
Environmental Statement

Planning application for a
proposed intensive poultry
installation at; Land at
Mulsford Farm, Sarn,
Malpas, Wrexham

Prepared for D J Huxley Farms

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Environmental Statement

Planning Authority

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CHAPTER 1 - INTRODUCTION

Foreword

This Environmental Statement (ES) has been prepared for D J Huxley Farms by Roger Parry & Partners LLP. It accompanies a planning application for an intensive poultry installation comprising two sheds and associated plant at land at Mulsford Farm, Sarn, Malpas, Wrexham.

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

The proposal is a sustainable economic development as supported by national, regional and local planning policy. On a global scale the development amounts to an expansion of the UK poultry meat production capacity and a step closer to meeting the rising demand for poultry meat in the UK and becoming self-sufficient in poultry meat therefore reducing the need to import foreign produced poultry meat and thus reducing greenhouse gas emissions 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) (England and Wales) Regulations 2017. The ES is intended to enable the recipients (such as the Local Planning Authority) to understand the nature of the proposed development 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:

-  Location Plan
-  Layout Plan
-  Landscape Plan
-  Elevations

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, The Estates Office, 20 Salop Road, Oswestry, SY11 2NU

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 development 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 new poultry units at land at Mulsford Farm, D J Huxley Farms 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 development and sets out the purpose of the ES.

1.2 Summary of the Proposals

The proposal is to build two sheds to the East of Mulsford Lane. The new poultry sheds will have associated feed bins, control and store rooms, ancillary plant and service yard area.

A scheme of landscaping and biodiversity enhancement is incorporated into the design to support the existing landscaping measures on site to reduce the impact of the development on the landscape and visual receptors, and to provide benefits to local ecological networks and habitats.

1.3 Site Location

The Ordnance Survey Grid reference of the site is: SJ434450. The site is located approximately 680 metres to the East of Mulsford Farm as indicated on the location plan ref: RJC-MZ63-Huxley-01 at Appendix 2. The site is part of an undulating lowland landscape currently in arable production.

The area is dominated by rural settlements including: Threapwood, Tallarn Green and Worthenbury.

There are no public rights of way directly affected by the proposed development. However, there are footpaths in the surrounding landscape with potential views of the site.

1.4 Requirement for an EIA: Legislative Background

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

1.5 Objectives and Purpose of EIA

The objectives of EIA are as follows:

-  To identify the potential environmental impacts of a proposed development, taking into account the characteristics of the development and the local environment, and the views of local authorities and statutory consultees with responsibilities for the environment;
-  To interpret the nature of potential impacts;
-  To identify measures to mitigate adverse impacts; and

-  To report the results of the assessment in an ES for submission to the planning authority.

The purpose of an ES is to present the findings of the assessment into the likely significant environmental impacts of the proposed development. This document describes the assessment process, the results of the assessment of the impacts of the proposed development, assesses the significance of the impacts and describes mitigation measures proposed to reduce impacts to acceptable levels.

The ES is intended to enable stakeholders to understand the nature of the proposed development and to evaluate the likely significant environmental impacts. In the case of the local planning authority it will be used in the decision making process as the relevant planning policy supports large scale agricultural development only where there are no unacceptable environmental impacts. The ES therefore serves to aid the decision-making process and to present relevant information in a readily accessible form.

1.6 Method Statement and Assessment Criteria

The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 2017, require (as set out in Part II of Schedule 4) that an ES should include, as a minimum, the following information:

-  "A description of the development comprising information on the site, design and size of the extension;
-  A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects;
-  The data required to identify and assess the main effects which the development is likely to have on the environment;
-  An outline of the main alternatives studied by the applicant or appellant and an indication of the main reasons for its choice, taking into account the environmental effects;
-  A non-technical summary of the information provided under paragraphs 1 to 4".

Part I of Schedule 4 expands in detail on the contents of an ES that would comply fully with the spirit of the Regulations. This is provided in Appendix 3.

Good practice advises that EIA should be treated as an iterative process rather than as a one-off, post-design environmental appraisal, and that interested parties be consulted at an early stage to identify key impacts and design appropriate mitigation. In this way, the findings from the EIA have been fed into the design process, leading to a project which achieves a 'best fit' within the environment. This approach has been used throughout the EIA of the proposed poultry development in particular the design was not fixed until specialist assessors had reported their recommendations following carrying out baseline assessments of the surrounding environment. Where likely significant adverse impacts have been predicted, or sensitive environments were identified, the results of the EIA have been used to influence the construction, location and design of the poultry development. In this way it has been possible to reduce or eliminate likely significant impacts through sensitive design and construction methods alone.

The EIA has been carried out taking due consideration of guidance such as that contained within the Institute of Environmental Management and Assessment's (IEMA) 'Guidelines for Environmental Impact Assessment' (2004), where appropriate, along with various guidance documents relation 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.).

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.

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.

Development 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);
-  Water Resources (Chapter 12);
-  Soils (Chapter 13);
-  Heritage (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 technical appendices and additional planning drawings should be read in conjunction with the ES as referenced.

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
Development Description	Roger Parry & Partners / D J Huxley Farms
Planning Policy Context	Roger Parry & Partners
Air Quality	Roger Parry & Partners
Landscape	Allan Moss Associates Ltd
Traffic	SK Consulting
Amenity	Roger Parry & Partners
Ecology	Churton Ecology
Noise & Vibration	Roger Parry & Partners
Water Resources	Roger Parry & Partners
Soils	Roger Parry & Partners
Heritage	Trysor
Summary & Conclusions	Roger Parry & Partners

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 installation could potentially create cumulative impact.

2.1 The Scoping Process

Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) 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 extension, resulting from:

- a) the existence of the extension;*
- 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.

The scope of the EIA has been informed by:

- (a) A Scoping Request submitted in relation to the proposed development at land at Mulsford Farm in February 2017 (see Appendix 4); and

The original scoping request and subsequent Statutory Consultee responses to the above application established the baseline environment and potential environmental impacts. 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 site is part of an undulating lowland landscape of medium to large scale sub-regular shaped fields in mixed agricultural uses. The fields are generally bounded by hedgerows with occasional hedgerow trees.

The site is located to the west of Threapwood, with Tallarn Green to the south east and Worthenbury to the north west.

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 A525, A539 and B5069.

2.2.3 Highways

The site is accessed off a new vehicular access onto Queensford which joins an existing access track leading to the proposed buildings.

2.2.4 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 Wrexham Borough Council and the Parish of Malpas. According to the 2001 Census the parish has 1,673 people.

2.2.5 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.

2.2.6 Geology, Soils, Ground Stability and Contamination

The geology of the area surrounding the site consists of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils. The soils are drained to the stream network with moderate fertility.

2.2.7 Water Resources

The application area is located within Flood Zone C2 and comprises 3.52ha. Flood zone C2 land is assessed as being an area of floodplain without significant flood defence infrastructure. However, the development is greater than 1ha in area, hence a Flood Risk Assessment (FRA) is required.

2.2.8 Ecology

The main site consists of arable land (currently Oil Seed Rape).

No standing water is evident within 500 metres of the site and therefore no survey for Great Crested Newts or other amphibians was necessary. Other than the land, other noted habitats were the surrounding hedgerows and off site tree plantations.

2.2.9 Cultural Heritage

For the purpose of this assessment, a search area of approximately 1km radius of the proposed poultry installation centre-point has been considered to gather heritage data and assess visual impact. Interrogation of the Clwyd Powys Archaeological Trust Historic Environment Record and data from RCAHMW and Cadw were consulted in respect of the application site and produced 4 listed buildings within the 1km radius of the application site and that the site is within the Maelor Saesneg Registered Historic Landscape.

The assessment concludes that there would be no significant, indirect, visual impacts arising from the proposed development and no nationally significant historic assets would be impacted upon by the development.

2.3 Summary of the Scoping Exercise

2.3.1 The aspects of the Proposed Development 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 development respectively.

Table 2: Summary of key potential impacts

Potential receptors of impact			Activities & potential Impacts	
			Construction Phase	Operation phase Decommissioning Phase
WATER	Surface hydrology and channel morphology	water	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 quality	water	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 - Leechate from manure heaps entering watercourses - Runoff after manure spread on land affecting watercourses
	Groundwater hydrology		Earthworks and site drainage - Reduction in water table	Use of borehole for water supply - Lowering water table Termination of abstraction - Rebound of water table

Potential receptors of impact		Activities & potential Impacts	
		Construction Phase	Operation phase
		- Changes to groundwater distribution and flow	Decommissioning Phase
	Groundwater quality	Materials management - Pollution from spills or leaks of fuel, oil and building materials	Land-spreading of waste - Contamination from infiltration arising from over-application Materials management - 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/spreading manure - Release of gases to the atmosphere - Ammonia emissions Animal housing - Ammonia emissions Use of vehicles and machinery - Exhaust emissions

Potential receptors of impact		Activities & potential Impacts		
		Construction Phase	Operation phase	Decommissioning Phase
FLORA AND FAUNA	Regional / global air quality	Change in vegetation - Changes in uptake of CO₂	Storage / spreading of manure - Release of gases to the atmosphere - Ammonia emissions Animal housing - ammonia emissions Animal housing - increase in domestic production leading to reduction in greenhouse gas emissions through transportation of overseas produce	
	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 / spreading of manure - deposition of ammonia onto vegetation Animal housing - deposition of ammonia onto vegetation Physical presence of building and ancillary structures	Post-closure land-use - changes in habitat type - opportunity for increase in uncultivated areas

Potential receptors of impact	Construction Phase	Activities & potential Impacts	
		Operation phase	Decommissioning Phase
HUMAN ENVIRONMENT	Socio-economic	- alteration or loss of terrestrial habitats - creation of new habitats Manure spreading - disturbance to, or loss of species	
		Farming operation - continued flux of people away from or towards the farm	Closure of 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) - risk of harm from land-spreading manure
	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 / spreading of manure / feed - increase in flies and vermin	

2.4 Consultations

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** – The ES assesses the effects on the local road network of the development and includes details of existing and proposed movements, their timing and routing.
-  **Ecology and Conservation** – The ES should 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 and risks associated the application of manure to agricultural land.
-  **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 16 planning applications within a 2km radius of the selected site from January 2012 to June 2017 as shown in Table 3 below;

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

TYPE	NUMBER
Industrial	0
Transport	0
Education and Health	0
Agriculture	2
Retail	0
Civil Engineering	0
Recreation	3
Office	0
Utilities	0
Residential	11

Of the total 16 applications within the last five years, two are agricultural:

1. Mulsford Farm
2. Boundary House

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 for the development of the intensive poultry unit installation. It also describes how the final location at land at Mulsford Farm for the proposal was ultimately reached.

3.1 Assessment of Alternatives

Where alternative approaches to the 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.

An appraisal of suitable sites was undertaken in consultation with having regard to the environmental impacts of the sites and having regard to highways and views of the development. The subject site was considered the only suitable location. This was due to the proximity of sensitive receptors close to other sites and as such no alternatives have been considered for the development.

CHAPTER 4 – DEVELOPMENT DESCRIPTION

4. Development Description

This Chapter provides a description of the proposed installation of an intensive poultry unit at land at Mulsford 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 development. This description sets the basis against which the Environmental Impact Assessment has been carried out.

4.1 Site Location

4.1.1 Description of Site

The site is an arable field on land at Mulsford Farm, Sarn, Malpas. Appendix 2 shows the site location in relation to the area.

The site is located at Grid Reference SJ434450. The site is surrounded by agricultural land, outlying land uses include residential to the east at Threapwood. Isolated farm units scatter the landscape. The surrounding village network is illustrated on Appendix 5 and on the Aerial Photograph and Appendix 6.

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

Access to the site for all traffic will be via the existing access track that runs to the proposed buildings and is in the ownership of the applicants.

There are no residential properties within 400 metres of the proposed development at land at Mulsford Farm. A distance of 400 metres is established in planning as the distance beyond which effects of livestock extensions 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 proposed description of the development is as follows:

Erection of two poultry rearing buildings, six feed bins including landscaping and tree planting.

The proposed site is 1.5ha which is currently in arable use.

The site is to be laid out as per the Site Layout Plan (drawing ref: RJC-MZ63-Huxley-02) and will include the following elements:

-  Two poultry sheds with attached control rooms
-  Six feed bins
-  Hardstanding for turning, loading and unloading
-  Landscaping

The proposed development will provide 100,000 bird places.

The following sections include a description of the main buildings and ancillary works, operational arrangements and environmental controls and a description of the production cycle.

4.3 Site Layout

4.3.1 Two poultry buildings and control rooms

The poultry shed design is illustrated on the proposed elevations, drawing no RJC-MZ63-Huxley-04. The layout is illustrated on drawing no RJC-MZ63-Huxley-2. The application is for full planning permission for the erection of 2 new poultry houses as illustrated on the proposed layout plans.

The new buildings located to the east of Mulsford Lane would each measure 108.20m x 24.38m x 2.48m (to eaves) and 5.17m (to ridge). Each unit would have a fan canopy and baffle area at the rear of the shed. The control rooms for each unit will be located between the two buildings at the front of the development.

The buildings will be fitted with roof extraction and rear gable end extraction fans. The roof extraction will be via outlets along the roof that are staggered either side of the ridge line with the finished height of the outlets being 5.75 metres high. Each shed will be fitted with 6 roof outlets.

The finished floor level of the new buildings would be 24.90m AOD.

All the new buildings and feed bins would be finished in a dark receding colour to be agreed with the planning authority.

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

Roofs

Box profile metal sheeting at 10 degree pitch. Eaves height: 2.48 metres, ridge height 5.17metres.

Walls

Box profile metal sheeting.

Insulation

The unit 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 $<0.4 \text{ W/m}^2 \text{ }^\circ\text{C}$ 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 unit is 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.

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.

Surplus material arising from the excavations would be used to create gentle ground modelling to help to shield the development.

4.3.2 Feed bins

The feed bins are shown on drawing no RJC-MZ63-Huxley-04.

Six feed bins are to be positioned on concrete plinths. The bins are a cylindrical design with a conical top and bottom. The height of the feed bins will be 6.6m high and the diameter is 2.8m. The heights of the base of the feed bins AOD is as per the adjoining poultry buildings.

4.3.3 Hardstanding and turning

The hardstanding and turning area is shown on drawing no RJC-MZ63-Huxley-02.

4.3.4 Drainage

We refer you to the Drainage Report at Appendix 7.

4.3.5 Access

The site is accessed off a new vehicular access onto Queensford which joins an existing farm access track leading to the proposed buildings.

4.3.6 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 along the A525.

4.3.7 Landscape Planting and Management

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 extension 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.

Landscape mitigation and enhancement is included as an integral part of the planning application proposals. The landscape proposals and management proposals are shown on the Landscape Plan prepared by Allan Moss Associates submitted with the planning application (drawing no 1488.04, Appendix 8).

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.

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.

Rough grassland will be managed to the north west and south east of the site, with new native woodland planting to the north east and west. The existing hedgerows surrounding the site will be managed at a height of 3m+ to provide screening to the development and a new native hedgerow is to be planted to the north west of the development which will also be managed at a height of 3m+. New native hedgerow trees are to be planted in existing hedgerows.

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.

4.3.8 Lighting

New external lighting will be kept to a minimum. Above each of the main shed doors there will be a single 100w metal halide lamp. These will be downward facing and protected with a cowl to reduce light spillage. Lighting of the site will only be required during bird catching at night. There will be no round the clock external lighting of the site and no use of high intensity security lighting.

4.4 Management Cycle

The following paragraphs set out the crop production process.

Prior to the crop cycle, fuel is delivered to the site and the sheds are pre-warmed to 31°C in preparation for the chick placement. Bedding litter (wood shavings) is then delivered to the site and spread evenly on the floor using a 'litter spreader'. Also sufficient feed (starter pellets) is delivered and stored in the feed bins. Once the site is prepared the chicks are delivered from a hatchery and placed in the sheds.

At the start of the crop cycle they are fed with starter pellets which are manually delivered to the birds from the starter pellet bins. The feed gradually changes to 'grower' mix and later to 'finisher' mix to reflect the needs of the birds as they grow. Protein and phosphorous levels are reduced over the growing period. Feed is stored in the feed bins between the sheds and automatically dispensed to feeders evenly located throughout the shed.

Water is provided via nipple drinkers which are designed to minimise spillage. Water use in each house is monitored daily by meters.

During the crop cycle the heating is gradually reduced and the ventilation rate increased.

Any fallen birds are removed each day and are stored in sealed containers on site prior to being removed under the National Fallen Stock Scheme.

When the birds reach around five weeks old a 'thinning' takes place. This means that a proportion of the birds are caught and transported to the processing companies. The thinning takes place over two days. Thinning takes place during the day time (i.e. between 0700 and 2300 hours) and night time (i.e. between 2300 hours and 0700 hours of the following day), it does not start before 0200 hours and the number of movements in any hour during the night does not exceed two.

When the birds are around six weeks old the remainder are caught and removed from the site. The bird removal takes place over two days. Bird removal takes place during the day time (i.e. between 0700 and 2300 hours) and night time (i.e. between 2300 hours and 0700 hours of the following day), it does not start before 0200 hours and the number of movements in any hour during the night does not exceed two.

At the end of the growing period the used litter is taken away from the site in covered vehicles and stored in fields off-site prior to spreading on agricultural land farmed by the applicant. Wash down and disinfection then takes place ready for the next crop. The wash water is collected in underground tanks before being spread to agricultural land.

4.5 Waste Management

4.5.1 Mortalities

Mortalities are stored in vermin proof stores prior to being removed under the National Fallen Stock Scheme.

4.5.2 Litter

Wood shavings are used as bedding material and are spread throughout the shed to a depth of 20mm; this allows the floor to breathe and release moisture thus enhancing environmental conditions inside the poultry house. This proposed depth of litter complies with the Red Tractor Assured Poultry Standards.

The spent litter based on wood shavings is cleared out and loaded onto trailers. The litter removal is carried out by staff at the poultry installation. To ensure poultry disease guidelines are adhered to and for bio security, the litter is taken off site immediately. It goes directly to be stored in in-field stores before being applied to the land as organic manure. No manure will be stored on site, even for a short period. The applicant farms sufficient land for spreading the manure and sufficient land for storing the manure within fields and away from ground and surface water sources.

4.5.3 Dirty Water

After the litter is cleared, the building and roofs inside and the walls are blown down with compressed air. Washing water then passes via a pipe directly to collection tanks. When the cleaning out is in progress the dirty washing water and any contaminated rain water falling on the yard is directed via drains to manholes and in to the tanks. The dirty water tank will be compliant with the SSAFO Regulations (2010) Wales Standards.

The floors are polished concrete and following a brushing down and a clean with compressed air, there is very little solid matter to be carried away with the washing water. 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 when washing down is taking place. The outside area is then cleaned up when the litter has been taken away.

A single pump with 2 pressure washing lances is used for cleaning down of the sheds. The outside concrete service area is temporarily piped into the dirty water collection tank while the litter is being removed.

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.

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.

4.5.4 Odour & Dust Suppression

Decomposing waste products such as manure, dust and bedding causes odours in poultry units. Ventilation rate and temperature significantly influence the concentration of odorous compounds; inadequate air movement in the houses, leading to high humidity and wet litter causes poor dispersal of odours. The ventilation system is designed to efficiently move moisture from the house and to remove heat. The drinking system is also designed to eliminate spillage. The shed is also insulated to eliminate condensation. Other management controls include dietary manipulation; crude protein levels will be kept at a practical minimum keeping crude protein low. The feed will contain enzymes that enhance the digestion of the cereal components of the feed as a result of the improved digestion, the amount of water drunk by the birds is reduced, and this in turn leads to a lower moisture content of the litter. Consequently the risks of odour are reduced by this drier litter. The baffle area beyond the ventilation fans will enhance dispersion of odorants by directing odorous air upwards into the wind that is building wake effected leading to enhanced mixing conditions. This dilutes the odorous air reducing odour nuisance at sensitive receptors. Studies undertaken in 2000 showed that baffle areas can reduce odour concentration at sensitive receptors by between 30 and 90 percent (Bottcher, 2000).

The Odour Management Plan attached at Appendix 9. is to be adopted and implemented prior to the operational phase of the development.

4.5.5 Noise Suppression

In order to ensure that noise disturbance is minimised the Noise Management Plan attached at Appendix 10 is to be adopted and implemented prior to the construction phase of the development.

4.6 Equipment and Management

4.6.1 Feed

The feed will be supplied by Lloyds Animal Feeds. It will be composed of high-quality raw materials and will be designed to suit the nutritional needs of chickens. 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 by the flock is therefore calculated as 353.

4.6.2 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 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.

4.6.3 Electrical Power

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

4.6.4 Labour and Hours of Operation

There will be additional labour required for poultry catchers, shed cleaners and manure removal contractors amounting to the equivalent of approximately a further 2 additional full time workers. Other employment would include feed delivery drivers, poultry collection drivers, poultry processors, construction workers, cleaning teams, manure removal teams, maintenance plumbers, maintenance electricians, ground workers, landscape contractors etc.

The development will require continual on site husbandry provided by new employees and managers of the poultry farm. Hours of operation are therefore continual while the birds are in the sheds; during the night time staff are required to respond to alerts relating to any equipment repair; a system of alarm via operators' mobile phones is in place. Twenty-four-hour support is also provided by equipment suppliers for the climate control system (heating and ventilation).

4.7 Environmental Controls

4.7.1 Introduction

Environmental Permit Determination

The proposed operation has applied for a licence to operate under the Environmental Permitting (England and Wales) Regulations 2010 as regulated by the Environment Agency. 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 development. 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 unit at land at Mulsford 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 development:

-  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 carcasses

The following sections provide more detail on incorporated environmental controls designed to avoid adverse effects on the living conditions of the local population.

4.8 Construction Phase

It is anticipated that the construction period would last for approximately 6 months. During that period construction vehicles and machinery would be active on the site including excavators, dump trucks and haulage lorries.

The sequence of works would start with the stripping of soils. Top-soils would be placed in temporary storage bunds for reuse on site. Groundworks would include cut & fill operations as necessary to

achieve the required finished levels, including the proposed ground modelling. All required services would need to be connected, including water supply, electricity supply and drainage.

Concrete for floors and foundations would be imported on to site and structure steelwork would be erected. Roofing and wall cladding would be fitted to the framework. Tradesmen required for the construction and fitting out the buildings would be working throughout the construction phase, with the numbers on site varying according to workload.

Landscaping would be completed during the first planting season following occupation of the proposed buildings.

4.9 Decommissioning

4.9.1 Introduction

The proposed poultry installation 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.

4.9.2 Decommissioning Considerations for the Design

The design of the development will be in accordance with all relevant legislation and standards, and industry good practice. The proposed poultry installation 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.

4.9.3 Decommissioning Considerations during Operation

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

4.9.4 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 installation.

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 units at National, Regional and Local levels. It concludes that the proposal for the poultry unit at land at Mulsford 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 development at land at Mulsford 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 aims and objectives of these policies and plans broadly centre on the principles and practice of 'sustainable development'. The extent to which policies at the regional and local levels are being achieved is important to the delivery of the Government's sustainable development objectives (Planning Support Statement 1 (PPS1)).

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

5.2 European

5.2.1 Introduction

Management of poultry sites for meat production in the UK is largely governed, directly or indirectly, by European law. In this context, much legislation and policy is derived from European Directives; the Directives of particular relevance to the proposed extension are:

-  The Environmental Permitting (England and Wales) Regulations 2011.

The following directive is due to come into force in 2010 and governs the management of chicken production. There is no specific domestic legislation governing the management of poultry production units only general animal welfare law:

5.3 Environmental Permitting (England & Wales) Regulations 2011

The development will enable land at Mulsford Farm to accommodate approximately 100,000 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 to gain a licence to operate under the Environmental Permitting (England and Wales) Regulations 2010 as regulated by the Environment Agency.

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).

5.4 National Planning Policy

5.4.1 Planning Policy Wales (Edition 9, November 2016) – Chapter 7 Economic Development

7.1.1 For planning purposes the Welsh Government defines economic development as development of land and buildings for activities that generate wealth, jobs and incomes. Economic land uses include the traditional employment land uses (offices, research and development, industry and warehousing), as well as uses such as retail, tourism, and public services. The construction and energy sectors are also important to the economy and are sensitive to planning policies.

7.1.2 It is essential that the planning system considers, and makes provision for, the needs of the entire economy and not just those uses defined under parts B1-B8 of the Town and Country Planning Use Classes Order. Particular policies on other economic sectors are also found elsewhere in Planning Policy Wales: in relation to Retail and Town Centres (Chapter 10); Tourism, Sport and Recreation (Chapter 11) and Infrastructure and Services (Chapter 12).

7.1.3 The planning system should support economic and employment growth alongside social and environmental considerations within the context of sustainable development. To this end, the planning system, including planning policies, should aim to ensure that the growth of output and employment in Wales as a whole is not constrained by a shortage of land for economic uses. Local planning authorities should aim to facilitate the provision of sufficient land required by the market, except where there are good reasons to the contrary. In addition, wherever possible local planning authorities should seek to guide and control economic development to facilitate regeneration and promote social and environmental sustainability. In so doing, they should aim to:

- co-ordinate development with infrastructure provision;
- support national, regional, and local economic policies and strategies;
- align jobs and services with housing, wherever possible, so as to reduce the need for travel, especially by car;
- promote the re-use of previously developed, vacant and underused land; and
- deliver physical regeneration and employment opportunities to disadvantaged communities.

7.3.3 Local planning authorities should adopt a positive approach to development associated with farm diversification in rural areas, irrespective of whether farms are served by public transport. While initial consideration should be given to adapting existing farm buildings⁹, the provision of a sensitively designed new building on a working farm within existing farm complexes may be appropriate where a conversion opportunity does not exist.

7.5.1 Development plans should:

- include policies encouraging farm diversification and new rural development opportunities;

5.4.2 Technical Advice Note (TAN) 6

Paragraph 25 under Development Related to Farm Diversification states the following:

'Small on-farm operations such as food and timber processing and food packing, together with services (e.g. workshop facilities, equipment hire and maintenance) to other farms, sports and recreation services, and the production of non-food crops and renewable energy, should be encouraged. Local planning authorities should, however consider the nature and scale of activity that would be appropriate.'

5.5 Local Planning Policy

5.5.1 Wrexham Unitary Development Plan 1996-2011

Policy GP1 General Development Principles

Criteria of the above policy:

- a) Ensure that built development in its scale, design and layout, and in its use of materials and landscaping, accords with the character of the site and makes a positive contribution to the appearance of the nearby locality.
- b) Take account of personal and community safety and security in the design and layout of development and public / private spaces.
- c) Make the best use of design techniques, siting and orientation in order to conserve energy and water resources.
- d) Ensure safe and convenient pedestrian and vehicular access to and from development sites, both on site and in the nearby locality.
- e) Ensure that built development is located where it has convenient access to public transport facilities, and is well related to pedestrian and cycle routes wherever possible.
- f) Ensure the safety and amenity of the public and safeguard the environment from the adverse effects of pollution of water, land or air, hazards from industry and quarrying, and associated noise, odour or vibration arising from development.
- g) Secure public services (e.g. gas, water, electricity) to development at minimum public cost.
- h) Safeguard sites and areas of nature conservation and wildlife interest, and to provide new habitats where there is an unavoidable loss of existing habitats and areas of wildlife interest.
- i) Ensure that development does not result in, or is subject to, flooding, soil erosion, landslides or contamination, either on or off the site.
- j) Have regard to the need to safeguard those areas that possess a strong Welsh cultural and/or linguistic identity from development that could harm this identity.
- k) Secure the development of sustainable communities, through the promotion of the economic, social and environmental well-being of the area.

Policy EC3 Agricultural Buildings

The construction of new agricultural buildings will be permitted unless the development is materially detrimental in terms of its impact on the environment or surrounding landscape. The development should form part of an existing farm complex and take advantage of topography and other landscape features for screening. Isolated buildings will only be permitted in exceptional circumstances where there is an essential agricultural need, and no reasonable alternative location for the development.

Therefore the proposed poultry development would not cause any unacceptable adverse effects on Wrexham's landscape as it has been carefully sited and designed to minimise the impact on the landscape through being grouped with existing agricultural buildings and being designed to be the same colour as the existing range of farm buildings.

Policy EC4, Hedgerows, Trees and Woodland

Development proposals should provide for the conservation and management of hedgerows, trees, orchards, woodland, wildlife and other natural landscape and water features, and include new planting in order to enhance the character of the landscape and townscape. Development which results in the loss or significant damage to valuable trees, important hedgerows or ancient woodland sites will not be permitted.

The proposed poultry unit at Mulsford Farm is positioned alongside existing agricultural buildings which provide a screen to the development, and as such the development would be seen in the same context as the farmstead. It is not proposed that any hedgerows or trees will be removed for the development. Habitats on site are generally of low value given the intensive use of the site for agriculture, and therefore the value of the site is found to be limited.

Landscape Character Area Supplementary Planning Guidance (SPG)

The site falls within the Landscape Character Area 13b – English Maelor, an area of undulating lowland farmland and small villages which retains evidence of historic landscapes and of alternating English and Welsh influence.

5.6 **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 unit development 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 development were assessed using screening tools where appropriate. In view of the emission integral to the design and operation of the poultry unit, 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

This chapter provides an assessment of the potential air quality issues associated with the proposed poultry installation at land at Mulsford Farm.

The following assessments are presented in this chapter:

-  Screening of potential effects of emissions on nearby SSSI habitat sites and national and local habitat sites.

The following areas are screened out of the EIA:

-  Assessment of the effect of additional road traffic on amenity as increases of traffic are insignificant.
-  Assessment of particulate matter (PM) as the Defra Technical Guidance LAQM.TG(09) on local air quality management requires detailed assessment of PM emissions from poultry units that house more than 400,000 birds if mechanically ventilated where there is relevant domestic exposure within 100m of the buildings. This proposal does not meet the threshold and hence air quality impact for PM would not require further assessment.

The following describes the site location and the potential air quality effects. The methods used to assess and manage these potential effects are described in the sections below, these set out the study results, with an assessment of impacts provided. The study conclusions are given at Section 6.6.

6.1.1 Site Location

The application site at land at Mulsford Farm is approximately 600 metres to the north west of the village of Tallarn Green in an agricultural area.

There are 12 Sites of Special Scientific Interest within 10km of the site and 2 Sites of Special Area of Conservation.

6.1.2 Potential Air Quality Effects of the Proposed Process

The proposed development comprises the following elements relevant to the air quality and health assessment:

-  Ventilation fans from bird areas of approximately 100,000 birds on site.

The proposed process has the potential to affect air quality and hence human health or the natural environment in the following ways:

-  Dust generated during the construction process could potentially cause a nuisance to local residents, unless properly controlled. This is addressed in Chapter 9 (Amenity).

-  Emissions of airborne pollutants from the extraction fans from the bird areas could potentially have an effect on designated ecological sites and human health. The substance of concern is ammonia.
-  The proposed poultry development, while resulting in emissions of Carbon Dioxide which derives from fossil fuel sources of carbon, would amount to an overall reduction as the chicken produced on site would be offset against imported chicken i.e. the environmental cost of producing chicken meat abroad for domestic consumption is higher than producing chicken meat in the UK for UK consumption.

These potential effects were assessed using the techniques and approaches set out in Section 6.2

6.1.3 Incorporated Mitigation

In view of the potential for adverse environmental effects a raft of environmental controls on emissions to air will be implemented under the requirements for Best Available Technique (BAT) as detailed in the reference document on *Best Available Techniques for Intensive Rearing of Poultry and Pigs* published in July 2003. The controls will be an integral part of the design and management of the poultry installation.

These controls are set out in Chapter 4 – Development Description, and include the following:

-  Providing adequate ventilation
-  Controlling shed temperature and humidity
-  Dietary manipulation
-  Providing a Baffle area adjacent to the ventilation fans
-  Good Practice management of manure disposal and storage

6.2 Legislation and Planning Policy

6.2.1 Legislation

Environmental Permitting Regulations 2010

The proposed operation has successfully applied to gain a licence to operate under the Environmental Permitting (England and Wales) Regulations 2010 as regulated by the Environment Agency. In being issued with the operating permit, the site will 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.

Habitats Directive

The Conservation of Habitats and Species Regulations 2010 transposes the Habitats Directive (92/43/EEC) into national law. The Regulations provide for the designation and protection of "European sites," and the protection of "European protected species." As part of the determination of the Environmental Permit, the Environment Agency is required to carry out an appropriate assessment to establish whether the proposed development would adversely affect the integrity of any such European sites.

The Appropriate Assessment must be undertaken by the competent authority, as defined in Regulation 7(1) of the Habitat Regulations, which includes any Minister, Government Department, public or statutory undertaker, public body of any description or person holding a public office (Natural England Guidance HRGN 1).

In situations where a plan or project requires the consent, permission or other authorisation of more than one competent authority then the Local Planning Authority are not required to assess any implications of a plan or project which would be more appropriately assessed by another competent authority as per Section 52 of the Habitat Regulations. In this instance, as emissions will be assessed during the processing of the environmental permit the Environment Agency are the relevant competent authority for the purpose of the regulations. This is especially relevant as the Environmental Permit and Planning applications are being “twin-tracked.”

Other Conservation Considerations

Part II of The Wildlife and Countryside Act 1981, as amended, provides protection to Sites of Special Scientific Interest (SSSIs) in England and Wales. This includes provisions which apply to owners and occupiers who wish to undertake notified operations likely to damage the special interest of the site, but more important in this context are the requirements that apply to public bodies such as local authorities and the Environment Agency. Section 28G places a duty on such bodies to take reasonable steps, consistent with the proper exercise of the authorities’ functions, to further the conservation and enhancement of special interest features of SSSIs. The Act also requires that they consult statutory nature conservation bodies before permitting (Section 28I) any operation likely to damage a SSSI.

The environmental permitting regulator has a duty to have regard to the purpose of conserving biodiversity in the exercise of its functions. This duty is provided by Section 40 of the Natural Environment and Rural Communities Act (1 October 2006) which extends the pre-existing duty on Ministers of the Crown, government departments and the National Assembly for Wales to all public authorities (this replaces Section 74(1) of the Countryside and Rights of Way Act 2000).

6.2.2 National Planning Policy

Planning Policy Statement 23 (Planning and Pollution Control) sets out the Government’s core policies and principles in relation to planning and pollution control. It affirms that the planning and pollution control systems are separate but complementary. Accordingly, the planning system should focus on whether the development itself is an acceptable use of the land and the impacts of those uses, rather than seeking to control the processes or emissions themselves. It advises that considerations of the quality of land, air or water and potential impacts arising from the development, possibly leading to an impact on health, are capable of being a material consideration. The policies in this statement and the advice in the accompanying Annex 1: Pollution Control, Air and Water Quality should be taken into account when making decisions on individual planning applications.

6.2.3 Local Planning Policy

There are no specific local policies that refer to Air Quality,

6.3 Air Quality Assessment Methodology and Baseline Conditions

6.3.1 Ammonia Emissions – Screening Tool

An assessment of the effect of ammonia emissions from the poultry unit on sites of ecological value was carried out using the Environment Agency’s significance test detailed in Annex (b) of the Environmental Risk Assessment v2.0 April 2010. Information regarding the size, location and bird numbers of the sheds was inputted into the screening tool along with information regarding the relative locations of sensitive receptors to the site. The methodology used in this assessment has been used by the Environment Agency when they consider and approve the Environmental Permit application and is therefore most appropriate, as the results returned by both this assessment and the Environment Agency’s screening officers will be the same.

The Environment Agency has confirmed that there is no prescribed methodology for assessing ammonia emissions from manure heaps stored within fields. No assessment has been carried out into the potential increase in ammonia emissions as a result of increased manure storage within fields; the Environment Agency have produced no guidance relating to this as they so far have considered that

the contribution of ammonia due to manure heaps is sufficiently insignificant to warrant detailed assessment.

6.3.2 Baseline Air Quality

In order to carry out the assessments it was necessary to compile background information regarding the background air quality and the existing situation.

Local factors potentially affecting air quality are:

-  the applicant's application and storage of manure.
-  other agricultural businesses in the area storing and applying poultry manure to the surrounding arable land.

6.3.3 Sensitive Receptors

The sensitive receptors around the site were identified. The following habitats are located in the vicinity of the proposed poultry extension.

Locations Where People May be Present

A total of six locations where people may be present were identified within a 500 metre radius of the site. The locations studied are listed in Table 8 and shown in Appendix 11. A 400 metre zone around intensive livestock developments is the generally accepted threshold for nuisance complaints relating to airborne emissions, the Health Protection Agency position statement relating to Intensive Farming states that intensive livestock farming extensions subject to regulation under Pollution Prevention Control Regulation (now amended by the Environmental Permitting Regulations) may need to produce an odour management plan if there are local communities within 400 metres of the site boundary. This suggests that any beyond this zone nuisance from odour is not an issue. To present a worst case scenario, sensitive receptors within 500 metres of the proposed site have been included within the study area.

Table 8: Sensitive Locations - Human

Ref	Name	Easting	Northing	Distance from extension to residential curtilage / footpath (m)
SR1	Sarn Bridge Farm	343901	344775	423
SR2	No 2 Upperwood Barns	343908	345302	437
SR3	No 3 Upperwood Barns	343890	345308	437
SR4	No 4 Upperwood Barns	343884	345320	437
SR5	Wychbrook Farm	343869	344775	459
SR6	No 1, Upperwood Barns	343916	345311	459

6.3.4 Sensitive Habitats

The following ecological sites are located within 10km of the site:

Table 9: Designated Sensitive Habitat Sites Included in the Study

Name	Designation	Easting	Northing	Distance
Well Rough & Long Plantation	SSSI	345197	344429	1815m
Afon Dyfrdwy (River Dee)	SSSI	341261	346602	2718m
River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid	SAC	341545	347318	2991
River Dee (England)	SSSI	342783	349143	4158

Name	Designation	Easting	Northing	Distance
Cloy Brook Pastures	SSSI	339683	342674	4485
Hanmer Mere	SSSI	345489	339999	5428
Taylor's Rough & Wellmeadow Wood	SSSI	348938	344897	5450
Llyn Bedydd	SSSI	346843	339397	6569
Fenn's Whixall, Bettisfield, Wem and Cadney Mosses	SSSI	348928	338546	8475
Fenn's Whixall, Bettisfield, Wem and Cadney Mosses	SAC	348928	338546	8475
Shell Brook Pastures	SSSI	336864	339165	8858
Dee Cliffs, Farndon	SSSI	341517	354030	9198
Bickerton Hill	SSSI	349428	352522	9548
Sontley Marsh	SSSI	334083	347822	9808

Please see attached land at Mulsford Farm poultry screening results Appendix 12.

6.3.5 Air Quality Standards and Guidelines

In the UK both statutory and non-statutory air quality objectives and guidelines exist. These are referred to in EA guidance as Environmental Assessment Levels (EALs). Air quality in compliance with these air quality objectives, guidelines and EALs is likely to have no significant adverse effects on health. Air quality above these objectives and guidelines could potentially have an adverse effect, although a considerable "margin of safety" is built into many of the guidelines (Environment Agency, 2003).

UK Air Quality Objectives

Table 10: EALs Relevant to this Study

Pollutant	Concentration (µg/m ³)	Measured as
Ammonia	180 ¹	Annual mean
	2500	Maximum 1 hour mean

In order to assess the impacts of ammonia gas on protected sites, the predicted contribution of ammonia from the poultry installation was assessed against the appropriate environmental benchmark – a Critical Level (CLE). Critical levels for habitat sites in the UK have been set by Natural England and the Environment Agency. The critical level is generally defined as "the atmospheric concentrations of pollutants in the atmosphere above which adverse effects on receptors, such as human beings, plants ecosystems or materials, may occur according to present knowledge" (UNECE, 1996). Where pollutant concentrations exceed the critical level (referred to as critical level 'exceedance'), there is a risk of harm to the ecosystem. Critical levels are agreed by the United Nations Economic Commission for Europe (UNECE) Convention on Long-Range Transboundary Air Pollution (CLRTAP) and proposed by teams comprising international experts on air pollution impacts on ecosystems. New critical levels for ammonia were agreed by the CLTRAP ICP Modelling and Mapping Task Force in April 2007. Table 11 below provides details of the Critical Levels relevant to this study for the protection of vegetation and ecosystems.

Table 11: Critical Levels for the protection of vegetation and ecosystems

Pollutant	Concentration (µg/m ³)	Measured as
Ammonia	1 ²	Annual mean

¹ Derived from Health & Safety Executive, EH40/2001, Occupational Exposure Limits 2001, 8 hour reference period converted to annual mean.

Pollutant	Concentration ($\mu\text{g}/\text{m}^3$)	Measured as
		for sensitive lichen communities & bryophytes and ecosystems where lichens and bryophytes are an important part of the ecosystem's integrity.
	3 ²	Annual mean For all higher plants (all other ecosystems)

The critical levels for the European designated habitat sites surrounding the site are have been provided by Natural England and are listed in Table 12.

Table 12: Critical Levels for designated wildlife sites

Site Name	$\mu\text{g NH}_3 \text{ m}^{-3}$
Well Rough & Long Plantation	3
Afon Dyfrdwy (River Dee)	3
River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid	3
River Dee (England)	3
Cloy Brook Pastures	3
Hanmer Mere	3
Taylor's Rough & Wellmeadow Wood	3
Llyn Bedydd	3
Fenn's I Whixall I Bettisfield I Wem and Cadney Mosses	3
Shell Brook Pastures	3
Dee Cliffs, Farndon	3
Bickerton Hill	3
Sontley Marsh	3

The Environment Agency H1 Environmental Risk Assessment – annex b states that an emission is significant where Process Contribution (PC) is <4% of Critical Levels for SACs, SPAs and Ramsars, <20% for SSSIs, and <50% for local and national nature reserves, ancient woodland and local wildlife sites.

