Environmental Statement

Planning application for an extension to an intensive poultry unit at; Morton Ley Farm,
Morton,
Oswestry,
Shropshire,
SY10 8BG

Prepared for Morton Growers Ltd

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Morton Growers Ltd

Extension to an Intensive Poultry Unit

Environmental Statement

October 2022

Client's Address

Morton Growers Ltd
Morton Ley Farm
Morton
Oswestry
Shropshire
SY10 8DG

Planning Authority

Shropshire Council
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Publication title	Environmental Statement
Version	1.0
Date	October 2022

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Ref: Edwards v 1.0

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CHAPTER 1 - INTRODUCTION

Foreword

This Environmental Statement (ES) has been prepared for Morton Growers Ltd by Roger Parry & Partners LLP. It accompanies a planning application for a proposed extension to an intensive poultry unit at Morton Ley Farm, Morton, Oswestry, Shropshire, SY10 8DG.

The proposal amounts to erecting two poultry buildings to the South West of the existing poultry buildings. A site layout plan for the proposal is attached to this Environmental Statement at Appendix 1.

As a worst case, the proposals assessed for the Environmental Impact Assessment (EIA) are for an intensive poultry extension with the capacity to produce 1,800 tonnes of broiler chicken meat per annum for human consumption.

The footprint of the poultry buildings is expected to cover 6,190m² totalling approximately 0.61hectares (ha) within a site of 12.98ha. The buildings are to be 5.0 metres (m) at their maximum height and the associated feed bins 7.5 m high. Hours of operation will be 24 hour seven days a week due to the fact that it is a livestock enterprise requiring continual husbandry. A site layout plan for the poultry extension is shown in Appendix 1.

The proposal is a farm diversification scheme for Morton Growers Ltd and is a sustainable economic development as supported by national, regional and local planning policy. On a global scale the extension amounts to an expansion of the UK poultry meat production capacity and a step closer to self sufficiency in poultry meat therefore reducing the need to import foreign produced poultry meat and this reducing greenhouse gas emission from fossil fuel consumption in transportation of meat across the globe – so called "food miles".

The ES is the principal written output of the EIA process, and provides the required information on the predicted environmental impacts of the proposal. It has been prepared in accordance with the Town and Country Planning (Environmental Impact Assessment) Regulations 2017. The ES is intended to enable the recipients (such as the Local Planning Authority) to understand the nature of the proposed extension and to evaluate the likely environmental impacts in the light of proposed mitigation measures. The ES therefore represents an essential component of the decision making process and presents information in a readily accessible form.

A Non-Technical Summary (NTS) and Technical Appendices accompany the ES and form part of the same document. Other documents making up the planning submissions include:

- Local Planning Authority Application Forms;
- Design and Access Statement
- Ownership Certificates and Notices;

The following drawings are also submitted in addition to the figures in this ES:

- Site and Access Plan
- Location Plan
- Elevation and Floor Plan
- Landscape Plan

Copies of the full documentation for this planning application have been placed on deposit at the following location, where they may be examined by members of the public during normal office hours: Roger Parry & Partners LLP, 9 Mercian House, Darwin Court, Oxon Business Park, Shrewsbury, SY3 5AL.

The Environmental Statement, in the form of a CD, can be purchased at a cost of £10 from the above address. The Non-Technical Summary is available free of charge from the same address and can be found on Roger Parry & Partners website at: www.rogerparry.net/planning.

1. Introduction

This chapter summarises the nature of the proposed extension and its location, introduces the basis for the planning application, explains the general basis and methods used for the Environmental Impact Assessment (EIA), sets out the structures of the Environmental Statement (ES) and introduces the authors of the ES.

1.1 Introduction to the Environmental Statement

As part of the process of making an application for the extension to an intensive poultry unit, Morton Growers Ltd have employed Roger Parry & Partners to co-ordinate with the compilation of the associated planning application, including provision of an Environmental Impact Assessment (EIA) to be reported in an Environmental Statement (ES).

This chapter summarises the nature of the proposed extension and sets out the purpose of the ES.

1.2 Summary of the Proposals

1.2.1 The Proposed Intensive Poultry extension

As a worst case the proposal assessed for the EIA is for a broiler meat production unit with the capacity for 90,000 broiler chickens per crop cycle and an annual meat production capacity of 1,800 tonnes and an annual manure production capacity of around 1,620 tonnes.

The broiler unit will be integrated into the applicant's arable enterprise and existing poultry unit to increase efficiency and sustainability. A broiler unit operating in association with an arable enterprise is a vertical integration of a production system whereby the manure produced is used to fertilise the crops on the applicants own farm, it is the most efficient system of poultry meat production, since the applicants will purchase grain which is grown in close proximity to the point of use and the waste completes the cycle.

The footprint of the proposed extension will total approximately 0.61hectares (ha) within a site of 12.98ha. The buildings will be 5.0 m high and the associated feed bins 7.5 m high. Hours of operation will be 24 hour seven days a week due to the fact that it is a livestock enterprise requiring continual husbandry. Short six day periods between crop cycles will occur when there will be no birds on the site. A layout plan for the poultry extension is shown in Appendix 1.

The chickens will be grown in 7.6 42-day crop cycles per annum with six-day turn around periods per crop. It is expected that, on the receipt of planning permission, the construction would commence in 2023 with operation commencing after a three month construction period.

The proposed extension to the intensive poultry unit is to be located at Morton Ley Farm, Morton, Oswestry, Shropshire, SY10 8BG. Grid reference SJ 312 232.

1.2.2 The need for the Proposal

DEFRA data shows that broiler production is in relatively rapid decline since 2005, the six month rolling average at March 2009 was down to 120,000 tonnes per month from a peak of about 135,000 tonnes and production is now at its lowest since 1995. This is due in part to many existing broiler houses reaching the end of their productive life when production either ceases or suffers (Savills, 2009).

The UK was 97% self-sufficient in poultry meat in the late 1980s and is now around 90% self sufficient and imports a greater volume than it exports; in 2006 imports were valued at £1 billion and exports almost £200 million. Imports peaked in the fourth quarter of 2005 at over 130,000 tonnes.

The Sterling exchange rate has weakened considerably over the past 24 months, which makes imports relatively more expensive. An increase in domestic production to create a vibrant UK broiler sector would create a greater security of supply.

The proposal is a sustainable economic development that will contribute positively to the UK poultry sector. In addition to the wider national benefit, the extension will create a full time employment position as well as indirectly contributing to the local economy through feed contracts, building contracts, veterinary employment etc.

The need for more poultry buildings in the UK is also being driven by the consumer demand for higher welfare chicken (HWC) meat; broiler meat produced for the Freedom Food Standards endorsed by the RSCPA requires 30% additional floor area than meat produced under the lower welfare standards of the Assured Poultry Meat Scheme.

1.3 Site Location

The poultry site is located directly to the south west of the existing buildings at Morton Ley Farm. A site location plan can be seen at Appendix 1. There are four existing broiler houses with a yard area and 10 feed bins located between each set of buildings, car parking area and associated infrastructure.

The proposed site is located to the north west of the village of Osbaston in the County of Shropshire. It lies within an arable farming unit. The location of the site is indicated on Appendix 2.

The surrounding land is exclusively agricultural.

Settlements surrounding the site include Knockin, Morton, Woolston, Llynclys and Crickheath.

The site is classed as open countryside in the Shropshire Core Strategy.

Morton Ley Farm is accessed off the B4396 and onto a private access which leads directly to the poultry units.

1.4 The Applicant

Morton Growers Ltd is an arable and poultry farming enterprise.

1.4.1 Business Evolution

Morton Ley Farm is owned and operated by the Edwards family and trades as Morton Growers Ltd. The business has been established within the last fifteen years and is made up of Mr Julian Edwards and his wife Mrs Heather Edwards.

The total farmed area extends to around 62.20 acres (25.17 hectares). The main farming enterprises are arable – growing winter wheat, spring barley and oil seed rape in rotation as well as the existing broiler unit enterprise.

The first two poultry units at Morton Ley Farm were granted planning permission in March 2012 and the site was further extended by another two poultry units which were granted planning permission in February 2016.

The Environmental Permit was varied in 2018 and now allows up to 350,000 broiler places. It is proposed to erect two further buildings leading to six buildings on the site.

1.4.2 Management

The business employs two full time people, Mr & Mrs Edwards.

1.5 Requirement for an EIA: Legislative Background

The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 require that for certain types of development an EIA must be undertaken. The Regulations prescribe the types of

development for which EIA is mandatory (Schedule 1 Development) and others which may require an assessment if they have the potential to give rise to significant environmental impacts (Schedule 2 Development). The proposed poultry extension is consistent with Schedule 1 of the Regulations (as it will accommodate in excess of 85,000 broiler chickens) and EIA is therefore mandatory. On this basis, no formal Screening Opinion was sought from the Planning Authority. This EIA has been based on Roger Parry and Partners LLP experience of what has been required for similar applications recently submitted to Shropshire County Council.

1.6 Objectives and Purpose of EIA

The objectives of EIA are to identify potential environmental impacts of the proposed extension and identify measures to mitigate any adverse impacts. The Environmental Statement will report on the findings of the EIA. The necessary information to assess impacts on the natural environment to be included within the ES include:

- A description of the development – including physical characteristics and the full land use requirements of the site during construction and operational phases.
- Expected residues and emissions (water, air and soil pollution, noise vibration, light, heat, radiation, etc) resulting from the operation of the proposed development.
- An assessment of alternatives and clear reasoning as to why the preferred option has been chosen.
- A description of the relevant aspects of the current state of the environment (baseline scenario).
- A description of the aspects of the environment likely to be significantly affected by the development, in particular, population, human health, biodiversity, fauna, flora, soil, water, air, climatic factors, material assets, including the architectural and archaeological heritage, landscape and the interrelationship between the above factors.
- A description of the likely significant effects of the development on the environment resulting from the construction and existence, use of natural resources, pollutants, noise, vibration, light, heat, radiation, and nuisances, waste, risks to human health, cultural heritage and environment, the cumulation of effects with other existing and/or approved projects, impact on climate, technologies and substances used – direct effects but also any indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects. Effects should relate to the existence of the development, the use of natural resources and the emissions from pollutants. This should also include a description of the forecasting methods and where possible offset any significant adverse effects on the environment.
- Description of forecasting methods or evidence used to assess the significant effects on the environment. An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the applicant in compiling the required information.
- A description of the measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the environment and any monitoring.
- A description of the expected significant adverse effects on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.
- A non-technical summary of the information.
- Reference detailing the sources used.

In addition the EIA has been carried out taking due consideration of other guidance such as that contained within the Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for Environmental Impact Assessment', where appropriate, along with various guidance documents relating to the assessment of individual issues (see individual assessment chapters).

In order to evaluate environmental impacts, it is important that assessment criteria are identified. Any impact is assessed by a combination of the degree of alteration from the baseline state (both positive and negative) which can be predicted (i.e. the magnitude of the effect) and the sensitivity of the receptor(s) (e.g. the rarity of a species/habitat, the quality of a view, the type of land use, the presence

of people etc.). The scoping and consultation phase has identified the likely impacts and the nature of the receiving environment.

Within this ES, thresholds of magnitude and sensitivity are used to make explicit the conclusion of the assessment process in terms of the significance of the impact. Significance is generally based on the structured evaluation of a number of primary criteria:

- the value of the resource (international, national, regional and local level importance);
- the magnitude of the impact;
- the duration of the impact (whether long-term or short-term, temporary or permanent);
- the reversibility of the impact;
- the number and sensitivity of receptors;
- the nature of the impact; and
- Whether the impact is direct or indirect.

For the purposes of undertaking an EIA, the significance of any impact (positive or negative) is generally considered in terms of:

- *No Significance / Negligible* - beneath the levels of perception, within normal bounds of variation or within the margin of forecasting error: a non-detectable change to a location, environment or species;
- *Minor Significance*: a detectable but non-material and non-noteworthy change to a location, environment or species at a local level, relevant quality standards not approached;
- *Moderate Significance*: a material and noteworthy but non-fundamental change to a location, environment or species of local or district importance, relevant quality standards may be approached;
- *Major Significance*: a fundamental change to a location, environment or species of district to regional importance, relevant quality standards exceeded;
- *Extreme Significance*: a fundamental change (e.g. loss) to a location, environment or species of national / international importance, relevant quality standards exceeded by a substantial margin on a regular basis.

This ES generally follows this theoretical approach. Full magnitude and significance criteria are provided in the individual topic assessment chapters as appropriate.

Impacts assessed to be moderate/major or above are considered to be significant. The assessment process considers residual impacts following the introduction of measures to reduce, remedy or avoid any significant adverse environmental impacts. Mitigation can be applied through the consideration of alternatives, physical design, provision of specific control equipment, project management or operation and other means. Mitigation generally incorporated into the design as standard and additional mitigation identified by the assessment process is set out within each technical impact assessment chapter of this ES.

1.7 Structure of the Environmental Statement

The key issues together with a clear description of the project and relevant planning policy form the main content of this ES.

This document is supplemented by a non-technical summary (NTS) of the findings of the EIA. The objective of the NTS is to provide an accurate and balanced statement of the key information presented in the ES.

The main body of the ES is set out as follows:

Introduction (Chapter 1) – setting out the background to, and location of, the extension and the EIA process;

Scoping and Key Issues (Chapter 2) – summarising how the topics to be assessed and methods to be used were chosen via the initial application process; and

Alternatives (Chapter 3) – describing the alternatives considered including the 'Do-Nothing Scenario' and alternative locations, in terms of their physical, operational, economic and environmental feasibility.

Extension Description (Chapter 4) – describing the construction, use and physical nature of the proposed plant and its use, including delivery and access issues; and

Policy and Legislative Context (Chapter 5) – summarising the planning and legislative context of the proposals.

The Environmental Assessment Chapters – covering impacts associated with:

- Air Quality (Chapter 6)
- Landscape and Visual Impacts (Chapter 7)
- Traffic (Chapter 8)
- Amenity Issues (Chapter 9)
- Ecology (Chapter 10)
- Noise and Vibration (Chapter 11)
- Odour (Chapter 12)
- Water Resources (Chapter 13)
- Soils (Chapter 14)

Each chapter sets out the types of impacts possible, summarises relevant legislation and policy (where appropriate), describes the existing background/baseline environment, the methodologies used to predict impacts and associated guidance (along with any limitations of the methodology or available data), magnitude and significance criteria, incorporated mitigation and the provision of additional mitigation, and the residual impact assessment. Where appropriate the assessment of individual sub-topics / sensitive receptors are assessed in discrete sections within each technical chapter. Also, combined impacts (e.g. one effect resulting in another effect, such as atmospheric emissions affecting habitats, is assessed in one chapter whilst cross referencing other relevant chapters as appropriate); and

Finally, **Summary and Conclusions** (Chapter 15) – provides an overview of the assessment.

Note that drawings are included within the chapters and technical appendices are provided as separate individual appendices.

A Design and Access Statement and other forms and certificates have been submitted separately.

1.8 Authors of the Environmental Statement

A number of organisations and specialist consultants have assisted with the preparation of this ES and provided input into the content of a number of individual technical chapters to a standard format

(where possible) provided by Roger Parry & Partners LLP (who also collated the ES). The specific contributions with respect to the key chapters are listed in Table 1 below.

Table 1 - Contribution to the ES

Topic Area	Author
Introduction	Roger Parry & Partners
Scoping and Key Issues	Roger Parry & Partners
Alternatives	Roger Parry & Partners
Extension Description	Roger Parry & Partners / Mr & Mrs Edwards
Planning Policy Context	Roger Parry & Partners
Air Quality	AS Modelling & Data Ltd / Roger Parry & Partners
Landscape	Roger Parry & Partners
Traffic	Roger Parry & Partners /Mr & Mrs Edwards
Amenity	Roger Parry & Partners
Ecology	Roger Parry & Partners
Noise & Vibration	Matrix Acoustics / Roger Parry & Partners
Odour	AS Modelling & Data Ltd / Roger Parry & Partners
Water Resources	Roger Parry & Partners/ Mr & Mrs Edwards/Townsend Engineering
Soils	Roger Parry & Partners
Summary & Conclusions	Roger Parry & Partners

Richard Corbett is a Professional and Partner with Roger Parry and Partners LLP. He holds a BSc Honours degree in Rural Enterprise and Land Management awarded by Harper Adams University College. He is a Member of the Royal Institution of Chartered Surveyors, following the Rural Faculty of the Royal Institution. He is also a Fellow of the Central Association of Agricultural Valuers. He has seventeen years' experience in rural planning and a total of nineteen years' experience in rural practice. He deals with a diverse range of planning applications from large scale agricultural buildings with EIA development, specialist poultry unit buildings requiring an Environmental Impact Assessment and not requiring an Environmental Impact Assessment, to new dwellings to renewable energy projects.

Rosina Riddle is a Professional and Associate with Roger Parry and Partners LLP. She holds a BSc Honours degree in Rural Enterprise and Land Management awarded by Harper Adams University. She is a Member of the Royal Institution of Chartered Surveyors, following the Rural Faculty of the Royal Institution. She has five years' experience in rural planning and a total of seven years' experience in rural practice, with over 3 years post qualification. She deals with a diverse range of planning applications from agricultural buildings, specialist poultry unit buildings both requiring an Environmental Impact Assessment and not requiring Environmental Impact Assessment, renewable energy projects and Agricultural Workers Dwellings.

CHAPTER 2 – SCOPING AND KEY ISSUES

2. Scoping and Key Issues

This chapter sets out the requirement for and process of scoping the Environmental Statement (ES), summarises the receiving environment in the vicinity, covers the scoping consultation process and indicates the results of the consultations, and provides the final scope for the ES. Finally it sets out other permitted/proposed developments with which the proposed poultry extension could potentially create cumulative impact.

2.1 The Scoping Process

Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (see Appendix 3) specifies the general information that should be included within an Environmental Statement (ES) as best practice. An ES should identify, describe and assess the likely significant impacts of the extension on the environment with reference to:

- *"Population;*
- *Climate;*
- *Flora;*
- *Fauna;*
- *Landscape;*
- *Soil;*
- *Air;*
- *Water;*
- *Material assets (including architectural and archaeological heritage); and*
- *Any inter-relationships between the above"*

The EIA Regulations also require that EIA should cover:

"Direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development, resulting from:

a) the existence of the development;

b) the use of natural resources;

c) the emission of pollutants, the creation of nuisances and the elimination of waste."

Scoping (i.e. determining the amount of information on each of these principal subjects and effect types to be presented in an ES) is regarded as an important first step in the overall EIA process, although it is not necessarily a mandatory requirement of the EIA Regulations. The primary aim of EIA scoping is to facilitate the planning of a focused EIA that concentrates on the resolution of substantive potential importance and, where appropriate, excluding any non–issues from further consideration. It also allows primary concerns to be identified at an early stage and informs developers of aspects of concern that they may not have been aware of. Surveys and assessment methodologies can also be agreed between all interested parties such that it is less likely that additional information is required after submission of the application.

Regulation 10 of the EIA Regulations allows potential applicants to ask the planning authority to state, in writing, the information that should be set out in an ES.

Issues that have been scoped out of the ES are set out in Section 2.4.

2.2 Summary of the Receiving Environment

2.2.1 General

The proposed site is located on a field directly to the south west of the existing poultry buildings at Morton Ley Farm.

The site is located to the north west of the village of Knockin in the County of Shropshire, the site lies within an existing arable unit. The field boundaries are mostly formed by hedgerows with some hedgerow trees.

Settlements surrounding the site include Knockin, Woolston, Llynclys and Crickheath.

Surrounding land uses include residential and agricultural.

2.2.2 Air Quality

There are no locally designated Air Quality Management Areas close to the site.

Local air quality is dominated by traffic sources including the A5, A483, B4396 (predominately) and the B4398.

2.2.3 Landscape

The application site lies within an agricultural area and is not included within any areas designated for their landscape character or quality.

Morton Ley Farm lies within the Settled Pastoral Farmlands Landscape Character Type, the key characteristics being:

- Heavy, poorly drained soils
- Pastoral land use
- Scattered hedgerow trees
- Irregular field pattern
- Small to medium scale landscapes

The site encompasses arable land, adjacent to the B4398 road between Knockin and Llynclys and lies at approximately 74 metres AOD. The site is bounded on three sides by hedgerows and on the fourth, south eastern side by the River Morda.

The landscape around the site is gently undulating. The site sits in a shallow valley at an altitude of approximately 55 metres AOD.

The population in the immediate surroundings is relatively dispersed with numerous small settlements such as Knockin, Morton, Woolston, Crickheath, Llynclys. Other key receptors in the vicinity of the site include walkers, horse and cycle riders and road users.

2.2.4 Highways

The site is accessed off the B4396 between Llynclys and Knockin. The site is accessed off the council maintained highway, from an existing access as per the site and location plans leading to the buildings. The existing access was improved under planning permission 11/02934/EIA (approved plan 996.S2A).

2.2.5 Population / Socio-Economics

The site lies within the open countryside with limited isolated residential properties close by and small villages in the surrounding landscape. The site lies within the Unitary Authority of Shropshire Council and the Parish of Oswestry Rural. According to the 2001 Census the parish has 4,504 people.

2.2.6 Noise

The noise environment in the area is dominated by road traffic sources from the three surrounding highways. The surrounding community comprises of a mixture of scattered agricultural holdings with some residential dwellings within small settlements. Noise levels across the site are considered to be typical of a rural area.

2.2.7 Geology, Soils, Ground Stability and Contamination

Within the area surrounding the proposed site there is one predominant land type detailed below;

- Drift from Palaeozoic sandstone and shale. Deep well drained, fine loamy soils and similar soils with slowly permeable sub soils and slight seasonal water logging. Some coarse loamy soils affected by ground water. Suitable for cereals and grassland in the northern region and stock rearing on permanent land in Wales (East Keswick 1).

2.2.8 Ecology

The majority of the area where the poultry units will be located, consists of an agricultural field bordered to the north east by the existing poultry unit and mature hedgerows to the east, south and west. To the north east there are mature trees along the River Morda.

No standing water is evident within 500 metres of the site and therefore no survey for Great Crested Newts or other amphibians was necessary. The surrounding landscape is dominated by agricultural land with farms and small villages.

2.2.9 Water Resources

The field drainage of the proposed site drains into the River Morda. The River Morda forms the south-eastern edge of the site. The small river lies in a deep channel with the summer water level being approximately 4 to 6 metres below the field surface.

2.2.10 Cultural Heritage

The site itself has no archaeological potential. Within 500 metres of the site there is one listed building – Morton Bridge Grade II. There are no scheduled monuments.

2.3 Summary of the Scoping Exercise

2.3.1 The aspects of the Proposed Extension Considered to Have the Potential to Give Rise to Significant Environmental Impacts

Following consideration of the existing environment the potential sources of environmental impacts have been preliminary identified in Table 2 below for construction, operation and decommissioning of the extension respectively.

Table 2: Summary of key potential impacts

Potential receptors of impact		Activities & potential Impacts Construction Phase	Operation phase	Decommissioning Phase
WATER	Surface water hydrology and channel morphology	**Use of vehicles and machinery** - Increase in surface runoff from soil compaction **Works near watercourses** - Change in flow velocities - Increased flood risk **Earthworks** - Increased sedimentation of watercourses **Buildings and ancillary structures** - Changes to runoff characteristics and infiltration rates	**Use of vehicles and machinery** - Increase in surface runoff from soil compaction	
	Surface water quality	**Earthworks** - Pollution from suspended material **Materials management** - Pollution from spills or leaks of fuel, oil and construction materials	**Water and manure management** - Decrease in water quality from sudden releases (e.g. from tank failure or yard washing) or gradual seepage of contaminated water into nearby watercourses **Materials management** - Pollution from agricultural chemicals, spills or leaks of fuel and oil - Eutrophication of watercourses	
	Groundwater hydrology	**Earthworks and site drainage** - Reduction in water table - Changes to groundwater distribution and flow	**Use of borehole for water supply** - Lowering water table	**Termination of abstraction** - Rebound of water table
	Groundwater quality	**Materials management**	**Materials management**	

Potential receptors of impact		Activities & potential Impacts Construction Phase	Operation phase	Decommissioning Phase
		- Pollution from spills or leaks of fuel, oil and building materials	- Contamination from agricultural chemicals, spills or leaks of fuel and oil	
LAND	Landscape	**Excavation and earthworks** - Creation of a new landform - Change in character of landscape **Creation of housing** - Change in character of landscape	**Presence of poultry housing** - Change in character of landscape **Presence of feed bins** - Change in character of landscape **Presence of manure** - Change in character of landscape	
	Soils	**Use of vehicles and machinery** - Compaction **Earthworks** - Further erosion of exposed soil	**Spreading of animal manure** - Changes in soil nutrient levels and heavy metals **Use of vehicles and machinery** - Soil compaction - Soil erosion	
AIR	Local Air quality	**Use of vehicles and machinery** - Dust generation	**Storage of manure** - Release of gases to the atmosphere - Ammonia emissions **Animal housing** - Ammonia emissions **Use of vehicles and machinery** - Exhaust emissions	
	Regional / global air quality	**Change in vegetation** - Changes in uptake of CO_2	**Storage of manure** - Release of gases to the atmosphere - Ammonia emissions **Animal housing** - ammonia emissions **Animal housing**	

Potential receptors of impact			Activities & potential Impacts Construction Phase	Operation phase	Decommissioning Phase
				- increase in domestic production leading to reduction in greenhouse gas emissions through transportation of overseas produce	
FLORA AND FAUNA		Aquatic ecology	**Drainage works and use of vehicles** - negative impact on flora and fauna from increased sediment loading of streams **Materials management** - harm to aquatic flora and fauna from oil, fuel or other substances entering watercourses	**Surface runoff** - pollution of watercourses by contaminated runoff - sedimentation of watercourses **Site drainage** - indirect effect on aquatic flora and fauna from ongoing changes to stream hydrology and morphology **Materials management** - direct and indirect effects from agro-chemicals, oil, fuel or other substances entering the aquatic environment	**Post-closure land-use** - changes in habitat type - opportunity for increase in uncultivated areas
		Terrestrial ecology	**Earthworks and excavations** - habitat removal, fragmentation or severance - disturbance to, or loss of species	**Storage of manure** - deposition of ammonia onto vegetation **Animal housing** - deposition of ammonia onto vegetation **Physical presence of building and ancillary structures** - alteration or loss of terrestrial habitats - creation of new habitats	**Post-closure land-use** - changes in habitat type opportunity for increase in uncultivated areas
HUMAN ENVIRONMENT		Socio-economic		**Farming operation**	**Closure of farm**

Potential receptors of impact	Activities & potential Impacts Construction Phase	Operation phase	Decommissioning Phase
		- continued flux of people away from or towards the farm	- movement of people away from the farm
Health & Safety	**Negative publicity** - adverse reaction to perceived health issues	**Waste disposal operations** - risk of nuisance or harm from manure storage (e.g. consumption of contaminated groundwater)	
Amenity		**Presence of building, ancillary structures and field boundaries** - possible alteration of rights of way or reduction in access **Vehicle movements** - increase in number and frequency of vehicles - noise and vibration from vehicle movements **Storage of manure / feed** - increase in flies and vermin	

2.4 Consultations

The consultation with Statutory and Non Statutory Consultees during and prior to the processing of a previous application for two broiler units at this site informed the scope of the EIA. The following Consultees made representations to the council regarding the planning application:

- Shropshire Council
- Arbor Vitae Environment

From the consultation the scope of the Environmental Impact Assessment was established. The main points of the Scope of the Environmental Impact Assessment are set out below:

- **Introduction and Project Description** – The ES should include a description of the site and its surroundings and details of its planning history. It should also include descriptions of the extent and duration of the construction works and longer term day to day activities
- **Planning Policy and Legislative Framework** – The ES should contain a section that considers the planning and legislative framework against which the proposals would be considered and assess whether the proposals accord with such policies and legislation.
- **Air Quality and Climate** – The impact of airborne emissions likely to affect designated nature conservation sites should be considered.
- **Noise and Vibration** – The assessment should cover the issues identified in the scoping exercise and include predicted noise levels from site operations and background noise monitoring at the nearest sensitive receptors including operation, construction plant and traffic noise and set out any proposed mitigation.
- **Highways and Traffic** – A Traffic Assessment is required which should assess the effects on the local road network of the extension and include details of daily movements, operational hours and routing. Details of highway improvements should be included. Details of surface water attenuation should be provided in relation to increased surface water run-off affecting the A5(T)
- **Ecology and Conservation** – The ES should include a data search from the Shropshire Ecological Record and consider direct and indirect impacts on both statutory and non-statutory sites of biodiversity importance, determine the presence of protected species (bats and great crested newts) and include mitigation as necessary.
- **Flood Risk, Surface and Groundwater Protection (Hydrology)** – The ES will need to include a section dedicated to flood risk and include a sequential test and Flood Risk Assessment (FRA). The FRA must address drainage issues to ensure that there is no increase in runoff and should take a + 20% increase in precipitation to account for climate change.
- **Landscape and Visual Assessment** – The ES should consider the site and its surroundings and should assess the proposals in the context of the local landscape character. A Zone of Visual Influence (ZVI) exercise should show the views affected by the extension. Plans of current site conditions and impacts on the quality of views as well as mitigation should be provided.
- **Historic Environment / Archaeology** – The ES should focus on indirect impacts on the settings of nearby listed buildings and include any mitigation proposals.
- **Soils**– The ES should include an assessment on the potential impacts on soils.

- **Amenity, Material Assets, and Socio-Economics** - The ES should cover issues relating to odour flies and other potential nuisance issues caused by poultry extensions.

- The ES must be accompanied by a Non-Technical Summary.

2.5 Items not to be assessed

Issues scoped out from the assessment were as follows:

- Public Safety during the Construction, Operational and Decommissioning as the site will be secure

- Utilities / Services during the construction and decommissioning phase

- Landscape features during the construction, operational and decommissioning stage

- Night-time lighting during the construction and decommissioning stages

- Archaeological during the construction, operational and decommissioning phases

- Architectural interest during construction phase

- Blight during decommissioning

- Fugitive emissions during decommissioning

- Water use during decommissioning

- Archaeology during decommissioning

2.6 Cumulative Impacts

There are 12 planning applications within a 2km radius of the selected site from September 2014 to September 2019 as shown in Table 3 below;

Table 3 – Planning Applications within 2km radius of site;

TYPE	NUMBER
Industrial	3
Transport	0
Education and Health	0
Agriculture	1
Retail	0
Civil Engineering	2
Recreation	0
Office	1
Utilities	4
Residential	7

Of the total 18 applications within the last five years one is agricultural.

List of the agricultural planning applications:

1. Osbaston Farm

CHAPTER 3 – ALTERNATIVES

3. Alternatives

This chapter sets out the requirement to assess alternatives in the Environmental Impact Assessment (EIA) process and describes the principal alternative sites considered during the development of the poultry extension proposals. It also describes how the final location at Morton Ley Farm for the proposal was ultimately reached.

3.1 Assessment of Alternatives

Where alternative approaches to development have been considered, paragraph 4 of Part II of Schedule 4 to the Town and Country Planning (Environmental Assessment) Regulations 2017 requires the developer to include in an ES an outline of the main alternatives, and the main reasons for the choice. Although the Directive and the Regulations do not expressly require the developer to study alternatives, the nature of certain developments and their location may make the consideration of alternative sites a material consideration. In such cases, the ES must record this consideration of alternative sites. More generally, consideration of alternatives is widely regarded as good practice, resulting in a more robust application for planning permission.

Schedule 4 of the Town and Country Planning (Environmental Assessment) Regulations 2017 requires that the applicant provides *"an outline of the main alternatives studied by the applicant… and an indication of the main reasons for his choice, taking into account the environmental effects"*. The wording of this clause suggests that only those "*alternatives studied by the applicant*" should be addressed such that it is not mandatory to consider all possible permutations of a proposal. It is also necessary only to deal with alternatives in "*outline*" such that detailed environmental assessment of all alternatives, or combinations of alternatives, is not required. In addition, factors other than the environment may be taken into account such as: costs; engineering constraints; safety issues; practicability; operational requirements etc.

3.2 Summary of Alternative Locations

An appraisal of suitable sites was undertaken in consultation with having regard to the environmental impact of the sites and having regard to highways and views of the development. The subject site was considered the only suitable location as it is a natural extension to the existing poultry installation and as such no alternatives have been considered for the development. No sites outside of the management control of the applicant were considered as this would have been cost prohibitive.

CHAPTER 4 – EXTENSION DESCRIPTION

4. Extension Description

This Chapter provides a description of the proposed poultry extension at Morton Ley Farm for which planning permission is sought. The description covers the site and its surroundings as well as the proposed buildings and structures that will constitute the proposed poultry extension. The chapter also describes the production cycle that will occur, providing information on the inputs and outputs from this process. There is also a summary of the construction and decommissioning phases of the extension. This description sets the basis against which the Environmental Impact Assessment has been carried out.

4.1 Existing Farm Unit

The land at Morton Ley Farm is owned by Morton Growers Ltd. There are four existing poultry units at Morton Ley Farm which are operated by Morton Growers Ltd.

The total farming area extends to approximately 62.20 acres (25.17 hectares). The main farming enterprises are arable crop production plus the existing poultry units.

4.1.1 Description of Site

The chosen site is adjoining the existing site at Morton Ley Farm. Appendix 2 shows the site location in relation to the area, a rural district to the north of Shrewsbury.

The site is surrounded by agricultural land, outlying land uses include residential to the east at Osbaston and Knockin, and even further afield is Oswestry to the North. Isolated farm units scatter the landscape. The surrounding village network is illustrated on Appendix 4 and on the Aerial Photograph at Appendix 5.

The site adjoins an existing farm buildings and yard area, the proposal does not therefore represent a major intrusion into an undeveloped area of the landscape as it extends an already developed area. Site bunding and choice of suitable cladding colours will reduce the visual impacts of the extension.

Access to the site for all HGV traffic will be from the B4396 existing access to Morton Ley Farm into the site.

The only residential property within 400 metres of the proposed extension is Morton Ley Farm farmhouse. A distance of 400 metres is established in planning as the distance beyond which effects livestock developments have a limited affect; e.g. it is the threshold which if exceeded triggers a livestock building to require full planning permission rather than determination under General Permitted Extension.

4.2 Proposed Extension

4.2.1 Overview

The Environmental Permit was varied in 2018 to allow up to 350,000 broiler places. It is proposed to erect two further buildings leading to six buildings on the site.

The site for the two further buildings is immediately to the south west of the existing unit and the six buildings will be parallel to each other. There are four existing broiler houses with a yard area and ten feed bins, car parking area and associated infrastructure.

The buildings will each measure 125.419m x 24.68m. The height to eaves will be 2.4m and 5m to ridge.

The following sections describe the production systems, the built development, operation of the site and environmental controls.

4.3 Management Cycle and Stocking Rates

4.3.1 Background

The method of broiler production that represents the *worst case* scenario is described in the following sections. The production cycle described is used to produce "Standards" rather than "Roasters", Standards are grown to a lower weight before slaughter over a shorter period. Typically Roasters are grown to a higher weight over 56 days with a 6 day turn around period (therefore 5.89 crops per year) and Standards are grown to 42 days with a 6 day turn around period (therefore 7.6g crops per year).

Broilers will be purchased as day old chicks. There will be a maximum of 45,000 per shed and they will consist of a 50-50 mix of males and females.

The unit will be managed with a two wave clearout per crop: at 36 days the cockerels will be removed. The average weight of the cockerels at 36 days will be approximately 2.272kg (Aviagen, 2007). At 42 days the pullets will be removed. The average weight of the pullets at 42 days will be approximately 2.436kg (Aviagen, 2007).

As required under Best Practice for ES's, the worst case scenario is considered therefore lower than average bird weights have been used which increases the number of potential bird places per crop.

4.3.2 Stocking Rates

The law covering the welfare of broiler chickens is covered by The Welfare of Farmed Animals (England) (Amendment) Regulations 2010. This sets the limits on stocking densities to include a maximum of 38kg/m^2 where approved by the Secretary of State and the following conditions are met:

- That documents relating to the unit giving a detailed description of production systems and technical details of the house are maintained and available on request to the Secretary of State.
- The documents relating to the detailed description of production systems and technical details are kept up to date.
- Ensuring that each house is equipped with ventilation and, if necessary, heating and cooling systems designed, constructed and operated in such a way that –
  - i) The concentration of ammonia does not exceed 20 parts per million and the concentration of carbon dioxide does not exceed 3,000 parts per million, when measured at the level of the chickens heads;
  - ii) When the outside temperature measured in the shade exceeds 30 degrees, the inside temperature does not exceed the outside temperature by more than 3 degrees; and
  - iii) When the outside temperature is below 10 degrees, the average relative humidity measured inside the house during a continuous period of 48 hours does not exceed 70%.

The birds will be grown for a food processing company that supplies chicken to the retail trade. In order to supply the retail trade, all farmers must as a minimum, be members of the independently audited Red Tractor Farm Assured Chicken Scheme (formerly ACP). The scheme requires farmers to comply with strict management requirements such as stocking at a maximum of 38kg/m^2. Some retailers now require the supply of 'Higher Welfare Chicken' (HWC), which includes those endorsed by the RSPCA Freedom Foods Scheme stocked to a lower rate of 30kg/m^2. However, as this is based on a 'worst case scenario' the higher stocking rate has been used to ensure the maximum stocking has been considered.

The chicks will be brought in from a hatchery with the average crop cycle being around 38 days plus the clean-out period. Before the chicks arrive the bedding is put in the buildings, which consist of wood shavings to a depth of around 2cm. The houses are warmed to a temperature of around 34 degrees. The temperature is reduced as the birds grow older and the ventilation rate conversely increases. Feed will be supplied by the processing company with additional grain grown on the farm. It will be mixed

according to the birds requirements at each stage of growth. The protein and phosphorus levels are reduced as the birds get larger. The water will be supplied by nipple drinkers which offer water on demand but minimise spillage.

The birds are checked regularly and any mortalities removed on a daily basis. The dead birds will be stored in vermin proof containers to await collection by Animal Health approved contractors.

At the end of the production cycle, the birds are removed and transported to the processing site. The buildings then go through a thorough clean-out phase which involves dry-cleaning to remove organic material, wash down and disinfecting. The normal turn around period is around 10 days before the buildings can be re-stocked and the cycle starts again.

4.4 Site Layout

4.4.1 Main Buildings Design

It is proposed that two broiler houses are constructed. The poultry houses will each measure 24.68 metres x 125.418 metres. The total floor area for each shed will therefore be 3,095m^2. Eaves and ridge height will be 2.40 metres and 5.00 metres respectively. Each of the new houses will have the potential to accommodate 45,000 "standard" broilers.

The design of the new buildings will be typical of modern poultry sheds.

Roofs

Box profile metal sheeting at 10 degree pitch. Eaves height: 2.40 metres, ridge height 5.0 metres.

Walls

Box profile metal sheeting.

Insulation

The broiler houses will be insulated with fibre glass insulation to the walls and roofs. The walls will be insulated with 100 mm insulant and the roofs with a 200 mm insulant. The U value will be <0.4 W/m^2 ^{o}C and therefore condensation on the inner lining of the buildings will be eliminated and the solar heat gain into the houses will be minimal.

Flooring

The houses are erected with a smooth easily washable concrete floor on a damp proof membrane. The walls will rest on a poured concrete foundation. The specification is as follows:-

- 100 mm concrete floor thickened to 200 mm thick below perimeter walls, 1,000ga DPM minimum 125 mm consolidated blinded hardcore.

Ventilation

The ventilation system will consist of air scrubber units, which would provide the majority of the ventilation for the majority of the time. Backup ventilation in case of scrubber failure and for supplementary ventilation which would be required at the end of crops in warm weather, would be provided by high speed ridge or roof fans, each with a short chimney.

Windows

Polycarbonate windows based on 3% of the floor area to RSPCA Welfare Standards will be incorporated and linked into automatic dusk till dawn sensors with a U value of 1.7 at 62% light transmissions. The windows will be 4 / 6 60mm 20mm / 4mm units with a quoted R_w of 29dB.

Shed Colour

The sheds will be coloured to Local Planning Authority specification. Olive Green is the applicant's preferred choice.

4.4.2 Ancillary Structures & Description

Hard standing / Loading Area

A 12 metre wide by 91 metre long and 0.15 metre thick concrete apron will be constructed to the front of the buildings together with turning head; this area will be used for loading and unloading chickens and chicks, unloading feed and removing manure.

Feed Bins

The two sheds will have five feed bins between them. The feed bins will have a 30 tonne capacity and will measure 7.5 metres high and will be 2.8 metres in diameter.

4.5 Access

4.5.1 Site access

The site is accessed off the B4396. Access to the Strategic Road Network is accessed along the B4396 to Llynclys Crossroads where the vehicles will join the A483 and thereafter the A5 Trunk Road at Mile End Roundabout. The access arrangements are designed to restrict HGV movements on to the B4396; Feed HGVs will be coming from Lloyds Animal Feeds located approximately ½ mile away on the B4396 towards Morton. The existing access is to be used which is 3.5 metres in width as indicated on Appendix 6 as approved under planning application 11/02934/EIA plan reference 996.S2A.

4.5.2 Routeing

Only routes used by HGVs, Tractor and Trailers and management (4 x 4s) are described below. All other traffic accessing the site such as engineers, vets etc will arrive in a small vehicle and will be too infrequent to discuss.

- Route A: HGV movements will be restricted by design and management to connect to the Strategic Road Network at Llynclys Crossroads onto the A483 and thereafter the A5 Trunk Road.

4.6 Equipment and Management

The management of the site will be overseen by Mr Julian Edwards of Morton Growers Ltd. All staff working for Morton Growers Ltd will be suitably trained and experienced in working on a poultry site. The site will operate 24 hours a day, 7 days a week as continual management and husbandry is required for livestock.

Feed

The feed will be supplied by Lloyds Animal Feeds, Morton. The feed will be mixed to the appropriate requirement at each stage of the production cycle. It will be composed of high-quality raw materials and will be designed to suit the nutritional needs of a broiler chicken. The feed will be blown from bulk feed HGVs into the bulk feed bins.

A Feed Conversion Rate (FCR) for the flock of 1.7 kg per kg produced (Aviagen, 2007) has been used for the purpose of this report. The number of tonnes of feed consumed per cycle by the flock is therefore calculated as 353.

Water

Water will be supplied via an existing borehole and mains water supply. It will be delivered to the birds via nipple drinkers; there will be a minimum of 1 nipple drinker per 10 to 20 birds as per ACP management requirements.

Nipple drinkers are used due to (a) ease of management, (b) good bird performance (c) maximum hygiene and (d) odour control; they keep the moisture content of the manure low as spillages are rare – dry manure is a less odorous and it is necessary to ensure that the risks of odours are minimised.

Electrical Power

Connection to the electricity grid will be made via the existing supply that is connected to the farm adjoining the site.

Mortalities

Mortalities are collected on a regular basis, stored in sealed containers and removed by a licensed operator – for the first three weeks of the production cycle the carcasses will be stored in a frozen store on site to reduce unnecessary vehicle movements. This report uses a figure of 3.5% of flock for mortalities per crop, this is the industry norm.

Litter

Wood shavings will be used to a depth of 2 cm; this allows the floor to breath and release moisture enhancing environmental conditions inside the poultry house. This proposed depth of litter complies with the Red Tractor Assurance Scheme Standards (formerly ACP). The litter will be removed at the end of each production cycle, by specialist contractors using a bobcat which will load the trailers directly inside the doors. The trailers will be sheeted and the litter taken straight off the site to a local AD plant. No muck from the poultry units will be stored or spread on the farm.

Dirty Water

After the litter is cleared the building and roofs inside and the walls are then blown down with compressed air. Washing water then passes via a pipe directly in to collection tanks between the houses. One tank will serve the sheds. Each tank holds 40 cu metres. Due to variants in the yard levels the tanks will serve a proportion of the yard area. The tanks will be made of concrete and will be to BS 5502 requiring no maintenance. When the cleaning out is in progress the dirty washing water and any contaminated rain water falling on the yard will be directed via drains to manholes and in to the tanks.

With the polished floors following a brushing down there will be very little solid matter to be carried away with the washing water. The sheds will take approximately 6 hours to be fully washed down. With the drains in the lowest corner of the sheds leading directly into the collection tanks and no water passing out on to the outside yard there can be no mistake over the position of the isolating valve (Described in Chapter 4) when washing down is taking place. The outside area can then be cleaned up when the litter has been taken away and also controlled in sections by the sloping concrete and having two tanks.

There will be a single pump with 2 pressure washing lances each delivering approximately 15 litres per minute. They are likely to be running for 70% of the time and so the total volume of water used in a 6 hour day will be approximately 7.56 cu metres. In practice because of the warm temperature of the concrete floor inside the houses some of this water evaporates.

Allowing for heavy rainfall on the outside concrete service area while the litter is being removed over perhaps a 3 day period the outside concrete area needs to be temporarily piped into the dirty water collection tank via a collection manhole. The concrete yard area measures approximately 1080 square metres and so allowing for 25 mm of rainfall over a working day the total volume of water which would need to be contained would be:

1080 sq m x 0.025 = 58.5 cu. metres

When washing coincides with the removal of litter the volume of washing water on a single day needs to be added to give a combined volume associated with the new units needing to be temporarily stored of approximately 67 cu. metres. On days such as this the tanks will need to be emptied during the day. Normally on a daily basis the volumes will be less than described. A level indicator in the tanks easily visible from the yard will help to quickly identify that the tanks need emptying. The tanks will be emptied as necessary at the end of the day and taken away for safe spreading by a member of staff on land within the management control of the applicant.

As a worst case scenario the potential production of dirty wash water at the close of each crop will be 167.5 cubic metres; an annual production of 1,273 cubic metres, this uses the assumption clearing out will take five days.

Importantly the wash water from the washing down is diluted wash water with a low nitrogen content and therefore can be spread on land at all times of the year and are therefore not included within calculation of nutrient loading for the purpose of field application.

4.7 Landscaping Planting and Management

4.7.1 General

The proposed landscaping plan for the poultry site is designed to provide biodiversity benefits to the operational site whilst creating an attractive setting, softening the appearance and obscuring the proposed buildings from view. New planting will include suitable native species and shrubs from local stock, where appropriate, to provide screening and habitat areas for wildlife. Native woodland planted around the site boundary will provide nesting and foraging areas for birds. The landscape proposals are shown on the Landscape Plan at Appendix 7, and are described below in detail.

4.7.2 Landscape Plan

Woodland Planting

It is proposed to create an area of native woodland planting to form a woodland tree belts of local landscape value although there are no Ancient Woodlands in close proximity, the nearest being in Llynclys Hills.

The proposed woodland planting will use a native mix in order to retain local vernacular. It is proposed to plant the wood as a mixture of "timber trees" and "Underwood". The Underwood will be felled and allowed to grow again by coppicing or suckering on a seven to ten year rotation. Many of the timber trees will stand for a number of cycles of regrowth before being felled when full-grown. When felling is undertaken it will be carried out on a rotation so that at all times a screen will remain relating to the length of the extension.

Woodland is proposed on the site between the proposed buildings and the B4396 and along the north eastern side of the buildings. There will also be some planting either side of the site entrance. The planting on the northern and north eastern side of the sheds will be essential to screen the buildings from the road and surrounding footpaths. This area of planting will include, ash, Elder, Field Maple, Silver Birch, Holly, Black Polar and Scots Pine. The planting is illustrated on Appendix 7.

Hedgerows

As part of the landscaping scheme the applicant proposes to maintain the existing mature hedgerows and to grow an effective screen of the extension through hedgerow management.

Traditionally, hedgerows were used to enclose or exclude animals and to mark ownership boundaries and rights of way. The particular mix of shrub and tree species in a hedgerow, which reflects both the age and local management customs, contributes to local landscape character. Hedgerows are a living part of landscape history and provide a record of use of the countryside over the centuries. The

particular planting mix within the new hedgerows will reflect the local vernacular it will include hawthorn and blackthorn as a base species but will include additional species found locally in ancient hedges.

Rough Grassland

Within the site boundaries on land that can no longer be cultivated as part of usual cropping areas of rough grassland will be created. The provision of a grassy area will greatly increase the wildlife interest of an arable field. The provision of a natural grassy area, containing some grassland flowering plants and scrub will benefit wildlife including invertebrates, birds, reptiles and amphibians (if located) near to a water feature.

4.7.3 Landscape Management

The applicant will establish a site management plan to ensure the maintenance of the landscaping scheme. This is likely to include thinning the tree cover, where necessary, occasional scrub clearance and mowing to maintain the grassland areas.

4.8 Lighting

The main building's gable ends will be lit externally with a single low-wattage fitting of low intensity lighting during normal working hours in winter months. All external lighting will be downward facing and protected with a cowl to reduce light spill to outside the unit.

During the clear out and thinning periods the site will be lit by low wattage lighting while birds are being removed from the buildings, this operation will be carried out in low light conditions to minimise stress to the birds.

There will be no round the clock external lighting of the site and no use of high intensity security lighting.

