.8	19.8
Notes: APIS Critical Load Screening Function prescribes the Clos relevant for Appropriate assessment (HRA) / significance test (planning / EIA) based on acid deposition as a proportion of the Maximum CL Function (keq/ha/yr) n/a = not applicable/ available Shaded entries denote locations for which no sensitive features are identified									