6.3.6 Cumulative Effects

It is understood that the main potential source of cumulative effects would be any cumulative issues associated with the proposed adjacent Mulsford Farm development site. In accordance with the Environment Agency's H1 Environmental Risk Assessment – annex b the impact of the poultry farm in relation to other nearby intensive livestock farms are only assessed if the farm fails the initial screening test and is required to carry out further assessment and ammonia emissions modelling.

6.4 Assessment Results

6.4.1 Screening Inputs

Each poultry unit is tunnel vented via ventilation fans. 6 fans will be located across the ridge of each roof, whilst fans will be positioned horizontally in a fan canopy in a gable on the southern end of each unit (see Chapter 4 above).

An emissions factor of 0.034 kg NH_3 /animal place per year was used as per the *Pollution Inventory reporting – Intensive farming guidance note* December 2009.

An assessment of predicted annual mean ammonia concentrations as a result of operation of the proposed facility has been undertaken using the EA ammonia modelling tool.

² UN Economic & Social Council, Executive Body for the Convention on Long-Range Transboundary Air Pollution, ECE/EB.AIR/WG. 5/2007/3.

6.4.2 Ammonia Screening

The proposed development consists of the installation of an intensive poultry unit.

The results indicate that the modelled ammonia concentrations are not likely to exceed the annual mean or hourly mean air quality guidelines for the protection of sensitive habitat sites at a nearby designated habitat site.

Please see Appendix 12, Air Quality impact assessment on ammonia emissions from land at Mulsford Farm.

6.5 Impact Assessment

6.5.1 Dust Generated During the Construction Process

This is addressed in Chapter 9 – Amenity

6.5.2 Airborne Pollutants

Levels of airborne pollutants in the vicinity of the proposed facility have the potential for adverse health and environmental effects. Air quality standards and guidelines have been specified, which correspond to levels of airborne pollutants which do not have significant adverse health or environmental effects. The main focus of the air quality study was to assess levels of airborne pollutants against these air quality standards and guidelines.

Despite the worst-case approach adopted in the study, no air quality standards or guidelines are forecast to be exceeded as a result of emissions from the proposed development. Screening thresholds were not exceeded such that a consideration of the project in combination with other projects was necessary. Screened forecast rates of deposition of potentially hazardous substances due to emissions from the proposed development were within the relevant air quality guidelines.

It is concluded that the proposed unit will have no significant effects on air quality. This indicates that there will be no significant adverse effects on human health or the environment as a result of the proposed development. The potential effects on human health for certain substances of particular concern are evaluated in more detail below.

6.5.3 Designated Habitat Sites

The contribution of emissions from the proposed process to nutrient nitrogen deposition at sensitive habitats is less than the relevant air quality standards and critical load values. It is concluded that emissions from the proposed facility will have no significant adverse effects on designated sensitive habitat surrounding the proposed development, and a more detailed assessment is not required.

6.5.4 Air Quality Benefits of the Proposed Scheme

This chapter has demonstrated that the potential adverse health and environmental impacts due to emissions to air from the proposed development would have no significant adverse effects. While these issues have been assessed on their own merits it is also worthwhile considering the impacts in the context of benefits that will accrue from the proposed poultry development.

Carbon off-set

The poultry unit would result in emissions of carbon dioxide. However the fossil-origin carbon dioxide emitted from the proposed facility would be offset as a result of avoided emissions from a reduction of transportation via air travel using fossil fuels.

6.6 Conclusions

It is concluded that the nature of the development and environmental controls built into the proposed poultry unit 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

7.1.1 Scope of Report

Allan Moss Associates Ltd has been appointed as the landscape consultant to this project.

This Landscape & Visual Impact Assessment (LVIA) provides an evidence base to inform the decision making process from a landscape character and visual amenity perspective. In particular, the report cover the following matters:

- Description of the proposed development, including integrated landscape mitigation measures; and identification of the range of potential landscape and visual effects;
- Consideration of the defining characteristics of the local area in terms of landscape character;
- Identification of representative viewpoints and potential visual receptor locations relevant to the proposed development;
- Identification of relevant landscape character classifications with particular reference to the Wrexham LANDMAP SPG 2007;
- Assessment of landscape quality/condition, landscape value and landscape susceptibility against appropriate criteria
- Assessment of the magnitude and significance of the landscape effects of the proposed development against appropriate criteria;
- Assessment of visual amenity value and visual receptor susceptibility against appropriate criteria;
- Assessment of the magnitude and significance of the visual effects of the proposed development against appropriate criteria;
- A summary of significant effects.

The report has been prepared by Allan Moss who is a chartered landscape architect and planner with over 37 years' experience in both private and public sectors. He was involved in preparing the Landscape Institute/IEMA's Guidelines on best practice for landscape and visual impact assessment (GLVIA), published in April 2002.

The site and the surrounding landscape were visited in May 2017 for the purpose of preparing this LVIA.

A list of references is given at the end of this report and the various plans and photographs referred to are included as appendices. All the photographs, apart from aerial views, have been taken with a Canon EOS MkIII DSLR camera (full frame sensor) fitted with a fixed 50mm lens.

7.1.2 Methodology

The methodology used in this assessment takes account of the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition 2013' (GLVIA3). The guidelines are not intended as a prescriptive set of rules. They indicate that landscape and visual impact studies can be undertaken at differing levels of detail depending on the scale and nature of the project. The approach adopted should be proportional to the scale of the project that is being considered and the nature of its likely effects. In accordance with the EIA regulations, the guidelines advise that assessments should focus on the identification of likely significant effects. There is no requirement to assess all effects.

The level of detail provided in this assessment is considered to be sufficient to inform the decision making process for a development of this nature from a landscape character and visual amenity perspective.

7.1.3 Limitations

The effects of the proposed development on the surrounding locality are considered on the basis of views from publicly accessible locations only. No attempt is made to negotiate blocked or hazardous

routes that may be unsafe to the assessor. Views from private property are generally considered on the basis of inter-visibility with the application site rather than visits to individual properties.

The assessment is based on fieldwork carried out during early May when most trees were coming into leaf. It is possible that parts of the site may be more visible in winter when there are no leaves on the trees.

Any heritage assets referred to in the assessment in accordance with the GLVIA3 guidelines (i.e. as effects on people or the landscape resource at those locations). The assessment is not intended to be an assessment on heritage assets or their settings, as different guidance and methodology has to be used for assessing such potential heritage impacts.

7.2 Nature of Proposed Development

7.2.1 Summary of Proposed Development

The application is for full planning permission for the erection of 2 poultry houses as illustrated on the proposed layout plan and elevations at Appendix 7.1.

The poultry houses will each measure 108.20m x 24.38m x 2.48m (to eaves) and 5.17m (to ridge). They will be clad in box profile metal sheeting finished in a dark receding colour to be agreed with the planning authority. They will be linked at the front by a small control rooms. Each unit will be fitted with roof extraction fans.

The finished floor level of the new buildings would be 24.90m AOD.

Two groups of 3 feed bins (each 6.6m high and 2.8m diameter) will be located alongside the poultry houses. These will be finished in a dark receding colour to match the poultry houses.

A concrete hardstanding will be constructed to the front of the buildings with access via an existing farm track linking to Mulsford Lane to the south-west.

7.2.2 Integrated Landscape Mitigation

Landscape mitigation and enhancement is included as an integral part of the planning application proposals. Full details of the proposed landscaping is indicated on the plan at Appendix 7.9.

New native hedgerows will be planted along the northern-western boundary to delineate the site from the adjacent field and to the south-west alongside the access track. Once these hedgerows are established they will be managed at a height of 3m+ to provide partial screening to the development. Native hedgerow trees (Oak and Field Maple) will also be planted in these hedgerows to further enhance the softening effect. The existing hedgerows along the south-eastern site boundary and the north and west will also be managed at a height of 3m+ to improve screening and softening.

Additional native tree planting will be carried out alongside Wych Brook to the north-east; to the west; and along the existing hedgerows around and near to the site.

7.2.3 External Lighting

New external lighting will be kept to a minimum. The front gable ends of each unit will be lit externally with a single 100w metal halide lamp. These will be downward facing and protected with a cowl to reduce light spillage. Lighting of the site will only be required during bird catching at night. There will be no round the clock external lighting of the site and no use of high intensity security lighting.

7.2.4 Construction Phase

It is anticipated that the construction period would last for approximately 6 months. During that period construction vehicles and machinery would be active on the site including excavators, dump trucks and haulage lorries.

The sequence of works would start with the stripping of soils. Top-soils would be placed in temporary storage bunds for reuse on site. Groundworks would include cut & fill operations as necessary to achieve the required finished levels. All required services would need to be connected, including water supply, electricity supply and drainage.

Concrete floors and foundations would be imported on to site and structural steelwork would be erected. Roofing and wall cladding would be fitted to the framework. Tradesmen required for the construction and fitting out the buildings would be working throughout the construction phase, with the numbers on site varying according to workload.

Landscaping would be completed during the first planting season following occupation of the proposed buildings.

7.2.5 Range of Potential Landscape & Visual Effects

The range of potential landscape and visual effects that may arise from a development such as this are summarised below:

Direct effects on the landscape resource, such as:

- Agricultural land loss
- Tree/hedgerow loss
- Tree/hedgerow gain
- Loss or gain of other characteristic landscape features

Effects on Landscape Character, such as:

- Introduction of new buildings, hardstandings, earthworks etc
- Off-site works such as highway improvements
- Introduction of new on-site and off-site landscaping

Effects of night-time lighting

Effects on Visual Receptors, such as:

- Public views from roads, footpaths etc
- Private views from residential properties

7.3 Landscape and Visual Baseline

7.3.1 Description of Site and Surrounding Locality

The application site is located approximately 0.5km to the north-west of Tallarn Green and 0.5km to the south-west of Threapwood, adjacent to the Wych Brook, as indicated on the location plan at Appendix 7.2. Existing features in the local landscape are illustrated on the aerial photographs at Appendix 7.3, which date from October 2010. Views from the surrounding locality are illustrated in the photographs at Appendix 7.4.

The site is located in a gentle low lying valley through which flows the Wych Brook. The land across the site falls from south-west to north-east towards the Wych Brook, crossing the 20m to 25m contours, as illustrated on the location plan.

The site occupies part of an arable field which was covered in a crop of oil seed rape at the time of the visit. The field is bounded by mature hedgerows to the north-west, south-east and south-west whilst the Wych Brook defines the north-eastern boundary. There are mature trees in the hedgerows (Oak and Ash) and strong tree cover along the watercourse (mostly Willow). The adjoining fields were also covered in oil seed rape at the time of the visit.

Access to the site from Mulsford Lane is via an existing farm track. There are no public rights of way directly affecting the site. However there are footpaths and bridleways in the surrounding countryside

with potential views of the site. The OS map at Appendix 7.5 indicates all public rights of way in the local area and provides reference numbers for those with potential views.

It can be seen from the aerial photographs that the application site is surrounded by a mix of small, medium and large scale fields in predominantly arable use.

Table 7.1: Field Scale:	
Small Scale	Under 10 acres (4 ha)
Medium Scale	10 - 25 acres (4 - 10 ha)
Large Scale	25 - 50 acres (10 - 20ha)
Very Large Scale	Over 50 acres (20ha)

The fields are generally bounded by mature hedgerows with frequent hedgerow trees. There is also strong tree cover and woodland along the Wych Brook.

The small linear settlement of Tallarn Green lies in the valley bottom approximately 0.5km to the south-east. The larger more sprawling settlement of Threapwood lies to the north-east occupying the upper slopes on the opposite side of the valley. Elsewhere there are scattered farmsteads and cottages served by a network of winding country lanes.

7.3.2 Overall Visibility

The site is low lying and well contained visually by rising ground and hedgerows to the south-west as illustrated in Photographs 1 & 10 at Appendix 7.4. The strong tree cover along the Wych Brook restricts views from the lower ground to the north and east as illustrated in Photographs 3, 4 & 9.

The site is more open to view from higher ground to the south and east as illustrated in Photographs 5 & 8 although it still benefits from a backdrop of tree cover and rising ground from these directions.

The general extent of visibility is represented by the visual envelope on the Visual Receptor Plan at Appendix 7.6, which has been established by way of desk study and detailed observations in the field. Relevant topographical and vegetation barriers to wider visibility are also illustrated on this plan.

7.3.3 Visual Receptors

The existing trees on the south-eastern site boundary provide a useful point of reference in assessing the visibility of the proposed development in the field. Visual receptor locations with potential views of the site are listed in Table 7.2 below. Each location is numbered and can be cross referenced to the Visual Receptor Plan at Appendix 7.6. The photographs from the various viewpoints referred to are provided at Appendix 7.4.

Table 7.2: Potential Visual Receptor Locations				
Ref	Receptor Location	Distance from Site	Elevation (AOD)	Comments
	Public locations with potential views of site:			
1	Footpath WOR/14	60-300m	20-30m	Variable short to middle distance views (Photos 1 & 2)
2	Footpath WOR/2	100-280m	20m	Partial short distance views (Photos 3 & 4)
3	Footpath WOR/4	380-460m	30-35m	Filtered middle distance views (Photos 5 & 6)
4	Footpath WOR/9	650-730m	20-35m	Filtered middle distance views (Photo 7)

5	Sarn Rd, Threapwood	550-600m	37m	Elevated middle distance view (Photo 8)
6	Bridleway WOR/18	320m	27m	One partial middle distance view (Photo 9)
7	Mulsford Lane	430m	29m	One filtered middle distance view (Photo 10)
	Private dwellings with potential views of site:			
8	Dwellings on edge of Threapwood	420-1000m	30-45m	Potential elevated middle distance views from approx 7 dwellings
9	Dwellings to south and west	500-720	23-40m	Potential middle distance views from approx 4 dwellings
NB. Elevations for receptor locations compare with an elevation of approx 20-25m AOD for the site.				

The extent to which the proposed development would be seen from each of these receptor locations is considered in Section 7.12.

7.4 Landscape Character Classifications

7.4.1 Definitions

GLVIA3 provides the following definitions:

"Landscape character: *A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse."*

"Landscape classification: *A process of sorting the landscape into different types using selected criteria but without attaching relative values to different sorts of landscape."*

7.4.2 Wrexham LANDMAP SPG 2007

The Wrexham LANDMAP Supplementary Planning Document 2007(3) classifies the application site as falling within Landscape Character Area 13b: English Maelor (western part). The character of this area is summarised as:

"An area of undulating lowland farmland and small villages which retains evidence of historic landscapes and of alternating English and Welsh influence."

The key landscape characteristics of English Maelor are summarised as:

Visual character:

- Gently undulating lowland farmland between 10 and 100 m above sea level, with small linear woodlands along streams
- Enclosure by abundant, usually well-managed hedges and hedgerow trees, and by landform, but good views from higher ground towards western hills
- Gredington, Bettisfield, Iscoyd and Emral Parks form enclosed private areas, but estate influence is widespread
- Small rural villages

Geological character:

- Landform reflects deep deposits of materials left after the Ice Age, over Triassic sandstones
- Meres and mosses with glacial origin, including Hanmer Mere
- Soils derived from glacial till are slow draining and heavy
- Areas of glacial sands and gravels are more hummocky and dissected, such as the area around Eglwys Cross. Deep and well drained sandy loam soils are found in these areas
- Drainage is to the River Dee, via the Emral and Wych Brooks

Ecological character:

- Mainly 'improved' grassland and farmland, but with valuable hedgerows and hedgerow trees
- Abundant field ponds derived from marl pits or clay pits
- Other aquatic habitats of high value including canal, meres and streams
- Areas of parkland and wood pasture with mature and veteran trees of high value
- Broadleaved, conifer and mixed plantation woodlands

Historical character:

- Extensive areas of medieval strip fields and ridge and furrow with associated moated sites, preserved under pasture
- Designed parkland/gardens on Cadw Register of Parks and Gardens (Bettisfield Hall Park, Gredington Park, Iscoyd Park) and others not on Register (Emral, Bryn-y-Pys)
- Settlements of medieval origin - Overton, Penley, Hanmer, Worthenbury, Bronington
- Widespread occurrence of English place names with 'green' (Tallarn Green, Horseman's Green, Lightwood Green)
- Former Ellesmere and Whitchurch railway and Shropshire Union Canal, with associated settlement at Bettisfield
- Site of Gwernheylod Banks Iron Age promontory fort near Overton

Cultural character:

- On Welsh border with strong links to Whitchurch, Malpas and Ellesmere
- Pre-1974, a detached part of Flintshire
- Predominantly agricultural land use, but many farmsteads undergoing conversion to residential use
- Network of footpaths and minor roads throughout the area, including Maelor Way
- Penley Polish Hospital was an adapted WW2 US army hospital, now in industrial or residential use

With respect to landscape sensitivity the SPG advises that the integrity of the traditional English Maelor landscape is vulnerable to economic changes which threaten traditional farming, and to development of land use practices which do not take historical landscape features into account.

The SPG also advises that the western part of English Maelor (within which the application site is located) has been designated by Cadw as a Landscape of Special Historic Interest.

Full details along with advice on management guidelines for LCA 13b: English Maelor are provided at Appendix 7.7.

7.5 Landscape Quality (Condition)

7.5.1 Definition

GLVIA3 provides the following definition:

"Landscape quality (condition): A measure of the physical state of the landscape. It may include the extent to which typical character is represented in individual areas, the intactness of the landscape and the condition of individual elements."

There have been different definitions of landscape quality in the past. Some of which have included subjective criteria such as landscape value and aesthetic appeal. Under this current definition the assessment of landscape quality is a more objective matter, comparing the condition and distinctiveness of a landscape against other landscapes of the same type.

It is not intended as a means of evaluating one landscape character type against another. Such comparisons obviously require subjective judgements to be made and are dealt with under the heading of 'landscape value'.

7.5.2 Landscape Quality Criteria

The landscape quality criteria in Table 7.3 below have been developed to provide a recognisable scale against which any baseline landscape can be assessed.

Table 7.3: Landscape Quality Criteria	
High	Landscapes with strong or distinctive character, in very good condition. No incongruous features. Best examples of a particular landscape type.
Medium/High	Landscapes with moderately strong character; in good condition; well intact; with few incongruous features. Good examples of a particular landscape type.
Medium	Landscapes with moderate strength of character. Whilst retaining many of the key characteristics of the landscape type it may have suffered from some decline and may feature occasional incongruous features.
Low/Medium	Landscapes with weak strength of character, often fragmented, and/or featuring significant atypical, incongruous, or discordant features.
Low	Landscapes with poorly defined character or few remaining characteristics typical of the type. Degraded landscapes or major incongruous features.

7.5.3 Landscape Quality Assessment

The 1st Edition OS Map of 1874 at Appendix 7.8 provides a useful baseline against which the condition of the present day landscape in the vicinity of the application site can be considered.

When compared to the aerial photographs at Appendix 7.3 it is evident that there has been considerable hedgerow loss in the local landscape over the years as fields have been adapted to changing agricultural practices. It is also likely that the remaining hedgerows are clipped more tightly today than they would have been prior to the advent of mechanical clipping.

Hedgerow loss is particularly noticeable to the south-east of the application site where several small fields have been amalgamated into one large field. Former hedgerow trees (now field trees) mark the position of former hedgelines. It is also evident that the field within which the application site is located used to be two fields, divided by a heavily treed hedgerow. Nevertheless relatively strong tree and hedgerow cover has still been retained in the local landscape and there are few incongruous features.

Overall whilst the local landscape has been subjected to ongoing change, particularly during the post-war period the character of the landscape is still recognisable in comparison to that of 1874 and a moderately strong character is still retained. Taking account of the criteria in Table 7.3, the local landscape is therefore assessed as having Medium/High Landscape Quality.

7.6 Landscape Value

7.6.1 Definition

GLVIA3 provides the following definition:

"Landscape value: *The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a whole variety of reasons.*"

Landscape value therefore involves a degree of subjectivity, in that it calls for comparisons between one landscape and another. All landscapes have value to someone, however, landscapes of recognised value at a national, county or district level have traditionally been recognised by the making of landscape designations.

7.6.2 Landscape Value Criteria

The landscape value criteria in Table 7.4 below have been developed to provide a recognisable scale against which any landscape area or landscape feature can be assessed.

Table 7.4: Landscape Value Criteria	
National Level	Landscape areas recognised at a national level eg. World Heritage Sites, National Parks, AONBs, Grade I & II* Registered Parks & Gardens, Registered Battlefields.
County/District Level	Landscape areas recognised at a county/district level eg. county/district level designated landscapes & historic parkland.
Parish/Community Level	Landscape areas of more than just local value eg. recognised landmarks & beauty spots, village greens & common land.
Local Level	Most other landscape areas are of value at a local level either as a local recreational resource or by providing a pleasant visual outlook.
Negligible or Negative	Some landscape areas may have little or even negative value. eg derelict or degraded landscapes and eyesores.

7.6.3 Landscape Value Assessment

There are no statutory landscape designations affecting the application site and the surrounding landscape. However, the adopted Wrexham UDP proposals map indicates that the application site falls within a Special Landscape Area (Policy EC5). This is a non-statutory landscape designation that conveys recognition of the landscape at a unitary authority level.

Although Policy EC5 aims to strictly control most forms of development in Special Landscape Areas, it does allow for agricultural development, subject to a high standard of design and landscaping.

Taking account of the criteria in Table 7.4 the local landscape is therefore assessed as having County/District Level landscape value.

7.7 Landscape Susceptibility

7.7.1 Definition

GLVIA3 provides the following definition:

"Susceptibility: *The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences.*"

7.7.2 Landscape Susceptibility Criteria

The landscape susceptibility criteria in Table 7.5 below have been developed to provide a recognisable scale against which landscape areas can be assessed in terms of their ability to accommodate the development proposed.

Table 7.5: Landscape Susceptibility Criteria	
High	Landscape areas which taking into account the nature of the change anticipated and the potential for mitigation are vulnerable to relatively small changes.

Medium/High	Landscape areas which taking into account the nature of the change anticipated and the potential for mitigation can accommodate some change, subject to sensible siting and design.
Medium	Landscape areas which taking into account the nature of the change anticipated and the potential for mitigation can reasonably accommodate moderate change, subject to sensible siting and design.
Low/Medium	Landscape areas which taking into account the nature of the change anticipated and the potential for mitigation can accommodate larger scale change, subject to sensible siting and design.
Low	Landscape areas which taking into account the nature of the change anticipated and the potential for mitigation can accommodate substantial change, subject to sensible siting and design.

Table 7.6 identifies factors that can affect landscape susceptibility. It provides a general guide, but it is not a rigid checklist, as most landscapes will display a mixture of factors indicating both a greater and lesser degree to which development can be accommodated. These factors therefore need to be considered 'in the round'.

Table 7.6: Landscape Character Susceptibility Factors

Factor	Indicators of lower susceptibility (Increased chance that development can be accommodated in the landscape)	Indicators of moderate susceptibility	Indicators of higher susceptibility (Reduced chance that development can be accommodated in the landscape)
Landform (also related to visual factors such as elevation and viewing angle)	Absence of strong topographical variety. Featureless, convex or flat.	Moderate topographical variety.	Presence of strong topographical variety or distinctive landform features.
Landscape pattern and complexity	Simple, regular or uniform.	Sub-regular.	Complex, rugged and irregular.
Settlement and man-made influence	Presence of contemporary development; strong relationship to existing settlement pattern.	Some contemporary development; moderate relationship to existing settlement pattern.	Absence of modern development, presence of small scale, historic or vernacular settlement; poor relationship to existing settlement pattern.
Inter-visibility with adjacent landscapes	Little inter-visibility with adjacent sensitive landscapes or viewpoints.	Moderate inter-visibility with sensitive landscapes or viewpoints.	Strong inter-visibility with sensitive landscapes. Forms an important part of a view from sensitive viewpoints.
Perceptual aspects (sense of remoteness, tranquillity)	Close to visible signs of human activity and development.	Moderate signs of human activity and development.	Physically or perceptually remote, peaceful or tranquil.
Existing mitigating features or potential for new mitigation	Presence of existing mitigating features (eg. woodlands and hedgerows).	Some existing mitigating features. Opportunities for new planting.	Absence of mitigating features (eg open moorland).
Proximity of sensitive landscape features	Absence of sensitive features	Presence of more distant sensitive features (eg. designated heritage assets)	Presence of closer sensitive features (eg. designated heritage assets)
Adapted from Natural England Technical Information Note TIN101 (September 2011)			

7.7.3 Landscape Susceptibility Assessment

The landscape character, landscape quality and general visibility of the application site and surrounding locality have been considered in Sections 7.3 to 7.5 above. The factors set out in Table 7.6 are assessed below on a site specific basis.

Landform (Moderate)

The site is located in a gentle low lying valley on the south-western bank of the Wych Brook. The valley landform will help to provide visual containment and limit the effects of the proposed development to a localised area.

Landscape Patterns and Complexity (Moderate)

This part of the Wych Brook valley is occupied by a mix of small, medium and large scale fields of sub-regular or irregular shape. Several of these fields have been formed by the amalgamation of smaller more regular shaped fields as illustrated on the historical map at Appendix 7.8. The woodland areas and tree belts tend to follow the course of the Wych Brook as it meanders through the valley. Overall this gives rise to a landscape pattern of moderate complexity as illustrated in the aerial photographs.

Settlement and Man-Made Influences (Moderate)

The small linear settlement of Tallarn Green lies in the valley bottom approximately 0.5km to the south-east. The larger more sprawling settlement of Threapwood lies to the north-east occupying the upper slopes on the opposite side of the valley. Elsewhere there are scattered farmsteads and cottages served by a network of winding country lanes.

Whilst the application site is not directly related to any existing farm buildings it is located in a settled landscape which includes farmsteads with modern farm buildings.

Inter-visibility with Adjacent Landscapes (Moderate)

The application site is located in a locally designated landscape. However, inter-visibility with the surrounding landscape is limited to a localised area as illustrated by the visual envelope on the Visual Receptor Plan at Appendix 7.6. Within that visual envelope, visibility is further restricted by the local tree and hedgerow cover.

There are no recognised or promoted viewpoints affected by the proposed development. Public views of the site are limited to those footpaths and roads identified on the plan.

Perceptual Aspects (Moderate)

Although the site is remote from existing farmsteads, there is evidence all around that this is part of a settled working landscape. There are moderate visible and audible signs of human activity and development in the vicinity of the site including the settlement of Threapwood, local roads and working farms.

Existing Mitigating Features or Potential for New Mitigation (Moderate)

The site is low lying and well contained visually by rising ground and hedgerows to the south-west. The strong tree cover along the Wych Brook also restricts views from the lower ground to the north and east. The site is more open to view from higher ground to the south and east although it still benefits from a backdrop of tree cover and rising ground from these directions.

There is scope for further hedgerow and tree planting around the site in a way that is appropriate to the character of the local landscape. The proposed structures can also be finished in a dark receding colour appropriate to this rural setting.

Proximity of Sensitive Landscape Features (Low)

There do not appear to be any particularly sensitive landscape features in the immediate vicinity of the application site.

Conclusion

There are no indicators that suggest that the site and surrounding landscape should be treated as having high landscape susceptibility. Most of the indicators suggest medium landscape susceptibility to the type of development proposed. The site should therefore be reasonably capable of accommodating the proposed poultry development.

Taking account of the criteria in Tables 7.5 & 7.6 the application site and surrounding landscape is assessed as having Medium Landscape Susceptibility to accommodating the proposed development.

7.7.4 Susceptibility to night-time lighting

In order to properly assess the significance of the night-time effects of new lighting that would be introduced by the proposed development, it is first important to consider the susceptibility of the local landscape to additional night-time lighting. The criteria indicated in Table 7.7 below have been developed to provide a recognisable scale against which any baseline landscape can be considered.

Table 7.7: Susceptibility of Night-Time Landscape to New Lighting	
High	Night-time landscape which is truly dark, and is vulnerable to relatively small scale or low levels of lighting intrusion eg. remote rural locations.
Medium/High	Between medium and high.
Medium	Night-time landscape which has relatively low levels of existing illumination, but is capable of accommodating some new lighting, subject to sensitive design eg countryside near to rural settlements.
Low/Medium	Between low and medium.
Low	Night-time landscape which has relatively high levels of existing illumination, and is capable of accommodating more substantial change, subject to sensitive design eg. countryside on edge of main towns or conurbations.

The application site is located approximately 0.5km to the south-west of Threapwood and approximately 0.5km to the north-west of the Tallarn Green. There is no street lighting in these settlements but there are the normal light sources associated with residential areas. There are also existing light sources associated with the scattered farmsteads and cottages away from these settlements as well as night-time traffic using the local road network. In addition there will be a seasonal occurrence of more intense light sources from agricultural vehicles operating in the fields during the hours of darkness during harvesting and other operations.

Taking account of the criteria in Table 7.7 it is considered that the night-time landscape in the immediate locality of the application site is of Medium Susceptibility to new lighting.

7.8 Magnitude of Landscape Effects

7.8.1 Definition

GLVIA3 provides the following definition:

"Magnitude (of effect): A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration."

7.8.2 Magnitude of Landscape Effects Criteria

The criteria in Tables 7.8, 7.9 & 7.10 below have been developed to provide a recognisable scale against which the magnitude of landscape change can be assessed.

Table 7.8: Criteria for Scale of Effect on Landscape Character (adverse or beneficial)	
High	A major change in landscape characteristics such as the introduction or removal of a dominant large scale development and/or a substantial loss of characteristic landscape features, whilst taking account the effectiveness of any landscape mitigation measures.
Medium/High	A notable change in landscape characteristics such as the introduction or removal of a prominent development and/or a notable loss of characteristic landscape features, whilst taking account the effectiveness of any landscape mitigation measures.
Medium	A moderate change in landscape characteristics such as the introduction or removal of a readily noticeable development and/or a moderate loss of characteristic landscape features, whilst taking account the effectiveness of any landscape mitigation measures.
Low/Medium	A minor change in landscape characteristics such as the introduction or removal of a less noticeable development and/or a minor loss of characteristic landscape features, whilst taking account the effectiveness of any landscape mitigation measures.
Low	A slight change in landscape characteristics and/or a slight loss of characteristic landscape features, whilst taking account the effectiveness of any landscape mitigation measures.

Table 7.9: Criteria for Geographical Extent of Landscape Effect	
High	Change on a scale influencing landscape character over an extensive area such as several landscape types or character areas.
Medium/High	Change on a scale influencing landscape character over a broad area such as the landscape type or character area within which the proposal lies.
Medium	Change on a scale influencing landscape character within the local area.
Low/Medium	Change on a scale influencing landscape character within the immediate setting of the site.
Low	Change on a scale influencing landscape character within the development site itself.

Table 7.10: Criteria for Duration and Reversibility of Landscape Effects	
Long Term	Permanent landscape effects likely to last for over 20 years.

Medium/Long Term	Permanent landscape effects capable of reasonable mitigation within 15 to 20 years.
Medium Term	Permanent landscape effects capable of reasonable mitigation within 10 to 15 years.
Short/Medium Term	Permanent landscape effects capable of reasonable mitigation within 5-10 years.
Short Term	Permanent landscape effects capable of reasonable mitigation within 5 years.
Temporary	Developments seeking temporary planning permission after which the land will be reinstated.
Seasonal	Some developments may be of a seasonal nature.
Intermittent	Some developments may be of an intermittent nature.

7.8.3 Assessment of Magnitude of Landscape Effects

The proposed development would result in approximately 1.5ha of farmland being permanently lost from arable production (to buildings and hardstandings etc). However there would be no loss of any specific landscape features such as existing trees and hedgerows.

The associated landscape proposals would result in an increase of approximately 170m of new hedgerow planting and 50 new hedgerow trees along with 3000m² of new native woodland planting to the north-east and west of the buildings.

Although the poultry houses will occupy a relatively large footprint, they are relatively low structures compared with other types of modern farm buildings. They will be partially cut into the upper slope and partially built up above the lower slope. The finished floor level for each poultry house would be 24.9m AOD resulting in a ridge height of 30.07m AOD for each building.

The proposed poultry houses will be partially screened from the north-east by the existing tree belt along the Wych Brook. The existing hedgerow along the south-eastern site boundary will be managed at a height of 3m+ to hide the lower parts of the building from that direction. The new hedgerow planting along the northern-western boundary will have a similar effect from that direction once established. The proposed tree planting around the site will further enhance the softening effect.

All the structures will be finished in a dark receding colour which will help to reduce their impact. The associated landscape mitigation and enhancement measures will enable the development to be integrated into the landscape in a way that is appropriate to the character of the English Maelor landscape.

The trees, hedgerows and woodlands in the surrounding countryside will help to further reduce the impact on the wider landscape although the development is still likely to be visible to some degree from those locations identified on the Visual Receptor Plan.

Taking account of the criteria in Tables 7.8, 7.9 & 7.10 the proposed development is assessed as having a High and permanent adverse scale of effect on the character of the application site itself during construction and on completion. The effect on the character of the immediate adjoining countryside would be Medium adverse in the Medium Term until the proposed landscaping takes effect. The scale of effect on the character of the wider landscape would be Low adverse until the proposed landscaping takes effect.

Effects of night-time lighting

New external lighting will be kept to a minimum. The front gable ends of each unit will be lit externally with a single low-wattage fitting of low intensity. All external lighting will be downward facing and protected with a cowl to reduce light spillage. Lighting of the site will only be required during working hours in the winter months and during bird catching. There will be no round the clock external lighting of the site and no use of high intensity security lighting.

Taking account of the criteria in Tables 7.8, 7.9 & 7.10 the night-time lighting of the proposed development is assessed as having a Low adverse scale of effect on the character of the local landscape. The effect would be of Low geographical extent and Intermittent in nature.

7.9 Significance of Landscape Effects

7.9.1 Definition

GLVIA3 provides the following definition:

"Significance: A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic."

With respect to determining significance the guidelines advise that there are two main alternative approaches to combining the individual judgements made under the various contributing criteria:

"1. They can be sequentially combined: susceptibility to change and value can be combined into an assessment of sensitivity for each receptor, and size/scale, geographical extent and duration and reversibility can be combined into an assessment of magnitude for each effect. Magnitude and sensitivity can then be combined to assess overall significance.

2. All the judgements against the individual criteria can be arranged in a table to provide an overall profile of each identified effect. An overview can then be taken of the distribution of the judgements for each criterion to make an informed professional assessment of the overall significance of each effect."

This assessment follows the second approach.

7.9.2 Landscape Significance Criteria

The criteria in Table 7.11 below provide a recognisable scale against which the significance of effects can be assessed. The criteria are based on Environmental Impact Assessment: A Guide to Good Practice and Procedures Consultation Paper (DCLG 2006)⁽⁴⁾.

Whilst the EIA Regulations require the likely significant effects of a development to be identified, there is no specific guidance as to where the threshold between 'significant' and 'not significant' lies. For the purposes of this assessment any adverse impacts assessed as Major or Severe are considered to be potentially significant to the decision making process.

Table 7.11: Definitions of Significance Terminology (adverse or beneficial)	
Degree of Significance	Definition
Severe (Significant)	Landscape effects that represent key factors in the decision-making process. They are generally, but not exclusively associated with sites and features of national importance and resources/features which are unique and which, if lost, cannot be replaced or relocated.
Major (Significant)	Landscape effects that are likely to be important considerations at a regional/district scale and, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process.
Moderate (Not Significant)	Landscape effects that while important at a local scale, are not likely to be key decision making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.

Minor (Not Significant)	Landscape effects that may be raised as local issues but are unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the detailed design of the project.
Negligible (Not Significant)	Landscape effects that are so slight that there is no need to take them into consideration in the design or mitigation of the development.
Adapted from Environmental Impact Assessment: A Guide to Good Practice and Procedures Consultation Paper (DCLG 2006)	

7.9.3 Assessment of Significance of Landscape Effects

All the judgements relating to landscape value, landscape susceptibility, scale of effect, geographical extent, duration and reversibility have been arranged in Table 7.12 to provide an overall profile of each identified effect. An informed professional judgement has then been made of the overall significance of each effect, as explained in the following paragraphs.

The local landscape in the vicinity of the application site has been assessed as having County/District level value and Medium susceptibility to this type of development.

The only direct effect that the proposed development would have on existing landscape features would be the loss of approximately 1.5ha of arable farmland. Although this would be a long term effect, the geographical extent would be low. Arable land is the dominant land use in this area and it is not considered to be a particularly sensitive landscape feature.

In terms of indirect effects on the adjoining countryside, although the poultry houses will occupy a relatively large footprint, they are relatively low structures compared with other types of modern farm buildings. They will be partially cut into the upper slope and partially built up above the lower slope. All the structures will be finished in a dark receding colour which will help to reduce their impact. The associated landscape mitigation and enhancement measures will enable the development to be integrated into the landscape in a way that is appropriate to the character of the English Maelor landscape.

The trees, hedgerows and woodlands in the surrounding countryside will help to further reduce the impact on the wider landscape although the development is still likely to be visible to some degree from those locations identified on the Visual Receptor Plan.

The scale of landscape effect has therefore been assessed as High adverse at a site specific level, reducing to Medium adverse in terms of the immediate adjoining countryside and Low adverse on the wider landscape.

Whilst such factors might be important at a local scale, planning policy does allow for agricultural development in Special Landscape Areas subject to a high standard of design and landscaping. It is considered that the siting, design and landscaping of this development does meet that standard and therefore the effects of the development on landscape character should not be an overriding decision making issue. The proposed development is therefore considered to be of Moderate adverse significance in terms of its effects on landscape character at both a site specific level and in terms of the wider countryside.

The local landscape is considered to have Medium susceptibility to new lighting sources. The scale of effect of the new lighting introduced by this particular development is likely to be Low adverse over a Low geographical area and Intermittent in nature. This has therefore been assessed as being of Negligible adverse significance.

Table 7.12: Summary of Assessment of Landscape Effects

Effect	Sensitivity of Landscape Receptor		Magnitude of Landscape Effect			Significance of Landscape Effect	
	Landscape Value	Landscape Susceptibility	Scale of Landscape Effect	Geographical Extent	Duration & Reversibility	Degree of Significance	Significant or Not Significant
Effect on character of application site	County/District	Medium	High adverse	Low	Long Term	Moderate adverse	Not significant
Effect on character of immediate adjoining countryside	County/District	Medium	Medium adverse	Low/Medium	Medium Term	Moderate adverse	Not significant
Effect on character of wider landscape	County/District	Medium	Low adverse	Medium	Medium Term	Moderate adverse	Not significant
Effects of night-time lighting	County/District	Medium	Low adverse	Low	Intermittent	Negligible adverse	Not significant

7.10 Visual Amenity Value

7.10.1 Definition

GLVIA3 provides the following definition:

"Visual amenity: *The overall pleasantness of the views people enjoy of their surroundings, which provides an attractive visual setting or backdrop for the enjoyment of activities of the people living, working, recreating, visiting or travelling through an area."*

The guidelines also offer the following guidance about judging the value attached to views:

"Judgements should also be made about the value attached to the views experienced. This should take account of:

- recognition of the value attached to particular views, for example in relation to heritage assets, or through planning designations;*
- indicators of the value attached to views by visitors, for example through appearances in guidebooks or on tourist maps, provision of facilities for their enjoyment (such as parking places, sign boards and interpretive material) and references to them in literature or art (for example 'Ruskin's View' over Lunedale, or the view from the Cob in Porthmadog over Traeth Mawr to Snowdonia which features in well-known Welsh paintings, and the 'Queen's View' in Scotland)."*

7.10.2 Visual Amenity Value Criteria

The visual amenity value criteria in Table 7.13 below have been developed to provide a recognisable scale against which the value of views can be assessed

Table 7.13: Visual Amenity Value Criteria	
National Level	Views of national importance eg. iconic views of nationally important structures, designed views in Grade I & II* Registered Parks & Gardens or views from scenic routes and scenic viewpoints in landscapes of national importance.
County/District Level	Views of county/district importance eg. views from scenic routes and scenic viewpoints in landscapes of county/district importance.
Community/Parish/Level	Views of more than just local value eg. views from recognised or well used local landmarks & beauty spots.
Local Level	Most other landscape views are of value at a local level providing a pleasant visual outlook to residents, visitors and travellers.
Negligible or Negative	Some views may have little or even negative value. eg views of derelict or degraded landscapes and eyesores.

7.10.3 Visual Amenity Value Assessment

The views identified on the Visual Receptor Plan at Appendix 7.6 are generally of value at a Local Level to local residents and users of the local roads, footpaths and bridleways.

None of the views identified in this study are considered to be of more than Local Level Value.

7.11 Visual Receptor Susceptibility

7.11.1 Definitions

GLVIA3 provides the following definitions:

"Visual receptors: *Individuals and/or defined groups of people who have the potential to be affected by a proposal."*

"Susceptibility: *The ability of a defined landscape or visual receptor to accommodate the specific proposed development without undue negative consequences."*

The guidelines also offer the following guidance about judging the susceptibility of visual receptors to change:

"The susceptibility of different visual receptors to changes in views and visual amenity is mainly a function of:

- *the occupation or activity of people experiencing the view at particular locations;*
- and*
- *the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations."*

Whilst the guidelines indicate that visual receptors most susceptible to change are likely to include residents at home it is a well-established planning principle that there is no right to a view. There have been a number of planning appeal decisions in recent years where Planning Inspectors considering the outlook from residential properties have adopted a stringent approach, whereby a visual impact would have to be overwhelming to the degree that a property would come to be widely regarded as an unattractive and unsatisfactory place in which to live, before giving rise to a reason for refusal. This has become known as the 'Lavender Test'.

As with landscape susceptibility, the susceptibility of visual receptors is also likely to vary according to the type of development envisaged. For example, residential properties on existing farmsteads are likely to be less susceptible to agricultural development than residential properties not associated with farmsteads.

7.11.2 Visual Receptor Susceptibility Criteria

The criteria in Table 7.14 below have been developed to provide a recognisable scale against which potential visual receptors can be assessed in terms of their susceptibility to the development proposed.