During hours of darkness the broiler sheds will be illuminated internally to 0.4 lux. The buildings will be clad with high density metal profile sheeting and therefore no light will escape to the outside. Regular tests will be conducted to check the effectiveness of the light proofing. The windows will be shuttered to avoid light escaping to the outside.

4.9 Surface Water Drainage

The site drainage scheme has been designed using Sustainable Drainage Systems (SuDS) principles that aim to mimic natural systems on Greenfield sites.

A swale is proposed to provide storage capacity for the 1 in 100 year event plus 20% for climate change as calculated using the IH124 methodology for sites smaller than 50 hectares. The calculations are based on a 6 hour duration storm event following advice in the SUDS manual (Ciria c697). The calculations conclude that 8 hour storm duration would produce the worst case storage volume and the design is therefore based on this.

The existing swale is 170 metres long and 7 metres wide. It is proposed to lengthen the swale to 245m.

- Attenuated flow from swale to discharge to the River Morda to the east of site

4.10 Environmental Controls

4.10.1 Introduction

Environmental Permit Determination

The proposed operation has successfully applied and gained a licence to operate under the Environmental Permitting (England and Wales) Regulations 2017 as regulated by the Environment

Agency. A copy is included in Appendix 8. The number of birds applied for in the permit covers 6 poultry units totalling 350,000 birds. In being issued with the operating permit, the site will be required to demonstrate that Best Available Techniques will be used to minimise emissions to all media. A detailed assessment of controls on air pollutants and any residual air quality effects are required as part of this process, the assessment considers impacts of ammonia on ecological sites.

The purpose of the Environmental Permitting is to achieve integrated prevention and control of pollution arising from activities listed in Annex 1 of the European Council Directive 96/61/EC, leading to a high level of protection of the environment as a whole. More specifically, it provides a system requiring operators and regulators to take an integrated, overall look at the polluting and consuming potential of the poultry extension. Central to this approach is the general principle that operators should take all appropriate preventative measures against pollution, in particular through the application of best available technique enabling them to improve environmental performance.

Best Available Technique

The term "best available technique" is defined in Article 2(11) of the European Directive as "the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing the basis for emission limit values designed to prevent and, where that is not practicable, generally reduce emissions and the impact on the environment as a whole."

The best available techniques to be applied to the poultry extension at Morton Ley Farm are those set out in the European Commission's *Reference Document on Best Available Techniques for Intensive Rearing of Poultry and Pigs* known as the BREF document. The following systems within the BREF Document are applicable to the proposed poultry extension at Morton Ley Farm:

- Good agricultural practice for environmental management
- Best Available Techniques for nutritional management
- Best Available Techniques for efficient use of water
- Best Available Techniques for efficient use of energy
- Best Available Techniques for the reduction of emissions from poultry housing
- Best Available Techniques for housing of broilers
- Best Available Techniques for the reduction of odour
- Best Available Techniques for the reduction of emissions from storage
- Best Available Techniques for the reduction of emissions from application of manure to land
- Best Available Techniques to reduce noise emissions
- Best Available Techniques for the treatment and disposal of residues other than manure and carcases

4.11 Construction

The exact methods employed to build the proposed poultry extension will be decided by the preferred shed contractor. The final construction methods and activities will be agreed with the relevant authorities prior to commencement.

Construction operations will take place between the hours of 0700 and 1900 Monday to Friday and 0700 to 1300 on Saturdays. Construction activities are unlikely to take place on Sundays and Bank Holidays and, if required, any significant work outside of these hours would be with the prior consent of the planning authority.

There will be no public access to the construction site and suitable fencing will be used to secure the site boundary.

4.12 Decommissioning

4.12.1 Introduction

The proposed poultry extension will be operated and maintained to ensure there is no deterioration in the site conditions during the life of its environmental permit. Materials that will have potential to cause contamination or pollution will be managed so as to minimise that potential. Environmental monitoring will be conducted throughout the operating life to review all emissions from the site.

Prior to the end of operations at the site a Site Closure and Restoration Plan will be prepared. It is anticipated that much of the proposed structure will be recyclable depending on market conditions at the time. In particular the concrete (for aggregate) and metal (for scrap) are likely to be readily recycled. It may also be possible for the buildings to be re-used for another purpose at the time of decommissioning.

4.12.2 Decommissioning Considerations for the Design

The design of the poultry extension will be in accordance with all relevant legislation and standards, and industry good practice. The proposed poultry extension will be designed to ensure it can be constructed, operated, maintained and decommissioned safely, in accordance with the Construction (Design and Management) Regulations.

Decommissioning issues to be considered during the design process include:

- Safety of construction materials;
- Robustness and durability of construction materials;
- Consumables and materials used in operation;
- Ease of access and procedure for dismantling;
- Size, weight and location of equipment;
- Appropriate storage of materials;
- Prevention of accumulations of contaminated or hazardous wastes;
- Ease of maintenance and cleaning;
- Electrical systems;
- Conveyance and control of liquids.

4.12.3 Decommissioning Considerations during Operation

Operational procedures will be adopted that will give due consideration to the ease and safety of decommissioning the poultry extension. Staff will be trained to ensure these measures are understood and implemented.

4.12.4 Site Closure

When the site operation is due to cease, a Site Closure and Restoration Plan will be prepared in consultation with the EA. All techniques previously described for minimising or mitigating potential for contamination will be adopted, together with specific measures for Site Closure activities. The Plan will include the following information:

- Site survey and ground investigation data, including soils testing and any proposed protection, decontamination and monitoring measures;
- Details of the removal or flushing out of pipelines and tanks;
- Plans of all underground pipes, tanks, services and foundations;
- Details of the treatment and or removal of all potentially harmful materials;
- Outline proposals for decommissioning, including method statements and risk assessment to be developed in detail prior to commencement of decommissioning of the plant.

In due course, a Closure Site Report will be drafted as part of the application to surrender the Environmental Permit.

All as building drawings and associated documents, Health and Safety files prepared under the Construction (Design and Management) Regulations and operating manuals will be collected together. Risk assessments and detailed method statements will be prepared to identify the hazards; required control measures specific procedures to be adopted during the decommissioning of the poultry extension.

Consultation will continue as appropriate with the EA, Health and Safety Executive (HSE), Local Authority and Planning Authority to ensure requirements are met. The relevant Notice of Demolition will be required from the Local Authority, and other notifications required under Health and Safety at Work Act 1974 (or equivalent at the time) will be made.

CHAPTER 5 – POLICY & LEGISLATION

5. Planning Policy and other Legislation

This chapter briefly summarises the principal planning policies and legislation relating to the operation of poultry farms at National, Regional and Local levels. It concludes that the proposal for the extension to the poultry farm at Morton Ley Farm is consistent with these policies and objectives.

5.1 Introduction

The purpose of this Chapter of the Environmental Statement is to provide an overview of how the proposed poultry extension at Morton Ley Farm 'fits' with the European, national, regional and local agricultural policy and legislative framework.

The chapter is structured around the hierarchical policy framework of:

- European agricultural legislation and policy;
- National agricultural strategy and planning policy guidance;
- Regional agricultural strategy and regional spatial strategy; and
- Local development plans.

The section concludes with an overview of the proposed extension in the context of the key policy messages.

5.2 Environmental Permitting (England & Wales) Regulations 2017

The extension will accommodate a maximum of 90,000 birds (existing unit at Morton Ley has 90,000 birds), this is over the threshold of 40,000 birds and an Environmental Permit from the Environment Agency will be required.

The proposed operation has successfully applied and gained a licence to operate under the Environmental Permitting (England and Wales) Regulations 2017 as regulated by the Environment Agency. A copy is included in Appendix 8.

The Environmental Permit is effectively a licence to operate and will only be granted if an acceptable level of Pollution Control management systems are adhered to. Under the Environmental Permitting regime the Environment Agency include the following key areas of potential harm when making an assessment for the Permit:

- Management – including general management, accident management, energy efficiency, efficient use of raw materials, waste recovery and security.
- Operations including permitted activities, operating techniques, closure and decommissioning.
- Emissions to water, air and land including to groundwater and diffuse emissions, transfers off site, odour, noise and vibration and monitoring.
- Information – records, reporting and notifications.
- Poultry Production – including the use of poultry feed, housing design and operation, slurry and manure storage and spreading.

All of the above would be assessed within the requirements of Best Available Techniques (BAT).

5.3 National Planning Policy

5.3.1 National Planning Policy Framework

The Revised National Planning Policy Framework (NPPF) was published in July 2021. The Framework sets out the Government's planning policies for England and how these should be applied. The purpose of the planning system is to contribute to the achievement of sustainable development – meeting the needs of the present without compromising the ability of future generations to meet their own needs. Plans and decisions should apply a presumption in favour of sustainable development.

Paragraph 8 states that there are three different objectives to sustainable development

- Economic;
- Social; and
- Environmental

Which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives).

Economic

Paragraph 8 of the NPPF sets out the objective '*to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating provision of infrastructure'.*

Chapter 6 Building a Strong, Competitive Economy identifies that planning should support a prosperous rural economy and that planning policies and decisions should enable:

The sustainable growth and expansion of all types of business in rural areas both through conversion of existing buildings and well-designed new buildings.

The development and diversification of agricultural and other land-based rural businesses.

Sustainable rural tourism and leisure development which respect the character of the countryside and;

The retention and development of accessible local services and community facilities, such as local shops, meeting places, sports venues, open space, cultural buildings, public houses and places of worship.

The Morton Ley Farm proposed development is part of a family farming business which has already diversified into broiler production to help meet the demand for British chicken meat; this will help to preserve the viability of the business for future farming generations. The proposed development complies with the national planning policy and weight should be given to the need to support such rural businesses, particularly in ensuring their longevity through sustainable reactions to farming markets.

Social

Paragraph 8 social objective is to support *strong, vibrant and healthy communities.*

Agriculture plays a significant role in the vibrancy of local communities across Shropshire, performing a social function as well as an economic function. The farming community is a key part of community life and cohesion in our rural villages and towns. In addition, agriculture provides a key source of employment for local people, particularly in peak seasons such as harvest.

The proposed poultry unit will help to ensure that the farming business remains viable for future generations by improving the profitability of the business and creating further employment. It will allow the business to respond more effectively to fluctuations in the commodity markets. Flexibility is vital in ensuring the longevity of farming business and, as such, the proposed development should be supported.

Environmental

Paragraph 8 of the NPPF is *to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*

Consideration has been given to the potential impact of the development on the character of the surrounding landscape. The proposed development has been designed with landscape and visual impact in mind, and the location of the site has been selected as low impact. Planting is to take place around the buildings which will not only reduce visual impact but increase biodiversity.

The proposed development complies fully with the policies contained within the NPPF. The proposed development makes a sustainable contribution to Shropshire's rural economy and farming community, diversifying an existing and well established agricultural business, allowing it to react to turbulence in the commodities market and remain viable fur future generations.

5.4 Local Planning Policy

At the local level agricultural planning policy is set out in the saved policies of the Shropshire Core Strategy. It states:

"promote sustainable economic development and growth by providing a flexible and responsive supply of employment land and premises, and….to support business development, satisfy the changing needs and demands of the Shropshire economy, promote inward investment, and to help generate skilled, well paid employment opportunities."

The Council's policies balance the conflicting demands of the need to ensure a buoyant rural economy and the need for the rural community to have access to a range of services and facilities. In order to achieve this, all the policies and proposals arising from the Local Development Plan are considered against the aim to "actively encourage a diverse and sustainable rural economy".

The proposed development is an agricultural scheme which will allow the business to develop in a positive and sustainable direction. The poultry industry continues to grow and presents an opportunity for farm businesses with the space and capacity to diversify their income.

The following policies are applicable to this proposal. The policies have led the approach to the principles of the design and layout of the extension:-

- CS5 Countryside and Green Belt

This policy supports agricultural related developments, recognising the need to ensure proposals for large scale new developments do not have unacceptable adverse environmental impacts. It also supports the retention and appropriate expansion of existing established businesses.

- CS6 Sustainable Design and Design Principles

CS6 applies to all development proposals and requires all development to protect, restore, conserve and enhance the natural, built and historic environment. Development should be appropriate in scale, density, pattern and design taking into account the local context and character.

- CS13 Economic Development, Enterprise and Employment

This policy recognises the continued importance of farming for food production and supporting rural enterprise and diversification of the economy, in particular areas of economic activity associated with agricultural and farm diversification. This policy must be given significant weight given its alignment with the overarching principles and objectives of the Core Strategy read in conjunction with the NPPF.

- CS17 Environmental Networks

This policy enables Shropshire's environmental assets to be identified, protected, enhanced and expanded to create a multifunctional network of natural and historic resources.

5.5 Policy Framework Overview

Examination of the current policy and legislative framework demonstrates that there is an acceptance that agricultural diversification has a continuing role in the rural area. The proposals are consistent with policies and objectives.

CHAPTER 6 – AIR QUALITY, HEALTH & CLIMATE

6. Air quality, Health and climate

The potential effects of atmospheric emissions from the proposed poultry extension were assessed. This took account of air quality standards and guidelines, potential health effects and effects on internationally and nationally designated conservation sites. The potential effects of the proposed poultry extension were assessed using screening tools where appropriate. In view of the emission integral to the design and operation of the poultry extension, it was forecast that all relevant air quality standards and guidelines will be achieved. It is concluded that emissions to air will have no significant adverse effects on air quality, the natural environment, or the health of local people.

6.1 Introduction

The main issue in relation to air quality, human health and climate from poultry buildings is from the ventilation fans. Each building will house up to 45,000 birds.

There is also potential for the development to affect air quality in the following ways:

- Dust generated during site construction – this is covered in Chapter 10 Amenity
- Dust generated from feed delivery – this is covered in Chapter 10 Amenity
- Airborne pollutants from extraction fans and potential effect on designated ecological sites
- Potential for odour generation from the production, storage and application of poultry manure – this is covered in Chapter 10 Amenity and Chapter 13 Odour
- Emissions from vehicles travelling to and from the site – this is covered in Chapter 9 Traffic
- Emissions of Carbon Dioxide from fossil fuel sources of carbon which can affect climate change
- Air quality

6.2 Legislation and Consultation

Habitat Regulation Assessment

The application will be considered under the Habitat Regulation Assessment process in order to satisfy the Local Authority duty to adhere to the Conservation of Species & Habitats Regulations 2010 (known as the Habitats Regulations).

Natural England will be formally consulted on this planning application and the Local Planning Authority must have regard to their representations when making a planning decision. Planning permission can only be granted where it can be concluded that the application will not have any likely significant effects on the integrity of any European Designated site.

The proposed application has an Environmental Permit from the Environment Agency. Shropshire Council, under Regulation 61 in the Habitats Regulations, can rely on the 'evidence and reasoning' of another competent authority. Shropshire Council can therefore use the Environment Agency modelling from the permit to complete the assessment of air pollution impacts.

With regards to assessment of ammonia, Shropshire Council require further information than that provided by the Environment Agency. An assessment of ammonia impacts against critical levels and critical loads (for nutrient and acid deposition) has therefore been completed by AS Modelling & Data Ltd.

6.3 Ammonia Emissions

AS Modelling & Data Ltd. has been instructed by Rosina Bloor of Roger Parry & Partners LLP., on behalf of Morton Growers Ltd., to use computer modelling to assess the impact of ammonia emissions from the existing and proposed broiler chicken rearing houses at Morton Ley Farm, near Osbaston, Oswestry. SY10 8BG.

Ammonia emission rates from the poultry houses have been assessed and quantified based upon the Environment Agency's standard ammonia emission factors and also upon an emissions model that

estimates emissions from the Pollo Company Air Scrubber ammonia scrubbing equipment that would be fitted to the existing and proposed poultry houses. The ammonia emission rates have then been used as inputs to an atmospheric dispersion and deposition model which calculates ammonia exposure levels and nitrogen and acid deposition rates in the surrounding area.

This report is arranged in the following manner:

- Section 2 provides relevant details of the farm and potentially sensitive receptors in the area.
- Section 3 provides some general information on ammonia; details of the method used to estimate ammonia emissions, relevant guidelines and legislation on exposure limits and where relevant, details of likely background levels of ammonia.
- Section 4 provides some information about ADMS, the dispersion model used for this study and details the modelling procedure.
- Section 5 contains the results of the modelling.
- Section 6 provides a discussion of the results and conclusions.

Background Details

The site of the broiler rearing houses at Moreton Ley Farm is in a rural area, approximately 750 m to the west-north-west of the village of Osbaston in Shropshire. The surrounding land is used largely for a mixture of arable and livestock farming, but there are also some isolated wooded areas. The site is at an altitude of around 70 m and is surrounded by relatively flat land.

There are currently four broiler chicken rearing houses at Moreton Ley Farm. The existing houses are ventilated by roof fans and gable ends fans with dust baffles.

Under the proposal, two new poultry houses would be constructed to the south-west of the existing buildings. The four existing and two proposed poultry houses would provide accommodation for up to 350,000 broiler chickens in total. The existing and proposed poultry houses would be ventilated by air scrubber units, which would provide the majority of the ventilation, for the majority of the time. Backup ventilation in case of scrubber failure and for supplementary ventilation which would be required at the end of crops in warm weather, would be provided by high speed ridge or roof fans, each with a short chimney. The chickens would be reared from day old chicks up to 38 days old and there would be approximately 7.5 flocks per annum.

Five scenarios have been modelled:

Scenario 1 - The four existing poultry houses with current ventilation system. (The Existing Scenario).
Scenario 2 - The two proposed poultry houses with standard ventilation.
Scenario 3 - The four existing houses, fitted with the Pollo air scrubber units.
Scenario 4 - The two proposed poultry houses, fitted with the Pollo air scrubber units.
Scenario 5 - The existing and proposed poultry houses, all fitted with the Pollo air scrubber units. (The Proposed Scenario).

There are several sites designated as Local Wildlife Sites (LWSs) and Priority Habitats (PHs) within 2 km of the existing and proposed poultry houses. There are also thirteen Sites of Special Scientific Interest (SSSIs) within 10 km, one of which is also designated as a Ramsar Site and one is also designated as a Special Area of Conservation (SAC). Some further details of SSSIs, Ramsar site and SAC are provided below:

- Morton Pool and Pasture SSSI/Ramsar site - Approximately 1.1 km to the west-north-west - The chief interest of Morton Pool is the fen and carr vegetation around it. The damp peaty pasture west of Morton Pool is exceptionally rich in flowering plants and is one of the best examples of damp grassland in Shropshire.
- Crofts Mill Pasture SSSI - Approximately 1.3 km to the north-north-west - A particularly rich example of damp peaty pasture.
- Llanymynech and Llynclys Hills SSSI - Approximately 3.3 km to the west - Extensive grassland, scrub and woodland communities and also natural rock faces, screes, a series of abandoned quarries and areas affected by past lead and copper mining. This site is particularly important for its limestone plants. The screes and shaded rocks at the base of the cliff are especially valuable for mosses and liverworts.
- Sweeney Fen SSSI Sweeney Fen - Approximately 3.9 km to the west-north-west - A small area of base-rich marsh and fen which has developed adjacent to a limestone stream. A thin deposit of peat has accumulated.
- Blodwel Marsh SSSI - Approximately 4.5 km to the west - A small but exceptionally rich area of fen pasture on base-rich peat, in a low-lying area west of the limestone outcrop of Llynclys Hill. This is one of a range of small, peaty grasslands in north-west Shropshire.
- Montgomery Canal, Aston Locks - Keeper's Bridge SSSI - Approximately 2.8 km to the north-north-east - A disused length of canal which is among the best localities for aquatic plants in Shropshire.
- Trefonen Marshes SSSI - Approximately 6.8 km to the west-north-west - A series of base-rich marshes and areas of dry Carboniferous limestone grassland in the valley of a tributary of the River Morda. Some of the damp areas beside the stream have developed into alder woodland.
- Craig Sychtyn SSSI - Approximately 7.9 km to the west-north-west - A west-facing Carboniferous limestone crag with woodland, scrub, grassland and rock face communities.
- Ty-Brith Meadows SSSI - Approximately 8.3 km to the south-west - An extensive example of unimproved lowland mesotrophic grassland managed as traditional hay meadow.
- Breidden Hill SSSI - Approximately 8.2 km to the south - Of outstanding importance for its uncommon plants. The presence of intruded igneous rocks, particularly dolerite, in this geologically complex site has led to a remarkable mixture of both lime-loving and acid-loving plants. Low outcrops and screes of igneous rocks support a notable and characteristic lower plant flora, with many species of mosses and lichens.
- Lin Can Moss SSSI - Approximately 6.4 km to the east-south-east - A small quaking bog which is believed to have developed in recent years. The surface is dominated by *Sphagnum recurvum*. The uncommon slender sedge *Carex lasiocarpa* has been found and other characteristic plants include sundew *Drosera rotundifolia*.
- Fernhill Pastures SSSI - Approximately 9.5 km to the north - A series of traditionally managed fen-meadows situated on gently sloping ground alongside the River Perry in north west Shropshire.
- Montgomery Canal SSSI/SAC - Approximately 4.9 km to the south-west - Of special interest because it supports aquatic, emergent and marginal plant communities of exceptional richness, including a large population of the internationally rare and threatened floating water plantain *Luronium natans* and a several other rare and scarce water plants. An important aquatic invertebrate assemblage is also present.

Maps of the surrounding area showing the position of the existing and proposed poultry houses and the nearby wildlife sites are provided in Figures 1a and 1b. In the figures, the LWSs are shaded in yellow, the SSSIs are shaded in green, the SAC is shaded in purple and the Ramsar site is shaded in blue, the site of the existing poultry houses is outlined in red and the site of the proposed poultry houses is outlined in blue.

Figure 1a. The area surrounding Morton Ley Farm, with circles radii at 2km (olive), 5 km (green) and 10 km (purple)

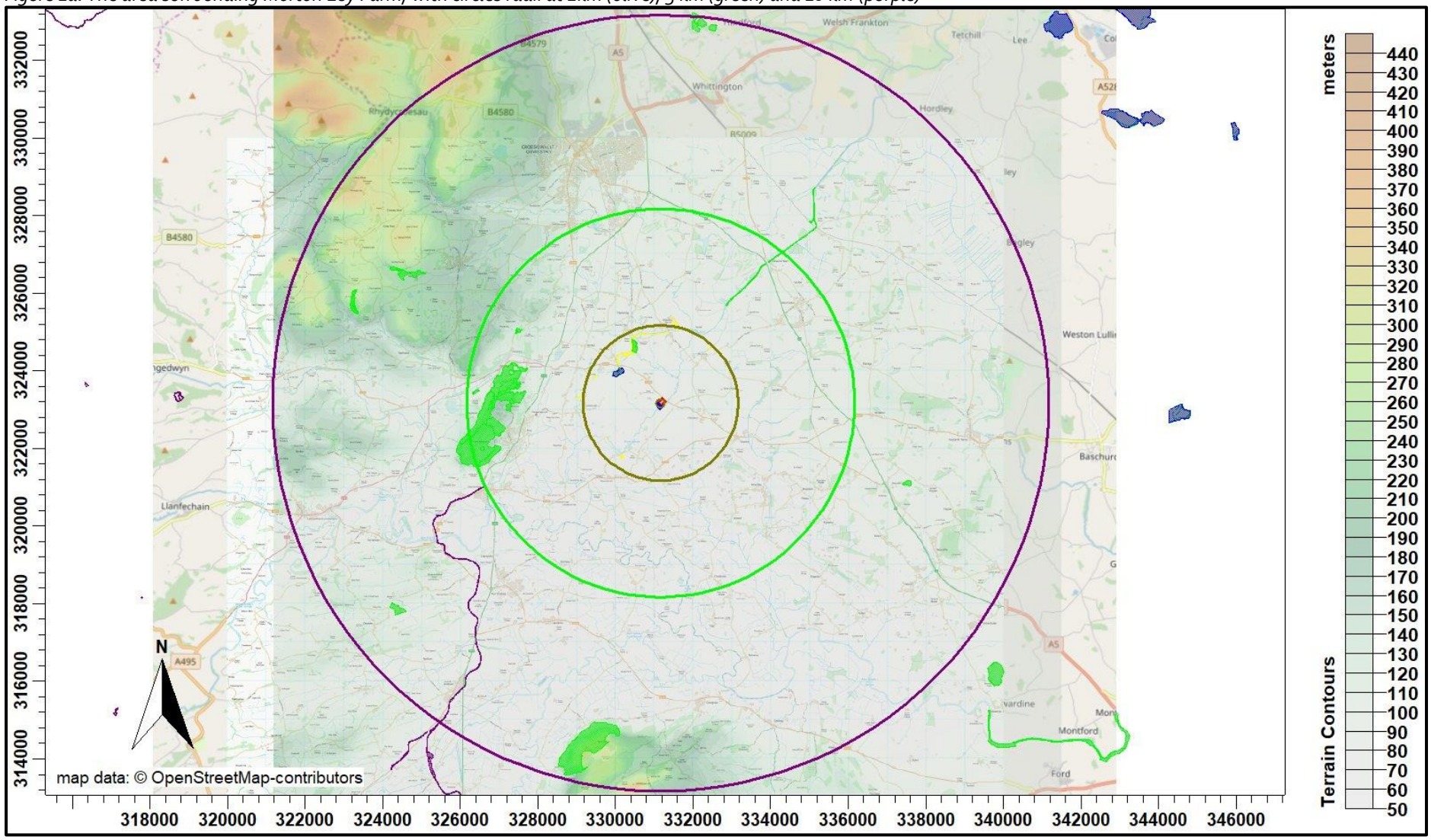
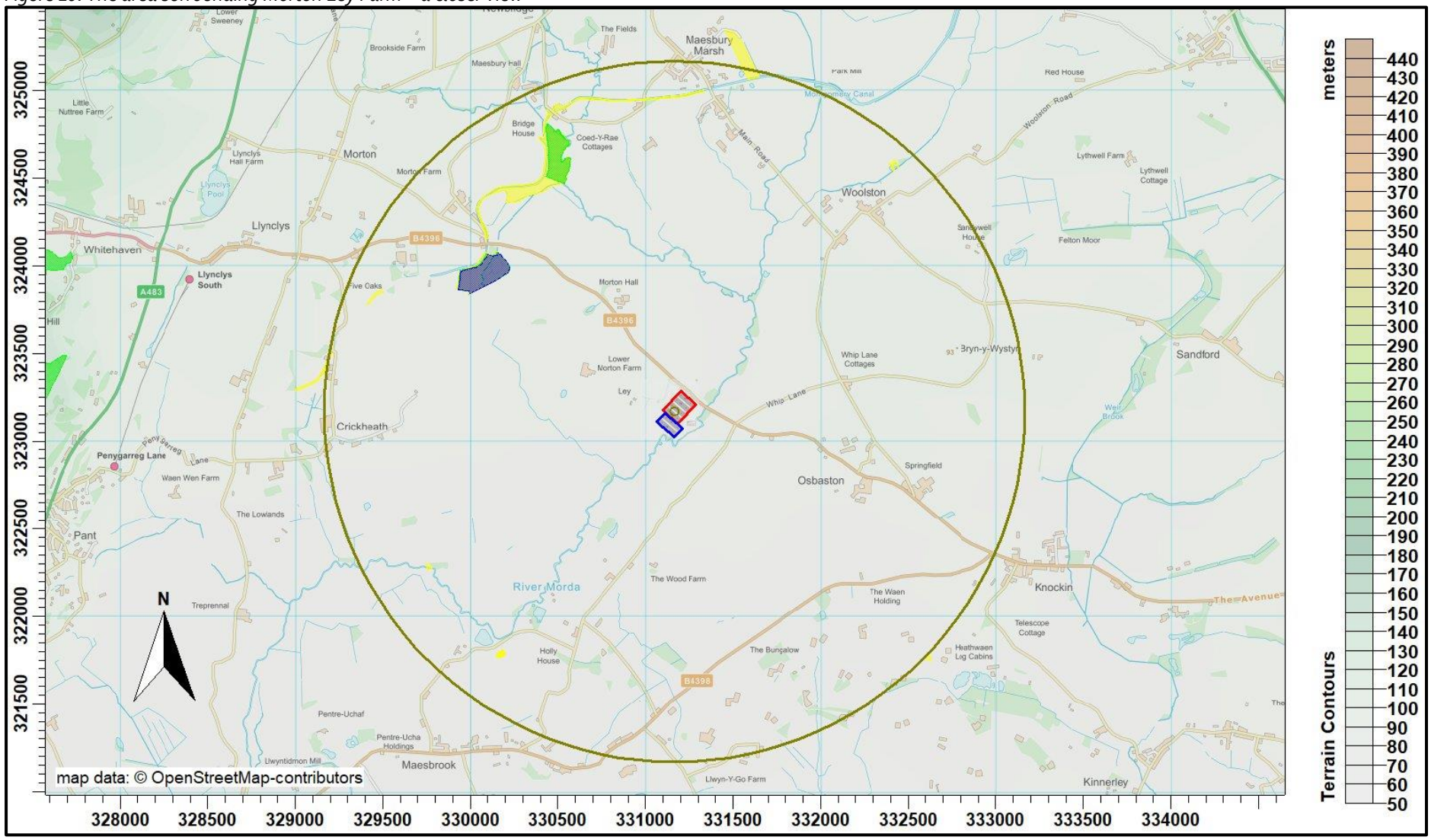


Figure 1b. The area surrounding Morton Ley Farm – a closer view



Ammonia, Background Levels, Critical Levels & Loads & Emission Rates

3.1 Ammonia concentration and nitrogen and acid deposition

When assessing potential impact on ecological receptors, ammonia concentration is usually expressed in terms of micrograms of ammonia per metre cubed of air (µg-NH_3/m^3) as an annual mean. Ammonia in the air may exert direct effects on the vegetation, or indirectly affect the ecosystem through deposition which causes both hyper-eutrophication (excess nitrogen enrichment) and acidification of soils. Nitrogen deposition, specifically in this case the nitrogen load due to ammonia deposition/absorption, is usually expressed in kilograms of nitrogen per hectare per year (kg-N/ha/y). Acid deposition is expressed in terms of kilograms equivalent (of H^+ ions) per hectare per year (keq/ha/y).

3.2 Background ammonia levels and nitrogen and acid deposition

The background ammonia concentration (annual mean) in the area around the site of the poultry unit and the wildlife sites is 2.85 µg-NH_3/m^3. The background nitrogen deposition rate to woodland is 35.98 kg-N/ha/y and to short vegetation is 20.72 kg-N/ha/y. The background acid deposition rate to woodland is 2.63 keq/ha/y and to short vegetation is 1.52 keq/ha/y. The source of these background figures is the Air Pollution Information System (APIS, January 2022).

3.3 Critical Levels & Critical Loads

Critical Levels and Critical Loads are a benchmark for assessing the risk of air pollution impacts to ecosystems. It is important to distinguish between a Critical Level and a Critical Load. The **Critical Level** is the gaseous **concentration** of a pollutant in the air, whereas the **Critical Load** relates to the quantity of pollutant **deposited** from air to the ground.

Critical Levels are defined as, "*concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge*" (UNECE).

Critical Loads are defined as, *"a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge*" (UNECE).

For ammonia concentration in air, the Critical Level for higher plants is 3.0 µg-NH_3/m^3 as an annual mean. For sites where there are sensitive lichens and bryophytes present, or where lichens and bryophytes are an integral part of the ecosystem, the Critical Level is 1.0 µg-NH_3/m^3 as an annual mean.

Critical Loads for nutrient nitrogen are set under the Convention on Long-Range Transboundary Air Pollution. They are based on empirical evidence, mainly observations from experiments and gradient studies. Critical Loads are given as ranges (e.g. 10-20 kg-N/ha/y); these ranges reflect variation in ecosystem response across Europe.

The Critical Levels and Critical Loads at the wildlife sites assumed in this study are provided in Table 1. N.B. Where the Critical Level of 1.0 µg-NH_3/m^3 is assumed, it is usually unnecessary to consider the Critical Load as the Critical Level provides the stricter test. However, it may be necessary to consider nitrogen deposition should a Critical Load of 5.0 kg-N/ha/y be appropriate. Normally, the Critical Load for nitrogen deposition provides a stricter test than does the Critical Load for acid deposition.

Table 1. Critical Levels and Critical Loads at the wildlife sites

Site	Critical Level (µg-NH_3/m^3)	Critical Load Nitrogen Deposition (kg-N/ha/y)	Critical Load Acid Deposition (keq/ha/y)
Non-statutory Sites	1.0 [1]	-	-
Crofts Mill Pasture SSSI, Fernhill Pastures SSSI and Blodwel Marsh SSSI	3.0 [2]	15.0 [3]	-
Llanymynech and Llynclys Hills SSSI and Craig Sychtyn SSSI	1.0 [1&2]	15.0 [3]	-
Sweeney Fen SSSI, Trefonen Marshes SSSI	1.0 [1&2]	10.0 [3]	-
Lin Can Moss SSSI & Breidden Hill SSSI	1.0 [1&2]	5.0 [3]	-
Morton Pool and Pasture Ramsar Site and Ty Brith Meadows SSSI	3.0 [2]	10.0 [3]	-
Montgomery Canal SAC and Montgomery Canal, Aston Locks – Keeper's Bridge SSSI	3.0 [2]	n/a [4]	n/a [4]

1. A precautionary figure used where no details of the ecology of the site are available, or the citation for the site contains reference to sensitive lichens and/or bryophytes.
2. Based upon the citation for the site and information listed on APIS.
3. The lower bound of the range of Critical Loads for the site/species, obtained from APIS.
4. No information on Critical Level/Load given.

3.4 Guidance on the significance of ammonia emissions

3.4.1 Environment Agency Criteria

The Environment Agency web-page titled "Intensive farming risk assessment for your environmental permit", contains a set of criteria, with thresholds defined by percentages of the Critical Level or Critical Load, for: internationally designated wildlife sites (Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites); Sites of Special Scientific Interest (SSSIs) and other non-statutory wildlife sites. The lower and upper thresholds are: 4% and 20% for SACs, SPAs and Ramsar sites; 20% and 50% for SSSIs and 100% and 100% for non-statutory wildlife sites. If the predicted process contributions to Critical Level or Critical Load are below the lower threshold percentage, the impact is usually deemed acceptable.

If the predicted process contributions to Critical Level or Critical Load are in the range between the lower and upper thresholds; 4% to 20% for SACs, SPAs and Ramsar sites; 20% to 50% for SSSIs and 100% to 100% for other non-statutory wildlife sites, whether or not the impact is deemed acceptable is at the discretion of the Environment Agency. In making their decision, the Environment Agency will consider whether other farming installations might act in-combination with the farm and the sensitivities of the wildlife sites. In the case of LWSs and AWs, the Environment Agency do not usually consider other farms that may act in-combination and therefore a PC of up to 100% of Critical Level or Critical Load is usually deemed acceptable for permitting purposes and therefore the upper and lower thresholds are the same (100%).

3.4.2 Natural England advisory criteria

Natural England are a statutory consultee at planning and usually advise that, if predicted process contributions exceed 1% of Critical Level or Critical Load at a SSSI, SAC, SPA or Ramsar site, then the local authority should consider whether other farming installations[1] might act in-combination or cumulatively with the farm and the sensitivities of the wildlife sites. This advice is based primarily upon the Habitats Directive, EIA Directive and the Countryside and Rights of Way Act. Additionally, this advice is primarily for combustion processes.

1. The process contribution from most farming installations is already included in the background ammonia concentrations and nitrogen and acid deposition rates. Therefore, it is normally only necessary to consider new installations and installations with extant planning permission and proposed developments when understanding the additional impact of a proposal upon nearby ecologies. However, established farms in close

proximity may need to be considered given the background concentrations and deposition rates are derived as an average for a 5 km by 5 km grid.

3.4.3 Shropshire Council Guidance

In April 2018, Shropshire Council published Interim Guidance Note GN2 (Version 1, April 2018), "Assessing the impact of ammonia and nitrogen on designated sites and Natural Assets from new and expanding livestock units (LSUs)".

AS Modelling & Data Ltd. are currently assessing this guidance; however, in summary, it appears that the following criteria are applicable:

If the sum of the Process Contribution from the application site and other nearby livestock units is less than 1% of the relevant Critical Level or Critical Load (at a wildlife site) then:

- The application can be determined providing avoidance and mitigation measures can be conditioned. It should be noted that it is extremely unlikely that this condition could ever be achieved.

- If the Process Contribution from the application site and other nearby livestock units is greater than 1% of the relevant Critical Level or Critical Load (at a wildlife site) then:

- If the modelled Process Contribution, including BAT (Best Available Techniques) or other avoidance/mitigation measures leads to either; no additional nitrogen deposition or a reduction in background nitrogen deposition (it is assumed this also means no increase in ammonia concentration, or a reduction in concentration), then the application can be determined providing avoidance and mitigation measures can be conditioned. Furthermore, the guidance states that a) new sites would have to be nitrogen neutral (please note that, without some form of nitrogen offset elsewhere, this is not possible) and b) extensions to existing sites would need to add no extra nitrogen deposition or, ideally, achieve a reduction in the nitrogen background level, by use of Best Available Techniques (BAT) or other mitigation measures.

- If the modelled Process Contribution, including BAT, or other avoidance/mitigation measures is not neutral or do not lead to a reduction in nitrogen deposition (it is assumed this also means ammonia concentration), then if the Predicted Environmental Concentration (sum of process contribution and background levels/loads) leads to an exceedance of the relevant Critical Level or Load at a receptor, then, assessments will be made on a case by case basis.

- In the case of nationally, or internationally designated wildlife sites: If the Predicted Environmental Concentration can be reduced to avoid the exceedance, or it can be demonstrated that there would be no adverse effect on an international site, or no damage to the scientific interest of a national site: then the application can be potentially approved with conditioned control measures; otherwise, the application will be potentially refused when all avenues to reduce the contributions are exhausted and it cannot be shown that damage to the sensitive receptors will not occur.

- In the case of a locally designated site: if control measures are available that can reduce the Predicted Environmental Concentration to avoid exceedance of the ammonia Critical Level or nitrogen Critical Load or it can be demonstrated that there would be no adverse effects then: the application can be potentially approved with conditioned control measures; otherwise, a balanced planning decision will be taken based on the information provided, other material considerations and planning policy.

3.4.4 Joint Nature Conservancy Committee – Guidance on Decision-making Thresholds for Air Pollution

In December 2021, the Joint Nature Conservancy Committee (JNCC) published a report titled, "Guidance on Decision-making Thresholds for Air Pollution" This report provides decision-making criteria to inform the assessment of air quality impacts on designated conservation sites. The criteria are intended to be applied to individual sources to identify those for which a decision can be taken without the need for further assessment effort.

The Decision-making thresholds (DMT) for on-site emission sources provided in the JMCC report are reproduced below:

- For lichens and bryophytes – 0.08%, 0.20%, 0.34% and 0.75% of the Critical Level for high, medium, low and very low development density areas, respectively.
- For higher plants – 0.08%, 0.20%, 0.34% and 0.75% of the Critical Level for high, medium, low and very low development density areas, respectively.
- For nitrogen deposition to woodland (Critical Load 10 kg-N/ha/y) – 0.13%, 0.34%, 0.57% and 1.30% of the Critical Level for high, medium, low and very low development density areas, respectively.
- For nitrogen deposition to grassland (Critical Load 10 kg-N/ha/y) 0.09%, 0.24%, 0.40% and 0.88% of the Critical Level for high, medium, low and very low development density areas, respectively.

Note that 'development density' is defined as, the assumed number of additional new sources below the DMT within 5km of the proposed development over 13 years: very low density being 1 development; low 5 developments; medium 10 developments and high 30 developments.

Subject to some exceptions, where the process contribution from an on-site source is below the DMT, no further assessment is required. Where the process contribution exceeds the DMT there are two possible outcomes:

- Where site-relevant thresholds have been derived these can be applied to see if it is possible to avoid further assessment effort on the basis of site specific circumstances.
- If site-relevant thresholds have not yet been derived, further assessment in combination with other plans and projects is required.

AS Modelling & Data Ltd. Would note that the DMT's for medium and high development density areas are more than 5 and 10 times lower than the current 1% of Environmental Assessment Level (EAL) that is normally considered negligible when assessing air quality, respectively, and that it is unlikely that any development: agricultural or otherwise; small or large; with or without mitigation, would fall below the DMT's in these areas.

3.5 Quantification of ammonia emissions

3.5.1 Regulatory modelling

Ammonia emission rates from poultry houses depend on many factors and are likely to be highly variable. However, the benchmarks for assessing impacts of ammonia and nitrogen deposition are framed in terms of an annual mean ammonia concentration and annual nitrogen deposition rates. To obtain relatively robust figures for these statistics it is not necessary to model short term temporal variations and a steady continuous emission rate can be assumed. In fact, modelling short term temporal variations might introduce rather more uncertainty than modelling continuous emissions.

The Environment Agency provides an Intensive farming guidance note which lists standard ammonia emission factors for a variety of livestock, including broiler chickens. The emission factor for broiler chickens is 0.034 kg-NH_3/bird place/y; this figure is used to calculate regulatory baseline/unabated emissions.

3.5.2 Modelling of air scrubber emissions

The ventilation rates used in the calculations are based on industry practices and standard bird growth factors. Minimum ventilation rates are as those of an operational poultry house and maximum ventilation rates are based on Defra guidelines. Target internal temperature is 33 Celsius at the beginning of the crop and is decreased to 22 Celsius by day 34 of the crop. If the external temperature is 7 Celsius, or more, lower than the target temperature, minimum ventilation only is assumed for the calculation. Above this, ventilation rates are increased in proportion to the difference between ambient temperature and target internal temperature. A maximum transitional ventilation rate (35% of the maximum possible ventilation rate) is reached when the ambient temperature is equal to the target temperature. A high ventilation rate (70% maximum possible ventilation rate) is reached when the temperature is 4 degrees above target and if external temperature is above 33 Celsius the maximum ventilation rate is assumed.

Based upon these principles, an ammonia emission rate for each hour of the period modelled is calculated by multiplying the outlet concentration by the ventilation rate.

For the calculation of the emission rates from the air scrubber, the outlet ammonia concentration is assumed to be a constant 2 ppm (1,408.8 µg/m^3). This figure is based upon the guaranteed maximum outlet concentration from the manufacturers of the ammonia scrubbing equipment. It should be noted that, typically, an agricultural wet chemical scrubber can achieve 1 to 1.5 ppm outlet ammonia concentration, therefore the 2 ppm assumed is precautionary. The capacities of the air scrubbers would be 100,000 m^3/h (27.778m^3/s), if the modelled ventilation rate exceeds the scrubber capacity, additional ventilation would be provided by the ridge mounted fans.

The concentration for unabated bypass emissions that occur when the modelled ventilation rate exceeds the scrubber is based upon long term, high temporal resolution monitoring of broiler rearing houses elsewhere and is dependent upon the crop stage. The internal ammonia concentrations assumed are then set so as to give approximately the same overall emission factor as the regulatory standard emission factor. Similarly, to the scrubber emissions, an emission rate from the bypass 13 ventilation system is calculated by multiplying the (unabated) internal concentration by the bypass ventilation rate.

Since emissions are variable, to avoid some of the uncertainty introduced because of timing of higher emission rates, wind directions and atmospheric stability and provide robust statistics, three sets of calculations were performed; the first with the first day of the meteorological record coinciding with day 1 of the crop cycle, the second coinciding with day 16 of the crop and the third coinciding with day 32 of the crop.

The annual emission rates are variable, as they depend on ambient temperature and for example how often bypass ventilation is used. However, the average emission rate of all three crop cycles over the four year meteorological record is equivalent to an emission factor of 0.009476 kg-NH_3/bird place/y, which is approximately 27.9% of the standard emission factor of 0.034 kg-NH_3/bird place/y i.e. assuming an outlet concentration of 2 ppm, the use of scrubbers would reduce housing emissions by approximately 72.1% from regulatory emission figures.

The Atmospheric Dispersion Modelling System (ADMS) and Model Parameters

The Atmospheric Dispersion Modelling System (ADMS) ADMS 5 is a new generation Gaussian plume air dispersion model, which means that the atmospheric boundary layer properties are characterised by two parameters; the boundary layer depth and the Monin-Obukhov length rather than in terms of the single parameter Pasquill-Gifford class.

Dispersion under convective meteorological conditions uses a skewed Gaussian concentration distribution (shown by validation studies to be a better representation than a symmetrical Gaussian expression).

ADMS has a number of model options that include: dry and wet deposition; NO_x chemistry; impacts of hills; variable roughness; buildings and coastlines; puffs; fluctuations; odours; radioactivity decay (and γ-ray dose); condensed plume visibility; time varying sources and inclusion of background concentrations.

ADMS has an in-built meteorological pre-processor that allows flexible input of meteorological data both standard and more specialist. Hourly sequential and statistical data can be processed and all input and output meteorological variables are written to a file after processing.

The user defines the pollutant, the averaging time (which may be an annual average or a shorter period), which percentiles and exceedance values to calculate, whether a rolling average is required or not and the output units. The output options are designed to be flexible to cater for the variety of air quality limits which can vary from country to country and are subject to revision.

4.1 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 is obtained from assimilation and short term forecast fields of the Numerical Weather Prediction (NWP) system known as the Global Forecast System (GFS).

The GFS is a spectral model: the physics/dynamics model has an equivalent resolution of approximately 9 km (latterly 6 km); terrain is understood to be resolved at a resolution of approximately 2 km, with sub-9/6 km terrain effects parameterised. Site specific data may be extrapolated from nearby archive grid points or a most representative grid point chosen. The GFS resolution adequately captures major topographical features and the broad-scale characteristics of the weather over the UK. Smaller scale topological features may be included in the dispersion modelling by using the flow field module of ADMS (FLOWSTAR). The use of NWP data has advantages over traditional meteorological records because:

- Calm periods in traditional observational records may be over represented, this is because the instrumentation used may not record wind speeds below approximately 0.5 m/s and start up wind speeds may be greater than 1.0 m/s. In NWP data, the wind speed is continuous down to 0.0 m/s, allowing the calms module of ADMS to function correctly.

- Traditional records may include very local deviations from the broad-scale wind flow that would not necessarily be representative of the site being modelled; these deviations are difficult to identify and remove from a meteorological record. Conversely, local effects at the site being modelled are relatively easy to impose on the broad-scale flow and provided horizontal resolution is not too great, the meteorological records from NWP data may be expected to represent well the broad-scale flow.

- Information on the state of the atmosphere above ground level which would otherwise be estimated by the meteorological pre-processor may be included explicitly.

A wind rose showing the distribution of wind speeds and directions in the GFS derived data is shown in Figure 2a. Wind speeds are modified by the treatment of roughness lengths (see Section 4.7) and where terrain data is included in the modelling, the raw GFS wind speeds and directions will be modified. The terrain and roughness length modified wind rose for the location at the poultry unit is shown in Figure 2b. The resolution of the wind field in terrain runs is approximately 340 m. Please also note that FLOWSTAR2 is used to obtain a local flow field, not to explicitly model dispersion in complex terrain as defined in the ADMS User Guide; therefore, the ADMS default value for minimum turbulence length has been amended3.

1. The GFS data used is derived from the high resolution operational GFS datasets, the data is not obtained from the lower resolution (0.5 degree) long-term archive.
2. Note that FLOWSTAR requirements are for meteorological data representative of the upwind flow over the modelling domain and that single site meteorological data (observational or from high resolution modelled data) that is representative of the application site is not generally suitable (personal correspondence: CERC 2019 and UK Met O 2015). If data are deemed representative of a particular application site, either wholly or 16 partially, then these data cannot also be representative of the upstream flow over the modelling domain. Furthermore, it would be extremely poor practice to use such data as the boundary conditions for a flow-solver, such as FLOWSTAR.
3. When modelling complex terrain with ADMS, by default, the minimum turbulence length has 0.1 m added to the flat terrain value (calculated from the Monin-Obukhov length). Whilst this might be appropriate over hill/mountain tops in terrain with slopes > 1:10 (and quite possibly only in certain wind directions) in lesser terrain it introduces model behaviour that is not desirable where FLOWSTAR is simply being used to modify the upwind flow. Specifically, the parameter sigma z of the Gaussian plume model is overly constrained, which for elevated point sources emissions, may on occasion cause over prediction of ground level concentrations in stable weather conditions and light winds (Steven R. Hanna & Biswanath Chowdhury, 2013), conversely for low level emission sources, this will cause gross under prediction. Note that this becomes particularly important overnight and if calm and light wind conditions are not being ignored, as they often are when using traditional observational meteorological datasets. To reduce this behaviour, where terrain is modelled, AS Modelling & Data Ltd. have set a minimum turbulence length of 0.025 m in ADMS. This approximates the normal behaviour of ADMS with flat terrain.