Table 7.14: Visual Receptor Susceptibility Criteria	
High	People engaged in strategic level recreational activities where landscape views are likely to be the prime focus of their attention eg: Visitors to scenic viewpoints Users of strategically promoted footpath routes Visitors to heritage attractions or to other attractions where views of the surroundings are an important contributor to the experience.
Medium/High	People engaged in local level activities where landscape views might be important but not necessarily the prime focus of their attention eg: Users of other public rights of way Occupiers of residential properties in open countryside Residents at home occupying principle daytime rooms. Motorists on rural scenic routes
Medium	People engaged in activities where landscape views provide a backdrop to their main activity eg: Motorists on minor rural roads Users of other open space/outdoor recreational facilities Occupiers of residential properties on existing farmsteads Occupiers of residential properties on edge of urban areas Residents at home occupying non-principle daytime rooms.
Low/Medium	People engaged in activities who might only get a fleeting glance or occasional view of a particular landscape eg: Users of public rights of way in urban areas Low usage or inaccessible public rights of way Motorists on rural A & B roads and motorways Users of railways Occupiers of residential properties in urban areas

Low	People engaged in activities whose attention is unlikely to be focused on the landscape eg: Motorists on urban roads People at their place of work
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7.11.3 Visual Receptor Susceptibility Assessment

Potentially susceptible visual receptor locations are listed in Table 7.15 below. Each location is numbered and can be cross referenced to the Visual Receptor Plan at Appendix 7.6. The susceptibility of each receptor is also assessed in Table 7.15, using the criteria from Table 7.14 above.

Table 7.15: Assessment of Visual Receptor Susceptibility			
Ref	Receptor Location	User Type	Susceptibility
	Public locations with potential views of site:		
1	Footpath WOR/14	Walkers	Medium/High
2	Footpath WOR/2	Walkers	Medium/High
3	Footpath WOR/4	Walkers	Medium/High
4	Footpath WOR/9	Walkers	Medium/High
5	Sarn Rd, Threapwood	Walkers Motorists	Medium/High Medium
6	Bridleway WOR/18	Walkers/Horse riders	Medium/High
7	Mulsford Lane	Walkers Motorists	Medium/High Medium
	Private dwellings with potential views of site:		
8	Dwellings on edge of Threapwood	Residents/visitors	Medium/High
9	Dwellings to south and west	Residents/visitors	Medium/High

There are no strategically promoted footpaths or scenic viewpoints affected by the development being considered. Therefore no receptors have been treated as having the highest level of susceptibility.

Walkers and horse riders using other local footpaths and minor roads have been treated as having Medium/High susceptibility on the basis that these are people who may be engaged in local level recreational activities.

Motorists using the local country roads have been treated as having Medium susceptibility on the basis that these are relatively slow and minor rural roads where views may be of some value.

Occupants of residential properties in this rural area have generally been treated as having Medium/High susceptibility.

The extent of potential visibility and degree of visual impact for each receptor location is discussed in Section 7.12 below.

7.12 Magnitude of Visual Effects

7.12.1 Definition

GLVIA3 provides the following definition:

"Magnitude (of effect): A term that combines judgements about the size and scale of the effect, the extent of the area over which it occurs, whether it is reversible or irreversible and whether it is short or long term in duration."

7.12.2 Magnitude of Visual Effects Criteria

The criteria in Tables 7.16, 7.17, & 7.18 below have been developed to provide a recognisable scale against which the magnitude of visual change can be assessed.

Table 7.16: Criteria for Scale of Visual Effects (adverse or beneficial)	
High	Substantial change in view where proposed development would be a dominant feature: commanding, controlling the view, foremost feature, prevailing, overriding.
Medium/High	Notable change in view where proposed development would be prominent: standing out, striking, sharp, unmistakable, easily seen.
Medium	Moderate change in view where proposed development would be conspicuous: noticeable, distinct, catching the eye or attention, clearly visible, well defined.
Low/Medium	Minor change in view where proposed development would be apparent: visible, evident, obvious, perceptible, discernable, recognisable.
Low	Slight change in view where proposed development would be inconspicuous: lacking sharpness of definition, not obvious, indistinct, not clear, obscure, blurred, indefinite, subtle.
Adapted from Guidance on the Assessment of the Impact of Offshore Windfarms: Seascape & Visual Impact Report. DTI (2005).	

Table 7.17: Criteria for Geographical Extent of Visual Effects	
High	Visual change over a wide area at the receptor location. (eg. over 2.5km length)
Medium/High	Between medium and high. (eg. 1250-2500m length)
Medium	Visual change over a moderate area at the receptor location. (eg. 500-1250m length)
Low/Medium	Between low and medium. (eg. 100-500m length)
Low	Visual change over a small area at the receptor location. (eg. less than 100m length)

Table 7.18: Criteria for Duration and Reversibility of Visual Effects	
Long Term	Permanent visual effects unlikely to be capable of reasonable mitigation within 20 years.
Medium/Long Term	Permanent visual effects capable of reasonable mitigation within 15 to 20 years.
Medium Term	Permanent visual effects capable of reasonable mitigation within 10 to 15 years.
Short/Medium Term	Permanent visual effects capable of reasonable mitigation within 5 to 10 years.
Short Term	Permanent visual effects capable of reasonable mitigation within 5 years.
Temporary	Temporary visual effects after which the view will be reinstated.
Seasonal	Seasonal visual effects.
Intermittent	Intermittent visual effects.

7.12.3 Assessment of Magnitude of Visual Effects

Footpath WOR/14

Footpath WOR/14 runs to the west of the application site approximately 60-300m away from the proposed development. There are variable short to middle distance views of the site from this footpath as illustrated in Photographs 1 & 2 at Appendix 7.4.

From the southern part of this footpath the proposed development would sit low in the landscape, against the backdrop of high ground and tree cover. Foreground trees and hedgerows would also help to reduce visibility from this direction. From the northern part of this footpath the proposed development would sit behind an existing hedgerow which would hide the lower part of the development, although the upper parts of the buildings and feed bins would be visible above the hedgerow. Raising the hedgerow to 3.0m + along with additional tree planting would help to soften the effect of the development from this direction.

Taking account of the criteria in Tables 7.16, 7.17 & 7.18 the proposed development is assessed as having a Medium adverse scale of effect of Low/Medium geographical extent along Footpath WOR/14. The duration of this effect would be Long term.

Footpath WOR/2

Footpath WOR/2 runs to the north-east of the application site, on the opposite side of the Wych Brook, approximately 100-280m away from the proposed development. There are partial short distance views of the site from this footpath as illustrated in Photographs 3 & 4.

From this footpath the proposed development would be partially screened by the existing vegetation along the Wych Brook, although parts of the development would still be visible through this. The proposed landscaping will help to improve the screening effect from this direction.

The proposed development is assessed as having a Medium adverse scale of effect of Low/Medium geographical extent along Footpath WOR/2. The duration of this effect would be Medium term until the new planting takes effect.

Footpath WOR/4

Footpath WOR/4 runs to the south of the application site approximately 380-246m away. There are filtered middle distance views of the site from this footpath as illustrated in Photographs 5 & 6.

From this footpath the proposed development would be visible in the middle distance against the backdrop of dense tree cover. The foreground hedgerow and trees would also provide a softening effect. The raising of the boundary hedgerow to 3.0m+ along with additional tree planting will help to improve the softening effect from this direction.

The proposed development is assessed as having a Low/Medium adverse scale of effect of Low/Medium geographical extent along Footpath WOR/4. The duration of this effect would be Long term.

Footpath WOR/9

Footpath WOR/9 runs to the south-east of the application site approximately 650-730m away. There are filtered middle distance views of the site from this footpath as illustrated in Photograph 7.

From this footpath the proposed development would again be visible against the backdrop of dense tree cover, similar to Footpath WOR/4, but more distant. The foreground hedgerow and trees would again provide a softening effect.

The proposed development is assessed as having a Low adverse scale of effect of Low/Medium geographical extent along Footpath WOR/9. The duration of this effect would be Long term.

Sarn Road, Threapwood

Sarn Road lies to the north-east of the site on the opposite side of the valley, approximately 550-600m away. There are elevated middle distance views of the site along a short section of this road as illustrated in Photograph 8.

From this short section of road the development would again be visible against a backdrop of rising ground and tree cover. The foreground hedgerow and trees would provide a softening effect. The raising of the boundary hedgerow to 3.0m+ along with additional tree planting would help to improve that softening effect from this direction.

The proposed development is assessed as having a Low/Medium adverse scale of effect of Low geographical extent along Sarn Road. The duration of this effect would be Long term.

Bridleway WOR/18

Bridleway WOR/18 runs to the north of the application site, on the opposite side of the Wych Brook, approximately 320m away. There is only one location along this bridleway with a partial middle distance view of the application site through a gap in the adjacent hedgerow as illustrated in Photograph 9.

From this location the proposed development would be mostly screened by the existing tree cover along the Wych Brook.

The proposed development is assessed as having a Low adverse scale of effect of Low geographical extent along Bridleway WOR/18. The duration of this effect would be Medium term until the new planting takes effect.

Mulsford Lane

Mulsford Lane runs to the south-west of the application site approximately 430m away. There is only one location along this lane with a filtered middle distance view of the application site through a gap in the roadside hedgerow as illustrated in Photograph 10.

From this location the proposed development would sit low in the landscape, against the backdrop of high ground and tree cover. Foreground trees would also help to reduce visibility from this direction.

The proposed development is assessed as having a Low adverse scale of effect of Low geographical extent along Mulsford Lane. The duration of this effect would be Long term.

Dwellings on edge of Threapwood

Based on observations from the application site there are approximately 7 dwellings on the south-western edge of Threapwood with potential views of the application site, varying in distance from 420m to 1000m away.

From these locations the proposed development would be seen against a backdrop of rising ground and tree cover. The foreground hedgerows, trees and vegetation along the Wych Brook would provide a softening effect.

The proposed development is assessed as having a Low/Medium adverse scale of effect of Low geographical extent at these properties. The duration of this effect would be Long term.

Dwellings to the South and West

Based on observations from the application site there are approximately 4 dwellings to the south and west with potential views of the application site, varying in distance from 500m to 720m away. These are Mulsford, Mulsford Cottages, Silver Birches and Caelica Farm.

From these locations the proposed development would sit low in the landscape, against a backdrop of high ground and tree cover. Foreground trees and hedgerows would also help to reduce visibility from these directions. Apart from Caelica Farm, which is the furthest away, only the upstairs windows of these properties are visible from the site.

The proposed development is assessed as having a Low adverse scale of effect of Low geographical extent at these properties. The duration of this effect would be Long term.

7.13 Significance of Visual Effects

7.13.1 Definition

GLVIA3 provides the following definition:

"Significance: A measure of the importance or gravity of the environmental effect, defined by significance criteria specific to the environmental topic."

With respect to determining significance the guidelines advise that there are two main alternative approaches to combining the individual judgements made under the various contributing criteria:

"1. They can be sequentially combined: susceptibility to change and value can be combined into an assessment of sensitivity for each receptor, and size/scale, geographical extent and duration and reversibility can be combined into an assessment of magnitude for each effect. Magnitude and sensitivity can then be combined to assess overall significance.

2. All the judgements against the individual criteria can be arranged in a table to provide an overall profile of each identified effect. An overview can then be taken of the distribution of the judgements for each criterion to make an informed professional assessment of the overall significance of each effect."

This assessment follows the second approach.

7.13.2 Visual Significance Criteria

The criteria in Table 7.19 below provide a recognisable scale against which the significance of effects can be assessed. The criteria are based on Environmental Impact Assessment: A Guide to Good Practice and Procedures Consultation Paper (DCLG 2006)⁽⁴⁾.

Whilst the EIA Regulations require the likely significant effects of a development to be identified, there is no specific guidance as to where the threshold between 'significant' and 'not significant' lies. For the purposes of this assessment any adverse impacts assessed as Major or Severe are considered to be potentially significant to the decision making process.

Table 7.19: Definitions of Significance Terminology (adverse or beneficial)	
Degree of Significance	Definition
Severe (Significant)	Visual effects that represent key factors in the decision-making process. They are generally, but not exclusively associated with sites and features of national importance and resources/features which are unique and which, if lost, cannot be replaced or relocated.
Major (Significant)	Visual effects that are likely to be important considerations at a regional/district scale and, if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision making process.
Moderate (Not Significant)	Visual effects that while important at a local scale, are not likely to be key decision making issues. Nevertheless, the cumulative

	effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource.
Minor (Not Significant)	Visual effects that may be raised as local issues but are unlikely to be of importance in the decision making process. Nevertheless, they are of relevance in the detailed design of the project.
Negligible (Not Significant)	Visual effects that are so slight that there is no need to take them into consideration in the design or mitigation of the development.
Adapted from Environmental Impact Assessment: A Guide to Good Practice and Procedures Consultation Paper (DCLG 2006)	

7.13.3 Assessment of Significance of Visual Effects

All the judgements relating to visual amenity value, visual receptor susceptibility, scale of effect, geographical extent, duration and reversibility have been arranged in Table 7.20 to provide an overall profile of each identified effect. An informed professional judgement has then been made of the overall significance of each effect, as explained in the following paragraphs.

The main public views of the proposed development will be from footpaths WOR/14, WOR/2, WOR/4 and Sarn Road Threapwood where the scale of visual effect will vary from Medium to Low/Medium adverse over Low/Medium to Low geographical extents. Although walkers using of these routes have been treated as having Medium/High susceptibility the views are only of Local Level value. Whilst such visual effects may be raised as local issues they are not likely to be overriding considerations in the decision making process. They are therefore considered to be of Minor/Moderate adverse significance.

Whilst views from Footpath WOR/9 are similar to those on Footpath WOR/4, they are more distant. They are therefore considered to be of Minor adverse significance to the decision making process. The level of effect on all the other publicly accessible views identified in this study are considered to be of Negligible adverse significance.

In terms of private views, the main residential properties affected by the proposed development are those on the south-western edge of Threapwood. These properties have been treated as having Medium/High susceptibility to change, but again their views would be of Local Level value only. Whilst these properties will have potential middle distance views of the proposed development the scale of effect is assessed as being Low/Medium adverse over a Low geographical extent at each property. Whilst such visual issues may be of concern to the occupants it is an established planning principle that there is no right to a view from private properties. This matter is not therefore likely to be a key decision making issue and consequently it is considered to be of Minor/Moderate adverse significance.

The visual effects on the 4 residential properties to the south and west are likely to be of a lower magnitude. They are therefore considered to be of Minor adverse significance.

Table 7.20: Summary of Assessment of Visual Effects

Table 7.20: Summary of Assessment of Visual Effects								
		Sensitivity of Visual Receptor		Magnitude of Visual Effect			Significance of Visual Effect	
Effect		Visual Amenity Value	Visual Receptor Susceptibility	Scale of Visual Effect	Geographical Extent	Duration & Reversibility	Degree of Significance	Significant or Not Significant
Ref	Public Views:							
1	Footpath WOR/14 Walkers	Local	Medium/High	Medium adverse	Low/Medium	Long Term	Minor/Moderate adverse	Not Significant
2	Footpath WOR/2 Walkers	Local	Medium/High	Medium adverse	Low/Medium	Medium Term	Minor/Moderate adverse	Not Significant
3	Footpath WOR/4 Walkers	Local	Medium/High	Low/Medium adverse	Low/Medium	Long Term	Minor/Moderate adverse	Not Significant
4	Footpath WOR/9 Walkers	Local	Medium/High	Low adverse	Low/Medium	Long Term	Minor adverse	Not Significant
5	Sarn Rd, Threapwood Walkers Motorists	Local	Medium/High Medium	Low/Medium adverse	Low	Long Term	Minor/Moderate adverse	Not Significant
6	Bridleway WOR/18 Walkers/Horse riders	Local	Medium/High	Low adverse	Low	Medium Term	Negligible adverse	Not Significant
7	Mulsford Lane Walkers Motorists	Local	Medium/High Medium	Low Adverse	Low	Long Term	Negligible adverse	Not Significant
	Private views:							
8	Dwellings on edge of Threapwood Residents/visitors	Local	Medium/High	Low/Medium Adverse	Low	Long Term	Minor/Moderate adverse	Not Significant
9	Dwellings to south and west Residents/visitors	Local	Medium/High	Low Adverse	Low	Long Term	Minor adverse	Not Significant

7.14 Summary of Significant Effects

7.14.1 Thresholds

As explained in Sections 7.9 and 7.13 above, whilst the EIA Regulations require the likely significant effects of a development to be identified, there is no specific guidance as to where the threshold between 'significant' and 'not significant' lies. For the purposes of this assessment any adverse impacts assessed as Major or Severe would be considered to be potentially significant to the decision making process.

7.14.2 Landscape Effects

No significant adverse landscape effects have been identified in this assessment.

7.14.3 Visual Effects

No significant adverse visual effects have been identified in this assessment.

Allan Moss BA (Hons), BPL, MRTPI, Dip LA, CMLI
June 2017

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2. Guidelines for Landscape and Visual Impact Assessment: Third Edition.
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4. Environmental Impact Assessment: A Guide to Good Practice and Procedures
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CHAPTER 8 – TRAFFIC

8. Traffic

This Chapter compares the existing and future traffic generation and its impact on the surrounding highway network. No significant effects on pedestrians, cyclists or vehicular traffic are envisaged as part of these development proposals.

8.1 Introduction

- 1.1 This Transport Statement has been prepared to consider traffic and transport matters relating to the proposed two shed poultry operation on land controlled by Mulsford Farm, Sarn. The assessment considers the potential impacts on traffic and transportation associated with the proposed poultry development during its operation.
- 1.2 The scope of the assessment has taken appropriate regard of other transport appraisals that have been prepared by SK Transport Planning Limited (SKTP) and Roger Parry and Partners (RPP) on comparable poultry farm schemes in England and Wales in the last three years. In summary previous agreed technical appraisals have presented the following traffic and transport information to be provided:

Existing Situation

- Confirmation of the existing farm operation
- The current number of traffic movements on the surrounding highway network i.e number and vehicle type and over what periods?
- Undertake an assessment of the existing vehicular access arrangements to the site (including HGV routes), as well as a review of Personal Injury Collision (PIC) data to consider any existing collision locations

Proposed Development

- What are the expected traffic movements (by vehicle type) that would be generated by the two-shed broiler unit? (broken down into bird deliveries/collection, feed deliveries, removal of waste etc)?
- Over what periods will these vehicle movements take place? How has this information been sourced and arrived at? (a graph or table showing the types/numbers of vehicles generated on each day through the crop cycle has been prepared to illustrate this).
- Confirmation of the proposed route that HGV traffic associated with the proposed scheme will use, and why this route is considered suitable. If deemed necessary what highway improvements are required?

Responses to all these questions are provided in this document. Note that the assessment work assumes the traffic generation for the proposed scheme has been calculated using the DEFRA theoretical maximum 7.6 bird crop cycles per year. This has been assumed in the technical evidence provided in this document.

This document covers the following information requirements:

- a baseline traffic assessment
- trip generation and assignment onto the adjacent highway network (for bird/feed deliveries, manure/bird removals etc)
- assessment of the traffic impact of the proposed development
- a routing plan for HGV traffic accessing the proposals

8.2 Proposed Development

The site is undeveloped arable farmland located to the north-east of Mulsford Lane, near Sarn. The site is approximately 700m to the north-west of the hamlet of Sarn and 600m north-east of the Mulsford Lane and A525/Hollybush Lane rural lane. Access to the proposed poultry farm will be via a new vehicular access onto Mulsford Lane, circa 75m south-east of the Mulsford Road/Queensford priority junction.

The proposed development description is as follows:

'Erection of two poultry rearing buildings, feed bins and other ancillary buildings, landscaping including ground modelling and tree planting.'

The site layout is shown on Drawing No RJC-MZ63_Huxley-01 in **appendix a**.

There will be 7.6 bird crop cycles per year. Delivery times vary according to the needs of the flock; in line with other poultry operations the movement of birds from the site (known as the depopulation movements) will take place from 0200 in the morning. This assessment considers these night time movements against the baseline traffic flows to give an assessment of the impact of the proposed development.

Employment related to the site will be carried out by existing members of the family business, plus two additional full time members of staff. The increase in private car movements associated with the proposed development will be minimal and well within the day-to-day variation of flow on the network. The catching of birds and the cleaning of the poultry sheds will be carried out by contractors.

8.2.1 Site Access

As mentioned earlier in this document the access to the proposed development will be via a new vehicular access onto Queensford. The access strategy has been modified since pre-application discussions with the Council, to ensure appropriate visibility splays can be achieved onto the public highway. The access will be designed to accommodate the largest vehicles needing to access the site (16.5m articulated vehicles).

The new access onto Queensford will provide visibility splays of 2.4m x 118m in the leading and trailing traffic directions. These splays have been calculated using the recorded 85th percentile vehicle speeds onto Queensford. Commentary on these vehicle speeds is provided later in this report. The proposed site access layout is shown in **appendix b**.

8.2.2 HGV Vehicle Routing

The site has been chosen to allow for a direct HGV routing strategy to and from the A525 to the south. All HGV traffic associated with the proposed poultry operation will use this defined HGV route for vehicle movements associated with chick deliveries, collecting birds and delivering feed. The proposed HGV route is:

Traffic to the proposed poultry site will route from the A525, turning north at the A525/Hollybush Lane crossroads junction and then using the local highway network to the proposed poultry farm site. The route will be reversed for outbound HGV movements.

Manure generated from the proposed development will be used on land farmed by the applicant and taken from the farm by tractor and trailer. This is in line with existing farming practices on the site.

8.2.3 Technical Assessment

In the DfT's 2007 'Guidance on Transport Assessment' paragraphs 4.59 states:

'there is a range of trip rate database tools available that contain national, or in some cases more local, trip rates measures for typical land use sites. However, obtaining an accurate comparison is not always straightforward, especially for atypical developments. In these instances it is recommended that, unless there is a clear valid comparable situation, the assessment trips should be constructed from first principles based on a detailed analysis of the daily operation of the proposed development'

This proposal is atypical and no comparable site exists in the TRICS database. Therefore the traffic/trip generation has been prepared using comparable sites and worst-case scenarios. The movements to be

generated by the proposed poultry development have been derived from a number of different poultry unit schemes including:

- Howle Manor near Newport
- Red Hall Farm near Crewe
- Plas Back Farm, Meifod
- Foxholes Farm, Little Ness
- Great Ness Poultry Ltd
- Bradeley Farm, Bourton
- Far Broadway Farm

First principles were derived from experience of other farms and were cross checked using standard industry figures sourced from DEFRA and Ross Broiler Guides that record the theoretical bird weights that are achievable under optimum growing conditions.

The traffic generation figures for the proposed development are provided later in this document.

8.3 Baseline Conditions

8.3.1 Road Network and Traffic Flows

The application site is located to the north of the Hollybush to Sarn publically adopted rural lane known as Queensford, to the north of the A525. The application site is on land to the north of the aforementioned rural lane. The site and local road network is shown on **plan 1** in **appendix c**.

The site is located a 2.5km crowfly distance north-east of the A525/Hollybush Lane crossroad junction. The A525 provides access to the A49 to the east at Whitchurch and to the A483 via Wrexham to the west.

The proposed HGV route to the site takes traffic off the A525 at the crossroads junction at Hollybush and on to the publically adopted rural lane towards Mulsford Farm. This HGV route is a voluntary scheme and is not a requirement of any previous planning consent. The operators of the proposed development will operate this HGV routing plan to avoid any conflict between poultry traffic using local routes and other vehicles. The proposed HGV route is the shortest route to the A525, and the applicant is not aware of any historic incidents involving HGV's along this route.

The proposed HGV route to and from the proposed poultry operation on Queensford is shown on **plan 2** in **appendix d**.

The rural lane from the A525/Hollybush Lane crossroad junction is subject to the national speed limit and varies in width from 5.0m to 7.0m along its length. As part of the baseline assessment an Automatic Traffic Count (ATC) was placed on this route to the west of the minor rural lane that routes northwards from the lane towards Mulsford Farm.

Whilst the rural lane is subject to the national speed limit (60mph for private cars) the 85th percentile vehicle speeds at the existing site access were recorded as 43.3 mph and 42.6 mph in the westbound and eastbound directions respectively.

Confirmation of these 85th percentile vehicle speeds can be found in the traffic count/speed surveys in **appendix e**.

The existing priority junction from Mulsford Lane onto the lane that routes to the A525/Hollybush Lane crossroads junction benefits from visibility splays of 2.4m by 41m in the leading and 2.4m by 20m in the trailing traffic directions. These existing visibility splays are provided in the publically adopted highway. The original development proposals looked to use Mulsford Lane as the access route onto the public highway, but the access strategy has been amended following comments provided by planning and highway authorities.

Tables 3.1 and 3.2 provide a summary of existing directional traffic volumes on Queensford, the rural lane from the A525/Hollybush Lane crossroad junction.

Table 3.1- Baseline Eastbound Traffic Flows

Date	Total	Cars	LGVs	HGVs
10/06/2017	105	96	9	0
11/06/2017	95	91	4	0
12/06/2017	160	139	17	4
13/06/2017	119	99	17	3
14/06/2017	149	129	16	4
15/06/2017	155	139	13	3
16/06/2017	166	144	18	4
Average	136	120	13	3

Table 3.2- Baseline Westbound Traffic Flows

Date	Total	Cars	LGVs	HGVs
10/06/2017	108	97	11	0
11/06/2017	89	83	6	0
12/06/2017	145	125	15	5
13/06/2017	126	107	16	3
14/06/2017	139	118	17	4
15/06/2017	163	134	22	7
16/06/2017	154	129	21	4
Average	132	113	15	3

The two-way traffic flows on the aforementioned rural lane are shown in table 3.3.

Table 3.3 - Baseline Two-Way Traffic Flows

Date	Total	Cars	LGVs	HGVs
10/06/2017	213	193	20	0
11/06/2017	184	174	10	0
12/06/2017	305	264	32	9
13/06/2017	245	206	33	6
14/06/2017	288	247	33	8
15/06/2017	318	273	35	10
16/06/2017	320	273	39	8
Average	268	233	29	6

This table confirms that there is an average daily traffic flow of 136 vehicles in the eastbound and 132 vehicles in the westbound direction. This gives an average daily two-way traffic flow of 268 vehicles on the route from the A525/Hollybush Lane junction.

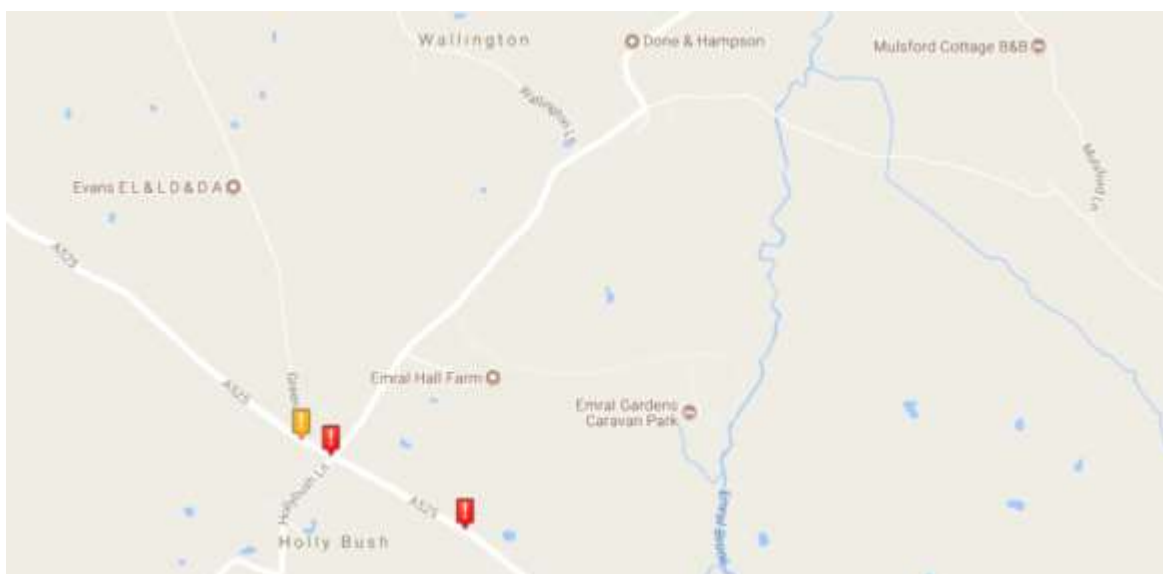
In terms of service vehicles an average of 29 Light Goods Vehicles (ARX Class 3 and 4) used this route on each of the surveyed days. An average of 6 Heavy Goods Vehicles (ARX Class 5 and above) also used this route on each of the survey days.

Tables 3.1 to 3.3 demonstrate that the rural lane is used by an average of 268 vehicles each day. A proportion of this traffic will relate to the existing farming businesses in the local area.

8.3.2 Personal Injury Accident Review

Personal Injury Accident (PIA) data has been reviewed from the Crashmap Website for the last five years. The accident data confirms that no collisions have been recorded in the last five years (2012 to 2016). Extracts from the Crashmap website are provided in **figure 3.1**.

Figure 3.1 – Crashmap Data for the Local Highway Network, including Queensford (from A525/Hollybush Lane Crossroad Junctions (2012 to 2016))



The information shown in **Figure 3.1** confirms that there have been no recorded collisions on Queensford from the A525/Hollybush Lane junction. Three collisions have been recorded in the vicinity of the A525/Hollybush Lane crossroads junction. A summary of these collisions is provided in table 3.4, with the full collision data provided in **appendix f**.

Table 3.4 – Summary of Crashmap Data for A525 in Vicinity of A525/Hollybush Lane junction

PIC Location	Reference	Date and Time	Severity	Conditions	Description
A525	201560S076033	27 May 2015	Slight	Weather – Fine without High Winds Road Surface - Dry	Van or goods vehicle in the act of turning right when collides with car travelling straight ahead
	201260N112461	10 th July 2012	Serious	Weather – Fine without High Winds Road Surface – Wet or Damp	V1 (private car) is waiting to proceed normally when V2 collides with V1
	201460R128779	17 th Aug 2014	Serious	Weather – Fine without High Winds Road Surface - Dry	PIC recorded as three vehicle collision, but only V1 (motorcycle) recorded as

					being involved in collision
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Table 3.4 confirms there is no pattern or causation at the A525/Hollybush Lane crossroad junction that would preclude this junction forming part of the HGV routing to the proposed development site.

8.4 Poultry Farm Traffic

Due to the nature of poultry farming vehicle movements associated with the farming operation are concentrated around certain activities during the cycle. As an example vehicle movements associated with feed deliveries increase during the crop cycle as the bird weights increase. Manure removal takes place at the end of the crop cycle over a short period after bird removal and before chick placement. The removal of birds normally takes place in two phases during the crop cycle.

Manure removal at the close of the crop period represents the peak periods in any given 24-hour period. These are tractor and trailer movements and depending on where the manure is to be spread at times may not even route onto the adjacent public highway (i.e. the manure is spread on fields adjacent to the farm). For completeness these movements are included in table 1 in appendix g.

Bird removal (known as depopulation) at the close of the crop cycle is the most significant traffic event in terms of HGV movements. There are currently no restrictions on any HGV movements on the surrounding highway network. With regard to the proposed poultry farm operation it is good practice and also in line with bird welfare standards to commence the bird depopulation no earlier than 0200.

Crop clearance will take place over two two-day periods separated by a week, and during the 0200 to 0700 period there will be typically no more than two HGV bird removal movements to/from the site per hour. With poultry farm HGV traffic using the HGV routing strategy there is no possibility of these vehicles meeting each other on the public highway, as the loaded vehicle will not be released from the site until the arriving vehicle is on site.

Communications between the site operators and the hauliers are made using radios and mobile phones, to manage the process in terms of the number of vehicles on site at any one time, and also to manage the movement of vehicles on the adjacent public highway.

Given that it is normal for bird removal movements not to start before 0200 on depopulation days it is expected that there will be a maximum of ten HGV movements between 0200 and 0700 during the night for a maximum of 30 days during the year.

Table 1 in Appendix g shows the HGV movements associated with the proposed 100,000 bird operation. On 33 days of the crop cycle there will be no HGV movements to/from the site. On a further 6 days of the crop cycle there will be an average of only 1 HGV visiting the site each day. On 4 days of the crop cycle there will be 2 HGV's visiting the site each day. On only 5 days of the whole crop cycle there will be more than 2 HGV visits per day.

Poultry depopulation good practice and bird welfare standards will be followed and the depopulation will not start earlier than 0200; on the longest depopulation day this will be completed by 0700 hours. The crop clearance will take place over two two-day periods separated by a week, and during the 0200 to 0700 period there will be typically no more than two HGV bird removal movements to/from the site per hour. HGV traffic will use the proposed HGV routing strategy to ensure there is no possibility of these vehicles meeting each other on the public highway.

There will be a maximum of ten HGV movements between 0200 and 0700 during the night for a maximum of 30 days during the year. Table 4.1 below sets out the expected vehicles movements per crop for the proposed poultry farm. The crop cycle profile is provided in Appendix c.

Table 4-1 – Proposed Vehicle Movements per Broiler Crop Cycle

	Description	Vehicle Type, dimensions and approximate weight: full/ empty (tonnes)	Timing of delivery/collection	Number of movements per crop (Number of HGVs)
HGV	Bedding Delivery	HGV: 2.5m wide, 15.4m long	Between 0700 to 1200	2 (1)
	LPG and Woodchip Delivery	HGV: 2.5m wide, 15.4m long	Between 0700 to 1200	2 (1)
	Chick deliveries	HGV: 4 axle rigid. 11.5T empty, c15.3T full.	Between 0700 and 1200	4 (2)
	Fallen Stock collection	7.5 tonne HGV	Between 0700 and 1200	6 (3)
	Night time Bird Collections (thinning over two days)	HGV: 2.5m wide, 15.4m long.	Between 0200 and 0700	12 (6)
	Day time bird collections (thinning over two days)		Between 0700 and 0800	0 (0)
	Night time bird collections (final clearance over two days)		Between 0200 and 0700	14 (7)
	Day time bird collections (clearance over two days)		Between 0700 and 0900	0 (0)
	Feed deliveries	HGV: 2.5m wide, 15.4m long. 17t empty, 44t full.	Between 0700 and 2300	18 (9)
Total HGV Movements				58 (29 HGV's)
Light Vehicles	Vet	Car	0700 to 2300	6
	Cleaning chemicals delivery	Van	0700 to 2300	2
	Cleaners	LGV	0700 to 2300	4
	Vaccination delivery	Van	0700 to 2300	2
	Litter spreader	LGV	0700 to 1200	2
Total Light Vehicle Movements				16

Note: one movement is a vehicle going on site, or leaving site.

Note: day time is 0700 to 2300. Night time is 2300 to 0700.

Table 1 in Appendix g confirms that the proposed poultry operation will generate a total of 74 HGV and tractor and trailer movements over its cycle, or 562 movements over the year (7.6 crop cycles).

When compared to the existing traffic volumes on the surrounding highway network this increase will not have any material impact on existing traffic movements, the use of the local highway network or highway safety. The poultry farm (and other farming and agricultural businesses) use the public highway network surrounding the site and the analysis of the PIA data confirms there have been no recorded conflicts between HGV or agricultural traffic in the vicinity of the site.

Of particular relevance to the impact of the proposed development is the likelihood of any HGV traffic related to the proposed poultry farm meeting another HGV on the highway network. With the route from the A525 being wide enough to already accommodating two-way HGV traffic without interruption, and with this route accommodating an average of 6 HGVs in each 24-hour period the minor increase in HGV movements generated by the proposed development will have no effect on the capacity or highway safety on this route. The likelihood of the additional HGV traffic meeting existing HGV traffic travelling in the opposite direction is exceptionally low.

8.5 Summary of Development Vehicle Movements

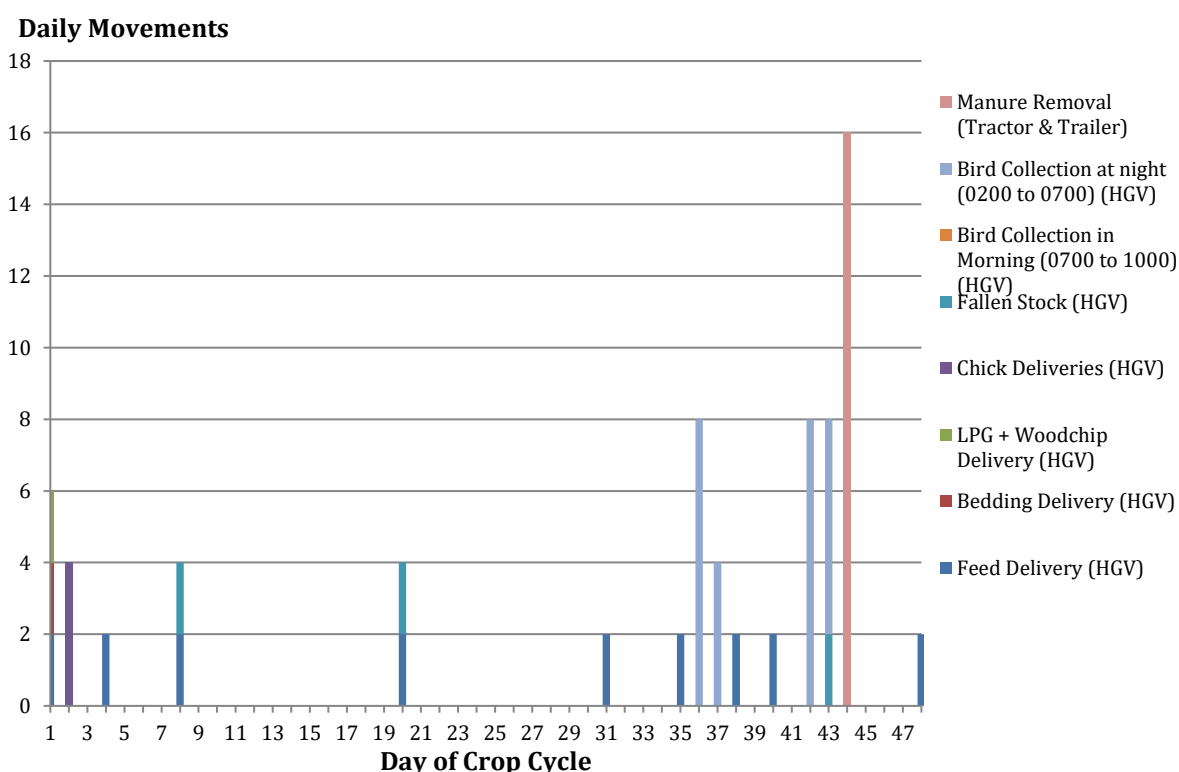
The future movements associated with one crop cycle are broken down per day in **Graph 1 in appendix h**. The graph shows that the peak number of vehicles in any one day will be 8 HGVs associated with the depopulation of birds and a feed delivery.

4.1 Graph 4.1 confirms that:

- on 33 days out of the crop cycle there will be no movements
- on a further 6 days out of the cycle only one vehicle will visit the site
- on a further 4 days of the cycle only two vehicles will visit the site
- in summary for 90% of the crop cycle there will be two vehicles or less visiting the site each day

Graph 4.1- Mulsford Farm Poultry Farm Poultry Crop Cycle

100,000 Bird Poultry Farm - HGV and Tractor/Trailer Movements



8.6 Site Traffic Management

8.6.1 Bird Depopulation

5.1 As part of the poultry farming operation the depopulation activities are carefully managed to minimise the impact on the surrounding area. The depopulation process will operate with a maximum of two movements per hour between the hours of 0200 and 0700. This approach minimises

disturbance to residential properties on the HGV route to/from the site. This two HGV movements/hour has previously been accepted by the Council and the Planning Inspectorate on comparable consented schemes across England and Wales promoted by SKTP and RPP. As stated above bird collections take place at two periods during the crop cycle. The Red Tractor Standard (Standard no. PT.9) states that "The processing plant is responsible for implementing a pre-planned arrivals system" for poultry transport). Approximately a week prior to bird collection the farm receives a logistics timetable from the processing company that provides a very detailed timetable for each lorry. The timetables include:

- The drivers name
- The load number
- The vehicle registration number
- The time that the vehicle is due to leave the poultry processor
- The time that the vehicle is to arrive at the farm
- The time that bird catching for that vehicle is due to start
- The time that the lorry is due to leave the farm
- The time that the lorry is due to arrive at the factory
- The identification number of the team that is due to catch the birds on the farm
- The house number from which the birds are to be caught
- The number of kilograms that are to be loaded into each draw on the lorry
- The number of birds that are to be placed per draw
- The number of draws that the lorry contains
- The age of the birds
- The "program weight" of the birds i.e. the predicted weight of the birds

This organisational approach demonstrates that the impact on the surrounding highway network will be kept to a minimum and the farm will be always aware of the times and vehicle locations during the depopulation period.

8.7 Conclusions

The proposed poultry farm proposals have been carefully prepared to ensure that the development will have a minimal impact on the surrounding area. In addition, this TS has demonstrated that the proposals will generate a minimal amount of additional vehicular movements onto the surrounding highway network.

The use of an HGV routing strategy and timing of HGV movements to and from the site will ensure that any impact on the residents living adjacent to the public highway on the HGV route are minimised.

The proposed poultry farm at Mulsford Farm will provide continued diversity for the farm enterprise and ensure sustained economic growth in the rural area.

This assessment has demonstrated that whilst the proposed development will generate a marginal change in vehicle movements on the depopulation days, for the majority of days there will be minimal change in vehicular traffic to the farm when compared to the existing operation.

Based on the above there are no transport-related reasons why the proposed poultry farm should not be granted planning consent with appropriate traffic/transport planning conditions.