Figure 2a. The wind rose. Raw GFS derived data for 52.801 N, 3.021 W, 2018 – 2021

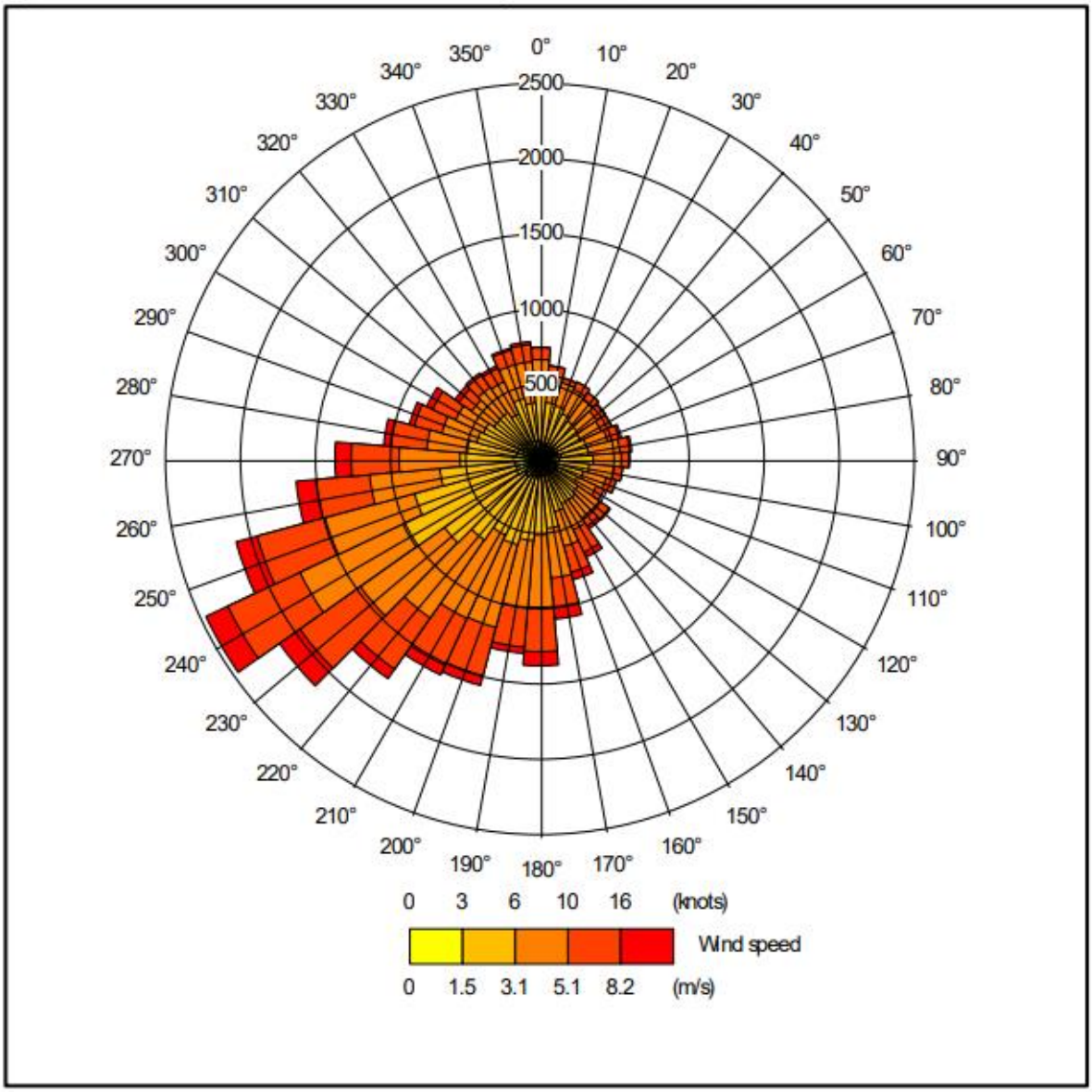
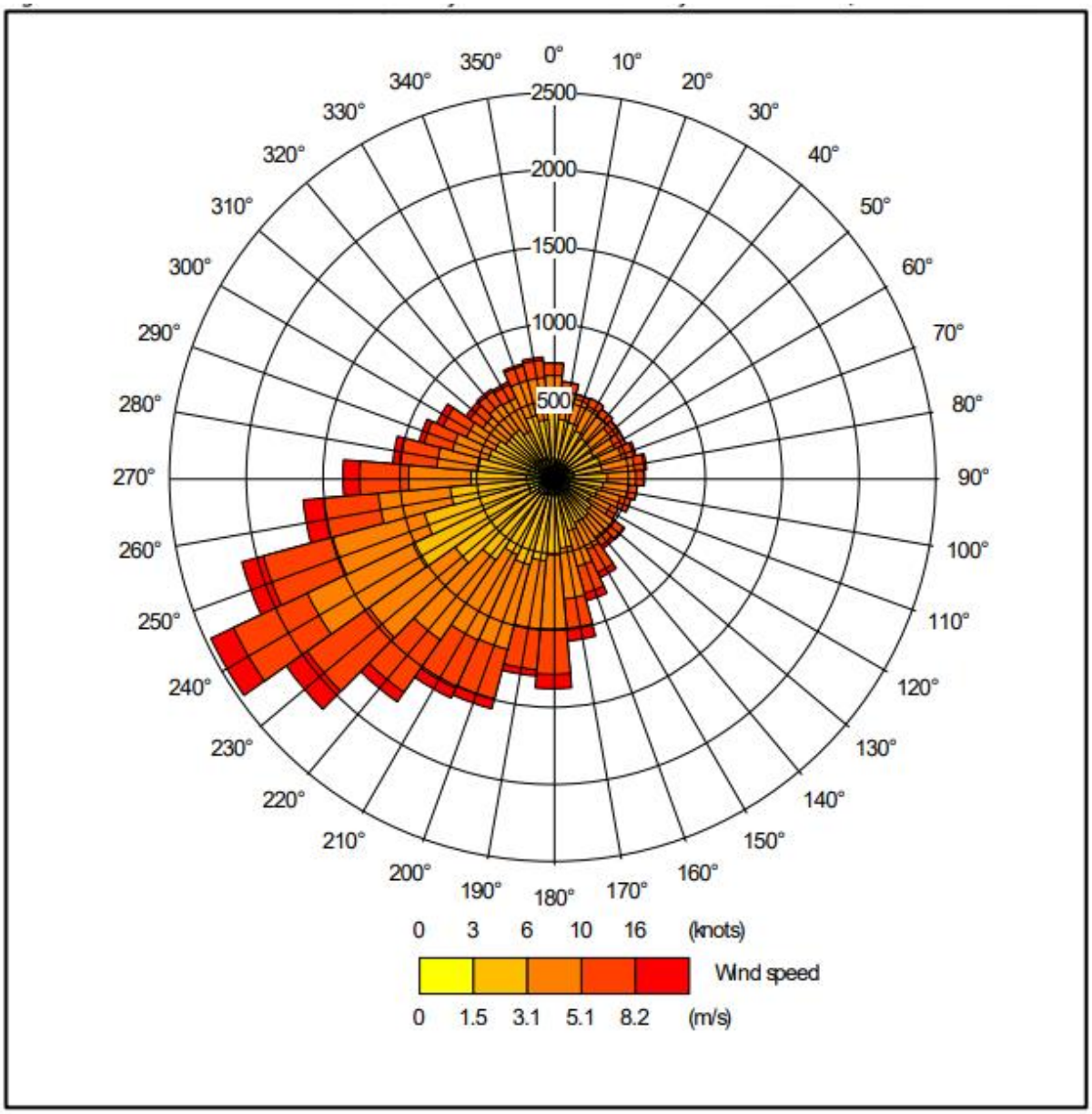

0°
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
160°
170°
180°
190°
200°
210°
220°
230°
240°
250°
260°
270°
280°
290°
300°
310°
320°
330°
340°
350°
2500
2000
1500
1000
500
0 3 6 10 16 (knots)
Wind speed
0 1.5 3.1 5.1 8.2 (m/s)

Figure 2b. The wind rose. FLOWSTAR modified GFS derived data for NGR 331150, 323150 2018 - 2021



4.2 Emission Sources

Emissions from the high speed ridge fans in the existing/unabated scenarios are represented by three point sources per house within ADMS (EX1_NOR to EX4_NOR 1, 2 & 3 and PR5_NOR to PR6_NOR 1, 2 & 3). The existing houses also currently have gable end fans with dust baffles for use in hot weather, these are represented by a single volume source in ADMS (EX_GAB).

Emissions from the air scrubbers and the high speed ridge/roof fans that would be used as bypass/backup ventilation in the proposed scenario are represented by a single point source per house within ADMS (EX1_BYP 1, 2 & 3 to EX4_BYP 1, 2 & 3, PR5_BYP to PR6_BYP 1, 2 & 3, EX1_SCR 1, 2 & 3 to EX4_SCR 1, 2 & 3 and PR5_SCR to PR6_SCR 1, 2 & 3).

Details of the point source and volume source parameters are shown in Tables 2a and 2b. The positions of the sources may be seen in Figure 3.

Table 2a. Point source parameters

Source ID	Height (m)	Diameter (m)	Efflux velocity (m/s)	Emission temperature (°C)	Emission rate per source (g-NH_3/s)
EX1_NOR to EX4_NOR 1, 2 & 3	6.0	0.8	11.0	Variable [1]	0.019959 [2]
PR5_NOR 1, 2 & 3 and PR6_NOR 1, 2 & 3	6.0	0.8	11.0	Variable [1]	0.022929
EX1 BYP to EX4_BYP 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [1]
EX1_SCR to EX4_SCR 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [1]
PR5_BYP 1, 2 & 3 and PR6_BYP 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [1]
PR5_SCR 1, 2 & 3 and PR6_SCR 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [1]

Table 2b: Volume source parameters

Table 2b. Volume source parameters

Source ID (Scenario)	Length Y (m)	Width X (m)	Depth (m)	Base height (m)	Emission temperature (°C)	Emission rate (g-NH_3/s)
EX_GAB	5.0	62.5	3.0	0.0	Ambient	0.119757 [3]

1. Dependent on ambient temperature.
2. Reduced by 50% when the ambient temperature equals or exceeds 21 Celsius.
3. 50% of the total emission emitted only when the ambient temperature equals or exceeds 21 Celsius

4.3 Modelled buildings

The structure of the existing and proposed poultry houses may affect the plumes from the point sources. Therefore, the buildings are modelled within ADMS. The positions of the modelled buildings may be seen in Figure 3, where they are marked by grey rectangles.

4.4 Discrete receptors

Thirty-nine discrete receptors have been defined: ten at the LWSs and PHs (1 to 10), twenty-one at the SSSIs (11 to 23 and 32 to 39), six at Montgomery Canal SSSI/SAC (24 to 29) and two at Morton Pool and Pasture SSSI/Ramsar site (30 to 31). These receptors are defined at ground level within ADMS. The positions of the discrete receptors may be seen in Figures 4a and 4b, where they are marked by enumerated pink rectangles.

4.5 Cartesian grid

To produce the contour plots presented in Section 5 of this report and to define the spatially varying deposition velocity fields, two regular Cartesian grids have been defined within ADMS. The grid receptors are defined at ground level within ADMS. The positions of the Cartesian grids may be seen in Figures 4a and 4b, where they are marked by grey lines.

4.6 Terrain data

Terrain has been considered in the modelling. The terrain data are based upon the Ordnance Survey 50 m Digital Elevation Model. A 22.0 km x 22.0 km domain has been resampled at 100 m horizontal resolution for use within ADMS. N.B. The resolution of FLOWSTAR is 64 x 64 grid points; therefore, the effective resolution of the wind field is approximately 340 m.

4.7 Roughness Length

A fixed surface roughness length of 0.25 m has been applied over the entire modelling domain. As a precautionary measure, the GFS meteorological data is assumed to have a roughness length of 0.225 m. The effect of the difference in roughness length is precautionary as it increases the frequency of low wind speeds and stability and therefore increases predicted ground level concentrations.

Figure 3. The positions of the modelled buildings and sources

Figure 4a. The discrete receptors and regular Cartesian grids – with circles radii at 2 km (olive), 5 km (green) and 10 km (purple)

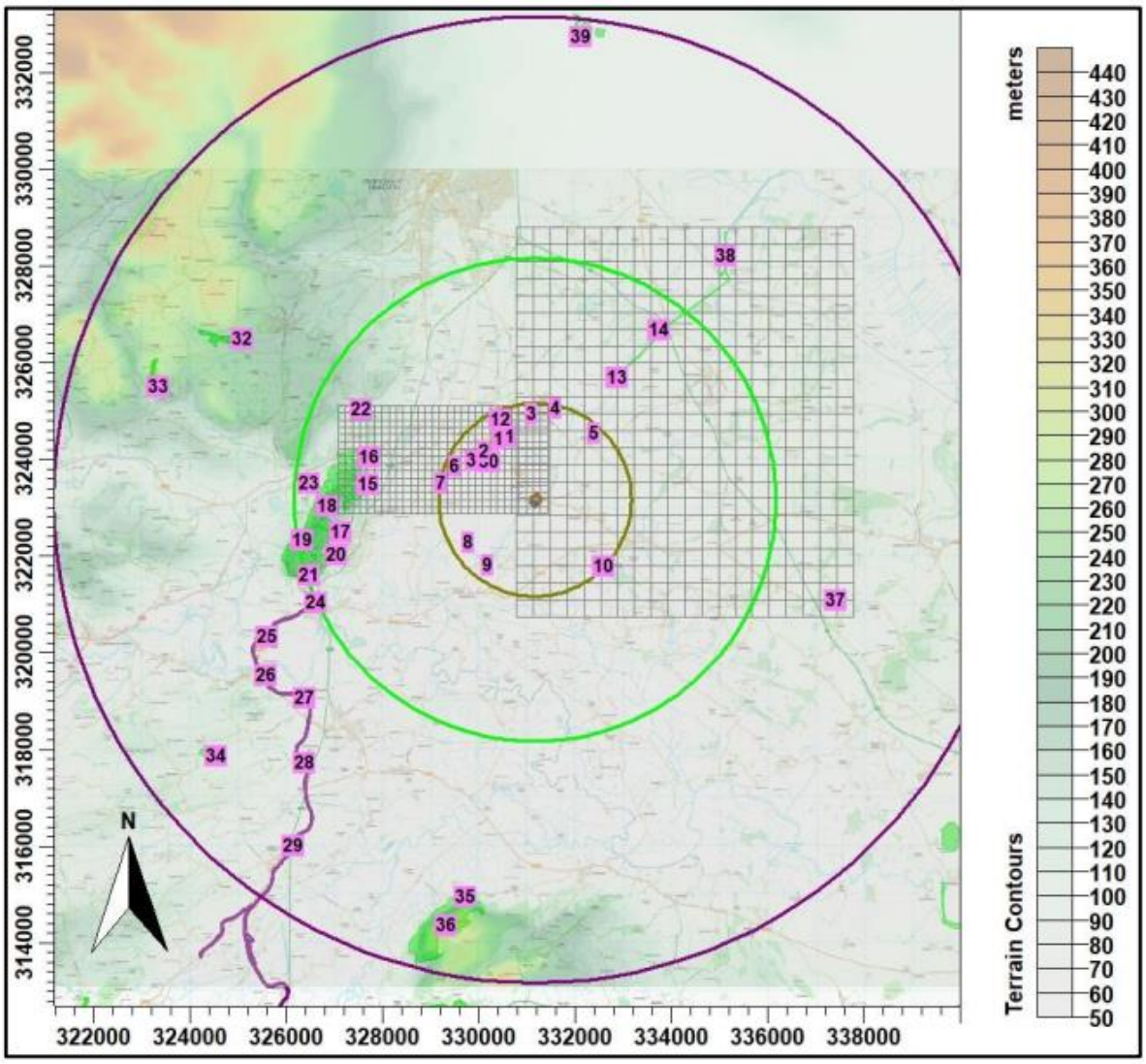
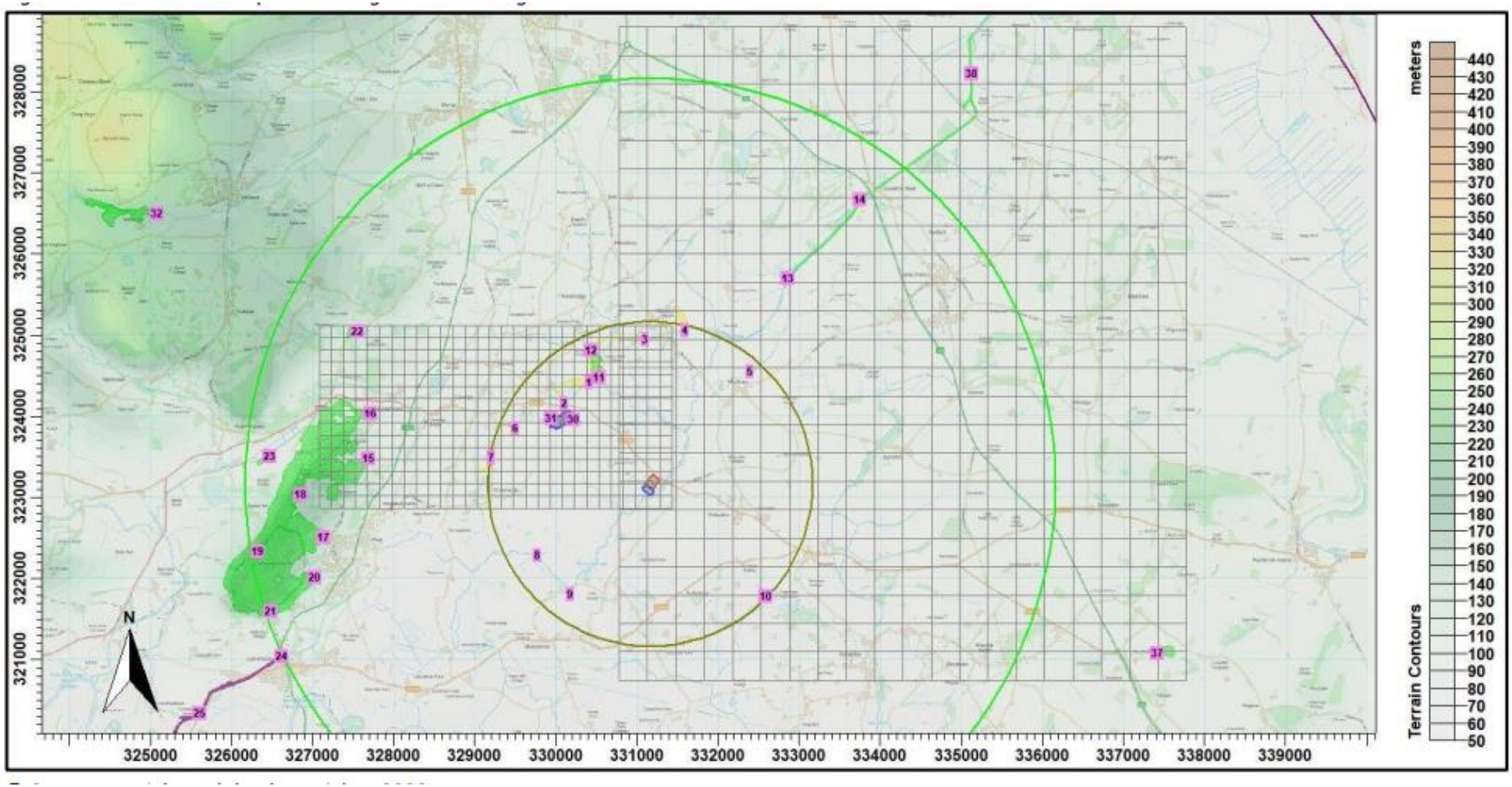


Figure 4b. The discrete receptors and regular Cartesian grids – a closer view



4.8 Deposition

The method used to model deposition of ammonia and consequent plume depletion is based primarily upon Frederik Schrader and Christian Brümmer. Land Use Specific Ammonia Deposition Velocities: a Review of Recent Studies (2004–2013). AS Modelling & Data Ltd. has restricted deposition over arable farmland and heavily grazed and fertilised pasture; this is to compensate for possible saturation effects due to fertilizer application and to allow for periods when fields are clear of crops (Sutton), the deposition is also restricted over areas with little or no vegetation and the deposition velocity is set to 0.002 m/s where grid points are over the poultry housing and 0.015 m/s to 0.010 m/s over heavily grazed grassland. Where deposition over water surfaces is calculated, a deposition velocity of 0.005 m/s is used.

In summary, the method is as follows:

- A preliminary run of the model without deposition is used to provide an ammonia concentration field.
- The preliminary ammonia concentration field, along with land usage, has been used to define a deposition velocity field. The deposition velocities used are provided in Table 3.

Table 3. Deposition velocities

NH_3 concentration (PC + background) ($\mu g/m^3$)	< 10	10 - 20	20 - 30	30 – 80	> 80
Deposition velocity – woodland (m/s)	0.03	0.015	0.01	0.005	0.003
Deposition velocity – short vegetation (m/s)	0.02 (0.015 over heavily grazed grassland)	0.015	0.01	0.005	0.003
Deposition velocity – arable farmland/rye grass (m/s)	0.005	0.005	0.005	0.005	0.003

- The model is then rerun with the spatially varying deposition module.

Contour plots of the spatially varying deposition fields to the east and west of the poultry unit are provided in Figures 5a and 5b.

In this case, as part of the preliminary modelling, the model has also been run with a fixed deposition at 0.003 m/s and similarly to not modelling deposition at all, the predicted ammonia concentrations (and nitrogen and acid deposition rates) are always higher than if deposition were modelled explicitly, particularly where there is some distance between the source and a receptor.

Figure 5a. The spatially varying deposition field - east

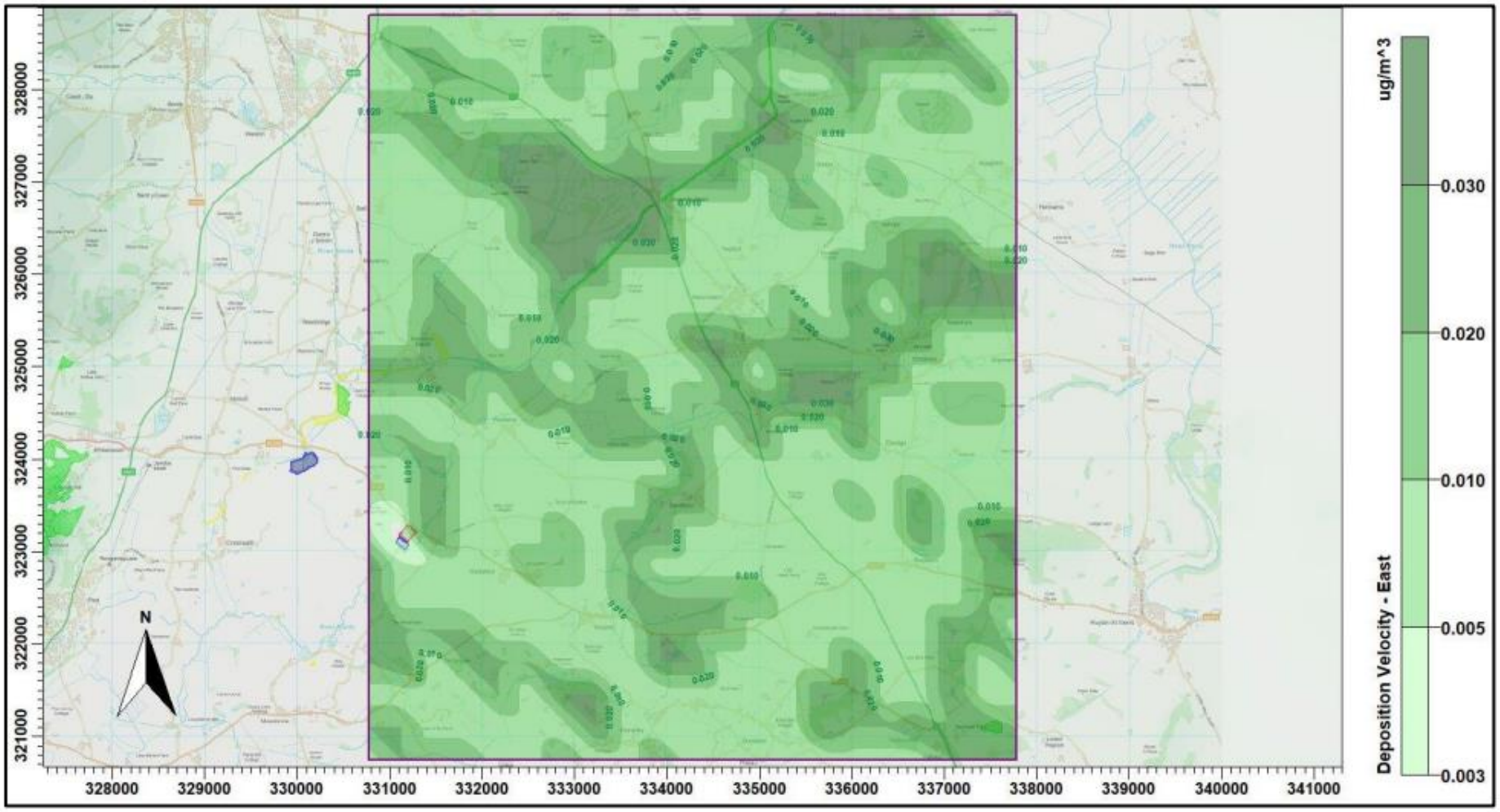
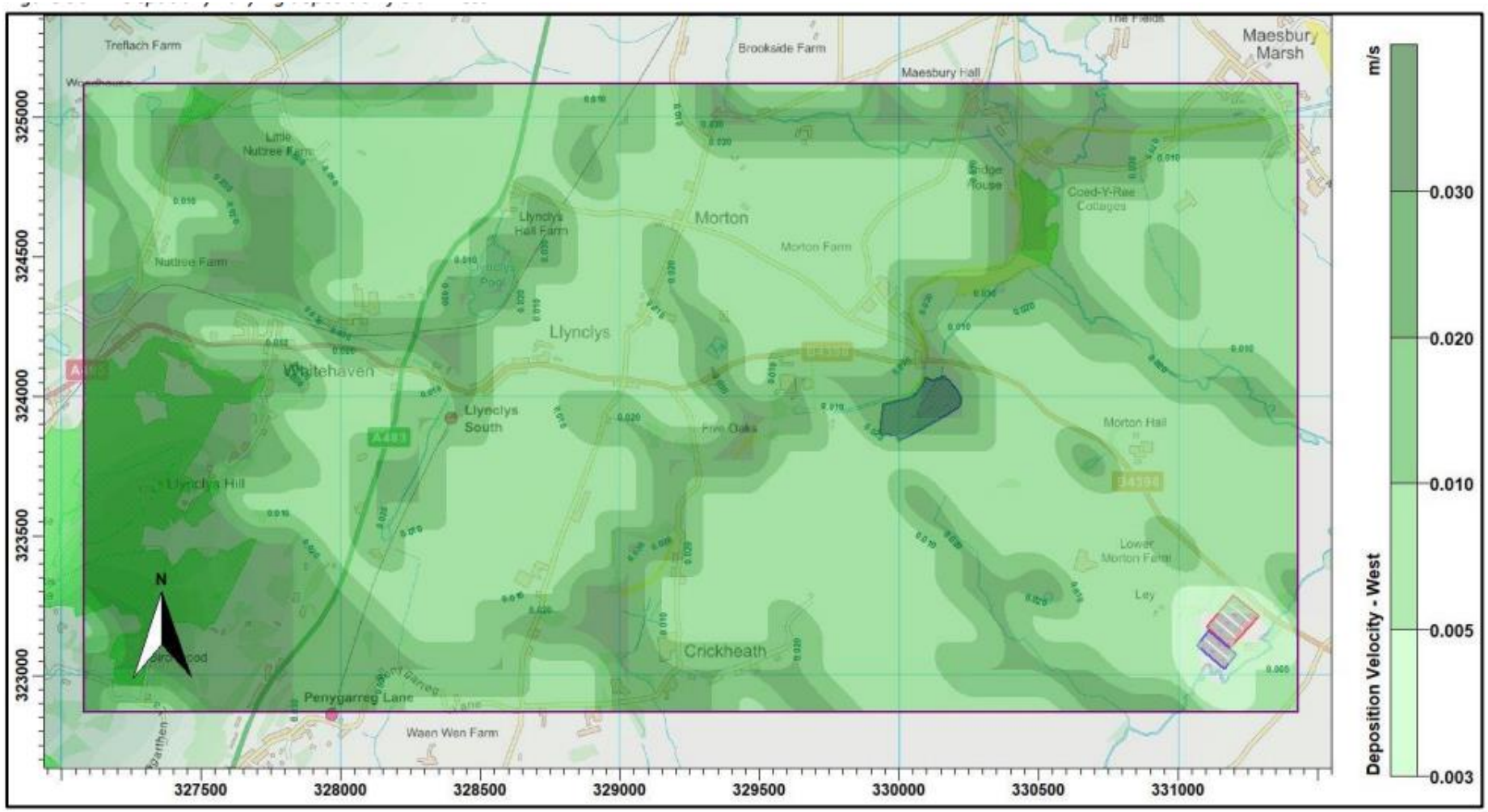


Figure 5b. The spatially varying deposition field - west



Details of the Model Runs and Results

Five scenarios have been modelled:

Scenario 1	- The four existing poultry houses with current ventilation system (The Existing Scenario).
Scenario 2	-The two proposed poultry houses with standard ventilation (ridge fans only).
Scenario 3	- The four existing houses, fitted with Pollo air scrubber units.
Scenario4	- The two proposed poultry houses, fitted with the Pollo air scrubber units.
Scenario 5	- The existing and proposed poultry houses, all fitted with the Pollo air scrubber units. (The Proposed Scenario).

5.1 Preliminary modelling
Not conducted. Model sensitivities have been well tested during previous modelling.

5.2 Detailed deposition modelling
The detailed modelling focused over restricted domains covering the poultry unit at Morton Ley Farm and several nearby wildlife sites where the predicted process contributions to ammonia concentrations and nitrogen deposition rates are expected to exceed 1% of the relevant Critical Level and Critical Load for the site.

The predicted maximum annual mean ground level ammonia concentrations and nitrogen deposition rates at the discrete receptors are shown in Tables 4a to 4e (Scenarios 1, 2, 3, 4 and 5). In these tables, predicted ammonia concentrations or nitrogen deposition rates that are in excess of 1% of Critical Level/Load are highlighted with bold text.

The changes in predicted maximum annual mean ground level ammonia concentrations and nitrogen deposition rates at the discrete receptors (Scenario 5 minus Scenario 1) are shown in Table 5.

Contour plots of the predicted ground level maximum annual mean ammonia concentration and the maximum annual nitrogen deposition rate for the Existing Scenario (Scenario 1) and the Proposed Scenario (Scenario 5) are shown in Figures 6a and 6b and Figures 7a and 7b. Please note that contour plots for other scenarios can be provided upon request.

Table 4a. Predicted maximum annual mean ammonia concentrations and nitrogen deposition at the discrete receptors - Scenario 1

Receptor number	X(m)	Y(m)	Designation	Site Parameters			Maximum annual ammonia concentration		Maximum annual nitrogen deposition rate	
				Deposition Velocity	Critical Level (µg/m³)	Critical Load (kg/ha)	Process Contribution (µg/m³)	%age of Critical Level	Process Contribution (kg/ha)	%age of Critical Load
1	330412	324423	Shropshire Union Canal Field LWS	0.02	1.0	10.0	0.039	**3.87**	0.20	**2.01**
2	330104	324155	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.036	**3.56**	0.18	**1.85**
3	331104	324950	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.038	**3.83**	0.20	**1.99**
4	331588	325060	Purple moor-grass & rush pastures PH	0.02	1.0	10.0	0.037	**3.69**	0.19	**1.92**
5	332398	324550	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.068	**6.82**	0.35	**3.54**
6	329499	323850	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.019	**1.88**	0.10	0.97
7	329204	323497	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.015	**1.49**	0.08	0.77
8	329767	322292	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.022	**2.17**	0.11	**1.13**
9	330183	321803	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.026	**2.61**	0.14	**1.36**
10	332593	321777	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.016	**1.55**	0.08	0.81
11	330534	324478	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.039	**1.29**	0.20	**1.34**
12	330439	324811	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.028	0.94	0.15	0.97
13	332862	325694	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.028	0.92	0.14	-
14	333748	326674	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.016	0.52	0.08	-
15	327687	323481	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.006	0.57	0.04	0.30
16	327714	324037	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.007	0.69	0.05	0.36
17	327139	322505	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.004	0.41	0.03	0.21
18	326856	323043	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.004	0.36	0.03	0.19
19	326327	322331	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.003	0.30	0.02	0.15
20	327030	322012	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.004	0.41	0.03	0.22
21	326482	321602	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.003	0.33	0.03	0.17
22	327559	325041	Sweeney Fen SSSI	0.02	1.0	10.0	0.006	0.59	0.03	0.31
23	326466	323500	Blodwel Marsh SSSI	0.02	3.0	15.0	0.004	0.12	0.02	0.13
24	326620	321040	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.004	0.13	0.03	-
25	325607	320338	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.003	0.09	0.02	-
26	325580	319526	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.003	0.09	0.02	-
27	326383	319070	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.004	0.12	0.03	-
28	326372	317709	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.003	0.11	0.03	-
29	326133	315999	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.002	0.08	0.02	-
30	330214	323962	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.042	**1.39**	0.22	**2.17**
31	329944	323971	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.028	0.93	0.14	**1.45**
32	325072	326494	Trefonen Marshes SSSI	0.02	1.0	10.0	0.002	0.21	0.01	0.11
33	323349	325499	Craig Sychtyn SSSI	0.03	1.0	15.0	0.001	0.15	0.01	0.08
34	324540	317848	Ty-Brith Meadows SSSI	0.02	3.0	10.0	0.002	0.06	0.01	0.10
35	329711	314933	Breidden Hill SSSI	0.03	1.0	5.0	0.003	0.26	0.02	0.41
36	329318	314344	Breidden Hill SSSI	0.03	1.0	5.0	0.001	0.14	0.01	0.22
37	337415	321076	Lin Can Moss SSSI	0.03	1.0	5.0	0.004	0.41	0.03	0.64
38	335126	328219	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.009	0.31	0.05	-
39	332121	332760	Fernhill Pastures SSSI	0.02	3.0	15.0	0.005	0.15	0.02	0.16

Table 4b. Predicted maximum annual mean ammonia concentrations and nitrogen deposition at the discrete receptors - Scenario 2

Receptor number	X(m)	Y(m)	Designation	Site Parameters			Maximum annual ammonia concentration		Maximum annual nitrogen deposition rate	
				Deposition Velocity	Critical Level (µg/m³)	Critical Load (kg/ha)	Process Contribution (µg/m³)	%age of Critical Level	Process Contribution (kg/ha)	%age of Critical Load
1	330412	324423	Shropshire Union Canal Field LWS	0.02	1.0	10.0	0.020	**2.04**	0.11	**1.06**
2	330104	324155	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.022	**2.20**	0.11	**1.14**
3	331104	324950	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.021	**2.07**	0.11	**1.07**
4	331588	325060	Purple moor-grass & rush pastures PH	0.02	1.0	10.0	0.020	**2.01**	0.10	**1.04**
5	332398	324550	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.036	**3.57**	0.19	**1.85**
6	329499	323850	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.011	**1.10**	0.06	0.57
7	329204	323497	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.009	0.90	0.05	0.47
8	329767	322292	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.013	**1.27**	0.07	0.66
9	330183	321803	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.016	**1.62**	0.08	0.84
10	332593	321777	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.010	0.96	0.05	0.50
11	330534	324478	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.021	0.70	0.11	0.73
12	330439	324811	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.016	0.52	0.08	0.54
13	332862	325694	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.015	0.51	0.08	-
14	333748	326674	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.009	0.29	0.05	-
15	327687	323481	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.003	0.34	0.03	0.18
16	327714	324037	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.004	0.40	0.03	0.21
17	327139	322505	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.22	0.02	0.12
18	326856	323043	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.21	0.02	0.11
19	326327	322331	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.16	0.01	0.08
20	327030	322012	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.22	0.02	0.12
21	326482	321602	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.19	0.01	0.10
22	327559	325041	Sweeney Fen SSSI	0.02	1.0	10.0	0.003	0.35	0.02	0.18
23	326466	323500	Blodwel Marsh SSSI	0.02	3.0	15.0	0.002	0.07	0.01	0.07
24	326620	321040	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.002	0.08	0.02	-
25	325607	320338	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.002	0.05	0.01	-
26	325580	319526	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.002	0.05	0.01	-
27	326383	319070	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.002	0.07	0.02	-
28	326372	317709	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.002	0.06	0.01	-
29	326133	315999	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.05	0.01	-
30	330214	323962	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.027	0.89	0.14	**1.39**
31	329944	323971	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.018	0.59	0.09	0.92
32	325072	326494	Trefonen Marshes SSSI	0.02	1.0	10.0	0.001	0.12	0.01	0.06
33	323349	325499	Craig Sychtyn SSSI	0.03	1.0	15.0	0.001	0.08	0.01	0.04
34	324540	317848	Ty-Brith Meadows SSSI	0.02	3.0	10.0	0.001	0.04	0.01	0.06
35	329711	314933	Breidden Hill SSSI	0.03	1.0	5.0	0.001	0.15	0.01	0.23
36	329318	314344	Breidden Hill SSSI	0.03	1.0	5.0	0.001	0.08	0.01	0.13
37	337415	321076	Lin Can Moss SSSI	0.03	1.0	5.0	0.003	0.25	0.02	0.39
38	335126	328219	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.005	0.17	0.03	-
39	332121	332760	Fernhill Pastures SSSI	0.02	3.0	15.0	0.003	0.09	0.01	0.09

Table 4c. Predicted maximum annual mean ammonia concentrations and nitrogen deposition at the discrete receptors - Scenario 3

Receptor number	X(m)	Y(m)	Designation	Site Parameters			Maximum annual ammonia concentration		Maximum annual nitrogen deposition rate	
				Deposition Velocity	Critical Level (µg/m³)	Critical Load (kg/ha)	Process Contribution (µg/m³)	%age of Critical Level	Process Contribution (kg/ha)	%age of Critical Load
1	330412	324423	Shropshire Union Canal Field LWS	0.02	1.0	10.0	0.012	**1.24**	0.06	0.64
2	330104	324155	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.010	**1.03**	0.05	0.53
3	331104	324950	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.013	**1.25**	0.07	0.65
4	331588	325060	Purple moor-grass & rush pastures PH	0.02	1.0	10.0	0.010	**1.03**	0.05	0.53
5	332398	324550	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.018	**1.79**	0.09	0.93
6	329499	323850	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.005	0.53	0.03	0.27
7	329204	323497	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.005	0.49	0.03	0.25
8	329767	322292	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.007	0.68	0.04	0.35
9	330183	321803	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.008	0.81	0.04	0.42
10	332593	321777	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.004	0.40	0.02	0.21
11	330534	324478	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.012	0.39	0.06	0.41
12	330439	324811	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.008	0.28	0.04	0.29
13	332862	325694	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.008	0.27	0.04	-
14	333748	326674	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.004	0.15	0.02	-
15	327687	323481	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.19	0.02	0.10
16	327714	324037	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.20	0.02	0.10
17	327139	322505	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.15	0.01	0.08
18	326856	323043	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.13	0.01	0.07
19	326327	322331	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.10	0.01	0.05
20	327030	322012	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.15	0.01	0.08
21	326482	321602	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.12	0.01	0.06
22	327559	325041	Sweeney Fen SSSI	0.02	1.0	10.0	0.002	0.17	0.01	0.09
23	326466	323500	Blodwel Marsh SSSI	0.02	3.0	15.0	0.001	0.04	0.01	0.04
24	326620	321040	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.04	0.01	-
25	325607	320338	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.03	0.01	-
26	325580	319526	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.03	0.01	-
27	326383	319070	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.03	0.01	-
28	326372	317709	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.03	0.01	-
29	326133	315999	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.02	0.01	-
30	330214	323962	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.012	0.39	0.06	0.61
31	329944	323971	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.008	0.25	0.04	0.39
32	325072	326494	Trefonen Marshes SSSI	0.02	1.0	10.0	0.001	0.06	0.00	0.03
33	323349	325499	Craig Sychtyn SSSI	0.03	1.0	15.0	0.000	0.04	0.00	0.02
34	324540	317848	Ty-Brith Meadows SSSI	0.02	3.0	10.0	0.000	0.02	0.00	0.03
35	329711	314933	Breidden Hill SSSI	0.03	1.0	5.0	0.001	0.08	0.01	0.12
36	329318	314344	Breidden Hill SSSI	0.03	1.0	5.0	0.000	0.04	0.00	0.07
37	337415	321076	Lin Can Moss SSSI	0.03	1.0	5.0	0.001	0.12	0.01	0.18
38	335126	328219	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.002	0.08	0.01	-
39	332121	332760	Fernhill Pastures SSSI	0.02	3.0	15.0	0.001	0.04	0.01	0.04

Table 4d. Predicted maximum annual mean ammonia concentrations and nitrogen deposition at the discrete receptors - Scenario 4

Receptor number	X(m)	Y(m)	Designation	Site Parameters			Maximum annual ammonia concentration		Maximum annual nitrogen deposition rate	
				Deposition Velocity	Critical Level (µg/m³)	Critical Load (kg/ha)	Process Contribution (µg/m³)	%age of Critical Level	Process Contribution (kg/ha)	%age of Critical Load
1	330412	324423	Shropshire Union Canal Field LWS	0.02	1.0	10.0	0.007	0.66	0.03	0.34
2	330104	324155	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.007	0.70	0.04	0.36
3	331104	324950	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.007	0.69	0.04	0.36
4	331588	325060	Purple moor-grass & rush pastures PH	0.02	1.0	10.0	0.006	0.57	0.03	0.29
5	332398	324550	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.010	0.99	0.05	0.52
6	329499	323850	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.003	0.29	0.02	0.15
7	329204	323497	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.003	0.30	0.02	0.16
8	329767	322292	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.004	0.44	0.02	0.23
9	330183	321803	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.005	0.53	0.03	0.28
10	332593	321777	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.003	0.27	0.01	0.14
11	330534	324478	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.007	0.23	0.04	0.24
12	330439	324811	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.005	0.17	0.03	0.17
13	332862	325694	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.005	0.15	0.02	-
14	333748	326674	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.003	0.09	0.01	-
15	327687	323481	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.12	0.01	0.06
16	327714	324037	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.12	0.01	0.06
17	327139	322505	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.09	0.01	0.04
18	326856	323043	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.08	0.01	0.04
19	326327	322331	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.06	0.00	0.03
20	327030	322012	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.08	0.01	0.04
21	326482	321602	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.001	0.07	0.01	0.04
22	327559	325041	Sweeney Fen SSSI	0.02	1.0	10.0	0.001	0.10	0.01	0.05
23	326466	323500	Blodwel Marsh SSSI	0.02	3.0	15.0	0.001	0.02	0.00	0.03
24	326620	321040	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.02	0.01	-
25	325607	320338	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.02	0.00	-
26	325580	319526	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.000	0.02	0.00	-
27	326383	319070	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.02	0.00	-
28	326372	317709	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.02	0.00	-
29	326133	315999	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.000	0.01	0.00	-
30	330214	323962	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.008	0.27	0.04	0.43
31	329944	323971	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.005	0.17	0.03	0.26
32	325072	326494	Trefonen Marshes SSSI	0.02	1.0	10.0	0.000	0.03	0.00	0.02
33	323349	325499	Craig Sychtyn SSSI	0.03	1.0	15.0	0.000	0.02	0.00	0.01
34	324540	317848	Ty-Brith Meadows SSSI	0.02	3.0	10.0	0.000	0.01	0.00	0.02
35	329711	314933	Breidden Hill SSSI	0.03	1.0	5.0	0.000	0.05	0.00	0.07
36	329318	314344	Breidden Hill SSSI	0.03	1.0	5.0	0.000	0.03	0.00	0.04
37	337415	321076	Lin Can Moss SSSI	0.03	1.0	5.0	0.001	0.07	0.01	0.11
38	335126	328219	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.001	0.05	0.01	-
39	332121	332760	Fernhill Pastures SSSI	0.02	3.0	15.0	0.001	0.02	0.00	0.02

Table 4c. Predicted maximum annual mean ammonia concentrations and nitrogen deposition at the discrete receptors - Scenario 5

Receptor number	X(m)	Y(m)	Designation	Site Parameters			Maximum annual ammonia concentration		Maximum annual nitrogen deposition rate	
				Deposition Velocity	Critical Level (µg/m³)	Critical Load (kg/ha)	Process Contribution (µg/m³)	%age of Critical Level	Process Contribution (kg/ha)	%age of Critical Load
1	330412	324423	Shropshire Union Canal Field LWS	0.02	1.0	10.0	0.019	**1.90**	0.10	0.99
2	330104	324155	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.017	**1.72**	0.09	0.89
3	331104	324950	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	0.019	**1.94**	0.10	**1.01**
4	331588	325060	Purple moor-grass & rush pastures PH	0.02	1.0	10.0	0.016	**1.59**	0.08	0.83
5	332398	324550	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.028	**2.78**	0.14	**1.44**
6	329499	323850	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.008	0.82	0.04	0.43
7	329204	323497	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.008	0.79	0.04	0.41
8	329767	322292	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.011	**1.12**	0.06	0.58
9	330183	321803	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.013	**1.34**	0.07	0.70
10	332593	321777	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	0.007	0.67	0.03	0.35
11	330534	324478	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.018	0.62	0.10	0.64
12	330439	324811	Crofts Mill Pasture SSSI	0.02	3.0	15.0	0.013	0.45	0.07	0.47
13	332862	325694	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.013	0.42	0.07	-
14	333748	326674	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.007	0.23	0.04	-
15	327687	323481	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.003	0.31	0.02	0.16
16	327714	324037	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.003	0.31	0.02	0.16
17	327139	322505	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.23	0.02	0.12
18	326856	323043	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.20	0.02	0.11
19	326327	322331	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.17	0.01	0.09
20	327030	322012	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.23	0.02	0.12
21	326482	321602	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	0.002	0.19	0.01	0.10
22	327559	325041	Sweeney Fen SSSI	0.02	1.0	10.0	0.003	0.27	0.01	0.14
23	326466	323500	Blodwel Marsh SSSI	0.02	3.0	15.0	0.002	0.07	0.01	0.07
24	326620	321040	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.002	0.07	0.02	-
25	325607	320338	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.05	0.01	-
26	325580	319526	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.04	0.01	-
27	326383	319070	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.002	0.05	0.01	-
28	326372	317709	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.05	0.01	-
29	326133	315999	Montgomery Canal SSSI/SAC	0.03	3.0	-	0.001	0.04	0.01	-
30	330214	323962	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.020	0.66	0.10	**1.03**
31	329944	323971	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	0.013	0.42	0.07	0.65
32	325072	326494	Trefonen Marshes SSSI	0.02	1.0	10.0	0.001	0.09	0.00	0.05
33	323349	325499	Craig Sychtyn SSSI	0.03	1.0	15.0	0.001	0.06	0.00	0.03
34	324540	317848	Ty-Brith Meadows SSSI	0.02	3.0	10.0	0.001	0.03	0.00	0.04
35	329711	314933	Breidden Hill SSSI	0.03	1.0	5.0	0.001	0.12	0.01	0.19
36	329318	314344	Breidden Hill SSSI	0.03	1.0	5.0	0.001	0.07	0.01	0.11
37	337415	321076	Lin Can Moss SSSI	0.03	1.0	5.0	0.002	0.19	0.01	0.29
38	335126	328219	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	0.004	0.13	0.02	-
39	332121	332760	Fernhill Pastures SSSI	0.02	3.0	15.0	0.002	0.06	0.01	0.06

Table 5. Changes in Predicted maximum annual mean ammonia concentrations and nitrogen deposition at the discrete receptors - (Scenario 5 - Scenario 1)

Receptor number	X(m)	Y(m)	Designation	Site Parameters			Maximum annual ammonia concentration		Maximum annual nitrogen deposition rate	
				Deposition Velocity	Critical Level (µg/m³)	Critical Load (kg/ha)	Process Contribution (µg/m³)	%age of Critical Level	Process Contribution (kg/ha)	%age of Critical Load
1	330412	324423	Shropshire Union Canal Field LWS	0.02	1.0	10.0	-0.020	-1.97	-0.10	-1.02
2	330104	324155	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	-0.018	-1.84	-0.10	-0.95
3	331104	324950	Montgomery Canal at Maesbury Marsh LWS	0.02	1.0	10.0	-0.019	-1.89	-0.10	-0.98
4	331588	325060	Purple moor-grass & rush pastures PH	0.02	1.0	10.0	-0.021	-2.10	-0.11	-1.09
5	332398	324550	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	-0.040	-4.04	-0.21	-2.10
6	329499	323850	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	-0.011	-1.06	-0.05	-0.55
7	329204	323497	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	-0.007	-0.70	-0.04	-0.36
8	329767	322292	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	-0.011	-1.05	-0.05	-0.55
9	330183	321803	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	-0.013	-1.27	-0.07	-0.66
10	332593	321777	Lowland fens/Upland fens, flushes & swamps PH	0.02	1.0	10.0	-0.009	-0.88	-0.05	-0.46
11	330534	324478	Crofts Mill Pasture SSSI	0.02	3.0	15.0	-0.020	-0.67	-0.10	-0.70
12	330439	324811	Crofts Mill Pasture SSSI	0.02	3.0	15.0	-0.015	-0.49	-0.08	-0.51
13	332862	325694	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	-0.015	-0.50	-0.08	-
14	333748	326674	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	-0.009	-0.29	-0.05	-
15	327687	323481	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	-0.003	-0.26	-0.02	-0.14
16	327714	324037	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	-0.004	-0.38	-0.03	-0.20
17	327139	322505	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	-0.002	-0.17	-0.01	-0.09
18	326856	323043	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	-0.002	-0.16	-0.01	-0.08
19	326327	322331	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	-0.001	-0.13	-0.01	-0.07
20	327030	322012	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	-0.002	-0.18	-0.01	-0.10
21	326482	321602	Llanymynech and Llynclys Hills SSSI	0.03	1.0	15.0	-0.001	-0.15	-0.01	-0.08
22	327559	325041	Sweeney Fen SSSI	0.02	1.0	10.0	-0.003	-0.32	-0.02	-0.17
23	326466	323500	Blodwel Marsh SSSI	0.02	3.0	15.0	-0.002	-0.06	-0.01	-0.06
24	326620	321040	Montgomery Canal SSSI/SAC	0.03	3.0	-	-0.002	-0.07	-0.02	-
25	325607	320338	Montgomery Canal SSSI/SAC	0.03	3.0	-	-0.001	-0.05	-0.01	-
26	325580	319526	Montgomery Canal SSSI/SAC	0.03	3.0	-	-0.001	-0.05	-0.01	-
27	326383	319070	Montgomery Canal SSSI/SAC	0.03	3.0	-	-0.002	-0.07	-0.02	-
28	326372	317709	Montgomery Canal SSSI/SAC	0.03	3.0	-	-0.002	-0.06	-0.01	-
29	326133	315999	Montgomery Canal SSSI/SAC	0.03	3.0	-	-0.001	-0.04	-0.01	-
30	330214	323962	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	-0.022	-0.73	-0.11	-1.13
31	329944	323971	Morton Pool and Pasture SSSI/Ramsar site	0.02	3.0	10.0	-0.015	-0.51	-0.08	-0.80
32	325072	326494	Trefonen Marshes SSSI	0.02	1.0	10.0	-0.001	-0.12	-0.01	-0.06
33	323349	325499	Craig Sychtyn SSSI	0.03	1.0	15.0	-0.001	-0.09	-0.01	-0.05
34	324540	317848	Ty-Brith Meadows SSSI	0.02	3.0	10.0	-0.001	-0.04	-0.01	-0.06
35	329711	314933	Breidden Hill SSSI	0.03	1.0	5.0	-0.001	-0.14	-0.01	-0.22
36	329318	314344	Breidden Hill SSSI	0.03	1.0	5.0	-0.001	-0.07	-0.01	-0.11
37	337415	321076	Lin Can Moss SSSI	0.03	1.0	5.0	-0.002	-0.23	-0.02	-0.35
38	335126	328219	Montgomery Canal, Aston Locks - Keeper's Bridge SSSI	0.02	3.0	-	-0.005	-0.18	-0.03	-
39	332121	332760	Fernhill Pastures SSSI	0.02	3.0	15.0	-0.003	-0.09	-0.01	-0.09

Figure 6a. Maximum annual ammonia concentration - Scenario 1 (Existing Scenario)

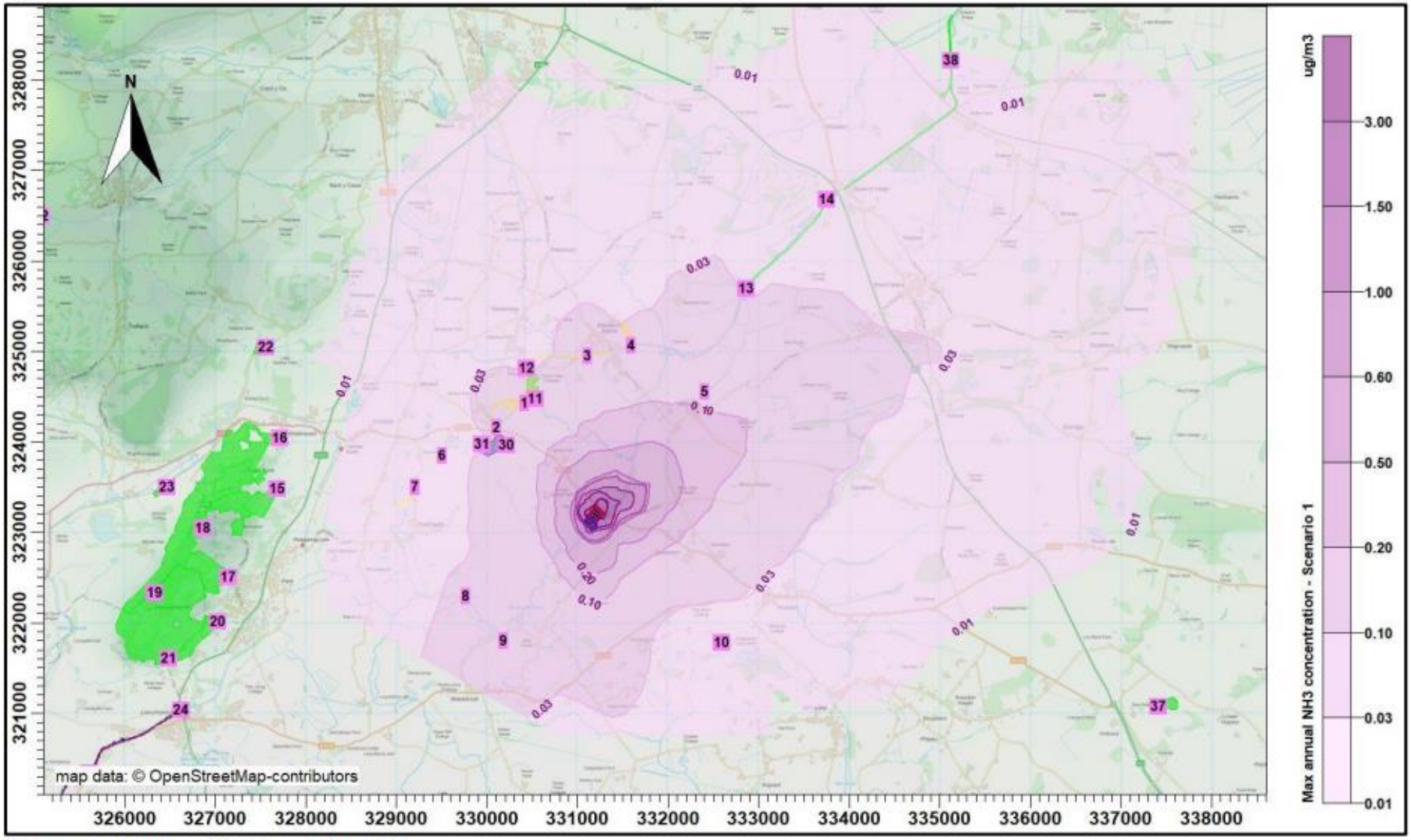


Figure 6b. Maximum annual nitrogen deposition rates - Scenario 1 (Existing Scenario)

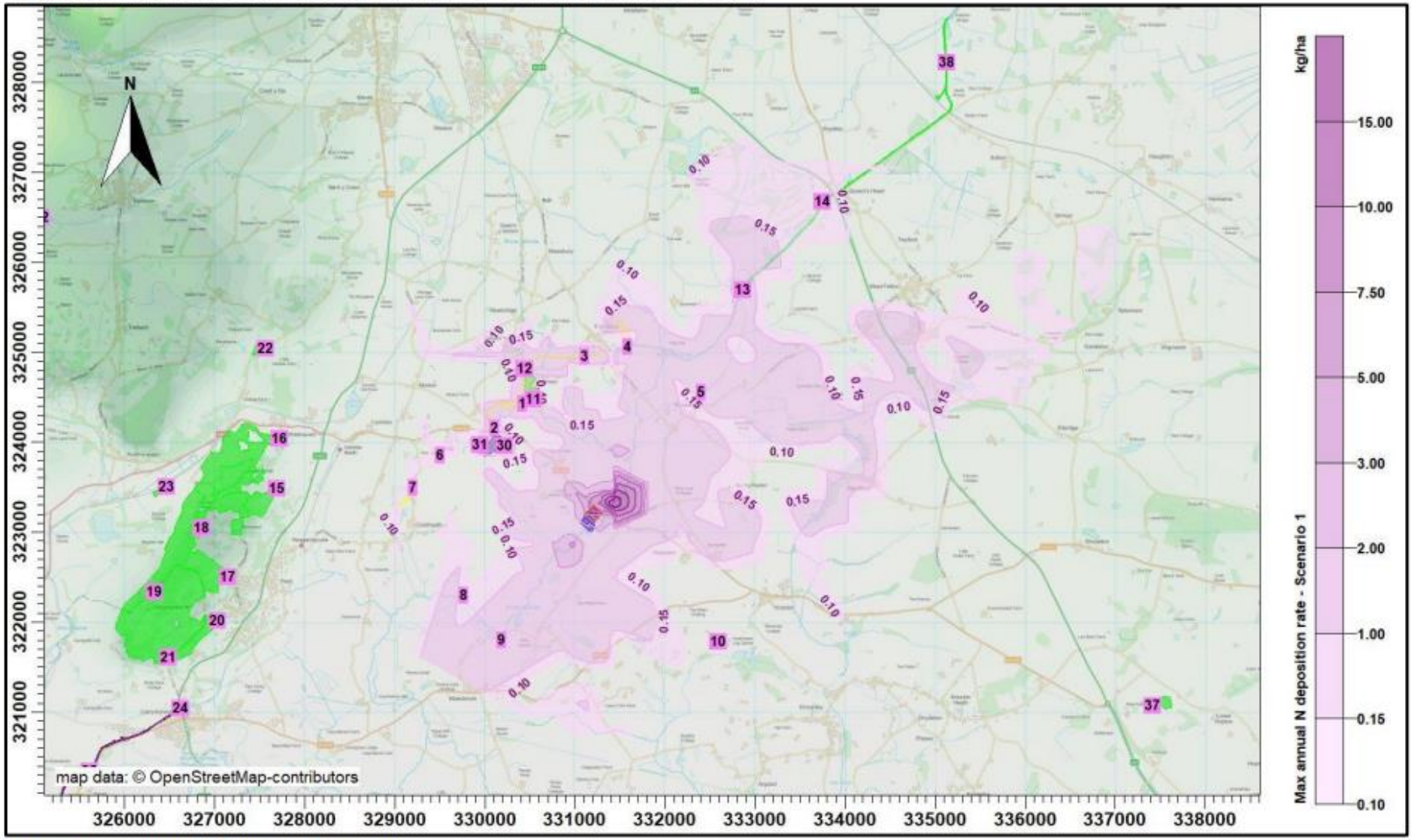


Figure 7a. Maximum annual ammonia concentration - Scenario 5 (Proposed Scenario)

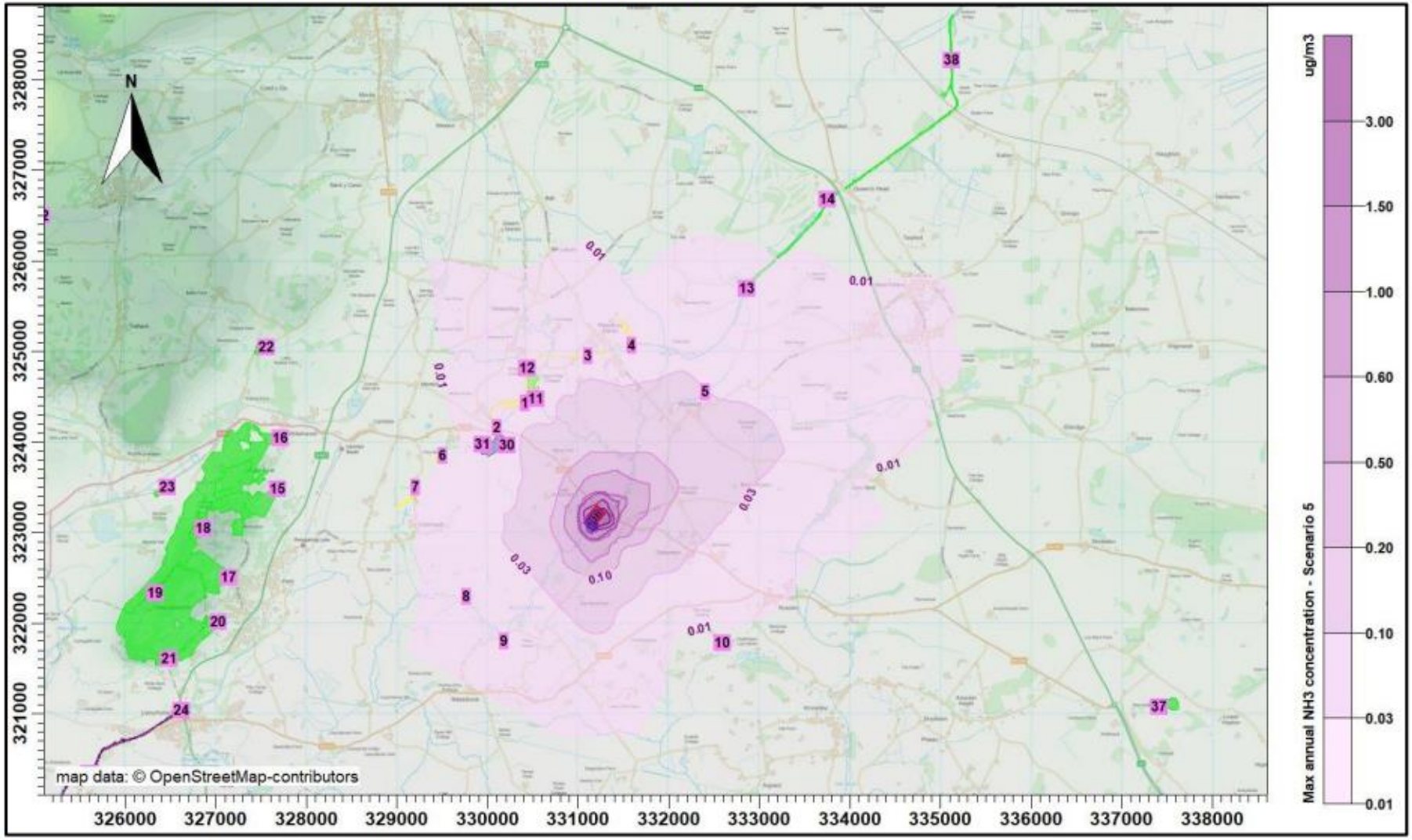
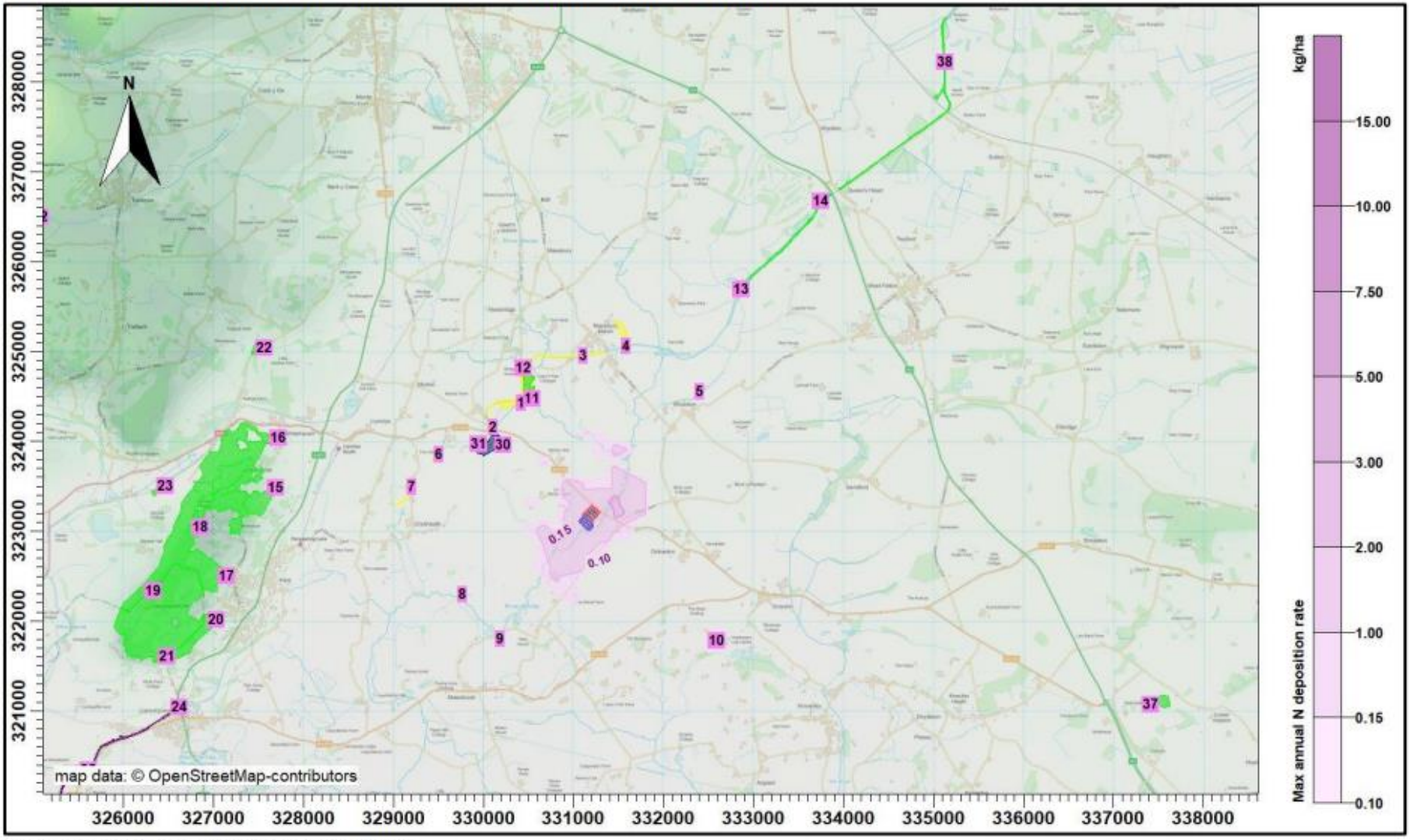


Figure 7b. Maximum annual nitrogen deposition rates - Scenario 5 (Proposed Scenario)



Summary and Conclusions

AS Modelling & Data Ltd. has been instructed by Rosina Bloor of Roger Parry & Partners LLP., on behalf of Morton Growers Ltd., to use computer modelling to assess the impact of ammonia emissions from the existing and proposed broiler chicken rearing houses at Morton Ley Farm, near Osbaston, Oswestry. SY10 8BG.

Ammonia emission rates from the poultry houses have been assessed and quantified based upon the Environment Agency's standard ammonia emission factors and also upon an emissions model that estimates emissions from the Pollo Compact Air ammonia scrubbing equipment that would be fitted to the existing and proposed poultry houses. The ammonia emission rates have then been used as inputs to an atmospheric dispersion and deposition model which calculates ammonia exposure levels and nitrogen and acid deposition rates in the surrounding area.

The detailed modelling of emissions from the scrubbers in the Proposed Scenario (Scenario 5), assuming the scrubber is 100% operational, predicts that

- At all statutory wildlife sites, the process contribution to annual mean ammonia concentrations and nitrogen deposition rates would be below 1% of the relevant Critical Level/Load for the site, with the exception of a small area of Morton Pool and Pasture SSSI/Ramsar Site, where concentrations would be below 1% of the Critical Level of 3.0 $\mu gNH_3/m^3/y$ but deposition rates would exceed 1% by a small margin of the Critical Load of 10.0 kg-N/ha/y; however, this is reduced from the existing scenario.
- Several nearby non-statutory sites would continue to exceed 1% of the precautionary Critical Level of 1.0 $NH_3/m^3/y$ by a small margin; however, in all cases the exceedances are reduced from the existing scenario.
- At all wildlife sites considered, the process contribution to annual mean ammonia concentrations and nitrogen deposition rates would be reduced from the existing scenario.
- The predicted changes in ammonia concentration and nitrogen deposition rate at all wildlife sites are negative. That is, changes are neutral or better and also below the JNCC de minimus thresholds.

6.4 Carbon Dioxide

Any carbon dioxide emitted from the poultry development would be off-set due to the reduction in emissions from transporting poultry meat from elsewhere. Increasing the amount of home produced poultry meat will reduce the need for importing meat from abroad and hence help to reduce the level of transportation required.

6.5 Conclusions

It is concluded that the nature of the extension and environmental controls built into the proposed poultry extension mean that emissions to air will have no significant adverse effects on air quality or the health of local people or designated wildlife sites. Therefore no further mitigation measures are required.

CHAPTER 7 – LANDSCAPE & VISUAL IMPACT ASSESSMENT

7. Landscape and Visual Assessment

7.1 Introduction

1. This **report** presents the findings of a landscape and visual impact assessment that has been **undertaken** to identify the likely **effects** of the proposed development on the landscape character and visual amenity of the locality.

2. The assessment has been undertaken by a Chartered Member of the Landscape Institute (CMLI) with over 25 years' experience in the landscape and visual assessment of various development types including residential, commercial, agricultural and renewable energy developments.

3. The assessment has **concentrated on a 3.0km radius study area for landscape character, landscape designations and visual amenity, which is considered sufficient to identify all likely impacts on landscape character and visual (see** Figure LV1 **for the extent of the study area).**

4. The assessment is illustrated by **Figures LV1 – LV3** and by **Viewpoints 1 - 6**.

7.2 Method of Assessment

7.2.1 Assessment Approach

5. The assessment is a study identifying the key views towards the proposed development and describing how these views could change as a result of the proposal. In addition, the study identifies the landscape character of the site and surroundings and sets out the potential changes to landscape character that could occur as a result of the proposal.

6. The methodology used in this study conforms to the Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3). This assessment also refers to Landscape Institute Technical Guidance for the Visual Representation of Development Proposals (LI, TGN 06/19). The assessment has also drawn on information provided within the local development plans that cover the study area (see list of references) and landscape character assessments which cover the study area (see list of references).

7.2.2 Good Practice Guidance and Data

7. As mentioned above, the assessment has utilised guidance set out within the GLVIA3. Photographs illustrating views from each viewpoint have been taken using a Canon EOS 6D digital camera using a fixed lens with a 50mm focal length. Each viewpoint is illustrated as wireframes and Type 3 photomontages (in line with Landscape Institute TGN 06/19). The viewpoint images are provided for information purposes and should not be considered as a substitute to visiting a viewpoint in the field.

7.2.3 Assessment Process

8. The assessment has involved information review, fieldwork observations and photography, and has been undertaken in several stages, as presented in the following sections of this report:

- Predicted effects and mitigation – a review of the visual characteristics of the proposed development to identify the aspects with the potential to give rise to visual effects and a description of the measures incorporated into the design to mitigate these effects.

- Landscape and visual context – a review of the existing landscape and visual baseline of the study area, to identify landscape character, landscape designations and visual receptors in the study area as well as any existing poultry developments within the baseline.
- Viewpoint analysis – to illustrate typical local views and to predict the changes to views as a result of the proposed development from a selection of viewpoints that represent the main visual receptors in the study area, including potential cumulative impacts.
- Landscape assessment – an assessment of the potential effects of the proposed development on landscape fabric, landscape character and landscape designations in the landscape study area in combination with other existing poultry developments within the study area.
- Visual assessment – an assessment of the potential effects of the proposed development on the visual amenity of receptors in the visual study area in combination with other existing poultry developments within the study area.
- Conclusions – a summary of the findings of the landscape and visual assessments.

7.2.4 Prediction Methodologies

9. The prediction methodologies for the viewpoint analysis, landscape assessment and visual assessment are provided at the beginning of these sections.

7.3 Predicted Effects and Mitigation

10. A detailed description of the proposed development and information on the installation of the various components of this proposed development are provided in the **Environmental Statement** of the Planning Application.

11. It is the visual appearance of the proposed development and associated activities and any proposed changes to the existing landscape fabric of the site that are the main aspects of the development with the potential to affect landscape and visual amenity and these are summarised below.

12. The main elements of the proposed development that would be visible would be:

- Built form – a series of two poultry unit buildings. Each building would measure approximately 125.4m by 24.68m and the two units would be approximately 11.5m apart, with a connecting corridor between the two units, with five grain silos also located between the two units. Each building would measure 5.0m to the ridge of the roof with an eaves height of approximately 2.4m. Seven extraction fans would be located along the ridge of the roofline at a height of approximately 1.02m above the roof. Each building would be fitted externally on the gable end with a single low-wattage low intensity light with shielding to minimise the light spread. Five silos would be located between the buildings as shown on the floor plans (RB-MZ445-03) and would be of a height of up to 6.6m. The building, roof and silos/hoppers would all be juniper green (or similar) in colour. (Final colours to be agreed with the Council).

- Hardstanding area – an existing access point to the public highway and an existing access track would be utilised, leading to an existing hardstanding area which would be connected to and extended by an area of approximately 85m by 160m to the south of the existing hardstanding.
- Deliveries to and from the site (as set out within the Environmental Statement).
- Landscape proposals – Plan RR-MZ445-06 sets out the details of the proposals which include maintenance of existing hedgerows around Morton Ley Farm to minimum heights of 3m and depths of 2m as well as additional grass seeding to the east of the proposed buildings. These measures are proposed to aid in the enhancement of local landscape fabric and to assist in the integration of the proposed buildings into the local area.

13 From a landscape and visual perspective, the number of elements visible has been minimised by situating the proposed development proximate to existing poultry buildings of a similar size and colour, by locating the proposals close to areas of mature tree cover, by the suggested juniper green colour for the built form to match with the adjacent built form and local colour palette, and through the landscape proposals associated with the application.

7.4 Landscape and Visual Context

14 The proposed development would be situated immediately south of four existing poultry buildings of similar design, height and colour. These four existing buildings are located immediately south of the B4396 between Knockin and Llynclys and the proposed poultry buildings would be located approximately 180m south of this road, at their closest point. A local road runs south from the B4396 to Maesbrook and at its closest point is located approximately 250m east of the proposed buildings. The existing and proposed buildings are located within a large and irregularly shaped agricultural field which is bound on its east side by the River Morda and a belt of mature trees, by an earth bund (approximately 2.5m in height) and then a roadside hedgerow to the north along the B4396, and by a hedgerow and a number of trees on its west and south sides. The existing access track has a gated entrance and enters the site field on the northwest corner, travelling west of the existing poultry buildings and connecting to the existing hardstanding on its southwest corner.

15 A section of local public footpath (0307/190/2) runs parallel to the B4396 just inside the site field and along the northern slopes of the earth bund, adjacent to the existing hedgerow and in the vicinity of the existing poultry buildings. A second section of the same footpath then travels south and west near Lower Morton Farm to Crickheath. To the east and northeast a number of public footpaths can be found within the local landscape.

16 The site is surrounded by a network of irregularly sized and shaped agricultural fields with a number of woodland copses associated with the River Morda located in the nearby landscape to the south, east and north of the site. interspersed with woodland blocks, particularly to the west, east and south. Fields tend to be bound by hedgerows, with hedgerow trees common in a number of local fields.

17 The nearest residential properties to the proposal are Morton Ley Farm (owned by the landowner), Lower Morton, Morton Hall, Brook House and Osbaston House, located at distances of approximately

150m west, 440m west, 730m northwest, 410m east and 620m south, respectively. Beyond these individual properties, most residential properties are located over 750m from the proposal. The settlement of Woolston is located approximately 1.5km to the northeast of the proposal, with Maesbury Marsh approximately 1.65km to the north, Llynclys approx. 2.5km to the west, Crickheath approx. 1.9km to the west and Maesbrook approx. 2.0km to the south.

18 The landform of the site and immediately surrounding area is broadly flat, located at approximately 70m AOD with a very gentle slope down east to the River Morda. The broader landform across the study area regularly undulates between approx. 70m and 90m AOD, with occasional higher points such as immediately west of Tramway Farm. The Montgomery Canal travels through the west, northwest and northern sectors of the study area.

19 A review of all existing poultry units has been undertaken and **Figure LV3** indicates those located within 3.0km of the proposal, the closest of which is the four unit development immediately north of the proposal at Morton Ley Farm. Other existing poultry buildings are located by Tramway Farm, approx. 2.2km to the west of the proposed development, and at West Farm, approx. 2.2km from the proposal, also to the west. These poultry units are discussed further later within the assessment.

7.4.1 Landscape Fabric

20 The field within which the proposed buildings and hardstanding are located is currently an arable field. This field is bound on its east side by the River Morda and a belt of mature trees, by an earth bund (approximately 2.5m in height) and then a roadside hedgerow to the north along the B4396, and by a hedgerow and a number of trees on its west and south sides. As mentioned above, the existing access track would be utilised for the proposed development.

21 The intention for the existing roadside hedgerow to the north along the B4396 is that it will be grown and maintained to a height of 3m, although currently it is between 1.0m and 1.5m in height. Typically, field boundary and roadside hedgerows are generally approx. 1.5m to 2.0m in height. Woodland copses are typical of the area local to the site, mainly located in association with the River Morda, although several other copses are scattered throughout the area, particularly north of Maesbrook and near Maesbury. Tree belts are also a common feature of parts of the Montgomery Canal within the study area.

7.4.2 Landscape Character

22 At a national level, Natural England has divided England into 159 National Character Areas (NCAs). The site and the whole study area fall within NCA 61: Shropshire, Staffordshire and Cheshire Plain. The full NCA description for this area is included within **Appendix LV1**, with the key characteristics for the area covering the site set out below (NCA 61).

NCA61: Shropshire, Staffordshire and Cheshire Plain

- Extensive, gently undulating plain, dominated by thick glacial till from the late Pleistocene Period, producing productive, clay soils and exemplifying characteristic glacial landforms including eskers, glacial fans, kettle holes, moraines and a landscape of meres and mosses.

- Prominent discontinuous sandstone ridges of Triassic age, characterised by steep sides and freely draining, generally infertile soil that supports broadleaved and mixed woodland.
- Few woodlands, confined to the area around Northwich and to estates, cloughs and deciduous and mixed woods on the steeper slopes of the wind-swept sandstone ridges. Locally extensive tracts of coniferous woodland and locally distinctive orchards scattered throughout.
- Strong field patterns with generally well-maintained boundaries, predominantly hedgerows, with dense, mature hedgerow trees. Sandstone walls occur on the ridges and estate walls and Cheshire-style (curved topped) metal railing fences occur locally on estates in Cheshire.
- Dairy farming dominates on the plain, with patches of mixed farming and arable in the north and large areas in the south-east.
- Diversity of wetland habitats includes internationally important meres and mosses comprising lowland raised bog, fen, wet woodland, reedbed and standing water, supporting populations of a host of rare wildlife, including some species of national and international importance.
- Extensive peat flood plains where flood plain grazing marsh habitats support regionally important populations of breeding waders in areas such as Baggy Moor, Weald Moor and Doxey Marshes.
- Many main rivers and their flood plains lie in this area, including the Dee, Dane, Severn, Penk and Sow. Significant areas of grazing marsh, alluvial flood meadows and hay meadows associated with the rivers Dee, Sow, Gowy and Severn. The area has the highest density of field ponds in western Europe.
- Rich archaeological evidence of iron-age hill forts concentrated on the sandstone ridges and the Weald Moors. Remnant ridge and furrow and moated houses are features of the plain. The Roman road, Watling Street, crosses the plain linking London to Wales via Wroxeter. Chester was an important Roman settlement.
- Regularly spaced, large farmsteads, dispersed hamlets, market towns and many other settlements including Macclesfield and Telford. Timber-frame buildings are a distinctive feature of the plain, often highly decorated in Cheshire, for example, the moated Little Moreton Hall. The historic towns including Stafford, Shrewsbury and the city of Chester have a wealth of 17th- and 18th-century half-timber, brick and red sandstone buildings.
- Parklands and gardens associated with estates such as Chillington, Trentham, Tatton and Attingham; country houses such as Gawsworth Hall, Arley Hall and Adlington Hall; and fortified manor houses and castles such as at Shrewsbury, Stafford, Beeston, Acton Burnell and Cholmondeley.
- Nationally important reserves of silica sand and salt. Active extraction of salt has developed a locally distinctive landscape of subsidence flashes, particularly around the area of Sandbach. Adjacent to these saline flashes are areas of salt marsh rarely found at inland sites.

- The numerous canals are important for recreation as well as habitat. Several National Cycle Routes and nearly 5,000 km of public rights of way cross the plain. Six National Nature Reserves (NNRs) are scattered throughout, close to large population centres and well used for recreation.

23 Some extracts from the Statements of Environmental Opportunity (SEO) as part of the NCA profile for NCA 61 include the following information relevant to the site. The SEOs offer guidance on appropriate management and growth within NCAs.

- **SEO 2:** Protect the landscape of the plain, recognising its importance to food production and incorporating well-maintained hedgerows, ponds and lowland grassland margins within agricultural systems, to secure resource protection and maintain productivity, while reducing fragmentation of semi-natural habitats to benefit a wide range of services, such as landscape character, sense of place, water quality and biodiversity.

24 Within the Shropshire Landscape Typology (SCC 2006) the proposed development would be entirely located within the Settled Pastoral Farmlands Landscape Character Type (LCT), as indicated on **Figure LV2**.

25 The Shropshire Landscape Typology describes the key characteristics of the Settled Pastoral Farmlands LCT as:

- Heavy, poorly drained soils
- Pastoral land use
- Scattered hedgerow trees
- Irregular field pattern
- Small to medium scale landscapes

26 The descriptive text associated with the LCT further describes the characteristics of the LCT, such as noting that "*Settled Pastoral Farmlands are lowland agricultural landscapes. Heavy, often poorly drained soils are one of the defining characteristics of this landscape type and have traditionally been associated with livestock farming. This land use means that the historic pattern of small to medium, sub-regular, hedged fields has been retained in most places. Whilst small, relict pieces of ancient woodland are present in some areas, tree cover is largely provided by scattered hedgerow oaks and Ash trees, along with linear bands of willows and alders along watercourses. Although these are not as densely distributed as they are in the Timbered pastures, they can be present in significant numbers and, combined with the field size, generate a small to medium scale landscape with predominantly filtered views.*"

27 The Shropshire Landscape Typology does not ascribe a sensitivity to this landscape type in its published documents. Through consultation with Shropshire Council we have been provided with the unpublished background fieldwork data associated with this LCT which ascribes a low overall sensitivity to the LCT with low visual sensitivity and moderate inherent sensitivity. Therefore, for the purposes of this assessment we are using a **medium/low sensitivity**.

28 In total four LCTs fall within the 3.0km radius study area, as indicated on **Figure LV2** (Estate Farmlands, Principal Settled Farmlands, Riverside Meadows and Settled Pastoral Farmlands LCTs). The key characteristics of each other LCT in the study area is set out below.

Estate Farmlands LCT

- Mixed farming landuse
- Clustered settlement pattern
- Large country houses with associated parklands
- Planned woodland character
- Medium to large scale landscapes with framed views

Principal Settled Farmlands LCT

- Mixed farming land use
- Varied pattern of sub-regular, hedged fields

Riverside Meadows LCT

- Flat, floodplain topography
- Pastoral land use
- Linear belts of trees along watercourses
- Hedge and ditch field boundaries
- Unsettled

7.4.3 Landscape Designations

29 There are no national or local landscape designations across the site or the 3.0km radius study area.

7.4.4 Visual Receptors

30 The visual receptor locations within the 3.0km radius study area include:

- Settlements –the villages and hamlets of Maesbury, Maesbury Marsh, Woolston, Knockin, Maesbrook , Crickheath and Llynclys.
- Individual residential properties – scattered houses and farmsteads.
- Local public rights of way – footpaths, bridleways and byways open to all traffic (BOATs).
- Long distance recreational routes – Shropshire Way and Wat's Dyke Way.
- Visitor attractions – Cambrian Heritage Railway at Llynclys.
- Public highways – including the B4396, B4398 and a network of minor roads.

31 The Countryside and Rights of Way (CRoW) Access Lands Maps on the Natural England website [1] have been checked and show no areas of access land within 3.0km of the site.

1 www.openaccess.naturalengland.org.uk

7.5 Visual Analysis

7.5.1 Theoretical Visibility Analysis

32 **Figure LV1** includes a zone of theoretical visibility (ZTV) for the proposed development, indicating the locations within a 3.0km radius where topography would theoretically allow visibility of the proposed buildings. The ZTV has been generated using a computer-based intervisibility package and the Ordnance Survey Digital Terrain Model (DTM) with height data at 5m intervals. This has been based on one of the highest point of the proposed buildings; the ridge of the roofline (Point C). This point has been used at a height above ground level relating to the height of these built elements within the design.

33 In addition, the ZTV also illustrates the potential visibility of the four existing poultry buildings at Morton Ley Farm where two buildings were each permitted as part of applications 11/02934 and 15/04477. These parts of the ZTV were also based on the ridge of the roofline of the existing buildings (Points A and B). Therefore, the blue tone denotes where only the existing poultry buildings under application 11/02934 would potentially be visible, the yellow tone denotes where only the existing poultry buildings under application 15/04477 would potentially be visible and the lilac tone denotes where only the proposed poultry development would potentially be visible. The salmon tone denotes where all the existing and proposed poultry buildings at Morton Ley Farm would potentially be visible at the same location and the green tone denotes where only the four existing poultry buildings at Morton Ley Farm would potentially be visible.

34 As **Figure LV1** indicates, from much of the east of the study area, none of the existing or proposed poultry buildings at Morton Ley Farm would be visible due to the screening effects of intervening topography. However, from much of the remainder of the study area, the salmon pink tone denotes that all the existing and proposed poultry buildings at Morton Ley Farm would potentially be visible. Nevertheless, it is important to note that the lilac tone is not found anywhere within the study area, meaning that the proposed development is not expected to add visibility of poultry buildings into any part of the study area where no poultry buildings are currently seen. The ZTV suggests that where the existing poultry buildings are potentially visible, in many cases the proposed buildings would also be seen.

35 However, the ZTV is based on bare terrain topographical data only. It does not take into account the screening effects of any minor topographic features, vegetation such as woodland, tree belts and hedgerows or other built structures and therefore tends to over-emphasise the extent of visibility in this type of well vegetated landscape, providing a worst case scenario. In reality, these surface features would fragment and reduce the extent of most of these zones of theoretical visibility, and, in a well vegetated landscape such as this, would also reduce the amount/proportion of the proposed buildings visible from any given location.

36 The ZTV does not illustrate the decrease in the scale of the proposed built development with increased distance from the site which is better illustrated by viewpoints. As a result, fieldwork and the viewpoint analysis are essential as a way of verifying the ZTV and undertaking a thorough assessment.

7.5.2 Viewpoint Analysis

37 Six viewpoints were selected as representing and illustrating some of the most open and/or key locations or receptors within the 3.0km radius study area and have been located in positions where the ZTV has suggested that potential visibility of the proposed development may be available. These viewpoints are listed below and the locations of these viewpoints are shown on **Figures LV1 and LV2**. A detailed description of these viewpoints and the potential changes that would occur through the introduction of the proposed development are contained below. The A3 single frame images from each viewpoint are produced at a set viewing distance, although they should not be considered as a substitute to visiting a viewpoint in the field.

Table LV1 – List of viewpoints

Vp	Viewpoint Name	NGR	Distance from proposed buildings	Landscape Character Type	Visual Receptor
1	Local road to Maesbrook	331140 322645	0.3km	Settled Pastoral Farmlands	Motorists
2	B4396 by Brook House	331595 323070	0.4km	Principal Settled Farmlands	A few residents, Motorists
3	Woolston Bank	331985 323815	1.0km	Principal Settled Farmlands	Motorists
4	Footpath 0307/188/1 near River Morda	330305 322130	1.2km	Settled Pastoral Farmlands	Walkers
5	B4396 by Montgomery Canal	330185 324130	1.3km	Settled Pastoral Farmlands	Motorists

6	Montgomery Canal junction with local road and Wat's Dyke Way	328650 323070	2.4km	Settled Pastoral Farmlands	Motorists, Walkers, a few nearby residents

Prediction Methodology

38 The following viewpoint analysis has identified the visual receptor sensitivity at each viewpoint location and combined these with the predicted magnitude of change in the view in order to determine the overall effect and whether or not this would be a significant change in the view for each visual receptor type at each location.

39 In accordance with GLVIA3, the sensitivity of each visual receptor group at each location is a function of the susceptibility of visual receptors to change at that location and the value attached to these views.

40 All visual receptors are people and are assumed to be equally sensitive to change. However, the location and activities of visual receptors influence the way in which they currently experience the landscape and views, the extent to which views of the surrounding landscape may contribute to their existing visual amenity, the value they place on these views and their susceptibility to changes in these views. Accordingly, at any one location there may be different levels of sensitivity for the different receptor groups, the sensitivity may vary depending on the direction of the view, and any one receptor group may be accorded different levels of sensitivity at different locations.

41 Receptor susceptibility levels of susceptible, moderate susceptibility and slight susceptibility are used taking into account the following factors:

- Receptor location, occupation or activity,
- Movement of receptor and duration and frequency of view experienced,
- Focus of attention and interest.

42 The judgement of value is based on a five point scale – National value, County/Borough/District value, Community value, private value, unvalued. The value attached to a location or to a particular view at a location can influence the purpose and expectation of receptors at the location and the judgement of value takes into account:

- Recognised value – for example by the presence of planning designations or designated heritage assets,
- Indicators of value – to individuals, communities and society generally, such as the popularity of a location.

43 Accordingly, within this assessment visual receptor sensitivity is determined in terms of the sensitivity of each location for each receptor type (rather than the sensitivity of the receptors *per se*), using a five point relative scale (high, high/medium, medium, medium/low and low).

44 The magnitude of the change in the views from the six viewpoints has been assessed using a four point scale – substantial, moderate, slight and negligible. This magnitude of change scale is a relative scale and is not an absolute scale. It is based on the assessor's interpretation of largely quantifiable parameters, including:

- Distance and direction of the viewpoint from the development.
- Extent of the development visible from the viewpoint.
- Field of view occupied by the development (horizontal and vertical angles of view) and proportion of view (as a percentage of the panorama).
- Context of the view and degree of contrast with the existing landscape and built elements (background, form, composition, pattern, scale and mass, line, movement, colour, texture, etc).
- Scale of change with respect to the loss or addition of features in the view.
- Duration and nature of the effect, eg direct/ indirect, secondary, cumulative, temporary/ permanent, short term/ long term, intermittent/ continuous, reversible/ irreversible, etc (as related to the nature of the development).

45 The sensitivity and magnitude of change have then been combined as per the matrix in Table LV2 below. Overall effects of major or major/moderate are considered significant and are shaded dark grey in Table LV2 below. Overall effects of moderate may be significant if experienced over a sustained length of a route or over most of a zone, area or location, whereas moderate/minor or lower changes are unlikely to result in significant changes to views.

46 In order to consider a worst case scenario, it is recommended that the predicted effects on views are considered to be adverse.

47 ***Table LV2: Assessment of overall impact***

Location sensitivity	Magnitude of change			
	Substantial	Moderate	Slight	Negligible
High	Major	Major/ moderate	Moderate	Moderate/ minor
High/ medium	Major/ moderate	Moderate	Moderate/ minor	Minor
Medium	Moderate	Moderate/ minor	Minor	Minor/ negligible
Medium/ low	Moderate/ minor	Minor	Minor/ negligible	Negligible

Low	Minor	Minor/ negligible	Negligible	Imperceptible

Viewpoint 1 – Local road to Maesbrook

47 This viewpoint is located at approximately 70m AOD and 390m south of the proposed buildings on a local road within the Settled Pastoral Farmlands LCT. The viewpoint is taken from a field gate and is not a typical view from this section of the local road due to varying heights of roadside boundary hedgerows. However, it represents a worst case view from this distance. Intervening mature tree cover along the River Morda filters much of the potential longer distance visibility to the north. The rooflines of the existing poultry buildings at Morton Ley Farm are discernible from this location, filtered through the riverside vegetation in the intervening landscape. No other existing poultry buildings within the study area are visible from this viewpoint.

48 The proposed buildings would be partially visible where intervening vegetation allows, seen in the middle distance of the view. The two proposed buildings would be seen in association with the existing poultry buildings, all partially screened by intervening vegetation, which would become a more effective screen in summer months. In winter months the roofline and southern end of the proposed development would be discernible, in the same way as currently the southern end of the existing poultry buildings is discernible. The colour and overall massing of the proposal would be in keeping with the existing poultry buildings but would extend additional built form further towards the viewpoint.

49 The viewpoint represents views of motorists (medium sensitivity (moderate susceptibility & community value view)). The magnitude of change in the view resulting from the introduction of the proposed buildings would be *slight (*a limited degree of change, no loss of horizon views etc*)*, resulting in a *minor effect* on the visual amenity of motorists, which would not result in a significant effect at this location. These effects would be adverse and long term.

Viewpoint 2 – B4396 by Brook House

50 This viewpoint is located at approximately 77m AOD and 395m east of the proposed buildings on a main road within the Principal Settled Farmlands LCT. The existing poultry buildings at Morton Ley Farm are partially visible on lower ground behind mature tree cover associated with the River Morda. The majority of the middle distance view is screened by the layering of vegetation within the view, although higher land around Llynclys is visible forming the skyline to the view. No other existing poultry buildings within the study area are visible from this viewpoint.

51 The proposed buildings and some of the grain silos would be partially visible filtered through the riverside vegetation and backgrounded by surrounding vegetation. The existing poultry buildings would also obscure some parts of the proposal from view.

52 The viewpoint represents views of residents within Brook House (high sensitivity (very susceptible & private view)) as well as views of motorists along the main road (medium sensitivity (moderate susceptibility & community value view)).

53 The magnitude of change in the view resulting from the introduction of the proposed development would be *slight (*a slight degree of change, adding development to an already developed section of the view, no loss of horizon views etc*)*, resulting in a *moderate* effect on the visual amenity of residents and a *minor* effect on the visual amenity of motorists at this point. These effects would not be significant for residents at Brook House or for motorists along the main road. The impacts would be adverse and long term.

Viewpoint 3 – Woolston Bank

54 This viewpoint is located at a field gate on a local road at approximately 83m AOD and 1.0km northeast of the proposed buildings within the Principal Settled Farmlands LCT. Views are available along the roadside looking across wide views to the south, west and northwest. Mature vegetation alongside the River Morda regularly interrupts views, although the relatively flat middle distance landscape is often visible as is the more distant higher ground around Llynclys. The existing poultry buildings at Morton Ley Farm are partially visible from this location, mainly seen as the roofline of the development. No other existing poultry buildings within the study area are visible from this viewpoint.

55 The proposed buildings and silos would be partially visible in the middle distance, largely screened behind the existing poultry buildings at the farm. The proposed buildings would simply be seen as an extension of the existing roofline of the existing buildings, seen as a similar colour and height. The proposed silos would also be partially discernible above the existing built form.

56 The viewpoint represents views of motorists along the local road between Woolston and the B4396 (medium sensitivity (moderate susceptibility & community value view)). The magnitude of change in the view resulting from the introduction of the proposed buildings would be negligible (a very limited degree of change, adding development to an already developed section of the view, no loss of horizon views etc), resulting in a minor/ negligible effect on the visual amenity of motorists at this point. These effects would be adverse and long term but would not be significant.

Viewpoint 4 – Footpath 0307/188/1 near River Morda

57 This viewpoint is located on a local footpath at approximately 66m AOD and 1.2km southwest of the proposal within the Settled Pastoral Farmlands LCT. This viewpoint allows views out across the relatively flat local landscape of agricultural fields, although the flat nature of the topography coupled with the good levels of local vegetation along field boundaries as well as along the River Morda means that views are relatively contained. Limited parts of the existing poultry buildings at Morton Ley Farm are discernible from the viewpoint, although it is not clear to the naked eye that they are poultry buildings from this distance and given the degree of intervening vegetative cover. No other existing poultry buildings within the study area are visible from this viewpoint.

58. The proposed buildings would be located directly in front of the existing poultry buildings from this orientation and would be viewed as very similar in appearance, size and colour to the existing buildings.

59. The viewpoint represents views of walkers on the local footpath (high/medium sensitivity (susceptible & community value view)). The magnitude of change in the view resulting from the introduction of the proposed buildings would be negligible (a very limited degree of change, no loss of horizon views etc), resulting in a minor effect on the visual amenity of walkers at this point. These effects would not be significant but would be adverse and long term.