CHAPTER 9 – AMENITY

9. Amenity

This chapter deals with the potential for odour, dust and flies to be produced by the proposed poultry installation 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

9.1.1 Context

The proposed poultry development at land at Mulsford Farm has the potential to affect amenity issues in the area. This chapter presents the findings of a series of risk assessments that have been carried out to assess the potential implications of the proposed poultry development on local amenity. The issues that have been assessed are:

-  Odour;
-  Dust (construction, operation (including bio aerosols) and decommissioning);
-  Flies; and
-  Vermin

It is acknowledged that noise could also be considered to be an amenity issue. However, rather than being assessed here, noise has been included as a separate chapter (Chapter 11 – Noise and Vibration) given the availability of advanced quantitative noise assessment techniques. The overall results are presented in this chapter.

9.2 Legislation, Planning Policy and Other Guidance

9.2.1 Legislation Regulating Nuisance

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 premises;
-  any dust, steam, smell or other effluvia arising on industrial, trade or business premises, which are prejudicial to health or a nuisance.

It should be noted that 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.

As confirmed in PPS 23 (see below), the planning and pollution control systems are separate but complementary. Pollution control is concerned with preventing pollution. The planning system is concerned with the development and use of land. It should focus on whether the development itself is an acceptable use of the land, and the impacts of those uses, rather than the control of processes or emissions themselves. Planning authorities should work on the assumption that the relevant pollution control regime will be properly applied and enforced.

9.2.2 Planning Policy

General

Few planning policies relate directly to the specific amenity issues assessed in this chapter of the ES. Nevertheless, the issues are alluded to in several relevant policy areas regarding air quality and pollution control and general environmental protection as follows:

National Policy

Planning Policy Statement (PPS) 23 – Planning and Pollution Control (2004) is the principle national planning guidance on pollution control issues covering water, land and air quality issues (including dust and odour) and covers pollution in relation to statutory nuisance. With regard to statutory nuisance issues Annex 1 of the PPS states that:

".....The granting of planning permission of any type may change the character of the locality and therefore raise or lower the standard for statutory nuisance in that area. This can have wide implications for the regulatory bodies, local businesses, residents and new extensions. It is not intended to secure a high level of amenity but is a basic safeguarding standard intended to deal with excessive emissions. Nuisance does not equate to loss of amenity. Significant loss of amenity will often occur at lower levels of emission than would constitute a statutory nuisance. It is therefore important for planning authorities to consider properly, loss of amenity from emissions in the planning process and its wider context and not just from the perspective of statutory nuisance."

Annex 1 of PPS23 also states that whilst "it should not be necessary to use planning conditions to control the pollution aspects of development that are subject to prior approval by a pollution control authority.....it may be appropriate to use planning conditions to control other aspects of the development provided they are not covered by the pollution permit and that a land use consideration can be clearly distinguished.....For example, planning conditions could be used in respect of.....odour... and dust from certain phases of the development such as demolition and construction."

9.3 Method of Assessment

9.3.1 Method

The risk assessment technique used in this assessment has been based on guidance relating to intensive livestock farming (from the Environment Agency's (EA's) 'Simple assessment of environmental risk for accidents, odour, noise and fugitive emissions (EPR – H1) – Version 080328 (March 2008)) and includes comprehensive management plans based on accepted guidance and Best Available Technique (BAT). The methodology utilises a range of simple checklist tables to identify sources, receptors and pathways in relation to potential amenity issues.

The types and sources of potential nuisances are identified and the potential sensitivity of individual receptors is qualitatively assessed. This is based upon the nature of, and proximity to hazard generating activities, general wind direction frequencies and the nature of the receptor. In addition, the scope and efficacy of integral controls have been accounted for.

In addition to the above method, historic complaints made to the Environmental Health Department regarding other poultry sites in the vicinity have been analysed in order to judge the frequency of complaints in relation to the amenity issues being assessed at similar sites. Magnitude and significance have been assessed using professional judgement based on the general expected intensity and frequency of any potential impact against the number, nature and sensitivity of receptors potentially affected. For example, a major, long term, release of odour, dust or flies etc. affecting large numbers of residential receptors to a level that would be likely to cause nuisance and complaint, and which is assessed to be a probable occurrence, would constitute an impact of Major Significance. Conversely, a minor release, barely detectable by a very limited number of industrial receptors, and which is assessed as being unlikely to occur, would constitute an impact of Minor or Negligible Significance.

9.3.2 Difficulties Encountered

The nature of the issues being assessed (generally relating to highly variable, intermittent and, therefore, unquantifiable emissions and subjective human responses to them) does not allow reliable quantitative assessment to be carried out. As such, the following assessments are based upon professional judgement and qualitative risk assessment, as set out above, and the experience of the agricultural industry in Wales.

9.4 Baseline Environment and Sensitive Receptors

In terms of other potential sources of amenity impacts, the Mulsford 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 and general receptors were identified around the areas where the poultry manure will potentially be spread and stored within fields. (N.B. distances are from the edge of the proposed operational area) The receptors listed in Table 26 are indicated on Appendix 11 and those close to fields within the control of D J Huxley Farms.

Table 26: Sensitive Receptors

Ref	Name	Easting	Northing	Distance from extension to residential curtilage / footpath (m)
SR1	Sarn Bridge Farm	343901	344775	423
SR2	No 2 Upperwood Barns	343908	345302	437
SR3	No 3 Upperwood Barns	343890	345308	437
SR4	No 4 Upperwood Barns	343884	345320	437
SR5	Wychbrook Farm	343869	344775	459
SR6	No 1, Upperwood Barns	343916	345311	459

9.5 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 Development.

9.6 Complaints History of local sites

9.6.1 Complaints History

No complaints have been made by the public to the Environmental Health Officer (EHO) for local sites within 5 miles that we are aware.

9.6.2 Odour

Generally complaints about odour from agricultural sources are common but the largest numbers of complaints arise from the spreading of manure. The original MAFF Code of Good Practice for the Protection of Air (The Air Code) since updated by *Protecting our Water, Soil and Air – A Code of Good Agricultural Practice for farmers, growers and land managers* states that there were about 9,000 complaints in England & Wales caused by agriculture in 1995/96, involving an estimated 3,646 farm

premises. However odour is rarely an issue at an efficiently operated modern poultry unit as illustrated by the minimal instances of complaints received in relation to the site at Felton Butler 28 miles away.

Research evidence suggests that odour emissions at the time of the growing period during the flock cycle when litter moisture is also rapidly increasing or at high levels. It is known that when litter moisture exceeds 40% there is a progressive decline in the friability of the litter as the moisture increases. When litter moisture reaches 46% the litter becomes capped, i.e. a crust forms, often on top of more friable litter under it. Excreta and moisture accumulate on the capped litter with the result that the activity of anaerobic bacteria break down the excreta and allow moisture to be absorbed is reduced. There is a shift to an aerobic breakdown with consequence that the release of volatile odorants is increased. It is therefore desirable to put strenuous efforts into management practices and building design that lead to low litter moisture levels. Odour emissions will be less and performance, welfare and profitability enhanced. These problems can be avoided and are not anticipated at the application site and will be controlled at source through management practices to keep litter at optimum moisture content for keeping it friable. This will be achieved through management of the shed litter, providing adequate ventilation, controlling shed temperature and humidity, and through dietary manipulation. Odour causes most impact during the cleaning out period and spreading / storage.

Odour from spreading causes minimal nuisance as the manure is incorporated into the land with cultivation methods soon after being spread therefore the duration of the nuisance is minimal. The nutrient value of manure decreases the longer it is left exposed on field surfaces prior to incorporation, it is therefore a commercial incentive to incorporate rapidly thus reducing the duration of odour instances. Spreading practices are and will continue to be carried out in accordance with the Environment Agency Sector Guidance Note *How to comply with your environmental permit for intensive farming* (Version 2 January 2010), the DEFRA *Code of Good Agricultural Practice (CoGAP)*, and the Wrexham Borough Council's information leaflet on *Advice for Dealing with Agricultural Odours*.

9.6.3 Dust

As for odour the dust / bio aerosols at an operational intensive poultry installation are generally not an issue. Within poultry units, the main sources of dust are the birds, their food and the floor litter. Measurements of dust concentrations have been found to be variable depending on the number and age of the birds as well as the level of activity within the buildings. The particle size of dust is variable too. In general terms, particles smaller than 2 microns (2 μm) account for around 70% of the number of particles, but only 5% of the mass. Similarly particles greater than 5 microns (5 μm) account for under 10% of the number but between 40 and 90% of the dust mass.

The particles are emitted into the atmosphere through the ventilation system. The amount of dust emitted is influenced by the level at which the ventilation system is operating. In hot summer weather conditions, for example, the ventilation system will be operating at a higher rate.

Dust baffles will be erected adjoining the ventilation fans to avoid any dust or odour becoming airborne See Chapter 4. The larger dust particles (5 microns/5 μm and over) found within the building either tend to fail to migrate to the ventilation fans, or are expelled from the building and are immediately deposited to the ground. Once released to the atmosphere smaller dust particles will be carried on the wind, with deposition continuing under the natural turbulent flow of the air. With increasing distance from the source there will come a point where the concentration of dust particles which originate from the poultry buildings fall into a level below air quality guideline values as laid down by the EU and eventually become indistinguishable from normal background dust levels.

9.6.4 Flies

Flies are not a problem on a well-managed and hygienically run poultry site; due to the feeding habits of poultry any maggots that hatch in the bedding are soon eaten.

Fly problems at poorly managed poultry farms can occur in the following areas:

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.

Field 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.

The storage of manure is one of the most important factors in preventing fly infestations. Manure that is produced, transported and delivered in a dry, fly free-state can in some cases become infested and cause problems. As good management practice, the applicant inspects existing poultry manure stores when delivered on a frequent basis to ensure that there is no fly activity.

9.6.5 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.

9.7 Potential impacts

9.7.1 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. Sheeting of manure heaps to increase temperature of manure heaps to kill flies and larvae.
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.

9.8 Risk Assessment Results

The results of the risk assessments are summarised below. Due to the nature of the proposed operations, the integral controls and the isolation of the facility from sensitive receptors, no receptor was considered to be more than moderately sensitive to any amenity issue potentially arising from the proposed poultry development.

9.8.1 Odour

If odour were to be released from on-site operations some limited receptors nearby could potentially be effected. However, this presupposes the regular emission of odours from the proposed poultry unit. In reality, during normal operations odour emissions will be minimal due to the proposed management practices. As such, any odorous emissions, if present, would be minor, intermittent and rare. This conclusion is backed up by the low number of odour complaints attributable to modern poultry developments in this area.

At this location, for odour to be released in any appreciable amount at the level to cause a significant nuisance to the local population, serious operational failures would be required (e.g. total closedown of the ventilation whilst birds continue to be housed). The houses are alarmed and management personnel will always be within a 2 minutes response zone from the buildings to repair failed equipment as such a failure would result in multiple mortalities and in a worst case scenario entire crop loss.

The results of the risk assessments would suggest that, whilst the majority of potentially sensitive receptors lie some distance away from the proposed poultry development, a few may lie close enough to potentially be affected if odour were to be released in appreciable amounts.

Recreational areas such as footpaths are relatively low sensitivity as people are present for short periods only.

From the wind-rose provided in Appendix 13 it is clear that the prevailing winds are from the southwest.

The receptors surrounding the land on which the applicant is to spread the poultry manure may be affected for short periods of time during the year by odour nuisance. The risk assessment concluded that the overall risk would not be significant as the manure is incorporated into the soil within 24 hours of spreading.

An odour management plan is to be adopted by the applicant prior to populating the development, the management plan is provided at Appendix 9. This management plan is also included as part of the Environmental Permit application and the Environment Agency will regulate the site and ensure that the site adheres to the plan.

9.8.2 Dust

Similar to odour there are few sensitive receptors occurring close enough to be affected by any dust emitted (coarse dust tends not to travel in appreciable volumes further than 100 metres from any local source due to exponential reductions in concentration and deposition with distance). As such the receptors at any risk due to dust emissions are only likely to effectively include roads along which construction vehicles will travel. Such receptors are unlikely to be particularly sensitive to dust the vehicle movements will not alter the baseline significantly. Also, the prevailing wind direction is not towards any receptors sensitive to dust.

In terms of dust emissions the greatest risks are likely to occur temporarily and intermittently during the construction and decommissioning phases when loose materials are being handled. During the operational phase dust emissions will be controlled at source through management practices and all vehicles removing manure from the site will be covered.

Given that the greatest dust emissions are likely to occur in the relatively short construction and decommissioning phases and there are few sensitive receptors close enough to be effected, and those that are present are outside the prevailing wind direction from the proposed poultry development, it is considered that no significant impact in terms of dust nuisance will occur. This conclusion is supported by the low level of complaints made at the other poultry sites in this area. The one complaint that was made regarding dust was in response to fears regarding Avian Flu. Nevertheless, there is still some minimal risk of dust impacts during construction which will require mitigation via best practice.

9.8.3 Flies

There is a slight occasional risk that the spreading of manure in summer could introduce a potential source of flies into the area that would not otherwise occur. However, with the proposed mitigation controls in place and with prompt incorporation of the manure into the soil it is expected that no significant fly impacts will result. This conclusion is supported by the lack of EHO complaints made. The result of the risk assessment indicates that there would be a considerable number of sensitive receptors in close proximity to areas where manure spreading will take place, however the control measures will limit the effect of flies on these sensitive receptors.

9.8.4 Vermin

Vermin are only a potential risk in close proximity to the source. With the proposed mitigation and management controls it is expected that no significant vermin impacts will result. This conclusion is supported by the lack of complaints made relating to vermin. The results of the risk assessment indicate that the separation distance between the site and sensitive receptors would be too great to have any impact.

9.8.5 Cumulative Impacts with Other Developments

There are no other similar developments within a five mile radius of the proposed site.

9.9 Follow Up Action

During operation the poultry development 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.

9.10 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 development are unlikely. It is predicted that the impacts of the proposed poultry development 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

Churton Ecology was instructed by Roger Parry and Partners LLP to carry out an Ecological Impact Assessment.

10.1 Summary

10.1.1 Background

This report provides information suitable for an Ecological Impact Assessment and may be used to inform the ecology chapter in an Environmental Impact Assessment. The report, commissioned by Roger Parry and Partners LLP, will accompany a planning application and considers the likely impacts on nature conservation of a poultry shed development on land at Mulsford, Wrexham County Borough (main site at SJ4345.4504, south-west access point at SJ4298.4478). The site lies close to the Cheshire/Denbighshire border.

10.1.2 Method of study

A desk study and Extended Phase 1 habitat survey were carried out on April 23rd 2017 in order to assess the current ecological value of the site and immediate surrounds (the zone of influence), to identify potential impacts and ecological constraints and to make recommendations for general mitigation, compensation and further surveys, as appropriate. The desk study search covered a surround of 10km for European designated sites and 5km for nationally designated sites, as recommended for an EclA. Other data (priority habitats and previous species' records) was sought in a 2km surround, as recommended for all development sites.

The data from the presence/absence survey for Great Crested Newt, carried out in two nearby pools in May 2016, was also used.

10.1.3 Baseline Ecological Conditions

Habitats

There are two European designated sites in the 10km surround, two additional national statutory sites in the 5km surround, and one Local Wildlife Site in the 2km surround.

There is some ancient semi-natural woodland, ponds, streams and hedgerows (all of which are priority habitats at national or local levels) in the 2km surround.

The site is not a designated site for nature conservation and is part of a larger arable field (currently Rape). Access to the site has been created along existing rough track, upgrade of which with hard core is near completion. A small river/stream (Wych Brook) runs close to the north boundary of the site; a broad bank between the site and the river supports semi-improved grassland, woodland, scrub and trees. A hedgerow, with some mature trees, runs close to the south-east boundary of the site. Other hedgerows with trees run close to the access track. There are two ponds in the 250m surround.

Arable land is not a priority habitat and is not considered to be an important ecological feature of the site's zone of influence. However, hedgerow is a Wales priority habitat and the south-east hedgerow is considered to be an important ecological feature at a local/site level. The stream falls into the Wrexham Borough Council priority habitat 'linear aquatic habitats' (which includes the bank and associated land) and is also considered to be an important ecological feature at a local/site level.

The two ponds near the site fall into the Wales (and district) priority habitat 'ponds' since both support breeding Great Crested Newt and the south pool supports a Nationally Scarce plant species – Cowbane. As breeding pools, they are considered to be an important ecological feature at a local level.

Species

The stream is known to be used by Otter and UK priority fish species. The stream and hedgerows are likely to be used by a number of other species e.g. by nesting birds, foraging & commuting bats and Great Crested Newt.

The two nearby ponds support a medium sized breeding population of Great Crested Newt and a significant population interchange between these two pools, which are 210m apart, appears to occur. Great Crested Newt are considered unlikely to use the site for shelter since it offers only poor terrestrial habitat, the two ponds are over 100m from the site and there are no pools to the south for GCN to migrate to.

Otter, Great Crested Newt, bats and the UK priority fish species are considered to be important ecological features at a local level, breeding birds at a site level.

10.1.4 Key Impacts without mitigation

Pollution

The development is of a size and type that may have an impact on the statutory sites in the surround. Air pollution is one consideration; however, emissions levels are likely to be so low as to have no predicted negative impact on these sites (a Habitats Regulations Assessment will likely be required to ascertain this).

The potential risk for pollution via water courses is more likely given that the nearby Wych Brook provides a direct link to the River Dee SAC. The impact of water pollution, at any stage of the development but particularly in the operational phase (either directly from the site or from fields spread with chicken manure), could have a significant effect on the River Dee SAC at an international level, and could have a significant effect on Otter and UK priority species using Wych Brook (and the River Dee).

Pollution is dealt with in another chapter of the EIA.

Site specific (GCN)

Negative impacts can be limited to i) the potential disturbance, capture and subsequent harm of (only) small numbers of dispersing Great Crested Newt and ii) the creation of suitable resting places as a result of development related activities (e.g. piles of building materials can create new suitable habitat, albeit temporary), with subsequent disturbance etc. These impacts are relevant to the construction phase only, since the completed development will not result in an obstructive new landscape element which might negatively affect migration behaviour.

Disturbance of better terrestrial habitat along hedgerows and the river corridor is not envisaged, but may occur where works are being carried out close by.

Pollution of the two breeding pools may occur if waste is spread in close proximity to them.

Site specific (other)

Indirect loss of the south-east boundary hedgerow could occur if works are carried out within its root protection zones, with potential negative impacts on protected species.

The potential negative impact of illumination of the south-east hedgerow and/or the river corridor in the operational phase may have a significant effect, in a local/site context, on foraging and commuting bats and/or Otter in the operational phase.

Development work (in the construction phase) that may remove, damage or destroy a nest of a wild bird whilst it is in use must be avoided as it may constitute an offence.

10.1.5 Avoidance, mitigation and enhancement

With rigorous precautions taken with regards construction run-off (construction phase), site drainage (operational phase) and management of waste (operational phase), there will be no residual effects on biodiversity. These issues are dealt with in another chapter of the EIA.

Impacts on GCN can be avoided by using Reasonable Avoidance Measures (RAMs), see 6.1.3.

The south-east hedgerow and river corridor will be protected by temporary fencing during construction.

In the construction and operational phases, external lighting must not illuminate the south-east hedgerow or river corridor (see 6.1.2)

Any clearance of scrub must be carried out i) within the bird nesting season, after a negative inspection for nests has been undertaken ii) outside the bird nesting season between August 31st and March 1st.

10.1.6 Enhancement

A broad band of land along the south-east side of the buildings will be sown and managed as rough grassland.

There will be two areas of tree planting using a woodland mix i) between the buildings and the river corridor and ii) alongside the west hedgerow of the development field.

The west and south-east hedgerows will be allowed to grow to 3m in height and managed at this height; any gaps will be planted up with native species.

A new native hedge will be planted alongside an open section of the access track.
Several new trees will be planted in surrounding hedgerows.

Another option is to create a rough grassland margin (5m wide is suggested) around both of the breeding Great Crested Newt newt ponds.

10.2 Introduction

10.2.1 Background

Churton Ecology was commissioned by Roger Parry and Partners LLP to carry out the necessary ecological surveys to inform an Ecological Impact Assessment. This report will accompany the planning application and considers the likely impacts on nature conservation of a poultry shed development on land at Mulsford, Wrexham County Borough (main site at SJ4345.4504, south-west access point at SJ4298.4478).

The site lies close to the Cheshire/Denbighshire border.

10.2.2 Site Description

The site measures approximately 1.5ha with an additional area of nearly 0.1ha taken up by access track. The site has no wildlife designation, and comprises arable land within a larger arable field with hedgerow boundaries. The access track passes through arable fields more or less following or crossing hedgerows. Most of the hedgerows have several mature trees.

The site and access track is flanked by arable land (currently Rape) on three sides, with river and associated scrub and woodland running close to the north boundary, and pasture to the north.

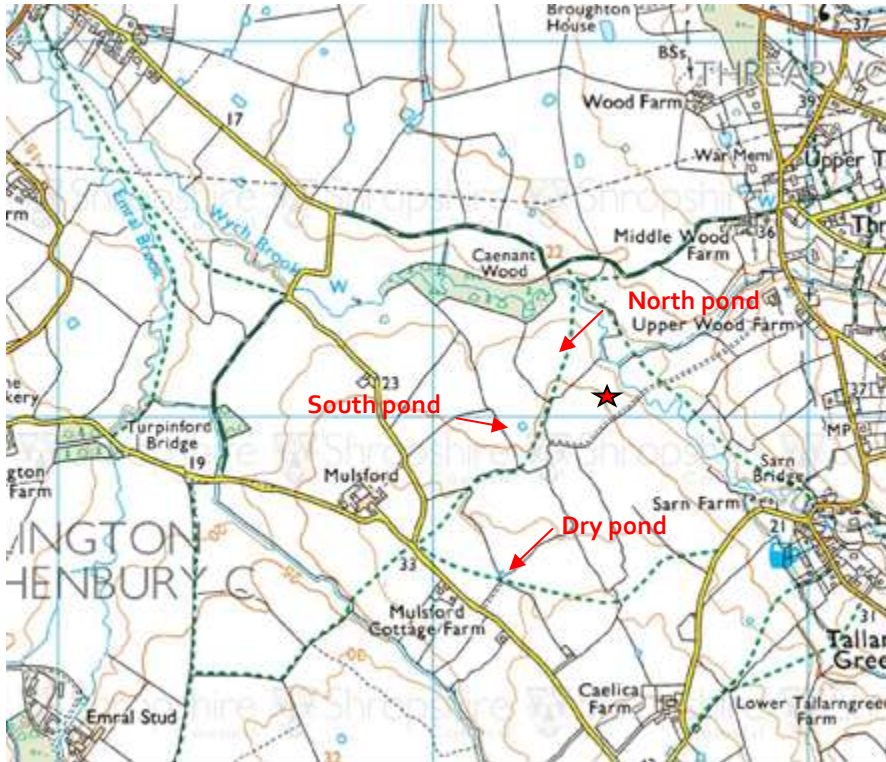


Figure E1: Site location (red star) and access route (red dots) with pools in 250m surround;
OS map licence no.100048619

The access track, which originally was to exit onto the lane using an existing field access, will now exit onto the land 25m to the south; this will require removal of a short section of hedgerow, see landscape plan in Appendix EA6.

10.2.3 Proposed works

Development proposals include the construction of poultry units and associated infrastructure at the site. The access track is an upgrade to an existing track and is near completion. A landscape plan has been drawn up showing proposed enhancements, see Appendix EA6.

10.2.4 Purpose of report

The EclA aims to a) to provide and evaluate ecological information based on the results of field surveys and desk study b) identify and assess any potentially significant ecological effects associated with the proposed development (before and after mitigation) c) identify mitigation measures that might be necessary prior to the submission of a planning application d) identify appropriate enhancement measures.

10.2.5 Sources of Information

Information used in the production of this report was derived from a desktop search (2017), an extended phase 1 survey (2017), assessment of pools within 250m surround (2016) and a detailed Great Crested Newt survey (2016).

10.3 Planning Policy and Legislation

10.3.1 Legislation

10.3.1.1 International, European and National Legislation

The EU Habitats Directive (together with the Birds Directive) forms the cornerstone of Europe's nature conservation policy. It is built around two pillars: the Natura 2000 Network of protected sites (Special

Protection Areas/SPAs and Special Areas of Conservation/SAC's) and the strict system of species protection. All in all, the Directive protects over 1.000 animals and plant species and over 200 so called "habitat types" which are of European importance.

The Habitats Directive is implemented, in England and Wales, by The Conservation of Habitats and Species Regulations 1994 (the 'Habitats Regulations'), amended in 2010, which provides for the protection of 'European sites' and EU protected species.

The protection and management of nationally designated sites is achieved under the Wildlife and Countryside Act 1981, as amended by the Countryside and Rights of Way Act 2000. The protection of other selected species (other than EU protected species) is through Part I of the Wildlife and Countryside Act 1981. Some animals are protected under their own legislation (for example, the Protection of Badgers Act 1992).

10.3.1.2 Designated Sites

Designated sites are areas of high nature conservation value which are protected to varying degrees by UK statutory or international conventions, or local planning policy. The sites form a network of habitats which may be of global, international, European, national, regional or local importance. Information on such sites is sought for all development sites, with a search of a wider surround for an EclA.

Generally, the priority for the protection of designated sites is as follows:

1. Global/International/European/National sites (Special Areas of Conservation - SACs, Special Protection Areas (for birds) - SPAs, Sites of Special Scientific Interest - SSSIs);
2. Regional or local sites
3. Other wildlife sites.

The protection afforded to sites by local authorities, such as County Wildlife Sites (CWS), Local Nature Reserves (LNR) and Sites of Importance for Nature Conservation (SINC), is normally significantly less than for statutory designations. Such designations are predominantly for planning purposes only and, while a local authority may have a stated policy of avoiding development in these areas, there is no statutory protection process.

A Local Nature Reserve is a statutory designation made under Section 21 of the National Parks and Access to the Countryside Act 1949.

10.3.1.3 Protected Species

In addition to habitats, a number of species are considered to be rare or subject to persecution and are also afforded protection through international/European and national law. Species or habitats which are threatened (including many that receive no statutory legal protection), receive national status under the 'UK post-2010 Biodiversity Framework' (formally the UK Biodiversity Action Plan).

Other species are considered to contribute to our 'quality of life'. Although these species do not benefit from legal protection, the possible effect that development may have on their habitat can be a material consideration in the decision making process.

The Wildlife and Countryside Act (WCA), 1981, as amended, The Protection of Badgers Act 1992 and the Habitat Regulations 1994 are the main legislative frameworks for the protection of wild animals in the UK.

Information on such species is sought for all development sites, with a search of a 1-2km surround as well as on the site and immediate surrounds.

Developers must be able to demonstrate that all reasonable measures have been taken to ensure that protected species are not subject to disturbance. The habitats of all Schedule 2 species in the Habitat Regulations, WCA Schedule 1 and some WCA Schedule 5 species are also protected from disturbance

and destruction. Again, all reasonable precautions should be taken to ensure that disturbance does not happen.

10.3.2 Planning Policy

The following sections briefly outline the policies that are relevant to the ecology of the site at International, European, national and local levels.

10.3.2.1 National Planning Policy

The National Planning Policy Framework (NPPF) provides local planning authorities with guidance in relation to conserving and enhancing the natural environment when preparing development plans. The government circular 06/2005, 'Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System', provides administrative guidance on the application of the law relating to planning and nature conservation.

The government's advice to local authorities on reconciling the potentially conflicting objectives of development and nature conservation can be found in chapter 11 of NPPF. The key objective most relevant to this site is:

- minimising impacts on biodiversity through the preferential use of degraded sites or sites with the least environmental value

The main changes from the previous PPS9 seem to be a greater emphasis on creating ecological networks, with net gains for biodiversity wherever possible. The NPPF places less emphasis on legally protected species than PPS9, although does identify the need to maintain biodiversity and protect priority species (formerly BAPs), which typically include protected species.

The presence of a protected species or habitat is still a material consideration when a local authority considers a development proposal. In addition, priority (BAP) species and habitats, or BAP/priority species' habitats receive protection under the provisions of the NERC Act (see Other Guidance below).

As part of the planning process, the competent authority is required to carry out an appropriate assessment to establish whether a proposed development would adversely affect the integrity of European sites. Such a development could only be granted planning permission under very restricted circumstances.

10.3.2.2 Local Planning Policy

Wrexham Local Development Plan (2013 – 2028) will replace the currently adopted Unitary Development Plan 2005.

The following policies in the UDP, under Environment and Conservation, relate to agricultural land and are, therefore, the most relevant to this site:

Policy EC2 Development on agricultural land of grades 1, 2 or 3a will only be permitted if it does not lead to the irreversible loss of that land.

Re Agricultural buildings Policy EC3 The construction of new agricultural buildings will be permitted unless the development is materially detrimental in terms of its impact on the environment or surrounding landscape. The development should form part of an existing farm complex and take advantage of topography and other landscape features for screening. Isolated buildings will only be permitted in exceptional circumstances where there is an essential agricultural need, and no reasonable alternative location for the development.

Policy EC4 Development proposals should provide for the conservation and management of hedgerows, trees, orchards, woodland, wildlife and other natural landscape and water features, and include new planting in order to enhance the character of the landscape and townscape. Development which results in the loss or significant damage to valuable trees, important hedgerows or ancient woodland sites will not be permitted.

Policy EC5 Within Special Landscape Areas, priority will be given to the conservation and enhancement of the landscape. Development, other than for agriculture, small-scale farm-based and other rural enterprises, and essential operational development by utility service providers, will be strictly controlled. Development will be required to conform to a high standard of design and landscaping, and special attention will be paid to minimising its visual impact both from nearby and distant viewpoints.

Policy EC6 Development either within or close to sites of biodiversity interest will only be permitted where it can be clearly demonstrated that the need for the development outweighs the need to safeguard the intrinsic nature conservation value of the site. Where such development is permitted, damage should be kept to a minimum, and compensatory measures should be provided. Measures to improve the biodiversity value of sites and enhance their natural conservation interest and landscape quality including the establishment of local nature reserves, will be supported.

Policy EC13 Development which would result in an unacceptable adverse impact on the water environment due to additional surface water run-off will not be permitted.

10.3.3 Other Guidance

The UK Post-2010 Biodiversity Framework and UK Biodiversity Action Plan (UK BAP)

The UK Biodiversity Action Plan (UK BAP) was first published in 1994 and set out the UK's response to Article 6 of the European Convention on Biological Diversity. The original lists of UK BAP priority species (SAPs) and habitats (HAPs) were subsequently updated in 2007, following a review.

At its termination, 943 Species Action Plans (SAP) and 56 Habitat Action Plans (HAP) were listed in England. These habitats and species are listed in Section 74 of The Countryside and Rights of Way (CROW) Act 2000 and subsequently became habitats and species 'of principal importance' for the conservation of biological diversity in England under the NERC Act.

The 'UK Post-2010 Biodiversity Framework', published in July 2012, has now succeeded the UK Biodiversity Action Plan. In summary of the relevant points, the framework sets out to identify and address causes of biodiversity loss; reduce direct pressures on biodiversity and; improve the status of biodiversity by safeguarding species, habitats and genetic diversity (presumably through linking habitats). In particular, much of the work previously carried out under the UK BAP is now focused at a county level and supports changing international priorities identified in the Convention on Biological Diversity's (CBD's) Strategic Plan for Biodiversity 2011-2020 and the 2011 EU Biodiversity Strategy (EUBS).

NERC Act (2010)

Section 41 of The Natural Environment and Rural Communities (NERC) Act 2006 requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England (the list forms a continuation of S74 of the CROW Act).

The S41 list is used to guide decision-makers such as planning authorities in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions. Most notably this gives additional protection to those species or habitats that do not necessarily receive statutory protection within the planning system (e.g. an area of land used by Slow-worm).

The Wrexham Biodiversity Action Plan has habitat and species action plans for the following, with those relevant to the site in bold type:

Great Crested Newt, Barn Owl, Song Thrush, Badger, **Otter**, Lesser Horseshoe Bat, Black Poplar, Derelict and Industrial Land, Garden, **Linear aquatic habitats** (rivers, streams, canals), **ponds**, upland moorland, woodland, lowland raised bog, lowland wood pasture & parkland and wet woodland. Those highlighted are relevant to this development site.

It is worth noting that the Wrexham Biodiversity Action Plan for 'ponds' states:

Ponds are by definition small bodies of water (under 2ha), a fact that makes them inherently vulnerable to damage. The factors which can degrade ponds are wide-ranging and include: pollution caused by agricultural chemicals, urban run-off and acid rain; direct loss caused by in-filling; vegetation succession; introduction or colonisation of non-native species and inappropriate pond management.

10.3.4 Legal status of species relevant to this site

Bats

All UK bat species are protected under both UK and European Law. Essentially this makes it unlawful to; deliberately capture, injure or kill a bat; intentionally or recklessly disturb a bat whilst it occupies a roost or deliberately cause disturbance to a bat or group of bats; damage, destroy or cause deterioration to the roosting site of a bat; intentionally or recklessly obstruct access to a bat roost.

Notably, legal protection gives absolute protection to bat roosts and their continued ability to function, regardless of deliberate, intentional or reckless action. A roost is defined loosely as a place used for the purposes of breeding, resting or sheltering. Legal protection also extends to seasonal roosts which are not always occupied by bats throughout the year.

Disturbance caused through excessive noise or lighting and/or alterations to the landscape could potentially impact on bat roosting, foraging and/or commuting habitats and may have legal implications with regards European disturbance/roost deterioration laws. It is therefore the duty of the competent authority to take habitat severance, disturbance and land use change issues and their potential for impact on bat populations into consideration when assessing applications for the relevant consent/s.

Great Crested Newt

Great Crested Newt is protected under both UK and European Law. Essentially this makes it unlawful to; deliberately capture, injure or kill a newt; intentionally or recklessly disturb a newt whilst it occupies a place of rest or deliberately cause disturbance to a newt or group of newts; damage or destroy the resting or breeding site of a newt; intentionally or recklessly obstruct access between terrestrial and/or aquatic habitats.

Disturbance caused through excessive lighting and/or alterations to the landscape could potentially impact on terrestrial or aquatic habitats and may have legal implications with regards European disturbance/roost deterioration laws. It is therefore the duty of the relevant competent authority to take habitat severance, disturbance and land use change issues and their potential for impact on Great Crested Newt populations into consideration when assessing applications for the relevant consent.

Otter

Otter is protected under both UK and European Law. Essentially this makes it unlawful to; deliberately capture, injure or kill an Otter; intentionally or recklessly disturb an Otter whilst it uses a place of rest, shelter or protection or deliberately cause disturbance to an Otter or group of Otters; damage or destroy a breeding site or resting place of an Otter; intentionally or recklessly obstruct access to any structure or place that it uses for shelter or protection.

Notably, legal protection gives absolute protection to breeding and resting places used by Otter, regardless of deliberate, intentional or reckless action.

Disturbance caused through excessive lighting and/or alterations to the landscape could potentially impact on the foraging and/or commuting habitats of Otter and may have legal implications with regards European disturbance laws. It is therefore the duty of the Planning Authority to take lighting and land use change issues and their potential for impact on Otter populations into consideration when assessing planning applications.

Birds

With the exception of Schedule 1 listed bird species, which receive a higher level of protection against breeding disturbance, all common species of bird are protected during their breeding activities under the Wildlife and Countryside Act 1981.

Essentially, this makes it an offence to intentionally take, damage or destroy the nest of any wild bird whilst that nest is occupied or being built; intentionally take or destroy the egg of any wild bird.

10.4 Methodology

10.4.1 Scope of Assessment

Since the access track is an upgrade to an existing track and is near completion, this part of the development site has not been considered further in this report.

The zone/area of influence was considered to be the site within the red line boundary and its immediate surrounds (stream corridor and east hedgerow); however, the presence of Great Crested Newt breeding ponds was considered within 250m of the site. In addition, the presence of special sites for nature conservation, which could be influenced by pollution much further from the site, was also considered.

The ecological features considered included a) all habitats within the site and immediate surrounds, noting presence or not of priority habitats b) presence and/or potential for presence of protected, priority or notable species within the site and immediate surrounds c) pools in the 250m surround d) special sites in the 2-10km surround.

10.4.2 Desk study

The desk study was conducted in April 2017 using the following sources:

- MAGIC maps
- Record (Cheshire)
- Cofnod
- OS maps and aerial photographs, to identify landscape features of potential interest including ponds, streams and ditches, and areas of apparent (semi-) natural value.

The desk study sought ecological information on the presence of:

- high value ecological sites in the wider surround (European designated sites within 10km and nationally designated sites within 5km)
- locally designated and non-designated sites and habitats of principle importance (UK priority habitats) within 2km
- protected species, UK and local priority species and other notable species in the 2km surround. This search highlights the species that are present or have been found in the area.

10.4.3 Habitat and plant survey

A phase 1 survey of the site and immediate surrounds was conducted on 23/4/2017 by Kate and Rob Thorne following the JNCC (1993) Phase 1 methodology, see Appendix EA1 for Phase 1 map. All plants on site were noted and have been listed in Appendix EA5. In the text species are referred to using their English names (Appendix 4 provides a list of their scientific names). Nomenclature follows Stace, C. (2011) New Flora of the British Isles.

The habitats were assessed, and their importance/value noted based on botanic diversity and/or their potential to support uncommon or rare species of fauna (e.g. axiophytes/Red Data Book species).

10.4.4 Protected species survey

10.4.4.1 Bat species

Trees in the hedgerow near the south-east boundary of the site were assessed for potential bat roosts on 23/4/17, from ground level. There are no trees or other structures on the site that might support roosting bats.

A general habitat suitability assessment of the site and surrounds was carried out to determine their value as potential foraging and commuting habitats.

10.4.4.2 Great Crested Newt (*Triturus cristatus*)

Aquatic habitats with the potential to support breeding Great Crested Newt were sought within 250m of the original site (further to the north-west). Three possible pools were identified, visited and assessed in 2016 and two of the pools subsequently were surveyed in detail, see detail of methods in Appendix EA2; the third pool was dry. These two pools also fall within the 250m surround of the new site location and were re-visited on 23/4/17.

The habitats on site were assessed for their suitability to provide resting places or areas suitable for shelter or protection (referred to as terrestrial habitats). The potential for newts to traverse the site and any dispersal limitations that might interrupt such migrations were also considered.

10.4.4.3 Otter (*Lutra lutra*) and Water Vole (*Arvicola amphibious*)

Signs such as holts, hovers, couches, paths, footprints, spraints and feeding remains were sought along the nearby stream and its supporting habitats on 23/4/17. This was achieved by walking along the stream and checking for features likely to be marked by commuting individuals or used for the purposes of rest or shelter.

10.4.4.4 Dormouse (*Muscardinus avellanarius*)

Suitable woodland and hedgerow habitats were noted within or adjacent to the site on 23/4/17. Dispersal links and barriers to suitable woodland habitats were also considered in relation to hedgerow/woodland links.

10.4.4.5 Badger (*Meles meles*)

Burrows were sought on the site and within a 50m surround (at least) on 23/4/17.

Other evidence of activity, such as latrine pits, paths, snuffle holes, feeding remains and hairs (in burrow spoil or snagged along trails) were also sought.

10.4.4.6 Reptiles

Suitable habitat within the site and adjacent surrounds, with potential to support the 'widespread' reptile species, was sought on 23/4/17. Areas were assessed for their potential to provide permanent, seasonal and/or temporary reptile habitats. Dispersal links and barriers between more abundantly suitable habitats were also considered in relation to mobile and/or transient species.

10.4.4.7 Birds

Habitats with potential to support common, priority or Schedule 1 species of bird were sought within the site and surrounds. A list of bird species using the site and adjacent surrounds was established during the survey and old nests encountered were attributed to species, where possible.

10.4.4.8 Other protected or priority species

The walkover process is generally designed to pick up on anything that may be encountered or inferred from habitat suitability.

10.4.5 Evaluation methodology

Evaluation of ecological features (habitats and species) follows the current CIEEM guidelines for Ecological Impact Assessment (2016).

In order to assess impacts arising from a particular development, it is necessary to establish the nature conservation importance (value) of each feature that may be affected by development proposals.

This evaluation process assesses the geographical scale of importance as follows:

- International (Europe)
- National (Wales),
- County (Denbighshire)
- District (Wrexham County Borough),
- Local ().

The CIEEM guidelines suggest that importance/value assigned to a feature should be a matter of professional judgement based on available guidance and information, which can include the following:

- existing designations;
- biodiversity value (including rare species, habitats that may support rare species, notably large or diverse species populations, habitat availability, extent and diversity, priority habitats and species).

Individual species that are protected under European or domestic legislation are evaluated as above, but with an additional consideration of legal obligations.

10.4.6 Assessment Methodology

10.4.6.1 Characterising Ecological Impacts

The potential impacts (and effects) of the proposed development, which might arise from the development in the absence of avoidance measures and/or mitigation, are considered only for 'important ecological features (habitats or species)' identified as such in the 'Baseline Conditions' (section E4). Impacts cover those in the construction and operational phases in this report.

The following terms are used to describe impacts (and effects)

- Direct or indirect
- Positive or Negative;
- Magnitude;
- Extent;
- Duration;
- Reversibility; and
- Timing and Frequency.

10.4.6.2 Estimation of Significance level of Impacts and Effects

An ecologically significant impact or effect is defined as an impact (negative or positive) on the integrity of a defined site or ecosystem and/or conservation status of habitats or species within a given geographical area. Positive impacts are likely to be rarer, but are possible if ecological enhancements are included within a scheme's design at an early stage in the project.

In the new CIEEM guidelines for EclA, there appears to be more of a distinction between impact and effect. An impact and effect is likened to 'cause' and 'effect' e.g. loss of hedgerow (impact) leading to loss of bird breeding habitat. (effect). However, the use of one or other of these terms is not always clear.

A level of significance is applied to all impacts and effects.

The level of significance of the impacts and effects of a development is a product of the characteristics of the impact (direct or indirect etc, see above) and the importance of the receptor (in terms of development control, policy guidance and legislation against the level at which it is valued).