Viewpoint 5 – B4396 by Montgomery Canal

60 This viewpoint is located on a local road at approximately 77m AOD and 1.3km northwest of the proposed development, located within the Settled Pastoral Farmlands LCT. At this location the view is relatively open to the southeast although spanning out across a broadly flat landscape where the layering of vegetation largely screens any detail within the view. Partial visibility of a few farm buildings and other built form is discernible amongst the vegetation within the view. The existing poultry units at Morton Ley Farm are entirely screened by intervening vegetation and no other existing poultry buildings within the study area are visible from this viewpoint.

61 The proposed development would be located behind the layering of intervening vegetation in the view so that even in winter months the proposal would be entirely screened in the same way as the existing poultry buildings at Morton Ley Farm are also screened. The wireframe overlaid on the photograph illustrates how the mature intervening vegetation would screen the proposal from view.

62 The viewpoint represents views of motorists along the main road (medium sensitivity (moderate susceptibility & community value view)). The magnitude of change in the view resulting from the introduction of the proposed development would be *none (*entirely screened from view*)*, resulting in *no effect* on the visual amenity of motorists at this point.

Viewpoint 6 – Montgomery Canal junction with local road and Wat's Dyke Way

63 This viewpoint is located on a local road over the Montgomery Canal at approximately 75m AOD and 2.5km west of the proposed development, within the Settled Pastoral Farmlands LCT. The viewpoint is also representative of users of the Shropshire Way and Wat's Dyke Way which both follow the route of the canal. The viewpoint illustrates the wealth of vegetation within the landscape local to Crickheath, with only very short distance views available to the east. The existing poultry units at Morton Ley Farm are entirely screened by intervening vegetation and no other existing poultry buildings within the study area are visible from this viewpoint.

64 The proposed buildings would be located behind the wealth of vegetation within the view and would be entirely screened from view by this vegetation, as indicated by the viewpoint illustrations.

65 The viewpoint represents views of motorists along the local road (medium sensitivity (moderate susceptibility & community value view)), walkers on the two long distance routes (high/medium sensitivity (susceptible & community value view)) and a few nearby residents within properties on the canal-side (high sensitivity (very susceptible & private view)). The magnitude of change in the view resulting from the introduction of the proposed development would be *none (*entirely screened from view*)*, resulting in *no effect* on the visual amenity of motorists, walkers or residents at this point.

Table LV3 – Summary of visual impacts

Vp	Viewpoint Name	Distance from proposed buildings	Predicted Visual Impacts
1	Local road to Maesbrook	0.3km	Motorists – minor effect.
2	B4396 by Brook House	0.4km	A few residents – moderate effect. Motorists – minor effect.
3	Woolston Bank	1.0km	Motorists –minor/ negligible effect.
4	Footpath 0307/188/1 near River Morda	1.2km	Walkers – minor effect.
5	B4396 by Montgomery Canal	1.3km	No effect.
6	Montgomery Canal junction with local road and Wat's Dyke Way	2.4km	No effect

Further Photographs

66 It is noted that the ZTV in **Figure LV1** suggests that the proposed building may potentially be visible from a number of areas of the 3.0km radius study area. However, fieldwork suggests that the extent of actual visibility of the proposal would be much more limited than the ZTV indicates due to the screening effects of mature vegetation in the predominantly flat landscape surrounding the proposal. The photographs below have been provided as evidence of this limited potential visibility.

67 It is also useful to note the very limited visibility of the four existing poultry buildings at Morton Ley Farm as well as the two other existing poultry developments within the west of the study area. Due to their positions in a predominantly flat landscape with some significant layering of tree copses, field boundary hedgerows and vegetation associated with the River Morda and the Montgomery Canal, fieldwork and site photography found these existing developments are all only visible within a very confined part of the study area.

68 It has been noted within the description of the Settled Pastoral Farmlands LCT that this is a landscape where "*tree cover is largely provided by scattered hedgerow oaks and Ash trees, along with linear bands of willows and alders along watercourses. Although these are not as densely distributed as they are in the Timbered pastures, they can be present in significant numbers and, combined with the field size, generate a small to medium scale landscape with predominantly filtered views.*" The following photographs provide illustration of this through typical views available from a number of local footpaths and roads surrounding the proposed site.

Plate 1 – View southwest in the direction of the site and existing Morton Ley poultry buildings. Taken from footpath 600m north of proposal. Riverside vegetation will entirely screen the proposal. NGR 331630 323475.

Plate 2 – View southwest from local footpath looking towards the site. Existing and proposed Morton Ley poultry buildings almost entirely screened from view. NGR 331710 323625.

Plate 3 – View southwest from local footpath looking towards the site. Existing and proposed Morton Ley poultry buildings entirely screened from view.. NGR 331875 323885.

Plate 4 -View west from footpath northeast of the site showing how riverside vegetation typically screens large parts of views across the local landscape. NGR 331875 323885.

Plate 5 - View west from Woolston Bank showing how riverside vegetation typically screens large parts of views across the local landscape. NGR 331985 323815.

Plate 6 - View from footpath within the south of the study area illustrating general levels of vegetation and enclosure in the local landscape. NGR 330305 322130.

Plate 7 - View towards the site from Montgomery Canal towpath. Neither the existing or proposed poultry units at Morton Ley Farm visible. NGR 329925 323980.

Plate 8 – View from Montgomery Canal towpath showing typical levels of vegetation alongside the canal. NGR 329925 323980.

Plate 9 – View towards the site from Montgomery Canal towpath. Neither the existing or proposed poultry units at Morton Ley Farm visible. NGR 329480 323840.

Plate 10 – View of typical levels of vegetation alongside the Montgomery Canal. NGR 329480 323840.

7.6 Landscape Assessment

69 This assessment draws on the review of the predicted effects of the development, the landscape fabric of the site, the key characteristics of the LCTs, the purposes/objectives of the landscape designations, the viewpoint analysis and fieldwork observations.

7.6.1 Effects on Landscape Fabric

Prediction Methodology

70 Landscape fabric is composed of the physical components of the landscape (eg landform, land cover and landscape elements and features). Developments can bring about both direct and indirect effects on landscape fabric. Direct effects occur where changes to the fabric of the landscape arise as the result of physical disturbance, for example, the loss of landscape elements such as hedgerows, walls and trees. Indirect effects are consequential changes that are separated from the source of the change in a temporal or spatial manner, for example changes in vegetation downstream as the result of modifications to surface water patterns upstream in a catchment area.

71 This assessment of effects on landscape fabric considers the existing landscape fabric of the site and the predicted effects of the development, and makes a judgement as to whether there are likely to be any significant beneficial or adverse changes to landscape fabric based on the following two definitions:

- Significant beneficial effects on landscape fabric - could occur where important/mature/diverse/distinctive components, which had previously been lost or degraded as the result of agricultural operations or other development, would be added, reinstated or improved.
- Significant adverse effects on landscape fabric - could occur where existing important/mature/diverse/distinctive components would be permanently lost (or long term temporarily lost) and the effects cannot be adequately mitigated.

72 The proposed development would be located within an agricultural field where the footprint of the buildings and hardstanding area would not require the removal of any existing important, mature, diverse or distinctive landscape components, hedgerows or isolated trees. Access from the public highway would by via an existing access track and so would also not require the remove any existing important, mature, diverse or distinctive landscape components.

73. Some landscaping proposals are suggested as part of the development including the management of existing hedgerows to the west and north of the site to heights of 3m and width of 2m. In addition, some grass seeding areas are proposed. These proposals are shown on Plan RR-MZ445-06.

74. The hardstanding area would be situated on existing ground levels in the same way as the existing poultry buildings adjacent to the site. Therefore, overall there would be some very limited ground disturbance with no loss of any existing important, mature, diverse or distinctive landscape components and some beneficial improvements to landscape fabric through additional grass seeding

of floristically enhanced buffer strip areas and hedgerow management. Therefore, overall on balance there would be neutral effects on landscape fabric as a result of the proposal.

7.6.2 Effects on Landscape Character

Prediction Methodology

75 In accordance with GLVIA3, the sensitivity of each landscape unit is judged on the basis of its value and its susceptibility to change arising from the specific type, scale and location of development proposed.

76 The susceptibility to change of a landscape unit is based on a three point scale (susceptible, moderate susceptibility and slight susceptibility) and depends on:

- The key characteristics of the landscape, and the clarity and robustness of these characteristics,
- Nature of views (visual enclosure/openness of views and extent to which views contribute to landscape character),
- Landscape planning policies and strategies for the landscape unit,
- The nature of the changes to landscape character and views that could be brought about by the type, scale and location of the proposed development and the compatibility of these with the above factors.

77 Judgements on landscape value are based on those given in published landscape character assessments (where given) and/or checked in the field from fieldwork observations.

78 Accordingly, the assessment of landscape sensitivity for each landscape unit is derived from the judgement of value and combined with the judgement of susceptibility to give a level of landscape sensitivity as part of a five point scale – high, high/medium, medium, medium/low or low sensitivity.

79 The magnitude of the change in landscape character is assessed using a four point scale –substantial, moderate, slight and negligible. This magnitude of change scale is a relative scale and is not an absolute scale. It is based on the assessor's interpretation of largely quantifiable parameters, those of which have already been set out within paragraph 44 above.

80 The sensitivity of the LCT is then combined with the magnitude of change to predict the potential impacts on landscape character as set out within the matrix below (the same as illustrated in **Table LV2** above). Overall effects of major or major/moderate are considered significant and are shaded dark grey in **Table LV2** below. Overall effects of moderate may be significant if experienced over most of a zone, area or location, whereas moderate/minor or lower changes are unlikely to result in significant changes to landscape character.

Table LV2 – Assessment of overall impact

Location sensitivity	Magnitude of change			
	Substantial	Moderate	Slight	Negligible
High	Major	Major/ moderate	Moderate	Moderate/ minor

High/ medium	Major/ moderate	Moderate	Moderate/ minor	Minor
Medium	Moderate	Moderate/ minor	Minor	Minor/ negligible
Medium/ low	Moderate/ minor	Minor	Minor/ negligible	Negligible
Low	Minor	Minor/ negligible	Negligible	Imperceptible

Settled Pastoral Farmlands LCT

81 Both fieldwork and the viewpoint illustrations have indicated that the proposed development is located within a well vegetated landscape with generally flat to gently undulating topography. The Shropshire Landscape Typology notes in relation to this LCT that "*Settled Pastoral Farmlands are lowland agricultural landscapes. Heavy, often poorly drained soils are one of the defining characteristics of this landscape type and have traditionally been associated with livestock farming. This land use means that the historic pattern of small to medium, sub-regular, hedged fields has been retained in most places. Whilst small, relict pieces of ancient woodland are present in some areas, tree cover is largely provided by scattered hedgerow oaks and Ash trees, along with linear bands of willows and alders along watercourses. Although these are not as densely distributed as they are in the Timbered pastures, they can be present in significant numbers and, combined with the field size, generate a small to medium scale landscape with predominantly filtered views.*" The Shropshire Landscape Typology does not ascribe a sensitivity to this landscape type in its published documents. Through consultation with Shropshire Council we have been provided with the unpublished background fieldwork data associated with this LCT which ascribes a low overall sensitivity to the area with low visual sensitivity and moderate inherent sensitivity. Therefore, for the purposes of this assessment we are using a **medium/low sensitivity**.

82 It is worth noting that the existing mature riverside planting immediately east of the site field along the River Morda would assist in containing any impacts on landscape character as a result of the proposal, as would the existing poultry buildings immediately north of the proposal which serve to contain visibility of the proposed buildings.

83 Nevertheless, the introduction of this scale of development into an agricultural field already containing four existing poultry buildings of a similar size, design and colour would result in a change to the landscape character of the site itself, fundamentally changing the character of a further section of the agricultural field from agricultural to developed, resulting in a significant effect on landscape character across the site itself. The key characteristics of this LCT are heavy, poorly drained soils, pastoral land use, scattered hedgerow trees, irregular field pattern and small to medium scale landscape. These key

characteristics would not fundamentally alter beyond the site itself although the proposal would add additional built form to a limited number of largely rural vistas across some parts of this LCT. Nevertheless, where visible, the proposal would be seen in conjunction with existing built form rather than in isolation and it should be noted that the existing poultry units at Morton Ley Farm do form partially although intermittently visible elements within some parts of the LCT local to the site.

84 Nevertheless, as set out above, this is an LCT where views are generally filtered by vegetation where much of the character of the area is gained from its intrinsic qualities rather than views across or beyond the LCT. Due to the position of the site within the LCT adjacent to existing similar built development and the features of its design in keeping with neighbouring development, the susceptibility to the type and location of development proposed is considered to be slight and the sensitivity of the LCT to the proposal is considered to be **medium/ low** (taken in part from the Shropshire Council fieldwork data and in part from the assessors observations).

85 Within the majority of the LCT within the study area, the proposed development would not be visible, screened by intervening vegetation, topography and adjacent built form at Morton Ley Farm, as indicated by some of the photographic plates above and by Viewpoints 5 and 6, where no effects on landscape character would occur.

86 From some locations within the LCT more proximate to the site some limited visibility of the proposal would be available, predominantly in association with the existing poultry units at Morton Ley Farm and similar to the views indicated by Viewpoints 1 and 4 where the limited and filtered visibility of the proposal adjacent to existing similar development would result in slight or negligible magnitudes of change (occupying a limited or very limited horizontal field of view, associated with existing similar built form, limited or very limited scale of change, no loss of existing features of view, not breaking the skyline etc) and minor/ negligible or negligible effects on landscape character. These effects would not be significant, although they would be long term and adverse.

87 In cumulative terms, fieldwork did not identify any locations within the LCT where the two other existing poultry developments were visible (as shown on **Figure LV3**). Both of these existing developments as well as the existing Morton Ley Farm poultry units are located within the Settled Pastoral Farmlands LCT, suggesting that the characteristics of this LCT are capable of accommodating more than one of this type of development without resulting in significant cumulative effects. Given the distance of the proposal of over 2.2km from the other two poultry developments, the intervening vegetation within this relatively flat landform is expected to entirely screen any potential cumulative visibility in the same way that it does with the existing Morton Ley Farm poultry buildings.

Estate Farmlands LCT

88 The Estate Farmlands LCT is located within the northeastern edge of the study area at distances of over 2.0km from the proposed development at its closest point. The ZTV in **Figure LV2** indicates that intervening topography would entirely screen the proposal from this LCT within the study area.

Therefore, no effects on the character of this LCT would occur as a result of the proposed development.

Riverside Meadows LCT

89 The Riverside Meadows LCT is located within the south of the study area at distances of 1.7km or greater from the proposed development at its closest point. The LCT encompasses lower lying land associated with local watercourses and a dismantled railway which all characteristically tend to have good levels of vegetation. The Shropshire Landscape Typology has asserted this LCT a moderate sensitivity where the key characteristics are noted as flat, floodplain topography, pastoral land use, linear belts of trees along watercourses, hedge and ditch field boundaries, and unsettled.

90 The ZTV suggests that much of this LCT within the study area would not have potential visibility of the proposal. However, more distant parts on the southern edge of the study area may potentially gain views of the proposal, according to topography alone. However, these are all areas to the south of the dismantled railway which has good levels of mature vegetation along its length which would entirely screen the proposed development from this LCT. Therefore, no effects on the character of this LCT are expected to occur as a result of the proposal.

Principal Settled Farmlands LCT

91 The Principal Settled Farmlands LCT is located within the east of the study area at distances of approximately 0.2km from the proposed development at its closest point. The LCT encompasses an area of undulating land with the village of Knockin located on a local high point within the LCT. Nevertheless, the undulating nature of the landform within the LCT coupled with the relatively low elevation of the proposal would result in very limited potential visibility of the proposal from within this LCT, as illustrated by **Figure LV2**. The potential visibility would be limited to western edges of the LCT within the vicinity of the site where the ZTV also indicates that any potential visibility of the proposal would consistently be in conjunction with the four existing poultry buildings at Morton Ley Farm.

92 The Shropshire Landscape Typology has asserted this LCT a moderate sensitivity where the key characteristics are noted as mixed farming land use and varied pattern of sub regular hedged fields. Viewpoints 2 and 3 are both located within this LCT at distances of 0.4km and 1.0km from the proposal, respectively, and both illustrate that not only would the proposal only be partially discernible through existing intervening vegetation, but it would also be seen in conjunction with the existing poultry buildings at the farm. In the case of VP3, these existing buildings would serve to screen large parts of the proposal from view. These viewpoints indicate that a slight and negligible magnitude of change would be expected respectively, resulting in minor or minor/ negligible effects on the character of the landscape of this LCT. These effects would not be significant but would be long term and adverse. Even from the most proximate sections of the LCT to the proposal, the proposed built form would be seen as an extension to the existing built form at the farm, where only filtered visibility of the development is possible due to the screening provided by the mature vegetation alongside the River

Morda. VP2 shows the worst case winter visibility, where summer views would be screened further when the trees are in leaf.

93 Therefore, whilst some limited adverse and long term effects on the character of the landscape of this LCT would occur in the vicinity of the site, these effects would not be significant and would be limited to a very small section of the LCT within the study area.

7.7 Visual Assessment

Prediction Methodology

94 Visual amenity arises from a visual receptor's experience of the visual world around them and the value they place on a particular view or views. For the purposes of this assessment, the predicted changes in views have been examined and significant effects on visual amenity have been identified where the proposed development would result in a significant effect on the primary view(s) at a location or along a route and the view(s) is/are valued and can be appreciated by receptors who are at that location for purposes that include the appreciation of the view(s).

95 The assessment identifies whether the predicted effects on visual amenity would be significant or not significant and, whilst it is expected that these significant effects would be considered to be adverse, it is important that the broad range of public opinions on such effects is also taken into account in the decision making process.

96 This assessment draws on the predicted effects of the development, the viewpoint analysis and fieldwork observations, and discusses the significance of the predicted effects on the visual amenity of receptors at a range of visual receptor locations within the study area. Within this study area these include settlements, individual residential properties, the local public rights of way network, long distance recreational routes, visitor attractions and public highways.

7.7.1 Settlements

97 Villages and hamlets are the main settlements within the study area and the ZTV in **Figure LV1** indicates that the proposal would be entirely screened by topography from Maesbury Marsh and Knockin, although some potential visibility of the proposal may be available from Maesbury, Maesbrook, Crickheath, Llynclys and small parts of Woolston. The ZTV is based on topography alone and does not take into account the screening effects of vegetation, which is particularly effective in this landscape at providing screening. This is illustrated by the fact that the ZTV also sets out potential visibility of the four existing poultry buildings at Morton Ley Farm and in reality these existing buildings are not visible from the majority of locations indicated within the ZTV due to the screening effects of localised mature vegetation. As a result, the potential views suggested from properties within Maesbury, Maesbrook, Crickheath, Llynclys and limited parts of Woolston are not expected to be available in reality due to the screening effects of intervening vegetation, such as riverside copses along the River Morda.

98 Viewpoint 3 is located along a local road immediately south of Woolston. The viewpoint was positioned in this location, rather than within Woolston itself due to some high hedgerows within the settlement and the intervening screening of the existing Morton Ley Farm poultry buildings provided

by riverside woodland copses. VP3 offers a more open view towards Morton Ley Farm where some limited visibility of the existing poultry buildings is available and in the same way, some limited potential visibility of the proposed development would be expected, as illustrated by the photomontage. At this location a negligible magnitude of change is predicted. Considering this as a worst case scenario for upper storey views within properties in Woolston, where riverside vegetation consistently intervenes in the views towards the site, these high sensitivity receptors would experience a moderate/ minor effect on their visual amenity at a distance of over 1km away, which would be adverse and long term, but not significant.

99 Maesbury, Maesbrook, Crickheath and Llynclys are all located at distances of at least 1.8km from the proposal. The viewpoints have indicated that at these sorts of distances from the proposal, the predominantly flat landform within central parts of the study area will largely screen the proposal from view in combination with the layering of intervening vegetation in the same way that the existing poultry buildings at Morton Ley Farm are already screened from view. In particular, from Maesbury, within the north of the study area, the proposed buildings would be located behind the four existing poultry buildings at the site, adding even further screening features. Fieldwork has verified these assumptions in the field, where no potential visibility of the proposals were found from any of these settlements. Viewpoint 6 illustrates a typical view from Crickheath at 2.4km from the proposal where intervening vegetation would entirely screen the proposal from view.

7.7.2 Individual Residential Properties

100 The closest individual properties to the site are Morton Ley Farm (owned by the landowner), Lower Morton, Morton Hall, Brook House and Osbaston House, located at distances of approximately 150m west, 440m west, 730m northwest, 410m east and 620m south, respectively. Beyond these individual properties, most residential properties are located over 750m from the proposal.

101 Morton Ley Farm currently gains visibility of the four existing poultry units at the farm approximately 160m away to the east, and the proposed poultry units would adjoin these buildings at a distance of approximately 150m away. The proposed buildings would be in keeping with the style, size and colour of the existing buildings and would take the form of an extension to the existing development within the view where a moderate magnitude of change (moderate extension of built development within the view, some loss of horizon views, moderate degree of change) and a major/ moderate effect on the visual amenity of these high sensitivity receptors would be expected. These effects would be significant, adverse and long term but it should be noted that this property is owned and occupied by the landowner/ applicant. None of the other existing poultry developments within the study area are visible from this property.

102 Lower Morton is located approximately 440m west of the proposal and 450m west of the four existing Morton Ley Farm poultry buildings. The proposed buildings would be in keeping with the style, size and colour of the existing buildings and would take the form of an extension to the existing development within the view where a slight magnitude of change (limited extension of built development within the view, no loss of horizon views, limited degree of change) and a moderate

effect on the visual amenity of these high sensitivity receptors would be expected. Some mature vegetation is located on the east side of the property meaning that these moderate effects would occur only for some views from the property and not for views north, west or south from the property, with ground floor views to the east likely screened by vegetation. As a result, these effects would not be significant but would be adverse and long term. None of the other existing poultry developments within the study area are visible from this property.

103 Morton Hall is located approximately 730m northwest of the proposal and 660m northwest of the existing Morton Ley Farm poultry buildings. Intervening agricultural buildings at Morton Hall as well as roadside hedgerows and a line of mature trees at the entrances to Lower Morton and Morton Ley Farm would assist in screening the proposal as a relatively low level form of development. In addition, the existing poultry buildings are in front of the proposal in views from Morton Hall where no visibility of the proposal is expected and no effects on the visual amenity of these residents would occur.

104 Brook House is located approximately 410m east of the proposed development as well as a similar distance from the existing poultry buildings at Morton Ley Farm. Viewpoint 2 is located by Brook House and indicates that in winter some filtered visibility of the existing poultry buildings is available and that this visibility would be extended slightly by the proposal, resulting in a slight magnitude of change and a moderate effect on visual amenity. In summer months this visibility would be lessened when the mature trees along the River Morda are in leaf. The effects outlined would not be significant but would be long term and adverse. None of the other existing poultry developments within the study area are visible from this property.

105 Osbaston House is located approximately 620m south of the proposal, with the existing poultry units located immediately adjacent to, but north of the proposal. The property is located on a similar elevation to the proposed development, with the River Morda intervening. The riverside vegetation currently also intervenes to screen large parts of the existing poultry buildings from view from the property, in conjunction with the mature vegetation along the northern boundary of the Osbaston House curtilage. The introduction of the proposal at a slightly more proximate distance is likely to also largely be screened by this existing vegetation, where a slight or negligible magnitude of change is expected (minor extension of built development within the view, no loss of horizon views, limited or very minor degree of change) and a moderate or moderate/ minor effect is anticipated, which would not be significant but would be long term and adverse.

7.7.3 Local public rights of way and long distance routes

106 One of the viewpoints is located on the local public rights of way network (Viewpoint 4). Plates 1-4 and 6 above are also located on the local public rights of way network and illustrate the regular screening provided by mature vegetation within the local landscape, not only in the direction of the proposed site, but also screening of the existing poultry buildings at Morton Ley Farm.

107 A number of public rights of way are located in the vicinity of the site. In particular it is worth noting the regular screening of the proposal and existing buildings at Morton Ley Farm from the footpath to the northeast of the site (0311/41/1), between the B4396 and Woolston (see Plates 1 – 4). A number of

rights of way are also located to the east and southeast of the proposal, although the ZTV in **Figure LV1** indicates that the proposal would be screened from several of these by intervening topography. In reality, fieldwork was unable to find any clear or open views of the proposal from the areas the ZTV suggests may gain some visibility due to the screening effects of riverside vegetation alongside the River Morda coupled with intervening roadside and field boundary hedgerows and hedgerow trees.

108 One footpath runs parallel to the B4396 immediately north of the existing poultry buildings at Morton Ley Farm (0307/190/2) and then runs east of Lower Morton and west to Crickheath. From the sections of the footpath in the vicinity of the proposal the roofline of the existing buildings are evident from the north side of the earth bund along which the footpath seems to pass. Parts of the roofline and the upper parts of the grain silos of the proposal would also be visible from this section, seen behind the foreground built form, resulting in a negligible magnitude of change (a very limited degree of change to the view, limited extension of development in view, no loss of horizon views etc) and a minor effect on the visual amenity of walkers at this point. Walkers further northwest on this section of the route, in the vicinity of Lower Morton, would gain some more open visibility of the proposal, although from a greater distance of approximately 400m away, where a slight magnitude of change (limited degree of change to the view, limited extension of development within view, no loss of horizon views etc) and a moderate/ minor effect on visual amenity would be expected. As the route then travels west to Crickheath the proposal would be between 450m and 1.5km from the proposal where intervening field boundary vegetation would regularly at least partially screen the proposal from view and the magnitude of change in the view would be expected to range between slight (limited degree of change to the view, limited extension of development within view, no loss of horizon views etc) and none and effects on walkers would be minor or lower. Fundamentally, where visible the proposal would be seen in conjunction with the existing poultry units at the site and so the addition of the proposal would be an incremental addition of further development to a section of the view already containing built form. Whilst a change would be discernible from some parts of the footpath, the visibility of the proposal would not be consistent and the effect on walkers would not be significant, but would be long term and adverse. In cumulative terms with other poultry developments within the study area, a mature woodland copse is located to the east of West Farm which is expected to regularly screen the poultry unit here from the footpath. In addition, the local rising landform immediately east of the Tramway Farm poultry buildings is expected to screen this built form from the footpath too.

109 Viewpoint 4 and Plate 6 represent views from the local right of way network to the south of the proposal, with the closest footpath located approximately 1.2km from the proposal (0307/188/1). Currently the existing poultry buildings at Morton Ley Farm are visible from limited parts of these routes, where intervening vegetation allows, as illustrated by VP4. However, the existing buildings are only very partially visible and not specifically discernible as poultry buildings, where the proposal would be located directly in front of the existing buildings and would be of a comparable colour, size and style. From a visual receptor point of view, it is unlikely that the change as a result of the introduction of the proposal would be particularly discernible from this distance, where a negligible magnitude of change

(a very limited degree of change, no loss of horizon views etc) and a minor effect on walkers on this route would be expected. These effects would not be significant but would be adverse and long term. The other existing poultry developments within the study area are located at distances of over 1.0km from this footpath and were not found to be visible from this route.

110 Footpath 0307/62/1 runs north from the B4396 to the west of Morton Hall to the Montgomery Canal and the ZTV in **Figure LV1** indicates that the proposal would be entirely screened from this footpath except for the short section closest to the B4396. However, this section runs immediately west of a mature woodland copse which would entirely screen the proposal from view.

111 At greater distances from the site intervening mature field boundary vegetation and woodland copse areas tend to add screening to views from public rights of way and the ZTV indicates potential visibility of the proposal would often become more scattered and intermittent.

112 Two long distance recreational routes are located within the study area and for the majority of the study area both follow the route of the Montgomery Canal and at their closest point are located approximately 1.3km northwest of the proposal. However, within Maesbury Marsh Wat's Dyke Way travels north and northwest through Maesbury whilst the Shropshire Way continues along the canal towpath. The ZTV in **Figure LV1** suggests several areas of potential visibility of the proposal from these routes, mainly in conjunction with the four existing Morton Ley Farm poultry buildings. However, fieldwork found that this was not the case. Typically the canal is surrounded by good levels of mature vegetation through the study area, as well as a number of residential properties being located close to or adjacent to the canal. As a result, fieldwork found that the proposal would be consistently screened from view, as indicated by Viewpoints 5 and 6, both located on or adjacent to the canal where no visibility of the proposal or the existing poultry units at Morton Ley Farm would be available. Therefore, no effects on the visual amenity of these long distance recreational users are expected as a result of the proposal.

7.7.4 Visitor Attractions

113 The Cambrian Heritage Railway is the only visitor attraction identified within the study area and is located approximately 2.7km west of the proposal on the western edge of the study area. The route travels broadly between Oswestry and Pant and Llynclys and Figure LV2 indicates some very limited potential visibility of the proposal in conjunction with the existing Morton Ley Farm poultry buildings from a section of the route north of Pant. However, Viewpoint 6 is located in the vicinity of this area at a distance of 2.4km from the proposal and illustrates that the proposed development would be entirely screened by intervening mature vegetation and built form. Fieldwork has also verified that vegetation along this section of the route would combine with intervening vegetation to entirely screen the proposal from view with the result that no effects on the visual amenity of visitors to the Cambrian Heritage Railway would occur as a result of the proposal.

7.7.5 Public Highways

114 The ZTV suggests potential views of the proposal would be available from some local roads in the study area as well as parts of the B4396 within central and northwestern parts of the study area. However, roads in this landscape are characteristically bounded by mature hedgerows, as indicated in several of the viewpoints. As a result, views of the proposal would be extremely limited in reality, with fieldwork suggesting that visibility of the proposal would be short-lived and intermittent. Viewpoints 1, 2, 3, 5 and 6 all illustrate potential views of the proposal from the road network within the study area at distances of between 0.3km and 2.4km from the proposal. VPs 1 – 3 indicate some very limited and filtered visibility of the proposal, seen in conjunction with the existing Morton Ley Farm poultry buildings at distances of 0.3km – 1.0km from the proposal where the magnitude of change in the view is predicted as slight or negligible due to the limited and incremental change to these views which already contain similar built form. As a result minor and minor/ negligible effects on the visual amenity of these medium sensitivity receptors are predicted. However, it should be noted that Woolston Bank (VP3) is an elevated viewpoint in comparison to the majority of roadside views within the study area and so, in general, most views towards the proposal from over 0.5km or more away would be entirely screened by intervening vegetation in a similar way to the views illustrated by Viewpoints 5 and 6 which are located at distances of over 1.2km from the proposal.

115 It is also worthwhile noting that none of the other existing poultry developments located within the study area were visible from any of the viewpoints within this assessment and fieldwork was unable to identify any roads within the study area where more than one poultry development would be visible consecutively along its length.

116 Therefore no significant effects on the visual amenity of motorists are expected as a result of the proposed development.

7.8 Conclusions

117 The proposed development would be located adjacent to four existing poultry buildings of similar size, scale, height and colour and, where visible, would be seen in conjunction with these existing buildings.

118 Through careful site design the significant effects of this proposal would be limited to:

- The character of the landscape of the site. This includes a limited part of the Settled Pastoral Farmlands LCT covering the site itself. The proposal would often only be intermittently and partially visible within the area immediately local to the site and would be completely screened from large parts of the study area. Management of existing field boundary hedgerows would occur to a height of 3m and a width of 2m to ensure robust screening wherever possible.
- The visual amenity of residents within Morton Ley Farm which is owned and occupied by the landowner/ applicant.

119 There would not be any significant effects on landscape fabric, landscape designations or any of the other LCTs located within the 3.0km radius study area. In addition, there would be no significant effects on the visual amenity of the vast majority of visual receptors within the study area including no

significant effects on residential receptors beyond the residents of Morton Ley Farm itself, which is owned and occupied by the landowner/ applicant.

120 Therefore, it is considered that the significant effects on landscape and visual amenity as a result of the proposal would be very limited in extent and duration in this location.

CHAPTER 8 – TRAFFIC

8. Traffic

This Chapter considers the development against National, Regional and Local Policy, and compares existing and future traffic generation and the impact on the local road network. A net reduction in vehicle movements is proposed in many villages across the locality, following this a positive benefit for existing and future users of the road network regarding safety will be realised. No significant effects on pedestrians, cyclists, horse riders or public transport are envisaged.

8.1 Introduction

The environmental impacts of the proposed development in relation to traffic have been assessed. In general, the following information should be included within a planning application of this type:

The existing situation:

- What is the existing farm operation and current traffic movements?
- Will those traffic movements change if the units are built?

The proposed development:

- What are the likely traffic movements including vehicle type that would be generated by the broiler units?
- Over what periods will these movements take place?
- What is the likely route to the site for HGV traffic.

8.1.1 Proposed Extension

The proposed poultry extension is expected to be operational in 2023 and it is envisaged to produce 1,800 tonnes of poultry meat per annum. Hours of operation will be 24 hours seven days a week. A proportion of movements of birds from the site take place between the recognised night time hours of 2300 and 0700 due to factory operating times and bird welfare standards. This assessment assesses night time movements to give a full assessment of the impact of future traffic generation. The movements taking place at night will be thinning and final depletion, amounting to 43 movements per crop (301 movements per year).

It was identified that there would be a maximum of around 7 bird removal HGVs (14 movements in and out) travelling to and from the poultry extension during bird removals in one 24 hour period and a maximum of two movements per hour. Part time employment attributed to the extension will be carried out by existing staff in the employment of Morton Growers Ltd and will therefore generate no increase in movements on the baseline.

8.1.2 Site Access

The site is accessed off the B4396 through an improved existing access which was approved under planning permission 11/02934/EIA (plan reference 996.S2A), Appendix 6.

8.1.3 Routeing

Access to the Strategic Road Network is accessed along the B4396 to Llynclys Crossroads where the vehicles will join the A483 and thereafter the A5 Trunk Road at Mile End Roundabout. The access arrangements are designed to restrict HGV movements on to the B4396; Feed HGVs will be coming from Lloyds Animal Feeds located approximately ½ mile away on the B4396 towards Morton.

8.2 Legislation, Planning Policy and Other Guidance

The NPPF promotes sustainable transport and a reduction in the need to travel. Developments which generate significant amounts of movements should be supported by a transport statement or transport assessment. Paragraph 32 sets out:

"Plans and decisions should take account of whether:

The opportunities for sustainable transport modes have been taken up depending on the nature and the location of the site, to reduce the need for major transport infrastructure

Safe and suitable access to the site can be achieved for all people; and

Improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe"

"Plans and decisions should ensure development that generate significant movement are located where the need to travel will be minimised and the use of sustainable transport modes can be maximised. However, this needs to take account of policies set elsewhere in the framework, particularly in rural areas".

8.3 Methodology

The DfT's 'Guidance on Transport Assessment' (2007) was withdrawn towards the end of 2014 and assessments are now assessed and provided in accordance with the guidance of the NPPF. It is considered that a transport assessment should be provided where:

'Developments will have significant transport implications, transport assessments should be prepared and submitted alongside the relevant planning applications for development. The coverage and detail of the transport assessment should reflect the scale of development and the extent of the transport implications of the proposal. For smaller schemes, the transport assessment should simply outline the transport aspects of the application'.

The NPPF advises in paragraph 32 that – All developments that generate significant amounts of movements should be supported by a Transport Statement or Transport Assessment. Plans and decisions should take account of whether:

- The opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- Safe and suitable access to the site can be achieved for all people; and
- Improvements can be undertaken within the transport network that cost effectively limit the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts of development are severe.

The next section involves Traffic Generation and Assignment which documents and is used to estimate the trip generation and assignment likely to result from this development proposal. The expected trip generation from this development has been estimated using industry provided information regarding the inputs and outputs of broiler farming. The industry information is based on scientific monitoring of broiler farming, legislation, market conditions, current environmental controls as well as extensive experience. The first principle for establishing the inputs and outputs is the stocking density of the sheds – establishing this enables a calculation of the number of birds per shed and their daily feed intake. Stocking density is framed by the Welfare of Farmed Birds Directive and transposed in UK Law by the Welfare of Farm Animals Regulations and standardised for the industry by the Red Tractor Assurance scheme. Therefore, legislation sets limits on stocking density.

The red tractor assurance scheme sets a limit of 38kg of poultry meat per square metre. All inputs and outputs are based on this maximum stocking density. This assessment assesses the vehicle movements associated with 'standard' broiler chickens being the most popular, least expensive and environmentally efficient meat protein that exists and uses a stocking density that is framed in legislation.

With poultry farming the movements are concentrated around certain activities during the growing cycle. Average movements per week increase during the crop cycle – feed movements increase as bird weight increases, manure removal takes place in a short period between bird removal and chick placement. Bird removals take place in two waves lasting one day per wave.

8.4 Baseline Conditions

8.4.1 Road Network

The site is accessed off the B4396. Access to the Strategic Road Network is accessed along the B4396 to Llynclys Crossroads where the vehicles will join the A483 and thereafter the A5 Trunk Road at Mile End Roundabout. Feed HGVs will be coming from Lloyds Animal Feeds located approximately ½ mile away on the B4396 towards Morton.

8.4.2 Current Traffic Conditions

The farmland adjoining the proposed extension generates movements of agricultural traffic including deliveries of fertilisers, seeds and contractors and collection of grain and crops in HGVs.

8.5 Prediction and Assessment of the Potential Impacts

8.5.1 Construction / Decommissioning – Generated Traffic

Estimates of construction traffic are summarised in Table 22.

Table 22: Traffic Movements for Construction

Type	Total Movements (Approx)
Stone	95
Concrete	88
Steel and shed materials	12
Feed Bins	2
Employees	Approximately 8 per day for month and a half during weekdays

It is expected that the construction timescale will be approximately a month and a half. It has been assumed that traffic levels during the decommissioning period would be similar to that during construction. As for operations HGVs will access the site from the A5 via the A483 and the Llynclys crossroads. No construction will take place on a Sunday or Bank holiday unless absolutely necessary. Construction will be limited to the hours of 07:30 – 18:30 Monday to Friday and 08:00 – 13:00 on Saturday to avoid causing disruption to local residents.

8.5.2 Operation – Generated Traffic

This section assesses the likely traffic generated and assesses the peak events during the crop cycle and the level of traffic outside the peak periods.

A summary of the movements associated with each stage of the crop cycle are provided below:

Vehicle Used	Traffic Source	Total Movements per Crop	Peak Movements per Hour	Timeline
HGV's	Bedding Delivery	1	1	Day 1 daytime
	Chick Delivery	1	1	Day 2 daytime
	Feed Delivery	12.5	1	Average 2 movements per week daytime

	Mortality collection	2	1	Day 28 and Day 38 (on final depletion) daytime
	Fuel Delivery	1	1	2 per year daytime
	Poultry Collection	14.5	1	Day 38 night time
Tractors & Trailers	Manure collection	10	1	Day 39-42 daytime
Small Vehicles	Vets, engineers, company inspection, cleaning contractors, catchers	1	1	Daytime
	Employees	0	0	Daytime and night time

One movement per crop means 1 two-way movement, which includes a vehicle in and out of the site. The peak periods are during poultry harvesting and manure removal and amount to between three and four days during the cycle.

8.5.3 Current Traffic Condition

The site is currently part of a mixed farming enterprise, being a mix of arable cropping and livestock, including four existing poultry buildings. The farm needs to continue to expand and diversify to remain viable, profitable and operationally sound.

Existing poultry units movements:

Chick delivery – 2 load per crop
Bedding – 2 deliveries lasts 1.5 crops
Mortality – 1 at 28 days and 1 at full depletion
Fuel – 2 per year
Poultry collection – 29 loads
Manure – 20 loads per crop

Trips will be combined for the poultry units which would ultimately mean that there would be no further increase in mortality trips, bedding would be 2.5 per crop.

If the six sheds (4 existing and 2 proposed) are analysed the following would be observed:
Chick delivery – 3 per crop
Bedding – 2.5 (3) loads per crop
Feed delivery – 25 loads per crop
Mortality – 1 load at day 28 and 1 load on day of final depletion
Fuel delivery – 2 per year
Poultry collection – thinning – 18 loads per crop
Final depletion – 25 loads per crop
Manure removal – 30 loads per crop. Manure from the proposed buildings will be taken to an AD plant by tractor and trailer.

8.5.4 Routing

The site is accessed off the B4396. Access to the Strategic Road Network is accessed along the B4396 to Llynclys Crossroads where the vehicles will join the A483 and thereafter the A5 Trunk Road at Mile End Roundabout. The access arrangements are designed to restrict HGV movements on to the B4396;

Feed HGVs will be coming from Lloyds Animal Feeds located approximately ½ mile away on the B4396 towards Morton.

8.6 Potential Cumulative Effects

There is no potential for cumulative traffic impacts as a result of no existing or proposed (not committed) poultry developments in close proximity to the proposed extension.

8.7 Residual Impacts

Sensitive routing of deliveries will ensure that impacts of traffic on residences are minimised. No significant impacts are expected regarding pedestrians, cyclists or public transport.

8.8 Summary and Conclusion

As a result of the proposal there will be a small increase in traffic in a limited number of settlements such that the baseline conditions including living conditions will change. The small increases in traffic are however offset by the predicted reduction in the use of the local highway network following the cessation of manure imports and the reduction in movements.

This assessment has demonstrated that the proposals are estimated not to have a significant effect on the surrounding highway network, and that the safety conditions of the network would not be made worse.

Based on the analysis provided in this assessment, there does not appear to be any significant transport related reason why these sites should not be granted Planning Permission.

CHAPTER 9 – AMENITY

9. Amenity

This chapter deals with the potential for odour, dust and flies to be produced by the proposed poultry extension and cause an impact in the local area. By conducting risk assessments, and analysing the recent nuisance complaint history of other sites in the area, the assessment concludes that no significant impacts are likely given the lack of complaints made other such facilities, the isolated location of the proposal and the integral controls to be applied.

9.1 Introduction

Poultry developments do have the potential to affect amenity issues in the surrounding area. The following issues have been assessed in relation to the development:

- Dust
- Odour
- Flies
- Vermin.

Noise, odour and air quality issues have been assessed in separate chapters. The potential for nuisance caused by these issues could potentially impact on local population.

Statutory nuisances are regulated by Part III of the Environmental Protection Act (EPA) 1990. The powers allow for action to be taken by local authorities or individuals against statutory nuisance that exists or is likely to occur or recur. Statutory Nuisances include smoke, fumes or gases emitted from premise, any dust, steam, smell or other effluvia arising on industrial, trade or business premises, which are prejudicial to health or a nuisance. There is a defence of using Best Available Technique (BAT) to prevent the nuisance or counteract its effects together with reasonable excuse. The granting of planning permission is not a defence.

The NPPF sets out in Chapter 11 Conserving and Enhancing the Natural Environment, that when considering the location of new development, the effects (including cumulative) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account.

In this chapter, the types and sources of potential nuisances are identified and assessed against the potential sensitivity of individual receptors. This is based on the nature and proximity to the activity, and also general wind direction and nature of the receptor. This is based on guidance relating to intensive livestock farming (from the Environment Agency's 'Simple assessment of environmental risk for accidents, odour, noise and fugitive emissions (EPR – H1) – Version 080328 (March 2008)) and includes comprehensive management plans base on accepted guidance and Best Available Technique (BAT).

9.2 Baseline Environment and Sensitive Receptors

In terms of other potential sources of amenity impacts, the Morton Ley Farm site lies within an area of arable farming where the land management operations includes application of poultry manure to the land and storage of poultry manure in fields, both of these activities are potential sources of flies and odour. However, in order to make a worst case assessment of the potential impacts from the proposals, it has been assumed that no amenity issues currently affect sensitive receptors in the locality.

Potentially sensitive receptors within approximately 400 metres of the site were identified. The receptors listed in Table 26 are indicated on Appendix 11 and those close to fields within the control of Morton Growers Ltd.

Table 26: Sensitive Receptors

Ref	Name	Easting	Northing	Distance from extension to residential curtilage / footpath (m)
SR1	Footpath (Morton Bridge to Crickheath)	331219	323253	0
SR2	Morton Ley Farmhouse (applicant owned)	330950	323274	235
SR3	Footpath (B4396 to Woolston)	331369	322864	374
SR4	Lower Morton	330674	323409	471
SR5	Brook House	331625	323046	495

9.3 Incorporated Mitigation

Standard Odour, Dust, Vermin and Fly management controls will be put into place. These have been taken account of in the assessment as they are an integral part of the overall design and proposed operations and are considered Best Available Technique; these management controls are detailed in Chapter 4 – Details of the Extension.

9.4 Flies

Flies are not a problem on a well-managed and hygienically run broiler site; due to the feeding habits of poultry any maggots that hatch in the bedding are soon eaten. Flies can however, be a problem outside the buildings when a site is not managed efficiently as set out below:

Feed Storage

Animal feed is attractive to flies as a breeding area. Problems mainly occur when feed is stored in unsuitable buildings or storage bins that do not function effectively.

These breeding areas are designed out of the majority of poultry farms by installing modern feed storage systems to meet the requirement of the Food Hygiene Regulations and the assured chicken production scheme standards.

Manure Storage

Managing poultry manure in such a way that it becomes unattractive as a breeding site is an effective way to keep the fly population under control. All flies go through four life stages; egg, larva, pupa, and adult. Eggs are deposited on the breeding media (frequently poultry manure) and larva (or maggots) hatch out in the moist or wet material where they remain until ready to pupate. Pupation may occur in a drier location than where the eggs hatch. Fresh poultry manure is approximately 60 to 80% moisture. If the moisture level can be reduced to approximately 30% flies will no longer find it an ideal site for laying eggs. Frequent inspections of storage sites are required to ensure that there is no fly activity as even manure that is produced, transported and delivered in a dry, fly free condition can sometimes become infested.

The litter will be removed at the end of each production cycle. It will be cleared out by specialist contractors and loaded into trailers directly inside the doors. The trailers will be sheeted and the litter taken straight off the site for use in a nearby AD unit.

The main source for fly nuisance is the manure storage and the pathway is through self-dispersal through flight with the potential impact being general annoyance, the need for control and potential spread of disease. The manure from the additional units will not be spread on the land so there will be no risk of flies from manure spreading.

In conclusion, there should not be a risk of fly problems from the development itself. Control measures and mitigation methods will limit the effect of flies.

9.4.1 Vermin

Large quantities of stored feed and stored litter have the potential to attract a variety of animals that are considered vermin. The site will be inspected regularly to check for the presence of vermin and employees will be instructed to report the presence of any vermin immediately. The applicants will be fully trained and certified in vermin control and the companies for which the chickens are grown stipulate strict regimes for vermin control. The potential for vermin will be limited through the installation of a modern feed storage system.

9.4.2 Dust and Air Quality

The main sources of dust from poultry buildings are the birds themselves, the food and litter. Dust levels have found to vary depending on the number of birds, their age and the activity levels within buildings. The particle size of the dust will also vary although in general, particles smaller than 2 microns (2um) will account for around 70% of the number but only 5% of the mass. Larger particles of greater than 5 um will account for less than 10% in number but between 40% and 90% of the dust mass. Dust particles can be emitted into the atmosphere through the ventilation systems so potential for impact is greater during the summer months when fans will be operating at a higher rate. Dust baffles will be used over the ventilation fans to avoid any dust becoming airborne. The larger dust particles will tend either to not get into the ventilation fans, or if they are expelled from the building will be immediately deposited on the ground. Smaller particles can be carried in the wind. As the distance from the site becomes greater, the concentration of dust will fall to a level below air quality guidelines and become indistinguishable from normal background dust levels.

In conclusion, there are few receptors close enough to be significantly affected by dust as course dust will tend not to travel in significant volumes further than 100m from the source due to reductions in concentration and deposition with distance. Potential receptors are outside of this zone. The greatest dust emissions are likely to arise during the construction and decommissioning phases for a short period of time and it is considered that no significant impact in terms of dust nuisance will occur.

9.5 Potential impacts

9.5.1 Sources, Pathways and Potential Impacts

The principal sources of amenity impact, the pathways by which they can be transferred to receptors and their potential impacts are set out for each issue in Table 27.

Table 27: Amenity Issue, Sources, Pathways and Potential Impacts

Issue	Sources	Pathways	Potential Impacts	General Available Mitigation
Odour	Feed Delivery & Storage, Ventilation system, Litter management, carcass disposal, house clean out, used litter, dirty water management	Wind transport. Dispersal tends to be worst in stable night-time conditions in low winds.	Nuisance for walkers on footpaths within 400 metres of the site	Management controls to reduce moisture content of litter. Equipment checks to reduce likelihood of failure. Manure handling controls during cleanout to reduce spillage. Manure transporting controls (e.g. sheeting trailers)
Dust	Dust – vehicles moving over dusty surfaces, wind blowing over dusty surfaces. Dust emissions from within buildings through ventilation.	Wind transport. Tends to disperse more rapidly than gases due to vertical deposition under gravity (nuisance not generally experienced beyond 100m). Greater emissions of dust in high winds but counteracted by greater dilution.	Irritation of respiratory tract/eyes and/or perception of health effects for sensitive receptors on footpaths within 400m of the site.	Dust Baffle over ventilation fans. Internal handling of manure. Good practice during construction (e.g. dampening of surfaces)
Flies	Manure storage	Self dispersal through flight.	General annoyance, buzzing, requirement for swatting and control, and potential for spread of disease.	Storage of manure away from sensitive receptors. Regular inspection to identify infestations.
Vermin	Feed storage	Self dispersal over land	General annoyance, requirement for control and potential spread of disease.	Storage of feed within concealed containers. Maintenance of feed storage containers to avoid damage / deterioration. Removal of feed spillages if they occur.

9.6 Impacts from Spreading Poultry Manure

All of the manure from the additional poultry units will be taken to a local AD plant. No muck from the additional poultry units will be stored or spread on the farm.

9.7 Follow Up Action

During operation the poultry extension management plans will be put in place to ensure that amenity issues do not become a problem. The site will be regularly inspected by the staff to ensure that no odour, dust, fly or vermin issues are arising. If complaints are received these will be logged and immediately followed up and assessed as part of the applicant's environmental management systems. The site will also be regularly inspected by the EA as part of the Environmental Permitting system. Any significant releases of odour, dust, flies or vermin will be dealt with as appropriate at the time to ensure no repetition.

9.8 Residual Impacts and Conclusions

The qualitative risk assessments and complaints analyses carried out suggest that significant adverse impacts on local amenity as a result of the proposed poultry extension are unlikely. It is predicted that the impacts of the proposed poultry extension would be acceptable, given the distance between existing sensitive receptors and the nature of the proposed operations. However, it is acknowledged that the issues discussed in this chapter are sensitive to local people. As such, a range of standard mitigation measures, that have been highly successful in other similar operations, would be put in place to minimise any potential adverse impacts.

CHAPTER 10 – ECOLOGY

10. Ecology

10.1 Introduction

10.1.1 Background to Development

Planning permission will be sought for the erection of two additional poultry units adjacent to existing units which are already in production.

Abor Vitae were commissioned by Roger Parry and Partners to undertake a Preliminary Ecological Appraisal in order to assess the impact of the development on habitats and protected species.

10.1.2 Scope of Survey

The survey is primarily designed to:

- Identify and record habitats and important ecological features on site;
- Evaluate the potential of the proposed development site to provide opportunities for protected species;
- Determine any likely impact which the development and landscape proposals may have on these.
- Identify opportunities for the enhancement of habitats and biodiversity features on site.

10.1.3 Key Principles

All ecological surveys conducted by Arbor Vitae Environmental Ltd are underpinned by the following key principles, as outlined by CIEEM (2018):

Avoidance – Seek options that avoid harm to ecological features (for example, by locating on an alternative site).

Mitigation – Adverse effects should be avoided or minimized through mitigation measures, either through the design of the project or subsequent measures that can be guaranteed – for example, through a condition or planning obligation.

Compensation – Where there are significant residual adverse ecological effects despite the mitigation proposed, these should be offset by appropriate compensatory measures.

Enhancements – Seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation.

10.2 Site Description

10.2.1 Location, Landscape, and Background

The site encompasses approximately 0.8 hectares of arable land, adjacent to the B4398 road between Knockin and Llynclys. The land is used for arable farming and comprises one field which slopes gently towards the River Morda in the south-east. The site lies at approximately 74 metres AOD.

10.3 Survey Methodology

10.3.1 Desk Study

An initial desk study was composed to gain background information regarding any protected species or designations within the area. The main sources of information were MagicMap and NBN Atlas.

10.3.2 Site Survey

A site visit was made on 13/02/2023. The survey was carried out in accordance with CIEEM (2017) best practice guidelines. The objective of the survey was to find and record any signs of use by protected species and to note the habitat features present.

An assessment of the available habitats both on and adjacent to the site led to consideration of the potential of the site for the following protected species:

- Badgers
- Bats
- Breeding birds
- Great Crested Newts
- Otters

The survey methodology was tailored to evaluate the area for these species in the following ways:

Badger

An area within 50 metres of the site was closely searched for the following signs of badger activity:

- Setts,
- Tracks and footprints,
- Latrines,
- Snuffle holes

Bats

The site was assessed in terms of its suitability to support bat species. Hedgerow habitat and nearby potential habitat were assessed and recorded and potential impacts from the proposals considered.

Breeding birds

The site was assessed in terms of its suitability to support breeding bird populations. Hedgerow habitat and nearby potential habitat were assessed and recorded.

Great Crested Newts

A desk study and a ground search were conducted to search for any areas of open water within 250 metres. Waterbodies were then assessed based on the Habitat Suitability Index for great crested newts (Oldham et al., 2000 and ARG UK, 2010).

Otter

Any water courses within the area and appropriate terrestrial land were searched for the following field signs:

- Spraint;
- Footprints,
- Feeding remains

10.3.3 Personnel

The survey was carried out by William Prestwood BSc: Ecologist with 35 years' experience.

10.3.4 Constraints

Breeding birds would not have been present at the time of the survey but previous nesting and appropriate nesting sites would have been apparent.

10.4 Survey Results

10.4.1 Desk Study

The desk study found that within 1km of the site there were the following designations:

Name	Designation	Distance from site
MORTON POOL	SSSI	1 KM
LIN CAN MOSS	SSSI	5 KM
The search included Ramsar, SSSI, SAC, SPA, LWS, NNR and LNR. [1]		

Results from the desk study revealed that within a 1km radius of the proposed development site the following protected/key species have been recorded:

Species	Distance	Protection
Otter	0.8km	European Protected Species, Wildlife and Countryside Act 1981.
Badger	0.7km	Protection of Badgers Act 1992, Wildlife and Countryside Act 1981.
Natterers Bat	0.3km	European Protected Species, Wildlife and Countryside Act 1981.

10.4.2 Habitats on Site

All habitats are classified using JNCC's Phase 1 Habitat Survey Handbook (JNCC, 2010).

Arable

This field has been farmed as an arable field for many years and produced a crop of cereals in 2022. A grass margin of approximately 6 metres width had been left adjacent to the River Morda to act as a buffer strip and prevent possible contamination of the river by fertilisers or pesticides. This strip has developed a tussocky grassland vegetation dominated by timothy, cock's-foot, creeping bent and perennial rye grass. A number of tall herbaceous plants such as thistle species, nettle and Himalayan balsam have also become established in this strip.

10.4.3 Adjacent Habitats

Running water
The River Morda forms the south-eastern edge of the site. This small river lies in a deep channel with the summer water level being approximately 4 to 6 metres below the field surface. It meanders considerably at this point in its course, creating a number of sharp bends with undercut cliffs and deep pools. Parts of the river form wider and shallower conditions with fast flowing water over beds of gravel. Other parts are narrower, deeper and slower.

The western bank of the river within the site is very steep, forming cliffs above the water. There is a restricted range of aquatic plants including water crowfoot and water milfoil, with occasional marginals of bur-reed, hemlock water dropwort and canary grass.

The upper, drier banks of the river support a community of dense, tall herbaceous plants including Himalayan balsam (which is abundant), nettle, spear thistle, angelica, hogweed, marsh woundwort and figwort. This strip of river-side vegetation forms a strip up to 4-6 metres in width.

The water body appears clean and clear with a healthy invertebrate fauna including mayflies (*Ephemeropetera)* stone-flies (*Plecoptera)* and freshwater shrimps *(Gammarus* sp.). The range of in-channel habitats is varied.

10.4.4 Protected Species

Badgers
There are no historical records of badger at the site and no field signs were found within the search area.

Bats
No large trees lie within the site. There are many old alders and crack willows upstream and downstream of the site which exhibit features which could provide potential roosting sits for bats.

Breeding birds
There are no features on the site which could support breeding birds although the nearby river banks may do so.

Great Crested Newt
No ponds were identified within 250m of the proposed development site and therefore no further survey work is required with regard to this species.

Otter
A search of the river bank found use by otters of the ledges and riverside boulders beneath the nearby road bridge. These are used as marking points and a number of spraints were discovered. No other evidence of otters was found but this is clearly a well used stretch of river. The evidence may come from a single otter travelling the river from the nearby R Severn or a breeding territory may be held on the R Morda itself. No signs of a holt were observed on the stretch of river covered by this survey (approximately 400 metres).

10.5 Potential Ecological Impact

10.5.1 Habitat Assessment

The loss of a small area of arable land is of no ecological significance in itself.

The River Morda is a diverse lowland river with a number of in-channel habitats and a range of associated habitats on its banks. It appears to be relatively unpolluted. Rivers and streams are the subject of a Habitat Action Plan in Shropshire.

The stretch of river adjacent to the site has a poor marginal flora due to very steep and high banks. The bank-side flora, dominated by tall herbaceous plants is a valuable resource for invertebrates due to the wealth of nectar-producing plants. However, the domination by Himalayan balsam detracts from its value as a natural habitat.

The edge of the proposed development currently leaves a 20 metre stand off from the river along the eastern edge of the study area. No physical impact is therefore likely to impact on this habitat.

The creation of areas of new hard surface could result in large volumes of drainage water in times of heavy rain. Any potential negative impact on the stream will be averted through the proposed design of the drainage system.

10.5.2 Protected Species Assessment

Badger
The survey revealed no signs of use by badger and there are no historic records of badger at the site. The proposals will have no impact on this species.

Bats
No trees within 50 metres of the site held features which are likely to be used for bats for roosting. However, the partially tree-lined river corridor will certainly be used by bats as a foraging route and flight line.

Breeding birds
There are no potential nest sites for birds on or near to the site other than in riparian vegetation near the river. It is unlikely that noise disturbance and post construction will impact bird behaviour.

The bird species recorded as breeding at or near the site in a previous survey in 2011 were almost entirely associated with hedgerows or neabry woodland. Most are common species although seven species recorded are listed as being Birds of Conservation Concern.

All bird species are protected when nesting. All work which has the potential to disturb birds at the nest must be carried out outside the nesting season (mid-March to August), or sites thoroughly checked by an ecologist to ensure no breeding birds are present.

Otter
The presence of otters is notable although many Shropshire rivers have now been re-colonised by this species. Otters are the subject of a Shropshire Species Action Plan.

Construction will come within 20 metres of the river. Disturbance during construction may have a small impact on otter behaviour but is highly unlikely to have a long-term impact. It is very likely that otters are restricted to the river and its immediate banks. They are known to leave water and hunt on land but the arable habitat available by the river is of very low potential as a hunting habitat.

It is very likely that otters will remain undisturbed and unaffected by building proposals. The availability of prey species in the river is clearly a critical feature of their survival and it is therefore vital that drainage from the site is free of any contaminants.

10.6 Avoidance, Mitigation and Enhancement

10.6.1 Habitat Mitigation

No habitat loss will result from the development and therefore no mitigation is required.

10.6.2 Protected Species Mitigation

Bats
- All external lighting will be designed with nocturnal wildlife in mind and will not create increased illumination of the river corridor. Hedgerows and key habitat features including mature trees on the site will not be illuminated in order to retain dark movement corridors for nocturnal wildlife. Illuminance along these features should be below 0.2 lux on the horizontal plane, and 0.4 lux on the vertical plane.
- Security lighting will be set on motion sensors with short timers (<1 minute) and should be LED lighting.
- External lights will be hooded and directed toward the ground to reduce upward light spill.
- A warm white spectrum will be adopted throughout the scheme to reduce blue light component (<2,700Kelvin).
- Where lighting is needed to illuminate paths/walkways, low level LED bollard lighting, set on motion sensors should be used to avoid light pollution about 1m from the ground.

Otters
The design of any external lighting will also be important in maintaining a dark corridor along the river for otters.

10.6.3 Ecological Enhancement

The creation of a dense area of native scrub and trees between the new buildings and the river would help to protect the river corridor and its wildlife from future noise or light disturbance.

The creation of an otter holt near to the river bank is recommended and can be readily constructed when machines are available during the construction of the new sheds. This will be supervised by the site ecologist.

In order to provide shelter, breeding and hibernating opportunities for a variety of wildlife, we recommend that a nest box scheme is adopted as follows:

- Three Woodcrete general purpose bat boxes, suitable for crevice-dwelling species should be installed into mature trees within the boundary hedgerows. No lighting should be installed in the vicinity of the boxes. They should be at least 3m from the ground and face south or south west.
- Six Woodcrete cavity nesting bird boxes with 28mm or 32mm access holes. These should be positioned within mature trees on the boundary of the site and the access should face away from the prevailing wind.

10.7 Summary

Planning Permission is being sought for the construction of two additional poultry sheds on arable land at Ley Farm, Morton. The change of agricultural land to buildings and hard standing necessitates that an assessment be made of the potential impact of the development on habitats and protected species.

The site comprises a 0.8ha arable field adjacent to four existing poultry units constructed since 2010.

A Habitat Survey was carried out and a survey of five groups of Protected Species including badgers, bats, breeding birds, great crested newts and otters.

The River Morda is a good example of a lowland river with good water quality and a diverse range of in-stream habitats. It is fringed by a wide band of herbaceous vegetation which is of interest for birds and invertebrates although the domination by Himalayan balsam reduced its ecological value.

Badgers are no resident on site but regularly traverse the site using a riverside path, use an area by Morton Bridge as a latrine and also utilise the area for foraging.

There is no evidence that bats utilise the site other than for overhead passage or foraging. No possible roosts were identified in trees.

A number of birds were recorded on a previous survey in 2011 utilising the site for breeding although these are mainly associated with hedgerows and trees or scrub on the edges of the site. Seven species observed on the site are Birds of Conservation Concern, of which three probably breed on site.

Evidence of otters was recorded at Morton Bridge where there were numerous footprints and some spraints.

The loss of an area of arable land is of minor ecological significance. The proposed development is unlikely to have any significant ecological impact on adjacent habitats. All hedgerows will be retained and the river corridor including adjacent herbaceous vegetation will be physically undisturbed.

No protected species will suffer loss of habitat, although badgers will lose a small area of foraging habitat. Breeding bird habitat will be retained in the form of hedgerows and trees. The loss of arable land may cause a minor local reduction in feeding area for linnet, yellow-hammer and skylark.

The most significant species using the site, the otter, will not be affected by this scheme in that the river and a wide buffer strip of river bank will remain undisturbed. The control of run-off from the site to ensure no water contamination, is regarded as essential for the diversity of fresh water fauna in this stretch of river.

A range of ecological safeguards, mitigation and enhancements are recommended including native tree and shrub planting, erection of bird and bat boxes and creation of an otter holt.

CHAPTER 11 – NOISE & VIBRATION

11. Noise & Vibration

This chapter assesses the noise and vibration impacts of the proposed poultry extension facility on nearby residential receptors. Impacts arising from construction, operation and decommissioning and associated traffic are assessed, where appropriate, using quantitative techniques. Using worst case assumptions regarding operational noise emissions, traffic levels and noise insulation levels of the building fabric, all predicted impacts are minor or negligible only. Impacts will be easily mitigated by incorporating appropriate noise baffling and insulation.

11.1 Introduction

The NPPF states that the planning system should contribute and enhance the natural and local environment and gives a number of ways in which this can be achieved, including, by minimising pollution, which includes, noise from new developments. In addition to this the document goes on to say that noise from new developments should not give rise to significant adverse impacts on health and quality of life.

To this end, this chapter looks at noise created by the proposed development, and the potential impacts of any noise created on surrounding receptors, such as, residential properties and amenity users of the local area as well as the measures which will be put in place to mitigate any potential impacts.

11.2 Overview of the Development

The proposal is for two additional poultry units (Sheds 5 & 6), located to the south-west of four existing poultry units (Sheds 1 – 4) at Morton Ley Farm, Morton, Oswestry; Figures 1 and 2.

The nearest dwellings, labelled A and B in Figure 1, are approximately between 165mm and 395m from the proposed enlarged poultry development.

Commercial vehicles will use the existing access road to the site, with loading/unloading of stock undertaken on the concrete aprons to the north-west of poultry units (existing and proposed).

Both the concrete aprons and feed bins for the two proposed poultry units will be no closer than those for the existing poultry units (and in the case for Dwelling B will be fully acoustically shielded by the sheds themselves). As a consequence, activities on the concrete apron (i.e., stock deliveries) and feed deliveries for the proposed poultry units will result in noise emissions no higher than for the existing units.

There will be a slight increase in the overall number of commercial vehicles per flock cycle as a result of the enlarged poultry development. On a daily basis however, there will be no change in the frequency of transport activities.

On the basis that there will be no change in the transport related noise emissions as a result of the enlarged poultry development, and taking into account the relative infrequency and shortterm duration of these activities (i.e., for the vast majority of time the extract fans will be the only noise source), this report reviews the noise emissions from the ventilation extract fans (existing and proposed additional poultry units) only as a result of the proposed scheme.

As with the existing poultry units, the proposed sheds will use Fancom 3680 ridge mounted extract fans; manufacturers data sheet for the fans is provided in Appendix B. The existing poultry units have 6 fans per shed whilst the two proposed units will have 7 fans per shed.

There will be an unobstructed noise path between both Dwellings A and B and the duct terminations.

The proposed additional poultry units are within context of the existing poultry development.

Figure 1. Ariel view (source: www.google.com) showing footprint of proposed additional poultry units and assessed dwellings

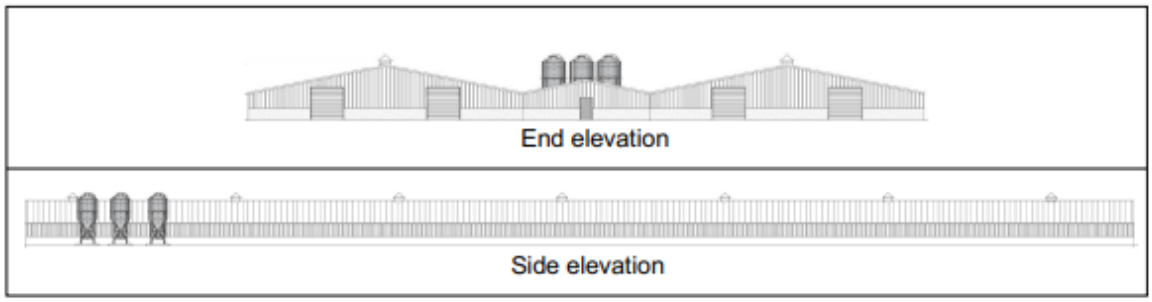


Figure 2. Elevations of proposed additional poultry units

11.3 Assessment Criteria

The noise impact of the aggregate noise emissions from the ventilation fans on the existing and proposed poultry units have been assessed in terms of their noise impact according to BS4142 and the change in noise emissions levels as a result of the additional units.

11.3.1 BS4142:2014

BS4142:2014 provides a methodology to assess the impact of industrial and commercial noise affecting dwellings, whereby the 'typical' background noise level is deducted from the industrial noise Rating Level (industrial noise corrected to account for the 'on-time' and noise character of the noise source). The following guidance is given based on the established difference:

- A difference of around +10dB or more is likely to be an indication of significant adverse impact, depending on context
- A difference of +5dB is likely to be an indication of an adverse impact, depending on context
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on context

Context, as defined in BS4142:2014, includes the consideration of the following factors:

- The absolute level of the noise emissions
- Character and level of the residual sound compared to the character and level of the Specific Level
- Sensitivity of the receptor and any acoustic design measures (e.g. façade sound insulation, use of mechanical ventilation and acoustic screening) incorporated at premises used for residential purposes

Where background noise and Rating Levels are low, BS4142:2014 states that 'absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night'. Low background noise and rating levels are not defined. However, in BS4142:1997 it states that 'background noise levels below 30dB and rating levels below about 35dB are considered to be very low'.

To take account of industrial/commercial noise sources that do not operate continually an 'ontime' correction is applied using:

$$- 10 \log (r/rref)$$

Where:

rref. = reference time (1hr between 07:00 – 23:00hrs and 15 minutes between 23:00 – 07:00hrs)
r = total 'on-time' during the reference period

Note that the shorter reference time interval between 23:00 – 07:00hrs is designed to penalise industrial/commercial noise events that occur during the night.

BS4142 provides four noise character correction categories with associated penalties that must be applied when determining the Rating Level, namely:

• Tonality:
o Not perceptible = 0dB
o Just perceptible = +2dB
o Clearly perceptible = +4dB
o Highly perceptible = +6dB
• Impulsivity:
o Not perceptible = 0dB
o Just perceptible = +3dB
o Clearly perceptible = +6dB
o Highly perceptible = +9dB
• Intermittency: +3dB if the intermittency of operation is readily distinctive against the residual noise environment
• Other: +3dB applied if the specific sound is neither tonal or impulsive but features noise characteristics that are readily distinctive against the residual noise environment

11.3.2 Change in Noise Level

The Institute of Environmental Management & Assessment (IEMA) 'Guidelines for environmental noise impact assessment: 2014' advise that the long-term impact with regard to change in noise is negligible if the change is < 5dB.

11.4 Background Noise Levels

A noise survey has not been undertaken to establish the existing background noise levels at the nearest dwellings. However, taking into account the rural location of the development, the typical background noise levels are not expected to exceed:
• Day (07:00 – 20:00hrs): LA90 35dB
• Evening (20:00 – 23:00hrs): LA90 30dB
• Night (23:00 – 07:00hrs): LA90 25dB

For the purpose of the assessment the above background noise levels, which are very low, have been taken to be representative to the 'typical' background noise levels that will occur at the nearest dwellings.

11.5 Plant noise Assessment

11.5.1 Calculation of Aggregate Extract Fan Noise at Dwellings A and B

The full calculations of the extract fan noise emissions are provided in Tables A1 and A2, Appendix A. The resultant aggregate noise emissions at Dwellings A and B are given in Table 1.

11.5.2 Source Noise Data

• Type: Fancom 3680
• Sound Pressure Level: 70dB(A) at 2m, 45° lateral
• Number:
o Sheds 1 – 4 (existing sheds): 6 per shed
o Sheds 5 & 6 (proposed sheds): 7 per shed
• Location: Ridge mounted, positioned evenly along the length of the shed

11.5.3 Extract Fan Operation

The temperature within the sheds is determined by a combination of the heat generated by the birds themselves, the external temperature and the ventilation provided by the extract fans.

To provide sufficient ventilation of the bird generated heat, as required to maintain the ideal internal operating temperature of around 20°C, up to 25% of the roof extract fans will be required to operate (either intermittently or on variable speed).

With the influence of the external temperature additional extract fans may be required in order to maintain the ideal operating internal temperature. Here the fans are operated in Stages, triggered with each 1°C rise above the ideal internal temperature. The highest Stage will typically only be triggered when the internal temperature rises above 23°.

The operation of 100% of the roof extract fans are only expected to occur during the day period when the external temperatures have the potential to be higher.

During the evening and night, when the external temperature will fall, there will be a corresponding decrease in the number of roof extract fans needed above those for bird generated heat alone; the expected percentage of ridge extract fans required to maintain the set temperature are 50% and 25% for the evening and night periods respectively.

For the assessment the calculations have therefore reviewed the following scenarios:
• Day (07:00 – 20:00hrs): 100% extract fans operating
• Evening (20:00 – 23:00hrs): 50% extract fans operating
• Night (23:00 – 07:00hrs): 25% extract fans operating

11.5.4 Derivation of Aggregate Extract Fan Noise Emissions

The individual noise level of each extract fan on the existing and proposed additional poultry units have been calculated at Dwellings A and B; Figure 1. The following corrections have been applied to the source noise data:
• Directivity corrections (gable end fans only): correction to convert the fan noise data from the manufacturers stated level at 45° lateral to 90° lateral (the propagation angle for the assessed dwellings), determined using the corrections given in Duct Directivity Index Applications (Day H. Hansen C & Bennett B, Acoustics Australia 96 Vol. 37 December (2009) No. 3). For the calculation a typical axial fan frequency spectra has been used
• Distance correction: 20 x log (d1/do), where d1 = distance between receptor and the proposed extract fan and do = reference distance
• Ground absorption correction: ISO 9613-2: Attenuation of sound during propagation outdoors, Formula 10:

$$Agr = 4.8 – (2hm/d)[17 + (300/d)]$$

Where, hm = mean height of the propagation path above ground
d = distance from source to receptor
• Atmospheric attenuation: ISO 9613-2: Attenuation of sound during propagation outdoors, Formula 8:

$$Aatm = \alpha d/100$$

Where, α = is the atmosphere attenuation coefficient for a temperature of 10°C and 70% relative humidity
d = distance from source to receptor
Note that the attenuation at 500Hz has been used
• On-time correction: it has been assumed that the fans are operating continuously and consequently no 'on-time' correction has been applied

Table A1 and A2, Appendix A provide the full calculations with the resultant aggregate Specific Levels at the Dwellings A - E.

11.5.5 Rating Level

To establish the Rating Level the following BS4142 character corrections have been applied to the Specific Level:
• Tonality:
o Correction: odB
o Reason: from inhouse measurements of the existing Fancom extract fans we can confirm that they are tonal according to BS4142
• Impulsivity:

o Correction: odB
o Reason: The proposed extract fans will not contain an impulsive noise element such as bangs or a very sudden jump in sound output due to quick startup/change in fan speed.
• Intermittency:
o Correction: odB
o Reason: It is possible on occasion that two or more extract fans will start/stop at the same time. However, the greatest expected increase/decrease in the aggregate fan noise is 3dB, which will only occur if the total number of fans operating doubles/halves. A 3dB increase/decrease is a just perceptible change in noise, which would not incur a BS4142 intermittency penalty (i.e. the change or 'intermittency' would not be 'readily distinctive against the residual noise environment').
• Other
o Correction: odB
o Reason: no 'other' noise characteristics of the fans are expected.

The resultant aggregate Rating Levels are provided in Table 1

11.5.6 BS4142 Assessment Level

We define Assessment Level = RL – min LA90 dB, where:
RL = aggregate Rating Level, dB(A)
LA90 dB = the typical background noise level, LA90 (in the case of this assessment the values are assumed levels taking into account the rural location).

Table 1 provides the extract fan Assessment Levels at Dwellings A and B for both the existing and proposed enlarged poultry development

Table 1. Typical background and calculated Rating and Assessment Levels at Dwellings A and B; Figure 1

Dwelling	Day: 07:00 - 20:00hrs					Evening : 20:00 - 23:00hrs					Night : 23:00 - 07:00hrs				
		100% extract fans operating					50% extract fans operating					25% extract fans operating			
		Existing (Sheds 1 - 4)		Proposed scheme (Sheds 1 - 6)			Existing (Sheds 1 - 4)		Proposed scheme (Sheds 1 - 6)			Existing (Sheds 1 - 4)		Proposed scheme (Sheds 1 - 6)	
	Typical L_{A90} dB	Rating Level, dB	Assessment Level, dB	Rating Level, dB	Assessment Level, dB	Typical L_{A90} dB	Rating Level, dB	Assessment Level, dB	Rating Level, dB	Assessment Level, dB	Typical L_{A90} dB	Rating Level, dB	Assessment Level, dB	Rating Level, dB	Assessment Level, dB
A	35	33	-2	35	0	30	29	-1	31	1	25	28	3	30	5
B	35	26	-9	28	-7	30	23	-7	25	-5	25	21	-4	23	-2

Note: Typical background noise levels are assumed values based on similar rural location sites

Where the Rating Level is at parity with the typical background noise level (Assessment Level = 0 dB) BS4142 states that the Specific Level will have a low impact; an adverse impact is indicated where the Rating Level ≥ 5dB and <10dB above the typical background noise level.

As can be seen in Table 1 the highest calculated aggregate Assessment Level during the day and evening is 0db and 1dB respectively.

On the basis that a 1dB change in noise level is imperceptible (i.e., an Assessment level of 1dB would be perceived as the same as 0dB) we conclude that the aggregate BS4142 noise impact during the day and evening (based on assumed typical background noise levels) of the extract fans on the existing and proposed additional poultry units will be low.

During the night (23:00 – 07:00hrs) the assumed typical background noise level and established Rating Levels are very low. We therefore consider, in accordance with BS4142, that the absolute noise levels at Dwellings A and B during the night are of more relevance in determining the noise impact than the Assessment Levels in this case.

We consider it is reasonable to assume that the occupiers of Dwellings A and B will be within their houses during the night period. On the basis that a facade with an open window will provide at least 10dB sound reduction, the highest resultant noise ingress will be 18dB.

This is a very low noise ingress level, being below the low assumed background noise level and >10dB below BS8233 LAeq 30dB noise ingress limits for bedrooms (noise limit applicable to road traffic noise and continuous operating plant).

We therefore conclude that during the night period the noise impact of the extract fans will be low.

11.5.7 Change in Noise Level

As can be seen in Table 1 the addition of the proposed poultry units increases the aggregate extract fans noise emissions at both Dwellings A and B by 2dB, which according to IEMA indicates a negligible impact.

11.5.8 Calculation Uncertainty

With all calculations there is a level of uncertainty, which in this case we do not expect to be greater than +/-3dB (3dB is a just perceptible change in noise level). This small level of uncertainty is not considered to have any significance to the outcome of the assessment.

The assumed typical background noise levels used in the assessment, which take into account of the rural setting of the development, are low. If however the underlying noise environment is lower than assumed it is very unlikely to be significantly so.

The difference between halving or doubling the number of fans operating (e.g. 50% to 100%) is 3dB. With smaller changes in the number of fans operating, for example, 50% to 70%, the change in aggregate noise emissions will be less than 2dB; this represents an imperceptible change in noise.

We therefore consider the used percentage of fans as suitably robust for the purpose of the assessment; it reflects the percentage of fans used in poultry units as advised by both operators and experts and would not result in a perceptible change in noise emissions with a 20 – 25% increase/decrease in the number of fans operating.

11.6 Conclusion

There will be no change in the daily transport related noise emissions (e.g., stock deliveries/collection) as a result of the enlarged development.

The only additional noise source will be the ventilation fans on the proposed units; the noise emissions from the ventilation fans on both the existing and proposed poultry units have been determined by calculation at the nearest dwellings; Figure 1 and Tables A1 and A2, Appendix A.

With the addition of the proposed poultry units, it has been established that there will be a 2dB increase in aggregate extract fan noise emissions from the development; according to IEMA this indicates a negligible impact.

The aggregate (existing + proposed) extract fan Rating Levels, when reviewed against assumed typical background noise levels commensurate with the rural setting of the development, indicate a BS4142 low noise impact during the day and evening.

Due to the very low Rating Levels and assumed typical background noise level during the night, the absolute noise levels have been assessed to review acceptability; this is in accordance with guidance given in BS4142.

During the night the extract fan noise ingress via an open window has been established to be below the low assumed underlying noise environment and >10dB below BS8233's noise ingress limits for bedrooms (note the limits are applicable to road traffic and continuous operating plant).

We therefore conclude that during the night the absolute noise levels will result in a low noise impact

On the basis that there will be no increase in the daily transport activity noise, a negligible increase in extract fans noise emissions and a low BS4142 noise impact (assessed using low typical background noise levels) as a result of the additional poultry units, we consider that the proposed scheme is acceptable with regard to noise.

CHAPTER 12 – ODOUR

12. Odour

Advice from the Environment Agency in relation to odour sets out that:

Odour: Our guidance (Intensive farming 'How to comply' versions 1 and 2, Odour management at intensive livestock installations) states that odour must be considered where:

- *There are 'sensitive receptors' located within 400m of the installation; and/or*
- *The installation (if existing) has a history of substantiated odour related complaints within the last three years.*

Whilst relevant, the 'H4' guidance is more applicable for activities which emit 'consistent' odour emissions around a given level. By their very nature poultry units odour emissions fluctuate according to the stage within the flock cycle. In this case the impact of short period intense odour may not be illustrated using out 'H4' guidance. The applicant should be made aware that they may be required to consider events beyond the 98th percentile, particularly to account for the latter stages of the crop cycle and during clean out. Increasing the modelling to 99.5 or 99.8th percentile could incorporate the shorter periods of intense odour which may otherwise be screened out using the standard approach. Any further modelling may require different thresholds for acceptability. It should be noted that the EP would not normally require assessment beyond the 98th percentile of emissions, unless there is a valid reason to do so. However, the submission of the above would of course help ensure a robust EIA and provide greater reassurances to your council and any third parties. We would advise that the EIA includes appropriate control measures which could be used to reduce the likelihood of odour annoyance during the operations. These could be secured in a detailed Odour Management Plan.

12.1 Introduction

AS Modelling & Data Ltd. has been instructed by Rosina Bloor of Roger Parry & Partners LLP., on behalf of Morton Growers Ltd., to use computer modelling to assess the impact of odour emissions from the existing and proposed broiler chicken rearing houses at Morton Ley Farm, near Osbaston, Oswestry. SY10 8BG.

Odour emission rates from the poultry houses have been assessed and quantified based upon an emissions model that takes into account the likely internal odour concentrations and ventilation rates of the poultry houses and the effects of the Pollo Compact Air Scrubber equipment that would be fitted to the poultry houses. The odour emission rates so obtained have then been used as inputs to an atmospheric dispersion model which calculates odour exposure levels in the surrounding area.

This report is arranged in the following manner:
• Section 2 provides relevant details of the site and potentially sensitive receptors in the area.
• Section 3 provides some general information on odour, details of the method used to estimate odour emissions from the poultry houses, relevant guidelines and legislation on exposure limits and where relevant, details of likely background levels of odour.
• Section 4 provides some information about ADMS, the dispersion model used for this study and details the modelling parameters and procedures.
• Section 5 contains the results of the modelling.
• Section 6 provides a discussion of the results and conclusions.

12.2 Background Details

The site of the broiler rearing houses at Moreton Ley Farm is in a rural area, approximately 750 m to the west-north-west of the village of Osbaston in Shropshire. The surrounding land is used largely for a mixture of arable and livestock farming, but there are also some isolated wooded areas. The site is at an altitude of around 70 m and is surrounded by relatively flat land.

There are currently four broiler chicken rearing houses at Moreton Ley Farm. The existing houses are ventilated by roof fans and gable ends fans with dust baffles.

Under the proposal, two new poultry houses would be constructed to the south-west of the existing buildings. The four existing and two proposed poultry houses would provide accommodation for up to 350,000 broiler chickens in total. The existing and proposed poultry houses would be ventilated by air scrubber units which would provide the majority of the ventilation, for the majority of the time. Backup ventilation in case of scrubber failure and for supplementary ventilation which would be required at the end of crops in warm weather, would be provided by high speed ridge or roof fans, each with a short chimney. The chickens would be reared from day old chicks up to 38 days old and there would be approximately 7.5 flocks per annum.

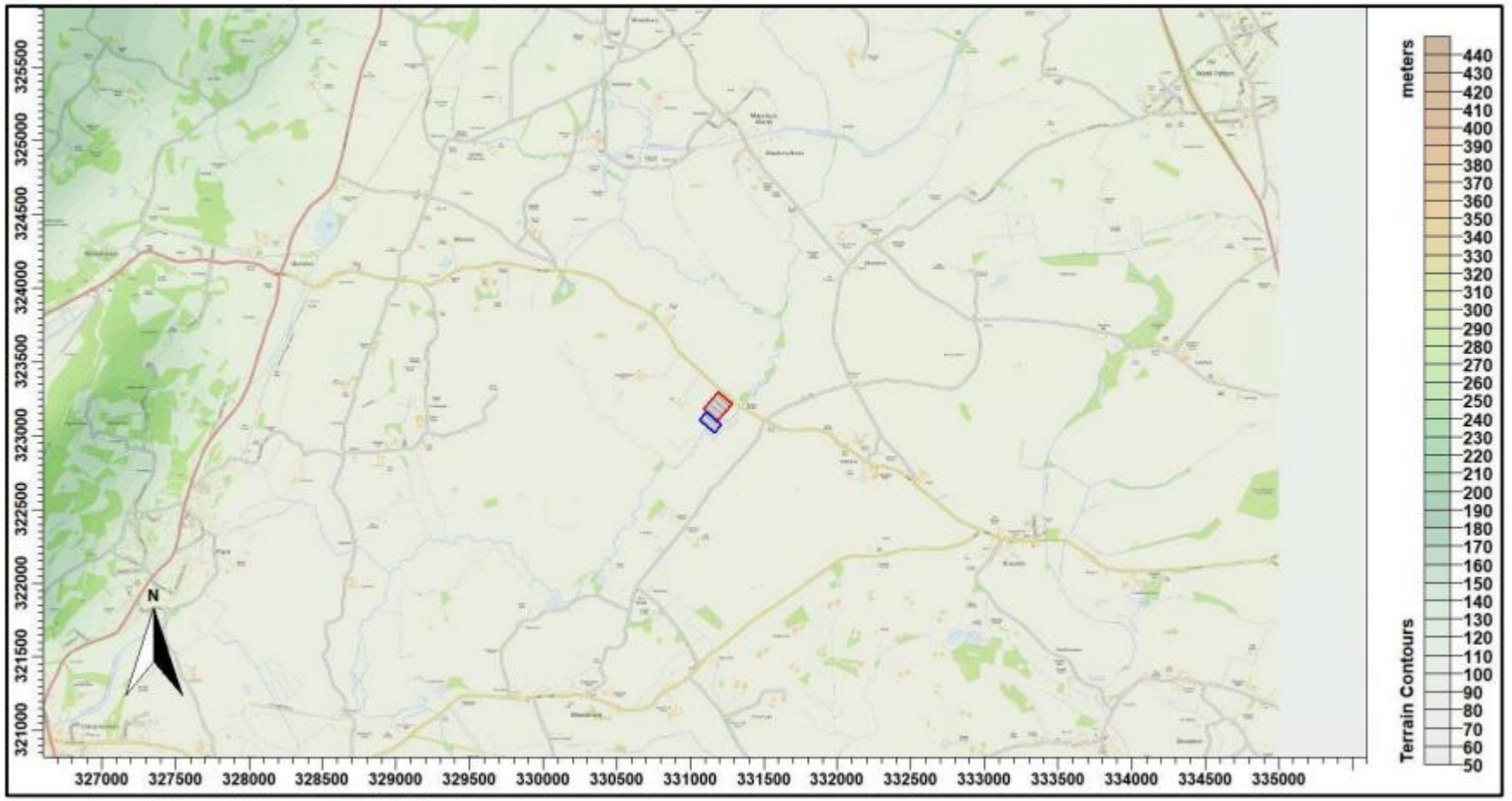
Five scenarios have been modelled:

Scenario 1 – the four existing houses (The Existing Scenario)
Scenario 2 – The four existing houses, plus two proposed poultry houses, all fitted with Pollo air scrubber units (The Proposed Scenario).

There are some residences and commercial properties in the area surrounding the site of the existing and proposed poultry houses at Morton Ley Farm. The closest residential properties are: Moreton Ley Farm, which is approximately 170 m to the west-north-west; Brook House and Westwood, the closest of which is approximately 350 m to the east-south-east; Lower Moreton Farm, which is approximately 440 m to the west-north-west; several residences in Osbaston, the closest of which is White Houses, which is approximately 700 m to the east-south-east and Mountain View, which is approximately 855 m to the east of the poultry unit. There are several other residences and commercial properties further afield.

A map of the surrounding area is provided in Figure 1; in the figure, the positions of the existing poultry houses are outlined in red and the site of the proposed poultry houses is outlined in blue.

Figure 1. The area surrounding the site of the poultry houses at Morton Ley Farm



12.3 Odour, Emission Rates, Exposure Limits & Background Levels

12.3.1 Odour concentration, averaging times, percentiles and FIDOR

Odour concentration is expressed in terms of European Odour Units per metre cubed of air (ouE/m3). The following definitions and descriptions of how an odour might be perceived by a human with an average sense of smell may be useful, however, it should be noted that within a human population there is considerable variation in acuity of sense of smell.

• 1.0 ouE/m3 is defined as the limit of detection in laboratory conditions.
• At 2.0 – 3.0 ouE/m3 , a particular odour might be detected against background odours in an open environment.
• When the concentration reaches around 5.0 ouE/m3 , a particular odour will usually be recognisable, if known, but would usually be described as faint.
• At 10.0 ouE/m3 , most would describe the intensity of the odour as moderate or strong and if persistent, it is likely that the odour would become intrusive.

The character, or hedonic tone, of an odour is also important; typically, odours are grouped into three categories.

Most offensive:
• Processes involving decaying animal or fish remains.
• Processes involving septic effluent or sludge.
• Biological landfill odours.

Moderately offensive:
• Intensive livestock rearing.
• Fat frying (food processing).
• Sugar beet processing.
• Well aerated green waste composting

Less offensive:
• Brewery.
• Confectionery.
• Coffee roasting.
• Bakery.

Dispersion models usually calculate hourly mean odour concentrations and Environment Agency guidelines and findings from UK Water Industry Research (UKWIR) are also framed in terms of hourly mean odour concentration.

The Environment Agency guidelines and findings from UKWIR use the 98th percentile hourly mean; this is the hourly mean odour concentration that is equalled or exceeded for 2% of the time period considered, which is typically one year. The use of the 98th percentile statistic allows for some consideration of both frequency and intensity of the odours

At some distance from a source, it would be unusual if odour concentration remained constant for an hour and in reality, due to air turbulence and changes in wind direction, short term fluctuations in concentration are observed. Therefore, although average exposure levels may be below the detection threshold, or a particular guideline, a population may be exposed to short term concentrations which are higher than the hourly average. It should be noted that a fluctuating odour is often more noticeable than a steady background odour at a low concentration. It is implicit that within the model's hourly averaging time and the Environment Agency guidelines and findings from UKWIR that there would be variation in the odour concentration around this mean, i.e. there would be short periods when odour concentration would be higher than the mean and lower than the mean.

The FIDOR acronym is a useful reminder of the factors that will determine the degree of odour pollution:
• Frequency of detection.
• Intensity as perceived.
• Duration of exposure
• Offensiveness.
• Receptor sensitivity.

12.3.2 Environment Agency guidelines

In April 2011, the Environment Agency published H4 Odour Management guidance (H4). In Appendix 3 – Modelling Odour Exposure, benchmark exposure levels are provided. The benchmarks are based on the 98th percentile of hourly mean concentrations of odour modelled over a year at the site/installation boundary. The benchmarks are:
• 1.5 ouE/m3 for most offensive odours.
• 3.0 ouE/m3 for moderately offensive odours.
• 6.0 ouE/m3 for less offensive odours.

Any modelled results that project exposures above these benchmark levels, after taking uncertainty into account, indicates the likelihood of unacceptable odour pollution.

12.3.3 UK Water Industry Research findings

The main source of research into odour impacts in the UK has been the wastewater industry. An indepth study of the correlation between modelled odour impacts and human response was published by UKWIR in 2001. This was based on a review of the correlation between reported odour complaints and modelled odour impacts in relation to nine wastewater treatment works in the UK with on-going odour complaints. The findings of this research and subsequent UKWIR research indicated the following, based on the modelled 98th percentile of hourly mean concentrations of odour:

• At below 5.0 ouE/m3 , complaints are relatively rare at only 3% of the total registered.
• At between 5.0 ouE/m3 and 10.0 ouE/m3 , a significant proportion of total registered complaints occur, 38% of the total.
• The majority of complaints occur in areas of modelled exposures of greater than 10.0 o+uE/m3 , 59% of the total.

12.3.4 Choice of odour benchmarks for this study

Odours from poultry rearing are usually placed in the moderately offensive category. Therefore, for this study, the Environment Agency's benchmark for moderately offensive odours, a 98th percentile hourly mean of 3.0 ouE/m3 over a one year period, is used to assess the impact of odour emissions from the existing and proposed poultry houses at potentially sensitive receptors in the surrounding area.

12.3.5 Quantification of odour emissions

Odour emission rates from broiler houses depend on many factors and are highly variable. At the beginning of a crop rearing cycle, when chicks are small, litter is clean and only minimum ventilation is required, the odour emission rate may be small. Towards the end of the crop, odour production within the poultry housing increases rapidly and ventilation requirements are greater, particularly in hot weather, therefore emission rates are considerably greater than at the beginning of the crop.

Peak odour emission rates are likely to occur when the housing is cleared of spent litter at the end of each crop. There is little available information on the magnitude of this peak emission, but it is likely to be greater than any emission that might occur when there are birds in the house. The time taken to perform the operation is usually around two hours per house and it is normal to maintain ventilation during this time. There are measures that can be taken to minimise odour production whilst the housing is being cleared of spent litter and there is usually some discretion as to when the operation is

carried out; therefore, to avoid high odour levels at nearby sensitive receptors, it may be possible to time the operation to coincide with winds blowing in a favourable direction.

12.3.5.1 Standard broiler house emissions

To calculate an odour emission rate, it is necessary to know the internal odour concentration and ventilation rate of the poultry house. For the calculation, the internal concentration is assumed to be a function of the age of the crop and the stocking density.

The internal concentrations used in the calculations increase exponentially from 300 ouE/m3 at day 1 of the crop, to approximately 700 ouE/m3 at day 16 of the crop, to approximately 1,800 ouE/m3 at day 30 of the crop and approximately 2,300 ouE/m3 at day 34 of the crop. These figures are obtained from a review of available literature and olfactometric measurements available to AS Modelling & Data Ltd. and are based primarily on Robertson et al. (2002).

The ventilation rates used in the calculations are based on industry practices and standard bird growth factors. Minimum ventilation rates are as those of an operational poultry house and maximum ventilation rates are based on Defra guidelines. Target internal temperature is 33 Celsius at the beginning of the crop and is decreased to 22 Celsius by day 34 of the crop. If the external temperature is 7 Celsius, or more, lower than the target temperature, minimum ventilation only is assumed for the calculation. Above this, ventilation rates are increased in proportion to the difference between ambient temperature and target internal temperature. A maximum transitional ventilation rate (35% of the maximum possible ventilation rate) is reached when the ambient temperature is equal to the target temperature. A high ventilation rate (70% maximum possible ventilation rate) is reached when the temperature is 4 degrees above target and if external temperature is above 33 Celsius the maximum ventilation rate is assumed.

At high ventilation rates, it is likely that internal odour concentrations fall because odour is extracted much faster than it is created. Therefore, if the calculated ventilation rate exceeds that required to replace the volume of air in the house every 5 minutes, internal concentrations are reduced (by a factor of the square root of 7.5 times the house volume divided by the ventilation rate as an hourly figure). Based upon these principles, an emission rate for each hour of the period modelled is calculated by multiplying the concentration by the ventilation rate. Both the crop length and period the housing is empty can be varied. An estimation of the emission during the cleaning out process can also be included. In this case, it is assumed that the houses are cleared sequentially and each house takes 2 hours to clear.

In this case, it is assumed for the calculations that the crop length is 38 days and that there is an empty period of 7 days after each crop. To provide robust statistics, three sets of calculations were performed; the first with the first day of the meteorological record coinciding with day 1 of the crop cycle, the second coinciding with day 16 of the crop and the third coinciding with day 32 of the crop. As an example, a graph of the emission rate for a single poultry house (55,577 birds) over the first year of the meteorological record for each of the three crop cycles is shown in Figure 2a.

12.3.5.2 Scrubber/bypass emissions

To calculate an odour emission rate, it is necessary to know the internal odour concentration and ventilation rate of the poultry house. For the calculation, the internal concentration is assumed to be a function of the age of the crop and the stocking density.

The internal concentrations used in the calculations increase exponentially from 300 ouE/m3 at day 1 of the crop, to approximately 700 ouE/m3 at day 16 of the crop, to approximately 1,800 ouE/m3 at day 30 of the crop and approximately 2,300 ouE/m3 at day 34 of the crop. These figures are obtained from a review of available literature and olfactometric measurements available to AS Modelling & Data Ltd. 9 and are based primarily on Robertson et al. (2002). For emissions that arise from the scrubber the concentration is restricted to 1,200 ouE/m3

The ventilation rates used in the calculations are based on industry practices and standard bird growth factors. Minimum ventilation rates are as those of an operational poultry house and maximum ventilation rates are based on Defra guidelines. Target internal temperature is 33 Celsius at the beginning of the crop and is decreased to 22 Celsius by day 34 of the crop. If the external temperature is 7 Celsius, or more, lower than the target temperature, minimum ventilation only is assumed for the calculation. Above this, ventilation rates are increased in proportion to the difference between ambient temperature and target internal temperature. A maximum transitional ventilation rate (35% of the maximum possible ventilation rate) is reached when the ambient temperature is equal to the target temperature. A high ventilation rate (70% maximum possible ventilation rate) is reached when the temperature is 4 degrees above target and if external temperature is above 33 Celsius the maximum ventilation rate is assumed. All ventilation up to the capacity of the scrubbers is assumed to go through the scrubbers, and additional ventilation though the bypass system.

At high ventilation rates, it is likely that internal odour concentrations fall because odour is extracted much faster than it is created. Therefore, if the calculated ventilation rate exceeds that required to replace the volume of air in the house every 5 minutes, internal concentrations for the bypass ventilation are reduced (by a factor of the square root of 7.5 times the house volume divided by the ventilation rate as an hourly figure). Based upon these principles, an emission rate for each hour of the period modelled is calculated by multiplying the concentration by the ventilation rate. Both the crop length and period the housing is empty can be varied. An estimation of the emission during the cleaning out process can also be included. In this case, it is assumed that the houses are cleared sequentially and each house takes 2 hours to clear.