When evaluating the level of significance of impacts and effects on sites and ecosystems at sub-national levels of importance, the description of the ecologically important characteristics of the site or ecosystem falls to the ecologists carrying out the assessment.

The main purpose, however, of the EcIA is to assess 'the significance or not (and the level of significance) of any residual effect' on each important ecological feature after mitigation and enhancements.

As with 'importance' of an ecological feature, the level of significance follows the same hierarchy – international, national etc. However, an impact on a species or habitat of e.g. national importance does not mean that that impact is significant at a national level.

10.5 Baseline Conditions (findings and evaluation)

10.5.1 Designated sites

10.5.1.1 Statutory sites

The River Dee and Bala Special Area for Conservation (a European designation) is located at 3km to the N/NW of the site at its nearest point. The River Dee is also an SSSI.

Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses, as part of the Midland and Mosses Phase 2 Ramsar site, and also a Special Area for Conservation (both European designations) as well as being a National Nature Reserve and an SSSI (national designations) is located at nearly 10km to the south-east of the site. Hanmer Mere at around 6km from the site is also part of the same Ramsar Site.

Within 5km there is one other SSSI – Well Rough and Long Plantation SSSI – which lies along the Wych Brook at 1.8km upstream to the south-east. Cloy Brook Pastures SSI are located just outside 5km to the SW.

Details of the above sites are set out in table E1 below.

10.5.1.2 Non-statutory sites

Tallarn Green Meadows Local Wildlife Site is present in the 2km surround, to the east of the site.

Table E1: Statutory and non statutory sites in the 2-10km surround (European 10km, national 5km, local 2km)

Site name	Legis-lation	Level of importance	Distance from site	Details
River Dee and Bala SAC	Hab regs	International	3km N/NW nearest point	Important features: Water courses of plain to montane level, Atlantic Salmon, Floating Water-plantain, Sea Lamprey, River Lamprey, Brook Lamprey, Bullhead, Otter
Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SAC	Hab regs	International	Nearly 10km to to SE	Important features: Active raised bog, and Degraded raised bog capable of recovery
Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses Ramsar Site	Hab regs	International	Nearly 10km to to SE	Wetland of international importance
Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses NNR and SSSI	WCA	National	Nearly 10km to to SE	The meres and mosses of the Clwyd-Cheshire-Shropshire-Staffs plain form a nationally and internationally important series of open water and peatland sites. They have developed in natural depressions in the glacial drift (sands and boulder clays) left by the ice sheets as they retreated from this plain some 15,000 years ago. Fenn's etc Mosses together form an outstanding example of a lowland raised mire. The moss complex, which straddles the border between Shropshire and Clwyd is one of the largest and most southerly raised mires in Britain. The site is highly valued ecologically as an example of mire development occurring under relatively warm and dry conditions and lying at the edge of the British range for this type of habitat.

River Dee SSSI	WCA	National	3km N/NW nearest point	The River Dee is notified for its nationally important transition through a range of river types from mesotrophic to eutrophic. It is also notified for Atlantic salmon, otter, club-tailed dragonfly and fluvial geomorphology
Well Rough and Long Plantation SSSI	WCA	National	1.8km to the south-east	Woodland on steep slopes in Wych Brook valley; Ash, Oak and wet woodland
Tallarn Green Meadows WS		County	Just under and over 2km to the south-east	

10.5.1.3 Priority habitats

There is some ancient semi-natural woodland in the 2km surround, largely associated with streams. The nearest such woodland is nearly 1km to the south. Caenant Wood, 265m to the north-west, is not ancient but is a mix of coniferous and broadleaved woodland flanking the Wych Brook. Other priority habitats (at national and/or local levels) in the surrounds include ponds, streams and hedgerows.

10.5.2 Site habitats and plants

10.5.2.1 Overview

The site is not a designated site for nature conservation.

The site is part of a larger arable field (currently Rape). Access to the site has been created along existing rough track, upgrade of which with crushed stone is near completion; the track runs along and through a series of hedgerows. A small stream ('Wych Brook') runs close to the north-east boundary of the site; a bank between the site and the river supports semi-improved grassland, woodland, scrub and trees. A hedgerow, with some mature trees, runs close to the south-east boundary of the site with a grassland margin between the Rape crop and the hedgerow. The only habitat on the site is arable land i.e. there will be loss of 1.5ha of arable land to development

Arable land is not a priority habitat and is not considered to be an important ecological feature of the site's zone of influence.

Hedgerow is a Wales priority habitat but the nearby hedgerows tend to be species-poor and compromised by trimming; their importance is raised, however, by the presence of mature trees and the likelihood that they are used by a number of species. The nearby/south-east hedgerow is, therefore, considered to be an important ecological feature at a site level.

The stream falls into the Wrexham Borough Council priority habitat 'linear aquatic habitats' (which includes the bank and associated land) and, since it supports a number of species, is also considered to be an important ecological feature at a local level.

The two ponds near the site fall into the Wales (and district) priority habitat 'ponds' since both support Great Crested Newt and pond 2 supports a Nationally Scarce plant species – Cowbane. As breeding pools, they are considered to be an important ecological feature at a local level.

10.5.2.2 Habitat descriptions (site and immediate surrounds)

Arable

The site is solely arable land, currently supporting a Rape crop with a very few arable weeds e.g. Red Dead-nettle, Common Chickweed, Hedge Mustard, Groundsel, Pineappleweed and Fat Hen.

Grassland

Field margin

A wide species-poor grassland margin runs along the south-east side of the Rape crop; this is more or less the east boundary of the site. Improved grassland is dominant but merges into an older grassland

type near the hedge. Grasses present overall include Perennial Rye-grass, Meadow Foxtail, Annual Meadow-grass and Cock's-foot. Grassland herb species include White Clover, Hogweed and Cut-leaved Crane's-bill with a few arable weeds present [Sticky Mouse-ear and Greater Plantain] and Cow Parsley.



Photograph 1: site viewed from the south-west; south-east hedgerow right/east; riparian corridor (distant tree line); grassland field margin (foreground)



Photograph 2: site viewed from the north-east; south-east hedgerow left; grassland field margin (foreground); site on right/north-west

Bank

A wide bank (approx 4m wide) of semi-improved long grassland descends to the wooded river corridor just to the north-east of the site. This supports a few grasses [Yorkshire-fog (dominant), Meadow Foxtail, Cock's-foot and Red Fescue] and grassland herbs [Common Sorrel, Knapweed, Creeping Buttercup, Yarrow, Dandelion and Cuckooflower]. There is some content of shade-loving species as the grass merges with the tree zone e.g. Red Campion, Cow Parsley, Garlic Mustard, Lesser Celandine and Hedge Woundwort. Also present are Nettle, Broad-leaved Dock, Curled Dock, White Dead-nettle and Ground-elder.



Photograph 3: site viewed from the north-east; grassland bank (foreground) descending to river corridor (right/north); site on left/south-west

Stream

The stream is moderately fast flowing but quite deep with silted margins (TN3 on phase 1 map in Appendix EA1).

Trees and shrubs flank the margins. Shrub species include Hawthorn (in old hedge), Osier and Grey Willow; tree species (mature and immature) include Alder, Ash, Oak and Crack Willow. There is a mix of woodland ground flora species [Ramsons, Wood Speedwell, Dog's Mercury, Ivy-leaved Speedwell, Wood Avens, False Brome, Yellow Archangel, Large Bitter-cress, Bugle, Golden-saxifrage and Ground-ivy] and wetland species [Reed Canary-grass, Water Chickweed and Himalayan Balsam]. Nettle is frequent.



Photograph 4: Wych Brook and riparian woodland north-east of site

Hedgerow

Hedgerow near south-east site boundary

The hedgerow close to the south-east boundary of the site (TN6) is intact and closely trimmed, with a few mature Oak trees. Woody species present include Hawthorn, Hazel, Blackthorn, Oak and Dog Rose. Woodland ground flora (as listed under the Hedgerow Regulations) includes only one species – Dog's Mercury – but a few other typical hedgerow herbs are present e.g. Greater Stitchwort and Cow Parsley. The hedge links with three other hedgerows and the riparian corridor, and also runs alongside an old grassy track (links with a bridge over the stream). Given the combination of the above features, the hedge is considered to be an 'important' one (as per the Hedgerow Regulations).

Hedgerows near access track

Hedgerows associated with the access track are all similar. All are closely trimmed, with only 4-5 woody species per hedge [Hawthorn (often dominant, Blackthorn, Elder and Field Maple] and occasional significant sized gaps. Most of the hedges have some content of mature trees [Oak (dominant) and Ash] but have few or no woodland ground flora species [Wood Aven]. Other typical hedgerow ground flora species include Hemlock and Cow Parsley. A few hedges have accompanying ditches with wetland ground flora species including Hemlock Water-dropwort and Wavy Bitter-cress.



Photograph 5: Upgraded access track alongside hedge and ditch



Photograph 6: Access track exit onto land (red dashes)

10.5.2.3 Habitats in the site surrounds

The site lies in a rural location close to a stream (Wych Brook) which marks the Wrexham County Borough/Denbighshire and Cheshire county boundaries. The surrounding farmland is a mix of grassland and arable land with hedgerow boundaries containing several mature trees, and areas of

woodland largely located along the stream. Pools are also a feature of the landscape, with two in the 250m surround of the site as follows:

Both pools are now surrounded by cultivated land (improved grassland in 2016). Bulrush, as in 2016, is frequent in the margins. The south pool (TN5) supports a couple of plants of particular interest (Cowbane and Cyperus Sedge). This pool otherwise has few wetland species and appears not to have much suitable egg laying material for Great Crested Newt. The north pool (TN1) has much more egg laying material (includes Water Forget-me-not) and supports a greater variety of wetland plants.



Photograph 7: north pool (south end), viewed from the west



Photograph 8a and B: south pool, viewed from the south (top 2016, bottom 2017)

10.5.2.4 Flora

Most of the species on the site and in the immediate surrounds are common. *Cardamine amara* (Large Bitter-cress), a county scarce plant, was noted in the river corridor. *Carex pseudocyperus* (Cyperus Sedge), found in both ponds, has some rarity status in Wales ('near threatened') and *Cicuta virosa* (Cowbane), found in the south pond is nationally scarce.

Cowbane, in particular, is characteristic of many of the meres and pools in this region (cross county).

10.5.3 Protected species survey

Note: some are also UK priority species

10.5.3.1 Bats

Species recorded post 2000, within 2km, have been from over 1km of the site and include *Pipistrellus pipistrellus* Common Pipistrelle, *Pipistrellus pipistrellus* Soprano Pipistrelle, *Plecotus auritus* Brown Long-eared Bat, *Nyctalus noctula* Noctule and *Myotis* sp. Natterer's bat. These are largely records of bats in flight with a very few being roost sites.

Some of the mature trees near the site may be used for roosting; those in the hedgerow near the south-east boundary have no obvious bat roost features but they are of an age and type that might support smaller roosts.

The site represents poor foraging habitat but the hedgerows, and river corridor close to the site boundaries may be used by foraging and commuting bats.

This species group is considered to be an important ecological feature, likely at a local level.

10.5.3.2 Great Crested Newt

There is a single record for Great Crested Newt at nearly 2km to the south-east.

The Habitat Suitability Index for each of the two pools was 'good' in 2016, see Table E2 in Appendix EA2. This has not changed in 2017, although the immediate surrounds of the pools was improved pasture in 2016, and is arable in 2017. A small area of rough ground (good for newts) close to the pool margins, present in 2016, has been lost to cultivation.

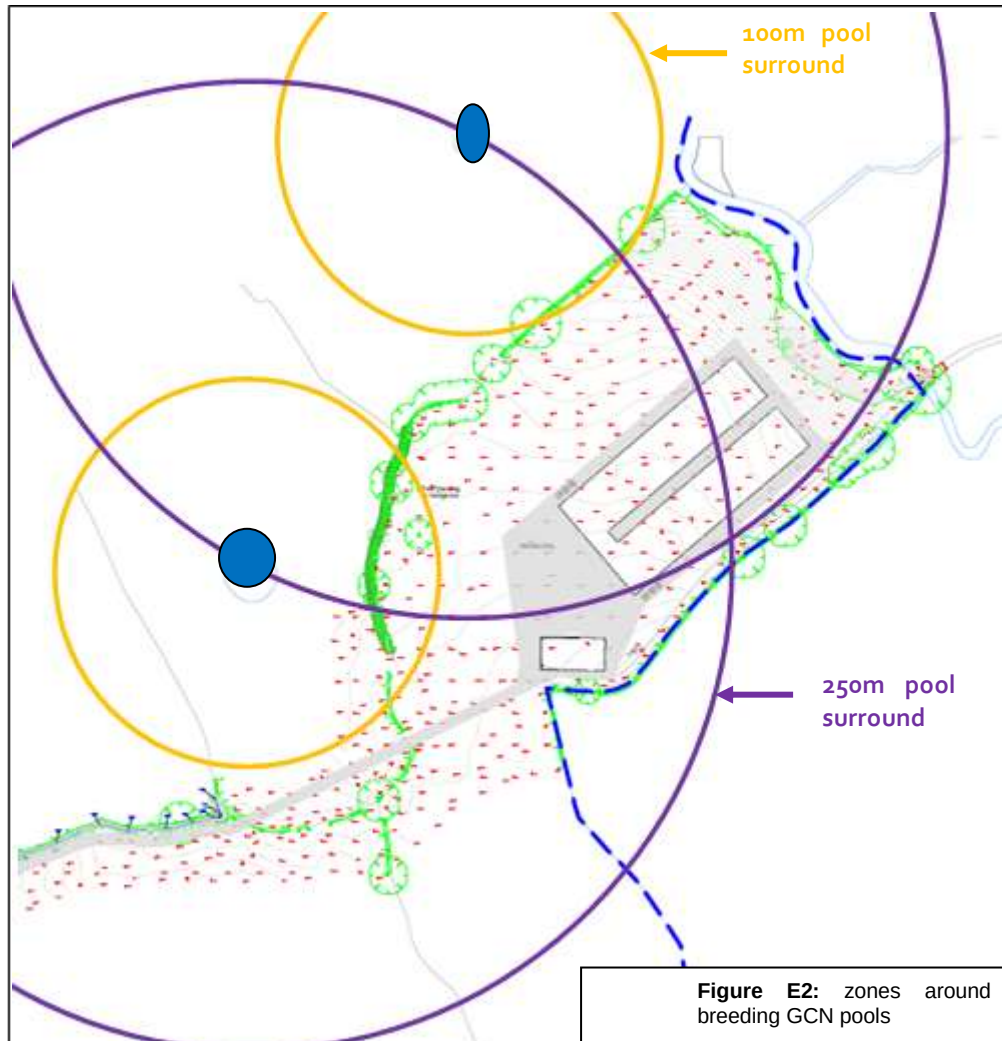
In 2016, the presence of Great Crested Newt was established on the initial visit when eggs were found in both pools. [Egg laying was noted again in April 2017].

A detailed GCN survey was subsequently carried out in 2016 see Appendix EA2 for method and results. Together, the ponds were found to support a medium breeding population of Great Crested Newt (62 individuals in traps) on 13/5/16. On this date, only 20% were found in the north pool, although there was much more evidence of egg laying here. The next highest count (30 individuals) was on 31/5/16 (fifth visit) when only 13% of individuals were in the north pool.

Significant population interchange between these two pools, which are 210m apart, appears to occur; the large number of adults found in the south pool on 13/5/16, with little evidence of egg laying, at the same time as numerous eggs and few adults were noted in the north pools, suggest that there may have been recent migration from one pool to the other. The GCN in each of these two pools is considered to be part of the same (meta-) population and may be an isolated one, given that i) the Wych Brook represents a significant barrier to dispersal to and from a number of pools in the 1km surrounds to the north ii) the nearest pool to the south is at 650m distance, well outside the typical area of population interchange.

The development site and the immediate pool surrounds (and land between the pools), as grassland in 2016 and now arable in 2017, remain poor quality terrestrial habitat. High quality terrestrial habitats are provided by the hedgerows; the hedgerow along the north-west of the site field (TN4) provides a covered link between the two pools. Additional suitable terrestrial habitat in the wider surrounds is provided by the woodland flanking the Wych Brook, to the north of the pools (90m from the north pool, 275m from the south pool).

Although the site location comprises poor terrestrial habitat and only covers an area of 1.5ha, with all land between 100m and 250m of either of the two pools (see figure E2), this species is considered to be an important ecological feature, at a local level.



10.5.3.3 Otter

There are several post 2000 records for this species along Wych Brook [SJ4444 (the site monad), SJ4245 and SJ4146] and along Emral Brook [SJ4245 and SJ4244].

On 23/4/17 some likely Otter footprints were noted but no spraints along Wych Brook; the water appeared to have been up to a higher level recently and there were few features suitable for Otters to mark. No potential holts were found but the river corridor does provide opportunities for shelter (hovers), commuting and foraging.

Otter is considered to be an important ecological feature at a local level.

10.5.3.4 Water Vole

There are two post 2000 records for Water Vole at over 1km from the site in SJ4245 (Wych Brook) and SJ4144.

No evidence of Water Vole was noted along the section of brook adjacent to the site. The survey was not aimed at being comprehensive (it was an incidental part of the Otter survey) as the site is well clear of the stream banks.

Water Vole is not considered to be an important ecological feature of the site's zone of influence.

10.5.3.5 Dormouse

There are no records for this species in the 2km surround.

The site itself lacks suitable habitat for Dormouse but there is some potential in the river corridor and hedgerows. However, given the lack of records, the trimmed nature of the hedgerows and the distance to woodland, it is considered highly unlikely that this species is present on or near the site.

Dormouse is not considered to be an important ecological feature within the site's zone of influence.

10.5.3.6 Badger

Badger has been recorded in SJ4345 at over 500m from the site.

A marked trail was noted running through hedge to the north-west of the site; this runs along the river bank under tree cover with a well-used path branching off to cross the stream via a fallen log. Latrines are located close to the branch path.

No setts were found in the riparian woodland near the site. There is no Badger activity on the site. Badger is not considered to be an important ecological feature within the site's zone of influence.

10.5.3.7 Reptiles

There are no previous records for reptiles in the 2km surround.

The intensively farmed nature of much of the site and its surrounds makes the presence of reptiles on or near the site unlikely. Grass Snake probably uses the river corridor.

Reptiles are not considered to be an important ecological feature within the site's zone of influence.

10.5.3.8 Birds

Previous bird records

Note: potentially breeding specially protected and UK priority species in the area are in bold type.

Previous recent (post 2000) records for UK specially protected birds in the 2km surround include i) Common Kingfisher (a few records along Wych Brook in SJ4245 and SJ4345) ii) several wetland birds [Bewick's Swan, Northern Pintail and Common Goldeneye] iii) birds of prey [Barn Owl (in SJ4245, SJ4346, and SJ4443), Red Kite (in SJ4246)] iv) smaller overwintering non wetland birds [Fieldfare].

In addition, there are previous recent (post 2000) records for several Wales priority (S7 species) in the surrounds as follows:

Woodland species – Willow Tit

Hedgerow/scrub species – Reed Bunting (plus wetland), Eurasian Tree Sparrow, Dunnock and Bullfinch
Species associated with housing – House Sparrow and Common Starling.

Ground nesting birds: Skylark, Eurasian Curlew, Northern Lapwing and Ring Ouzel

Wetland species: Black-headed Gull

Other species: Kestrel.

Other birds with some sort of rarity status (but not specially protected or S7 species) include some additional wetland ducks, swans and geese species, waders [Redshank] some ground nesting birds

[Eurasian Woodcock], some species associated with buildings [Common Swift and House Martin] and other species [Mistle Thrush and Common Gull].

Birds noted during the field surveys were largely just off site around the boundaries or around the pools. UK priority species noted included Reed Bunting (north pool 2016). Birds with amber status noted included Redstart and Willow Warbler. Common species included Blackbird, Chiff-chaff, Robin, Pheasant and Blackcap.

Evaluation (birds)

The site (with Rape dominance) lacks suitability for the priority ground nesting birds previously recorded in the surrounds.

Hedgerow, woodland and mature trees, present only near the site and access route, have potential for species typical of these habitats to breed.

Birds are considered to be an important ecological feature at a site level.

10.5.3.9 Other protected and priority species

Fish

Atlantic Salmon (*Salmo salar*), River Lamprey (*Lampetra fluviatilis*), Sea Lamprey (*Petromyzon marinus*), Brown Trout (*Salmo trutta*) and European Eel (*Anguilla anguilla*) have all been reliably recorded post 2000 in Wych Brook and Emral Brook.

These species are considered to be important ecological features at a local level.

Other

Brown Hare has been recorded rarely from distances between 1.5km and 2km from the site (2005 - 2016) – UK protected and priority species.

No evidence of or potential for other protected or priority species was noted.

10.5.4 Site evaluation summary

The following ecological features are considered to be of some importance within the zone of influence:

- South-east hedgerow - of importance in a site context
- Stream - of importance in a local context
- Breeding GCN ponds - of importance in a local context
- Great Crested Newt - of importance in a local context
- Bats - of importance in a local context
- Otter - of importance in a local context
- Birds - of importance in a site context
- UK priority fish species - of importance in a local context

10.5.5 Survey limitations

There were no significant survey limitations.

10.5.6 Further survey recommendations

No further surveys are recommended.

10.5.7 Personnel

Kate Thorne has about twenty years experience surveying sites for development and conservation purposes, covering Ecological Impact Assessment, botanical and vegetation surveys, and surveys for the range of protected species most typically relevant to planning proposals. She holds NE and NRW bat and Dormouse survey and mitigation licences and is an accredited agent to survey for Great

Crested Newt. She holds an IdQ in Vascular Plants (Natural History Museum) and is a botanical tutor for the Field Studies Council (also the BSBI county recorder for vascular plants in Montgomeryshire) and has years of experience assessing and monitoring vegetation. She is also experienced in breeding bird survey techniques.

Rob Thorne has over twelve years' experience surveying sites for development and conservation purposes, covering Ecological Impact Assessment, botanical and vegetation surveys, and surveys for the range of protected species most typically relevant to planning proposals. He holds NE and NRW bat and Great Crested Newt survey and mitigation licences. He holds, or is accredited to work under, survey licences for Barn Owl, White-clawed Crayfish and Dormouse. He is also an experienced reptile worker having undertaken large scale reptile surveys for Natural England and the Wildlife Trusts. He is also experienced in reptile mitigation, habitat management and translocation from development sites.

10.6 Assessment of Impacts and Effects

This section identifies and describes all the potential impacts of the proposed development, which might arise from the development in the absence of avoidance measures and/or mitigation, on each ecological feature identified important in the 'Baseline Conditions', including impacts associated with all phases (construction and operation).

The significance of any residual effects is further discussed with mitigation in place, and/or enhancements that have been agreed upon by the client.

10.6.1 Habitats in the surrounds

Potential (pre-mitigation) impacts

The development is of a size and type that may have an impact on the statutory sites in the surround, as demonstrated on MAGIC, which identifies impact zones around special sites. Air pollution is one consideration; however, emissions levels are likely to be so low as to have no predicted negative impact on these sites (a Habitats Regulations Assessment will likely be required to ascertain this). This is dealt with in another chapter of the EIA.

The potential risk for pollution via water courses is more likely given that the nearby Wych Brook provides a direct link to the River Dee SAC; the actual junction with the Dee is at nearly 5km distance.

The impact of water pollution, at any stage of the development but particularly in the operational phase (either directly from the site or from fields spread with chicken manure), could have a significant effect on the River Dee SAC at an international level.

Significance of residual effects after mitigation

With rigorous precautions taken with regards construction run-off (construction phase), site drainage (operational phase) and management of waste (operational phase), there will be no residual effects on biodiversity. These issues are dealt with in another chapter of the EIA.

10.6.2 Habitats on site and in the immediate surrounds

Potential (pre-mitigation) impacts

On site there will be permanent direct loss of habitats which are not considered to be important ecological features; this (impact) will not have a significant effect on biodiversity at any stage of the development.

Minimal loss of higher value hedgerow is envisaged only around the access track exit but indirect loss of the south-east boundary hedgerow could occur if works are carried out within its root protection zones, with potential negative impacts on protected species, see below.

Significance of residual effects after mitigation

With mitigation in place (see 6.1.1), there will be no residual effects on hedgerows.

After enhancement

With enhancements in place - an area of rough grassland created with a new length of hedgerow, areas of native tree planting and less intensive management of some of the hedgerows - there could be a net gain for biodiversity.

10.6.3 Protected species

The survey has shown that no development related impact on Dormouse, Badger or reptiles can be reasonably predicted and no further survey or assessment is required.

10.6.3.1 Bats

Potential (pre-mitigation) impacts

The potential impact (direct, negative and permanent) of illumination of the south-east hedgerow and the river corridor in the construction and/or operational phases, may result in the deterioration of foraging and/or commuting habitat; this in turn, could result in deterioration of any nearby roosts. It is difficult to quantify the significance of this (effect), as the species using these features are not known. It should be assumed that a significant effect (likely only at a very local level) is possible.

Significance of residual effects after mitigation

With mitigation in place (see 6.1.2), there will be no residual effects on bats.

10.6.3.2 Great Crested Newt

Potential (pre-mitigation) impacts

With reference to the site plans provided, the entire development site (an area measuring approximately 1.5ha) lies beyond 100m but within 250m of both breeding pools, see habitat map in Appendix EA1. Using the Natural England rapid risk assessment tool the return is 'Amber, offence likely' - which would tend to take into account the presence of suitable terrestrial habitat within the site as well as potential impacts on migrating newts.

Since the site only supports poor terrestrial habitat it is unlikely that works would result in the damage, destruction or deterioration of a resting site or in the (significant) loss of foraging habitat i.e. a loss that would result in a detrimental impact on the status of the population.

The site does not lie on any significant potential migration route as there are no pools or notable/significant areas of terrestrial habitat to the south of the proposed development site - which might otherwise influence regular trans-site migrations. Therefore, negative impacts can be limited to i) the potential disturbance, capture and subsequent harm of (only) small numbers of dispersing Great Crested Newts and ii) the creation of suitable temporary resting places within the site as a result of development related activities, with subsequent disturbance etc. These impacts and effects are relevant to the construction phase only since the completed development will not result in an obstructive new landscape element which might negatively affect migration behaviour.

Disturbance of better quality terrestrial habitats along hedgerows and the river corridor is not envisaged, but may occur where works are being carried out close by.

Pollution of the two breeding pools may occur if waste is spread in close proximity to them.

Disturbance of better quality terrestrial habitats along hedgerows and the river corridor is not envisaged, but may occur where works are being carried out close by.

Pollution of the two breeding pools may occur if waste is spread in close proximity to them.

10.6.3.3 Birds

Potential (pre-mitigation) Impacts

The potential impact (direct, negative and permanent) of habitat loss, during the operational phase, is not likely to have a significant effect on birds. However, development work (in the construction phase) that may remove, damage or destroy a nest of a wild bird whilst it is in use must be avoided as it may constitute an offence.

Significance of residual effects after mitigation

With mitigation in place (see 6.1.4), any offence against breeding birds will be avoided.

After enhancement

With enhancements in place – a new hedgerow and areas of woodland planted, plus more sensitive management of some hedgerows – there is likely to be a net gain in nesting and foraging habitat.

10.6.3.4 Otter and UK priority fish species

Potential (pre-mitigation) impacts

The impact of water pollution on the nearby Wych Brook, at any stage of the development but particularly in the operational phase (either directly from the site or from fields spread with chicken manure), could have a significant effect, at a county level, on Otter or any of the priority fish species using it - Atlantic Salmon, River Lamprey, Sea Lamprey, Brown Trout and European Eel.

Significance of residual effects after mitigation

With rigorous precautions taken with regards construction run-off (construction phase), site drainage (operational phase) and management of waste (operational phase), there will be no residual effects on biodiversity. These issues are dealt with in another chapter of the EIA.

10.7 Proposed Avoidance Measures, Mitigation and Enhancement

10.7.1 Avoidance measures and mitigation

10.7.1.1 Habitats in the zone of influence

The south-east hedgerow and the river corridor will be protected by temporary fencing during construction.

Loss of hedgerow around the access track exit will be kept to a minimum.

Rigorous precautions will be taken with regards construction run-off (construction phase), site drainage (operational phase) and management of waste (operational phase). These issues are dealt with in another chapter of the EIA. If a swale is required, this must be located south of the access track (see star on the phase 1 map) in order to avoid a 100m buffer zone (at least) around the nearest Great Crested Newt breeding pond.

10.7.1.2 Bats

To mitigate lighting issues, external lighting must be located in the least ecologically sensitive areas i.e. away from the east hedgerow and the river corridor. Lighting should be fixed on low columns with light-spread kept at, or below, the horizontal using cowl, hoods, screens or simply by downward directionality. Bulbs should be low intensity with a narrow or UV reduced spectrum (<150W, high or low pressure sodium types or LEDs). LED lighting, preferably incorporating an orange filter, may be appropriate near all boundary features – LED lamps effectively reduce light spill and are highly directional. PIR systems [if applicable] should be set on a short timer and responsive only to larger moving objects. Note: refer to Bats and Lighting (Bat Conservation Trust).

10.7.1.3 Great Crested Newt

Impacts on protected habitats are not likely to occur since there is no suitable terrestrial habitat within the site. Negative impacts can be limited to the potential disturbance, capture and subsequent harm of Great Crested Newts and the creation of suitable resting places as a result of development related activities. Given these impacts can be avoided by using Reasonable Avoidance Measures (RAMs), no

further survey is considered necessary. A non-licensed method statement has been provided below. If RAMs are not considered viable options for the developer a mitigation licence would be required to develop the site.

RAMs will reduce the potential for impacts to an appropriate level by regulating the storage of building materials and minimising opportunities for animal disturbance, capture and harm. Provided entrapped animals can quickly escape unaided there is little potential for (deliberate) capture, or any need for subsequent animal handling or transportation and release (an offence without a mitigation licence). Additionally the level of disturbance incurred by the fall and escape is likely to be equal to that which an animal might occasionally experience in its wild or natural habitat (i.e. falling into a dry ditch and climbing out).

Pre-construction phase

- The site must remain sterile (cropped, rolled and treated with herbicide, where appropriate) leading up to and into the development phase.

Construction phase

- A storage compound for materials must be established in a location as far from either pond as possible – this could be located near the south-west corner of the (south) proposed building, **south of the access track**.
- The ground-works period must be carefully planned to run in a quick and orderly succession with the absolute minimum of delays incurred.
- Ground disturbances will be limited solely to unsuitable or pre-sterilised habitats within the site. No spoil or other materials will be pushed into more suitable fringe habitats (e.g. adjacent hedgerows) and there will be no associated damage to these areas (through the manoeuvring of heavy machinery etc.)
- Excavated spoil will be removed from the site immediately – unless it is backfilled, sealed or compacted before nightfall in its permanent location. Alternatively excavated spoil can be stored in raised containers.
- Trenches and pits will be opened, closed and/or backfilled during the same day where possible. Alternatively, excavations will be carried out in achievable daily sections with all soil backfilled before nightfall. Where this is not possible (and only in the very short term), any loose soil lining the trench or pit base will be compacted before nightfall e.g. using the underside of a digger bucket, tamper or vibrating plate. Gently sloping dirt ramps or sloping diagonal scrapes will be created regularly to ensure trapped animals have a means of escape.
- Pits or trenches that remain open for extended periods of time will be avoided. Where smaller excavations are to remain open for longer periods (i.e. at terminals or manifold junctions) the trench lip should be rebated and a covering board slotted in so that this lies flush at ground level. Once complete the board edges will be covered with a layer of fine pea shingle.
- All open excavations will be inspected at the start of each day to check for the presence of trapped amphibians – the must be carried out by a trained member of personnel.
- Construction materials provide cover objects under which migrating newts can potentially find shelter, particularly if stockpiled for extended periods of time. Therefore, construction materials will be brought to site daily or, if stored over time, then on a) raised palettes or timber bearers b) in trailers or in raised containers c) in raised tonne bags or tarpaulins folded up and secured around the edges.
- Where an MOT or hardcore sub-base is required, this will be spread and compacted before nightfall in achievable daily sections. These materials will be brought to site daily and not stockpiled (unless stored in a suitable area or a suitable manner; see above).
- If newts are encountered at any point works will cease immediately and a licensed ecologist will be contacted to identify the species present. If it is suspected or confirmed that a Great Crested Newt has been encountered at any time during the development, works will cease and Natural England will be contacted to advise.

10.7.1.4 Birds

Any clearance of scrub must be carried out i) within the bird nesting season, after a negative inspection for nests has been undertaken ii) outside the bird nesting season between July 31st and March 1st.

10.7.1.5 Otter and UK priority fish species

Rigorous precautions will be taken with regards construction run-off (construction phase), site drainage (operational phase) and management of waste (operational phase). These issues are dealt with in another chapter of the EIA.

Mitigation of lighting issues along the river corridor is also relevant to Otter, see bats (6.1.2).

10.7.2 Habitat enhancement recommendations, also see Landscape Plan in Appendix EA6

Hedgerow and woodland

- Screening at this site will be partially achieved by allowing relevant hedgerows to grow to 3m. These will likely require side trimming in an arable landscape but the hedgerows will be considerably enhanced in this way for species such as bats and birds. In addition there will be planting of several hedgerow trees (using Pedunculate Oak, Sessile Oak and Field Maple) in many of the surrounding hedgerows.
- A new native hedgerow will be planted where the access track crosses open land; this will also be managed at 3m height. Plants will include Hawthorn, Blackthorn, Holly, Field Maple and Hazel.
- A few gaps in hedgerows associated with the development field and the access will be planted up with native species.
- An area of 'woodland', using native broadleaved species, will be created to the north-east of the building – this will act as a buffer zone for the river corridor. A second area of 'woodland' will be created alongside the west hedgerow of the development field – this is likely to be of particular value for Great Crested Newt, given its proximity to one of the breeding pools. The woodland areas will include Pedunculate Oak, Sessile Oak, Downy Birch, Alder (native), Field Maple, Rowan and Crab Apple).

Rough grassland around buildings

Rough grassland will be sown as a band along the south-east side of the buildings and will serve as a buffer for the south-east hedgerow.

A 'floristically enhanced buffer strip' mix (Boston seeds) will be used [which contains fine leaved Fescues, Meadow-grass, Bird's-foot-trefoil, Yarrow, Common Knapweed, Wild Carrot, Red Clover, Self-heal and Ox-eye Daisy] and will be managed by annual topping* in autumn at a height of 15-20cm. Injurious weeds (Thistle and Dock) and Common Ragwort may take hold and will need to be controlled; herbicide treatment (Glyphosate) will be used but cutting or pulling are other options, pulling being particularly effective for Ragwort. Some Bramble presence is likely to occur and is acceptable, but saplings are not desired components. Depending on the degree of invasion by Bramble and saplings, a second cut may be required; this will be carried out in the spring (March – April). The grassland will require more intensive management in the first year to allow the sward to become established.

*A flail topper is recommended for cutting both grassland types because cuttings are mulched and spread out in the process and this avoids cut grass lying on the surface. Some toppers can be used behind and alongside a tractor but using a hedge cutter flail arm is an alternative for the steeper ground. However, given the height of the cut, it is likely that a large amount of cuttings will not be generated, and a topper (with blade) may be a better tool for the 'wild flower grassland' on the flatter ground.

Buffers around pools

Rough grassland could be sown in a buffer zone (5m wide is suggested) around both of the breeding Great Crested Newt pools. This could be cut when there is an opportunity to access the pools in the arable calendar. There is also an opportunity to create a grassland link between the pools and hedgerows by reinstating the public footpath (which passes close to both pools) as grassland.

A 'bufferstrip and beetle bank' mix is recommended (Boston seeds' BS ELS1/CSS1) – this includes some tussock forming grasses [fine leaved Fescues, Cock's-foot (*Dactylis glomerata*), Timothy (*Phleum*

pratense) and Tall Fescue (*Schedonurus arundinaceae*)] and will be managed by annual topping* in autumn (September – November) at a height of 20-30cm. Management would be similar to the 'floristically enhanced grassland'.

Swale

If a swale is required, it could be designed to support a sump suitable for retaining a more permanent area of water for Great Crested Newt to colonise.

10.8 Conclusion

The ecological assessment has shown that potential impacts associated with the proposed development in the construction phase include i) pollution of nearby water courses with adverse effects on the River Dee SAC, Otter and fish ii) the potential disturbance, capture and subsequent harm of (only) small numbers of dispersing Great Crested Newt iii) the creation of suitable temporary GCN etc. iv) damage to the river corridor and south-east hedgerow leading to disturbance of protected species using them v) disturbance of nesting birds if removal of any scrub is carried out within the breeding season.

Potential impacts in the operational phase include i) pollution of nearby water courses with adverse effects on the River Dee SAC, Otter and fish ii) pollution of nearby pools with adverse effects on GCN and plant species ii) the deterioration of bat and Otter foraging and/or commuting habitat through illumination of the stream corridor and south-east boundary hedge.

Mitigation is required in order to prevent any offence being committed (birds and Great Crested Newt) and/or to remove any significant effects on habitats and species (stream, hedgerow, ponds, bats, Otter and fish), as follows:

- Rigorous precautions must be in place with regards construction run-off (construction phase), site drainage (operational phase) and management of waste (operational phase). These issues are dealt with in another chapter of the EIA.
- The river corridor and south-east hedgerow must be protected by temporary fencing during construction.
- Reasonable Avoidance Measures must be adhered to in the construction phase.
- Any clearance of scrub should, where possible, be carried out in the late summer or winter months to avoid the main bird-nesting season.
- In the construction and operational phase, external lighting must not illuminate the south-east boundary hedge or river corridor.

Enhancement of the site will include an area of rough grassland created with a new length of hedgerow, areas of native tree planting and less intensive management of some of the hedgerows) there could be a net gain for biodiversity.

10.9 References

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CHAPTER 11 – NOISE & VIBRATION

11. Noise & Vibration

This chapter assesses the noise and vibration impacts of the proposed poultry 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

11.1.1 Scope

There is the potential for noise from the proposed poultry development to affect sensitive receptors around the site and, as such, the following impacts have been considered within this assessment. Sensitive receptors are predominantly residential properties around the proposed site.

Chapter 4 (Development Description), sets out the detailed design for the proposed poultry installation.

The operation of the proposed poultry development is not considered to have the potential to generate significant sources of vibration. As such, the impacts from vibration during the operation of the proposed poultry development have not been considered further.

For decommissioning of the site, the resultant noise impacts would be likely to be similar to those for the construction phase.

11.1.2 Consultations

The Environmental Health Department of Wrexham Borough Council have previously been contacted with regard to the scope of the assessment, methodologies used and sensitive receptor locations. The following assessment methodology and content has been agreed in this context.

11.1.3 Terminology

Relevant British Standards and planning guidance refer to noise in decibels (dB). The decibel scale is logarithmic rather than linear; hence a 3dB increase in the sound pressure level represents a doubling of sound energy present. Judgement of the loudness of a sound is subjective but, as a general guide, nothing less than a change of 10dB corresponds to a doubling of perceived loudness.

The A weighted sound level, dB(A), takes this response into consideration and is used for the measurement of environmental noise. It can be used to indicate the subjective human response to noise.

Environmental noise usually varies continuously from second to second. It is impractical to specify the sound level for each second. As such, human response has been related to various units, which allow for the fluctuating nature of sound.

These include;

-  **LAeq,t** – The A weighted equivalent continuous sound pressure level. A representation of a continuous sound level containing the same amount of sound energy as the measured varying noise over the measurement period, t.
-  **LA90,t** – The A weighted sound pressure level that is exceeded for 90% of the measurement period, t. This is commonly used as the background noise level for assessing the effects of industrial noise in the UK.

-  **LA_{10,t}** – The A weighted sound pressure level that is exceeded for 10% of the measurement period, t. This is commonly used in the UK for describing traffic noise levels.
-  **LAMax** – The highest A weighted noise level recorded during a noise measurement period.

11.1.4 Legislation, Planning Policy and Other Guidance

Noise nuisance in the UK is principally governed under Statutory Nuisance legislation under the Environmental Protection Act (1990 – as amended). No legal standards regarding noise levels are applied; however, guidelines are provided both in British Standards (BS) and by the World Health Organisation (see later sections of this chapter). Noise nuisance is generally policed by Local Authority Environmental Health Departments.

TAN 11 Noise (1997) provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account in drawing-up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources.

11.2 Methodology & Approach

11.2.1 Documents Consulted

The noise impact assessment has assessed the potential impact of noise and vibration from the proposed poultry development (including both normal noise emissions and any occasional intense noise sources) and alterations to traffic flows during the construction, operation and decommissioning phases. The following guidance has been used for the assessment;

-  Technical Advice Note 11 – Noise 1997
-  BS5228: 1997 'Noise and Vibration Control on Construction and Open Sites',
-  BS4142: 1997 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas',
-  BS7445: 2003 'Description and Measurement of Environmental Noise',
-  Department of Transport 'Calculation of Road Traffic Noise' 1984
-  World Health Organisation 'Guidelines for Community Noise', 1999.
-  Institute of Environmental Management and Assessment (IEMA), and Institute of Acoustics (IOA) 'Guidelines for Noise Assessment', 2002
-  Highways Agency 'Design Manual for Roads and Bridges –Volume II', 1994

11.2.2 Baseline Noise Environment

The main sources of noise in this area are (a) road traffic (b) agricultural operations and (c) aircraft traffic (usually helicopter training). The agricultural traffic peaks during the harvest period (between May and October). During the harvest period it is common for movements of agricultural traffic to occur between the hours of 2300 and 0700. It is also common for grain drying to occur for long periods of time during the harvest; this is a significant source of noise emissions.

The noise climate in the area surrounding the Mulsford Farm site is deemed to be typical of a rural area. The principal noise sources include road traffic noise, which is influenced by reasonably high levels of

HGV's associated with local agricultural activities, as well as operational noise from the field work and grain drying.