In this case, it is assumed for the calculations that the crop length is 38 days and that there is an empty period of 10 days after each crop. To provide robust statistics, three sets of calculations were performed; the first with the first day of the meteorological record coinciding with day 1 of the crop cycle, the second coinciding with day 16 of the crop and the third coinciding with day 32 of the crop. As an example, a graph of the emission rates, for a single poultry house (55,577 birds) over the first year of the meteorological record for each of the three crop cycles is shown in Figure 2b.

Figure 2a. Specific emission rate over the first year of the meteorological record (2018) - single house with standard ventilation (ridge fans with gable end fans for supplementary ventilation)

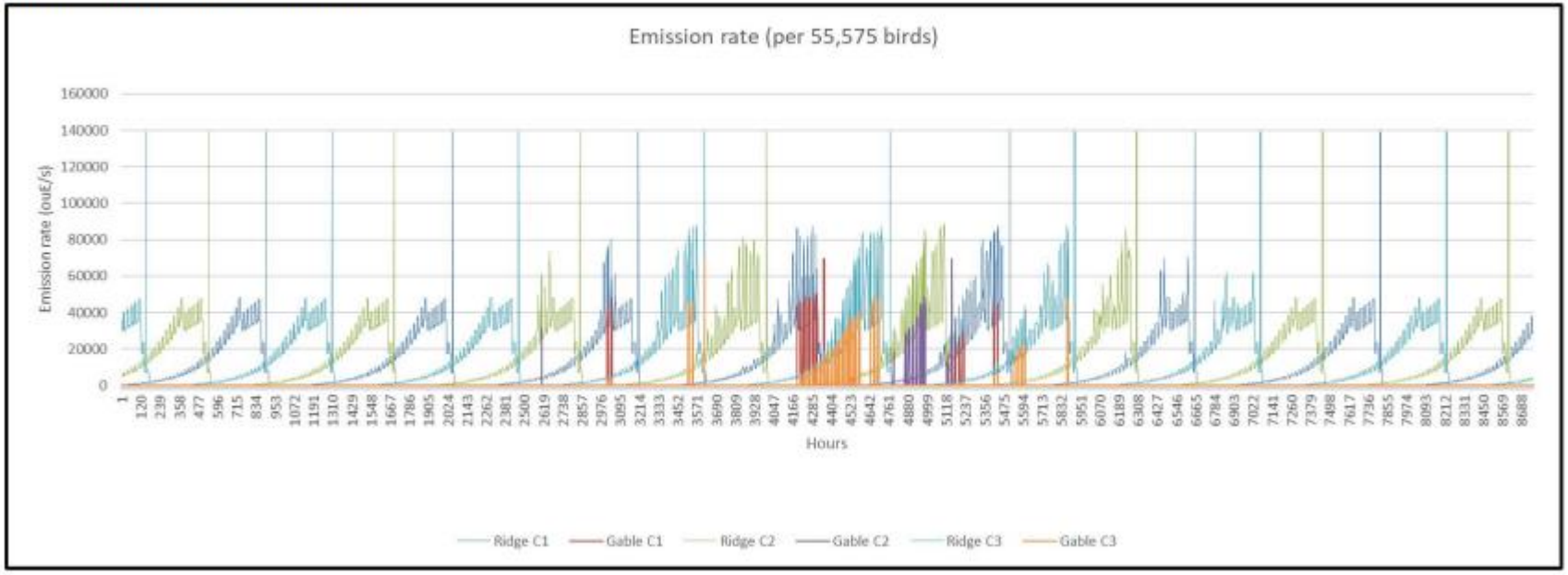
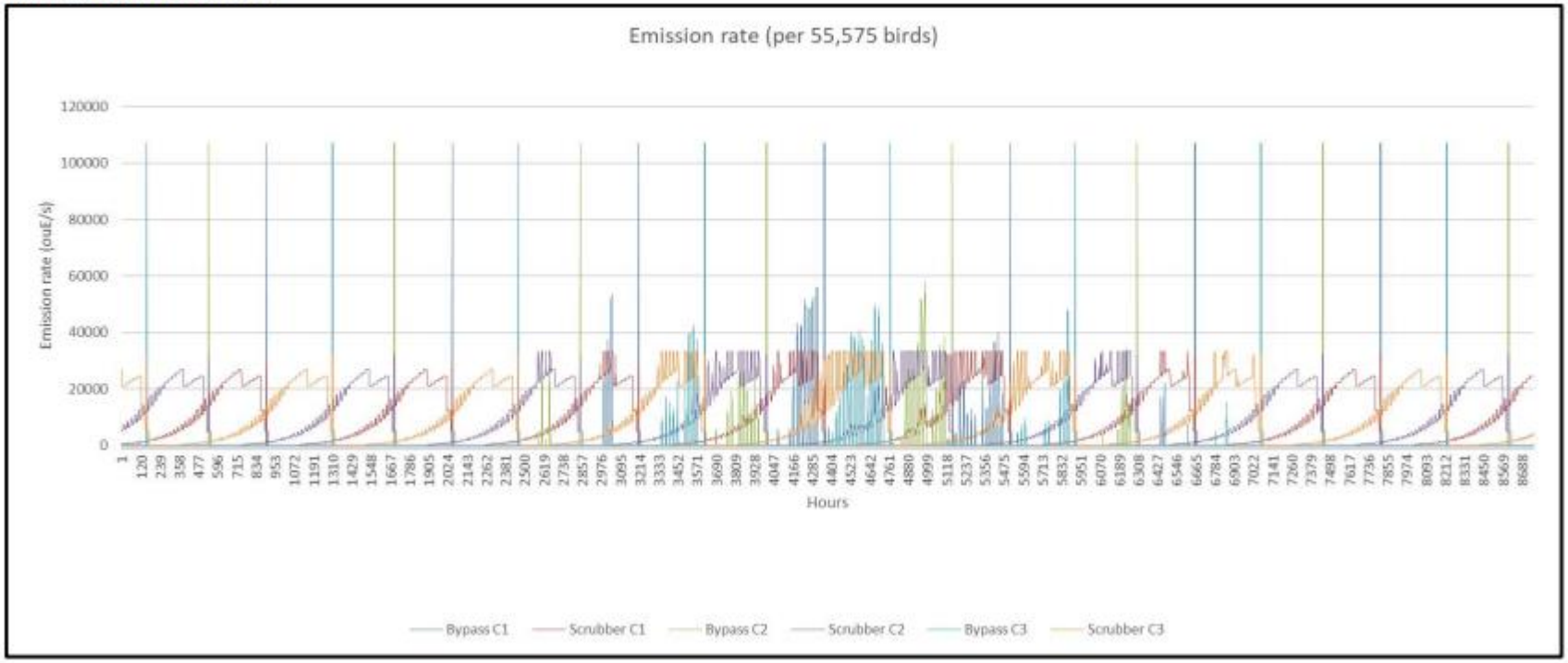


Figure 2b. Specific emission rate over the first year of the meteorological record (2018) - single house with Pollo scrubbers (scubbers with ridge fans for bypass/backup ventilation)



12.4 The Atmospheric Dispersion Modelling System (ADMS) and Model Parameters

The Atmospheric Dispersion Modelling System (ADMS) ADMS 5 is a new generation Gaussian plume air dispersion model, which means that the atmospheric boundary layer properties are characterised by two parameters; the boundary layer depth and the Monin-Obukhov length rather than in terms of the single parameter Pasquill-Gifford class.

Dispersion under convective meteorological conditions uses a skewed Gaussian concentration distribution (shown by validation studies to be a better representation than a symmetrical Gaussian expression).

ADMS has a number of model options that include: dry and wet deposition; NOx chemistry; impacts of hills, variable roughness, buildings and coastlines; puffs; fluctuations; odours; radioactivity decay (and γ-ray dose); condensed plume visibility; time varying sources and inclusion of background concentrations.

ADMS has an in-built meteorological pre-processor that allows flexible input of meteorological data both standard and more specialist. Hourly sequential and statistical data can be processed and all input and output meteorological variables are written to a file after processing.

The user defines the pollutant, the averaging time (which may be an annual average or a shorter period), which percentiles and exceedance values to calculate, whether a rolling average is required or not and the output units. The output options are designed to be flexible to cater for the variety of air quality limits, which can vary from country to country and are subject to revision.

12.4.1 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 is obtained from assimilation and short term forecast fields of the Numerical Weather Prediction (NWP) system known as the Global Forecast System (GFS).

The GFS is a spectral model: the physics/dynamics model has an equivalent resolution of approximately 9 km (latterly 6 km); terrain is understood to be resolved at a resolution of approximately 2 km, with sub-9/6 km terrain effects parameterised. Site specific data may be extrapolated from nearby archive grid points or a most representative grid point chosen. The GFS resolution adequately captures major topographical features and the broad-scale characteristics of the weather over the UK. Smaller scale topological features may be included in the dispersion modelling by using the flow field module of ADMS (FLOWSTAR). The use of NWP data has advantages over traditional meteorological records because:

- Calm periods in traditional observational records may be over represented, this is because the instrumentation used may not record wind speeds below approximately 0.5 m/s and start up wind speeds may be greater than 1.0 m/s. In NWP data, the wind speed is continuous down to 0.0 m/s, allowing the calms module of ADMS to function correctly.
- Traditional records may include very local deviations from the broad-scale wind flow that would not necessarily be representative of the site being modelled; these deviations are difficult to identify and remove from a meteorological record. Conversely, local effects at the site being modelled are relatively easy to impose on the broad-scale flow and provided horizontal resolution is not too great, the meteorological records from NWP data may be expected to represent well the broad-scale flow.
- Information on the state of the atmosphere above ground level which would otherwise be estimated by the meteorological pre-processor may be included explicitly.

The raw GFS wind speeds are modified by the treatment of roughness lengths (see Section 4.7) and because terrain data is included in the modelling, wind speeds and directions will be further modified. The raw GFS wind rose is shown in Figure 3a and the terrain and roughness length modified wind rose

for the site of the poultry houses at Morton Ley Farm is shown in Figure 3b. Note that elsewhere in the modelling domain, the modified wind roses may differ more markedly and that the resolution of the wind field in the modelling terrain runs is approximately 100 m. Please also note that FLOWSTAR2 is used to obtain a local flow field, not to explicitly model dispersion in complex terrain as defined in the ADMS User Guide; therefore, the ADMS default value for minimum turbulence length has been amended3 .

1. The GFS data used is derived from the high resolution operational GFS datasets, the data is not obtained from the lower resolution (0.5 degree) long-term archive.
2. Note that FLOWSTAR requirements are for meteorological data representative of the upwind flow over the modelling domain and that single site meteorological data (observational or from high resolution modelled data) that is representative of the application site is not generally suitable (personal correspondence: CERC 14 2019 and UK Met O 2015). If data are deemed representative of a particular application site, either wholly or partially, then these data cannot also be representative of the upstream flow over the modelling domain. Furthermore, it would be extremely poor practice to use such data as the boundary conditions for a flow-solver, such as FLOWSTAR.
3. When modelling complex terrain with ADMS, by default, the minimum turbulence length has 0.1 m added to the flat terrain value (calculated from the Monin-Obukhov length). Whilst this might be appropriate over hill/mountain tops in terrain with slopes > 1:10 (and quite possibly only in certain wind directions) in lesser terrain it introduces model behaviour that is not desirable where FLOWSTAR is simply being used to modify the upwind flow. Specifically, the parameter sigma z of the Gaussian plume model is overly constrained, which for elevated point sources emissions, may on occasion cause over prediction of ground level concentrations in stable weather conditions and light winds (Steven R. Hanna & Biswanath Chowdhury, 2013), conversely for low level emission sources, this will cause gross under prediction. Note that this becomes particularly important overnight and if calm and light wind conditions are not being ignored, as they often are when using traditional observational meteorological datasets. To reduce this behaviour, where terrain is modelled, AS Modelling & Data Ltd. have set a minimum turbulence length of 0.025 m in ADMS. This approximates the normal behaviour of ADMS with flat terrain.

Figure 3a. The wind rose. Raw GFS derived data, for 52.801 N, 3.021 W, 2018 - 2021

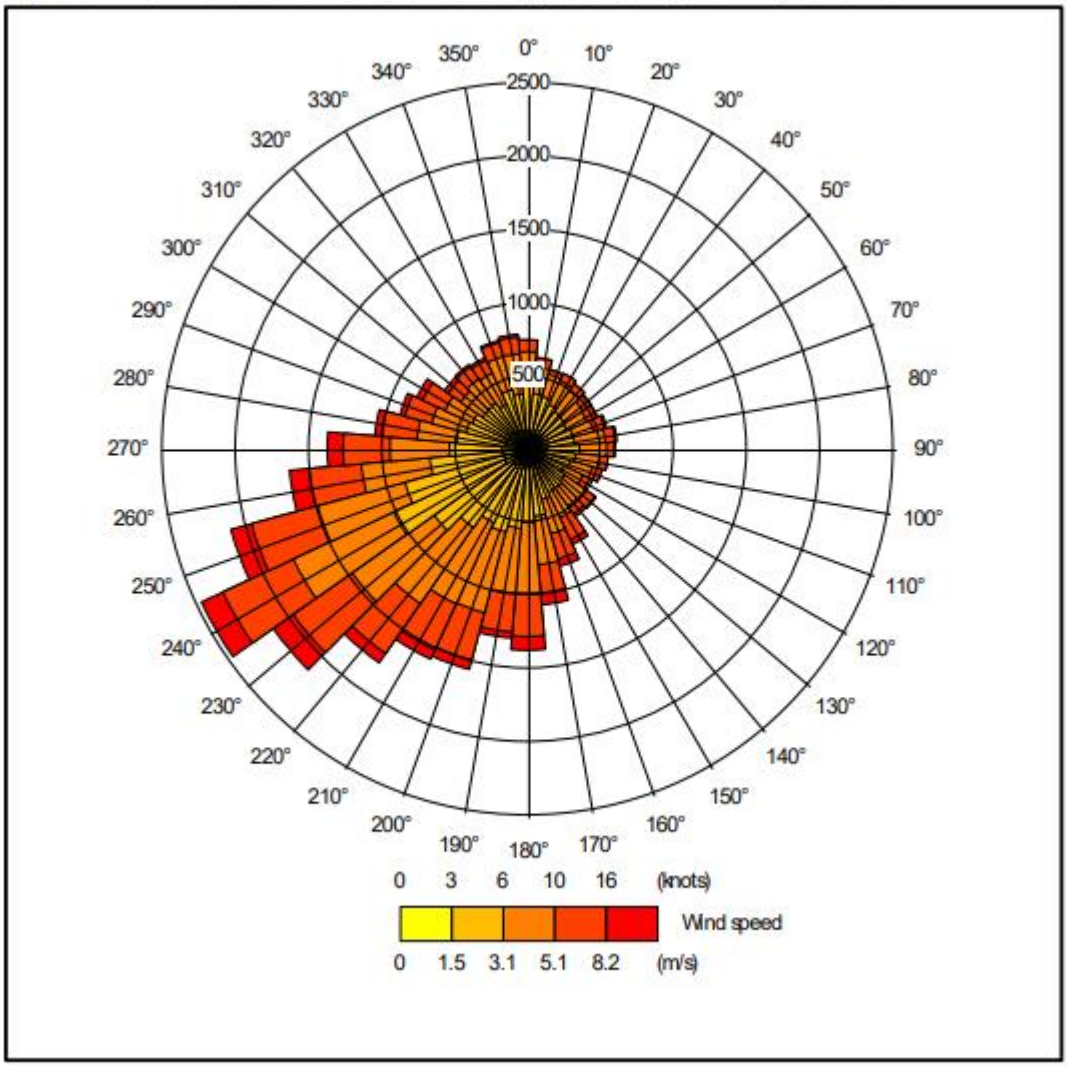
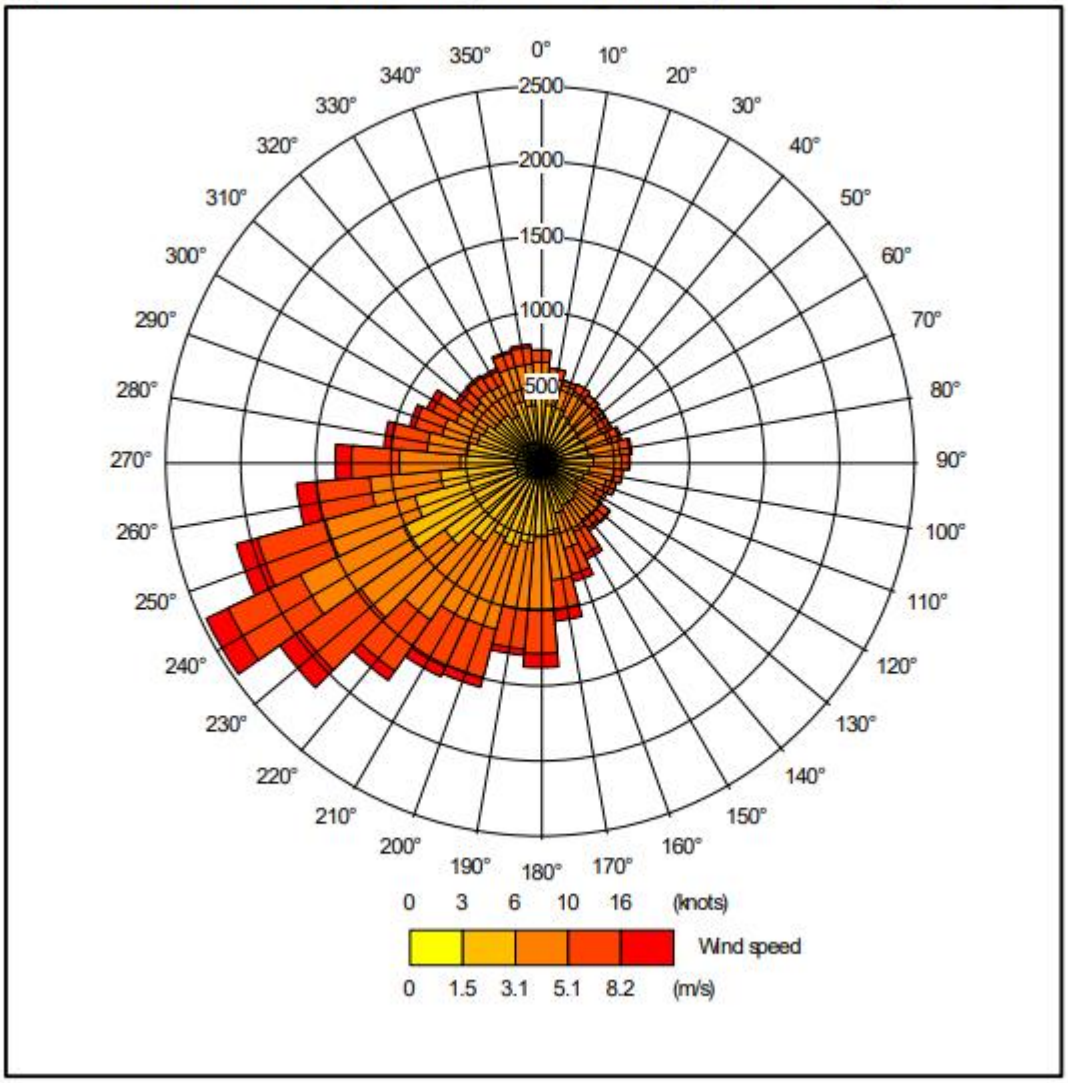


Figure 3b. The wind rose. FLOWSTAR modified GFS derived data for NGR 331150, 323150 2018-2021



12.4.2 Emission sources

Emissions from the high speed ridge fans in the existing/unabated scenarios are represented by three point sources per house within ADMS (EX1_NOR to EX4_NOR1, 2 & 3 and PR5_NOR 1, 2 & 3). The existing houses also currently have gable end fans with dust baffles for use in hot weather, these are represented by a single volume source in ADMS (EX_GAB).

Emissions from the air scrubbers and the high speed ridge/roof fans that would be used as bypass/backup ventilation in the proposed scenario are represented by a single point source per house within ADMS (EX1_BYP 1, 2 & 3 to EX4_BYP 1, 2 & 3, PR5_BYP to PR6_BYP 1, 2 & 3, EX1_SCR 1, 2 & 3 to EX4_SCR 1, 2 & 3 and PR5_SCR to PR6_SCR 1, 2 & 3).

Details of the point and volume source parameters are shown in Table 1a and Table 1b. The positions of the sources may be seen in Figure 4.

Table 1a. Point source parameters

Source ID	Height (m)	Diameter (m)	Efflux velocity (m/s)	Emission temperature (°C)	Emission rate per source (ou_E/s)
EX1_NOR to EX4_NOR 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [2]
PR5_NOR 1, 2 & 3 and PR6_NOR 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [1]
EX1 BYP to EX4_BYP 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [1]
EX1_SCR to EX4_SCR 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [1]
PR5_BYP 1, 2 & 3 and PR6_BYP 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [1]
PR5_SCR 1, 2 & 3 and PR6_SCR 1, 2 & 3	6.0	0.8	11.0	Variable [1]	Variable [1]

Table 1b. Volume source parameters

Source ID (Scenario)	Length Y (m)	Width X (m)	Depth (m)	Base height (m)	Emission temperature (°C)	Emission rate (ou_E/s)
EX_GAB	5.0	62.5	3.0	0.0	Ambient	Variable [3]

1. Dependent on ambient temperature.
2. Reduced by 50% when the ambient temperature equals or exceeds 21 Celsius.
3. 50% of the total emission emitted only when the ambient temperature equals or exceeds 21 Celsius

12.4.3 Modelled buildings

The structure of the poultry houses may affect the plumes from the point sources. Therefore, the buildings are modelled within ADMS. The positions of the modelled buildings may be seen in Figure 4, where they are marked by grey rectangles.

12.4.4 Discrete receptors

Nineteen discrete receptors have been defined at a selection of nearby residences and commercial properties. The receptors are defined at 1.5 m above ground level within ADMS and their positions may be seen in Figure 5, where they are marked by enumerated pink rectangles.

12.4.5 Nested Cartesian grid

To produce the contour plots presented in Section 5 of this report, a nested Cartesian grid has been defined within ADMS. The grid receptors are defined at 1.5 m above ground level within ADMS. The positions of the grid receptors may be seen in Figure 5, where they are marked by green crosses.

Figure 4. The positions of the modelled buildings and sources

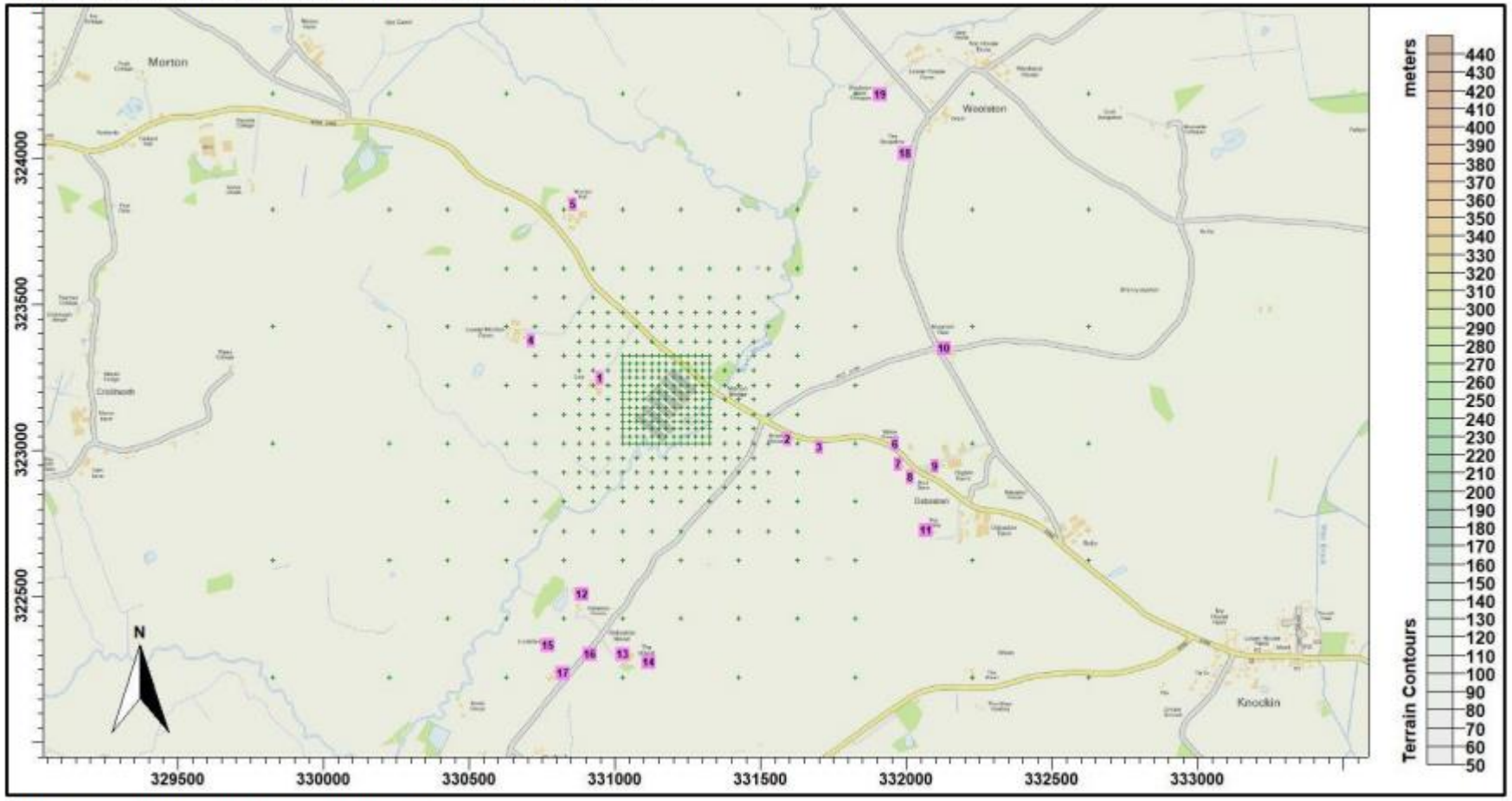
12.4.6 Terrain data

Terrain has been considered in the modelling. The terrain data are based upon the Ordnance Survey 50 m Digital Elevation Model. A 6.4 km x 6.4 km domain has been resampled at 50 m horizontal resolution for use within ADMS for the preliminary and detailed modelling runs. N.B. The resolution of FLOWSTAR is 64 x 64 grid points; therefore, the effective resolution of the wind field is 100 m.

12.4.7 Other model parameters

A fixed surface roughness length of 0.25 m has been applied over the entire modelling domain. As a precautionary measure, the GFS meteorological data is assumed to have a roughness length of 0.225 m. The effect of the difference in roughness length is precautionary as it increases the frequency of low wind speeds and stability and therefore increases predicted ground level concentrations.

Figure 5. The discrete receptors and nested Cartesian grid receptors.



12.5 Details of the Model Runs and Results

For this study, the model was run with the calms and terrain modules in ADMS. The model was run four times, once for each year in the meteorological record, using the GFS meteorological data for all five scenarios:

Scenario 1 – The four existing houses (The Existing Scenario)
Scenario 2- The four existing houses, plus two proposed poultry houses, all fitted with Pollo air scrubber units (The Proposed Scenario).

Statistics for the annual 98th percentile hourly mean odour concentration at each receptor were compiled for each of the four modelling runs.

A summary of the results at the discrete receptors are provided in Table 2, where the maximum annual 98th percentile hourly mean odour concentration for each scenario is shown. Contour plots of the predicted maximum annual 98th percentile hourly mean odour concentrations is shown in Figures 6a (Scenario 1) and 6b (Scenario 2).

In Table 2, predicted odour exposures in excess of the Environment Agency's benchmark of 3.0 ouE/m3 as an annual 98th percentile hourly mean are coloured blue; those in the range that UKWIR research suggests gives rise to a significant proportion of complaints, 5.0 ouE/m3 to 10.0 ouE/m3 as an annual 98th percentile hourly mean, are coloured orange and predicted exposures likely to cause annoyance and complaint, those in excess of 10.00 ouE/m3 as an annual 98th percentile hourly mean, are coloured red.

Table 2. Maximum annual 98th percentile hourly mean odour concentrations at the discrete receptors

Receptor number	X(m)	Y(m)	Name/Location	Maximum annual 98th percentile hourly mean odour concentration (ou_E/m^3)	
				Scenario 1 (Existing Houses with standard ventilation)	Scenarios 2 (Existing & Proposed all with scrubbers)
1	330948	323247	Morton Ley Farm	2.48	2.46
2	331590	323039	Brook House	1.32	1.80
3	331700	323012	Westwood	0.97	1.27
4	330712	323378	Lower Morton Farm	0.79	0.90
5	330855	323842	Morton Hill	0.77	0.83
6	331960	323020	White Houses	0.56	0.73
7	331973	322953	Osbaston	0.58	0.68
8	332013	322907	Bryn Derw	0.49	0.63
9	332100	322946	Higher Farm	0.45	0.54
10	332128	323350	Mountain View	0.72	1.01
11	332066	322726	The Fields	0.39	0.53
12	330887	322508	Osbaston House	0.51	0.75
13	331025	322304	Osbaston Wood	0.48	0.66
14	331117	322274	The Wood	0.58	0.76
15	330770	322334	Lindisfarn	0.35	0.48
16	330913	322301	The Wood	0.42	0.53
17	330823	322237	The Wood	0.33	0.42
18	331996	324017	The Bungalow	0.63	0.65
19	331909	324219	Woolston Bank Cottages	0.56	0.60

Figure 6a. Predicted maximum annual 98th percentile hourly mean odour concentration - Scenario 1

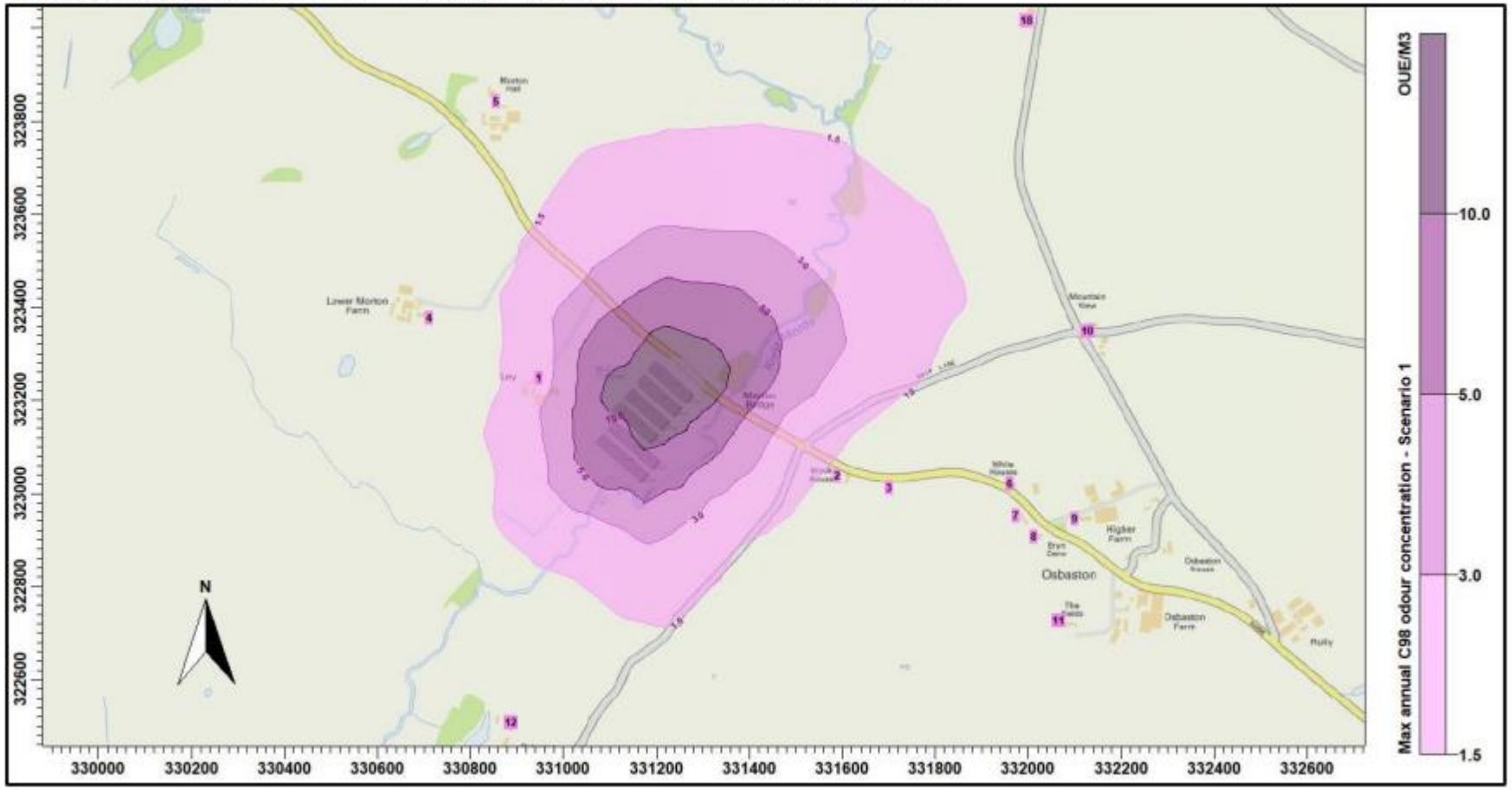
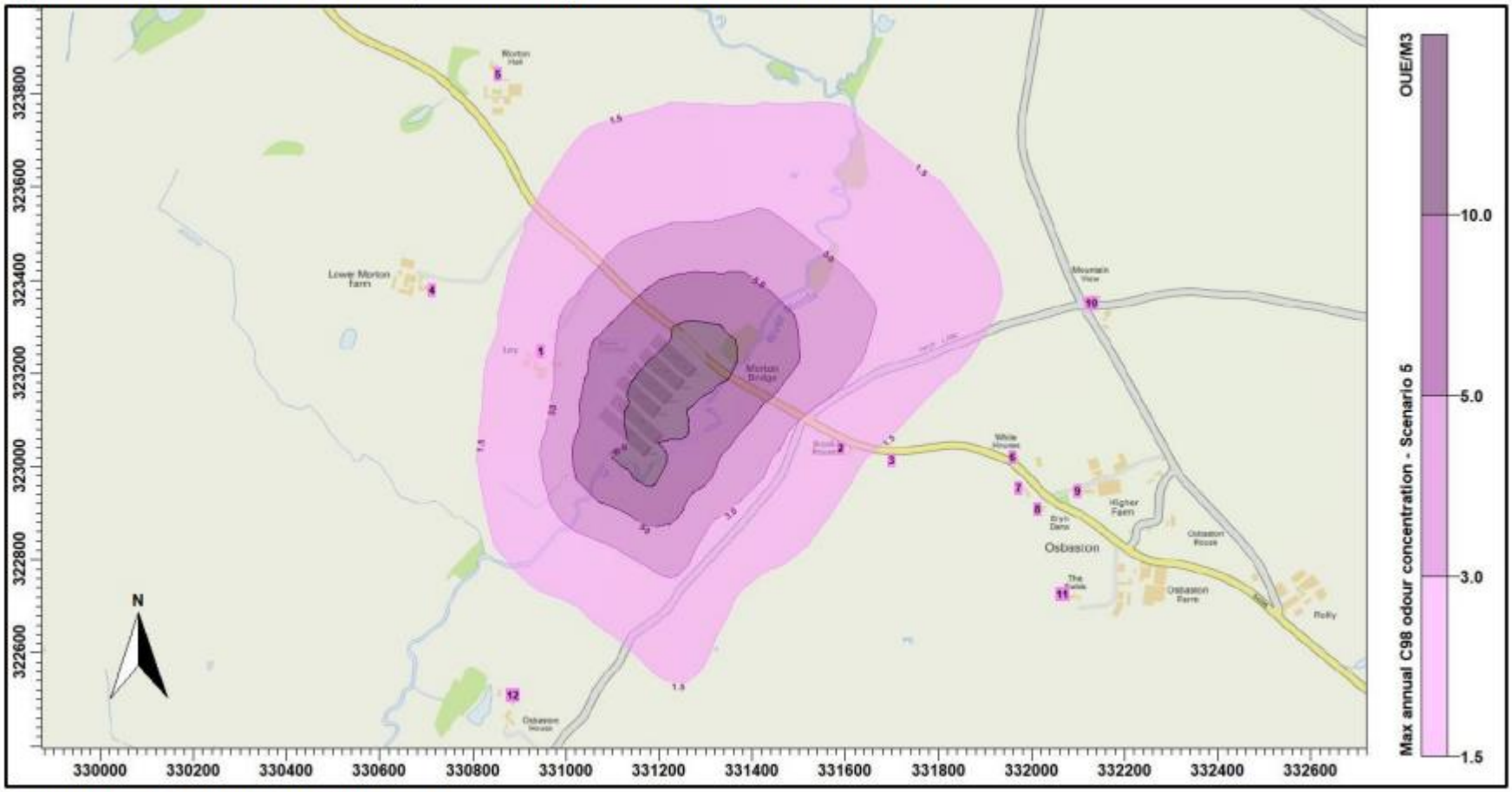


Figure 6b. Predicted maximum annual 98th percentile hourly mean odour concentration - Scenario 2



12.6 Summary and Conclusions

AS Modelling & Data Ltd. has been instructed by Rosina Bloor of Roger Parry & Partners LLP., on behalf of Morton Growers Ltd., to use computer modelling to assess the impact of odour emissions from the existing and proposed broiler chicken rearing houses at Morton Ley Farm, near Osbaston, Oswestry. SY10 8BG.

Odour emission rates from the poultry houses have been assessed and quantified based upon an emissions model that takes into account the likely internal odour concentrations and ventilation rates of the poultry houses and the effects of the Pollo Compact Air Scrubber equipment that would be fitted to the poultry houses. The odour emission rates so obtained have then been used as inputs to an atmospheric dispersion model which calculates odour exposure levels in the surrounding area.

The modelling predicts that should the proposed poultry houses be constructed at Moreton Ley Farm, at all nearby residential residences considered in the modelling, odour exposure would remain below the Environment Agency's benchmark for moderately offensive odours, a 98th percentile hourly mean of 3.0 ouE/m3 over a one year period at all nearby residential receptors.

CHAPTER 13 – FLOOD RISK ASSESSMENT AND DRAINAGE STRATEGY

13. Flood Risk Assessment and Drainage Strategy

13.1 Introduction

13.1.1 Purpose of this Report

Townsend Water Engineering Ltd, has been appointed by Morton Growers Ltd, for a flood risk assessment (FRA) for a proposed poultry unit at land at Morton Ley Farm (Grid Ref: 388291, 394995). This report has been prepared in support of the planning permission for the aforementioned development. The site is within Flood Zone 1, 2 and 3 and this report has undertaken hand calculation to ensure that the proposed development is not effected by flooding.

The report is based on the available flood risk information for the site detailed in Section 1.2 and prepared in accordance with the planning policy requirements set out in Section 1.3. The scope of the FRA is consistent with the 'Site Specific Flood Risk Assessment Checklist' from the National Planning Policy Framework (NPPF) and accompanying Planning Practice Guidance (PPG):

Flood risk and coastal change - GOV.UK (www.gov.uk)

We refer you to the Rebuttal Report dated 5th May 2023.

13.1.2 Sources of Information and Consultation

This Report has been informed by:

- Existing draft Site Plan drawings and respective topographic plan delivered by Roger Parry and Partners;
- BGS website http://mapapps.bgs.ac.uk/geologyofbritain/home.html?mode=boreholes;
- Defra Magic Map https://magic.defra.gov.uk/magicmap.aspx;
- Cranfield university Soil Mapping http://www.landis.org.uk/soilscapes/;
- The EA online flood maps;
- Flood Zone Map https://flood-map-for-planning.service.gov.uk/;
- Flood Risk Map https://flood-warning-information.service.gov.uk/long-term-flood-risk/.

13.1.3 Policy Context

This report has been prepared in accordance with the relevant national, regional and local planning policy and statutory guidance as follows:

- National policy contained within the National Planning Policy Framework (NPPF) dated July 2021, issued by former Ministry of Housing, Communities and Local Government with reference to Section 14 'Meeting the challenge of climate change, flooding and coastal change';
- The NPPF Planning Practice Guidance (PPG) released in March 2014 ('Flood Risk and Coastal Change' section) and updated in February 2016 to incorporate the EA 'Flood Risk Assessments: Climate Change Allowances' guidance;

13.1.4 Structure of this Report

The Report has been prepared based on the following structure:

- Section 2 refers to spatial planning considerations by reference to the proposed land use, flood zoning and NPPF vulnerability;
- Section 3 presents the assessment of existing flood risk at the site;
- Section 4 presents the proposed development and findings of flooding;
- Section 5 presents the drainage strategy; and
- Section 6 provides a summary of the assessments.

Additional Appendices are provided that deal with the following:

- Appendix A Topographical Survey;
- Appendix B ReFH Hydrological Calculations

- Appendix C Manning Equation; and
- Appendix D InfoDrainage Results.

13.2 Spatial Planning Consideration

13.2.1 Location and Background

The location of the proposed development site is shown in Figure 1 and Figure 2, with location details found in Table 1. The site is located on Morton Ley Farm, Oswestry SY10 8BG (Grid Ref:). (Table 1: Site Details).

The proposed development is for the extension of the poultry farm. It is proposed for two new units at the proposed site. The proposed site is approximately 0.626ha. There is a watercourse that runs North East to South East on the Eastern border called the River Morfa. The River Morfa is a main river. To the north is the B4396. To the west is Lower Morton. To the south and east are fields.

Figure 1: Site Location (Source: Bing)

Figure 2: Aerial map of the bridge (Source : Bing aerial map)

Figure 3: Aerial map of the bridge (Source : Bing aerial map)

Table 1: Site Details

Reference	Value
OS X (Eastings)	31164
OS Y (Northings)	23174
Nearest Post Code	SY10 8BG
Nat. Grid	SJ 31164 23174

Grid reference details taken from the site Grid reference Finder

13.2.2 Topography

The existing ground elevations on site is shown in the topographic drawing (Appendix A). The locations of the cross sections is shown in Figure 4. Please see appendix A

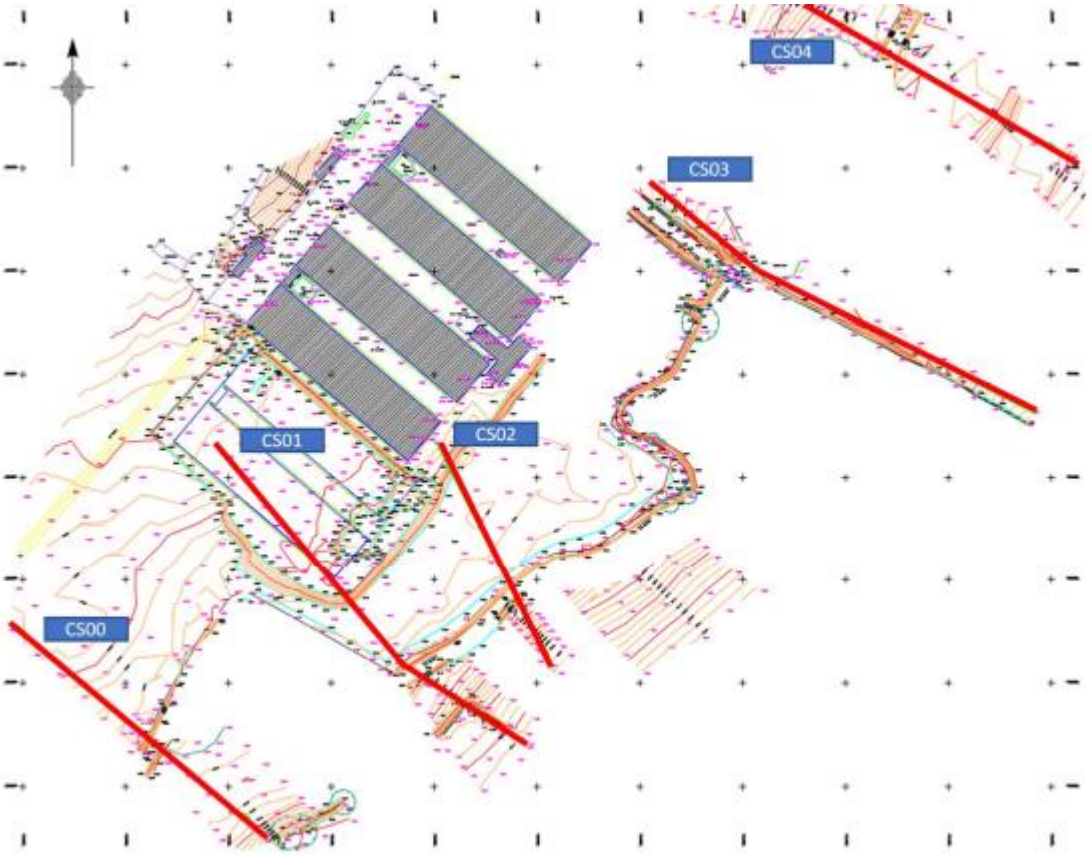


Figure 4: Topographical survey and cross section location

The cross-sectional data is shown in Figure 5. The bed slope is 0.0007.

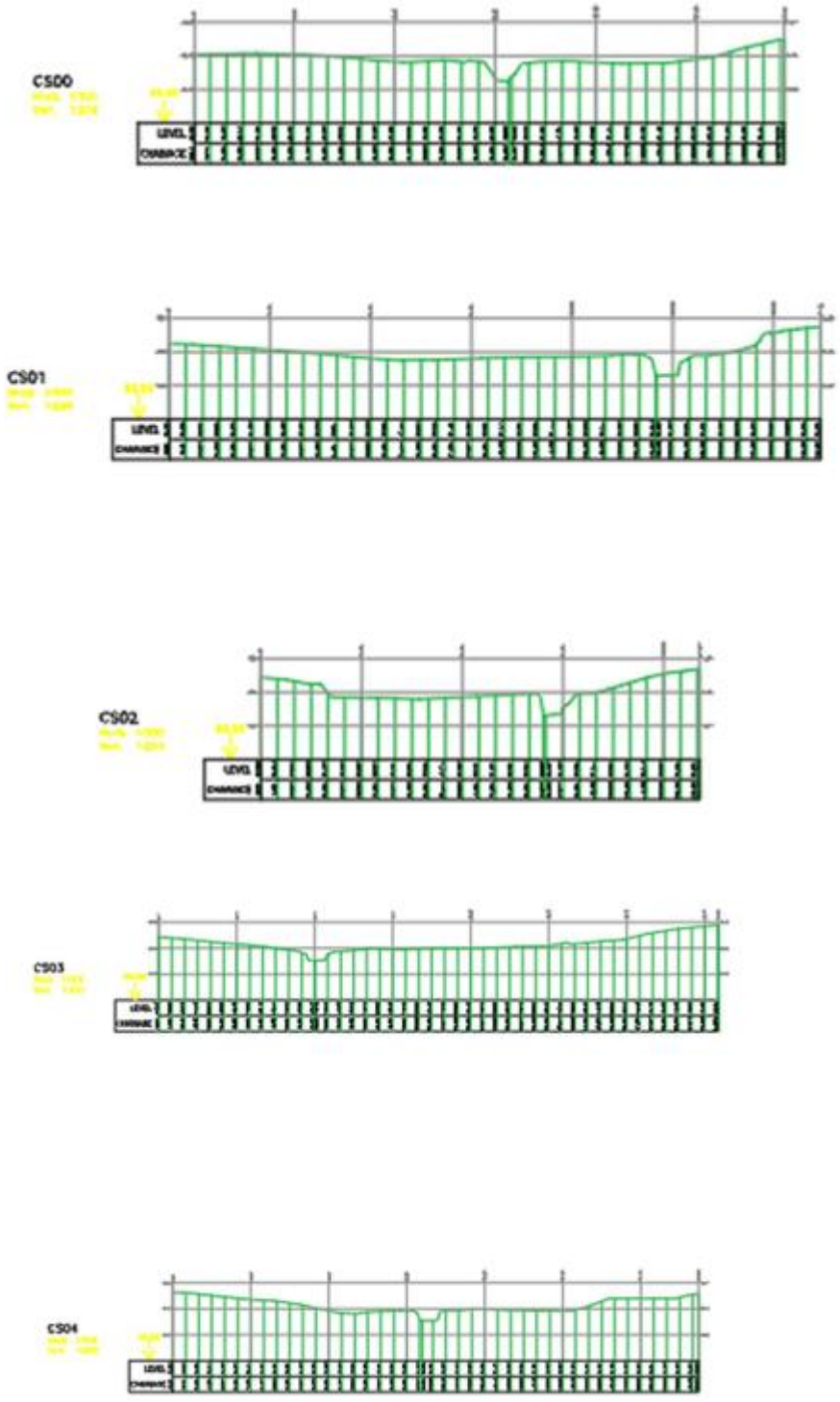


Figure 5: Cross section plots (Cross sections in Appendix A)

13.2.3 Geology and Soil

The geology at the site has been obtained from the British Geological Survey (BGS) website. The bedrock geology is Kinnerton Sandstone Formation – Sandstone. Sedimentary bedrock formed between 252.2 and 247.1 million years ago during the Triassic period. The superficial geology Devensian – Sand and gravel. Sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period.