11.2.3 Impact Assessment Methodology

In relation to noise, general guidelines are provided in the relevant planning document Planning Policy Guidance (PPG24), published in 1994, entitled 'Planning and Noise'.

Construction Noise

TAN11 provides detailed guidance on the introduction of noise sources into a noise-sensitive area, and gives recommendations that BS5228 should apply to noise from construction sites and to industrial operations.

BS5228 provides guidance relating to the prediction and control of noise and vibration from open sites where noise from fixed plant and mobile plant has the potential to be an issue with regards to the potential disturbance of residents. In particular, this document provides guidance that is relevant to this noise assessment relating to:

-  noise and vibration, and its potential for affecting neighbours of open sites;
-  the prediction of environmental noise levels associated with fixed and mobile plant;
-  criteria for setting noise control targets;
-  the control of noise emissions from open sites; and
-  the calculation of noise levels associated with plant which does not operate continuously.

Additionally, this document includes reference noise level data for various types of plant commonly associated with activities on construction sites. Noise and vibration levels generated by construction activities are regulated by guidelines and subject to local authority control. Guidance is contained within BS5228 but no fixed limits are suggested in the document.

Operational Noise

The impact of noise from a new source may be determined by comparing the noise level of the source with recommended, absolute noise limits contained within guidance documents. The relevant document in this instance is the World Health Organisation Guidelines.

The use of fixed limits is appropriate for the assessment of sources that are contained within a finite boundary, particularly where noise sensitive receptors are few or are grouped together. Thus, this assessment method is appropriate to the noise from site activity, such as that within the buildings, the fans and vehicle movements on the service pad to the front of the buildings.

There are a number of guidance documents that contain recommended fixed limits. These are discussed below.

TAN11 contains comprehensive advice on the subject of noise both in the circumstances of a residential development or a noise producing development.

The subject of commercial and industrial development, in this section, reference is made to BS 8233:1987 (now superseded by BS 8233:1999).

This Standard is principally intended to assist in the design of new dwellings; however, the Standard does state that it may be used in the assessment of noise from new sources being brought to existing dwellings.

The BS 8233:1999 limits may be summarised as follows:

Gardens LAeq,16hr = 50 to 55 dB
 Living rooms (internal) LAeq,16hr = 30 to 40 dB
 Bedrooms (internal) LAeq,8hr = 30 to 35 dB
 Bedrooms (internal) LAmax = 45 dB

BS 8233:1999 was based on the advice contained in a draft of World Health Organisation document "Guidelines for community noise". This document was released in final form in 2000.

The WHO advice is the most useful, comprehensive, and pertinent advice in this case, because it is not specific to the circumstances of the assessment. Instead, it provides guideline values at, for example, schools, dwellings and offices.

The WHO guideline values, set, are appropriate to what are termed "critical health effects". This means that the limits are at the lowest noise level that would result in any psychological, physiological or sociological effect.

It is important to appreciate that the WHO guideline values are very stringent and are not indicative of significant impact. Instead, a report compiled by the National Physical Laboratory for the DETR concluded that noise levels below the WHO guideline values indicate "negligible effects" and significant effects may not occur until much higher values are reached.

In this respect, the WHO values are much more robust than the national planning policy objective, this being to "avoid demonstrable [i.e. real] harm to interests of acknowledged importance" (ref TAN 11).

The WHO guideline values may be summarised as follows:

Day	External	LAeq,16hr =	50-55 dB
	Internal	LAeq,16hr =	35 dB
Night	External	LAeq,8hr =	45 dB
		LAmax =	60 dB
	Internal	LAeq,8hr =	30 dB
		LAmax =	45 dB

These criteria have been used in this case for the assessment of noise impact from site activity: ventilation fans, movements on the service pad. However, because some of these activities will vary widely, over the 16 hour day period or 8 hour night period, the LAeqT index has been normalised over a peak 1 hour period in order to ensure that a robust assessment is undertaken.

Operational Traffic Noise and Vibration

There is also potential for noise from vehicles associated with the proposed poultry development facility to impact upon sensitive receptors along the roads on which they travel. The noise levels, with and without the proposed poultry development, have been calculated using the methodology in 'Calculation of Road Traffic Noise' CRTN. The level of any change has been used to assess the impact of noise and vibration generated by operational traffic on local sensitive receptors.

11.2.4 Assessment Criteria

The impact magnitude and significance has been defined using the criteria in Table 29 and Table 30 below. These criteria have been developed for use in this assessment based on the guidance set out in the draft 'Guidelines for Noise Impact Assessment' (IEMA/IOA, 2002).

Table 29: Magnitude Criteria

Subject Area	Impact Magnitude			
	Major	Moderate	Minor	Negligible
Nearby residents from construction/ decommissioning of proposed extension	Noise levels normally over 75dB(A)	Noise levels normally 65-75dB(A)	Noise levels normally 56 – 65 dB(A)	Noise levels normally less than 55 dB(A)
Nearby residents from operational noise	Noise Rating Level >10 dB(A) above Background Noise Level	Noise Rating Level equal to or above Background Noise Level (up to 10 dB(A)	Noise Rating Level up to 10 dB(A) below Background Noise Level	Noise Rating Level > 10 dB(A) below Background Noise Level
Nearby residents from traffic noise and vibration	Change in noise level of more than 10dB(A)	Changes in traffic noise levels between 3 and 10 dB(a)	Change in traffic noise levels between 1 and 3 dB(A)	Changes in traffic noise levels of less than 1dB(A)

Table 30: Significance Criteria

Subject Area	Impact Significance	
	Significant	Not Significant
Nearby residents from construction of extension	Long term (more than a few days) major or moderate impacts	Minor or Negligible Impact
Nearby residents from operational noise	Major or moderate impact	Minor or Negligible impact
Nearby residents from traffic noise and vibration	Major or moderate impact	Minor or negligible impact

11.2.5 Limitations of the Assessment

As mentioned above, construction details to be used are not currently available to accurately estimate actual noise emissions from the proposed facility. Nevertheless worst case assumptions are utilised regarding emissions such that the following assessment is robust.

11.3 Baseline Position

11.3.1 Noise Monitoring Results

In rural areas, background levels may be between 38 - 42 dB adjacent to an existing farm this figure is likely to be towards 42 dB figure if not in excess of this.

11.3.2 Incorporated Mitigation

As part of the assessment the following has been assumed in terms of the features of the basic design and operation of the poultry development which assist in reducing noise emissions:

-  Housing of most noise sources within buildings;
-  Siting of buildings so that noise emitting areas face away from residential areas;
-  Insulation of buildings and using double glazed windows;
-  Using noise baffles areas around ventilation fans; and
-  Restriction of vehicle movements other than those associated with bird removals to less sensitive periods (deliveries will take place between 07:00 and 21:00 on weekdays, 07:00 and 17:00 Saturdays and 09:00 and 17:00 on Sundays and Bank Holidays).

11.4 Assessment of Impacts

The details of the development are included in Chapter 4. The following elements of the proposal are considered to be noise emitting sources:

11.4.1 Ventilation Fans:

The following ventilation fans will be fitted to the building:

12	x	10" x 52" inlets in each gable end per shed
6	x	800mm extraction fans in roof per shed

It is not possible to calculate in-situ noise outputs of the ventilation fans therefore comparable noise measurements have been used to calculate worst case noise power output. Noise monitoring data detailing noise emissions from a poultry unit with high velocity ridge mounted fans has been used. This represents a worst case as ridge mounted ventilation systems have a greater noise power output than tunnel ventilation systems as they are not enclosed within noise baffle areas. The sound power level of a building with 24 ridge mounted extractor fans was measured as 36.7dBA.

In order to calculate the overall level of the fans, the following calculation has been used $L_2 = L_1 + 10\log N$

Where L_2 = overall level for N number of sources

L_1 = the measured level of an individual noise source

N = number of similar sources.

Therefore the overall noise level for the roof fans will be 42.7dBA.

There will be incorporated mitigation into the design of the buildings. The fans will be enclosed within a treated plenum chamber which will be 3050 in depth and will be fitted with a 200mm insulated roof and 100mm insulated walls as per the sheds. They will exhaust into an insulated baffle area which will be located 4600mm from the fans themselves. The baffles will be insulated with 100mm insulated sheets. The attenuation offered by screens / barriers is a very complex problem but according to BS 5228: Part 1: 2009 Section F.2.2.2.1 Section C, an attenuation to the noise will vary between 5 and 10dBA – as a worst case is assumed it is expected that the noise output is attenuated by 5dBA. It is thereby estimated that noise levels due to the ventilation fans will be 0.4dBA at the nearest sensitive receptor after subtracting distance decay; this amount to at least 10dBA under all of the measured background noise levels for the area during both day and night.

11.4.2 Internal Conditions

The sound from birds within the buildings will be transmitted to outdoors through the series of ventilation apertures in the elevations facing the receptors. The sound insulation of the composite material of which the buildings will be constructed is 25 dBA. The presence of ventilation apertures of overall area 1% of the elevation gives an indoors to outdoors sound reduction of 20 dBA. Measured interior sound levels of comparable bird accommodation are no higher than 67dBA. It is thereby estimated at 47 dBA immediately outside the buildings and 4.72dBA LAeq at the nearest sensitive receptor (423 metres from the development), after subtracting distance decay; this amounts to at least 10dBA under all of the measured background noise levels for the area during both day and night.

11.4.3 Vehicle Movements on Site

There will be three main categories of movement on site: first, movements of feed HGVs delivering feed; second, movements of tractors and trailers removing manure; and third, collections / delivery of birds. The three categories will not occur simultaneously.

There will normally be no more than one delivery of feed in any 24 hour period. Unloading of the feed would take approximately 30 minutes. Measured noise levels of delivery vehicles arriving and unloading fluctuate between 66 and 75dB (applicable at 3 metres) and is broken down between arrival (2.5 minutes) at 69dB, blowing off feed (30 minutes) at 66dB and departure (0.5 minutes) at 75dB. Deliveries and collections of birds in will have similar noise outputs.

Tractors and trailers removing manure will be loaded by a loader scraping manure from within the building. One loader will operate continuously scraping the buildings, the tractor and trailer will park with the trailer adjacent to the building. Two tractor and trailer units will serve the loader. When not in use all engines will be switched off i.e. when the trailers are being loaded or when the second trailer is waiting to be loaded. Manure will not be removed from the buildings between the hours of 2300 and 0700; manure removal will take place from 0700 to 2100 each day during clearout (fourteen hours). The noise levels of the tractor scraping the sheds and the tractors carting manure will have a similar measured level as the delivery vehicles, therefore the $L_{Aeq (14h)r}$ at the garden edge of the closest sensitive receptor would be significantly more than 10 dB(A) below Background noise levels.

11.4.4 Traffic Noise and Vibration

From measurements of delivery vehicle pass-bys at speeds typical for those found on roads such as this, a delivery type vehicle is indicated as generating an $L_{Amax} = 75$ dB at 3 metres.

To enable an assessment to be made over a period of time, the Single Event Noise level (SEL) for each vehicular movement must be established. In practice this is limited to the time during which the actual noise is within 10 dB(A) of the maximum and may be approximated from:

$$SEL = L_{Amax} + \Delta A$$

Where

$$\Delta A = 10 \log (((t_2 - t_1)/2)t_{ref})$$

And

t_1 and t_2 are the 10 dB down points of a vehicle drive-by and t_{ref} is one second. (Source - The Noise Council = "A guide to measurement and prediction of the Equivalent Continuous Sound Level").

The 10 dB down points can be calculated on the basis of vehicle speed and the attenuation with distance that would be experienced as a vehicle approaches and departs the reception point. For the vehicle speed of 32kph (20mph), $\Delta A = 5$ dB and the resulting SEL is 80 dB(A) at 3 metres.

The $L_{Aeq,T}$ can now be calculated from the equation:

$$L_{Aeq,T} = SEL + 10 \log n - 10 \log T - 10 \log d_1/3 - \text{screening} - 10 \log (\text{angle of view}/180)$$

where

n	= number of events in the time period
T	= number of seconds in the time period
D_1	= distance from centre line of road to receiver
angle of view	= angle of view of the access road

HGVs collecting birds may collect birds during the recognised night time hours of 2300 to 0700. The Design Manual for Roads and Bridges States that:

"Research has been conducted into the relationship between sleep disturbance, as reported in social surveys, and noise exposure, as measured or predicted by acousticians. There tends to be a rather poor correlation between reported awakenings and recorded intrusive events and, similarly, rather poor correlations between reported sleep quality and observed behaviour such as awakening or changes in sleep stage patterns. Measurements of noise from roads in Britain and Germany both show that night-time traffic noise (ie, noise between 10pm and 6am on the following day) is on average 10 dB(A) less than daytime levels (Railway Noise and the Insulation of Dwellings, DoT, 1991).

In 1982 Rice and Morgan produced a comprehensive synthesis of field and laboratory studies and suggested that sleep disturbance could be significant at quite low noise levels. In 1992, the Department of Transport completed a major study into aircraft noise and sleep disturbance. This study was based on collecting objective data on how people slept in their own homes under normal circumstances. This was done by using actimeters, a wrist-watch sized computer that is put on at night to measure limb movements (which correlate well with sleep disturbance). Data were collected on 400 subjects for 15 nights each. This was the largest set of such data ever collected.

Aircraft noise has many characteristics similar to traffic noise at night. Movements by aircraft tend to occur at irregular intervals and the level of activity is far below normal daytime levels. The main findings of this study were that, once asleep, very few people living near airports are at risk of any substantial sleep disturbance due to aircraft noise, even at the highest event noise levels above 100 dB(A). At outdoor peak noise levels below 80 dB(A), average sleep disturbance rates are unlikely to be affected by aircraft noise. At higher levels, and most of the noise data on which the conclusions were based were in the range 80-95 dB(A) L max, the chance of the average person being awakened is about 1 in 75. Compared with the overall average of about 18 nightly awakenings from other causes, this probability indicates that even large numbers of noisy night time aircraft movements will cause very little increase in the average person's night awakenings. Therefore, based on expert opinion on the consequences of sleep disturbance, the results of this study provide no evidence to suggest that aircraft noise is likely to cause harmful after effects. (Report of a Field Study of Aircraft Noise and Sleep Disturbance, DoT 1991)"

If the results of this study are broadly valid for road traffic then it would suggest that the risk of sleep disturbance from traffic noise at night is very small, and certainly well below the levels suggested by previous studies or analysis.

11.4.5 Construction Noise

The exact construction process will be determined by the successful contractor. It is therefore not possible to accurately calculate the likely noise and vibration levels during construction which would enable its impact to be fully ascertained.

It is considered unlikely that noise from traffic associated with the construction of the development will generate a significant impact. This is because HGV traffic levels associated with the construction phase of the development are predicted to be lower than the operational phase and will not be during night time hours. In addition, although there are likely to be additional car movements generated by construction workers travelling to and from the site, these movements are insignificant when compared to existing traffic levels and will have a minimal effect on a very small number of sensitive receptors.

11.4.6 Decommissioning

Noise from decommissioning would be similar to noise during the construction phase. As such, it is proposed that the noise controls will be put into place to ensure that the impact from decommissioning will not be significant.

11.5 Mitigation

11.5.1 Construction and Decommissioning

In order to ensure that noise disturbance is minimised, the following noise mitigation measures shall be incorporated during the construction and decommissioning phases and implemented at all times:

-  Good maintenance of plant to ensure that excessive noise and vibration levels are not generated;
-  Limiting hours of delivery to avoid sensitive periods;

-  Regular integrity checks of noise mitigation measures fitted to items of plant. Such measures are likely to include silencers and engine covers. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken;
-  If plant or machinery is found to be generating excessive noise, unless bird welfare is at stake, the development will be taken out of service until repairs can be undertaken to reduce noise levels generated;
-  Plant should be switched off when not in use; and,
-  High revving of engines will be minimised.

11.5.2 Operation

Noise limits for components of the proposed poultry development will be set to ensure that background (LA90) noise levels are not exceeded. The following noise mitigation measures will be incorporated into the detailed design to ensure that operational noise impacts from the proposed poultry development are minimised:

-  The adoption of the noise management plan attached to Appendix 10.
-  Use of modern ventilation fans.
-  Regular maintenance and repair or replacement of noisy equipment.
-  Restriction of all vehicle movements other than bird removals outside the hours of 2300 and 0700.
-  Insulation of sheds and provision of double glazing.
-  Incorporating a noise baffle and fan canopy surrounding the ventilation fans.

11.6 Residual Impacts and Conclusions

A noise assessment of the proposed poultry development at land at Mulsford Farm has been undertaken. Estimations have been used to construct a worst-case noise model of the likely effects of plant and noise. This data has shown that noise levels are predicted to be below existing background noise levels at all receptors. It is also predicted that with incorporated management controls the residual noise during the operational and decommissioning stages will not be significant. This impact of this level of change will not be significant. The impact of changes in vibration levels are closely related to the impact of changes in traffic noise levels. As such, the impact of changes in traffic vibration levels will also be minor or negligible and not significant. Added to this complaints analyses carried out suggest that significant adverse impacts on local amenity as a result of noise release from the onsite plant or HGV movements from proposed poultry installation are unlikely.

CHAPTER 12 – WATER RESOURCES

12. Water Resources

This chapter deals with the potential impacts of the proposed poultry development on water resources including surface waters, groundwater and flood risk. The main risks identified with the proposal were the risks of pollution of groundwater and surface water from nitrates from spreading and removal of manure and dirty water, the increased in surface water runoff from the site. With the appropriate best practice mitigation in place (including the use of Sustainable Drainage Systems (SuDs) all risks are reduced to minor or less.

12.1 Introduction

This chapter forms part of the overall Environmental Statement (ES), which has been prepared to accompany the detailed planning application for the proposed poultry development at land at Mulsford Farm.

The chapter assesses the potential significant hydrogeological and hydrological impacts of the proposed poultry development. The assessment is based primarily on a desk-based survey of the existing hydrogeological and hydrological conditions within the area, using information from published sources and specific investigations. The sensitivity of receptors and magnitude of impacts are assessed and combined to determine the significance of each impact. Mitigation measures and the nature of any residual risks, post-mitigation are also discussed

12.1.1 Overview of Potential Impacts on Surface and Groundwater

The potential hydrological and/or hydrogeological impacts of the proposed poultry development relate to three main issues: nutrient pollution events through spreading of manure; chemical/effluent pollution events from on site; and alteration/interruption of surface and/ or groundwater flows as set out below.

12.1.2 Nutrient pollution from spreading

The risks relate to the possibility of applying too much nitrogen or of raising soil phosphorus levels above recommended limits.

12.1.3 Chemical / Effluent Pollution

Oil / fuel / chemical pollution (e.g. from incorrect storage, containment, accidental spillage and malfunction of dirty water system) could affect aquatic ecology and could also impact on the quality of water abstracted from both surface and groundwater for drinking supply,

12.1.4 Alteration / Interruption to Flow

Any alteration of natural drainage patterns could disturb natural surface and subsurface water flows to either water dependent habitats or water supply abstraction points. Concrete hardstanding areas, buildings and bunds could provide new preferential pathways or prevent water ingress into soils and interfere with the retention of flows within catchments. Alteration of surface runoff due to increased areas of hardstanding could potentially cause flooding to receptors downstream of the site.

12.1.5 Summary of Potential Impacts

Table 31 provides a summary of the potential impacts that could occur as a result of the proposed poultry development.

Although a number of potential impacts are identified in Table 31 it does not necessarily follow that they would actually occur.

Table 31: Potential Impacts Resulting from Extension Activities

Key Activities	Specific Element / Activity	Potential Effect	Potential Sensitive Receptors
Construction	Use of vehicles / machinery during construction	Increase of surface run off due to compaction of soil	Surface water hydrology. Impacts on water flow which may lead to potential damage and or flooding
	Materials Management	Leakages of chemicals to ground	Principal aquifer groundwater abstractions and nearby rivers via baseflow, aquatic species / ecological systems
Operation	General Operations	Leakage of chemicals etc	Principal Aquifer, groundwater abstractions and nearby rivers via baseflow, aquatic species / ecological systems
	Building wash-down	Leakage of dirty water	Principal Aquifer, groundwater abstractions and nearby rivers via baseflow, aquatic species / ecological systems
	Application of manure to land	Nutrient concentrations exceed recommended limits	Principal Aquifer groundwater abstractions and nearby rivers via baseflow, aquatic species / ecological systems
	Use of vehicles	Spillage of Fuel	Principal Aquifer groundwater abstractions and nearby rivers via baseflow, aquatic species / ecological systems
	Presence of Hard Surfaces	Alteration to run-off flows	Flood risk, effects on catchments and river flows.
Decommissioning	Use of vehicles / machinery during demolition	Increase in surface run-off due to compaction of soil.	Surface water hydrology / channel morphology. Impacts on water flow regime which may lead to potential damage and flooding.
	Materials management	Leakage of contaminants to ground	Principal Aquifer groundwater abstractions and nearby rivers via baseflow, aquatic species / ecological systems

12.1.6 Consultation Responses

Results relating to hydrological features from the consultation exercise regarding the Environmental Impact Assessment are summarised in Table 32 below.

Table 32: Consultation responses in relation to impact on Water Resources

Consultee	Comment
Natural Resources Wales.	It is noted from the documentation submitted, that a borehole is proposed. Should it be intended to abstract more than 20 cubic metres of water per day, then a licence for the abstraction will be required from Natural Resources Wales.

12.2 Legislation Planning Policy and other Guidance

12.2.1 Legislation

Guidance provided from the UK Technical Advisory Group (UKTAG) provides an overview of the environmental standards for water quality and hydromorphology arising from requirements set by the European Water Framework Directive (WFD). Consideration is given to these environmental standards throughout this assessment. The WFD was transposed into English and Welsh law in December 2003 through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.

The Nitrate Pollution Prevention Regulations 2008 regulate the use of organic and inorganic fertilisers within Nitrate Vulnerable Zones.

12.2.2 Planning Policy

The planning policy framework in the context of this development comprises the national Technical Advice Notes (TAN's) and local plans. The TAN that particularly relates to water issues is Technical Advice Note 15 – Development and Flood Risk (2004).

12.2.3 Guidance

With regard to hydrology, management of water-borne pollution and protection of ecologically sensitive areas, Natural Resources Wales (NRW) has a statutory obligation to manage and control the pollution of water resources. Accordingly, it is reasonable to assume that the adoption of the NRW's Best Practice Guidelines and licensing of the poultry development under Environmental Permitting Regulations will prevent pollution to recognised standards and make any 'significant' impacts unlikely.

The NRW's How to comply with your environmental permit for intensive farming (EPR 6.09) is the principal document used for guidance on preventing the contamination of surface waters from construction activities.

Other relevant guidance includes:

-  Guidance on the Groundwater Regulations 1998 (DEFRA);
-  The Control of Pollution (Oil Storage) (England) Regulations 2001;
-  Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors C532 (CIRIA);
-  Environmental Good Practice on Site C650 (CIRIA);
-  Culvert Design Guide C168 (CIRIA);
-  Sustainable Drainage Systems. Hydraulic, Structural and Water Quality Advice C609 (CIRIA);
-  Sustainable Water Management in Landuse Planning C630 (CIRIA); and
-  Control of Water Pollution from Linear Construction Projects: Technical Guidance C649 (CIRIA).

Guidance regarding the application of manure to agricultural land is regulated by the Nitrate Pollution Prevention Regulations 2008. A number of guidance notes in the *Guidance for Farmers in NVZs* series produced by Defra relate to the practical application of manure to the land. Where land is outside the NVZ there are no specific legal requirements, however the Code of Good Agricultural Practice for the protection of Water, Soil and Air should be referred to.

12.3 Methodology

12.3.1 Desk Study

The assessment predominantly entailed a desk study involving collation and assessment of the relevant information from the following sources:

-  Ordnance Survey (OS) Landranger Map at 1: 50,000 scale
-  Groundwater Vulnerability Map 1: 100,000
-  Landmark Envirocheck Report on surface water and groundwater

12.3.2 Manure Management Plan

To assess the risks associated with the application of manure to the land and to estimate storage requirements a Farm Waste Management Plan has been produced. The plan has been produced with reference to Guidance notes for the application of manure to agricultural land and includes a risk assessment and a calculation of land available for spreading (Appendix 14).

12.3.3 Assessment Criteria (Contamination and General Risks)

The significance of any impacts of the proposed poultry unit on baseline conditions is assessed as part of the impact assessment. The sensitivity of the receptor and the magnitude of potential impact combine to determine the significance of that impact. Magnitude, sensitivity and significance criteria were developed for the conditions and environments prevailing at the site.

Magnitude

The criteria used to determine the magnitude of a potential impact are defined in Table 33. Assessment of magnitude includes consideration of the amount and intensity of disturbance and duration (i.e. whether permanent or temporary). In this assessment, consideration of likelihood is incorporated into a final risk based assessment (see below).

Table 33: Impact Magnitude Criteria

Magnitude	Definition
Negligible	Unquantifiable or unqualifiable change in hydrological/hydrogeological conditions (including water quality).
Minor	Detectable but minor change to hydrological/hydrogeological conditions. Water quality/quantity standards less than threshold and unlikely to affect most sensitive receptors.
Moderate	Detectable change to hydrological/hydrogeological conditions resulting in non-fundamental temporary or permanent consequential changes. Some deterioration in water quality/quantity likely to temporarily affect most sensitive receptors.
High	Fundamental change to hydrological/hydrogeological conditions (including deterioration in water quality/quantity) resulting in temporary or permanent consequential changes.

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. a n Aquifer or nearby abstraction borehole should be considered more sensitive to any impact than a non-aquifer). The sensitivity criteria developed for this assessment are presented in Table 34.

Table 34: Sensitivity Criteria

Sensitivity	Definition
Negligible	Environment is insensitive to impact, no discernible changes e.g. non-aquifer where little or no effect on groundwater could occur.
Low	Environment responds in minimal way such that only minor changes are detectable e.g. surface water features present at some distance or groundwater resource with minimal sensitivity e.g. Minor Aquifer.
Medium	Environment clearly responds to effects in quantifiable and / or qualifiable manner e.g. reasonable proximity to a surface water course abstraction point, or Major Aquifer or sited on a Minor Aquifer.
High	Environment is subject to major change due to impact e.g. adjacent to or within 100m of a sensitive watercourse or sited directly upon a Major Aquifer / Source Protection Zone (SPZ).

Significance

The combination of magnitude and sensitivity logically combine to provide a matrix categorisation of significance. Significance levels are presented in Table 35.

Table 35: Significance Matrix

	Sensitivity			
	Negligible	Low	Medium	High

Magnitude	Sensitivity				
	Negligible	Insignificant	Insignificant	Insignificant	Insignificant
	Minor	Insignificant	Minor	Minor	Moderate
	Moderate	Insignificant	Minor	Moderate	High
	High	Insignificant	Moderate	High	Very High

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, a water resource, 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 transport via run-off). 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. Therefore, the presence of a hazard at a site does not necessarily mean that there will be attendant risks.

Sources

Potential sources of contamination have been identified for the Mulsford Farm site, based on a review of the proposed site uses, potential spillages from construction plant or operational chemical/waste storage etc). The nature, and the likely extent, of any contamination have also been considered, e.g. whether such contamination is likely to be localised or widespread.

Receptors

The varying effects that a hazard has on individual receptors are dependent largely on the sensitivity of the receptor. Receptors include any people, animal or plant populations, or natural or economic resources that are within the range of the potential spread of the source, and which are connected to the source by a transport pathway. Although in this instance the assessment is principally concerned with surface water and groundwater receptors.

Pathways

The mere presence of contamination 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 impact on the receptor. A pathway which transports the contaminants to the receptor, generally involves conveyance via soil, water or air, or, in some cases, direct contact.

Exposure Assessment

By considering the source, pathway and receptor, an assessment has been made for each contaminant type, on a receptor by receptor basis, with reference to the significance and degree of risk. In assessing this information, a judgement has been made as to whether the source contamination can reach a receptor, and whether it is of a major or minor significance. The exposure risks are assessed against the present Mulsford Farm site conditions (i.e. the 'Do Nothing Scenario').

The assessment of risk that is presented within this report is 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 NRW 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 the 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 36 shows how the risk rating is achieved by combining the likelihood of the event and the degree of significance.

Table 36: Risk Assessment Matrix

		Significance			
		Insignificant	Minor	Moderate	High
Likelihood	Unlikely	Very Low Risk	Very Low Risk	Low Risk	Moderate / Low risk
	Low Likelihood	Very Low Risk	Low Risk	Moderate / low risk	Moderate risk
	Likely	Low risk	Moderate / Low risk	Moderate risk	High risk
	High Likelihood	Low risk	Moderate risk	High risk	Very high risk

Under such a classification system the following categorisation of risk has been developed and the terminology adopted as shown in Table 37.

Table 37: Risk Criteria

Term	Description
Very low risk	The presence of an identified hazard does not give rise to the potential to cause significant harm to a designated receptor.
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 realized would normally be minor.
Moderate risk	It is possible that, without appropriate remedial action, harm could arise to a designated receptor, but it is relatively unlikely that any such harm would be high, and if any harm were to occur it is more likely that such harm would be relatively minor.
High risk	Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remedial action.
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.

The assessment of likely significant impacts of the proposed poultry development, both from the site and outside the site, is initially based on potential impact before mitigation. Levels of assessed impact which are moderate or above will require mitigation/management to reduce the level of impact to negligible or low levels.

12.3.4 Assessment Criteria (Flood Risk and Drainage)

It is recommended by both the NRW and the Department for the Environment, Food and Rural Affairs (DEFRA) that the primary assessment tool within a flood risk assessment should be the sequential test as set out in Technical Advice Note 15 – Development and Flood Risk (2004). Such an assessment, however, deals almost exclusively with the risks associated with tidal and fluvial sources and not the full range of flooding sources. In addition to this, the sequential test does not provide guidance for assessing the impact of mitigation and residual risk subsequent to the development.

Therefore in order to allow for the wider assessment of flood risk the following more generalised assessment methodology has been developed. It should be noted that where applied to fluvial and tidal sources the results of the assessment should be cross checked against the results of the sequential test.

Assessment Methodology

In line with guidance set out in Technical Advice Note 15, the key to the classification is that the designation of significant (or risk) is based upon the consideration of:

-  The sensitivity of the receptor – takes into account the nature of the development or receptor and its likely response to increased risk.

-  The magnitude of the potential hazard (i.e. severity) – takes into account the potential severity and nature of the flooding.
-  The probability of occurrence (i.e. likelihood) – takes into account the anticipated frequency of occurrence but also considers both the presence of the hazard and receptor, and the integrity of the pathway.

Sensitivity

When considering off-site impacts, there is a general assumption that all developments are highly sensitive. The assumption can, however, typically be relaxed when considering 'Water Compatible' development or undeveloped land. Given this the sensitivity of the receptor is ranked as shown in Table 38.

Table 38: Classification of Sensitivity of Receptor

Sensitivity of Receptor	New Extension	Off site
Very Low	Flood Attenuation Features	-
Low	Water Compatible* developments	-
Moderate	Less Vulnerable* developments	Undeveloped Land
High	More Vulnerable* developments	Other access routes
Very High	Highly Vulnerable* developments	All built extension unless mitigating circumstances exist. Key access routes

Magnitude

To classify the magnitude of the potential effects it is necessary to look at the nature and scale of the individual impacts. These include, but are not confined to, the extent of flooding, the depth of flooding, the duration of flooding and the velocity of flood waters. For new developments the assessment is based on the likely post-development situation, for off-site receptors it is based solely on these receptors' likely deterioration.

Given this the magnitude of the potential effect is then ranked as shown below in Table 39.

Table 39: Matrix for Determining the Significance of the Potential Effect

Magnitude of Hazard	New Extension	Off Site
Negligible	No potential for flooding, or no identifiable impact of flooding	No likely increase in flood severity at any off site location
Very Low	Planned or permitted flooding that does not adversely impact the built extension	-
Low	All of the following criteria achieved: Flood depths below 0.3m, Likely flood duration below one hour Flood proofing measures planned	Likely but unquantifiable small increases of flood depths, durations, flow velocities or extent
Medium	Any one of the following criteria achieved: Flood depths between 0.3m and 1m, Flood flow velocity greater than 0.15m/s Likely flood duration in excess of 1 hour Any restrictions to access and egress	Any other measurable increase of flood depths, durations, flow velocities or extent
High	Any of the following criteria achieved: Flood depths greater than 1m, Flood flow velocities greater than 0.45m/s Likely flood duration in excess of 24 hours	Any marked increase (>10%) increase in flood depth, flood flow velocity or flood duration. Any change in flood extent that impacts additional properties including access

Classification of Probability of Occurrence

To classify the probability of occurrence for a potential effect, it is necessary to understand how regularly a given event or outcome is likely to occur. This can be assessed in a number of ways including

assessments based on historical data, quantitative analysis, or experience from other similar sites. Often this assessment will be based on standard guidance. The probability of the potential effect is then ranked as shown below in Table 40.

Table 40: Classification of Probability of Occurrence

Probability of Occurrence	Potential Effect
Very Low	It is unlikely that any consequence will ever arise.
Low	It is unlikely that any consequence would arise within the lifetime of the development. Equivalent to an annual probability of less than 0.1% or Flood Zone 1*
Medium	Circumstances are such that an event is possible in the medium term and likely over the long term, although not necessarily inevitable. Equivalent to an annual probability between 0.1 and 1% (0.1 and 0.5% for tidal) or Flood Zone 2*.
High	Any consequence would appear likely in the medium term and inevitable in the long term (lifetime of the development). Equivalent to an annual probability of flooding of greater than 1% (0.5% for tidal) or Flood Zone 3*.

Risk Assessment

Once the magnitude of the potential effect and likelihood of occurrence have been assessed these are then combined using a risk matrix (41) to assess the flood risk of each potential effect.

Table 41: Risk Matrix

		Likelihood of Occurrence			
		Very Low	Low	Medium	High
Magnitude of Potential Effect	Negligible	Negligible	Negligible	Negligible	Negligible
	Very Low	Negligible	Very Low	Low	Low
	Low	Very Low	Low	Low	Moderate
	Moderate	Low	Low	Moderate	High
	High	Low	Moderate	High	High

Typically flood risks assessed as low, or less, are considered acceptable. If the assessment results in moderate or high risk, additional mitigation measure will be required to facilitate the development.

In some situations the risk assessment procedure will result in an artificially low assessment of risk. This is particularly the case in situations where consequences of very rare flooding (i.e. breach scenarios) are so extreme that any residual risk, however low, should not be allowed. In such instances the assessed risk should be elevated. Such decisions must always be accompanied by detailed justification.

12.4 The Receiving Environment and Sensitive Receptors

12.4.1 Geographical Context

The site is located on land at Mulsford Farm in a rural area.

12.4.2 Mains Supply and Drainage

There are no mains supply pipes currently within the Mulsford Farm site.

Surface Water Drains & Sewers

Surface water from the existing building is directed into the ditch. There are no other surface water drains on the site.

Foul Sewers

There is no foul sewer connection in the vicinity to the site.

12.4.3 Geology

The geology of the area surrounding the site consists of slowly permeable seasonally wet and slightly acid but base-rich loamy and clayey soils.

12.4.4 Hydrogeology

The site is located within a designated Surface Water Nitrate Vulnerable Zone (NVZ) under the Nitrates Directive, due to groundwater containing, or potentially containing, nitrate concentrations of greater than 50mg/l (if preventative action was not taken).

12.4.5 Flood Risk

The site is partially located within Zone C2 as defined by Welsh Government's Development Advice Map referred to under TAN15: Development & Flood Risk. Due to the site being in excess of 1ha it has been necessary to prepare a Flood Risk Assessment for this site (see below).

TAN 15 defines the flood zones as:-

Zone A – Considered to be at little or no risk of fluvial or tidal/coastal flooding

Zone B – Areas known to have been flooded in the past evidenced by sedimentary deposits

Zone C – Based on NRW extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal)

Zone C1 – Areas of the floodplain which are developed and served by significant infrastructure, including flood defences; and

Zone C2 – Areas of the floodplain without significant flood defence infrastructure.

The flood zones are based on annual probabilities of flooding. It is unlikely, but possible, that a flood with, for example, an annual probability of 1% will occur two years running. The flood zones show the flooding that would occur to land without the presence of flood defences.

12.4.6 Designated Sites

The site is located within a designated Surface Water Nitrate Vulnerable Zone (NVZ) under the Nitrates Directive, due to groundwater containing, or potentially containing, nitrate concentrations of greater than 50mg/l (if preventative action was not taken).

12.5 Predicted Impact and Evaluation of Significance (Contamination and General Risks)

12.5.1 Assessment of Potential Impacts and Risk Basis for Assessment

The impact assessment has been undertaken according to the following basis regarding the nature and extent of the development:

 The proposed development will house approximately 100,000 birds at any one time and will produce a maximum of 1,800 tonnes of manure per year.

 Uses of the individual hardstanding areas may include chemical storage.

12.5.2 Sources, Pathways & Receptors

A variety of sources, pathways and receptors have been identified as outlined below. These are generally associated with the release of chemicals, oils and fuels and dirty wash water.

Sources

-  Site development – storage and use of chemicals, fuels and oils, and concrete and sediment/silt associated with construction; and
-  Accidental release of dirty wash water or chemicals delivered to, and stored at, the site entering watercourses; and

Pathways

-  Seepage of chemicals to groundwater through permeable ground; and
-  Any chemicals/oils which seep into groundwater migrating via baseflow to nearby surface water courses;

Receptors

Receptors that would be sensitive to changes in the hydrological regime on the Mulsford Farm site and within the surrounding area include:

-  Surface water –local drainage and associated ponds.
-  Groundwater – Shallow groundwater and Principal Aquifer; and
-  Public and private water supplies.

Impacts

The principal potential impacts are therefore considered to be as follows:

-  Pollution of surface water by oil, fuel or chemicals during construction and decommissioning;
-  Pollution of groundwater by oil, fuel or chemicals during construction and decommissioning;
-  Pollution of surface water and groundwater water abstractions by chemicals or dirty wash water associated with operations;
-  Obstruction of surface water courses causing flow alteration.

Potential impacts can be considered during three stages of development, the construction stage, the operational stage and during decommissioning.

Incorporated Mitigation

Several pollution prevention and drainage management features are inherent within the design of the proposed development; a number of these will provide protection to surrounding water features. These are detailed below. However, the main mitigation feature will be the carrying out of all operations within a building and on hardstanding.

-  The floors of the poultry houses will be constructed from reinforced concrete rendering it waterproof and so preventing potential of manure effluent seepage into groundwater.
-  During the washing down of the poultry houses all dirty water will be directed to a dirty water tank
-  Level indicators in the dirty water tanks will be easily visible from the hardstanding area to quickly identify when the tanks need emptying.

-  A diverter valve will be connected to the drainage system for the hardstanding area which will divert the yard water either to the Sustainable Drainage System or to the dirty water holding tanks. During wash down the outfall drain from the hardstanding will be diverted to the dirty water collection tanks.
-  All chemical substances and hazardous materials are to be stored in accordance with NRW guidelines.
-  All diesel fuel and lubrication oils used during the construction period will be stored in bunded areas; diesel will be contained within double skinned tanks. Bunded areas will have a 110% capacity of the storage tank; and,
-  Additionally, the use of SuDS will assist with the attenuation of any polluting surface water runoff.
-  Finished Floor Levels (FFLs) are to be at least 0.3m above surrounding ground level reducing risk from flooding.

Construction and Decommissioning Phases

Impacts associated with construction will be similar to those associated with decommissioning and are considered together within this report. Potential impacts are:

Contamination of groundwater

Construction at the site will require the use and storage of a wide range of chemicals. The construction will also involve delivery of materials by heavy good vehicles and the use of construction plant on the site. Spillage or uncontrolled disposal of chemicals in any areas of the site could result in contamination of the shallow groundwater beneath the site.

Pollution of surface water

As with potential contamination to groundwater, construction will involve the use and storage of chemicals, along with the presence of delivery vehicles and mechanised construction plant. Spillage or uncontrolled disposal of chemicals in any areas of the site could rapidly lead to pollution of surface water runoff from the site from hard-standing surfaces infiltrating into the drainage system.

Table 42 provides a summary of the assessment of potential construction impacts prior to mitigation.

Table 42: Unmitigated Construction and Decommissioning Phase Impacts

Nature of Impact	Pathway	Receptor	Sensitivity of Receptor	Magnitude of Impact	Significance of Impact	Likelihood	Risk
Water Quality	Surface water run-off	River Severn/River Morda	Medium	Moderate	Moderate	Low Likelihood	Moderate / low risk
	Direct infiltration to ground	Shallow Groundwater	Low	Minor	Minor	Low Likelihood	Low Risk
	Infiltration through overlying glacial till	Principal Aquifer	High	Minor	Moderate	Low Likelihood	Moderate / low risk

12.5.3 Operational Phase

This section of the assessment relates to both on-site and off-site impacts to the hydrological environment that could potentially arise from operation of the proposed poultry development.

Potential pollution impacts are:

 Pollution of site runoff by oils and hydrocarbons

Routine use / presence of lorries and other vehicles across the site and on access routes and associated accidental spills or minor leaks all have the potential to contaminate runoff in the locality with hydrocarbons or other chemicals. This could then be flushed through the system during heavy rainfall or flooding events which could then lead to contamination of receptors downstream of the site.

If such contamination occurred, it could lead to degradation of water quality in the downstream receptors and associated ecological damage.

 Contamination of groundwater

The operational phase will involve the wash down of the hard standing area to the front of the buildings and the buildings themselves. Leakage of dirty water could occur if operational practices are not developed and managed efficiently.

Routine use of heavy goods vehicles, cars and other vehicles across the site and chemicals stored and utilised on site, all have the potential to create contamination which could then infiltrate into the shallow groundwater either through cracks in hardstanding, or through runoff onto non-developed or designed infiltration areas.

Given the permeability of the shallow geology it is likely that there could be some migration of any released contamination, particularly with regards to shallow groundwater.

Table 43 provides a summary of the potential operational phase pollution related impacts prior to mitigation.

Table 43: Unmitigated Operational Phase Impacts

Source	Nature of Impact	Pathway	Receptor	Sensitivity of Receptor	Magnitude of Impact	Significance of Impact	Likelihood	Risk
Site (operation and storage)	Pollution by oils and hydrocarbon	Surface water run off	Drainage network and associated ponds	Low	Moderate	Minor	Unlikely	Very low risk
		Surface water run off	Local ditches	Medium	Moderate	Moderate	Unlikely	Low Risk
		Direct infiltration to Ground	Shallow Groundwater	Low	Moderate	Minor	Unlikely	Very Low Risk
		Infiltration through overlying glacial drift	Principal Aquifer	High	Minor	Moderate	Unlikely	Very Low Risk
	Pollution by dirty water	Surface water run off	Drainage network and associated ponds	Low	Negligible	Insignificant	Unlikely	Very Low Risk
			Local ditches	Medium	Negligible	Insignificant	Unlikely	Very Low Risk
			Shallow Groundwater	Low	Negligible	Insignificant	Unlikely	Very Low Risk
			Principal Aquifer	High	Negligible	Insignificant	Unlikely	Very Low Risk

12.5.4 Impact Assessment

Whilst some potential impact significances are as high as moderate all risks from the operation of site are classed as low risk or lower.

12.5.5 Mitigation (Contamination and General Risks)

Construction and Decommissioning Phase

Mitigation measures during the construction/ decommissioning phase will help to manage any identified negative impacts deemed to be significant. If possible, works should be avoided, or sensibly managed, in accordance with adverse ground and/or weather conditions occurring such as heavy rainfall or waterlogged soils.

It should also be noted that a minimum 5m wide buffer zone should be left between any works associated with the construction of the proposed extension, or the plant itself and any watercourses. Should any of the works during construction be likely to affect a local watercourse (e.g. diversions - whether temporary or permanent), permission will need to be sought from NRW under the Land Drainage Act of 1991 well in advance of construction commencing. At this stage it is not thought that this will be necessary.

Contamination of Groundwater and Surface Water

The storage of polluting materials will be kept to a minimum where practicable, and where less hazardous or inert materials are available these should be specified. For example, construction materials containing sulphides or cement which could potentially alter the pH of runoff will be avoided and the use of biodegradable hydraulic oils could be considered for construction plant. In addition, absorbent mats/pads, absorbent granules and sand will be made available, and site operatives trained in their use, to deal with any spillages.

Further measures to be adopted include locating mobile plant, batching plant, materials storage, topsoil storage, and waste disposal facilities at least 20m from water features. Further, the positioning of fuel storage tanks and other potentially polluting materials and maintenance facilities will be on bunded areas of hard standing with dedicated drainage systems. The bunded areas will be protected from direct rainfall by organic mulch or a temporary sward, and stored materials on site will be checked regularly for containment integrity (both primary and secondary), quantity stored and security of storage.

Construction of concrete structures during the construction phase would be monitored to prevent cementitious material entering any watercourses. Pre-cast work or permanent formwork will reduce the amount of in-situ concreting required adjacent and above the watercourses. Ready mix suppliers will be used in preference to on-site batching. Washing out of concrete wagons or other equipment used in concreting operations will be undertaken in designated contained washout areas. These should be located away from all watercourses, drains and groundwater protection zones, and should be impermeable.

Summary

Given appropriate mitigation as detailed above, the residual potential for impacts on both groundwater and surface water contamination occurring during the construction phase and the significance of any contamination will be minimised.

Operation

Pollution from Process Wastes

Management of manure removal will be undertaken with due caution to prevent pollution release. The SuDS system described below (re: Flood Risk) will also provide some level of protection from waste entering the water environment.

Pollution of Site Runoff and Groundwater by Oils and Hydrocarbons

Any operational activities that carry significant risk of oils/hydrocarbon spillage must comply with TAN15. Any operational activities that carry significant risk of oils/hydrocarbon spillage will be subject to a separate task specific environmental risk assessment under the Environmental Permitting Regulations regime and associated licences from NRW.

Implementation of these mitigation measures will ensure that residual impacts on the identified receptors and their significance are minimised.

12.5.6 Assessment of Residual Impact Significance

Given the additional mitigation set out above, all significant impacts for the construction/decommissioning and operation of the proposed poultry development will be mitigated to a minor level (or less) for all the identified potential impacts. The risks of impact are also reduced to low risk (or less).

All operations will occur on hardstanding within a building, significant protection from pollution incidents is provided to the underlying principal aquifer and surface waters. The mitigation measures specified will, therefore, minimise any potential impacts. Incorporation of standard best practice during the construction works and during operation will also ensure that no major pollution incidents occur and thus protect the aquifer and surface waters. The resulting post-mitigation impacts are set out below in 44 for the risks from the construction/ decommissioning phase and in Table 45 for the operational phase.

Following mitigation, all risks from potential impacts have been reduced to low (or less than) and likelihood is reduced to low likelihood or lower.

Table 44: Mitigated Construction and Decommissioning Phase Impacts

Nature of Impact	Pathway	Receptor	Sensitivity Receptor	of	Magnitude Impact	of	Significance Impact	of	Likelihood	Risk
Water Quality	Surface water run-off	Local ditches	Medium		Negligible		Insignificant		Unlikely	Very Low Risk
	Direct infiltration to ground	Shallow Groundwater	Low		Minor		Minor		Unlikely	Very Low Risk
	Infiltration through overlying glacial till	Principal Aquifer	High		Minor		Insignificant		Unlikely	Very Low Risk

Table 45: Mitigated Operational Phase Impacts

Source	Nature of Impact	Pathway	Receptor	Sensitivity Receptor	of	Magnitude Impact	of	Significance Impact	of	Likelihood	Risk
Site (operation and storage)	Pollution by oils and hydrocarbon	Surface water run off	Drainage network and associated ponds	Low		Negligible		Insignificant		Unlikely	Very low risk
		Surface water run off	Local ditches	Medium		Negligible		Insignificant		Unlikely	Very Low Risk
		Direct infiltration to Ground	Shallow Groundwater	Low		Minor		Insignificant		Unlikely	Very Low Risk
		Infiltration through overlying glacial drift	Principal Aquifer	High		Minor		Insignificant		Unlikely	Very Low Risk
	Pollution by dirty water	Surface water run off	Drainage network and associated ponds	Low		Minor		Insignificant		Unlikely	Very Low Risk
		Surface water run off	Local ditches	Medium		Negligible		Insignificant		Unlikely	Very Low Risk
		Direct Infiltration to Ground	Shallow Groundwater	Low		Minor		Insignificant		Unlikely	Very Low Risk
		Infiltration through overlying glacial drift	Principal Aquifer	High		Minor		Insignificant		Unlikely	Very Low Risk

12.6 Flood Risk

12.6.1 Flood Risk Assessment

The Flood Risk Assessment was carried out in line with TAN15 for the proposed site as the site exceeds 1 ha. For any site larger than one hectare the NRW's standing policy, in accordance with TAN15, states that an assessment must be undertaken. In addition to assessing external risk of flooding to the site, an assessment must demonstrate that the proposed development would not exacerbate flooding elsewhere. On Brownfield sites it is also necessary to demonstrate that peak rates of flow would be reduced back towards the levels that would be expected from a Greenfield site.

Flood Risk

The site is located within Flood Zone C2, indicating that there are areas of the floodplain without significant flood defence infrastructure.

Storm Water Management

Calculations indicate that 720 m³ of attenuation storage would be required to manage up to a 1-in100 year rainfall event (including provision for climate change) if run off were to be completely managed using this method. The required attenuation could be provided in the form of an underground attenuation tank located within the proposed yard area.

12.6.2 External Flood Sources

Within TAN15 it is recommended that a Flood Risk Assessment should consider all possible sources of flooding for a given site. The following sources of flooding are summarised in Table 46;

Table 46: Summary of potential flood source

Flood Type	Source	Potential Pathway
Fluvial	Ponds and Drains on site	Blockage and exceedance of channel/retention area
	Ponds and drains off site	Blockage and exceedance of channel/retention area
Tidal	None	None
Drainage	Mains Supply	Pipe burst and overland flow
	Surface drains and sewers	Blockage and surcharge followed by overland flow
	Foul sewers	Blockage and surcharge followed by overland flow
Overland flow	None	None
Groundwater	Sandstone	High groundwater levels expressed at surface

12.6.3 Risk Assessment

The risk assessment methodology used is set out in section Table 46 above and is based on guidance provided in TAN15. The guidance recommends that flood risk is assessed through consideration of both the magnitude of potential impacts and the probability of occurrence. The magnitude of impact is dependent on two factors; the sensitivity of potential receptors and the severity of the flooding. There are therefore three criteria on which flood risk is assessed. These are:

-  Sensitivity of the receptor
-  Severity of the flooding; and
-  Probability of occurrence.

12.6.4 Sensitivity of Receptors

The proposed development is a building used for agriculture, thus, under the sequential test defined within TAN15 the development would be classified as a "less vulnerable development". Given this sensitivity has been defined as moderate.

Development in general has the potential to impact the flood risk posed to off-site receptors. All off-site development is considered to have a very high sensitivity to any increase in flood risk and, therefore, it is important that any adverse off-site impacts on flood severity or frequency are avoided.

12.6.5 Severity and Probability of Flooding

The severity and probability of flooding are both fully defined above and the classification of these criteria is discussed in the following sections.

Tidal

Not relevant at the Mulsford Farm site given the distance from tidal watercourses.

Drainage and Mains Supply

The drainage and mains supply are a significant distance from the site that in the event of a system collapse the total volume of flood waters is not expected to be large enough to cause a flooding event at the site.

Overland Flow

The Mulsford Farm site is on flat land with no steep slopes in the vicinity. No potential pathways are therefore identified for flooding from overland flows.

Groundwater

The topsoil across the site is underlain by freely draining glacial drift which have the potential to transmit large volumes of water, however the site is on flat land and is not at the base of a significant slope. There is therefore a low potential for flooding to occur from groundwater seepage.

12.6.6 Summary of Risks

The probability and severity of each type of flooding has been assessed in line with the methodology and guidance set out above. This is then combined with the assessment of receptor sensitivity to define the level of flood risk on a scale ranging from negligible to high. These are outlined in Table 47.

Typically risks assessed to be low or less are acceptable whereas risks assessed to be moderate or high require additional mitigation or management to enable the development to proceed. All the risks to the development are assessed as being either low or very low. Thus, no further mitigation or management is required in respect of flood risk.

Table 47: Flood Risk Summary

Flood Source		Pathway	Receptor	Sensitivity	Magnitude of potential hazard	Probability of Impact	Flood Risk
Fluvial	Ponds and drains	Blockage and exceedance of channel/retention area	Extension	Moderate	Negligible	Low	Negligible
Drainage	Mains Water	Pipe burst and overland flow	Extension	Moderate	Negligible	Very Low	Negligible
	Surface Water Drains and Sewers	Blockage and surcharge followed by overland flow	Extension	Moderate	Negligible	Very Low	Negligible
	Foul Sewers	Blockage and surcharge followed by overland flow	Extension	Moderate	Negligible	Very Low	Negligible
Groundwater	Underlying glacial Drift	High groundwater levels expressed at surface	Extension	Moderate	Very Low	Very Low	Negligible
Increased impermeable areas	Development	Increased surface water runoff	River Severn Flood Plain	Moderate	Moderate	High	High

12.6.7 Internal Flood Sources

Increases in the area of the site covered by impermeable surfaces will lead to higher peak flows from the site and faster flows off the site. This will then discharge into the local drainage system and could contribute to an increased flood risk from the local watercourses and downstream of the site. Note is made of the vast distance of the Llangollen Canal to the site. The sensitivity of the receptor is classed as medium, and a medium magnitude of potential. The resulting impact is moderate. There is high probability of occurrence, with a resulting high risk of flooding of downstream receptors.

Increased surface water runoff from increases in impermeable areas poses a high risk of flooding to downstream receptors and will require mitigation.

12.6.8 Flood Risk Mitigation

Site Drainage Systems

The proposals will result in approximately 40% of the site area being converted to an impermeable surface (hardstanding). This increase in impermeable surface area could have an impact on receptors downstream of the site and mitigation is required.

NRW's policy for site development is that runoff from a site should not be increased. Drainage systems for the site should be designed based on the 1% annual probability design event. Additionally, potential increases in storm severity associated with climate change need to be considered (20% increase in rainfall depths).

Site drainage should be designed based on sustainable drainage principles as laid out in guidance documents including TAN15. The most preferable option for drainage receptors is infiltration drainage or, where this is not possible, or does not provide sufficient capacity; attenuated discharge to watercourses should be sought. Discharge to sewers should only be considered where the above options are not available.

Site drainage should be designed based on sustainable drainage principles as laid out in guidance documents including TAN15. The most preferable option for drainage receptors is infiltration drainage or, where this is not possible, or does not provide sufficient capacity; attenuated discharge to watercourses should be sought. Discharge to sewers should only be considered where the above options are not available.

Sustainable Drainage System

The NRW's standing policy for site development is that runoff from a site should not be increased and that a decrease of site runoff towards Greenfield levels is desirable. Where possible, this should be done using **Sustainable Drainage Systems (SuDS)**.

A quantitative assessment of the anticipated increase in run-off has been undertaken by estimating the greenfield peak run-off rates and peak run-off rates expected upon completion of the development. The volumes of storage required to limit predicted runoff rates to original greenfield rates have been calculated.

The SPRHOST (standard percentage run-off) value of 15.1%, is indicated for the catchment in the Flood Estimation Handbook (Centre for Ecology & Hydrology, 1999), which is indicative of a sandy soil type. However, the client reports that soils at the site are a medium/heavy loam. For the purpose of the calculations, the soil type is therefore assumed to be 'loam/intermediate soils'.

12.6.9 Assessment of Residual Impact Significance

Although no significant flood risks have been identified appropriate SuDS will be deployed to ensure the development does not contribute to flooding of downstream receptors. With regards to flood risk, the application of SuDS will ensure runoff from the site will remain at Greenfield levels, resulting in no impact on flood risk.

12.7 Surface water / Groundwater Pollution – Application and storage of poultry manure

12.7.1 Introduction

This section of the report deals with the issues surrounding the impact of the proposed development on water resources through generation, storage, transport and application to land of all dirty water, slurry and manure likely to be produced by the birds at the proposed development.

12.7.2 Legislative Framework

The leaching of nitrogen from fields to watercourses has severe implications upon water quality. Consequently the nitrate pollution prevention regulations 2008 have been introduced to implement the European Community's Nitrates Directive, to reduce nitrogen losses from agriculture to water. They designate areas where nitrate pollution is a problem, known as Nitrate Vulnerable Zones (NVZs). The applicant's farm has been designated as an NVZ area.

12.7.3 Methodology

The application of animal manure, slurry and dirty water to land is planned using the principles laid out in the Defra Guidance notes for Farmers within Nitrate Vulnerable Zones derived from the Nitrate Vulnerable Zones Regulations 2008 which lays down quantitative limits for the application of nitrogen to land.

A Farm Waste Management Plan has been produced in order to identify the risks associated with the application of poultry manure to the land. The plan is based on an understanding of the soils and climate of the area and the identification of spreading risks, calculation of manure and dirty water production.

First, a water features survey has been carried out to identify land where material should not be spread at any time. A ten-metre strip adjacent to all watercourses should be left untreated to avoid direct pollution of surface waters. Risk of pollution of vulnerable groundwater sources such as wells, springs and boreholes is reduced by designating a 50 metre radius non-spreading zone around such sources, variable according to the local geology and topography. Additional areas upon which materials should not be spread include very steep slopes with a risk of run-off all-the-year-round, areas such as SSSIs that are subject to management agreements.

The next stage is to match the quantities of nutrients supplied by the material to the area of land available for application. Current guidance is that there should be sufficient land available so that material can be spread within the requirement so that the total amount of nitrogen in livestock and other organic materials does not exceed a threshold of 170kg/ha/year. This figure includes manure deposited by grazing livestock. Furthermore the amount of available nitrogen in organic material applied to crops should not be more than the crop needs.

The third stage is to assess the risk of pollution that might arise from the application of the material to land, and estimate the number of months that these risks apply. Cropping and soil conditions might also limit land spreading because of the chance of damage. These limitations have been assessed by the production of the Farm Waste Management Plan, the applicant having undertaken a survey of its own landholding in order to assess the risk of spreading material.

Land farmed by the applicant has been divided into three categories according to the criteria laid out in DEFRA guidance leaflet: *Leaflet 8 Guidance for Farmers in Nitrate Vulnerable Zones – Field application of organic manures* and are summarised in Table 48.

Table 48: Classification of Land Spreading

Classification	Restrictions on Application	Location of Area
Non-spreading areas (Red)	At all times of year	Within at least 10 metres of either side of any surface water including ditches, temporary dry ditches and piped ditches. Within at least 50 metres of any spring, well, borehole or open reservoir.

Classification	Restrictions on Application	Location of Area
		Very steep slopes where run-off is a high risk throughout the year.
Non-spreading areas (White)	At all times of year	Non-farmed areas – buildings, roads, tracks
		Land use – e.g. woodlands etc
		Fields or part fields next to a watercourse, spring or borehole when the surface is severely compacted ¹ or waterlogged.
		Fields or part fields that are likely to flood sometime in most winters.
Very High Risk (Orange)	No solid or liquid effluent should be applied during the period of Field Capacity ²	Field or part fields next to a watercourse, spring or borehole when the soil is at field capacity (in winter) and there is:  a steep slope  a moderate slope and a slowly permeable soil (i.e. a clay soil or one through which water passes only slowly)
High Risk (Yellow)	No more than 50m ³ /hectare of liquid effluent should be applied at any one time whilst the fields are at Field Capacity and at least three weeks between applications	Field or part fields next to a watercourse, spring or borehole when the soil is at field capacity (in winter) and there is:  a moderate slope and a well-drained soil  a slight slope and a slowly permeable soil
		All fields or part fields with effective pipe or mole drains that are not already coloured red or orange ³ (see extra limitations below).
		Very shallow soils (less than 30 cm) over gravel or rock, e.g. limestone, chalk, slates and shales.
Low Risk (Green)	Most of the year	Areas with no mole drains or any of the above.

¹ Severely compacted is when rain stays on the surface after rainfall.

² Field capacity is when the soil becomes fully wetted and more rain would cause water loss by drainage. This normally happens in autumn and lasts until the spring.

³ Fields or part fields which in the last 12 months have been pipe drained, mole drained or sub-soiled over drains should not be used for spreading.

12.7.4 Soils and climate of the area

The soils of the areas where manure will be spread are summarised in Table 49 below. The soils are identified on the National Soil Resource Institute website and 1: 250,000 map.

Table 49: Soil types across controlled land

Farm Name	Soil Characteristics
Land at Mulsford Farm	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils

The majority of the land is under-drained and for the purpose of this plan it is assumed that all land is under-drained.

12.7.5 Identification of land available for spreading

The entire landholdings have been assessed for spreading risk according to the recommendations of the Guidance for Farmers in Nitrate Vulnerable Zones. All surface water features have been surveyed and taken into account during the calculation of the land available for spreading.

Part 4 of the Nitrates Pollution Prevention Regulations establishes a limit on the amount of nitrogen (from manufactured nitrogen fertiliser and crop available nitrogen from livestock manures) that can be applied to specified crops. The N max limits for the specified crops allow a range permitted

adjustments to the application limits, however for the purpose of this report, the lowest limit of 170kgN/ha has been used.

12.7.6 Calculation of Manure and Effluent Production

It is proposed that the whole of the proposed poultry installation will have approximately 100,000 birds. The volume of manure generated by these stock numbers is calculated using standard figures published by DEFRA. 1,000 broiler places at an occupancy rate of 85% produce 1.5 tonnes per month. The following table gives a summary of the total volume produced by the site:

Weight produced by 1000 broilers per month (tonnes)	Number of birds proposed	Weight of excreta produced per month (tonnes)	Weight of excreta produced per annum (tonnes)
1.5	100,000	150.00	1,800

There will be an annual production of 1,800 tonnes of poultry manure per year.

12.7.7 Dirty Water Production

Wash water from washing down is diluted wash water with a low nitrogen content and therefore can be spread directly on land at all times of the year and does not have to be included within the calculation of nutrient loading for the purpose of field application. Dirty water will be spread directly onto the adjoining land thereby eliminating the need to travel on the local highway.

12.7.8 Manure Storage

Crops will not require applications of poultry manure throughout the year due to growth stages and lack of ability of the crops to utilise the nutrients. Hence it is common practice to store the manure in triangular-shaped heaps ready for spreading on the fields and then for it to be incorporated immediately into the soil by cultivation. This practice minimises nutrient loss (nitrogen) and minimises the release of odour. It is in the applicant's best interest to utilise the manure to best advantage since it reduces the cost of purchased inorganic fertiliser and places organic matter into the soil to improve soil condition.

All sites indicated are located on sites that accord with the above regulations. Well over 50 sites are available across land controlled by the applicant and each of them has an unlimited capacity for the storage of poultry manure produced by the proposed poultry installation.

12.7.9 Calculation of Nutrient Loading

The main limitation on the application of organic manure to land is its total nitrogen content. In order to comply with the regulations manures applied to arable land should not contain more than a total of 170kg nitrogen per hectare covered. Standard nutrient production figures are published by DEFRA. The total nitrogen produced by 1000 broiler places is 330 kilograms per year.

The following table provides a breakdown of annual nitrogen production of the site:

Total N produced by 1000 broilers (kg/year)	Number of birds proposed	Total N produced by proposed development (kg/year)
330	100,000	33,000
Spreading area at 170 kg total N/ha/annum		1,116.95

This calculation shows that the applicant has control of sufficient land for the spreading of all of the manure produced by the site per annum. It can be concluded that the proposed stocking maximum are sustainable in terms of the nitrogen loadings, the Nitrate Pollution Prevention Regulations and the recommendations of the DEFRA Code of Good Practice for Protecting Water, Soil and Air.

12.7.10 Other Nutrient Leaching

Poultry manure is also a significant source of phosphorous, another essential plant nutrient. However, if applied excessively it will lock up other minerals thereby decreasing crop yields. Excessive phosphorous application can lead to eutrophication of watercourses, ultimately killing aquatic life. Current soil indices across the farm are significantly below 4.

12.7.11 Environmental Permitting Regulations

In addition to the measures detailed above, it is a requirement under the Environmental Permitting (England and Wales) Regulations 2011 that the site has a Permit to operate. Under the Environmental Permitting regime the emissions of the proposal to groundwater are assessed within the requirements of Best Available Techniques.

12.7.12 Discussion and Conclusions

The main limitation on stocking rates at the proposed poultry development is the availability of land. In order to maximise the efficiency of the farming operations and reduce the risk of pollution, manure arising from the proposed development will be applied to the land with the recommendation of good agricultural practice on the land within the control of the applicant as appropriate.

Sufficient suitable land is available within the applicant's holding to enable manure to be applied to land in a way that is beneficial to crops and presents a minimal risk of pollution to surface waters in line with the NVZ regulation and the DEFRA Code of Good Agricultural Practice for protecting Water, Soil and Air.

12.7.13 Mitigation against Nutrient Overloading

Regular soil testing is carried out by the applicant across the land farmed by the applicant; nutrient (phosphate and nitrogen) levels of the soils are recorded and programmed into a Global Positioning System attached to machinery used for spreading organic fertiliser (manure) and inorganic fertiliser; the system applies nutrients at the necessary rate according to the soil tests and statutory loading limits.

12.8 Follow Up Actions

Short term surveillance monitoring will be undertaken to ensure that no detrimental impacts occur during site construction, decommissioning and operation. This short surveillance monitoring should include specific water quality monitoring for shallow groundwater and surface water monitoring and assessment of existing NRW data regarding the biological health of the River Dee. Such monitoring will be carried out by the site operator in accordance with requirements set by the NRW under the Environmental Permitting regime.

12.9 Conclusions

A number of potential impacts on the local hydrology and hydrogeology have been identified as a result of the construction and operation of a poultry development at the site.

Potential impacts include the risk of groundwater and surface water contamination from oils and hydrocarbons and dirty water.

Both development and operation of a poultry development on this site have the potential to negatively impact on the hydrology and hydrogeology of the area through the contamination of surface water and groundwater. Employing appropriate construction techniques (see Technical Advice Notes) and good design will ensure that these risks will be successfully mitigated.

The significance of such impacts has been systematically evaluated and mitigation measures for each of the impacts have been identified. Following mitigation, the significance of residual impacts is all reduced to a minor level or below.

CHAPTER 13 – SOILS

13. 13 Soils

This chapter assesses the impact of the proposals on soils on site and soils to which poultry manure will be applied. No significant impacts upon soils are envisaged.

13.1 13.1 Introduction

13.1.1 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 installation and the spreading of poultry manure on agricultural land.

13.2 Overview of Potential Impacts on Soils

In the absence of mitigation, the potential impacts to soils arising from the proposed poultry development 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 development; and
-  Operation – off-site: Compaction of soils from spreading of manure, contamination from heavy metal inputs
-  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 12 - 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 unit. However, it does not necessarily follow that all these impacts would actually occur.

Table 50: Potential Impacts Resulting from the Development

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 development	Leaks of potential contaminants. Examples include, but not limited to: manure leachates; dust; process chemicals; oils etc.	Soils	
Operation	Application of poultry manure to agricultural land	Compaction of soil, increased run off	Soils	
Operation	Application of poultry manure to agricultural land	Heavy metal and Veterinary Medicine input to soils	Soils	
Decommissioning	Removal of poultry development	Leaks of potential contaminants. Examples include, but not limited to: manure leachates; dust; process chemicals; oils etc.	Soil	

Key Activities	Specific Element/Activity	Potential Impacts Potential Effect	Potential Receptors	Sensitive
Decommissioning	Removal of hard standing/buildings	Exposure of soils which could lead to leaching of any contaminants and increased sediment load	Primarily soils	

13.3 Methodology

13.3.1 Methodology and Relevant Guidance/Standards

The assessment of potential impacts on soils arising from the proposed poultry development 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 12) and follows a similar methodology.

The assessment identifies the likely risks of soil contamination during the construction, operational and decommissioning phases of the poultry installation. 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.

13.3.2 Assessment Criteria

The significance of any impacts of the proposed poultry development 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 Mulsford Farm 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			
Magnitude		Negligible	Low	Medium	High
	Negligible	Insignificant	Insignificant	Insignificant	Insignificant
	Minor	Insignificant	Minor	Minor	Moderate
	Moderate	Insignificant	Minor	Moderate	High
	High	Insignificant	Moderate	High	Very High

13.3.3 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 Mulsford Farm site and agricultural land on which manure will be spread, 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 NRW 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

Probability (likelihood)	Significance				
		High	Moderate	Minor	Insignificant
	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 development 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.

13.4 The Baseline Environment and Sensitive Receptors

13.4.1 Geology and Soils

The site geology and the geology of soils on which application of manure is proposed is summarised in Table 56.

Table 56: Soil types across controlled land

Farm Name	Soil Characteristics
Land at Mulsford Farm	Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils

13.5 Assessment of Impacts and Risk

13.5.1 Basis for Assessment and Incorporated Mitigation Measures

The impact assessment for the proposed poultry development on soils has been undertaken assuming the following:

-  The Mulsford Farm site will produce a maximum of 1,800 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 areas and 20% landscaped areas.

The impact assessment for the poultry installation on soils also assumes the following incorporated mitigation measures:

-  Operation in accordance with Pollution Prevention Guidelines (PPGs) (see Chapter 12 – Water Resources) and licensed by Natural Resources Wales (NRW) 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.

13.5.2 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 development;
-  Use of heavy machinery on site and during application of soil to land (compaction of soils); and
-  Heavy metal content of poultry manure, veterinary medicines within poultry manure.

Pathways,

-  Leaching of inorganic and organic chemicals;

-  Building works affecting soil structure; and
-  Application of poultry manure to land.

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 Spreading of Manure

The UK poultry flock (including layers and broilers) produces around 4 million tonnes of poultry manure per year (Chambers & Smith, 1998). This contains around 49,000 tonnes of nitrogen following ammonia losses (31,000 t of N) and losses to incineration (20,100 t of N). To comply with the Nitrate Pollution Prevention Regulations 2008, poultry manure applications to agricultural land should supply no more than 170 kg total N/ha per annum (except in some circumstances – for this assessment the lowest possible figure has been used to present a worst case scenario). Poultry manures are therefore spread across around 200,000 hectares of agricultural land. When this is spread in wet soil conditions it can potentially lead to soil compaction (Larsen et al., 1994).

The magnitude of impact without mitigation would be moderate.

Soil Compaction from Construction

The compaction of soils during construction may also increase surface runoff. This risk is assessed in Chapter 12 – 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.

Heavy Metals

At the field level, zinc inputs from layer manure are higher than those from any other livestock manure, including pigs (Nicholson et al., 2003). Zinc inputs from layer manure to agricultural land in England and Wales amount to 2.7 kg Zn ha⁻¹ a⁻¹, while copper inputs amount to 0.4 kg Cu ha⁻¹ a⁻¹.

The magnitude of impact without mitigation would be moderate.

Veterinary Medicines

The only veterinary medicines routinely used in broiler feed are coccidiostats, endogenous oestrogens.

Data available on endogenous oestrogens (Shore *et al.*, 1988) demonstrate that these compounds can be transported from poultry farms, via agricultural run-off to rivers and streams. Oestrogen (as an endocrine disruptor) can affect reproduction in fish species.

Increased concentrations of oestrogen can give rise to male fish gaining female characteristics, which could in turn impact on reproduction - this has been studied in Atlantic salmon and other species.

There is a scarcity of research about the impacts of free range production on biodiversity.

The magnitude of impact without mitigation would be moderate.

13.6 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 Receptor	of	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 development;	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
Heavy metal content of poultry manure, veterinary medicines within poultry manure.	Contaminate Soils	Soils	Negligible		Moderate	Insignificant

13.6.1 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 realised)	Likelihood Construction (if	Operation	Decommissioning	Risk Construction	Operation	Decommissioning
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed poultry development;	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 the development	Compaction	Soils	Insignificant	Likely	Likely	Likely	Low Risk	Low Risk	Low Risk
Heavy metal content of poultry manure, veterinary medicines within poultry manure.	Contaminate Soils	Soils	Insignificant	n/a	Likely	n/a	n/a	Low Risk	n/a

13.7 Mitigation and Management

Mitigation and management of potential risks to the soils underlying the Mulsford Farm site and soils across the land on which manure will be spread are as follows:

-  Application of poultry manure will only take place when weather conditions are favourable and soil conditions would support machinery. The applicant employs the use of a penetrometer for assessing the levels of compaction; the information that the penetrometer presents is used to ascertain whether sub-soiling should occur.
-  Soils are regularly tested across land on which poultry manure is spread. Heavy metal concentrations would be detected and appropriate remedial action taken.
-  Defra project SP0129 (Anon, 2001b) concluded that reducing dietary trace element supplementation would be an effective strategy for protecting soils from long-term heavy metal accumulation. Strategies for reducing heavy metal excretion in broiler litter also include:
 - Lowering levels of supplementation through reducing EC maximum levels of inclusion and safety margins
 - Using feeds with higher bioavailability of Cu and Zn
 - Using chelated metals – if they are shown to have consistently higher bioavailability

13.7.1 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 NRW's guidance on how to comply with your Environmental Permit is the principal document used for guidance on preventing contamination from construction activities.

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 development;	Contaminate Soils	Soils	Negligible	Negligible	Insignificant
Use of heavy machinery on site and during application of soil to land.	Compaction	Soils	Negligible	Negligible	Insignificant
Heavy metal content of poultry manure, veterinary medicines within poultry manure.	Contaminate Soils	Soils	Negligible	Minor	Insignificant

13.7.2 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 6o. 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 60: Risk Assessment Table – mitigated risks

Source	Potential impact	Receptor	Resulting Significance (if realised)	Likelihood			Risk		
				Construction	Operation	Decommissioning	Construction	Operation	Decommissioning
Storage and use of inorganic and organic chemicals during the construction, operation and decommissioning of the proposed poultry development;	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 the development	Compaction	Soils	Insignificant	n/a	Low	n/a	Very Low Risk	Very Low Risk	Very Low Risk
Heavy metal content of poultry manure, veterinary medicines within poultry manure.	Contaminate Soils	Soils	Insignificant	n/a	Low	n/a	n/a	Low Risk	n/a

13.8 Residual Impacts and Conclusions

Following mitigation the overall risks of the poultry development on soils have been assessed as very low and no further mitigation or management issues need to be addressed. Therefore the proposed development is unlikely to give rise to any significant adverse impacts on the soils of the site. Furthermore the regular application of poultry manure to agricultural land can potentially improve soil quality and fertility (Bhogal et al., 2006; Haynes & Naidu, 1998; Hountin et al., 1997; Persson & Kirchmann, 1994; Van Meirvenne et al., 1996).

CHAPTER 14 – HERITAGE

14. Heritage

This chapter assess the effects of the development on designated or un-designated heritage assets within the area surrounding the development site. There are no known designated or un-designated heritage assets within the proposed development site boundary. However the surrounding area contains a number of designated heritage assets and the impact on these is assessed in this chapter.

14.1 Summary

This historic environment assessment has been undertaken by Trysor to examine likely impacts on the historic environment from two poultry sheds on land northeast of Mulsford Farm, Sarn, Malpas, Powys.

A site visit was undertaken by Trysor to examine the location of the development. Information was also gathered on the indirect, visual impacts on historic assets within the wider landscape.

The walk-over survey provided no evidence of buried archaeological features at the development site, although the land was under a crop and the surface largely obscured.

The assessment studied the direct and indirect impacts on all recorded historic assets within an area measuring 1 kilometre in radius, focused on SJ4343045050, the centre of the development. The Clwyd Powys Archaeological Trust Historic Environment Record and data from RCAHMW and Cadw was consulted. Historical mapping was also consulted as well as aerial photographs and LiDAR.

There are no Scheduled Monuments within a 1km radius of the development.

There are 4 Listed Buildings within a 1km radius of the development. There would be no impact on them from the development.

There are no Registered Parks and Gardens within the 1km radius of the development.

The development site lies within the Maelor Saesneg Registered Historic Landscape. The physical evidence for medieval agricultural regimes is a very significant feature in the local landscape and is found across a wide area in this low lying part of Wales.

There would be a High, direct physical impact on a 0.6 hectare area of ridge and furrow, ID Number 44. The area of ridge and furrow that would be destroyed is visible on some recent aerial photographs and faintly visible on LiDAR. It is not as distinctive as areas of ridge and furrow to the north and west. It was not visible during the site visit, which was undertaken in low light with a brassica crop on the field. It is not the best preserved example in the extensive area where ridge and furrow is present.

There would be a Low indirect physical impact and Very Low impact on setting of an infilled marl pit/clay pit (ID number 53). Such features are a significant element of the local landscape, where they survive, but this example is no longer a landscape feature. They postdate the ridge and furrow but most predate the late 19th century 1st edition Ordnance Survey map.

There is no physical, documentary, cartographic or aerial photographic evidence to suggest that the proposed development site has potential for further buried archaeology.

No archaeological mitigation is thought necessary in associated with this development.

14.2 Copyright

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14.3 Introduction

Roger Parry & Partners LLP, The Estates Office, 20 Salop Road, Oswestry, Shropshire, SY11 2NU have commissioned Trysor heritage consultants on behalf of their client to undertake an historic environment desk-based assessment for poultry sheds on land northeast of Mulsford Farm, Mulsford, Sarn, Malpas, Cheshire SY14 7LP, see Figure 1.

A planning application has not been submitted yet. A specification for this historic environment desk-based assessment was agreed by the CPAT, the archaeological advisors to the LPA, see Appendix 1. Note that the biomass unit mentioned in the specification has been withdrawn from this scheme.

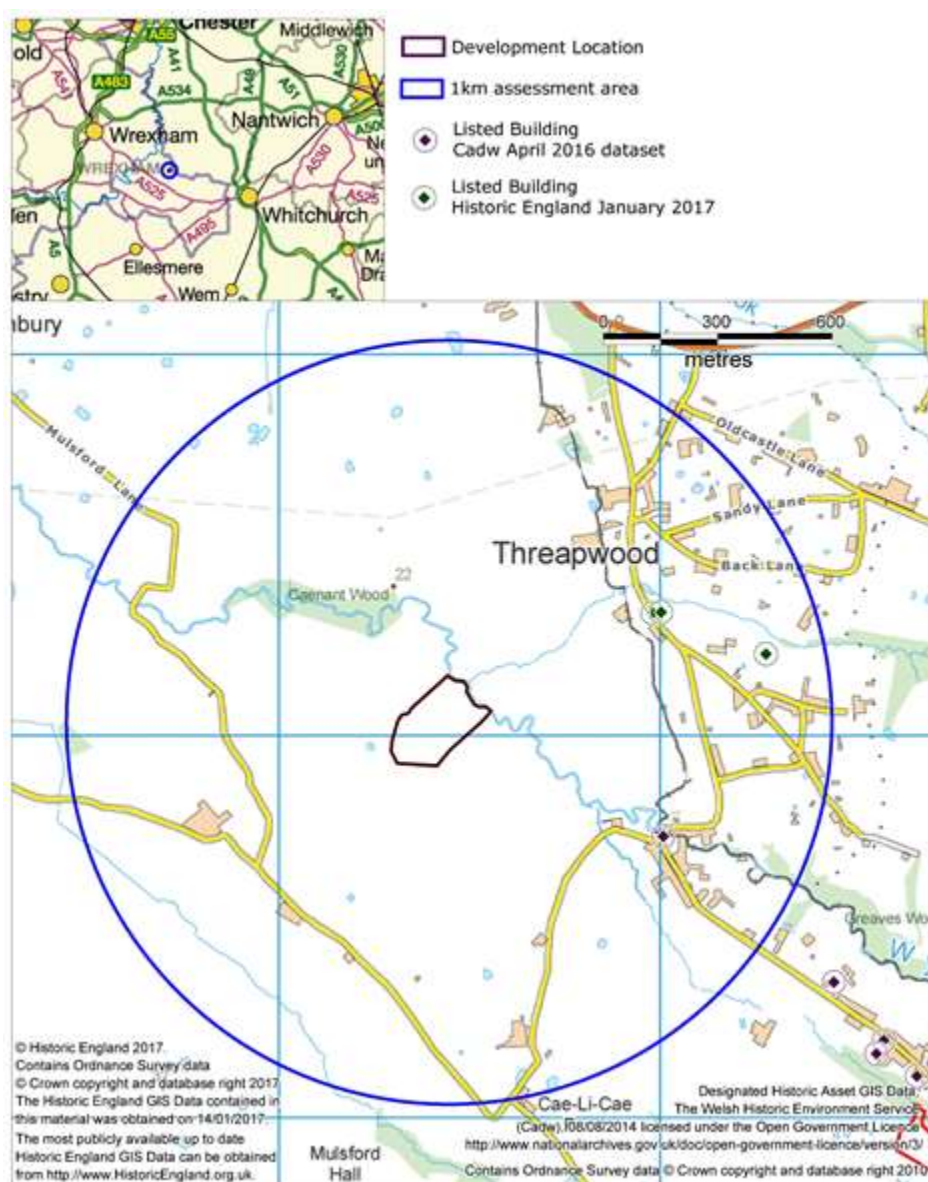


Figure 1: Location of the proposed development, showing the 1km radius assessment area.

14.4 The development

It is proposed that two poultry sheds are developed in a field, 500 metres to the northeast of Mulsford Farm, Mulsford, Sarn, Malpas, Cheshire, SY14 7LP.

14.5 Methodology

The desk-based assessment considered known historic assets within a 1 km radius circle centred on SJ4343045050, the centre of the proposed development (see Figure 1). This has helped develop an

understanding of the archaeology and landscape of the surrounding area as well as assess any direct or indirect impacts. Historic assets have been given an ID number for the purposes of this report, other reference numbers, such as HER PRNs are cross referenced in Appendix B.

Data from the regional Historic Environment Record held by Clwyd Powys Archaeological Trust was acquired for the 1 kilometre assessment. Listed Buildings, and other heritage assets, within 1km in Threapwood in England were also included.

Historic mapping was consulted. The maps used included the early 19th century Ordnance Survey Original Surveyors Drawings, as well as late 19th and 20th century 1:2500 scale Ordnance Survey mapping and the parish tithe map.

A site visit was made by Trysor to the development site, and the surrounding area, on February 1st, 2017. Visible archaeological features within the area that would be directly affected by the development were searched for and any other historic assets on which there may be a direct impact recorded. The wider landscape was also studied taking note of topography, vegetation and structures.

Aerial photographs on Google Earth, dating to 1999, 2003, 2005, 2006, 2009 and 2010, were used to inform the assessment as well as aerial photographs from 1969 and 2013 available from the Welsh Government Aerial photographic unit online. LiDAR data, between 2 metre and 1 metre resolution, was available for most of the assessment area.

Modern mapping was used to assess current public access.

All information gathered during the desktop assessment and site visit was entered into a bespoke database created in Access 2003 to form an assessment dataset.

The final dataset is the source of the material output in this report, including the GIS mapping which illustrates the location of historic assets in the area, and the tables and appendices which provide detailed information on the historic assets within the study area.

Each of the records in the final assessment 1 kilometre dataset was assessed for Period, Rarity, Documentation, Group Value, as well as Evidential Value, Historical Value, Aesthetic Value, Communal Value. Once these had been considered the significance of each historic asset was determined and scored in accordance with the categories adopted by the Welsh Archaeological Trusts i.e. Nationally Important, Regionally Important, Locally Important, Minor and Features Needing Further Investigation (Unknown), see Figure 4. Full details of this exercise are given in Appendix B.

The Direct and Indirect impact on each historic asset was assessed taking into account both physical and non-physical impacts. Each impact was assessed within the scale Very Low, Low, Moderate, High and Very High, taken into account the significance of the historic asset and the nature of the impact.