Due to the ground being sandstone, it is likely that soakaways will be feasible at the site.

According to Soilscapes website the soil conditions are free draining, slightly acid loamy soils.

However due to the proximity of the watercourse it is believed that the groundwater level may be high, and it is not recommended that infiltration is used for the units.

13.2.4 Flood Zone

According to the flood map the proposed development is within Flood Zone 1, 2 and 3 (area at low, medium and high risk of flooding). Flood Zone 1 has a return period of greater than 1 in 1000 year event. Flood Zone 2 is an area of risk of flooding between 1 in 1000 and 1 in 200 year event. Below is the map indicating the flood area of the site (figure 3).

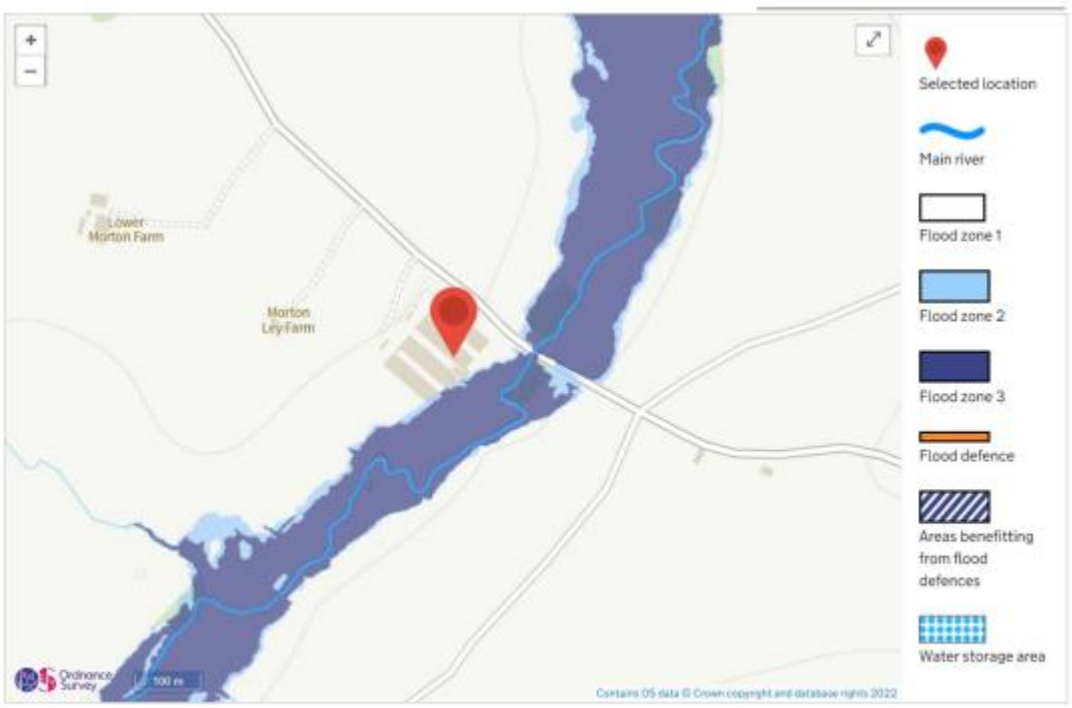


Figure 6: Flood Map from the Environment Agency

13.2.5 NPPF Vulnerability

The development will be classed as 'Less Vulnerable' under the NPPF vulnerability classification (Table 2). The flood risk vulnerability and flood zone compatibility are displayed in Table 3: Flood Risk Vulnerability and flood zone compatibility (Source NPPF Technical Guide). As noted in Section 2.4, the site is within Flood Zone 1, 2 and 3 and has minimal surface water flooding according to the EA flood risk maps (fluvial and tidal).

Table 2:Flood Risk Vulnerability Classification (Source: NPPF Technical Guide)

Less Vulnerable (LV)
Police, ambulance and fire stations which are not required to be operational during flooding.
Buildings used for shops; financial, professional and other services, restaurants, cafes and hot food takeaways; offices, general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class, and assembly and leisure.
Land and buildings used for agriculture and forestry
Waste treatment (except landfill* and hazardous waste facilities).
Minerals working and processing (except for sand and gravel working).
Water treatment works which do not need to remain operational during times of flood
Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Car Parks

Table 3:Flood Risk Vulnerability and flood zone compatibility (Source NPPF Technical Guide)

Flood Zone	Definition	Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
1	T>1,000	✔	✔	✔	✔	✔
2	100<T_{fluv}<1,000 200<T_{tidal}<1,000	✔	✔	Exc. Test	✔	✔
3a	T_{fluv}<100 T_{tidal}<200	Exc. Test	✔	✖	Exc. Test	✔
3b (functional floodplain)	T_{fluv}<20	Exc. Test	✔	✖	✖	✖

As the development refers to poultry units (Less Vulnerable) and it is located in Flood Zone 1 and low surface water flooding according to Table 3: Flood Risk Vulnerability and flood zone compatibility (Source NPPF Technical Guide), the sequential is passed and there is no need for an exception test.

13.2.6 Climate change allowances

Figure 7 indicates the climate change allowance for this area in regards to river flows. The central allowance will be used for this proposed development, as it is classified as 'less Vulnerable'. The development has 100-year design life and therefore a 33% allowance has been used.

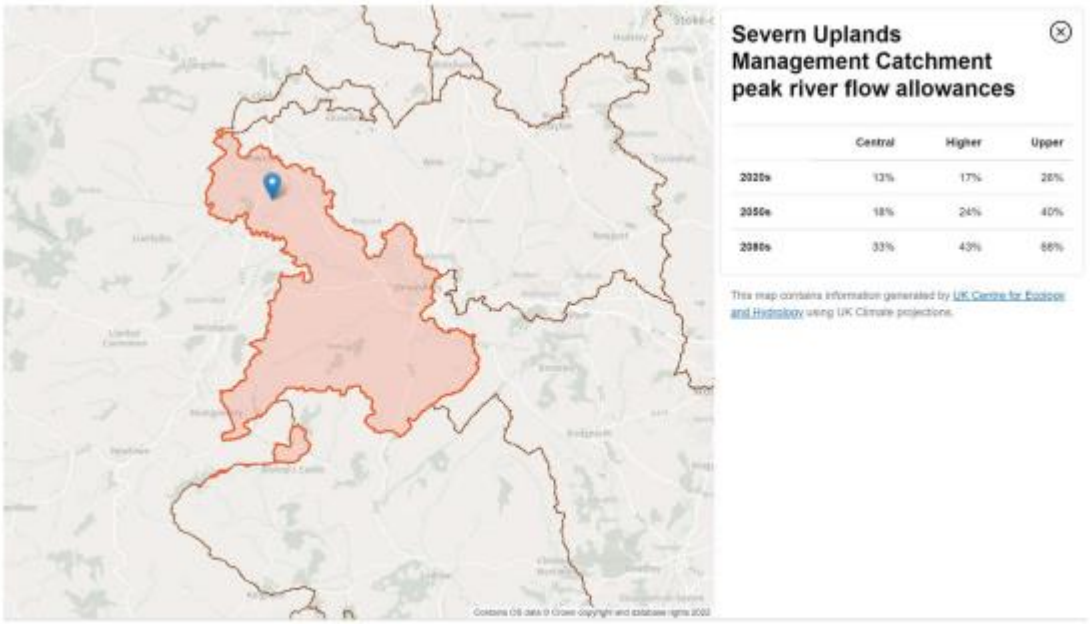


Figure 7:Peak river intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Similarly for the rainfall the increase for less vulnerable is 30%.

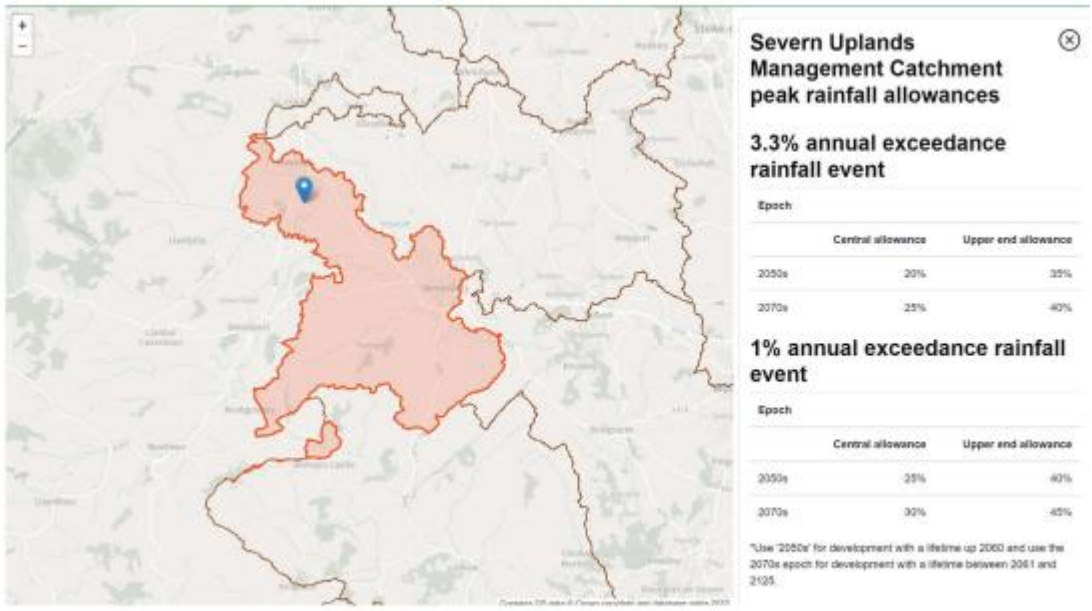


Figure 8:Peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

13.3 Flood Hazard for Existing Site

13.3.1 Source of Flood Risk

Flood sources and their possibilities at the site are described below.

Flood Risk from Fluvial Sources

Extent of FZ3 is the outline of 1 in 100yr event. To estimate the water level for the 100yr flow the following approach was applied.

- The cross sections of the River Morfa were based on the channel survey data received from Battlefield surveys.
- Five cross sections including two adjacent to existing buildings and existing ground level where the proposed buildings will be situated.
- Channel hydraulic parameters was estimated from the cross-section data using bespoke application.
- Flow across the channel section at different depths can be estimated utilising Manning's equation of uniform flow within an excel spreadsheet. The equation is shown below:

  $Q = (A \times 1/n) \times R^{2/3} \times S^{1/2}$

  Where, A is the channel cross sectional area, R is the hydraulic Radius (R = A/P, P is wetted perimeter), n is the Manning's roughness coefficient and S is the channel bed slope.

- Flow in the channel has been estimated utilising ReFH2, one of the Flood Estimation Handbook (FEH) recommended methods based on FEH catchment parameters data, for the 100yr event, and then
- The water level at the channel section for the event has been read from the Manning's flow estimation spreadsheets and a 1D flood model.

13.3.2 Manning's n

The channel roughness has been estimated from the Manning's roughness value suggested for different channel bed conditions by V. Chau. The channel roughness value for different channel bed material suggested by Chau is shown in Table 4.

Table 4: Manning's roughness value (suggested by Chou)

Channel substrate (with d_{50} values)	Manning's n roughness values		
	Mid	Lower	Upper
Bedrock	0.025	0.023	0.028
Cobbles (64-256mm)	0.055	0.04	0.07
Coarse Gravel	0.035	0.022	0.04
Gravel (2-64mm)	0.03	0.028	0.035
Fine gravel	0.024	0.02	0.028
Sand (0.2mm)	0.012	0.01	0.016
Sand (0.3mm)	0.017	0.015	0.022
Sand (0.4mm)	0.02	0.017	0.025
Sand (0.5mm)	0.022	0.018	0.027
Sand (0.6mm)	0.023	0.02	0.03
Sand (0.8mm)	0.025	0.023	0.032
Sand (1.0mm)	0.026	0.024	0.033
Coarse sand (1-2mm)	0.028	0.026	0.035
Silt	0.022	0.02	0.025
Clay	0.02	0.018	0.023
Peat	0.02	0.018	0.023
Earth	0.02	0.018	0.023
Firm soil	0.02	0.018	0.023
Concrete	0.02	0.018	0.022

A conservative value of Manning's n for a natural channel has been used in this analysis. For this watercourse the channel bed is assumed to be formed of sand. According to Table 2, the Manning's co-efficient is 0.028 to 0.035. For the design purposes a value of 0.035 has been considered. However, the sensitivity of the level estimation to roughness was checked by increasing the Manning's n to 0.042 (20%).

13.3.3 Hydrological Analysis and Flow Estimation

Flow estimation was undertaken using ReFH2, one of the Flood Estimation Handbook (FEH) recommended methods utilising FEH catchment parameters for the 100year event.

Catchment Characteristics were obtained from the FEH webservice for the River Morda catchment at downstream of the site. The catchment map is given in Figure 9 while the characteristics are given in Table 5. A critical duration of 7.5hr was derived from a series of testing in ReFH2 and resulted peak flow for 100yr event is 39.85m3/s. as discussed in section 2.6 for climate change a further 33%, therefore the 1 in 100 year plus 33% climate change is 53m3/s. the full results are in appendix B.

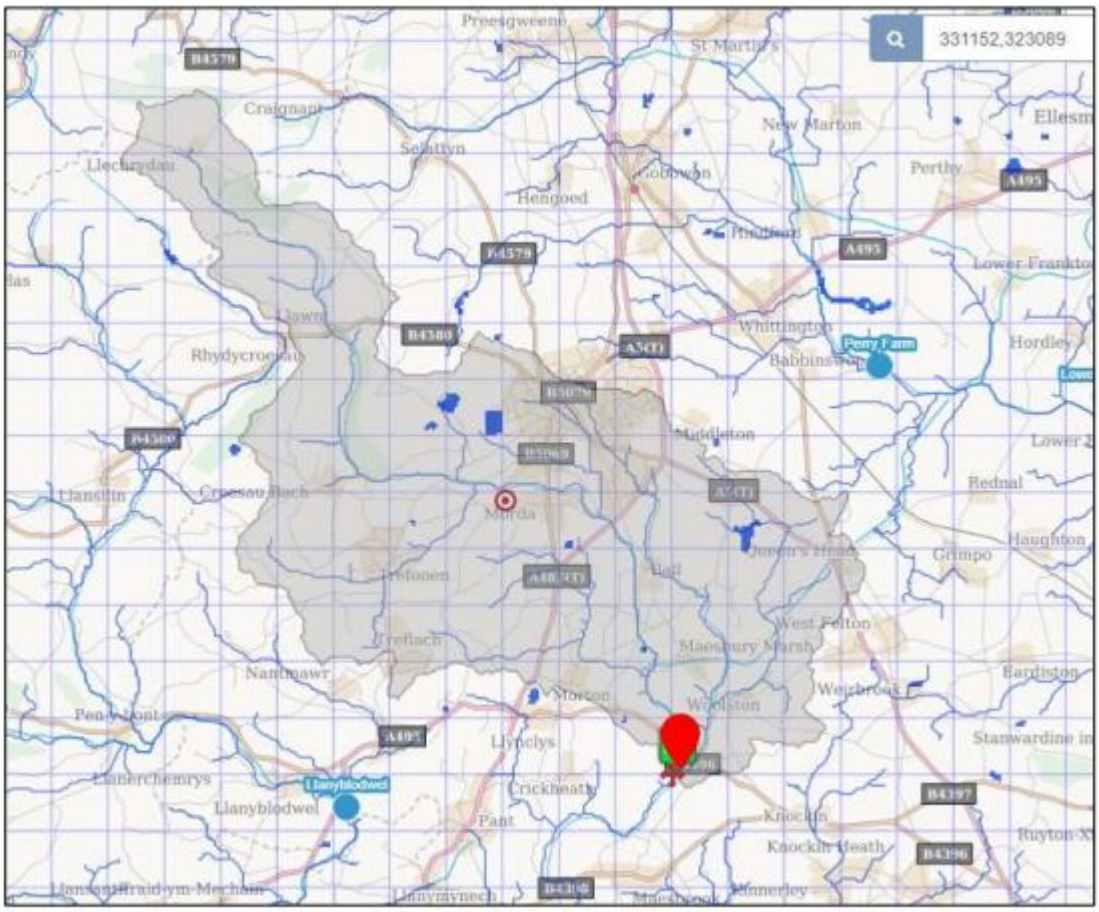


Figure 9: Catchment of the River Morda to D/S of the Site (source: FEH Webservice 2021)

Table 5: Catchment Characteristics (source: FEH Webservice 2021)

Characteristic	Description	
NGR	(catchment outlet)	SJ 31100 23000
NGR	(catchment centroid)	SJ 28048 27851
AREA	Catchment area (km2)	64.1775
ALTBAR	Mean elevation (m)	177
ASPBAR	Mean aspect	126
ASPVAR	Variance of aspect	0.36
BFIHOST	Base flow index	0.556
DPLBAR	Mean drainage path length (km)	9.47
DPSBAR	Mean drainage path slope	66
FARL	Index of lakes	0.988
FPEXT	Prop. of catchment in1% FP	0.1118
FPDBAR	Mean flood depth (catchment)	0.764
FPLOC	Avg dist of FP to outlet	0.577
LDP	Longest drainage path (km)	20.95
PROPWET	Proportion of time soil is wet	0.51
RMED-1H	Median 1 hour rainfall (mm)	9.3

Characteristic	Description	
RMED-1D	Median 1 day rainfall (mm)	32.6
RMED-2D	Median 2 day rainfall (mm)	42.4
SAAR	Average annual rainfall (mm)	860
SAAR4170	Ditto for 1941-1970 (mm)	896
SPRHOST	Percentage runoff	33.95
URBCONC2000	Urban concentration 2000	0.845
URBEXT2000	Urban extent 2000	0.0315
URBLOC2000	Urban location 2000	0.915

13.3.4 Estimation of Water Level at the Cross-Section

As mentioned in Section 1.3, the hydraulic perimeter of the channel section was estimated using a bespoke application from cross-section data extracted from topographic data and a flood model. Flow across the channel sections at different depths was estimated using Manning's Equation for uniform flow. Flow estimation was made for Manning's n value of 0.035 and 0.042. for both values channel bed slope considered was between 0.0007 and 0.003: The flow estimations are shown in Table 6. The maximum value estimated for the level of the 100 year plus 33% for climate change flood return period is 68.32mAOD. This is at Section CS03, i.e. at the bridge section which seems logical. The flood level at where the potential units will be situated is 67.92mAOD. the ground level of where the potential units are is above 69mAOD.

Therefore the units are not at risk of flooding in the 1 in 100 year plus 33% climate change. The full results are in Appendix C.

Table 6: Water Level (Mannings 0.035 and 0.042)

Channel Section	Section CS04	Section CS03	Section CS02	Section CS01	Section CS00
Bed level mAOD	64.974	65.127	65.205	66.063	66.168
Approximate Top Width (m)	9.8	12	10.2	9.8	9.7
Bank Level mAOD of main channel of the cross section	67.310	67.68	67.705	67.903	67.680
100yr +CC Flow (m^3/s)		53.0			
100yr +CC Flood Level (mAOD) with 0.035 Mannings' n, for manning equations	68.32	68.29	67.91	67.92	67.94
100yr +CC Flood Level (mAOD) with 0.042 Mannings' n, using manning equations	68.42	68.36	68.13	68.01	68.03

Below is an approximate outline of the Flood Zone 3.

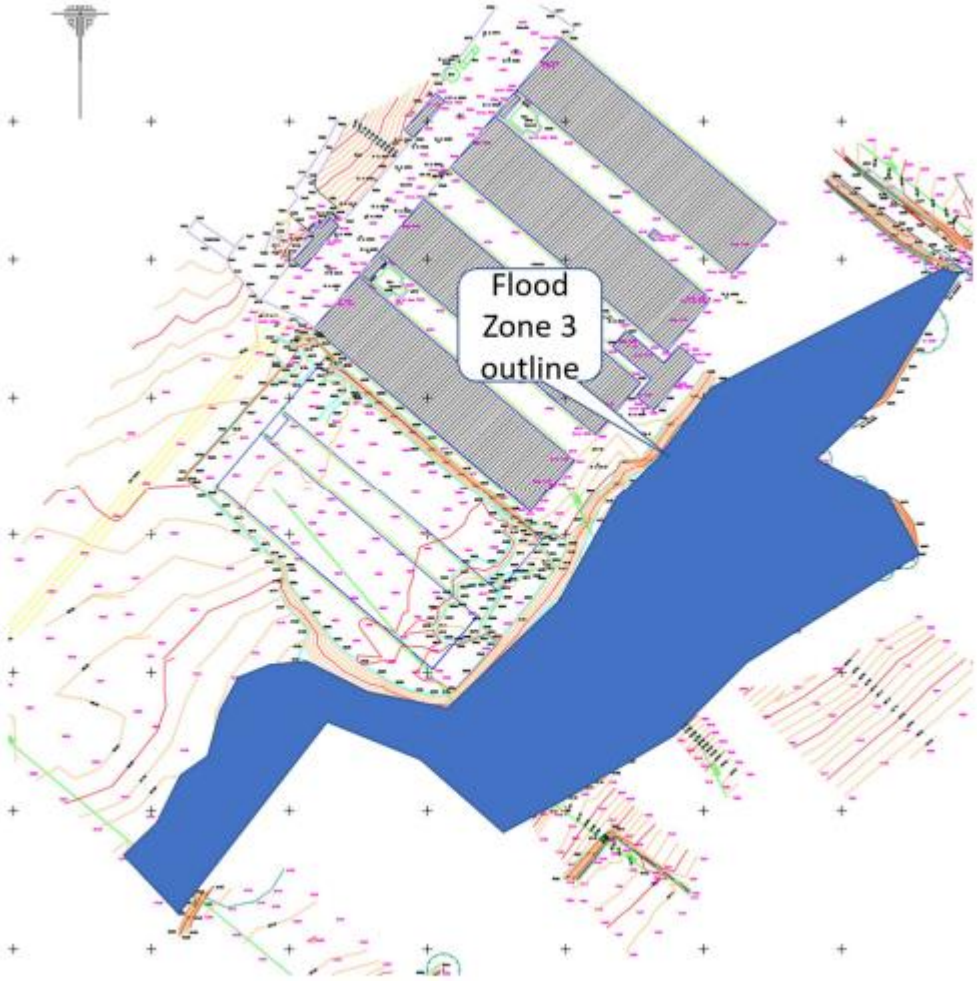


Figure 10: Flood Outline for Flood Zone 3b

The proposed development is considered to be at low risk of fluvial flooding.

Surface Water

The EA surface flood extents and flood depths (Figure 11) have been obtained from the EA open dataset. The majority of the site is at low risk flooding (higher probability than the 0.1% AEP event). The only parts that are at high flood risk are around a small section near the river. As the proposed development will not be built near the Morfa, the surface water flooding from river should be of minimal risk to the site.

Figure 11: 0.1% AEP Surface Water Depth (Source: EA Open Dataset)

It is believed the risk of flooding from surface water is low.

Flood Risk from Reservoir/Canals/Other Artificial Sources

The EA Extent of Flooding from Reservoirs map (Figure 12: Extent of Flooding from Reservoirs (Source: EA Flood Warning Information Service)), based only on large reservoirs (over 25,000 m3 of water), shows that some of the site is within potential risk of flooding in the event of a breach from reservoirs when the rivers are in flood as well. There is a slight risk of flooding from the reservoir. However it is extremely unlikely to flood as the reservoir would need to fail. It must be remembered that the poultry units are based on higher land than the surrounding area and it is unlikely they would flood.

Flooding from a reservoir is considered to be extremely unlikely and the risk of flooding to the site considered to be low.

There is no flood risk from canals or other artificial sources as there are no canals or artificial sources within the vicinity of the site.

Figure 12:Extent of Flooding from Reservoirs (Source; EA Flood Warning Information Service)

Flood Risk from Groundwater

According to the SFRA Level 1 for Shropshire, there is no history of groundwater flooding in this area.

Flood Risk from Sewers

According to the SFRA Shropshire, there is no history of sewer flooding on the site as there are no public sewer crossing the site.

13.3.4 Existing Surface Water Drainage Arrangements

Existing surface runoff from the site likely drains to Morfa River. The site is a greenfield site.

13.4 Assessment of Flood Risk for Proposed Development

13.4.1 Development Proposals

It is proposed to build 2 new poultry units at Morton Ley Farm as shown on the indicative masterplan Figure 13.

The development area of the extension has an impermeable area of 0.626ha.

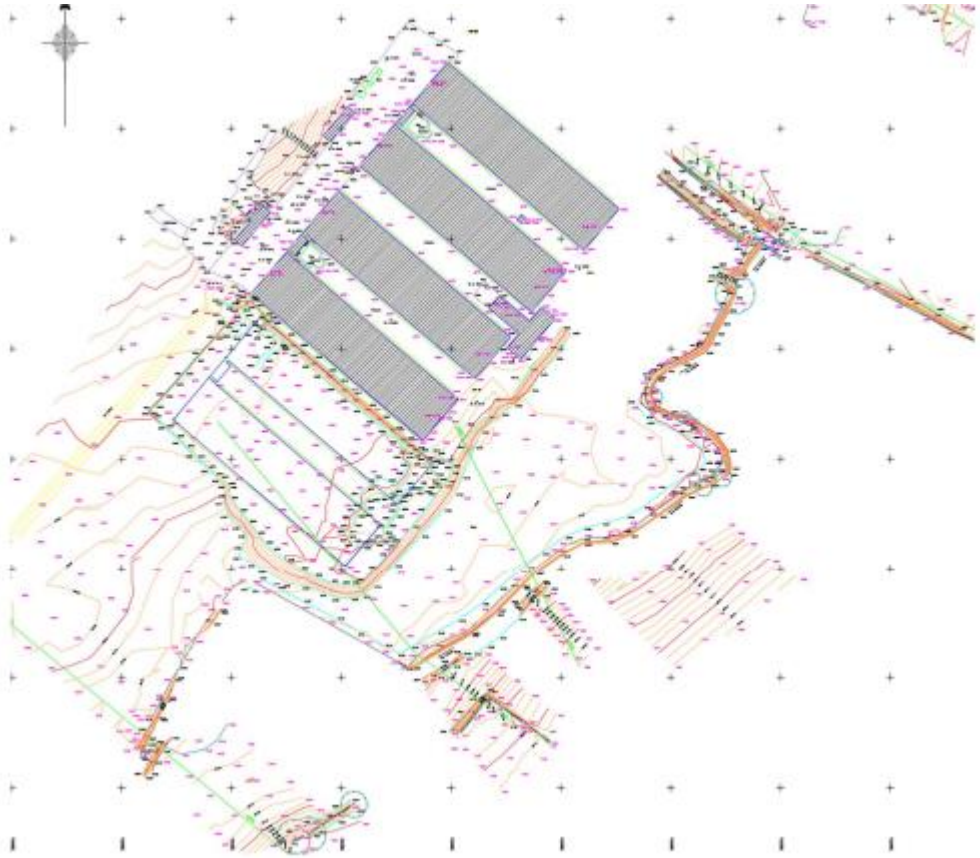


Figure 13: Proposed Site (Source: Client)

13.4.2 Fluvial Flood Management

The proposed development is outside of the 1 in 100 year event plus climate change and therefore at low risk of flooding. It is approximately 0.9 to 1m higher than the 1 in 100 year flood level plus climate change.

It is believed the site is at low risk of flooding.

13.4.3 Surface Water flooding

The site is not at risk of surface water flooding up to and including the 1 in 100 year event. With the inclusion of a new and working drainage system with attenuation up to and including the 1 in 100 year event plus climate change (30%) the site is believed to be at low risk of surface flooding.

13.5 Drainage Strategy

13.5.1 Existing Drainage Arrangements

Surface Water

The existing site is a greenfield site. The surface water for the existing poultry units drains to a swale which is 170m long, 7m wide at the top and 2m wide at the bottom and discharges at 1.2l/s.

13.5.2 Infiltration Rates

It is considered that infiltration is unlikely to be feasible due to high groundwater levels near the river. Therefore it is proposed to have the proposed units drained to the existing swale and then discharge to the River Morfa.

13.5.3 Surface Water Drainage Strategy

Hierarchy of Discharge

As discussed, it is believed that infiltration is not feasible because the groundwater level is high. Therefore the site will drain to the River Morfa.

The proposed discharge is set at 12.5l/s which is the 2 year greenfield for the new and existing impermeable area. Please see appendix D for the calculation for the greenfield rates.

Sizing of SUDS Features

As discussed in section 5.3.1 the existing poultry unit drain to a swale. It is the intension is to lengthen the swale and increase the discharge rate to accommodate the additional poultry units. The swale will be lengthened from 160m to 245m. the discharge will be increased to 12.5l/s which is the 2 year greenfield rate. The proposed hard standing will drain to the River Morfa.

The drainage will be separate to the existing drainage system and discharge into a swale and then into the River Morfa.

Modelling of the surface water runoff to the design parameters was carried out using the Source Control of Info Drainage, an industry leading software which allows design and analysis of SuDS features. Micro Drainage modelling results. Appendix E. The following conservative assumptions and design parameters have been set within the Hydraulic model for the housing section of the site:

- The total including the existing poultry units equals 2.449ha;
- Rainfall intensity was obtained using the Flood Studies Report (FSR) methodology and increased by 30%, the upper end allowance for climate change over the 100 years design life of the proposed residential development, in line with the requirements of the NPPF;
- No runoff loss has been assumed in the modelling, therefore all the design rainfall landing on the impermeable surfaces is expected to reach the detention basin;
- As per the conclusions in Section 3.3 the soil has been modelled with an infiltration rate of zero (0.0) m/hr;
- Please see below the summary of the results.

FSR: Critical Storm Per Item

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. Avg. Depth (m)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)	Status
Swale	FSR: 100 years: +30 %: 720 mins: Winter	69.443	69.444	1.469	1.462	935.920	1197	2	OK

Table 7: Summary of results

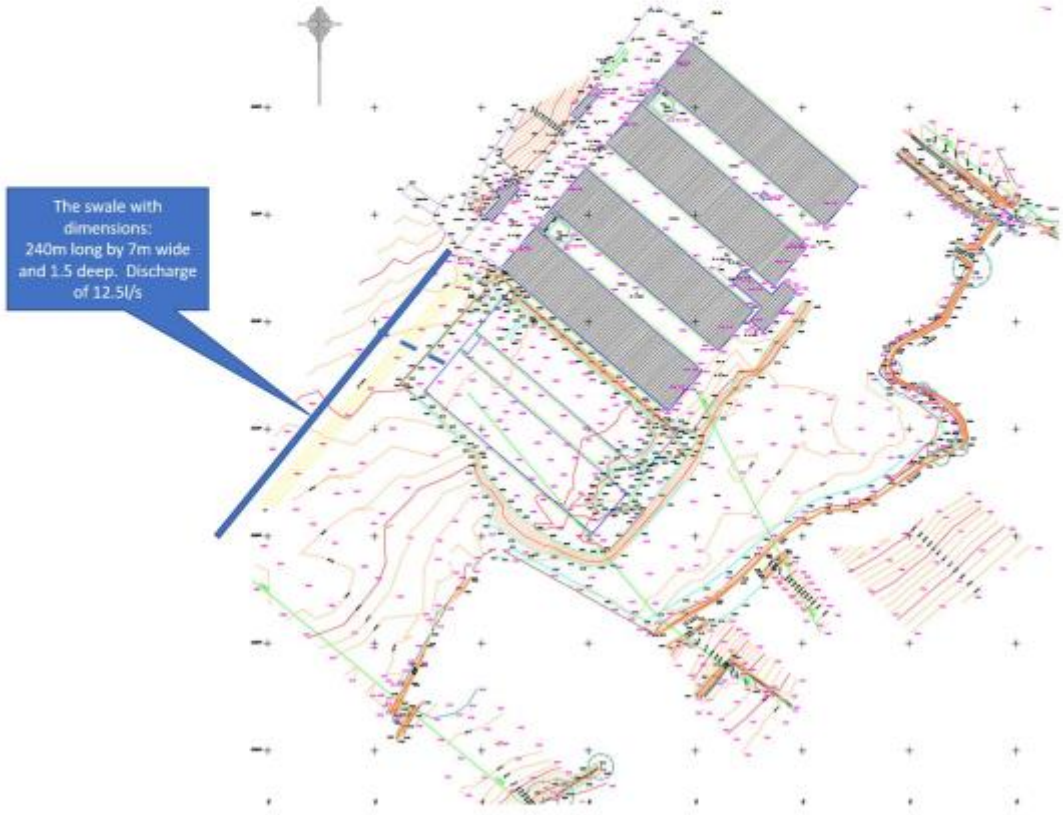


Figure 14: Proposed Drainage Strategy

Maintenance Plan

Structures which manage surface water runoff require little maintenance, however a regular maintenance schedule e.g. after heavy rainfall, should be established by the site owners to reduce the risk of blockage within the drainage system and ensure the design remains in good working order. It is proposed to offer this up for adoption.

TABLE 17.1 Operation and maintenance requirements for swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Table 8: Operation and Maintenance Requirements for a Swale

13.6 Summary & Conclusions

A summary of the main conclusions for the FRA is presented below:

- The proposed development is an extension of the poultry unit;
- The development site is approximately 0.626ha;
- There is a River on the eastern boundary is called Morfa River. This flows from East to West;
- Manning equations have been undertaken and indicate the proposed development is not effected by flooding up to and including the 1 in 100 year event plus climate change.
- The site lays at a low risk of surface water, groundwater and infrastructure flooding;
- It appears infiltration will not be feasible due to the ground conditions;
- The proposed development will drain to the amended existing swale and then discharge at greenfield rate (12.5l/s) to River Morfa;
- The site will be required to have attenuation up to and including the 1 in 100 year event plus climate change of 30% for the surface water. This will be kept in swale.

CHAPTER 14 – SOILS

14. Soils

This chapter assesses the impact of the proposals on soils on site. No significant impacts upon soils are envisaged.

14.1 Introduction

14.1.1 Introduction to the Issues

This chapter considers the baseline soil conditions and of the potential impact to soils that may result from the construction, operation and decommissioning of the proposed poultry extension.

14.2 Overview of Potential Impacts on Soils

In the absence of mitigation, the potential impacts to soils arising from the proposed poultry extension include, but are not limited to, the following:

- Construction: Compaction of soils, and removal of surplus soil and isolated occurrences of soil contamination;
- Operation – on-site: Contamination of soils from potential spillages and leaks on site including hydrocarbons and liquids originating from the poultry extension; and
- Decommissioning: Contamination could arise during the decommissioning process from chemicals/materials stored on-site during operation and the exposure of soil as the hard standing is removed.

Impacts on soils may lead to secondary effects on groundwater, surface water and ecological receptors and therefore reference should also be made to Chapters 10 – Ecology, and 13 - Water Resources.

Summary of Potential Impacts

Table 50 provides a summary of the impacts that could potentially occur as a result of the development of the site as a poultry extension. However, it does not necessarily follow that all these impacts would actuality occur.

Table 50: Potential Impacts Resulting from Extension

Key Activities	Specific Element/Activity	Potential Impacts Potential Effect	Potential Receptors	Sensitive
Construction	Use of heavy Machinery	Compaction of soil, increased runoff	Soils	
Operation	Use of poultry extension	Leaks of potential contaminants. Examples include, but not limited to: manure leachates; dust; process chemicals; oils etc.	Soils	
Decommissioning	Removal of poultry extension	Leaks of potential contaminants. Examples include, but not limited to: manure leachates; dust; process chemicals; oils etc.	Soil	
Decommissioning	Removal of hard standing/buildings	Exposure of soils which could lead to leaching of any contaminants and increased sediment load	Primarily soils	

14.3 Methodology

14.3.1 Methodology and Relevant Guidance/Standards

The assessment of potential impacts on soils arising from the proposed poultry extension has been undertaken by analysing any interactions between the construction, operational and decommissioning processes on soil conditions. This assessment is inevitably linked with the assessment of water resources (Chapter 13) and follows a similar methodology.

The assessment identifies the likely risks of soil contamination during the construction, operational and decommissioning phases of the poultry extension. This involves assessing the significance of any potential effects by determining the sensitivity of the receptor and the magnitude of the potential effect. A qualitative risk assessment has been undertaken to establish the significance of possible effects through consideration of the likelihood of an event and the severity of the hazard to the soil.

14.3.2 Assessment Criteria

The significance of any impacts of the proposed poultry extension on baseline conditions is assessed as part of the impact assessment. The sensitivity of the receptor and the magnitude of any potential impact combine to determine the significance of any impact.

Magnitude, sensitivity and significance criteria were developed for the conditions prevailing at the Morton Ley site and are detailed below. In this assessment, consideration of likelihood of the effect occurring is also incorporated into a final risk based assessment.

Magnitude

The criteria used to determine the magnitude of a potential impact are defined in Table 51 below. Assessment of magnitude includes consideration of the amount and intensity of impact and the duration of that impact (i.e. whether permanent or temporary).

Table 51: Impact Magnitude Criteria

Magnitude	Definition
Negligible	Unquantifiable or unqualifiable change in soil conditions
Minor	Detectable but minor change to soil conditions. Soil quality standards less than threshold and unlikely to affect most sensitive receptors (e.g. a minor spillage)
Moderate	Detectable change to soil conditions resulting in non-fundamental temporary or permanent consequential changes. Some deterioration in soil quality likely to temporarily affect most sensitive receptors (e.g. a minor spillage).
High	Fundamental change to soil conditions (including deterioration in soil quality) resulting in temporary or permanent consequential changes (e.g. major spillage resulting in dangerous levels of contamination).

Sensitivity

Sensitivity criteria can be based both on the degree of environmental response to any particular impact, as well as the 'value' of the receptor (e.g. greenfield soils with an agricultural land use are more sensitive than brownfield soils present on an industrial/commercial site). The sensitivity criteria developed for this assessment are presented in Table 52.

Table 52: Sensitivity Criteria

Sensitivity	Definition
Negligible	Environment is insensitive to impact, no discernible changes e.g. soils are not in use, the land has an industrial/ commercial land use and/or mainly covered by hard standing.
Low	Environment responds in a minimal way such that only minor changes are detectable e.g. landscaped areas
Medium	Environment clearly responds to effect(s) in quantifiable and/or qualifiable manner e.g. low grade agricultural land, recreational ground.
High	Environment responds to major change(s) e.g. agricultural land use for food production, allotments.

Significance

The combination of magnitude and sensitivity logically combine to provide a matrix categorisation of significance. Significance levels are presented in 53.

Table 53: Significance Matrix

		Sensitivity			
		Negligible	Low	Medium	High
Magnitude	Negligible	Insignificant	Insignificant	Insignificant	Insignificant
	Minor	Insignificant	Minor	Minor	Moderate
	Moderate	Insignificant	Minor	Moderate	High
	High	Insignificant	Moderate	High	Very High

14.3.3 Risk Assessment

Qualitative Risk Assessment Methodology

Risk assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential risks to receptors. The receptors may be human health, agricultural land, a water system, a sensitive local ecosystem or even future construction materials. Receptors can be connected with the hazard under consideration via one or several exposure pathways (e.g. the pathway of direct contact or indirect transport by wind/water etc). Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source (hazard), pathway and receptor, there can be no risk.

Thus, the mere presence of a hazard at a site does not mean that there will necessarily be attendant risks.

Sources

Potential sources of contamination are identified for the Morton Ley site, based on a review of the proposed uses. Not only the nature but also the likely extent of any contamination is considered, e.g. whether such contamination is likely to be localised or widespread.

Pathways

The mere presence of a contaminant does not infer a risk. The exposure pathway determines the dose delivered to the receptor and the effective dose determines the extent of the adverse effect on the receptor. The pathway which transports the contaminants to the receptor or target generally involves conveyance via soil, water or air or may be direct.

Receptors

The varying effects of a hazard on individual receptors depend largely on the sensitivity of the receptor. Receptors include any people, animal or plant population, or natural or economic resources within the range of the source which are connected to the source by the transport pathway, although in this instance the assessment is concerned primarily with soils.

Exposure Assessment (Likelihood of Occurrence)

By considering the source, pathway and receptor, an assessment is made for each contaminant on a receptor by receptor basis with reference to the significance and degree of the risk. In assessing this information, a measure is made of whether the source contamination can reach a receptor, determining whether it is of a major or minor significance (as set out above).

The assessment of risk presented here has been based upon the procedure outlined in the Department for the Environment Transport and the Regions (DETR) Circular 02/2000. In addition, the DETR (now Defra) with the EA and the Institute of Environment and Health, has published guidance on risk assessment (Guidelines for Environmental Risk Assessment and Management). This guidance states that the designation of risk is based upon a consideration of both:

- The likelihood of an event; (takes into account both the presence of a hazard and receptor and the integrity of the pathway); and
- The severity of the potential significance (takes into account both the potential severity of the hazard and the sensitivity of the receptor).

Table 54 shows how the risk rating is achieved by combining the likelihood of the event and the degree of significance.

Table 54: Risk Assessment Matrix

		Significance			
		High	Moderate	Minor	Insignificant
Probability (likelihood)	High Likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/Low risk	Low risk
	Low Likelihood	Moderate risk	Moderate/low risk	Low risk	Very Low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very Low risk

Under such a classification system the following categorisation of risk has been developed and the terminology adopted as shown in Table 55.

Table 55: Risk Criteria

Term	Description
Very High Risk	There is a high likelihood that severe harm could arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
High Risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
Moderate Risk	It is possible that, without appropriate remedial action, harm could arise to a designated receptor. It is relatively unlikely that any harm would be high, and if any harm were to occur it is more likely that such harm would be relatively minor.
Low Risk	It is possible that harm could arise to a designated receptor from an identified hazard but it is likely that, at worst, this harm, if realised, would normally be minor.
Very low risk	The presence of an identified hazard does not give rise to the potential to cause significant harm to a designated receptor.

The assessment of likely significant impacts of the proposed poultry extension is initially based on potential impact before mitigation and is addressed in sections to follow. Levels of assessed impact which are moderate or above require mitigation/management to reduce the level of impact to negligible or low levels. Proposed mitigation is discussed in Section 13.7 and the residual effects after mitigation are presented if required following this section.

14.4 The Baseline Environment and Sensitive Receptors

14.4.1 Geology and Soils

The site geology and the geology of soils is summarised in Table 56.

Table 56: Soil types across controlled land

Farm Name	Soil Characteristics	Geology
Morton Ley	Deep well drained fine loamy soils and similar soils with slowly permeable subsoils and slight seasonal water logging. Some coarse loamy soils affected by groundwater.	Drift from Palaeozic Sandstone and Shale.
Morton Ley	Deep stoneless fine silty and clayey soils variably affected by groundwater. Flat land. Risk of flooding.	River Alluvium.

14.5 Assessment of Impacts and Risk

14.5.1 Basis for Assessment and Incorporated Mitigation Measures

The impact assessment for the proposed poultry extension on soils has been undertaken assuming the following:

- The Morton Ley site will produce a maximum of 1,620 tonnes of poultry manure per annum.
- Chemicals will be stored on the site for cleaning processes;
- Soils will be excavated and re-graded to allow for a basement level;
- The site will be covered with approximately 80% hard standing and 20% landscaped areas.

The impact assessment for the poultry extension on soils also assumes the following incorporated mitigation measures:

- Operation in accordance with Pollution Prevention Guidelines (see Chapter13 – Water Resources) and licensed by the Environment Agency (EA) under the Environmental Permitting regime;
- All bulk storage tanks will be appropriately bunded and located on areas of hard standing;
- All tanks, bunds, drains and hard standing will be inspected frequently for damage, maintained and remedial works conducted if necessary.

14.5.2 Potential Sources, Pathways, Receptors and Impacts

A variety of sources, pathways and receptors have been identified as outlined below.
These are generally associated with the release of chemicals, fuels and oils and soil compaction.

Sources

- Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed poultry extension;
- Use of heavy machinery on site and during application of soil to land (compaction of soils)

Pathways

- Leaching of inorganic and organic chemicals;
- Building works affecting soil structure; and

Primary Receptors

- Soils.

Potential Impacts

The principal potential impacts on soil considered in this assessment comprise:

- The contamination of soils by inorganic and organic chemicals during construction, operation or decommissioning phases;
- Contamination of soils through build up of heavy metals; and
- Direct damage to the soils via compaction.

Soil Compaction from Construction

The compaction of soils during construction may also increase surface runoff. This risk is assessed in Chapter 13 – Water Resources. Direct damage to the soils on-site via compaction is not considered significant as the site will require significant areas of made up ground. The soils also do not support important habitats and as such the issues of compaction from construction have not been assessed further in this chapter.

The magnitude of impact without mitigation would be moderate.

14.6 Assessment of Impact Significance

The significance of potential impacts is assessed from a combination of the sensitivity of the receptor and the magnitude of the impact. This is summarised in Table 57.

The differences between construction, operation and decommissioning are not deemed relevant for this assessment. Differences in construction, operational and decommissioning phases will have an effect on the probability or likelihood of the impact being realised.

Table 57: Assessment of Significant Unmitigated Impacts

Source	Potential Impact	Receptor	Sensitivity of Receptor	Magnitude of Potential Impact	Resulting Significance (if realised)
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed poultry extension;	Contaminate Soils	Soils	Negligible	Moderate	Insignificant
Use of heavy machinery on site and during application of soil to land (compaction of soils); and	Compaction	Soils	Negligible	Moderate	Insignificant

14.6.1 Unmitigated Risk

The actual likelihood or probability of the above linkages being realised requires assessment so that the level of overall unmitigated risk can be qualified and the likely significant impacts identified. The overall risk assessment matrices are provided in Table 58. These have been developed based on the combination of the significance of the potential impact and the likelihood of that potential impact occurring.

The assessment of overall risk indicates that there is a low likelihood of many of the impacts has resulted in the risks being very low.

Table 58: Risk Assessment Table – unmitigated risks

Source	Potential Impact	Receptor	Resulting Significance (if realised)	Likelihood Construction	Operation	Decommissioning	Risk Construction	Operation	Decommissioning
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed poultry extension;	Contaminate Soils	Soils	Insignificant	Likely	Low	Likely	Low Risk	Very Low Risk	Low Risk
Use of heavy machinery on site and during application of manure to land and construction of extension	Compaction	Soils	Insignificant	Likely	Likely	Likely	Low Risk	Low Risk	Low Risk

14.7 Mitigation and Management

14.7.1 Regulatory Guidance and Best Practice

There are a variety of best practices and recognised measures to mitigate the identified potential impacts, providing appropriate provisions are made in the construction planning and methodology (see below). These include management at the construction stage and monitoring.

The significance of potential mitigated impacts is assessed from a combination of the sensitivity of the receptor and the magnitude of the impact. This is summarised in Table 59.

Table 59: Assessment of Significant mitigated Impacts

Source	Potential Impact	Receptor	Sensitivity of Receptor	Magnitude of Potential Impact	Resulting Significance (if realised)
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed poultry extension;	Contaminate Soils	Soils	Negligible	Negligible	Insignificant
Use of heavy machinery on site and during application of soil to land.	Compaction	Soils	Negligible	Negligible	Insignificant

14.7.2 Overall Risk with mitigation

The actual likelihood or probability of the above linkages being realised requires assessment so that the level of overall risk can be qualified and the likely significant impacts identified. The overall risk assessment matrices are provided in Table 60. These have been developed based on the combination of the significance of the potential impact and the likelihood of that potential impact occurring.

The assessment of overall risk indicates that there is a low likelihood of many of the impacts has resulted in the risks being very low.

Table 6o: Risk Assessment Table – mitigated risks

				Likelihood			Risk		
Source	Potential mpact	Receptor	Resulting Significance (if realised)	Construction	Operation	Decommissioning	Construction	Operation	Decommissioning
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed poultry extension;	Contaminate Soils	Soils	Insignificant	Unlikely	Unlikely	Unlikely	Very Low Risk	Very Low Risk	Very Low Risk
Use of heavy machinery on site and during application of manure to land and construction of extension	Compaction	Soils	Insignificant	n/a	Low	n/a	Very Low Risk	Very Low Risk	Very Low Risk

14.8 Residual Impacts and Conclusions

Following mitigation the overall risks of the poultry extension on soils have been assessed as very low and no further mitigation or management issues need to be addressed. Therefore the proposed extension is unlikely to give rise to any significant adverse impacts on the soils of the site.

CHAPTER 15 – SUMMARY & CONCLUSIONS

15. Summary and Conclusions

It is clear that, in most cases, even without mitigation, impacts are generally insignificant. This has been achieved by appropriate location and design of the proposed poultry extension. Even where significant impacts are identified many are effectively reduced to insignificant by the use of appropriate mitigation. Indeed, in some areas, negative impacts are altered to positive impacts via the application of mitigation and enhancement measures (particularly in relation to traffic and ecology). There are no impacts that remain significantly negative.

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