14.6 The Development Site

The proposed development site is underlain by Triassic sandstones/conglomerate of the Helsby Sandstone Formation. These were laid down as river deposits between 237 and 251 million years ago. The superficial deposits are glacial tills created in Ice Age conditions up to 2 million years ago.

The development site is located in an arable field on the western side of the Wych Brook, 430 metres to the west of the Wales/England border. The surrounding area is largely level with gentle undulations. The fields are irregular in shape and bounded by hedges with occasional trees.

14.7 Mulsford: Archaeological Overview

14.7.1 Palaeolithic and Mesolithic (250,000BC – 4,000BC)

There are no records of artefacts or sites associated with the Palaeolithic period or Mesolithic period recorded within a 1km radius of the proposed development site.

14.7.2 Neolithic and Earlier Bronze Age (4,000BC – 1,500BC)

There is no evidence of Neolithic and Early Bronze Age activity within a 1km radius of the proposed development site.

14.7.3 Later Bronze Age and Iron Age (1500BC – AD43)

There is no evidence of Later Bronze Age and Iron Age activity within a 1km radius of the proposed development site.

14.7.4 Roman (AD43 – AD410)

There is no evidence of the Roman period within a 1km radius of the proposed development.

14.7.5 Early Medieval (AD410 – AD1100)

There is also no evidence of the transition from Roman society to Early Medieval society in this district.

14.7.6 Medieval (AD1100 – AD1539)

The ridge and furrow, which remain evident in many of the fields over a wide area of this low lying part of Wales, are the physical remains of medieval field systems. They often have a different layout to the modern fieldscape, the hedges of post medieval fieldscape breaking across the ridge and furrow.

14.7.7 Post Medieval & Industrial (AD1539 – present day)

Most of the sites recorded within a 1km radius of the proposed development site date to the Post Medieval period. The majority are marl/clay pits. These postdate the ridge and furrow but mostly predate the late 19th century 1st edition Ordnance Survey maps.

14.8 Mulsford Development Site: Historical overview

The proposed development site is located on land that has formed part of Mulsford Farm in modern times.

At the time of the parish tithe map of 1838, however, the development site falls within the area of two fields which were owned and farmed by different individuals.

Field parcel 258, as shown on the parish tithe map (see Figure 2) was owned by Ann Allanson and Elizabeth Broughton and farmed by their tenant Thomas Edwards of Lower Wood Farm.

Field parcel 259, as shown on the parish tithe map (see Figure 2) was owned by Viscount Dungannon of Bryncynallt and farmed by his tenant Jonathan Phillips.

The two fields shown on the parish map are still shown on the 1874 1:2500 scale Ordnance Survey Map (see Figure 3). This map also shows a probably disused marl pit or clay pit (ID number 53) against the southern side of the boundary bank which separated the two fields.

The 1899 edition of the 1:2500 scale Ordnance Survey map shows that the dividing boundary bank had been removed, amalgamating the two fields into a single parcel. The former marl or clay pit is depicted on the map as a boggy area. Many of these former pits, of which there are a great number of examples in the district, became flooded as ponds or turned into damp hollows after they had fallen out of use.

Aerial photographs and LiDAR show that the field parcel at the proposed development site is underlain by relict “ridge and furrow” cultivation ridges. Although such cultivation ridges are generally thought of as representing medieval agricultural practices, they may also be of early post-medieval date. The ridges were created by the medieval practice of ploughing with a traditional non-reversible plough, which always pushed soil to the right. By ploughing in one direction and creating a ridge, and then ploughing back along the opposite side of the ridge, pushing more soil onto the ridge, this resulted in

the creation of prominent ridges and furrows which gave the land a corrugated appearance. The land was farmed in common in large, open fields by members of a community. Villagers would tend their own strip of land which they would plough in essentially the same way every year, the ridges and furrows therefore becoming established as permanent landscape features. The ridge and furrow has survived in areas which were allowed to become pastureland after the medieval period and were not subject to intensive ploughing in later centuries. Even today, a significant area of relict ridge and furrow cultivation can be seen in the landscape of the Maelor Saesneg district and have contributed to the area being designated as a Historic Landscape of Special Historic Interest.

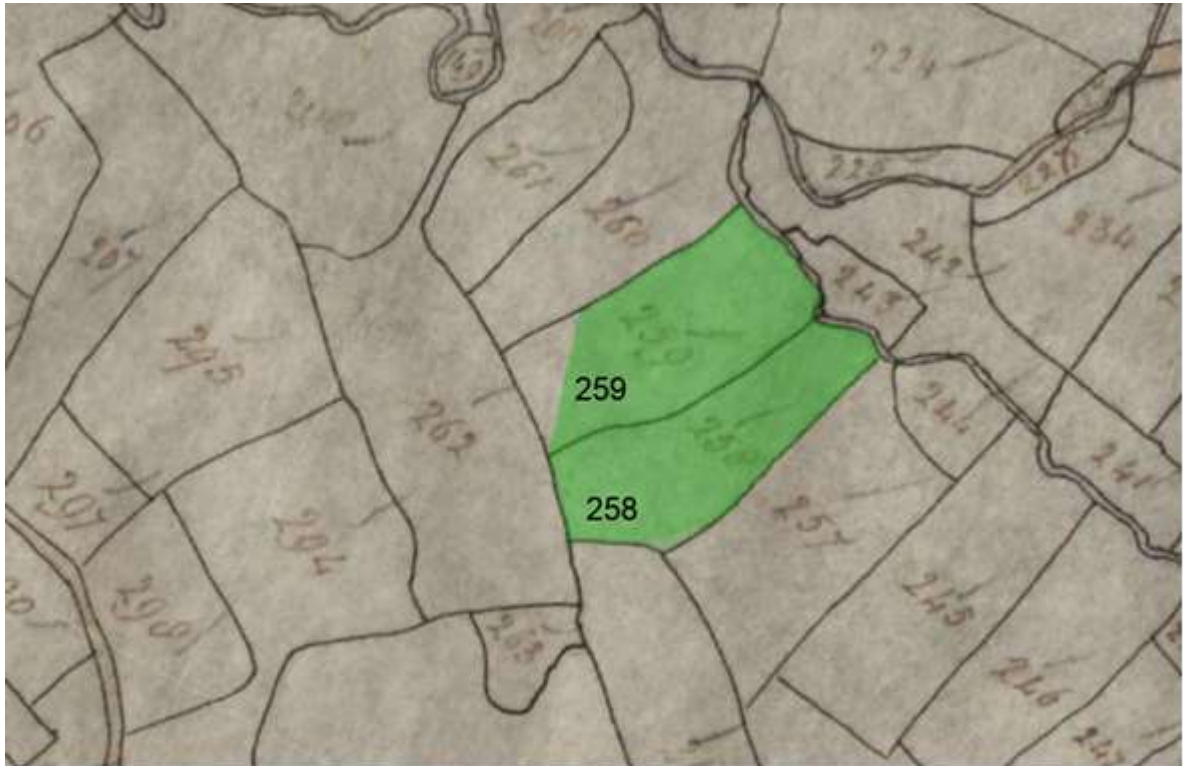


Figure 2; An excerpt from the Worthenbury parish tithe map of 1838. The proposed development site is now a single field created by the amalgamation of field parcels 258 and 259, which are named as Cote Field and Cae Slack respectively on the tithe schedule.



Figure 3; An excerpt from the 1874 First Edition 1:2500 scale Ordnance Survey map which shows that the adjacent field was known as Brick Field. On the tithe map, this was parcel 257 and called Cae Coedian.

14.9 Data Collection

The CPAT HER enquiry for the 1km radius assessment area yielded 47 records for historic assets. A further 5 records for nationally important heritage assets in England were included.

One new record was created in the project database by Trysor for a marl or clay pit

After the site visit, the historic map search, and the rapid assessment of the readily available data the final dataset for the 1km radius assessment area contained 53 records for historic assets.

14.10 Assessment of Significance

The significance of each historic asset was determined and scored in accordance with the categories adopted by the Welsh Archaeological Trusts i.e. Nationally Important, Regionally Important, Locally Important, Minor and Features Needing Further Investigation (Unknown), see Figure 4. Full details of the results of this exercise are given in Appendix B.

Within the 53 records there were no Scheduled Monuments and four Listed Buildings.

Table 1: Significance of assessed historic assets

ID Number	Historic Asset	Significance	Site Status
1	SARN BRIDGE	Nationally Important	Listed Building
48	ST. JOHN'S CHURCH, THREAPWOOD	Nationally Important	Listed Building
49	ST. JOHN'S CHURCH, THREAPWOOD	Nationally Important	Listed Building

ID Number	Historic Asset	Significance	Site Status
52	BEVAN'S MILL,THREAPWOOD	Nationally Important	Listed Building
2	MAELOR SAESNEG POND 798	Locally Important	
3	MAELOR SAESNEG POND 956	Locally Important	
4	MAELOR SAESNEG POND 957	Locally Important	
5	MAELOR SAESNEG POND 959	Locally Important	
6	MAELOR SAESNEG POND 960	Locally Important	
7	MAELOR SAESNEG POND 961	Locally Important	
8	MAELOR SAESNEG POND 962	Locally Important	
9	MAELOR SAESNEG POND 963	Locally Important	
10	MAELOR SAESNEG POND 964	Locally Important	
11	MAELOR SAESNEG POND 965	Locally Important	
12	MAELOR SAESNEG POND 1825	Locally Important	
13	MAELOR SAESNEG POND 1826	Locally Important	
14	MAELOR SAESNEG POND 1828	Locally Important	
15	MAELOR SAESNEG POND 1833	Locally Important	
17	MAELOR SAESNEG POND 1835	Locally Important	
18	MAELOR SAESNEG POND 1846	Locally Important	
19	MAELOR SAESNEG POND 1847	Locally Important	
20	MAELOR SAESNEG POND 1848	Locally Important	
21	MAELOR SAESNEG POND 1849	Locally Important	
22	MAELOR SAESNEG POND 1850	Locally Important	
23	MAELOR SAESNEG POND 1851	Locally Important	
24	MAELOR SAESNEG POND 1852	Locally Important	
25	MAELOR SAESNEG POND 1853	Locally Important	
26	MAELOR SAESNEG POND 1854	Locally Important	
27	MAELOR SAESNEG POND 1906	Locally Important	
28	MAELOR SAESNEG POND 1907	Locally Important	
29	MAELOR SAESNEG POND 1908	Locally Important	
30	MAELOR SAESNEG POND 1909	Locally Important	
31	MAELOR SAESNEG POND 1910	Locally Important	
32	MAELOR SAESNEG POND 1911	Locally Important	
33	MAELOR SAESNEG POND 1912	Locally Important	
34	MAELOR SAESNEG POND 1913	Locally Important	
35	MAELOR SAESNEG POND 1915	Locally Important	
36	MAELOR SAESNEG POND 1916	Locally Important	
37	MAELOR SAESNEG POND 1917	Locally Important	
38	MAELOR SAESNEG POND 1918	Locally Important	
39	TALLARN GREEN, MILL HOUSE	Locally Important	
40	SARN MILL	Locally Important	
41	SARN SMITHY	Locally Important	
42	BROUGHTON HOUSE BOUNDARY STONE	Locally Important	
43	BROUGHTON HOUSE RIDGE AND FURROW	Locally Important	
44	SARN FARM, RIDGE AND FURROW I	Locally Important	
45	CAENANT WOOD, RIDGE AND FURROW	Locally Important	

ID Number	Historic Asset	Significance	Site Status
46	SARN FARM, RIDGE AND FURROW II	Locally Important	
47	MULSFORD, RIDGE AND FURROW	Locally Important	
50	EBENEZER CONGREGATIONAL CHAPEL	Locally Important	
51	THREAPWOOD WAR MEMORIAL	Locally Important	
16	MAELOR SAESNEG POND 1834	Minor Importance	

Land Northeast of Mulsford, Sarn, Malpas
Historic Environment Desk-based Assessment

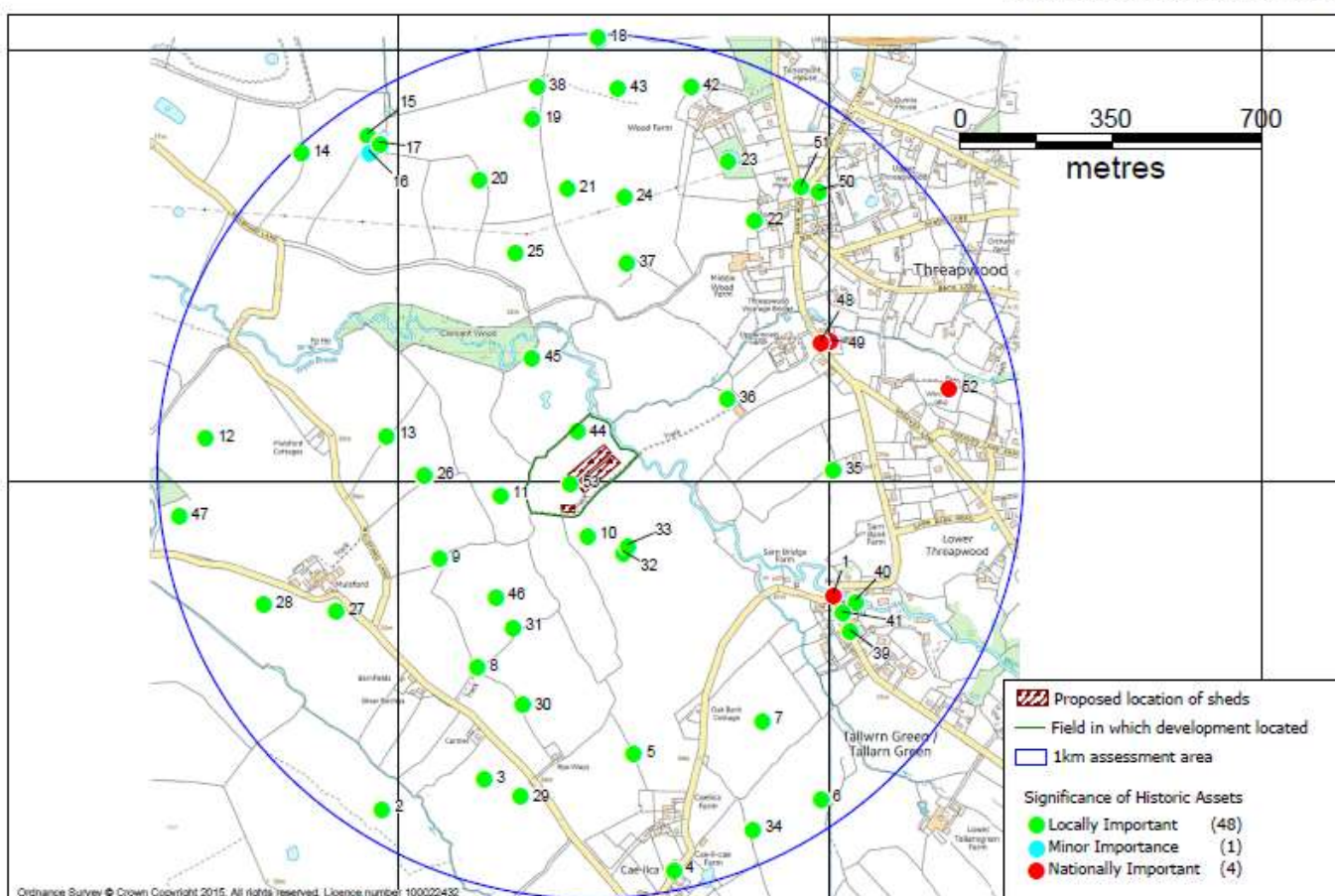


Figure 4: The 1km assessment area showing significance of historic assets, labelled with Project ID number

14.11 Assessment of Impact

The Direct and Indirect impact on each historic asset was assessed taking into account both physical and non-physical impacts. Each impact was assessed within the scale Very Low, Low, Moderate, High and Very High, taken into account the significance of the historic asset and the nature of the impact. A full table is found in Appendix B but a summary is tabulated in Table 2 below and illustrated in Figure 5.

Table 2: Impact on assessed historic assets within the 1km assessment area

ID Number	Historic Asset Name	Historic Asset Type	Level of Direct Impact	Level of Indirect Impact	Level of Impact on Setting
44	SARN FARM, RIDGE AND FURROW I	RIDGE AND FURROW	High	Low	Low
53	MULSFORD FARM	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	Low	Very Low
11	MAELOR SAESNEG POND 965	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	Very Low	Very Low
1	SARN BRIDGE	BRIDGE	None	None	None
2	MAELOR SAESNEG POND 798	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
3	MAELOR SAESNEG POND 956	MARL PIT (POSSIBLE)	None	None	None
4	MAELOR SAESNEG POND 957	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
5	MAELOR SAESNEG POND 959	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
6	MAELOR SAESNEG POND 960	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
7	MAELOR SAESNEG POND 961	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
8	MAELOR SAESNEG POND 962	MARL PIT (POSSIBLE)	None	None	None
9	MAELOR SAESNEG POND 963	MARL PIT (POSSIBLE)	None	None	None
10	MAELOR SAESNEG POND 964	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
12	MAELOR SAESNEG POND 1825	MARL PIT	None	None	None
13	MAELOR SAESNEG POND 1826	MARL PIT (POSSIBLE)	None	None	None
14	MAELOR SAESNEG POND 1828	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
15	MAELOR SAESNEG POND 1833	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
16	MAELOR SAESNEG POND 1834	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
17	MAELOR SAESNEG POND 1835	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
18	MAELOR SAESNEG POND 1846	MARL PIT	None	None	None
19	MAELOR SAESNEG POND 1847	MARL PIT	None	None	None
20	MAELOR SAESNEG POND 1848	MARL PIT (POSSIBLE)	None	None	None
21	MAELOR SAESNEG POND 1849	MARL PIT	None	None	None
22	MAELOR SAESNEG POND 1850	MARL PIT?; CLAY PIT?	None	None	None
23	MAELOR SAESNEG POND 1851	MARL PIT	None	None	None
24	MAELOR SAESNEG POND 1852	MARL PIT	None	None	None
25	MAELOR SAESNEG POND 1853	MARL PIT (POSSIBLE)	None	None	None
26	MAELOR SAESNEG POND 1854	MARL PIT (POSSIBLE)	None	None	None
27	MAELOR SAESNEG POND 1906	MARL PIT (POSSIBLE)	None	None	None

ID Number	Historic Asset Name	Historic Asset Type	Level of Direct Impact	Level of Indirect Impact	Level of Impact on Setting
28	MAELOR SAESNEG POND 1907	MARL PIT (POSSIBLE)	None	None	None
29	MAELOR SAESNEG POND 1908	MARL PIT (POSSIBLE)	None	None	None
30	MAELOR SAESNEG POND 1909	MARL PIT (POSSIBLE)	None	None	None
31	MAELOR SAESNEG POND 1910	MARL PIT (POSSIBLE)	None	None	None
32	MAELOR SAESNEG POND 1911	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
33	MAELOR SAESNEG POND 1912	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
34	MAELOR SAESNEG POND 1913	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
35	MAELOR SAESNEG POND 1915	POND	None	None	None
36	MAELOR SAESNEG POND 1916	MARL PIT (POSSIBLE); CLAY PIT (POSSIBLE)	None	None	None
37	MAELOR SAESNEG POND 1917	POND	None	None	None
38	MAELOR SAESNEG POND 1918	MARL PIT	None	None	None
39	TALLARN GREEN, MILL HOUSE	BARN	None	None	None
40	SARN MILL	MILL (CORN)	None	None	None
41	SARN SMITHY	BLACKSMITHS WORKSHOP	None	None	None
42	BROUGHTON HOUSE BOUNDARY STONE	BOUNDARY STONE	None	None	None
43	BROUGHTON HOUSE RIDGE & FURROW	RIDGE AND FURROW	None	None	None
45	CAENANT WOOD, RIDGE & FURROW	RIDGE AND FURROW	None	None	None
46	SARN FARM, RIDGE AND FURROW II	RIDGE AND FURROW	None	None	None
47	MULSFORD, RIDGE & FURROW	RIDGE AND FURROW	None	None	None
48	ST. JOHN'S CHURCH, THREAPWOOD	CHURCHYARD BOUNDARY	None	None	None
49	ST. JOHN'S CHURCH, THREAPWOOD	CHURCH	None	None	None
50	EBENEZER CONGREGATIONAL CHAPEL	CHAPEL	None	None	None
51	THREAPWOOD WAR MEMORIAL	WAR MEMORIAL	None	None	None
52	BEVAN'S MILL, THREAPWOOD	WINDMILL	None	None	None

Table 2 shows that most recorded historic assets within the 1km assessment area would not be exposed to any significant impact from the development. Full details of the assessment of direct and indirect impact for each of the historic assets in Table 2 can be found in Appendix B.

Fifty one historic assets would be unaffected by the development.

One historic asset (ID Number 53, a marl pit) would experience a Low, indirect, visual impact with a Very Low impact on its setting.

One historic asset (ID Number 11, a marl pit) would experience a Very Low, indirect, visual impact with a Very Low impact on its setting.

One historic asset (ID number 44, an area of ridge and furrow cultivation), would experience a High, direct, physical impact, with a Low impact on setting and a Low, indirect, visual impact.

There are no Scheduled Monuments within 1km of the development area.

There are 4 Listed Buildings within the 1km assessment area but there would be no impact on any of them, see Table 2, Appendix B and Figures 4 & 5.

There are no Registered Historic Parks and Gardens within the 1km assessment area.

There are no World Heritage sites within the 1km assessment area.

The development site is within the Maelor Saesneg registered Historic Landscape. This low lying Historic Landscape lies on the border between Wales and England. Its main characteristic is that it retains evidence of earlier agricultural practises in the form of medieval ridge and furrow.

Specifically the development area lies within the Mulsford Historic Landscape character area, as defined by CPAT. This area extends over some 538 hectares, of which 0.6 hectares would be affected by the proposed development, representing 0.11% of the total character area.

The proposed development would stand in the Mulsford LANDMAP Historic Landscape Aspect Area (WRXHMHL028), see Figure 7, which is described as;

"A predominantly agricultural landscape of mixed irregular, mostly hedged, fields containing scattered farms of late medieval origin (although their current farm buildings result largely from 17th and 18th century replacement) associated with more regular areas of ridge and furrow cultivation. A single larger hamlet at Tallarn Green is, as its name suggests, probably the result of 19th century encroachment on to areas of common grazing (greens), surrounding a medieval moated site. Even earlier settlement is hinted at across the area by Anglo Saxon placename elements."

The overall evaluation of this aspect area is Moderate and the justification is given as "An area of slightly degraded medieval and later field systems on the fringes of the Maelor Saesneg complex. Exhibits fewer elements than its outstanding neighbours."

The development area, would stand in the Maelor Saesneg West LANDMAP Cultural Landscape Aspect Area (WRXHMCL037), see Figure 8, which is described as;

"Flat fertile land on the western fringes of Shropshire and Cheshire and very untypical of Wales; unchanged though the historic landscape might be, it is clear that farming in the area is going through profound change."

The overall evaluation of this aspect area is Outstanding (As an archaeological landscape) and the justification is given as "Outstanding as a landscape that preserves historic traces."

There are no Conservation Areas within the 1km study area.

During the field visit, no physical, visible evidence was noted suggestive of significant buried archaeology on land which would be affected by the development. Light levels were low and the field was covered in a well grown brassica crop. There is no documentary, cartographic or aerial photographic evidence of buried archaeology at this location.

No palaeoenvironmental potential was identified at the proposed development site, which lies in a level arable field.

The boundary banks on the holding are post-medieval in date and include hedged and fenced boundaries on low earthwork banks.

There are no field names of archaeological significance at the development site. The proposed development would take place in a field created by the amalgamation of two fields in the late 19th century, which were named Cote Field and Cae Slack on the 1838 parish tithe map. The significance of these name is not apparent, but there is no tradition or evidence of structures within the fields.

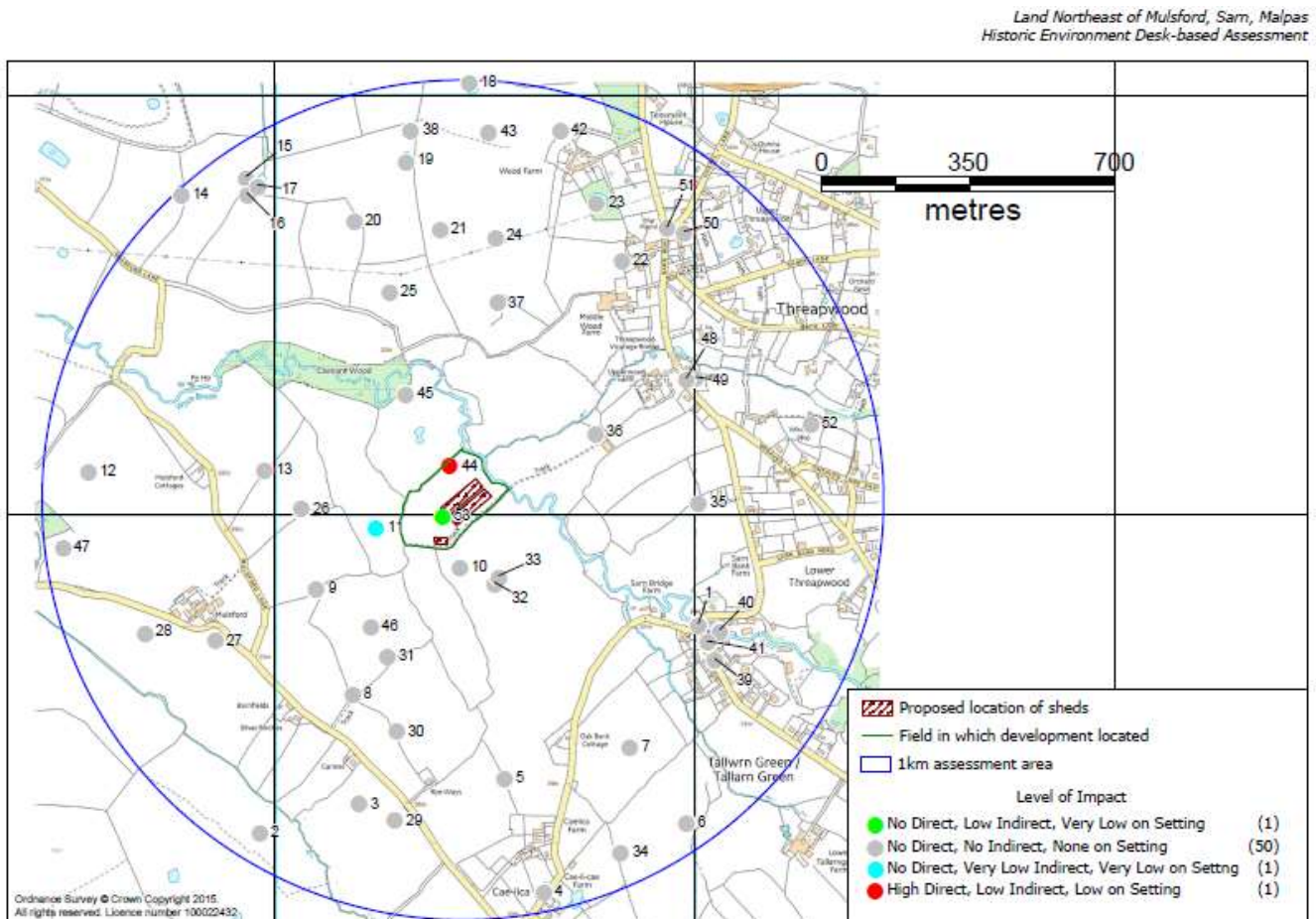


Figure 5: The 1km assessment area showing the level of impact on historic assets, labelled with Project ID number

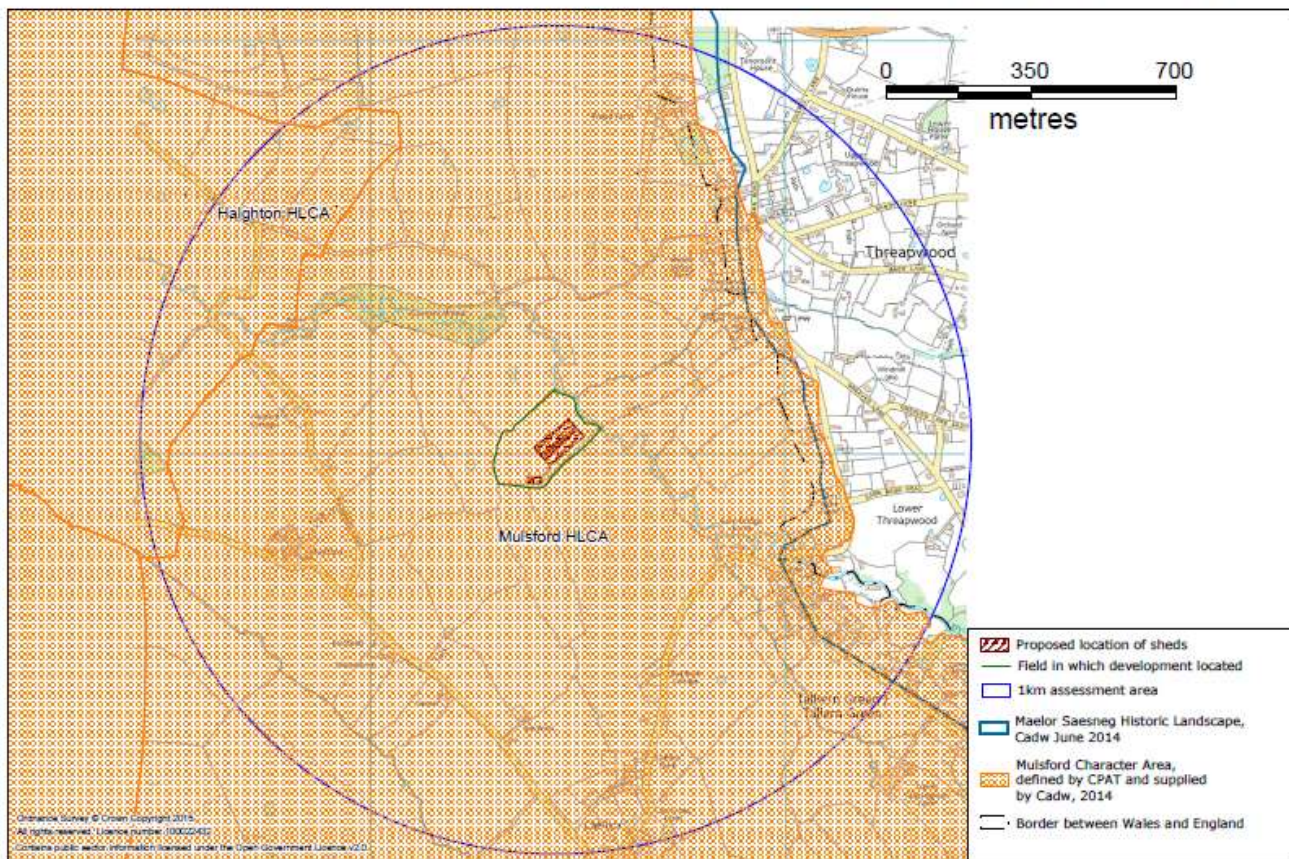


Figure 6: The 1km assessment area showing the Maelor Saesneg Historic Landscape, from Cadw, with the Character Areas defined by CPAT, labelled with Character Area name

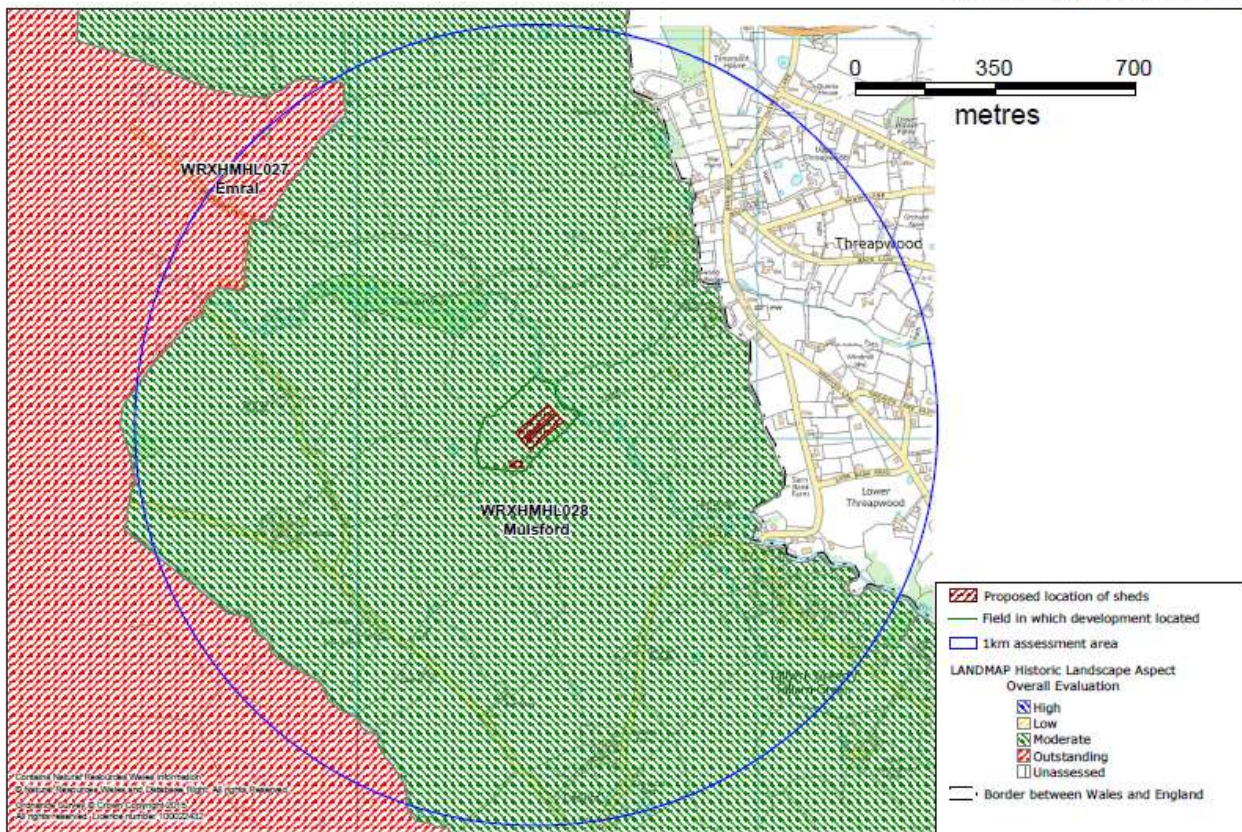


Figure 7: The 1km assessment area showing the LANDMAP Historic Landscape aspect, labelled with LANDMAP Aspect Area Number and Name

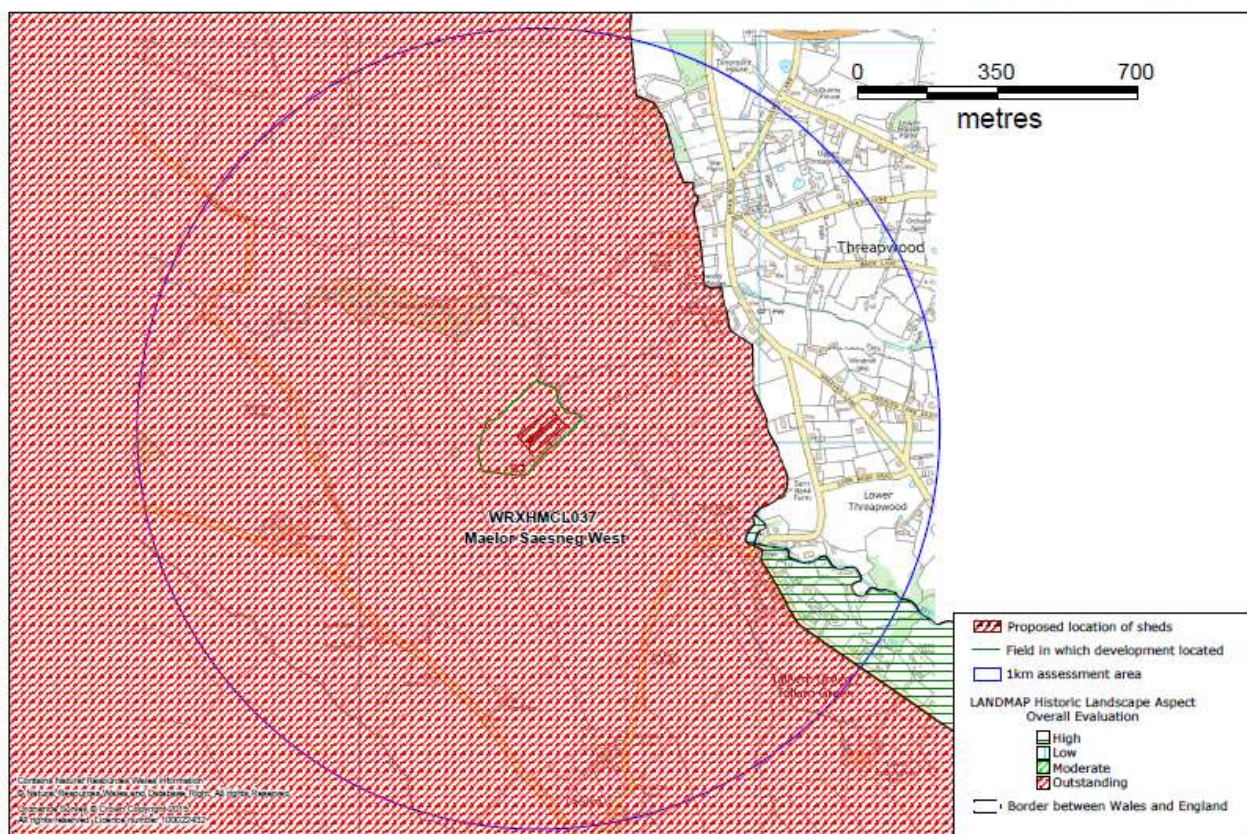


Figure 8: The 1km assessment area showing the LANDMAP Cultural Landscape aspect, labelled with LANDMAP Aspect Area Number and Name

14.12 Conclusion

The development would cause a High direct, physical impact on an area of denuded ridge and furrow cultivation (ID number 44) within an arable field. However, the area is known for the extensive survival of ridge and furrow and the loss of this relatively small area, which is not well-preserved, would not be considered significant.

There would be no significant, indirect, visual impacts arising from the proposed development. No nationally significant historic assets would be impacted upon by the development.

The proposed development would occur within the Maelor Saesneg Registered Historic Landscape, specifically within the relatively large Mulsford Historic Landscape character area. This area extends over some 538 hectares, of which 0.6 hectares would be affected by the proposed development, representing 0.11% of the total character area.

There is no physical, documentary, cartographic or aerial photographic evidence to suggest that the proposed development site has potential for further buried archaeology.

No archaeological mitigation is thought necessary in associated with this development.

14.13 Reporting

Copies of this report will be provided to the client, National Monument Record and the Regional Historic Environment Record.

14.14 References

14.14.1 Map sources

Ordnance Survey, 1819, 2" to 1 mile Original Surveyors drawing, "Chester" Sheet
Ordnance Survey, 1833, 1" to 1 Mile Sheet 73
Ordnance Survey, 1874, 1:2500, 1st edition
Ordnance Survey, 1899, 1:2500 2nd edition
Ordnance Survey, 1912, 1:2500
Ordnance Survey, 1974, 1:2500
Worthenbury Parish, Tithe Map, 1838
Worthenbury Parish, Tithe Apportionment, 1827

14.14.2 Web-based materials

Historic England, 2015, The Setting of Historic assets Historic Environment Good Practice Advice in Planning Note 3
Welsh Government, 2016, Draft Setting of Historic Assets in Wales
Cynefin, 2016, Tithe Maps of Wales
<http://cynefin.archiveswales.org.uk/en/tithe-maps/>
British Museum, 2016, Online Gallery: Ordnance Survey Drawings
<http://www.bl.uk/onlinegallery/onlineex/ordsurvdraw/index.html>

14.14.3 Published sources

Cadw, 2010, Conservation Principles for the Sustainable Management of the Historic Environment in Wales

14.14.4 Data Sources

Clwyd Powys Archaeological Trust, Historic Environment Record, data received 13/02/2017
Cadw, Listed Building all-Wales dataset, downloaded April 2016
Cadw, Parks and Gardens all-Wales dataset, downloaded August 2015
Cadw, Scheduled Ancient Monument all-Wales dataset, downloaded April 2016
Cadw, Registered Historic Landscapes dataset, supplied June 2014

14.15 Reliability & Limitations of Sources

In line with the requirements of the ClfA Standards & Guidance notes for Desk-based Assessments (Point 3.3.6), the following observations on the usefulness and reliability of the sources used have been made.

The cartographic sources used include a range of Ordnance Survey maps produced during the 19th and 20th centuries, all of which provided sufficiently clear and accurate representations of the evolving landscape of the assessment area.

The earliest map source was the 1819 Ordnance Surveyors Original Surveyors Drawings, of which clear digital copies are available through the British Museum website.

The parish tithe map and apportionment of 1840 are available for inspection at the National Library of Wales and on the Cynefin website "The Tithe Maps of Wales". The tithe map and apportionment are both clear and informative sources.

The main source of data for the assessment was the Clwyd Powys Archaeological Trust HER. The HER data supplied by the Clwyd Powys HER was in most respects accurate.

Google Earth aerial images of the assessment area were also used online. These date to 1999, 2003, 2005, 2006, 2009 and 2010 and provide good coverage for the whole assessment area.

LiDAR imagery available from Natural Resources Wales was of good quality for this area, and helped confirm existing sites, in particular ridge and furrow and marl pits. and suggest a different origin for one site.

Jenny Hall & Paul Sambrook
Trysor,
March, 2017

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 free range 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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